***Draft Offer Document***
*Dated January 14, 2026*
***Book Built Issue***

# RAAJMARG INFRA INVESTMENT TRUST

The Trust has been registered in the Republic of India as an irrevocable trust set up under the Indian Trusts Act, 1882, on November 24, 2025, and registered as an infrastructure investment trust under the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, on December 22, 2025, having registration number IN/InvIT/25-26/0034.

**Principal Place of Business**: G - 5 & 6, Sector 10, Dwarka, New Delhi – 110 075
**Telephone**: +91 2507 4100-1524; **Compliance Officer**: Gunjan Rajpal
**E-mail**: compliance@riimpl.in; **Website**: www.raajmarginfratrust.in

| SPONSOR | INVESTMENT MANAGER | TRUSTEE |
|---|---|---|
| NATIONAL HIGHWAYS AUTHORITY OF INDIA | RAAJMARG INFRA INVESTMENT MANAGERS PRIVATE LIMITED | IDBI TRUSTEESHIP SERVICES LIMITED |

**INITIAL PUBLIC OFFERING OF UP TO [●] UNITS OF RAAJMARG INFRA INVESTMENT TRUST ("TRUST") FOR CASH AT A PRICE OF ₹ [●] PER UNIT AGGREGATING UP TO ₹ 57,000.00 MILLION ("ISSUE"). THE ISSUE IS AN INITIAL PUBLIC OFFER IN RELIANCE UPON REGULATION 14(4) OF THE SECURITIES AND EXCHANGE BOARD OF INDIA (INFRASTRUCTURE INVESTMENT TRUSTS) REGULATIONS, 2014, AS AMENDED ("INVIT REGULATIONS").**

Pursuant to the Commitment Letter, the Sponsor will subscribe to [●] Units of the Trust for a cash consideration of ₹[●] million to ensure that the aggregate unitholding of the Sponsor amounts to at least 15.00% of the total post-Issue unit capital of the Trust in order to comply with the sponsor and sponsor group lock-in requirements under Regulations 12(3) and 12(3A) of the InvIT Regulations ("**Sponsor Contribution**"). Upon Sponsor Contribution, the Issue Size will be reduced to the extent of such Sponsor Contribution (the Issue less Sponsor Contribution is hereinafter referred to as "**Net Issue**"). The Net Issue will constitute at least [●]% of the outstanding Units on a post-Issue basis.

This Issue is being made through the Book Building Process and in compliance with the InvIT Regulations and the SEBI InvIT Master Circular, wherein not more than 75.00% of the Net Issue shall be available for allocation on a proportionate basis to Institutional Investors, provided that the Investment Manager may, in consultation with the Book Running Lead Managers, allocate up to 60.00% of the Institutional Investor Portion to Anchor Investors on a discretionary basis in accordance with the InvIT Regulations and the SEBI InvIT Master Circular. Further, not less than 25.00% of the Net Issue shall be available for allocation on a proportionate basis to Non-Institutional Investors, in accordance with the InvIT Regulations and the SEBI InvIT Master Circlar, subject to valid Bids being received at or above the Issue Price. All Bidders, other than Anchor Investors, are required to utilise the Application Supported by Blocked Amount ("**ASBA**") process by providing details of their respective ASBA accounts and UPI ID (in case of individual Non-Institutional Investors using the UPI Mechanism Bidding with a Bid Amount of ₹ 0.50 million or less), in which case the corresponding Bid Amounts will be blocked by the Self Certified Syndicate Banks ("**SCSBs**") or under the UPI Mechanism, as applicable, to participate in this Issue. Anchor Investors are not permitted to participate in the Anchor Investor Portion of the Issue through the ASBA. process For details, please see the section entitled "*Issue Information*" on page 259.

The Price Band and the Minimum Bid Size (as determined by the Investment Manager in consultation with the Book Running Lead Managers) will be announced on the websites of the Trust, the Sponsor, the Investment Manager and the Stock Exchanges, as well as advertised in all editions of [●] (a widely circulated English national daily newspaper) and in all editions of [●] (a widely circulated Hindi national daily newspaper, Hindi also being the regional language of Delhi, where the registered office of the Investment Manager is located) at least two Working Days prior to the Bid/Issue Opening Date. For further information, please see the section entitled "*Basis of Issue Price*" on page 75. In case of any revision to the Price Band, the Bid/Issue Period will be extended by at least one Working Day, subject to the total Bid/ Issue Period not exceeding 30 days, provided that there shall not be more than two revisions to the Price Band during the Bid/ Issue Period. Any revision to the Price Band and the revised Bid/ Issue Period, if applicable, will be widely disseminated by notification to the Stock Exchanges during the Bid/ Issue Period and by indicating the change on the websites of the Trust, the Sponsor, the Investment Manager and Stock Exchanges. In case of force majeure, banking strike or similar circumstances, the Bid/ Issue Period may, for reasons to be recorded in writing, be extended by a minimum period of three Working Days, subject to the total Bid/ Issue Period not exceeding 30 days.

The Units will only be offered and sold in India to Institutional Investors and Non-Institutional Investors.

## RISKS IN RELATION TO THE ISSUE

This being the first issue of the Units of the Trust, there has been no formal market for the Units of the Trust. The Issue Price, Floor Price and Cap Price determined by the Investment Manager in consultation with the Book Running Lead Managers, on the basis of assessment of market demand for the Units by way of the Book Building Process, as stated under "*Basis of Issue Price*" on page 75, should not be considered to be indicative of the market price of the Units after the Units are listed. No assurance can be given regarding an active or sustained trading in the Units or regarding the price at which the Units will be traded after listing.

## GENERAL RISKS

Investments in Units involve a degree of risk and Bidders should not invest any funds in this Issue unless they can afford to take the risk of losing their entire investment. For taking an investment decision, Bidders must rely on their own examination of the Trust, the Units and this Issue. Bidders are advised to carefully read the section entitled "*Risk Factors*" on page 35 before making an investment decision relating to this Issue. Each Bidder is advised to consult its own advisors in respect of the consequences of an investment in the Units being issued pursuant to the Offer Document. This Draft Offer Document has been prepared by the Trust solely for providing information in connection with this Issue. The Securities and Exchange Board of India ("**SEBI**") and the Stock Exchanges assume no responsibility for or guarantee the correctness or accuracy or adequacy of any statements made, opinions expressed or reports contained herein. Admission of the Units to be issued pursuant to this Issue for trading on the Stock exchanges should not be taken as an indication of the merits of the Trust or of the Units.

## INVESTMENT MANAGER'S AND SPONSOR'S ABSOLUTE RESPONSIBILITY

Each of the Investment Manager and Sponsor, severally and not jointly, having made all reasonable inquiries, accept responsibility for, and confirm that this Draft Offer Document contains all information with regard to the Trust and this Issue, which is material in the context of this Issue in accordance with the InvIT Regulations and the SEBI InvIT Master Circular and the information contained in this Draft Offer Document is true and correct in all material respects and is not misleading in any material respect, and the opinions and intentions expressed herein are honestly held and that there are no other facts, the omission of which makes this Draft Offer Document as a whole or any of such information or the expression of any such opinions or intentions misleading in any material respect.

## LISTING

The Units to be offered pursuant to the Offer Document are proposed to be listed on the National Stock Exchange of India Limited (the "**NSE**") and BSE Limited (the "**BSE**", together with NSE, the "**Stock Exchanges**"). We have received in-principle approvals for listing of the Units from BSE and NSE pursuant to letters dated [●] and [●], respectively. For the purposes of the Issue, [●] is the Designated Stock Exchange.

| BOOK RUNNING LEAD MANAGERS | | | | REGISTRAR TO THE ISSUE |
|---|---|---|---|---|
| **SBI CAPITAL MARKETS LIMITED**<br>1501, 15th Floor, A & B Wing<br>Parinee Crescenzo Building, G Block,<br>Bandra Kurla Complex, Bandra (East),<br>Mumbai 400 051<br>Maharashtra, India<br>**Tel:** +91 22 4196 8300<br>**E-mail:** raajmarg.ipo@sbicaps.com<br>**Investor grievance e-mail:** investor.relations@sbicaps.com<br>**Contact person:** Sanjay Sethia<br>**Website:** www.sbicaps.com<br>**SEBI registration number:** INM000003531 | **AXIS CAPITAL LIMITED**<br>1st Floor, Axis House<br>Pandurang Budhkar Marg, Worli<br>Mumbai 400 025<br>Maharashtra, India<br>**Tel**: +91 22 4325 2183<br>**E-mail**: raajmarg.ipo@axiscap.in<br>**Investor grievance e-mail**: compliants@axiscap.com<br>**Contact person**: Harish Patel/ Mayuri Arya<br>**Website**: www.axiscapital.co.in<br>**SEBI registration number**: INM000012029 | **ICICI SECURITIES LIMITED**<br>ICICI Venture House,<br>Appasaheb Marathe Marg,<br>Prabhadevi, Mumbai 400 025,<br>Maharashtra, India<br>**Tel**: +91 22 6807 7100<br>**E-mail**: raajmarg.ipo@icicisecurities.com<br>**Investor grievance e-mail**: customercare@icicisecurities.com<br>**Contact person**: Shri Subramanyam / Sumit Singh<br>**Website**: www.icicisecurities.com<br>**SEBI registration number**: INM000011179 | **MOTILAL OSWAL INVESTMENT ADVISORS LIMITED**<br>Motilal Oswal Tower, Rahimtullah Sayani Road, Opposite Parel ST Depot, Prabhadevi, Mumbai – 400 025, Maharashtra, India<br>**Telephone:** +91 22 7193 4380<br>**E-mail:** riit.ipo@motilaloswal.com<br>**Investor grievance e-mail:** moiaplredressal@motilaloswal.com<br>**Contact person:** Shashank Pisat<br>**Website:** www.motilaloswalgroup.com<br>**SEBI registration number.:** INM000011005 | **KFIN TECHNOLOGIES LIMITED**<br>Selenium, Tower B, Plot No-31 and 32, Financial District, Nanakramguda, Serilingampally, Hyderabad, Rangareddy - 500 032, Telangana, India<br>**Tel.**: +91 1800 309 4001 / +91 40 6716 2222<br>**E-mail**: riimpl.invit@kfintech.com<br>**Investor grievance e-mail**: einward.ris@kfintech.com<br>**Website**: www.kfintech.com<br>**Contact person**: M. Murali Krishna<br>**SEBI registration number**: INR000000221 |

## BID ISSUE/PROGRAM

| ANCHOR INVESTOR BIDDING DATE | [●]* | BID/ISSUE OPENS ON | [●] | BID/ISSUE CLOSES ON | [●]** |
|---|---|---|---|---|---|

**The Investment Manager may, in consultation with the Book Running Lead Managers, consider participation by Anchor Investors in accordance with the InvIT Regulations. The Anchor Investor Bidding Date shall be one Working Day prior to the Bid/Issue Opening Date.*

***The Investment Manager may, in consultation with the Book Running Lead Managers, consider closing the Bid/ Issue Period for QIBs one Working Day prior to the Bid/ Issue Closing Date in accordance with the InvIT Regulations.*

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## NOTICE TO INVESTORS

The statements contained in this Draft Offer Document relating to the Trust and the Units are, in all material respects, true and accurate and not misleading, to enable the investors to make an informed decision. The opinions and intentions expressed in this Draft Offer Document with regard to the Trust and the Units are honestly held, have been reached after considering all relevant circumstances and are based on reasonable assumptions and information presently available with the Investment Manager, the Sponsor or both, the Investment Manager and the Sponsor, as applicable. There are no other facts in relation to the Trust and the Units, the omission of which would, in the context of the Issue, make any statement in this Draft Offer Document misleading in any material respect. Further, each of the Investment Manager and the Sponsor has made all reasonable enquiries to ascertain such facts and to verify the accuracy of all such information and statements disclosed in this Draft Offer Document in all material respects.

Bidders acknowledge that they have neither relied on the Book Running Lead Managers nor any of its shareholders, employees, counsel, officers, directors, representatives, agents or affiliates in connection with such person's investigation of the accuracy of such information or such person's investment decision, and each such person must rely on his/her own examination of the Trust and the merits and risks involved in investing in the Units. Bidders should not construe the contents of this Draft Offer Document as legal, business, tax, accounting or investment advice. Each Bidder acknowledges that in making an investment decision, such investor has relied solely on the information contained in this Draft Offer Document, the Offer Document and the Final Offer Document and not on any other disclosure or representation by the Investment Manager, the Project Manager, the Trustee, the Sponsor, the Book Running Lead Managers or any other party. Save as expressly stated in this Draft Offer Document, nothing contained herein is, or may be relied upon as, a promise or representation as to the future performance of the Trust.

No person is authorized to give any information or to make any representation not contained in this Draft Offer Document and any information or representation not so contained must not be relied upon as having been authorized by or on behalf of the Trust or by or on behalf of the Sponsor, the Investment Manager or by or on behalf of the Book Running Lead Managers.

### Notice to Investors in jurisdictions outside India

The Units will only be offered and sold only in India to Institutional Investors and Non-Institutional Investors. The distribution of this Draft Offer Document, the Offer Document and the Final Offer Document and the offer of the Units in certain jurisdictions may be restricted by law. As such, this Draft Offer Document, the Offer Document and the Final Offer Document do not constitute, and may not be used for, or in connection with, an offer or solicitation by anyone in any jurisdiction in which such offer or solicitation is not authorized or to any person to whom it is unlawful to make such offer or solicitation. In particular, no action has been taken by the Investment Manager or the Book Running Lead Managers which would permit an offer of the Units or distribution of this Draft Offer Document, the Offer Document and the Final Offer Document in any jurisdiction, other than India. Accordingly, the Units may not be offered or sold, directly or indirectly, and neither this Draft Offer Document, the Offer Document and the Final Offer Document nor any Issue materials in connection with the Units be distributed or published in or from any country or jurisdiction that would require registration of the Units in such country or jurisdiction.

Each purchaser of the Units offered by this Draft Offer Document will be deemed to have made the representations, agreements and acknowledgments as described in this section and the "*Issue Information*" on page 259.

### Available Information

The Investment Manager agrees to comply with any undertakings given by it from time to time in connection with the Units and, without prejudice to the generality of foregoing, shall furnish to the Unitholders all such information as may be required under the InvIT Regulations.

### Disclaimer

This Draft Offer Document does not, directly or indirectly, relate to any invitation, offer or sale of any securities, instruments or loans (including listed non-convertible debentures or bonds, if any) that may be issued by the Trust after the listing of the Units. Any person or entity investing in such issue or transaction by the Trust should consult its own advisors. Neither the Book Running Lead Managers, nor their associates or affiliates have any

responsibility or liability for such issue or transaction by the Trust.

**IMPORTANT NOTICE**

**THE VALUE OF UNITS AND THE INCOME DERIVED FROM THEM MAY FALL AS WELL AS RISE. UNITS ARE NOT OBLIGATIONS OF, DEPOSITS IN, OR GUARANTEED BY, THE TRUST, THE TRUSTEE, THE SPONSOR, THE INVESTMENT MANAGER, THE LEAD MANAGER OR ANY OF THEIR RESPECTIVE SHAREHOLDERS, EMPLOYEES, COUNSEL, OFFICERS, DIRECTORS, REPRESENTATIVES, AGENTS, ASSOCIATES OR AFFILIATES. AN INVESTMENT IN UNITS IS SUBJECT TO INVESTMENT RISKS, INCLUDING THE POSSIBLE LOSS OF THE PRINCIPAL AMOUNT INVESTED. FURTHER, LISTING OF THE UNITS ON THE STOCK EXCHANGES DOES NOT GUARANTEE A LIQUID MARKET FOR THE UNITS. INVESTORS HAVE NO RIGHT TO REQUEST THE TRUST, THE TRUSTEE, THE SPONSOR OR THE INVESTMENT MANAGER OR ANY OF THEIR RESPECTIVE SHAREHOLDERS, EMPLOYEES, COUNSEL, OFFICERS, DIRECTORS, REPRESENTATIVES, AGENTS, ASSOCIATES OR AFFILIATES TO REDEEM THEIR UNITS WHILE THE UNITS ARE LISTED, UNLESS OTHERWISE PERMITTED BY APPLICABLE LAW. THE PERFORMANCE OF ANY OF THE LISTED UNITS OF THE TRUST IS NOT NECESSARILY INDICATIVE OF THE FUTURE PERFORMANCE OF UNITS OF THE TRUST.**

## DEFINITIONS AND ABBREVIATIONS

*This Draft Offer Document uses the definitions and abbreviations set forth below which you should consider when reading the information contained herein.*

*References to any legislation, act, regulations, rules, guidelines, circulars, notifications, clarifications or policies shall be to such legislation, act, regulations, rules, guidelines, circulars, notifications, clarifications or policies as amended, supplemented, or re-enacted from time to time and any reference to a statutory provision shall include any subordinate legislation made under that provision.*

*The words and expressions used in this Draft Offer Document but not defined herein shall have the meaning ascribed to such terms under the InvIT Regulations, the SEBI Act, the Depositories Act, and the rules and regulations made thereunder.*

*Notwithstanding the foregoing, the terms not defined but used in the sections entitled "Audited Financial Information", "Projections of Revenue from Operations and Cash Flow from Operating Activities", "Taxation" and "Material Litigation and other Regulatory Action" on pages 301, 320, 282 and 236, respectively, shall have the meanings ascribed to such terms in those respective sections.*

*In this Draft Offer Document, unless the context otherwise requires, a reference to "we", "us" and "our" refers to the Trust and the Project SPV on a consolidated basis.*

### Trust Related Terms

| Term | Description |
|---|---|
| Asset Revenue Information | Revenue data of the InvIT Assets as has been collected through toll collection and maintenance contracts, for the period between April 1, 2022, to December 31, 2025. |
| Associate | Associate shall have the meaning as set forth in Regulation 2(1)(b) of the InvIT Regulations.<br><br>Since the Sponsor is a body corporate whose capital is funded by the Central Government and members are appointed, and executive decisions are taken by the President of India (acting through the Department of Personnel and Training and MoRTH), persons or entities that may be classified as "associates" of the Sponsor in terms of Regulation 2(1)(b)(ii) and Regulation 2(1)(b)(iii) of the InvIT Regulations, have not been identified as 'associates' of the Sponsor. Further, given that the Sponsor is also the promoter of Project Manager, settlor of the Trust and a shareholder of the Investment Manager, the associates of Project Manager, Investment Manager and the Trust have not been identified or disclosed. |
| Audit Committee | The audit committee of the Investment Manager constituted in accordance with the applicable law |
| Audited Financial Information | The special purpose standalone audited financial information of the Trust, for the period from the date of its settlement, that is November 24, 2025, till December 31, 2025 |
| Auditors | A.R. & Co., Chartered Accountants, statutory auditors of the Trust |
| Borrowing Policy | The borrowing policy of the Trust adopted by the Investment Manager pursuant to a resolution of the IM Board dated December 15, 2025 |
| CARE Industry Report | The report titled "*Research Report on Road Sector in India*" dated January 10, 2026, prepared by CARE Analytics and Advisory Private Limited |
| Chennai Bypass | The six-lane section from km 0+000 to km 32+600 of NH-32 and NH-48, in the state of Tamil Nadu, having total length of 32.600 km |
| Chennai-Tada | The six-lane section from km 21+400 to km 54+400 of NH-16, in the state of Tamil Nadu, having total length of 33.000 km |
| Chilakaluripet -Vijayawada | The six-lane section from Chilakaluripet to Vijayawada from km 355+000 to km 357+342 and from km 372+038 to km 422+605 along with Chilakaluripet bypass section from 0+000 to km 16+499 ("**Chilakaluripet Bypass**") of NH 16, in the state of Andhra Pradesh, having total length of 69.408 km |
| Commitment Letter | The letter dated January 12, 2026, from Sponsor to the Investment Manager, pursuant to which the Sponsor has agreed to subscribe to such number of Units which shall be equivalent to at least 15.00% of the total post-Issue unit capital of the Trust in order to comply with the sponsor and sponsor group lock-in requirements under Regulations 12(3) and 12(3A) of the InvIT Regulations. For details, see '*Formation Transactions in relation to the Trust – Sponsor Contribution*' on page 23 |
| Compliance Officer | The compliance officer of the Trust, namely, Gunjan Rajpal |
| Concession Agreements | The concession agreements each dated [●], entered into by the Project SPV and NHAI in relation to the InvIT Assets |

| Term | Description |
|---|---|
| Credit Rating Agencies | Collectively, CARE Ratings Limited and India Ratings & Research Private Limited |
| Distribution Policy | The distribution policy adopted by the Investment Manager pursuant to a resolution of the IM Board dated December 15, 2025 |
| Facility | The loan aggregating to ₹ [●] million to be provided by the Trust to the Project SPV in accordance with the Facility Agreement |
| Facility Agreement | The facility agreement to be entered into between the Trust (acting through the Trustee), the Investment Manager and the Project SPV |
| Gorhar-Barwa Adda | The four/six lane section from Gorhar to Barwa Adda from km 320+810 to km 400+632 (design km 401+332) of NH-19 (old NH-2), comprising km 320+810 to km 326+000 between Gorhar and Atka, being a 4 lane section; Atka to Khairatunda from km 326+000 to km 360+300 (design km 361+000) and Khairatunda to Barwa Adda from km 360+300 (design km 361+000) to km 400+632 (design km 401+332), being 6 lane sections, in the state of Jharkhand, having total length of 80.522 km |
| Holdco(s) | A holding company, as defined under Regulation 2(1)(sb) of the InvIT Regulations. |
| IM Board | The board of directors of the Investment Manager. |
| Investment Management Agreement | Investment management agreement dated December 2, 2025, entered into between the Trustee (on behalf of the Trust) and the Investment Manager |
| Investment Manager or RIIMPL | Raajmarg Infra Investment Managers Private Limited |
| Investment Objectives | The investment objectives of the Trust, as provided under the section entitled "*Overview of the Trust*" on page 21 |
| InvIT Assets | InvIT assets as defined in Regulation 2(1)(zb) of the InvIT Regulations, in this case being the concessions to be granted under the Concession Agreements to RPPL in respect of: (i) Chennai Bypass, (ii) Chennai-Tada, (iii) Chilakaluripet-Vijayawada, (iv) Gorhar-Barwa Adda and (v) Neelmangla-Tumkur. |
| InvIT Documents | (i) The Trust Deed; (ii) the Investment Management Agreement; (iii) the Project Implementation and Management Agreement; (iv) Transitional Support Agreement and (v) such other policies, documents, agreements and letters executed in connection with the Trust, as originally executed and amended, modified, supplemented or restated from time to time, together with the respective annexures, schedules and exhibits, if any |
| Neelmangla-Tumkur | The four/six lane section from Neelmangla to Tumkur from km 29+500 to km 74+168 of NH-48, comprising km 29+500 to km 49+900 between Neelmangla to Dobbaspet, being a 6 lane section; Dobbaspet to Tumkur from km 49+900 to km 61+520, being a 4 lane section and Tumkur Bypass from km 61+520 to km 74+168, being a 6 lane section, in the state of Karnataka, having total length of 44.668 km |
| Nomination and Remuneration Committee | The nomination and remuneration committee of the Investment Manager constituted in accordance with the applicable law |
| Parties to the Trust | The Sponsor/Sponsor Group, the Trustee, the Investment Manager and the Project Manager |
| Project Implementation and Management Agreement | Project implementation and management agreement dated January 6, 2026, entered into amongst the Trustee (on behalf of the Trust), the Project Manager, the Investment Manager and the Project SPV |
| Project Manager / NHIPMPL | National Highways InvIT Project Managers Private Limited |
| Project SPV / RPPL | Raajmarg 1 Projects Private Limited |
| Projections of Revenue from Operations and Cash Flow from Operating Activities | Projections of revenue from operations and cash flow from operating activities of the Trust (consisting of the Trust and the Project SPV) for the years ending March 31, 2026, March 31, 2027, March 31, 2028 and March 31, 2029, along with the basis of preparation and other explanatory information and significant assumptions. |
| Related Parties | Related parties, as defined under Regulation 2(1)(zv) of the InvIT Regulations |
| Risk Management Committee | The risk management committee of the Investment Manager constituted in accordance with the applicable law |
| Risk Management Policy | The risk management policy adopted by the IM Board vide resolution dated December 15, 2025. |
| Sponsor | The sponsor of the Trust, National Highways Authority of India |
| Sponsor Contribution | The subscription of such number of Units which shall be equivalent to at least 15.00% of the total Units of the Trust on a post-Issue basis, for a cash consideration of such amount, by the Sponsor in accordance with the terms of the Commitment Letter |
| Sponsor Group | National Highways Authority of India |
| SPV(s) | Special purpose vehicles, as defined in Regulation 2(1)(zy) of the InvIT Regulations |
| Stakeholders Relationship Committee | The stakeholder relationship committee of the Investment Manager constituted in accordance with the applicable law |
| Technical Consultant | (i) URS Scott Wilson India Private Limited in JV with Marc Technocrats Private Limited, and (ii) Chaitanya Projects Consultancy Limited in association with Shree Bhawani Consultancy Services Private Limited |

| Term | Description |
|---|---|
| Technical Reports | Technical consultant reports each dated January 2026, issued by the Technical Consultant, concerning the InvIT Assets, which forms part of this Draft Offer Document, as set out in Annexure B |
| Traffic Consultants | Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited |
| Traffic Reports | Traffic consultant reports each dated January 9, 2026, issued by the Traffic Consultant, concerning the InvIT Assets, which forms part of this Draft Offer Document, as set out in Annexure C |
| Transitional Support Agreement | The transitional support agreement to be entered into amongst the Sponsor, Project Manager and the Project SPV. For further details, please see the section entitled "*Related Party Transactions – Transitional Support Agreement*" on page 222. |
| Trust / InvIT | Raajmarg Infra Investment Trust |
| Trust Deed | Trust deed dated November 24, 2025, entered into between the Sponsor and the Trustee |
| Trust Group | The Trust together with the Project SPV |
| Trustee | IDBI Trusteeship Services Limited |
| Unexpired Cash Flow | The amount calculated by multiplying concession fee with the percentages provided in the relevant Concession Agreements |
| Unit | An undivided beneficial interest in the Trust, and such Units together represent the entire beneficial interest in the Trust |
| Unitholder(s) | Any Person who holds Units (as hereinafter defined) upon making a defined contribution as determined by the Trustee |
| Valuation Report | The valuation report dated January 12, 2026, issued by the Valuer, which sets out their opinion as to the fair enterprise value of the InvIT Assets as on December 31, 2025, which is set out in Annexure A to the Draft Offer Document |
| Valuer | RBSA Valuation Advisors LLP |

**Issue Related Terms**

| Term | Description |
|---|---|
| Abridged Offer Document | The memorandum containing such salient features of the Offer Document in accordance with InvIT Regulations and SEBI InvIT Master Circular and as specified by SEBI in this regard |
| Acknowledgement Slip | The slip or document issued by the Designated Intermediary to a Bidder as proof of registration of the Bid cum Application Form |
| Allocated/ Allocation | Allocation of Units, following the determination of the Issue Price by the Investment Manager, in consultation with the Book Running Lead Managers, to Bidders on the basis of the Application Form submitted by the Bidder |
| Allot/ Allotment/ Allotted | Unless the context otherwise requires, the issue and allotment of Units pursuant to the Issue to the successful Bidders |
| Allotment Advice | The note or advice or intimation of Allotment sent to each of the successful Bidders who have been or are to be Allotted Units after the Basis of Allotment has been approved by the Designated Stock Exchange |
| Allottees | Successful bidders to whom Units are Allotted in this Issue |
| Anchor Investor | An Institutional Investor, making an application of a value of at least ₹ 100.00 million, applying under the Anchor Investor Portion in accordance with the requirements specified in the InvIT Regulations and the SEBI InvIT Master Circular, in terms of the Offer Document |
| Anchor Investor Allocation Price | The price at which Units will be allocated to Anchor Investors during the Anchor Investor Bidding Date in terms of the Offer Document, as decided by the Investment Manager in consultation with the Book Running Lead Managers |
| Anchor Investor Application Form | The application form used by an Anchor Investor to make a Bid in the Anchor Investor Portion in accordance with the requirements of the InvIT Regulations and SEBI InvIT Master Circular and which will be considered as an application for Allotment in terms of the Offer Document |
| Anchor Investor Bidding Date | The day being one Working Day prior to the Bid/Issue Opening Date, on which Bids by Anchor Investors are to be submitted, prior to and after which no bids will be accepted from Anchor Investors |
| Anchor Investor Issue Price | The final price at which Units will be Allotted to Anchor Investors in terms of the Offer Document and the Final Offer Document, which price will be equal to or higher than the Issue Price but not higher than the Cap Price.<br>The Anchor Investor Issue Price will be decided by the Investment Manager in consultation with the Book Running Lead Managers. |
| Anchor Investor Pay-in Date | With respect to Anchor Investor(s), the Anchor Investor Bid/ Issue Period, and in the event the Anchor Investor Allocation Price is lower than the Anchor Investor Issue Price, not later than two Working Days after the Bid/ Issue Closing Date |
| Anchor Investor Portion | Up to 60.00% of the Institutional Investor Portion, which may be allocated by the Investment Manager in consultation with the Book Running Lead Managers on a discretionary basis |
| Application Supported | An application, whether physical or electronic, used by ASBA Bidders to make a Bid by authorizing |

| Term | Description |
|---|---|
| by Blocked Amount or ASBA | an SCSB to block the Bid Amount in the ASBA Account and will include applications made by UPI Bidders using the UPI Mechanism where the Bid Amount will be blocked upon acceptance of UPI Mandate Request by the UPI Bidders using the UPI Mechanism |
| ASBA Account | A bank account maintained with an SCSB and specified in the ASBA Form for blocking the Bid Amount mentioned in the ASBA Form and includes the account of a UPI Bidder in which the Bid Amount is blocked upon acceptance of a UPI Mandate Request made by the UPI Bidders using the UPI Mechanism |
| ASBA Bid | A Bid made by an ASBA Bidder including all revisions and modifications thereto as permitted under the InvIT Regulations |
| ASBA Bidder | All Bidders other than Anchor Investors |
| ASBA Form | An application form, whether physical or electronic, used by ASBA Bidders which will be considered as the application for Allotment in terms of the Offer Document and the Final Offer Document |
| Axis | Axis Capital Limited |
| Banker(s) to the Issue | Collectively, the Escrow Collection Bank(s), the Public Issue Account Bank(s), the Sponsor Banks and the Refund Bank(s), as the case may be |
| Basis of Allotment | The basis on which Units will be Allotted to successful Bidders under the Issue, as described in "*Issue Information"* on page 259 |
| Bid | An indication to make an offer during the Bid/Issue Period by an ASBA Bidder pursuant to submission of the ASBA Form, or on the Anchor Investor Bidding Date by an Anchor Investor pursuant to submission of the Anchor Investor Application Form, to subscribe to or purchase Units of the Trust at a price within the Price Band, including all revisions and modifications thereto as permitted under the InvIT Regulations and the Offer Document and the Bid cum Application Form. The term "Bidding" shall be construed accordingly. |
| Bid Amount | The highest value of optional Bids indicated in the Bid cum Application Form and payable by the Bidder or blocked in the ASBA Account of the ASBA Bidder, as the case may be, upon submission of the Bid in the Issue. |
| Bid cum Application Form | The Anchor Investor Application Form or the ASBA Form, as the context requires |
| Bid/Issue Closing Date | Except in relation to any Bids received from the Anchor Investors, the date after which the Designated Intermediaries will not accept any Bids, being [●] which will be published in editions of [●] (a widely circulated English national daily newspaper) and in all editions of [●] (a widely circulated Hindi national daily newspaper, Hindi also being the regional language of Delhi, where the registered office of the Investment Manager is located) |
| Bid/Issue Opening Date | Except in relation to any Bids received from the Anchor Investors, the date on which the Designated Intermediaries shall start accepting Bids, being [●] which will be published in all editions of [●] (a widely circulated English national daily newspaper) and in all editions of [●] (a widely circulated Hindi national daily newspaper, Hindi also being the regional language of Delhi, where the registered office of the Investment Manager is located) |
| Bid/Issue Period | Except in relation to Anchor Investors, the period between the Bid/Issue Opening Date and the Bid/ Issue Closing Date, inclusive of both days, during which Bidders can submit their Bids, including any revisions thereof |
| Bidder | Any prospective investor who makes a Bid pursuant to the terms of the Offer Document and the Bid cum Application Form and unless otherwise stated or implied, includes an ASBA Bidder and an Anchor Investor |
| Bidding Centres | Centres at which the Designated Intermediaries shall accept ASBA Forms, i.e. Designated SCSB Branch for SCSBs, Specified Locations for Syndicate, Broker Centres for Registered Brokers, Designated RTA Locations for RTAs and Designated CDP Locations for CDPs |
| Body Corporate / Bodies Corporate | Body Corporate / Bodies corporate as defined in Regulation 2(1)(d) of the InvIT Regulations |
| Book Building Process | The book building process, as provided in Part A of Schedule XIII of the SEBI ICDR Regulations |
| Book Running Lead Managers | The book running lead managers to the Issue, namely, SBI Capital Markets Limited, Axis Capital Limited, ICICI Securities Limited and Motilal Oswal Investment Advisors Limited |
| Broker Centres | Broker centres notified by the Stock Exchanges where Bidders can submit the ASBA Forms to a Registered Broker.<br><br>The details of such broker centres, along with the names and contact details of the Registered Brokers are available on the websites of the respective Stock Exchanges (www.bseindia.com and www.nseindia.com) |
| Business Day | Any day from Monday to Friday, excluding any public holiday |
| Cap Price | The higher end of the Price Band, being ₹ [●] per Unit, above which the Issue Price will not be finalized and above which no Bids will be accepted |
| Cash Escrow and Sponsor Bank Agreement | The cash escrow and Sponsor Bank agreement to be entered into amongst the Trust (acting through the Trustee), the Trustee, the Sponsor, the Investment Manager, the Registrar to the Issue, the Book Running Lead Managers and the Bankers to the Issue for *inter alia*, collection of the Bid Amounts from Anchor Investors, transfer of funds to the Public Issue Account and where applicable, remitting |

| Term | Description |
|---|---|
| | refunds of the amounts collected from Anchor Investors, on the terms and conditions thereof in accordance with the UPI circulars |
| Client ID | Client identification number maintained with one of the Depositories in relation to a dematerialised account |
| Closing Date | The date on which Allotment of Units pursuant to the Issue shall be made, i.e. on or about [●] |
| Collecting Depository Participant or CDP | A depository participant as defined under the Depositories Act, registered with SEBI and who is eligible to procure Bids at the Designated CDP Locations in terms of circular no. CIR/CFD/POLICYCELL/11/2015 dated November 10, 2015, issued by SEBI |
| Confirmation of Allocation Note / CAN | The notice or intimation of allocation of Units sent to Anchor Investors who have been allocated Units, after the Anchor Investor Bidding Date |
| Demographic Details | Details of the Bidders, including the Bidder's address, investor status, occupation and bank account details, PAN, DP ID and Client ID |
| Depository Participant or DP | A depository participant as defined under the Depositories Act, 1996. |
| Designated Date | The date on which funds are transferred from the Escrow Accounts and the amounts blocked by the SCSBs are transferred from the ASBA Accounts, as the case may be, to the Public Issue Account or the Refund Account, as appropriate |
| Designated Intermediaries | Syndicate, sub-syndicate/agents, SCSBs, Registered Brokers, CDPs and RTAs, who are authorized to collect ASBA Forms from the ASBA Bidders, in relation to the Issue. |
| Designated RTA Locations | Such locations of the RTAs where Bidders can submit ASBA Forms to RTAs. The details of such Designated RTA Locations, along with names and contact details of the RTAs eligible to accept Bid cum Application Forms are available on the respective websites of the Stock Exchanges (www.bseindia.com and www.nseindia.com) |
| Designated SCSB Branches | Such branches of the SCSBs which shall collect the ASBA Forms, a list of which is available on the website of SEBI at https://www.sebi.gov.in/sebiweb/other/OtherAction.do?doRecognised=yes or at such other website as may be prescribed by SEBI from time to time |
| Designated Stock Exchange | [●] |
| DP ID | Depository Participant's Identification |
| Draft Offer Document | This draft offer document dated January 14, 2026, issued in accordance with the InvIT Regulations and SEBI InvIT Master Circular, which does not contain complete particulars of the price at which the Units will be Allotted and the size of the Issue, including any addenda or corrigenda thereto |
| Escrow Account(s) | The 'no-lien' and 'non-interest bearing' accounts opened with the Escrow Collection Bank(s) and in whose favour the Bidders (excluding ASBA Bidders) will transfer money through NACH/direct credit/NEFT/RTGS in respect of the Bid Amount when submitting a Bid |
| Escrow Collection Bank | [●] |
| Final Offer Document | Final offer document to be filed with SEBI and the Stock Exchanges after the Pricing Date in accordance with the InvIT Regulations containing, amongst other things, the Issue Price that is determined at the end of the Book Building Process, the size of this Issue and certain other information, including any addenda or corrigenda thereto |
| First Bidder | The Bidder whose name shall be mentioned first in the Bid cum Application Form or the Revision Form and in case of joint Bids, whose name shall also appear as the first holder of the beneficiary account held in joint names |
| Floor Price | The lower end of the Price Band, subject to any revision thereto, in this case being ₹ [●] at or above which the Issue Price and the Anchor Investor Issue Price will be finalised and below which no Bids will be accepted |
| Institutional Investor Portion | Portion of the Issue (including the Anchor Investor Portion) being not more than 75.00% of the Net Issue Size, comprising not more than [●] Units which shall be available for allocation to Institutional Investors (including Anchor Investors), subject to valid Bids being received at or above the Issue Price |
| Institutional Investors | Institutional investor means: (i) a Qualified Institutional Buyer, or (ii) a family trust or intermediaries registered with SEBI, having a net-worth of more than ₹ 5,000.00 million as per the latest audited financial statements |
| I-Sec | ICICI Securities Limited |
| Issue | The issue of up to [●] Units (as defined below) for cash at a price of ₹ [●] per Unit aggregating up to ₹ 57,000.00 million.<br><br>Pursuant to the Commitment Letter, the Sponsor will subscribe to [●] Units of the Trust for a cash consideration of ₹ [●] million to ensure that the aggregate unitholding of the Sponsor amounts to at least 15.00% of the total post-Issue unit capital of the Trust in order to comply with the sponsor and sponsor group lock-in requirements under Regulations 12(3) and 12(3A) of the InvIT Regulations. Upon Sponsor Contribution, the Issue Size will be reduced to the extent of such Sponsor Contribution. |
| Issue Agreement | The issue agreement dated January 14, 2026, entered into amongst the Trust (acting through the Trustee), the Investment Manager, the Trustee, the Sponsor, the Project Manager and the Book Running Lead Managers, pursuant to which certain arrangements have been agreed to in relation to |

| Term | Description |
|---|---|
| | the Issue |
| Issue Price | ₹ [●] per Unit, being the final price at which Units will be Allotted to successful Bidders, other than Anchor Investors in terms of this Draft Offer Document.<br>The Issue Price will be decided by the Investment Manager in consultation with the Book Running Lead Managers on the Pricing Date in accordance with the Book Building Process and in terms of the Offer Document and the Final Offer Document. |
| Issue Proceeds | The proceeds of the Issue (including the Sponsor Contribution), aggregating up to ₹ 57,000.00 million.<br><br>For further details about the use of the Issue Proceeds and the Issue Expenses, please see the section entitled '*Use of Proceeds*' on page 206 |
| Issue Size | [●] Units aggregating up to ₹57,000.00 million |
| Listing Agreement | Any listing agreement to be entered into with the Stock Exchanges by the Trust, in line with the format as specified under the Securities and Exchange Board of India circular number CIR/CFD/CMD/6/2015 dated October 13, 2015, on "Format of uniform Listing Agreement" |
| Listing Date | The date on which the Units will be listed on the Stock Exchange |
| Minimum Bid Size | ₹ [●] |
| Motilal | Motilal Oswal Investment Advisors Limited |
| Mutual Funds | Mutual funds registered with SEBI under the Securities and Exchange Board of India (Mutual Funds) Regulations, 1996 |
| Net Issue | The Issue less Sponsor Contribution |
| Net Proceeds | The gross proceeds of the Fresh Issue, less the offer expenses |
| Non – Institutional Investors | All Bidders, that are not Institutional Investors, who have Bid for Units in the Issue. |
| Non-Institutional Investor Portion | Portion of the Issue being not less than 25.00% of the Net Issue, comprising at least [●] Units, which shall be available for allocation on a proportionate basis to Non-Institutional Investors, subject to valid Bids being received at or above the Issue Price |
| Non-Resident Indian/ Non-Resident | An individual resident outside India who is a citizen or is an 'overseas citizen of India' cardholder within the meaning of Section 7A of the Citizenship Act, 1955 and includes a Non-Resident Indian, FVCIs, FIIs and FPIs |
| Offer Document | The Offer Document to be issued in accordance with the provisions of the InvIT Regulations, which will not have complete particulars of the Price Band and the Issue Price at which the Units will be offered and the size of this Issue including any addenda, corrigenda thereto.<br><br>The Offer Document will be filed with SEBI and the Stock Exchanges and shall become the Final Offer Document which shall be filed with SEBI and the Stock Exchanges after the Pricing Date. |
| Price Band | Price band between the minimum price of ₹ [●] per Unit (Floor Price) and the maximum price of ₹ [●] per Unit (Cap Price) including any revision thereof.<br><br>The Price Band will be decided by the Investment Manager, in consultation with the Book Running Lead Managers, and will be announced at least two Working Days prior to the Bid/ Issue Opening Date, on the websites of the Trust, the Sponsor and the Investment Manager, and shall be made available to the Stock Exchanges for the purpose of uploading on their respective websites. |
| Pricing Date | The date on which the Investment Manager in consultation with the Book Running Lead Managers, finalizes the Issue Price in accordance with the Book Building Process and in terms of the Offer Document and the Final Offer Document. |
| Public Issue Account | 'No-lien and 'non-interest bearing' bank account opened to receive monies from the Escrow Accounts and from the ASBA Accounts on the Designated Date. |
| Public Issue Account Bank | [●] |
| Qualified Institutional Buyers or QIB(s) | Qualified institutional buyers, as defined under Regulation 2(1)(ss) of the SEBI ICDR Regulations, which currently includes (i) a mutual fund, venture capital fund, alternative investment fund and foreign venture capital investor registered with SEBI, (ii) foreign portfolio investor other than individuals, corporate bodies and family offices, (iii) a public financial institution, (iv) a scheduled commercial bank, (v) a multilateral and bilateral development financial institution, (vi) a state industrial development corporation, (vii) an insurance company registered with the IRDAI, (viii) a provident fund with minimum corpus of ₹ 250 million, (ix) a pension fund with minimum corpus of ₹ 250 million registered with the Pension Fund Regulatory and Development Authority established under subsection (1) of section 3 of the Pension Fund Regulatory and Development Authority Act, 2013, (x) National Investment Fund set up by resolution no. F. No. 2/3/2005-DDII dated November 23, 2005 of the GoI published in the Gazette of India, (xi) insurance funds set up and managed by army, navy or air force of the Union of India, (xii) insurance funds set up and managed by the Department of Posts, India, and (xiii) systemically important non-banking financial companies. |
| Refund Account(s) | 'No-lien' and 'non-interest bearing' account(s) opened with the Refund Bank(s), from which refunds, if any, of the whole or part of the Bid Amount to Anchor Investors shall be made |

| Term | Description |
|---|---|
| Refund Bank | [●] |
| Registered Brokers | Stock brokers registered with the stock exchanges having nationwide terminals, other than Book Running Lead Managers and the Syndicate Member, eligible to procure Bids in terms of Circular No. CIR/CFD/14/2012 dated October 4, 2012, issued by SEBI |
| Registrar Agreement | The agreement dated January 14, 2026, entered into between the Trustee (on behalf of the Trust), the Investment Manager, and the Registrar to the Issue in relation to the responsibilities and obligations of the Registrar to the Issue pertaining to the Issue. |
| Registrar or Registrar to the Issue | KFin Technologies Limited |
| Revision Form | The form used by the Bidders to modify the quantity of Units or the Bid Amount in any of their ASBA Forms or any previous Revision Forms. Bidders are not allowed to withdraw or lower their Bids (in terms of number of Units or the Bid Amount) at any stage. |
| SBICAPS | SBI Capital Markets Limited |
| Self-Certified Syndicate Bank(s) or SCSB(s) | Banks registered with SEBI, offering services in relation to ASBA, a list of which is available on the website of SEBI at https://www.sebi.gov.in/sebiweb/other/OtherAction.do?doRecognisedFpi=yes&intmId=34 or https://www.sebi.gov.in/sebiweb/other/OtherAction.do?doRecognisedFpi=yes&intmId=35, as applicable, or such other website as updated from time to time, and updated from time to time |
| Specified Locations | Bidding centres where the Syndicate shall accept ASBA Forms from Bidders |
| Sponsor Bank(s) | [●] |
| Stock Exchanges | Together, BSE and NSE |
| Sub-Syndicate Members | The sub-syndicate members, if any, appointed by the Book Running Lead Managers and the Syndicate Member, to collect ASBA Forms and Revision Forms. |
| Syndicate Agreement | The agreement, to be entered into between the Trustee (on behalf of the Trust), the Investment Manager, the Lead Manager, the Syndicate Member and the Registrar to the Issue in relation to collection of Bid cum Application Forms by the Syndicate |
| Syndicate Member | Intermediaries, registered with SEBI who are permitted to accept bids, applications and place orders with respect to the issue. |
| Syndicate/ Members of the Syndicate | The Book Running Lead Managers and the Syndicate Member |
| UPI | Unified Payments Interface, which is an instant payment mechanism, developed by NPCI |
| UPI Bidder(s) | Individual Non-Institutional Investors with an application size of up to ₹ 0.50 million in the Non-Institutional Category, and Bidding under the UPI Mechanism through ASBA Form(s) submitted with Syndicate Member, Registered Brokers, Collecting Depository Participants and Registrar and Share Transfer Agents |
| UPI ID | ID created on the UPI for single-window mobile payment system developed by the NPCI |
| UPI Mandate Request | A request (intimating the UPI Bidders, by way of a notification on the UPI linked mobile application and by way of an SMS directing the UPI Bidders to such UPI linked mobile application) to the UPI Bidders using the UPI Mechanism initiated by the Sponsor Bank(s) to authorise blocking of funds equivalent to the Bid Amount in the relevant ASBA Account through the UPI linked mobile application, and the subsequent debit of funds in case of Allotment |
| UPI Mechanism | The Bidding mechanism that may be used by UPI Bidders to make Bids in the Issue in accordance with the InvIT Regulations |
| Working Day | Working day, with reference to (a) announcement of Price Band; and (b) Bid/ Issue Period, shall mean all days, excluding Saturdays, Sundays and public holidays, on which commercial banks in Mumbai are open for business; and (c) the time period between the Bid/ Issue Closing Date and the listing of the Units on the Stock Exchanges, shall mean all trading days of Stock Exchanges, excluding Sundays and bank holidays |

**Technical and Industry Related Terms**

| Term | Description |
|---|---|
| AADC | Annual Average Daily Collection |
| AADT | Annual Average Daily Traffic |
| ADT | Average Daily Traffic |
| AL | Axle Load |
| CAGR | Compound Annual Growth Rate |
| CBIC | Chennai – Bengaluru Industrial Corridor |
| CFS | Container Freight Station |
| CJV | Car / Jeep / Van |
| CP | Check Plaza |
| EoDB | Ease of Doing Business |

| Term | Description |
|---|---|
| EPC | Engineering, Procurement and Construction |
| ETC | Electronic Toll Collection |
| EV | Electric Vehicle |
| FMCG | Fast Moving Consumer Goods |
| FSI | Floor Space Index |
| FY | Financial Year |
| GDP | Gross Domestic Product |
| GI | Geographical Indication |
| Golden Quadrilateral | Golden Quadrilateral refers to the national highway network connecting Delhi, Mumbai, Chennai and Kolkata, forming a quadrilateral-shaped corridor of approximately 5,846 km, developed as part of India's National Highways Development Program. |
| GSDP | Gross State Domestic Product |
| GST | Goods and Services Tax |
| GVA | Gross Value Added |
| HAM | Hybrid Annuity Mode |
| HCV | Heavy Commercial Vehicle |
| IT | Information Technology |
| Km | Kilometer |
| LCV | Light Commercial Vehicle |
| MADT | Monthly Average Daily Traffic |
| MAV | Multi Axle Vehicle |
| MLFF | Multi Lane Free Flow |
| MoRTH | Ministry of Road Transport and Highways |
| MSME | Micro, Small, and Medium Enterprises |
| NH | National Highway |
| NHAI | National Highways Authority of India |
| NHIT | National Highways Infra Trust |
| NMP | National Monetisation Pipeline |
| NW | National Waterway |
| OSV | Oversized Vehicle |
| PCI | Per Capita Income |
| PCU | Passenger Car Unit |
| PPP | Public-Private Partnership |
| PSU | Public Sector Undertaking |
| SEZ | Special Economic Zone |
| TOT | Toll, Operate, Transfer |
| 2A | 2 Axle |
| 3A | 3 Axle |

**Abbreviations**

| Term | Description |
|---|---|
| AIF | Alternative Investment Fund as defined in and registered with SEBI under the SEBI AIF Regulations |
| BSE | BSE Limited |
| CCEA | Cabinet Committee on Economic Affairs |
| CCI | Competition Commission of India |
| CDSL | Central Depository Services (India) Limited |
| CIN | Corporate Identity Number |
| Companies Act/ Companies Act, 2013 | Companies Act, 2013 |
| Companies Act, 1956 | Erstwhile, Companies Act, 1956 |
| Competition Act | Competition Act, 2002 |
| Depository | A depository registered with SEBI under the Securities and Exchange Board of India (Depositories and Participants) Regulations, 2018 |
| Depositories Act | Depositories Act, 1996 |
| DIN | Director Identification Number |

| Term | Description |
|---|---|
| Fee Rules | National Highways Fee (Determination of Rates and Collection) Rules, 2008 and further amendments in relation to these rules till the date of the signing of the respective concession agreements |
| FEMA | Foreign Exchange Management Act, 1999, read with rules and regulations thereunder |
| FEMA Rules | Foreign Exchange Management (Non-debt Instruments) Rules, 2019 |
| Financial Year or Fiscal Year or Fiscal | Period of 12 months ended March 31 of that particular year, unless otherwise stated |
| FPI | Foreign portfolio investors |
| FVCI | Foreign venture capital investors, as defined under the SEBI FVCI Regulations |
| GAAR | General Anti-Avoidance Rules |
| GoI or Government | Government of India |
| GST | Goods and Services Tax |
| ICAI | Institute of Chartered Accountants of India |
| Income Tax Act or IT Act | The Income-tax Act, 2025 |
| Ind AS | Indian Accounting Standards as defined in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015 prescribed under Section 133 of the Companies Act, 2013, including any amendments or modifications thereto |
| Indian GAAP | Indian Accounting Standards as defined in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015 prescribed under Section 133 of the Companies Act, 2013, including any amendments or modifications thereto |
| Indian GAAS | Generally Accepted Auditing Standards in India |
| InvIT Regulations / SEBI InvIT Regulations | Securities and Exchange Board of India (Infrastructure Investment Trust) Regulations, 2014 as amended |
| IRDAI | Insurance Regulatory and Development Authority of India |
| MCA | Ministry of Corporate Affairs, Government of India |
| MORTH | Ministry of Road Transport and Highways, Government of India |
| MoEF | Ministry of Environment, Forest and Climate Change |
| NACH | National Automated Clearing House |
| NEFT | National Electronic Funds Transfer |
| NHAI | National Highways Authority of India |
| NHAI Act | National Highways Authority of India Act, 1988, as amended |
| NSDL | National Securities Depository Limited |
| NSE | The National Stock Exchange of India Limited |
| PAN | Permanent account number |
| RBI | Reserve Bank of India |
| RoC | Registrar of Companies, Delhi and Haryana at New Delhi |
| Rs./Rupees/INR/₹ | Indian Rupees |
| RTGS | Real Time Gross Settlement |
| SCRA | Securities Contracts (Regulation) Act, 1956, as amended |
| SCRR | Securities Contracts (Regulation) Rules, 1957, as amended |
| SEBI | Securities and Exchange Board of India constituted under the SEBI Act |
| SEBI Act | The Securities and Exchange Board of India Act, 1992, as amended |
| SEBI AIF Regulations | Securities and Exchange Board of India (Alternative Investments Funds) Regulations, 2012, as amended |
| SEBI Debenture Trustees Regulations | Securities and Exchange Board of India (Debenture Trustees) Regulations, 1993, as amended |
| SEBI FPI Regulations | Securities and Exchange Board of India (Foreign Portfolio Investors) Regulations, 2019, as amended |
| SEBI FVCI Regulations | Securities and Exchange Board of India (Foreign Venture Capital Investors) Regulations, 2000, as amended |
| SEBI ICDR Regulations | Securities and Exchange Board of India (Issue of Capital and Disclosure Requirements) Regulations, 2018, as amended |
| SEBI InvIT Master Circular | SEBI Master Circular no. SEBI/HO/DDHS-PoD-2/P/CIR/2025/102 dated July 11, 2025, including any amendments or modifications thereto |
| SEBI LODR Regulations | Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015, as amended |
| Securities Act | U.S. Securities Act of 1933 |
| Stock Exchange | BSE and NSE |
| U.S./U.S.A./United States | United States of America |
| USD/US$ | United States Dollars |

## PRESENTATION OF FINANCIAL DATA AND OTHER INFORMATION

### Certain Conventions

All references in this Draft Offer Document to "India" are to the Republic of India.

Unless stated otherwise, all references to page numbers in this Draft Offer Document are to the page numbers of this Draft Offer Document.

### Financial Data

The Trust was settled on November 24, 2025, and has acquired ownership of the Project SPV on January 5, 2025. The audited standalone financial information of the Trust for the period from its date of settlement, i.e. November 24, 2025, up to December 31, 2025, is included in this Draft Offer Document.

As the Project SPV was incorporated on November 21, 2025, the summary financial information of the Project SPV for Fiscals 2025, 2024 and 2023, are not available for disclosure in this Draft Offer Document. Further, no separate financial information, including actual revenue data for the InvIT Assets, are currently available, which could be used to clearly ascertain historical financial information including revenue and expenses in respect of each of the InvIT Assets. Accordingly, in lieu of the combined financial statements of the Trust along with the InvIT Assets and/or SPV not being available, the revenue data of the InvIT Assets that NHAI has been collecting through toll collection and maintenance contracts, has been included in the section entitled "*Asset Revenue Information*" on page 298. This revenue data has been provided from April 1, 2022, till December 31, 2025, separately for each InvIT Assets, to the extent that such data is available for such InvIT Assets. The said amounts being collected are at times intermittent on account of gaps in tolling contract periods and would not be a true reflection of the revenue that these InvIT Assets are actually generating.

Further, this Draft Offer Document includes projections of revenue from operations and cash flow from operating activities of the Trust and the Project SPV, for the financial years ended March 31, 2026, March 31, 2027, March 31, 2028, and March 31, 2029, prepared in accordance with the basis of preparation as set out in the projections of revenue from operations and cash flow from operating activities. For further details, please see the section entitled "*Projections of Revenue from Operations and Cash Flow from Operating Activities*" on page 320.

Further, this Draft Offer Document includes summary financial information of the Sponsor, as of and for the financial years ended March 31, 2024, March 21, 2023 and March 31, 2022, derived from the audited standalone financial statements of the Sponsor for the respective years. For further details, please see the sections entitled "*Summary Financial Information of the Sponsor*" on page 28.

Further, as highlighted in the section entitled "*Parties to the Trust*" on page 77, the Investment Manager was incorporated on August 22, 2025. Accordingly, the summary financial information of the Investment Manager for Fiscals 2025, 2024 and 2023, are not available for disclosure in this Draft Offer Document. The audited financial information of the Investment Manager for the period from August 22, 2025 to November 30, 2025, is included in this Draft Offer Document.

The degree to which the financial information included in this Draft Offer Document will provide meaningful information is entirely dependent on the reader's level of familiarity with Indian accounting policies and practices, the Companies Act, Ind AS, Indian GAAP and the InvIT Regulations. Any reliance by persons not familiar with Indian accounting policies and practices on the financial disclosures presented in this Draft Offer Document should accordingly be limited.

The financial year for the Trust and Parties to the Trust commences on April 1 and ends on March 31 of the next year; accordingly, all references to a particular financial year, unless stated otherwise, are to the 12 month period ended on March 31 of that year.

In this Draft Offer Document, any discrepancies in any table between the total and the sums of the amounts listed are due to rounding off. All figures in decimals and all percentage figures have been rounded off to two decimal places, wherever available.

**Currency and Units of Presentation**

All references to:

- "Rupees" or "₹" or "INR" or "Rs." are to Indian Rupee, the official currency of the Republic of India; and
- "USD" or "US$" are to United States Dollar, the official currency of the United States.

Except otherwise specified, certain numerical information in this Draft Offer Document have been presented in "million" units. One million represents 1,000,000 and one billion represents 1,000,000,000. One lakh represents 1,00,000 and one crore represents 1,00,00,000.

Unless the context requires otherwise, any percentage amounts, as set forth in this Draft Offer Document, have been calculated on the basis of the Audited Financial Information, Asset Revenue Information and the summary financial statements of the Sponsor.

**Exchange Rates**

This Draft Offer Document contains conversion of certain other currency amounts into Indian Rupees. These conversions should not be construed as a representation that these currency amounts could have been, or can be converted into Indian Rupees, at any particular rate.

The following table sets forth, for the dates indicated, information with respect to the exchange rate between the Rupee and the US$ (in Rupees per US$):

| Currency | December 31, 2025 | March 31, 2025 | March 31, 2024 | March 31, 2023 |
|---|---|---|---|---|
| 1 US$ | 89.92 | 85.58 | 83.37 | 82.22 |

*Source: https://www.fbil.org.in*
*Note: If the RBI reference rate is not available on a particular date due to a public holiday, exchange rates of the previous working day has been disclosed. The reference rates are rounded off to two decimal places*

**Industry and Market Data**

Unless stated otherwise, industry and market data used in this Draft Offer Document has been obtained or derived from publicly available information, as well as from the report titled "*Research Report on Road Sector in India*" dated January 10, 2026, prepared by CARE Advisory Research and Training Limited ("**CARE Industry Report**"). The CARE Industry Report is subject to the following disclaimer:

"*This report is prepared by CARE Analytics and Advisory Private Limited (CareEdge Research). CareEdge Research has taken utmost care to ensure accuracy and objectivity while developing this report based on information available in CareEdge Research's proprietary database, and other sources considered by CareEdge Research as accurate and reliable including the information in public domain. The views and opinions expressed herein do not constitute the opinion of CareEdge Research to buy or invest in this industry, sector or companies operating in this sector or industry and is also not a recommendation to enter into any transaction in this industry or sector in any manner whatsoever. This report has to be seen in its entirety; the selective review of portions of the report may lead to inaccurate assessments. All forecasts in this report are based on assumptions considered to be reasonable by CareEdge Research; however, the actual outcome may be materially affected by changes in the industry and economic circumstances, which could be different from the projections. Nothing contained in this report is capable or intended to create any legally binding obligations on the sender or CareEdge Research which accepts no responsibility, whatsoever, for loss or damage from the use of the said information. CareEdge Research is also not responsible for any errors in transmission and specifically states that it, or its directors, employees, parent company – CARE Ratings Ltd., or its directors, employees do not have any financial liabilities whatsoever to the subscribers/users of this report. The subscriber/user assumes the entire risk of any use made of this report or data herein. This report is for the information of the authorised recipient in India only and any reproduction of the report or part of it would require explicit written prior approval of CareEdge Research. CareEdge Research shall reveal the report to the extent necessary and called for by appropriate regulatory agencies, viz., SEBI, RBI, Government authorities, etc., if it is required to do so. By accepting a copy of this Report, the recipient accepts the terms of this Disclaimer, which forms an integral part of this Report*"

Industry publications generally state that the information contained in such publications has been obtained from publicly available documents from various sources believed to be reliable but accuracy, completeness and underlying assumptions of such third-party sources are not guaranteed. Although the industry and market data

used in this Draft Offer Document is reliable, the data used in these sources may have been re-classified by us for the purposes of presentation however, no material data in connection with the Issue has been omitted. Data from these sources may also not be comparable.

Industry sources and publications may base their information on estimates and assumptions that may prove to be incorrect. The extent to which the industry and market data presented in this Draft Offer Document is meaningful depends upon the reader's familiarity with, and understanding of, the methodologies used in compiling such information. There are no standard data gathering methodologies in the industry in which the Trust proposed to conduct business and methodologies and assumptions may vary widely among different market and industry sources. Such information involves risks, uncertainties and numerous assumptions and is subject to change based on various factors.

**Credit ratings**

The credit ratings included in this Draft Offer Document are subject to the following disclaimer:

**Disclaimer from CARE Ratings Limited**

*"The ratings issued by CARE Ratings are opinions on the likelihood of timely payment of the obligations under the rated instrument and are not recommendations to sanction, renew, disburse, or recall the concerned bank facilities or to buy, sell, or hold any security. These ratings do not convey suitability or price for the investor and no part of the Material should be construed as an expert advice or investment advice within the meaning of any law or regulation. The rating agency does not constitute an audit on the rated entity. CARE Ratings has based its ratings/outlook based on information obtained from reliable and credible sources. CARE Ratings does not, however, guarantee the accuracy, adequacy, or completeness of any information and is not responsible for any errors or omissions and the results obtained from the use of such information."*

**Disclaimer from India Ratings & Research Private Limited**

*"India Ratings & Research Private Limited ("India Ratings") relies on information obtained from multiple sources and there may be instances where the information is not accurate/incomplete, despite efforts been taken to verify the same. Ultimately, the issuer /its advisers are responsible for the accuracy of the information they provide to India Ratings and to the market in offering documents and other reports. In issuing its rating, India Ratings relies on the work of experts, including independent auditors with respect to financial statements and attorneys with respect to legal and tax matters. Further, ratings are inherently forward-looking and embody assumptions and predictions about future events that by their nature cannot be verified as facts. As a result, despite any verification of current facts, ratings can be affected by future events or conditions that may not have been anticipated at the time a rating was issued or affirmed.*

*It needs to be noted that ratings are not a recommendation or suggestion, directly or indirectly, to you or any other person, to buy, sell, make or hold any investment, loan or security or to undertake any investment strategy with respect to any investment, loan or security of any issuer. Credit Ratings do not comment on the adequacy of market price, the suitability of any investment, loan or security for a particular investor (including without limitation, any accounting and/or regulatory treatment), or the tax-exempt nature or taxability of payments made in respect of any investment, loan or security. The Rating Agency shall neither construed to be nor acting under the capacity or nature of an 'expert' as defined under Section 2(38) of the Companies Act, 2013. India Ratings does not provide any financial, legal, auditing, accounting, appraisal, valuation or actuarial services in any manner. A rating should not be viewed as a replacement for such advice or services. Investors may find our ratings to be important information, and India Ratings notes that you are responsible for communicating the contents of this letter, and any changes with respect to the rating, to investors."*

## FORWARD-LOOKING STATEMENTS

Certain statements contained in this Draft Offer Document that are not statements of historical fact constitute "forward-looking statements". Bidders can generally identify forward-looking statements by terminology such as "aim", "anticipate", "believe", "continue", "can", "could", "estimate", "expect", "intend", "may", "objective", "plan", "potential", "project", "pursue", "seek to", "shall", "should", "will", "would", or other words or phrases of similar import. Similarly, statements that describe the strategies, objectives, plans or goals of the Trust and the Projections of Revenue from Operations and Cash Flow from Operating Activities and the Traffic Reports are also forward-looking statements. However, these are not the exclusive means of identifying forward-looking statements.

All statements regarding the Trust's expected financial conditions, results of operations and cash flows, business plans and prospects including the Projections of Revenue from Operations and Cash Flow from Operating Activities are forward-looking statements. These forward-looking statements include statements as to the Trust's business strategy, planned projects, revenue and profitability (including, without limitation, any financial or operating projections or forecasts), new business and other matters discussed in this Draft Offer Document that are not historical facts. These forward-looking statements and any other projections contained in this Draft Offer Document (whether made by the Trustee, Investment Manager or any third party), are predictions and involve known and unknown risks, uncertainties, assumptions and other factors that may cause the Trust's actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements or other projections. Further, please note that the Projections of Revenue from Operations and Cash Flow from Operating Activities included in this Draft Offer Document are based on a number of assumptions. For further details, please see the section entitled "*Projections of Revenue from Operations and Cash Flow from Operating Activities*" on page 320.

The Valuation Report included in this Draft Offer Document, is based on certain projections and accordingly, should be read together with assumptions and notes thereto. For further details, please see the "*Valuation Report*" attached as Annexure A. The Traffic Reports and the Technical Reports include projections and estimates in relation to traffic growth and operation and maintenance expenses, respectively, and accordingly, should be read in conjunction with the relevant notes and assumptions thereto.

Actual results may differ materially from those suggested by the forward-looking statements or financial projections due to certain known or unknown risks or uncertainties associated with the Investment Manager's expectations with respect to, but not limited to, the actual growth in the infrastructure sector, the Investment Manager's ability to successfully implement the strategy, growth and expansion plans, cash flow projections, exposure to market risks, the outcome of any legal or regulatory proceedings, the future impact of new accounting standards, regulatory changes pertaining to the infrastructure sector in India and our ability to respond to them, general economic and political conditions in India which have an impact on our business activities or investments, changes in competition, and the Project Manager's ability to operate and maintain the Project SPV and successfully implement any technological changes. By their nature, certain of the market risk disclosures are only estimates and could be materially different from what actually occurs in the future. As a result, actual future gains, losses or impact on net interest income and net income could materially differ from those that have been estimated.

Factors that could cause actual results, performance or achievements of the Trust to differ materially include, but are not limited to, those discussed in the sections entitled "*Risk Factors*", "*Industry Overview*", "*Business*" and "*Discussion and Analysis by the Directors of the Investment Manager of the Financial Condition, Results of Operations and Cash Flows of the Project SPV of the Trust*", on pages 35, 113, 155 and 211, respectively. Some of the factors that could cause the Trust's actual results, performance or achievements to differ materially from those in the forward-looking statements and financial information include, but are not limited to, the following:

- The Trust is a newly settled trust with no operating history and limited historical financial information and, as a result, investors may not be able to assess its prospects on the basis of past records and the financial information disclosed in this Draft Offer Document.
- We have not executed any binding agreements with respect to the proposed acquisition of the InvIT Assets including any concession agreement or any binding agreement of Issue Proceeds, and our ability to enter into the Concession Agreements and other binding agreements will impact the ability of the Investment Manager to complete this Issue.
- We have sought exemptions from the strict application of certain requirements under the InvIT Regulations including in relation to the preparation of the combined financial statements of the Trust, Project SPV and

the InvIT Assets. There can be no guarantee that SEBI will grant such exemptions, in a timely manner or at all.

- We must maintain certain investment ratios, which may present additional risks to us.
- The ability of the Trust to make or maintain consistency in distributions to Unitholders depends on the financial performance of the Project SPV and their profitability.

Forward-looking statements and Projections of Revenue from Operations and Cash Flow from Operating Activities, Valuation Report and Technical Reports reflect current views as of the date of this Draft Offer Document and are not a guarantee of future performance or returns to Bidders. These statements and projections are based on certain beliefs and assumptions, which in turn are based on currently available information. Although each of the Investment Manager and the Sponsor believes that the expectations and the assumptions upon which such forward-looking statements are based are reasonable at this time, neither the Investment Manager nor the Sponsor can assure Bidders that such expectations will prove to be correct or accurate. In accordance with the InvIT Regulations, the assumptions underlying the Projections of Revenue from Operations and Cash Flow from Operating Activities have been examined by the Auditors. The Projections of Revenue from Operations and Cash Flow from Operating Activities have been prepared for inclusion in the Draft Offer Document for the purposes of this Issue, using a set of assumptions that include hypothetical assumptions about future events and management's actions that are not necessarily expected to occur, and have been approved by the IM Board. Consequently, Bidders are cautioned that the Projections of Revenue from Operations and Cash Flow from Operating Activities may not be appropriate for purposes other than that described above. Given these uncertainties, Bidders are cautioned not to place undue reliance on such forward-looking statements and Projections of Revenue from Operations and Cash Flow from Operating Activities. In any event, these statements speak only as of the date of this Draft Offer Document or the respective dates indicated in this Draft Offer Document, and the Trust, the Investment Manager and the Book Running Lead Managers or any of their affiliates or advisors, undertake no obligation to update or revise any of the statements reflecting circumstances arising after the date hereof or to reflect the occurrence of underlying events, whether as a result of new information, future events or otherwise after the date of this Draft Offer Document. If any of these risks and uncertainties materialize, or if any of the Investment Manager's underlying assumptions prove to be incorrect, the actual results of operations or financial condition or cash flow of the Trust could differ materially from that described herein as anticipated, believed, estimated or expected. All subsequent forward-looking statements attributable to the Trust are expressly qualified in their entirety by reference to these cautionary statements.

## THE ISSUE

The following is a general summary of the terms of this Issue. This summary should be read in conjunction with, and is qualified in its entirety by, the detailed information appearing elsewhere in this Draft Offer Document:

| | |
|---|---|
| **Issue** | The initial offer of up to [●] Units for cash at a price of ₹ [●] per Unit aggregating up to ₹ 57,000.00 million. |
| *Less* | |
| **Sponsor Contribution** | Up to [●] Units for a cash consideration of ₹ [●] million |
| *Accordingly* | |
| **Net Issue** | Up to [●] Units aggregating up to ₹ [●] million |
| ***Of which*** | |
| **Institutional Investor Portion (not more than 75.00% of the Net Issue)*** | Not more than [●] Units |
| **Non-Institutional Investor Portion (not less than 25.00% of the Net Issue)** | Not less than [●] Units |
| **Floor Price** | ₹ [●] per Unit |
| **Cap Price** | ₹ [●] per Unit |
| **Issue Price** | ₹ [●] per Unit |
| **Minimum Bid Size** | Minimum [●] and in multiples of [●] thereafter by Bidders (other than Anchor Investor) |
| **Bid/Issue Opening Date**** | [●] |
| **Bid/Issue Closing Date***** | [●] |
| **Sponsor** | National Highways Authority of India |
| **Trustee** | IDBI Trusteeship Services Limited |
| **Investment Manager** | Raajmarg Infra Investment Managers Private Limited |
| **Project Manager** | National Highways InvIT Project Managers Private Limited |
| **Authority for this Issue** | This Issue was authorised and approved by the IM Board on January 12, 2026. |
| **Tenure of the Trust** | The Trust shall remain in force perpetually until it is dissolved or terminated in accordance with the Trust Deed. For details, please see the section entitled "*Parties to the Trust*" on page 77 |
| **Units issued and outstanding as of the date of this Draft Offer Document** | As of the date of this Draft Offer Document, there are no issued and outstanding Units. |
| **Units issued and outstanding immediately after this Issue** | Up to [●] Units |
| **Sponsor and Sponsor Group(s) Units** | Up to [●] Units<br><br>Pursuant to the Commitment Letter, the Sponsor will subscribe to [●] Units of the Trust for a cash consideration of ₹ [●] million to ensure that the aggregate unitholding of the Sponsor amounts to at least 15% of the total post-issue unit capital of the Trust in order to comply with the sponsor and sponsor group lock-in requirements under Regulations 12(3) and 12(3A) of the InvIT Regulations. For details, see '*Formation Transactions in relation to the Trust – Sponsor Contribution*' on page 23.<br><br>The Units held by the Sponsor and Sponsor Group shall rank *pari passu* with and have the same rights as the Units to be Allotted pursuant to this Issue. The Units to be held by the Sponsor and the Sponsor Group have been allotted to the Sponsor and Sponsor Group pursuant to the resolution of the IM Board dated [●] |
| **Distribution** | Please see the section titled "*Distribution*" on page 216 |
| **Indian Taxation** | Please see the section titled "*Taxation"* on page 282 |
| **Use of Proceeds** | Please see the section titled *"Use of Proceeds*" on page 206 |
| **Listing** | Prior to this Issue, there has been no market for the Units. The Units are proposed to be listed on the Stock Exchanges. In-principle approval for listing of the Units has been received from BSE Limited and National Stock Exchange of India Limited pursuant to letters, each dated [●].<br><br>The Investment Manager shall apply to the Stock Exchanges for the final listing and trading approval, after the Allotment and the credit of the Units to the demat accounts of the Allottees |
| **Designated Stock Exchange** | [●] |

| | |
|---|---|
| **Closing Date** | The date on which Allotment of the Units pursuant to this Issue shall be made, i.e. on or about [●] |
| **Ranking** | The Units being issued shall rank *pari passu* in all respects, including rights in respect of distribution.<br>Please see the section entitled *"Rights of Unitholders"* on page 252 |
| **Lock-in and Rights of Unitholders** | For details, please see the sections entitled "*Information Concerning the Units*" and "*Rights of Unitholders*" on pages 204 and 252, respectively |
| **Risk Factors** | Prior to making an investment decision, Bidders should consider carefully the matters discussed in the section entitled *"Risk Factors*" on page 35 |

* *The Investment Manager may, in consultation with the Book Running Lead Managers, consider participation by Anchor Investors in this Issue for up to 60% of the Institutional Investor Portion in accordance with the InvIT Regulations.*

** *The Anchor Investor Bidding Date shall be one Working Day prior to the Bid/Issue Opening Date.*

*** *The Investment Manager may in consultation with the Book Running Lead Managers, consider closing the Bid/ Issue Period for QIBs one Working Day prior to the Bid/ Issue Closing Date, in accordance with the InvIT Regulations.*

Allocation in all categories except the Anchor Investor Portion, if any, shall be made on a proportionate basis. In case of under-subscription in any category, the unsubscribed portion in either category may be allotted to investors in the other category at the discretion of the Investment Manager, in consultation with the Book Running Lead Managers and the Designated Stock Exchange.

The Issue is being made through the Book Building Process, wherein not more than 75.00% of the Net Issue shall be available for allocation to Institutional Investors on a proportionate basis, provided that the Investment Manager, in consultation with the Book Running Lead Managers, may allocate up to 60.00% of the Institutional Investor Portion to Anchor Investors on a discretionary basis in accordance with the InvIT Regulations and the SEBI InvIT Master Circular. Further, not less than 25.00% of the Net Issue shall be available for allocation on a proportionate basis to Non-Institutional Investors, subject to valid Bids being received at or above the Issue Price. In case of under-subscription in any category, the unsubscribed portion in either category may be Allotted to Bidders in the other category at the discretion of the Investment Manager, in consultation with the Book Running Lead Managers and the Designated Stock Exchange.

The Units, on Allotment, shall be traded only in the dematerialized segment of the Stock Exchanges.

In accordance with the InvIT Regulations, the Investment Manager undertakes that at any given time, there shall only be one denomination for the Units, and no Unitholder shall enjoy superior voting or any other rights over another Unitholder, except as per Regulation 4(2)(i), pursuant to which the unitholder(s) holding not less than ten percent of the total outstanding units of the Trust, either individually or collectively, shall be entitled to nominate one director on the board of directors of the Investment Manager. Further, there shall not be multiple classes of Units.

In case the Trust receives oversubscription of the Issue, then the Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to retain oversubscription of not more than 25.00% of the Issue in accordance with the InvIT Regulations. The Investment Manager, in consultation with the Book Running Lead Managers, will decide whether or not to retain any oversubscription in the Issue only after the Bid/Issue Closing Date. The maximum subscription from any investor, other than the Sponsor, its related parties and its associates, taken together with Units held by them and persons acting in concert with them in the Trust, shall not be more than 25.00% of the total post-Issue unit capital of the Trust.

For further details in relation to this Issue, including the method of application, please see the section entitled "*Issue Information*" on page 259.

## OVERVIEW OF THE TRUST

*The following overview is qualified in its entirety by, and is subject to, the more detailed information contained in or referred to elsewhere in this Draft Offer Document. Statements contained in this summary that are not historical facts may be forward-looking statements. Such statements are based on certain assumptions and are subject to certain risks, uncertainties and assumptions that could cause actual results of the Trust to differ materially from those forecasted or projected in this Draft Offer Document. Under no circumstances should the inclusion of such information herein be regarded as a representation, warranty or prediction of the accuracy of the underlying assumptions by the Trust, the Parties to the Trust or the Book Running Lead Managers or any other person or that these results will be achieved or are likely to be achieved. Investment in Units involves risks. Bidders are advised not to rely solely on this overview, and, should read this Draft Offer Document in its entirety and, in particular, the sections entitled "Risk Factors" and "Forward Looking Statements" on pages 35 and 17, respectively.*

### Structure and description of the Trust

The Sponsor settled the Trust on November 24, 2025, as a contributory irrevocable trust, pursuant to the Trust Deed, under the provisions of the Indian Trusts Act, 1882 and was duly registered in India under the provisions of the Registration Act, 1908 on December 1, 2025. The Trust was registered with SEBI on December 22, 2025, as an infrastructure investment trust under Regulation 3(1) of the InvIT Regulations having registration number IN/InvIT/25-26/0034. The Sponsor has settled the Trust for an initial sum of ₹10,000.

For details of the registered office and contact person of the Sponsor, please see the section entitled "*General Information*" on page 68. For the contact details of the Trust, please see the cover page.

Further, Raajmarg Infra Investment Managers Private Limited has been appointed as the investment manager, and National Highways InvIT Project Managers Private Limited has been appointed as the project manager to the Trust. For further details please see the section entitled "*Parties to the Trust*" on page 77.

### Investment objectives

The Investment objectives of the Trust shall be to carry on the activities of and to make investments as an infrastructure investment trust as permissible in terms of the InvIT Regulations. The investment of the Trust shall be in any manner permissible under, and in accordance with, the InvIT Regulations and applicable law, including in such holding companies and/or SPVs and/or infrastructure projects and/or securities in India as permitted under the InvIT Regulations. The Trustee shall ensure that the capital contribution and other InvIT Assets shall be utilized solely for the purposes of making investments as stated above, in accordance with the InvIT Regulations and applicable law. Whilst making such investments, the Trust shall adhere to the investment strategy as set out in the section entitled "*Business*" on page 155. The investment by the Trust shall be in compliance with the provisions of the InvIT Regulations.

As on the date of this Draft Offer Document, the Trust is not permitted to carry out any other principal activity unless specifically provided under applicable law. Further, the Trustee shall through the Investment Manager ensure that the Trust complies with any additional conditions as may be specified by SEBI or applicable law.

### *Fee and expenses*

#### *Annual expenses*

The expenses in relation to the Trust, other than such expenses incurred in relation to operations of Project SPV, would broadly include fees and expenses payable to (i) Trustee; (ii) Investment Manager; (iii) Project Manager; (iv) Auditor; (v) Valuer; and (vi) other intermediaries and consultants.

The estimated recurring expenses on an annual basis, including but not limited to, are as follows:

**(*in ₹ million*)**

| Payable by the Trust | Estimated Expenses |
|---|---|
| Fee payable to Trustee | 0.45 |
| Fee payable to the Investment Manager | 110.00 |
| Fee payable to the Project Manager | 2.50 |
| Fee payable to the Auditors | 0.05 |
| Fee payable to the Valuer | 1.89 |

| Payable by the Trust | Estimated Expenses |
|---|---|
| Fee payable to the Registrar | 0.36 |
| Fee payable to the Stock Exchanges and Depositories | Stock Exchange: [●]<br>Depositories (NSDL and CDSL): [●] |
| Fee payable to Credit Rating Agency | 0.43 |

*Note: The amounts are exclusive of GST.*

***Issue expenses***

The total expenses of this Issue are estimated to be up to ₹ [●] million which will be incurred by the Trust. For details in relation to the expenses for this Issue, please see the section titled "*Use of Proceeds*" on page 206.

***Set-up expenses***

The expenses in relation to the setting up the Trust of approximately ₹ [●] million, have been borne by the Sponsor, on behalf of the Trust.

***Details of credit ratings***

With respect to our proposed long term bank facilities, we have been given a credit rating of:

(i) Provisional CARE AAA; Stable by CARE Ratings Limited available at www.careratings.com/upload/CompanyFiles/PR/202601120147_Raajmarg_Infra_Investment_Trust.pdf; and

(ii) Provisional Ind AAA/Stable by India Ratings & Research Private Limited available at www.indiaratings.co.in/pressrelease/80812.

## FORMATION TRANSACTIONS IN RELATION TO THE TRUST

**Details of arrangement pertaining to the Trust**

The Trust's portfolio comprises the Project SPV namely, Raajmarg 1 Projects Private Limited. The details of the Project SPV are as provided below:

***Raajmarg 1 Projects Private Limited ("RPPL")***

RPPL is a private limited company incorporated on November 21, 2025, at New Delhi, under the Companies Act, 2013, having obtained a certificate of incorporation, from the Registrar of Companies, Central Registration Centre on November 21, 2025. The CIN of the Project SPV is U42101DL2025PTC459067.

*Capital structure*

| Particulars | Number of equity shares of ₹ 10 each |
|---|---|
| Authorised equity share capital | 100,000 |
| Issue, subscribed and paid-up share capital | 2 |

The shareholding pattern of RPPL as on the date of this Draft Offer Document is provided below:

| S. No. | Name of the shareholder | No. of equity shares of ₹ 10 each | Percentage Shareholding (%) |
|---|---|---|---|
| 1. | Raajmarg Infra Investment Trust | 1 | 100.00 |
| 2. | Mridul Dubey* | 1 | - |
| **Total** | | **2** | **100.00** |

**Nominee of the Trust*

The InvIT Assets will constitute tolling rights and will not possess any ownerships rights of the underlying land. Accordingly, no land diligence has been undertaken with respect to the InvIT Assets.

For further details in relation to the Project SPV, please see the section entitled "*Business*" on page 155.

**Utilisation of Net Proceeds**

Further, upon the listing of the Units, the Trust shall utilize the Net Proceeds for: (i) infusion of debt and/or equity into the Project SPV, which shall be utilized by the Project SPV for the payment of concession value of the InvIT Assets to NHAI and payment of improvement costs of the InvIT Assets; and (ii) general purposes. For further details, please see the section entitled "*Use of Proceeds*" on page 206.

**Borrowings of the Trust**

For details of the Borrowings of the Trust, please see the section "*Financial Indebtedness and Deferred Payments"* on page 210.

**Sponsor Contribution**

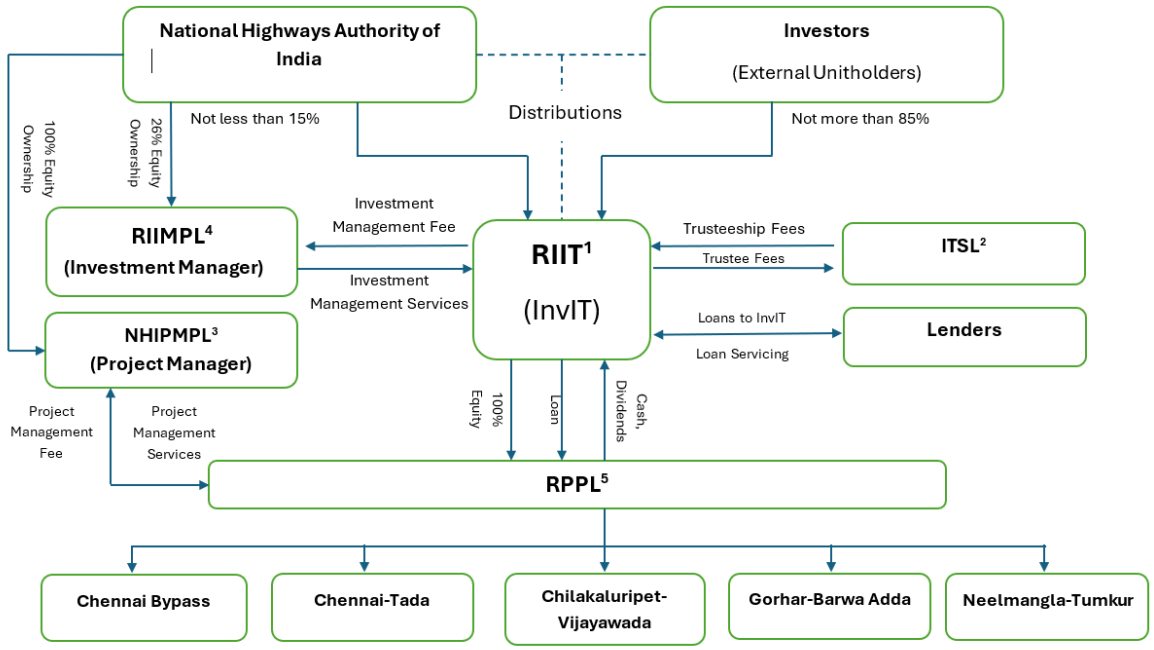
Pursuant to the letter dated January 12, 2026 ("**Commitment Letter**"), the Sponsor has agreed to contribute such amount towards subscription of such number of Units, which shall be equivalent to at least 15.00% of the total Units of the Trust on a post-Issue basis, to comply with the requirement under Regulations 12(3) and 12(3A) of the InvIT Regulations ("**Sponsor Contribution**").

While the Sponsor shall subscribe to the Units prior to the Bid/ Issue Closing Date, such Units shall be allotted to the Sponsor on the date of Allotment. Subsequently, the Investment Manager (on behalf of the Trust) shall utilize the Sponsor Contribution towards the objects of the Issue specified in the section titled "*Use of Proceeds*" on page 206.

**Proposed post-listing structure**

For details of the pre-Issue and post-Issue unitholding structure of the Trust, please see the section entitled "*Information Concerning the Units"* on page 204.

The following structure illustrates the relationship between the Trust, the Trustee, the Sponsor, the Investment Manager, the Project Manager and the Unitholders as at the Listing Date:




[1] RIIT - Raajmarg Infra Investment Trust
[2] ITSL - IDBI Trusteeship Services Limited
[3] NHIPMPL - National Highways InvIT Project Managers Private Limited.
[4] RIIMPL - Raajmarg Infra Investment Managers Private Limited
[5] RPPL – Raajmarg 1 Projects Private Limited

## SUMMARY SPECIAL PURPOSE FINANCIAL STATEMENTS OF THE TRUST

*The following tables set forth the summary standalone financial statements of the Trust derived from the Audited Financial Information of the Trust prepared in accordance with Ind AS and other relevant provisions of the InvIT Regulations, as of and for the period from the date of settlement of the Trust i.e. November 24, 2025, to December 31, 2025. The degree to which the summary financial information included herein below will provide meaningful information is entirely dependent on the reader's level of familiarity with Indian accounting practices, Ind AS, the Companies Act and the InvIT Regulations. Accordingly, any reliance by persons not familiar with Indian accounting practices, Ind AS, the Companies Act and the InvIT Regulations on the summary financial information presented below should be limited.*

### Summary special purpose standalone balance sheet of the Trust

(*in ₹ million*)

| Particulars | As at December 31, 2025 |
|---|---|
| **Assets** | |
| **Non-current assets** | |
| (a) Financial assets | - |
| (i) Investments | - |
| (ii) Loans | - |
| (iii) Other financial assets | - |
| (b) Other non-current assets | - |
| **Total Non-Current Assets** | **-** |
| | |
| **Current assets** | |
| (a) Financial assets | |
| (i) Cash and cash equivalents | - |
| (ii) Other financial assets | - |
| (b) Current tax assets (Net) | - |
| (c) Other Current assets | 0.01 |
| **Total Current Assets** | **0.01** |
| **Total Assets** | **0.01** |
| | |
| **Equity and liabilities** | |
| **Equity** | |
| (a) Unit Capital | - |
| (b) Initial settlement amount | 0.01 |
| (b) Other equity | - |
| **Total Equity** | **0.01** |
| | |
| **Liabilities** | |
| **Non-current liabilities** | |
| (a) Financial liabilities | |
| (i) Borrowings | - |
| **Total Non-Current Liabilities** | **-** |
| | |
| **Current liabilities** | |
| (A) Financial liabilities | |
| (i) Borrowings | - |
| (ii) Trade payables | |
| (a) Total outstanding dues of micro enterprises and small enterprises | - |
| (b) Total outstanding dues of creditors other than micro and small enterprises | - |
| (iii) Other financial liabilities | - |
| (B) Current tax liabilities (net) | - |
| (C) Other current liabilities | - |
| **Total Current Liabilities** | **-** |
| **Total Liabilities** | **-** |
| **Total Equity and Liabilities** | **0.01** |

**Summary special purpose standalone statement of Profit and Loss**

(*in ₹ million*)

| Particulars | For the period from November 24, 2025 to December 31, 2025 |
|---|---|
| **Income and Gains** | |
| (a) Interest income on loan given to subsidiaries | - |
| (b) Interest income on fixed deposits | - |
| (c) Profit on sale of investments | - |
| (d) Other income | - |
| **Total income (I)** | **-** |
| | |
| **Expenses** | |
| (a) Investment Manager Fees | - |
| (b) Trustee Fees | - |
| (c) Valuation expenses | - |
| (d) Annual listing fees | - |
| (e) Rating fees | - |
| (f)Audit fees | |
| - Statutory audit fees | - |
| - Other audit services (including certification) | - |
| (g) Custodian Fees | - |
| (h) Finance Cost | - |
| (i) Other Expenses | - |
| **Total expenses (II)** | **-** |
| | |
| **Profit before tax (III)= (I-II)** | **-** |
| **Tax expense:** | |
| (a) Current tax | - |
| (b) Current tax – earlier years | - |
| (c) Deferred tax expense/(credit) | - |
| **Total tax expenses (IV)** | **-** |
| **Net profit for the period/year (V)= (III-IV)** | - |
| **Other comprehensive income (OCI) (VI)** | |
| (A) (i) Items that will not be reclassified to profit or loss | **-** |
| (ii) Income tax relating to items that will not be reclassified to profit or loss | - |
| (B) (i) Items that will be reclassified to profit or loss | **-** |
| (ii) Income tax relating to items that will not be reclassified to profit or loss | - |
| **Total Comprehensive Income, net of tax (VII)=(V+VI)** | **-** |
| | |
| **Earnings per Unit** | |
| Basic | - |
| Diluted | - |

## Summary Special Purpose standalone Statement of Cash Flows

(*in ₹ million*)

| Particulars | For the period from November 24, 2025 to December 31, 2025 |
|---|---|
| **Cash flows from operating activities** | |
| **Net profit/(loss) before tax** | **-** |
| *Adjustments:* | |
| Finance cost (net) | - |
| Interest income on bank FDR | - |
| Interest income on long term loan given to SPVs | - |
| Profit on redemption of Mutual Funds | - |
| **Operating cash flows before Working Capital changes** | **-** |
| **Movements in Working Capital** | |
| Decrease / (Increase) in Other Financial Assets | - |
| Decrease / (Increase) in Other Current/ Non-Current Assets | - |
| Increase / (Decrease) in Trade & Other Payables | - |
| Increase / (Decrease) in Other Financial Liabilities | - |
| Increase / (Decrease) in Other Current Liabilities | - |
| Increase / (Decrease) in Current Tax Liabilities | - |
| **Cash used in operating activities** | **-** |
| Income tax paid | - |
| **Net cash flows from/(used in) operating activities – (A)** | **-** |
| | |
| **Cash Flows from Investing Activities** | |
| Long term loans given | - |
| Purchase of non-current investments | - |
| Investment in FDR | - |
| Profit on redemption of Mutual Funds | - |
| Interest received on long term loan given | - |
| Interest received from bank | - |
| **Net cash flows used in investing activities – (B)** | **-** |
| | |
| **Cash flows from financing activities** | |
| Proceeds from Issue of unit capital | - |
| Expense incurred towards initial public debt offering | - |
| Expense incurred towards institutional unit allotment | - |
| Processing fee paid | - |
| Proceeds from long term borrowings | - |
| Distribution paid to unit holders | - |
| Repayment of long term borrowings | - |
| Finance costs paid | - |
| **Net cash flows from/(used in) financing activities (C)** | **-** |
| | |
| **Net Increase / (Decrease) in cash and cash equivalents (A+B+C)** | **-** |
| Cash and cash equivalents at the beginning of the period / year | - |
| **Cash and cash equivalents at the end of the period / year** | **-** |

## SUMMARY FINANCIAL INFORMATION OF THE SPONSOR

*The following tables set forth the summary financial information derived from the audited standalone financial statements of the Sponsor, which was prepared in accordance with Section 23 of the National Highways Authority of India Act, 1988 (NHAI Act, 1988) and Rule 6 (5) of National Highways Authority of India (Budget, Accounts, Audit, Investment of Funds and Powers to Enter Premises) Rules, 1990 as amended from time to time, as of and for the financial years ended March 31, 2024, March 31, 2023 and March 31, 2022. The degree to which the summary consolidated financial information included herein below will provide meaningful information is entirely dependent on the reader's level of familiarity with Indian accounting practices, NHAI Act and the InvIT Regulations. Accordingly, any reliance by persons not familiar with Indian accounting practices, NHAI Act and the InvIT Regulations on the summary financial information presented below should be limited.*

***Summary Balance Sheet of the Sponsor as on March 31, 2024, March 31, 2023 and March 31, 2022***

(*in ₹ million*)

| S. No. | Particulars | As on March 31, 2024 | As on March 31, 2023 | As on March 31, 2022 |
|---|---|---|---|---|
| **I.** | **Sources of Funds** | | | |
| 1. | **Shareholders' Fund** | | | |
| | a) Capital | 7,081,775.78 | 4,953,213.20 | 3,365,958.77 |
| | b) Reserves & Surplus | - | - | - |
| 2. | **Grants** | | | |
| | a) Capital | 159,073.83 | 152,821.03 | 150,821.03 |
| 3. | **Borrowings** | | | |
| | a) Secured Loans | 1,989,310.50 | 2,049,785.21 | 2,066,286.65 |
| | b) Unsecured Loans | 1,364,421.47 | 1,381,357.14 | 1,422,785.71 |
| | **Total** | **10,594,581.58** | **8,537,176.59** | **7,005,852.16** |
| **II.** | **Application of Funds** | | | |
| 1. | **Fixed Assets** | | | |
| | a) Gross Block | 4,480.04 | 4,240.94 | 4,098.39 |
| | b) Less:- Assets Created Out of Grant | 75.81 | 75.81 | 75.81 |
| | c) Assets out of own fund | 4,404.23 | 4,165.13 | 4,022.58 |
| | d) Less:- Depreciation | 2,029.60 | 1,786.29 | 1,465.62 |
| | e) Net Block | 2,374.63 | 2,378.85 | 2,556.96 |
| | **Assets held on behalf of GOI (completed & ongoing)** | | | |
| | a) Completed | 4,477,824.47 | 3,834,188.92 | 3,005,155.75 |
| | b) Ongoing | 5,597,504.72 | 4,637,242.72 | 3,947,721.39 |
| | **Total** | 10,075,329.19 | 8,471,431.63 | 6,952,877.14 |
| 2. | **Investment** | **83,299.05** | **65,728.02** | **50,981.33** |
| 3. | **Current Assets, Loans and Advances** | | | |
| | a) Inventories | - | - | - |
| | b) Deposits, Loans & Advances | 564,912.33 | 516,550.35 | 474,854.92 |
| | c) Interest accrued but not due on deposits | - | 4,250.89 | 6,327.32 |
| | d) Interest accrued and due on CALA Deposits | - | 459.44 | 453.28 |
| | e) Cash & Bank Balances | 363,370.12 | 37,570.59 | 39,712.70 |
| | f) Inter unit account | - | - | - |
| | **Sub total** | **928,282.45** | **558,831.26** | **521,348.22** |
| | **Less:- Current Liabilities and Provisions** | | | |
| | a) Liabilities | 493,273.11 | 559,920.36 | 520,860.46 |
| | b) Reserves & Provisions | 1,430.62 | 1,272.80 | 1,051.03 |
| | **Sub Total** | 494,703.73 | 561,193.16 | 521,911.49 |
| | **Net Current Assets** | 433,578.72 | (2,361.90) | (563.28) |
| 4 | **Misc. Expenditure** | - | - | - |
| | (to the extent not written off) | | | |
| 5 | **Profit & Loss Account** | - | - | - |
| | (Debit Balance, if any) | | | |
| | **Total** | **10,594,581.58** | **8,537,176.59** | **7,005,852.16** |

***Summary Statement of Profit and Loss of the Sponsor for the years ended March 31, 2024, March 31, 2023 and March 31, 2022***

(*in ₹ million*)

| S. No. | Particulars | For the year ended on March 31, 2024 | For the year ended on March 31, 2023 | For the year ended on March 31, 2022 |
|---|---|---|---|---|
| **I.** | **Income** | | | |
| | **a)** Value of Work Done | **-** | **-** | **-** |
| | b) Other Income | 267.85 | 322.77 | 341.31 |
| | c) Interest (Gross) | 0.26 | 0.60 | 0.02 |
| | d) Net Increase/ Decrease in work in progress | - | - | - |
| | **Total Income** | 268.11 | 323.37 | 341.33 |
| | | | | |
| **II.** | **Expenditure** | | | |
| | a) Construction Stores/Material Consumed | | | |
| | Other stores, spares & tools etc. consumed | - | - | - |
| | Work Expenses | - | - | - |
| | Personnel & Administrative Expenses | 8,043.03 | 7,236.21 | 6,010.30 |
| | Finance Charges | 1.88 | 11.18 | 4.43 |
| | Depreciation | 258.68 | 232.74 | 202.62 |
| | Assets of Small Value Charged off | 2.20 | 2.72 | 2.77 |
| | | | | |
| | Exceptional Item | | | |
| | Loss on winding up of MTRCL | - | - | 1,270.96 |
| | Less:- transferred to Capital (Sch-1) | - | - | (1,270.96) |
| | Gain on swapping of shares with units | - | - | (1,014.20) |
| | Less:- transferred to Capital (Sch-1) | 41.25 | - | 1,014.20 |
| | Less:- Provision transferred to capital | - | - | - |
| | Loss: Transfer of shares of various SPVs | 2,930.01 | - | - |
| | Loss: Conversion of recoverable accrued interest of various SPVs into shares | 12,406.89 | - | - |
| | Net loss transferred to Capital (Sch-1) | (15,336.90) | - | - |
| | Gain: Recovery of loss from SPVs (MTRCL) | (41.25) | - | - |
| | | | | |
| | **Total Expenditure** | **8,305.79** | **7,482.85** | **6,220.11** |
| I | Profit/ (Loss) for the period | (8,037.68) | (7,159.48) | (5,878.79) |
| | Add:- Prior Period Items net (+/-) | (29.76) | 536.80 | 377.75 |
| | **Transfer of Net Establishment Expenses for the year** | **(8,007.92)** | **(7,696.27)** | **(6,256.54)** |
| | Less/Add : Provision for Taxation | - | - | - |
| | Net Profit | - | - | - |
| | Less:- Transfer to Capital Reserve | - | - | - |
| | Less:- Transfer to other specific Reserve/fund | - | - | - |
| | Less/Add:- Transfer to/ Transfer from General Reserve (+/-) | - | - | - |
| | Less/Add:- Surplus brought forward from previous year | - | - | - |

***Summary Cash flow Statement of the Sponsor for the years ended March 31, 2024, March 31, 2023 and March 31, 2022***

(*in ₹ million*)

| S. No. | Particulars | For the year ended on March 31, 2024 | For the year ended on March 31, 2023) | For the year ended on March 31, 2022 |
|---|---|---|---|---|
| **A.** | **Cash Flow from Operating Activities:-** | | | |
| | Net Profit before tax | (8,037.68) | (7,159.47) | (5,878.79) |
| | Adjustments for:- | | | |
| | Depreciation | 258.68 | 232.74 | 202.62 |
| | Profit/Loss on Sale of assets | (0.63) | (0.52) | (0.43) |
| | Interest Income | (0.26) | (0.60) | (0.02) |
| | **Operating profit before working capital changes** | **(7,779.88)** | **(6,927.85)** | **(5,676.62)** |
| | Adjustments for | | | |
| | (Increase)/Decrease in Deposits, Loans & Advances | (47,769.80) | (41,695.43) | (9,456.43) |
| | Increase/(Decrease) in liabilities | (66,647.25) | 39,059.90 | 98,009.64 |
| | (Increase)/Decrease in Provision for gratuity and Leave encashment | 157.82 | 221.77 | 179.71 |
| | **Cash flow before extraordinary Item & prior period items** | **(122,039.12)** | **(9,341.61)** | **83,056.30** |
| | Loss due to conversion of receivable accrued interest into shares | (12,406.89) | - | - |
| | Prior period item | 29.76 | (536.80) | (377.75) |
| | **Net Cash generated from operating activities** | **(134,416.25)** | **(9,878.41)** | **82,678.55** |
| | | | | |
| **B.** | **Cash Flow from Investing Activities** | | | |
| | Purchase of fixed assets | (255.49) | (55.77) | (1,642.31) |
| | Realisation from sale of assets | 1.65 | 1.66 | 0.74 |
| | (Increase)/Decrease in Capital Work in Progress | (1,380,339.65) | (1,294,048.86) | (1,062,485.83) |
| | (Increase)/Decrease in Investment | (17,571.03) | (14,746.68) | (30,521.60) |
| | Interest Income | 45,643.77 | 25,577.25 | 15,200.33 |
| | Capital Reserve (Receipts) | 1,927.98 | 15,501.31 | 42,019.14 |
| | Net Loss from transfer of shares of various SPVs | (2,930.01) | - | - |
| | Recovery of loss-Winding up of MTRCL | 41.25 | - | - |
| | Loss from investing activities | - | - | (256.76) |
| | **Net cash used in Investing activities** | **(1,353,481.53)** | **(1,267,771.08)** | **(1,037,686.29)** |
| | | | | |
| **C.** | **Cash Flow from financing Activities** | | | |
| | Capital base | 0.00 | 0.00 | 0.00 |
| | Cess funds received from Govt of India | 1,277,274.18 | 1,106,739.21 | 362,100.00 |
| | Capital additional budgetary receipts | 405,358.70 | 197,858.35 | 161,421.80 |
| | Proceeds from InvIT Projects | 156,998.82 | 28,496.67 | 73,504.00 |
| | EAP Grant utilized towards Revenue Expenditure | 6,252.80 | 2,000.00 | 10,000.00 |
| | Adjusted plough back of Toll Remittance, etc. | 304,226.53 | 254,160.21 | 158,054.41 |
| | Net decrease in loan from ADB due to Exchange Loss after Adjustment of Repayments | (1,125.57) | (727.23) | (740.24) |
| | Proceeds from issue of 54EC Capital Gains Tax-Free Bonds | - | 7,975.79 | 50,284.58 |
| | Proceeds/ Repayment from issue of taxable bonds | - | (23,750.00) | 80,757.00 |
| | Proceeds/Repayment From NSSF Loan & Term Loan | (16,935.67) | (11,428.57) | 354,285.71 |
| | Redemption of 54EC Capital Gains Tax-Free Bonds | (47,063.46) | - | - |

| S. No. | Particulars | For the year ended on March 31, 2024 | For the year ended on March 31, 2023) | For the year ended on March 31, 2022 |
|---|---|---|---|---|
| | Redemption of Tax Free Secured Non-Convertible Bonds (10Yr) 11-12 | (12,285.69) | - | (67,140.81) |
| | Redemption of Masala Bonds | - | (30,000.00) | - |
| | Interest and Other expenditure on Bond | (259,003.33) | (255,817.05) | (240,153.34) |
| | | | | |
| | **Net cash generated from financing activities** | **1,813,697.31** | **1,275,507.38** | **942,373.11** |
| | | | | |
| | **Net increase(decrease) in cash and cash equivalents (A+B+C)** | **325,799.54** | **(2,142.12)** | **(12,634.63)** |
| | | | | |
| | Operating cash and cash equivalents | 37,570.59 | 39,712.70 | 52,347.33 |
| | | | | |
| | **Closing cash and cash equivalents** | **363,370.12** | **37,570.59** | **39,712.70** |
| | | | | |
| | **Notes:** | | | |
| | Cash and cash equivalents Include: | | | |
| | Cash and cheques in hand/ in transit | 0.09 | 0.27 | 0.23 |
| | Balance with banks-Current Account | 196,560.15 | 27,347.94 | 24,628.87 |
| | Balance with banks-Saving Bank Account | 161,414.74 | 6,950.86 | 11,574.04 |
| | Balance with banks-Fixed Deposit Account | 5,395.15 | 3,271.52 | 3,509.56 |
| | **Balance as per books of account** | **363,370.12** | **37,570.59** | **39,712.70** |

## SUMMARY FINANCIAL INFORMATION OF THE INVESTMENT MANAGER

*The following tables set forth the summary standalone financial statements of the Investment Manager prepared in accordance with Ind AS and other relevant provisions of the InvIT Regulations, as of and for the period from the date of incorporation of the Investment Manager i.e. August 22, 2025, to November 30, 2025. The degree to which the summary financial information included herein below will provide meaningful information is entirely dependent on the reader's level of familiarity with Indian accounting practices, Ind AS, the Companies Act and the InvIT Regulations. Accordingly, any reliance by persons not familiar with Indian accounting practices, Ind AS, the Companies Act and the InvIT Regulations on the summary financial information presented below should be limited.*

### Summary of Balance Sheet

*(in ₹ million)*

| Particulars | As at November 30, 2025* |
|---|---|
| **Assets** | |
| | |
| **1) Non-current assets** | |
| (a) Financial assets | - |
| (i) Investments | - |
| (ii) Loans | - |
| (iii) Other financial assets | - |
| (b) Other non-current assets | - |
| | |
| **Total non-current assets** | - |
| | |
| **Current assets** | |
| (a) Financial assets | |
| (i) Cash and cash equivalents | 200.93 |
| (ii) Other financial assets | |
| (b) Current tax assets (net) | |
| (c) Other current assets | |
| **Total current assets** | **200.93** |
| **Total assets** | **200.93** |
| | |
| **Equity and liabilities** | |
| Equity | |
| 1) Share capital | 200.00 |
| 2) Initial settlement amount | - |
| 3) Other equity | (0.07) |
| Total equity | 199.93 |
| | |
| **Liabilities** | |
| **1) Non-current liabilities** | |
| (a) Financial liabilities | - |
| (i) Borrowings | - |
| **Total non-current liabilities** | - |
| | |
| **2) Current liabilities** | |
| (A) Financial liabilities | |
| (i) Borrowings | 1.00 |
| (ii) Trade payables | |
| (a) Total outstanding dues of micro enterprises and small enterprises | - |
| (b) Total outstanding dues of creditors other than micro and small enterprises | - |
| (iii) Other financial liabilities | - |
| (c) Current tax liabilities (net) | - |
| (d) Other current liabilities | - |
| **Total current liabilities** | 1.00 |
| **Total equity and liabilities** | 200.93 |

** The Investment Manager was incorporated as a private company under Companies Act, 2013 on August 22, 2025 and accordingly, the financial statements of the Investment Manager are available only for the period from August 22, 2025 to November 30, 2025.*

**Summary statement of Profit & Loss**

*(in ₹ million, unless otherwise stated)*

| Particulars | For the period from August 22, 2025 to November 30, 2025* |
|---|---|
| **Income** | |
| (a) Revenue from operation | - |
| (b) Other income | - |
| **Total income (I)** | **-** |
| | |
| **Expenses** | |
| (a)Audit fees | |
| - Statutory audit fees | - |
| - Other audit services (including certification) | - |
| (b) Finance Cost | - |
| (c) Other Expenses | 0.07 |
| **Total expenses (II)** | **0.07** |
| | |
| **Profit before tax (III)= (I-II)** | **(0.07)** |
| **Tax expense:** | |
| (a) Current tax | - |
| (b) Current tax – earlier years | - |
| (c) Deferred tax expense/(credit) | - |
| **Total tax (IV)** | **-** |
| **Profit after tax (V)= (III-IV)** | **(0.07)** |
| **Other comprehensive income (OCI) (VI)** | |
| (A) (i) Items that will not be reclassified to profit or loss | **-** |
| (ii) Income tax relating to items that will not be reclassified to profit or loss | **-** |
| (B) (i) Items that will be reclassified to profit or loss | **-** |
| (ii) Income tax relating to items that will not be reclassified to profit or loss | **-** |
| **Total Comprehensive Income, net of tax (VII)=(V+VI)** | **(0.07)** |
| | |
| **Earnings per Unit (*in* ₹)** | |
| Basic | (0.01) |
| Diluted | (0.01) |

** The Investment Manager was incorporated as a private company under Companies Act, 2013 on August 22, 2025 and accordingly, the financial statements of the Investment Manager are available only for the period from August 22, 2025 to November 30, 2025.*

**Summary Statement of Cash flows**

*(in ₹ million unless otherwise stated)*

| Particulars | For the period from August 22, 2025 to November 30, 2025* |
|---|---|
| **A. Cash flow from operating activities** | |
| Net Profit / (Loss) before tax | (0.07) |
| *Adjustments:* | |
| Finance cost (net) | - |
| Interest income on bank FDR | - |
| Interest income on long term loan given to SPVs | - |
| Profit on redemption of Mutual Funds | - |
| **Operating cash flows before working capital changes** | (0.07) |
| **Movements in Working Capital** | |
| Decrease / (Increase) in Other Financial Assets | - |
| Decrease / (Increase) in Other Current/ Non-Current Assets | - |
| Increase / (Decrease) in Trade & Other Payables | - |
| Increase / (Decrease) in Other Financial Liabilities | - |
| Increase / (Decrease) in Other Current Liabilities | - |
| Increase / (Decrease) in Current Tax Liabilities | - |
| **Cash used in operating activities** | (0.07) |
| Income tax paid | - |
| **Net cash flows from/(used in) operating activities – (A)** | (0.07) |
| | |
| **B. Cash Flows from Investing Activities** | |
| Long term loans given | - |
| Purchase of non-current investments | - |
| Investment in FDR | - |
| Profit on redemption of Mutual Funds | - |
| Interest received on long term loan given | - |
| Interest received from bank | - |
| **Net cash flows used in investing activities – (B)** | - |
| | |
| **C. Cash flow from financing activities** | |
| Proceeds from Issue of share capital | 200.00 |
| Expense incurred towards initial public debt offering | - |
| Expense incurred towards institutional unit allotment | - |
| Processing fee paid | - |
| Proceeds from long term borrowings | 1.00 |
| Distribution paid to unit holders | - |
| Repayment of long term borrowings | - |
| Finance costs paid | - |
| **Net cash flow from / (used in) financing activities (C)** | **201.00** |
| | |
| Net increase / (decrease) in Cash and cash equivalents (A+B+C) | **200.93** |
| **Cash and cash equivalents as at the beginning of the period/year** | **-** |
| **Cash and cash equivalents as at the end of the period/year** | **200.93** |

** The Investment Manager was incorporated as a private company under Companies Act, 2013 on August 22, 2025 and accordingly, the financial statements of the Investment Manager are available only for the period from August 22, 2025 to November 30, 2025.*

## RISK FACTORS

*An investment in the Units involves a high degree of risk. Investors should carefully consider all the information in this Draft Offer Document, including the risks and uncertainties described below, before making an investment in the Units. If any of the following risks actually occurs, the business, results of operations and financial condition of the Trust could suffer, the price of the Units could decline and investors may lose all or part of their investment. The risks and uncertainties described below are not the only risks that the Trust faces or may face. Additional risks and uncertainties not presently known to the Investment Manager and the Trust or that they currently believe to be immaterial may also have an adverse effect on the business, results of operations and financial condition of the Trust and as a result, the returns on investments of the Unitholders. If any of the following risks, or other risks that are not currently known or are currently considered immaterial, actually occur, our business prospects, results of operations, cash flows and financial condition could suffer, the price of the Units could decline, and Bidders may lose all or part of their investment. Unless specified or quantified in the relevant risk factors below, the Investment Manager and the Sponsor are not in a position to quantify or specify the financial or other implications of any of the risks described in this section.*

*In making an investment decision, Bidders must rely on their own examination of the Trust and the terms of the Issue, including the merits and risks involved. To obtain a complete understanding, this section should be read in conjunction with the sections entitled "Business" and "Discussion and Analysis by the Directors of the Investment Manager of the Financial Condition, Results of Operations and Cash Flows of the Project SPV of the Trust" on pages 155 and 211, respectively as well as the financial statements and other financial information included elsewhere in this Draft Offer Document. Before investing in the Units, Bidders should obtain professional advice on investing in the Issue.*

*Investors should be aware that the price of the Units, and the income from them, may be subject to volatility. If any of the risks described below occurs, our business and prospects could be materially and adversely affected, the trading price of the Units could decrease, and investors could lose all or part of their original investment.*

*This Draft Offer Document also contains forward-looking statements that involve risks and uncertainties and assumptions. The Trust's actual results could differ materially from those anticipated in these forward-looking statements as a result of certain factors, including considerations described below and in the section entitled "Forward-Looking Statements" on page 17.*

*In making an investment decision, Bidders must rely upon your own examination and the terms of the Issue, including the merits and the risks involved. You should consult your tax, financial and legal advisors about the particular consequences of investing in the Issue.*

*In this section, unless specified otherwise, a reference to "we", "us" and "our" refers to the Trust and the Project SPV on a consolidated basis.*

### Risks Related to the Structure of the Trust

**1. *The Trust is a newly settled trust with no operating history and limited historical financial information and, as a result, investors may not be able to assess its prospects on the basis of past records and the financial information disclosed in this Draft Offer Document.***

The Trust was set-up on November 24, 2025 under the provisions of the Indian Trust Act, 1882 and it is registered as an infrastructure investment trust with SEBI on December 22, 2025, in accordance with InvIT Regulations. The Project SPV was incorporated on November 21, 2025, for the purpose of entering into the Concession Agreements to acquire tolling rights for undertaking tolling, operation, and maintenance of national highways in India. As a newly established entity, the Trust and the Project SPV do not have any operating history or historical financial information by which their past performance may be assessed. This could make it difficult for investors to assess the likely performance of the Trust and the Project SPV. Accordingly, there can be no assurance that the Project SPV will be able to generate sufficient cash flows from the operations of the InvIT Assets to make distributions to the Unitholders or that such distributions will be as anticipated with those set out in the section entitled *"Distribution"* on page 216. Our inability to successfully operate and manage the Toll Roads or to operate and manage the Toll Roads in an efficient and cost-effective manner could have an adverse effect on our results of operations and our ability to meet our payment obligations under the Units.

2. ***We have not executed any binding agreements with respect to the proposed acquisition of the InvIT Assets including any concession agreement or any binding agreement of Issue Proceeds including the Facility Agreement, and our ability to enter into the Concession Agreements and other binding agreements will impact the ability of the Investment Manager to complete this Issue.***

As on the date of this Draft Offer Document, the InvIT Assets are currently owned and managed by the NHAI. While we have received the approval of NHAI for monetisation of the InvIT Assets on December 20, 2025, we have not executed the concession agreements in relation to the InvIT assets. Such agreements shall be executed prior to the filing of the Final Offer Document, and the underlying transactions will be consummated or become effective, as applicable, after the filing of the Final Offer Document. Post the filing of this Draft Offer Document and basis the approval from the IM Board on January 12, 2026, we intend to make an offer to NHAI to grant us concessions for each of the five InvIT Assets, at a certain price or on such terms as may be mutually agreed between the parties.

There can be no assurance that NHAI will accept our offer or grant us concessions rights for any or all of the InvIT Assets. Accordingly, the execution of the Concession Agreements are subject to NHAI's acceptance of our offer and fulfilment of conditions precedent and other contractual requirements.

If NHAI does not accept the offer or if its acceptance is delayed beyond the timelines contemplated in this Draft Offer Document, we may be unable to proceed with the Issue and it could materially and adversely affect our business, prospects, financial condition, results of operations and cash flows and it may adversely impact our ability to complete the Issue within the anticipated time frame or at all.

We have also not executed binding agreements including the Facility Agreement with respect to the proposed utilization of the Issue Proceeds. For further details, see *"Use of Proceeds"* and *"Formation Transactions in relation to the Trust"* on pages 206 and 23. Such agreements shall be executed prior to the filing of the Offer Document, and the underlying transactions shall be consummated or become effective, as applicable, after the Bid/Issue Closing Date and prior to the Allotment of Units pursuant to the Issue, with the consideration being paid only after the Listing Date in accordance with applicable laws. Furthermore, in the event of a shortfall of funds from the Issue Proceeds, the Trust shall be required to rely on alternative sources of funding, including, inter alia, external debt, and we cannot assure you that funds shall be available to the Trust in a timely manner, or at all.

3. ***We have sought exemptions from the strict application of certain requirements under the InvIT Regulations including in relation to the preparation of the combined financial statements of the Trust, Project SPV and the InvIT Assets. There can be no guarantee that SEBI will grant such exemptions, in a timely manner or at all.***

The Sponsor has submitted a request to SEBI dated January 14, 2026 seeking exemptions under the InvIT Regulations and the SEBI InvIT Master Circular in respect of: (i) preparation and disclosure of consolidated financial statements of the Sponsor prepared on a consolidated basis in accordance with Indian Accounting Standards for financial years ended March 31, 2022, March 31, 2023 and March 31, 2024; (ii) disclosure of audited financial statements of the Sponsor for the financial year ended March 31, 2025; (iii) exemption from strict application of certain provisions of the InvIT Regulations and SEBI InvIT Master Circular in respect of disclosure of financial statements of the InvIT Assets proposed to be held by the Trust and related disclosure requirements including combined financial statements of the Trust and any other applicable disclosure requirements arising in relation to preparation and disclosure of combined financial statements under the SEBI; (iv) disclosure of material litigation and regulatory actions pending against the associates of the Trust, Sponsor, Investment Manager, and Project Manager; (v) exemption from compliance with Regulation 10(7) of the InvIT Regulations read with paragraph 6(a)(vi) of Schedule III to the InvIT Regulations with respect to the InvIT Assets being adequately insured; (vii) exemption from compliance with Regulation 2(zy)(b) of the InvIT Regulations with respect to the Project SPV holding at least 90.00% of its assets directly in infrastructure assets; and (viii) exemption from compliance with Clause 18.2 of the SEBI InvIT Master Circular with respect to dematerialisation of the securities of Project SPV.

As a result, this Draft Offer Document does not include historical consolidated financial statements of the Sponsor, combined financial statements of the Trust and Project SPV, or certain disclosures relating to material litigations of associates. Instead, it includes summary standalone financial statements of the Sponsor prepared under IGAAP for the financial years ended March 31, 2022, March 31, 2023, and March 31, 2024, and project wise revenue data of the InvIT Assets collected from tolling and maintenance contracts for the period from April 1, 2022 to December 31, 2025.

Further, as on the date of this Draft Offer Document, (i) the equity shares of the Project SPV which are held by the InvIT are not in dematerialised form; (ii) the Project SPV does not have any assets; (iii) the InvIT Assets do not have any insurance obtained by us; and (iv) the Parties to the Trust have not identified any associates.

As on the date of this Draft Offer Document, the exemption requests are yet to be acceded by SEBI. In the event that the requested exemptions are not acceded to by SEBI, the Trust and the Sponsor may be required to provide such consolidated and combined financial statements and additional disclosures regarding the InvIT Assets and the associates in the Final Offer Document. There can be no assurance that (i) the Sponsor and relevant entities will be able to provide all necessary financial information and confirmations required under the InvIT Regulations and SEBI InvIT Master Circular, and (ii) such disclosures would not result in adverse information or risks that could materially and adversely affect the assessment of the Trust, the Sponsor, or the InvIT Assets by investors.

**4.** ***We must maintain certain investment ratios, which may present additional risks to us.***

Pursuant to the InvIT Regulations, we are required to invest not less than 80.00% of the value of our assets proportionate to our holding in completed and revenue generating infrastructure projects subject to conditions specified in the InvIT Regulations. In addition, we must not invest more than 20.00% of the value of our assets in under-construction infrastructure projects and certain financial instruments such as listed or unlisted debt of companies or body corporate in infrastructure section, equity shares of companies listed on a recognized stock exchange, government securities, money market instruments, amongst others, subject to the thresholds specified in the InvIT Regulations. If these conditions are breached on account of market movements of the price of the underlying assets or securities, the Investment Manager must inform the Trustee and ensure that these conditions are satisfied within six months of such breach (or within one year with Unitholder approval in accordance with the InvIT Regulations). Additionally, under the InvIT Regulations, the aggregate consolidated borrowings and deferred payments, net of cash and cash equivalents, cannot exceed 70% of the value of the assets of the Trust or such threshold as may be specified under the InvIT Regulations. Failure to comply with these conditions may present additional risks to us, including divestment of some or all of our assets, delisting of units from the Stock Exchanges and other penalties, which could have a material, adverse effect on our business, financial condition and results of operations.

**5.** ***The ability of the Trust to make or maintain consistency in distributions to Unitholders depends on the financial performance of the Project SPV and their profitability.***

The amount of future distributions, if any, will depend upon various factors including future earnings, financial condition, cash flows, working capital requirements and capital expenditures of the Project SPV and the dividends, interest payments and repayments of indebtedness that are distributed by the Project SPV to the Trust. The income earned from the InvIT Assets depends on, among other things, the amount of income generated from annuities and the level of operating and other expenses incurred. If the Project SPV do not generate sufficient operating profit, the income of the Trust, cash flows and ability to make distributions or level of distributions made to Unitholders will be adversely affected.

The Trust will substantially rely on the receipt of interest, dividends, and principal repayments (net of applicable taxes and expenses) from the Project SPV in order to make distributions to Unitholders. The distributions to Unitholders will be in the form of dividends, interest and any other means permitted by law. There can be no assurance or guarantee that the Trust will have sufficient distributable or realised profits or surplus in any future period to make distributions every year in any amount or at all. The ability of the Project SPV to make dividend payments may be affected by a number of factors, among other things:

a. its business, operational performance and financial position;
b. insufficient cash flows received from the Project SPV;
c. restrictions under applicable laws and regulations;
d. ability of the Project SPV to borrow funds and access capital markets;
e. operating losses incurred by the Project SPV in any financial year;
f. terms and conditions, covenants or any other stipulations applicable to external commercial borrowings availed by the Trust or the Project SPV;
g. changes in accounting standards, taxation laws and regulations, corporation laws and regulations relating thereto; and
h. restrictive covenants or the terms of agreements, including the Concession Agreements or financing agreements, to which the Project SPV is, or may become, a party.

In addition, the InvIT Regulations provide that the Trust must distribute not less than 90% of net distributable cash flows of each Project SPV in proportion of its holding in each of the Project SPV subject to the applicable provisions of the Companies Act, 2013. The distributions to Unitholders must be declared not less than once every six months in every financial year and shall be made within five working days from the record date, being two working days from the date of such declarations, excluding the date of declaration and the record date, in accordance with InvIT Regulations. There is no assurance that the Trust will be able to make distributions to the Unitholders or that such distributions will be consistent across various periods. For further details, see the section titled "*Distribution*" on page 216.

Further, the method of calculating the net distributable cash flows of a Project SPV is subject to change and any change in the applicable laws in India or elsewhere may limit the Trust's ability to pay or maintain consistency in distributions to Unitholders. There is also no assurance that the expansion of the Trust's portfolio of infrastructure assets will increase the Trust's cash flows and thereby result in an increase in the level of distributions to Unitholders over time.

6. ***We depend on the Investment Manager, the Project Manager and the Trustee to manage our business and assets, and our financial condition, results of operations and cash flows and our ability to make distributions may be harmed if the Investment Manager, Project Manager or the Trustee fail to perform satisfactorily. The rights of the Trust and the rights of the Unitholders to recover claims against the Project Manager, the Investment Manager or the Trustee may be limited***.

The success of our business and growth strategy and the operational success of our assets will depend significantly upon the managers' satisfactory performance of these services. Our recourse against the Project Manager, the Trustee and Investment Manager, is limited.

The aggregate maximum liability of the Project Manager under the Project Implementation and Management Agreement in each financial year shall be limited to the fees payable to the Project Manager in such financial year in accordance with the terms of the Project Implementation and Management Agreement provided that such maximum aggregate liability shall not be applicable in the event such liability of the Project Manager arises out of any gross negligence, wilful default, wilful misconduct or fraud on the part of the Project Manager, as determined by a court of competent jurisdiction.

If the Trustee is required by the InvIT Regulations or any applicable law to provide information regarding the Trust or the Sponsor/Sponsor Group or the Unitholders, the investments made by the Trust and income therefrom and provisions of such presents, and complies with such request in good faith, whether or not it was in fact enforceable, the Trustee shall not be liable to the Unitholders or to any other party as a result of such compliance or in connection with such compliance. The Trustee is also not liable on account of anything done or omitted to be done or suffered by the Trustee in good faith in accordance with, or in pursuance of any request or advice of the Investment Manager. Further, the Trustee is not liable for any act or omission which may result in a loss to a Unitholder (by reason of any depletion in the value of the fund of the Trust or otherwise), except in the event that such depletion is a result of fraud, gross negligence or misconduct on the part of the Trustee or results from a breach by the Trustee of the Trust Deed, as determined by a court of competent jurisdiction. The liability of the Trustee shall be limited to the extent of the fees received by it, in all circumstances whatsoever except, amongst others, in case of any negligence or misconduct or fraud on the part of the Trustee as may be determined by a court of competent jurisdiction.

The Investment Manager's liability to Trustee, its directors, employees and officers ("**Trustee Party**") for breach of its obligations under the Investment Management Agreement in each financial year is limited to the aggregate fees paid to the Investment Manager for immediately preceding one financial year under the agreement. Further, the Investment Manager shall indemnify the Trustee Party against any and all direct and actual losses, actions, claims, suits, proceedings, damages, liabilities, costs and expenses including legal fees, incurred or suffered by the Trustee Party in connection with the material breach of any of the terms specified under the Investment Management Agreement. Accordingly, the Unitholders may not be able to recover claims against the Project Manager, the Trustee or the Investment Manager.

If the management agreements were to be terminated or if their terms were to be altered, our business could be adversely affected, as the Trustee may not be able to immediately replace such services, and even if replacement services were immediately available, the terms offered or obtained with the new managers could be less favourable than the ones currently offered by the Investment Manager and the Project Manager.

**7.** ***Our success depends in large part upon the Investment Manager and Project Manager, the management and personnel that they employ, and their ability to attract and retain such persons.***

Our ability to make consistent distributions to our Unitholders depends on the continued service of management teams and personnel of the Investment Manager and Project Manager. Each of the Investment Manager and Project Manager may face challenges in recruiting and retaining a sufficient number of suitably skilled personnel. Generally, there is significant competition for management and other skilled personnel in our industry in India, and it may be difficult to attract and retain the skilled personnel that the Investment Manager and Project Manager need for our operations. Furthermore, the Investment Manager and Project Manager may not be able to adequately re-deploy and re-train their employees to keep pace with evolving industry standards and changing customer preferences. The loss of key personnel of either of the Investment Manager or the Project Manager, may have a material adverse effect on our business, prospects, financial condition, results of operations and cash flows of the Trust.

**8.** ***We are governed by the provisions of, amongst others, the InvIT Regulations and the SCRA, the implementation and interpretation of which, is evolving. The evolving regulatory framework governing infrastructure investment trusts in India may have a material adverse effect on the ability of certain categories of investors to invest in the Units, our business, financial condition and results of operations and our ability to make distributions to the Unitholders.***

The Trust has been constituted under the InvIT Regulations which were issued on September 26, 2014. The InvIT Regulations have been amended pursuant to various notifications and further supplemented with additional guidelines and circulars issued by SEBI from time to time.

As the regulatory framework governing infrastructure investment trusts in India comprises a separate set of regulations, interpretation and enforcement by regulators and courts involves uncertainties. Furthermore, regulations and processes with respect to certain aspects of infrastructure investment trusts, including, but not limited to, follow-on public offers and bonus issues, the liabilities of the Unitholders, and the procedure for dissolution of infrastructure investment trusts have not yet been issued. For example, infrastructure investment trusts are not "companies" or "bodies corporate" within the meaning of the Companies Act, 2013 and various SEBI regulations, including the Securities and Exchange Board of India (Buy-back of Securities) Regulations, 2018 and the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulations, 2011.

The InvIT Regulations and other corresponding changes to applicable law, are largely untested in their implementation. Uncertainty in applicability, interpretation or implementation of any amendment to, or change in, law, regulation or policy, including due to an absence, or a limited body, of administrative or judicial precedent may be time consuming and costly for us to resolve and may impact the viability of our current business or restrict our ability to grow our business in the future and consequently, our ability to make distributions to the Unitholders. Changes to our organizational structure, changes to our agreements, cost increases, fines, legal fees or business interruptions may result from changes to regulations, from new regulations, from new interpretations by courts or regulators of existing regulations or from stricter enforcement practices by regulatory authorities of existing regulations. In addition, new costs may arise from audit, certification and/or self-assessment standards required to maintain compliance with new and existing InvIT Regulations, which may render it economically unviable to continue conducting business as an infrastructure investment trust or otherwise have a material, adverse effect on our business, financial condition, results of operations and cash flows.

Further, SEBI has the right to, with or without prior notice, order inspection of the books of accounts, records and other documents pertaining to our operations, either on its own or, upon receipt of complaint. Upon review of the inspection report, SEBI is entitled to, if it so deems appropriate (in the interest of the securities markets or our investors) (a) to require us to surrender our certificate of registration; (b) to wind-up our operations; (c) to sell our assets; (d) direct us to not operate or access the capital markets for a specified period; or (e) direct us to not do such things as SEBI may deem appropriate in the interest of our investors. Any such occurrence may have a material adverse effect on our business, result of operations, financial conditions and cash flows.

Additionally, with effect from April 1, 2021, units and other instruments issued by an InvIT have been included in the definition of 'securities' under section 2(h) of the SCRA. Such amendments have come into effect on April 1, 2021, and consequently, the implementation and interpretation of these amendments is untested and evolving. Accordingly, the applicability of several regulations (including regulations relating to intermediaries, merchant

bankers, takeover, insider trading and fraudulent and unfair trade practices) to the Trust is unclear and subject to the interpretation and clarifications issued by regulatory bodies such as SEBI.

There can be no assurance that the legal framework for infrastructure trusts will not impose additional regulations and policies which could impact our operations and it is difficult to forecast how any new laws, regulations or standards or future amendments to the InvIT Regulations, the SCRA and other applicable law will affect infrastructure trusts and the infrastructure sector in India. Such changes may adversely affect our business, results of operations and prospects, to the extent that we are unable to suitably respond to and comply with any such changes in applicable law and policy. We may incur increased costs and other burdens relating to compliance with such new regulations, which may also require significant time and other resources, and any failure to comply with these changes may adversely affect our business, results of operations and prospects.

**Risks Relating to Our Business and the Concession Agreements**

**9. *Any payment by the Project SPV, including in the event of the termination of the Concession Agreements, is subject to a mandatory escrow arrangement which restricts its flexibility to utilise the available funds.***

Under the terms of the Concession Agreements, the Project SPV is required to establish escrow account prior to the appointed date. All funds received by the Project SPV, including the financial package, all fees and other revenues from or in respect of the projects (including proceeds of any rentals, deposits, capital receipts or insurance claims), and all payments by the NHAI and the relevant concessioning authorities, must be deposited into an escrow account and can only be used according to a pre-determined order set out in the relevant concession agreements and the escrow agreement. For a summary of the escrow arrangements, please see the section titled "*Summary of Concession Agreements*" on page 195.

The escrow arrangements provide for appropriation of funds towards payment of all taxes due and payable, followed by the payment of concession fee to the NHAI, payment of expenses in connection with the construction of the project, operation and maintenance expenses and other costs and expenses incurred by the Sponsor in its capacity as concessioning authority and certified as payable, provision for debt service payments, any payments and damages certified by the concessioning authority as due and payable to the concessioning authority, and balance, if any, in accordance with the instructions of the concessionaire. Further, the concessionaire cannot modify the order of payments without prior written approval of the NHAI and the lenders.

The debt financing proposed to be provided by the Trust to the Project SPV comprises of certain secured and/or unsecured interest-bearing loans (collectively, the "**Trust Financing**"). In accordance with the escrow arrangement, the amounts payable to the Trust in respect of the Trust Financing, will be subordinated to the amounts payable in respect of taxes due, concession fees, construction related expenses, operation and maintenance and other costs and expenses. Further, any reduction in the cash flows of the Project SPV and/or an unanticipated increase in any of the abovementioned payments to be made by the Project SPV from the escrow accounts may result in decreased and/or delayed payment to the Trust, materially and adversely impacting the ability of the Project SPV to meet their payment obligations to the Trust. Any inability on the part of the Project SPV to meet their payment obligations to the Trust may adversely impact the ability of the Trust to make distributions to the Unitholders in the manner described in this Draft Offer Document or at all.

In the event of termination and withdrawal of funds from the escrow account, the escrow arrangement prioritises the payment of all taxes due and payable the concessionaire for and in respect of the projects, payment due to lenders, all payments and damages certified by the concessioning authority as due and payable, retention and payments relating to liability for defects and deficiencies, incurred or accrued operation and maintenance expenses, and any other payments required to be made under the Concession Agreements. Therefore, in case of termination, the amounts payable to the Trust in respect of the Trust Financing may be recovered in accordance with the order of priority specified under the Concession Agreements.

**10. *Upon completion of the Issue, the Sponsor may be able to exercise significant influence over activities of the Trust on which Unitholders are entitled to vote. The Sponsor and Sponsor Group's interests may be different from the other Unitholders.***

Under the InvIT Regulations, upon completion of the Issue, the Sponsor and the Sponsor Group, collectively, are required, must continue to own all of their Units for one year and must own at least 15.00% of the outstanding Units for three years from the date of listing of the Units, subject to the conditions specified in the InvIT Regulations. Although the Investment Manager will have an independent board of directors, the Sponsor may

nonetheless be in a position to exercise significant influence in matters which require the approval of Unitholders by virtue of its ownership of Units in the Trust. The interests of the Sponsor may conflict with the interests of our other Unitholders and the Sponsor may, for business considerations or otherwise, seek to benefit itself instead of the Trust or the interests of the other Unitholders. The Sponsor will also exercise influence over the Investment Manager and the Project Manager, as the Sponsor holds 26.00% shareholding in the Investment Manager and 100.00% shareholding in the Project Manager (wholly owned subsidiary of the Sponsor). Accordingly, the Investment Manager and Project Manager may also be subject to conflicts of interest with respect to the Trust.

Pursuant to the Commitment Letter, while the Sponsor has undertaken to hold 15.00% of the Units of the Trust for five years and 10.00% thereafter, under the InvIT Regulations the Sponsor and Sponsor Group will be able to divest its holding in the Units at any time three years from the date of listing of Units after completion of the lock-in period prescribed under the InvIT Regulations. Given the influence that the Sponsor exerts on the Investment Manager, and consequently the operations, governance and credibility of the Trust, any material divestiture by the Sponsor in the Units, or any conflict of interest that it has compared to that of other Unitholders, could have a material adverse impact on our business, financial condition and results of operations.

**11.** ***The cost of implementing new technologies for collection of tolls and monitoring our projects could materially and adversely affect our business, financial condition and results of operations.***

Our future success will depend in part on our ability to respond to technological advances and emerging standards and practices in a timely and cost-effective manner. In addition, rapid and frequent technology and market-demand changes can often render existing technologies and equipment obsolete, requiring substantial new capital expenditures or write-downs of assets. For instance, we are required to implement automatic number plate recognition ("**ANPR**") camera and RFID (FASTAG) based barrier less multi lane free flow (MLFF) tolling system at the toll plaza location on the respective highway stretches. The concessioning authority may also require the Project SPV to implement and adhere to certain technologies in connection with the projects in the future and there can be no assurance that we would be able to do so in a timely manner, or at all. Any failure by us to successfully adopt such technologies in a timely and cost-effective manner could increase the cost of operating the projects. Such delays or challenges may also result in operational inefficiencies or non-compliance with concession requirements. There is no guarantee that the cost of implementing new technologies for the projects will be fully reimbursed by the concessioning authority and any such cost may therefore have an adverse effect on our business, results of operations and financial condition.

**12.** ***We may face limitations and risks associated with debt financing and refinancing, which may adversely affect our operations and our ability to make distributions to Unitholders.***

We are subject to regulatory restrictions in relation to our debt financing and refinancing. We may from time to time require debt financing and refinancing to carry out the Investment Manager's investment strategy and to cover maintenance costs. In the event that we undertake debt financing or refinancing, we may be limited by Indian law as to the nature of financing or refinancing that we may undertake. As a trust, we may be unable to access certain debt capital available to companies.

In the event that we undertake debt financing or refinancing, we may also be subject to risks associated with debt financing and refinancing, including the risk that our cash flow may be insufficient to meet required payments of principal and interest under such financing and to make distributions to Unitholders. Our ability to generate sufficient cash to satisfy our debt obligations will depend on our future operating performance, which may be affected by prevailing economic conditions and financial, business and other factors beyond our control. There is no assurance that we will be able to generate sufficient cash flow to meet all of our debt obligations. If we are unable to make payments due under our debt facilities, the lenders may be able to declare an event of default and initiate enforcement proceedings relating to any security provided in respect of the loan facilities, and/or call upon any guarantees, and this may materially and adversely affect our ability to make distributions to Unitholders. Such default may also result in the termination of the Concession Agreements by the Sponsor.

We may also be subject to certain covenants in connection with any future borrowings that may limit or otherwise adversely affect our operations and our ability to make distributions to Unitholders, such as covenants restricting our ability to acquire assets or undertake other capital expenditure, requirements to set aside funds for maintenance or repayment of security deposits or requirements to maintain certain financial ratios. For further details, see *"Financial Indebtedness and Deferred Payments"* on page 210.

Further, if prevailing interest rates or other factors at the time of financing or refinancing (including changes in market conditions and maturity term imposed by any lenders) result in higher interest rates, the interest expense may be significant and may have an adverse effect on our cash flow and the amount of distributions available to Unitholders.

**13.** ***We may be required to pay additional stamp duty if the Concession Agreements are subject to payment of stamp duty as a deed creating leasehold rights, or as a development agreement.***

For the purposes of stamp duty payment, concession agreements are generally considered to be agreements which are not lease deeds and stamp duty ranging between ₹ 100.00 to ₹ 500.00 is typically paid for such concession agreements. However, stamp duty authorities of certain states in India have issued notices to some concessionaires alleging inadequate stamp duty on the concession agreements executed between the concessionaires and the relevant concession authority treating the concession agreements as lease deeds. The stamp authorities allege that since concession agreements relate to the letting of tolls to the concessionaires in the form of leases, or as development agreements, such agreements were required to be stamped as lease agreements or development agreements, as applicable. The stamp duty for a lease agreement or a development agreement ranges between 1.00% and 11.00% of the annual rent or premium payable or the market value of the property. Furthermore, stamp duty authorities may impose penalties for payment of inadequate stamp duty, which could extend up to ten (10) times the amount of the stamp duty payable. Accordingly, concession agreements that have not been stamped as such could be considered to be inadequately stamped. The High Courts of Allahabad and Maharashtra have also held that a concession agreement ought to be stamped as a lease agreement and have upheld the imposition of a higher stamp duty on such agreements. Furthermore, pursuant to the judgments issued by the Hon'ble Supreme Court of India, a concession agreement for a toll road has been categorized as a "lease" under the Indian Stamp Act, 1899. As a result, the stamp duty provisions that apply to leases are now applicable to these agreements.

If any Concession Agreements were determined to be inadequately stamped, then such agreements would be inadmissible as evidence in any legal action, until the deficient amount of stamp duty together with penalties, if any, has been paid. Any deficiently stamped documents can also be impounded by any person having authority, by law or consent, to receive evidence or every person who is in-charge of a public office, and such impounded documents could be made subject to stamp duty and penalty. In addition, a person who signs an instrument chargeable with stamp duty will be subject to a fine if such instrument is not duly stamped. Any additional stamp duty payable in respect of the Concession Agreements, if any, shall be reimbursed by NHAI, as confirmed by them vide letter dated January 12, 2026.

While we believe we have discharged our obligation of stamp duty on each of the Concession Agreements adequately, if any demand for payment of a higher stamp duty or penalty is imposed which would increase the costs of the InvIT Assets and NHAI fails to reimburse us for the same, then to the extent such additional costs are not recoverable from the concessioning authority, such demand could adversely affect our business, results of operations and prospects.

**14.** ***Certain actions of the Project SPV requires the prior approval of NHAI, and no assurance can be given that NHAI will approve such actions in a timely manner or at all.***

Certain terms and conditions in the Project SPV's Concession Agreements including, financing agreements require NHAI's prior written approval to be obtained for one or more of the following actions, among others, such as:

a. amendment, modification, or replacement by the Project SPV of any project agreements (including financing agreements) relating to the operation of the road asset to which the Project SPV is a party if the amendment, modification, or replacement of such agreement increases or imposes any financial liability or obligation on the concessioning authorities;
b. assignment of the Concession Agreements to any persons, the creation of any encumbrance over, or security interest over, or transfer or disposal of rights and benefits of the Project SPV under the Concession Agreements or any project agreements;
c. the selection or replacement of any operation and maintenance contractor and execution of the operation and maintenance agreements;
d. securing refinancing;
e. abandoning, or manifesting an intention to abandon, the operation and maintenance of the InvIT Assets; and
f. any change in ownership of the Project SPV.

Furthermore, the Concession Agreements typically require the submission to NHAI, for its review and comments, all project agreements (including, financing agreements, O&M contracts) to which the Project SPV is a party prior to entry, amendment or replacement of such agreements, even if such agreements do not affect the financial liability or obligations of the concessioning authorities.

The restrictions described above may impose constraints on our flexibility to conduct our business. Further, if as a result of these restrictions, we are unable to pursue a favourable course of action or to respond to an unfavourable event, condition or circumstance, then our business, financial condition and results of operations may be materially and adversely affected. For further details on the terms of the Concession Agreements, section headed "*Summary of the Concession Agreements*" on page 195.

**15. *The Project SPV's toll-road concessions may be terminated prematurely under certain circumstances, which could materially affect our business, operating results, financial condition and cash flows.***

The Toll Roads concessions of the Project SPV are our principal assets. Our ability to collect tolls or receive contractual payments from the authorities and consequently, to distribute funds to our unitholders depends on the Project SPV maintaining its concession rights from the concessioning authority, in its capacity as concessioning authority. The Project SPV will be unable to continue the operation of a particular road concession without a continuing concession right from the concessioning authority, in its capacity as concessioning authority. Concession Agreements may be terminated by the concessioning authority, in its capacity as concessioning authority for certain reasons set forth herein, including, but not limited to, one or more of the following events of default by the Project SPV:

a. any failure by the Project SPV to comply with the change of ownership requirements;
b. any failure by the Project SPV to make any payments to the concessioning authority, including concession fees, within a prescribed period;
c. any failure by the Project SPV to comply with the prescribed operation and maintenance requirements;
d. abandonment or intention to abandon construction or operation of a project by us without the prior written consent of the concessioning authority;
e. failure to comply with the provisions of the escrow agreements entered into with the concessioning authority or other regulatory authorities;
f. any occurrence of an event of default under any project agreement, including financing agreements;
g. insolvency, liquidation, dissolution, winding-up, or bankruptcy of the Project SPV or appointment of a trustee, receiver, or provisional liquidator for its assets;
h. any continuation of a force majeure event, such as an act of God, act of war, expropriation or compulsory acquisition of any project assets by the government, strikes, civil commotions, boycotts and political agitations, beyond a specified time; and
i. any failure by the Project SPV to comply with the Concession Agreements if such default causes a material adverse effect on the concessioning authority.

If the Concession Agreements are terminated by the NHAI due to a default by the Project SPV, or by the Project SPV due to a default by the NHAI, the Project SPV is entitled to termination payments or otherwise from the NHAI in accordance with the terms of the relevant Concession Agreements. If the Concession Agreements are terminated prematurely, our business, financial condition and results of operations may be materially and adversely affected. For further details on the termination of the relevant Concession Agreements, the termination payments, and the definition of "default" as contemplated under the Concession Agreements, see the section headed "*Summary of the Concession Agreements*" on page 195.

**16. *Toll collections and Toll Road traffic volumes may be affected by existing or new competing roads and bridges and other modes of transportation, and any improvements to, or construction of, such roads, bridges and other modes of transportation.***

Upon commencement of the concessions, our principal source of revenue will be the collection of toll fees from users of the Toll Roads. The level of toll collections may be affected by existing or new competing routes and alternative modes of transportation, such as adjacent free roads, new or existing toll roads including national highways or state toll roads, railways or air transport. Although the Concession Agreements contain certain restrictions on the ability of the concessioning authority, to construct or cause to be constructed any competing roads within 15 kms of the Toll Roads, the concessioning authority is not prohibited from constructing such competing free or toll roads if the average traffic on the Toll Road exceeds 90.00% of its designed capacity for three consecutive years, as stipulated in the Concession Agreement. Furthermore, the concessioning authority is

not restricted under the Concession Agreements from constructing alternative modes of travel which service the same areas as are serviced by the Toll Roads.

In particular, the Sponsor (in its capacity as the concessioning authority) has entrusted the Project SPV with the role of development, operation, maintenance and management of the toll roads mentioned hereinbelow.

| Toll Road | Length of Toll Road (in kms) | Lanes | State |
|---|---|---|---|
| Gorhar – Barwa Adda | 80.522 | Four/six | Jharkhand |
| Chilakaluripet-Vijayawada | 69.408 | Six | Andhra Pradesh |
| Chennai – Bypass | 32.600 | Six | Tamil Nadu |
| Chennai – Tada | 33.000 | Six | Tamil Nadu |
| Neelmangla –Tumkur | 44.668 | Four/six | Karnataka |

Additionally, given the renewed focus of the GoI, at the national, state and local levels, on the development and strengthening of the highway network across India, subject to the aforementioned restriction, there can be no assurance that there will not be any construction, widening or improvement of any free or toll roads, or construction of other modes of transportation, in the proximity of the Toll Roads or which provide an alternative or more direct routing to locations served by the Toll Roads. Any such construction, widening or improvement may divert traffic away from the Toll Roads, which may adversely affect toll collections and, therefore, our ability to meet our payment obligations under the Units.

**17.** ***Our business will be subject to seasonal fluctuations and business and economic cycles that may affect our cash flows.***

Our cash flows from InvIT Assets will be affected by seasonal factors, and business and economic cycles, which may materially and adversely affect traffic volumes. Traffic volumes tend to decrease during the monsoon season and conversely tend to increase during holiday seasons. The monsoon season may also restrict our ability to carry on activities related to our operation and maintenance of the Toll Roads. Further, extreme weather conditions, such as floods, incessant or torrential rain, acts of God, or any other force majeure event, could impair the safe operation of and traffic movement on the Toll Roads by causing events such as overtopping of structures on the carriageway, amongst others. This may also result in stoppage or diversion of traffic on Toll Roads or delays in periodic maintenance and may also reduce productivity. Additionally, anticipated traffic diversions could be higher for certain projects due to disruptions caused by capacity augmentation construction, as seen in past projects, thereby materially and adversely affecting our business, financial condition and results of operations. Furthermore, toll revenues are highly sensitive to traffic volume and vehicle composition. Any decline in economic activity, rise in fuel prices, changes in freight movement, or external disruptions like pandemics can lead to reduced vehicle flow on highways, directly impacting toll collections and revenue stability. Variations in these underlying economic indicators may cause deviations in traffic volumes from initial forecasts. Any significant shortfall between actual and forecast traffic volumes or toll revenues may have a material adverse effect on the Project SPV's cash flows, results of operations and financial condition.

**18.** ***Toll rates and collections and Toll Road traffic volumes depend on regulatory limitations and number of people using our roads, which in turn are dependent on factors beyond our control and are subject to significant fluctuations.***

Revenue from toll receipts is determined by both the base rates set by the concessioning authority under the Concession Agreements and the actual volume of traffic on our roads. The toll rate structure is laid down under National Highways Fee (Determination of Rates and Collection) Rules, 2008, as amended from time to time (the "**Fee Rules**") read with our Concession Agreements executed by the Project SPV awarded by the NHAI, typically restrict the extent to which toll rates can fluctuate and prescribe related regulations. Usually, the relevant concessioning authority establishes the applicable user fees and outlines the methods for periodic adjustments. As a result, we may not be able to increase toll rates sufficiently to offset increases in our operating, financing, or other costs. The concessioning authority may revise user fees in accordance with the changes in the tolls related policies or terms of the concession agreement and relevant laws. Consequently, our revenue from tolls depends on both traffic volume and user fees, neither of which we control.

The toll rate structure is laid down under the Fee Rules. The Fee Rules specify that the applicable toll rates specified thereunder shall be increased by three per cent each year along with an adjustment based on an increase in the wholesale price index (the "**WPI**"), which currently is set at 40% of WPI. We are not provided with any flexibility to adjust the toll rates as the rates are explicitly changed by the GOI in accordance with the Fee Rules.

Additionally, NHAI issued a circular dated September 13, 2025, revising the WPI linking factor, which would have affected toll rate adjustments, however, this circular has been stayed and is currently not in effect. For further details, see "*—Toll collections are affected by applicable toll rates and revisions to such rates and the number of road users subject to such rates.*"

Traffic volumes on the Toll Roads and toll revenue we collect are directly and indirectly affected by a number of other factors beyond our control, including but not limited to:

a. the growth of the Indian economy and the economic development of the states in which the Toll Roads are located as well as neighbouring states (the "**Project Influence Area**");
b. restrictions on mining, or a decline in manufacturing or exports of commodities plying on the Toll Roads due to regulatory clampdowns, financial crises or other reasons that could distort global commodity prices;
c. the number and type of motor vehicles in operation as well as the cost of purchasing and operating motor vehicles in areas served by the toll roads, including financing costs, environmental law compliance costs, exchange rate fluctuations and fuel prices, in the Project Influence Areas;
d. adverse weather conditions, such as floods or torrential rain, acts of God, strikes or any other force majeure event, including epidemics, or political and non-political unrest that could impair the safe operation of, restrict traffic access to, or prevent use or accessibility of the toll roads;
e. traffic on the roads providing access to and from the toll roads including coming up of alternate routes, or the physical condition of such roads, the waiting time at the toll plazas and congestion at the gateways, which hampers the ability of road users to reach and depart from our toll roads;
f. construction, maintenance or widening of highways or adjacent project roads or any entry restrictions of vehicles or material closures on account of safety precautions by the local administration may adversely impact the revenue of the project;
g. the capacity of the toll roads, or any associated structures such as bridges, bypasses or tunnels, as well as maintenance and repair requirements of parts or all of the toll roads, or any structure forming part of the toll roads, which may result in restricted or no access to the toll roads for material periods of time;
h. overall security of the toll roads as managed by the relevant security contractors, including the possible threat of terrorist attacks on the toll roads or any of their free-standing structures;
i. a change in the applicable toll policies or other applicable laws which affects any category of vehicle or fuel;
j. changes to axle load norms in order to further increase the permissible axle load limits in India, which may adversely impact traffic growth along Indian national and state highways and cause accelerated deterioration of the condition of the pavement of the toll roads;
k. the reactions of the public or other national or state government institutions to toll rate increases; and
l. seasonal holidays.

In the event there is a significant decrease in traffic volume or change in toll rates on the toll roads, there may be a corresponding decrease in toll collections which could have a material adverse effect on our ability to make distribution to unitholders. Furthermore, certain regulatory and policy guidelines issued by the NHAI from time to time may adversely affect the business of certain toll-based Project SPV, results of operations, cash flows and financial condition. For instance, NHAI had in the past temporarily suspended tolling on project roads due to COVID-19 during the nationwide lockdown from March 25, 2020 to April 19, 2020. Furthermore, the implementation of an annual pass, which is a capped tolling system has reduced the average toll revenue per vehicle with effect from August 15, 2025 may also affect our toll revenue. For further details see, " – *Changes in the policies adopted by governmental entities or in the relationships of any member of the Trust with the Government or State Governments could materially and adversely affect our business, financial condition, results of operations and ability to make distribution to our Unitholders."* on page 47.

**19. *Leakage of the tolls collected on the toll roads may adversely affect toll collections.***

Toll collections are dependent on the integrity of our toll collection system. Upon commencement of the concessions, the toll roads will be operated on an "open" toll collection system with different toll rates applicable to certain classes of vehicles; each motorist using a particular class of vehicle is charged a flat rate at the point of entry to the toll road regardless of the actual distance travelled.

The level of toll collections may be reduced by leakage through toll evasion, fraudulent acts on the part of road users or our toll collection operators, theft, technical faults in our toll collection systems, or unlawful roadway entries or exits by road users to avoid paying the required toll. To the extent we become aware of any routes available to road users to bypass the toll plazas, we may face delays in obtaining approval from the concessioning

authority to implement additional toll plazas to prevent such unauthorized entry or exit to the toll roads, which may adversely affect our revenue and our ability to meet our payment obligations under the Units. If toll collection is not adequately monitored, leakage may reduce toll collections. Although we expect to put in place systems and software, as well as deploy a number of toll plaza supervisors and security manpower, to minimize leakage through fraud and theft, if there is any significant failure in the efficiency or effectiveness of our collection practices or of the installed system software or any significant failure by us or our contractors to control leakage in toll collection, there could be a material adverse effect on our toll collections.

Furthermore, there may be situations where toll collection is disrupted or stopped, for example, due to public disturbances, or strikes or work stoppages as a result of disputes with local labor unions. See " *–The results of operations of the Project SPV could be adversely affected by strikes, work stoppages or increased wage demands by the employees of the Project SPV, and independent contracts or other subcontractors*." Any such disruption or other stoppage of toll collection may interfere with our collection practices, resulting in increased leakage and reduced toll collections by us, which may adversely affect our revenue and our ability to meet our payment obligations under the Units.

**20.** ***The termination payment due to us upon termination of the Concession Agreements may not adequately compensate us for the actual costs and investments associated with the toll roads in a timely manner or at all and thus may not provide us with sufficient funds to repay the Units.***

The Concession Agreements may be terminated by us or the NHAI prior to their expiration for a number of reasons. In the event that the early termination of the Concession Agreements is due to a breach by us, we are entitled to receive a termination payment equal to 70.00% of the Unexpired Cash Flow, as defined in the Concession Agreements, in addition to remaining liable for costs and liabilities in relation to the Toll Roads. In the event that the early termination of the Concession Agreements is due to a breach by the NHAI, we are entitled to receive a contractually agreed termination amount equal to 105.00% of the Unexpired Cash Flow. For further details see "*Summary of the Concession Agreements.*" on page 195. As the termination payment payable to us in the event of a breach by us could be lower than what we would have otherwise been entitled to receive in the event that the Concession Agreement had not been terminated, we may not be adequately compensated for the actual costs and investments associated with our assets and, therefore, may adversely affect our ability to make distributions to the Unitholders. Furthermore, such termination payments may be subject to adjustments in relation to any outstanding amounts payable to the authority, including for example any outstanding penalties/damages imposed on our Project SPV by the relevant concessioning authority till that date.

There is no assurance that any termination payment due to us will be paid in full or part, within the timelines specified in the Concession Agreement or at all. In the event of a delay in the disbursement of a termination payment by the NHAI, in particular, if any dispute arises in respect of such payment, or in the event the NHAI fails to make the termination payment at all, we may be unable to make distributions to the Unitholders.

**21.** ***Toll collections are affected by applicable toll rates and revisions to such rates and the number of road users subject to such rates.***

Under the terms of the Concession Agreements, the toll rates applicable to the toll roads are determined in accordance with the Fee Rules. In accordance with the Fee Rules, the toll rates are increased annually by 3.00% (fixed) and adjustments are based on the WPI. The adjustment considers the change in WPI between the week ending on January 6, 2007, and the corresponding week of each adjustment year (the "**WPI Adjustment**"). However, the WPI Adjustment is capped at 40% of the WPI change. While a correlation exists between WPI and factors like wage and material costs, toll rate increase may not fully offset operational costs, especially in high WPI fluctuation periods. Additionally, toll collections can be influenced by exemptions granted under Concession Agreements, such as for non-commercial road users or discounted fee users. Any increase in exemptions or inability to implement revised toll rates promptly can reduce toll collections. This impact can be compounded by factors like reduced traffic volume or changes in consumer preferences.

Further, the annual toll rate revisions, typically effective from April 1, are critical to ensuring revenue growth and aligning toll collections with operational costs. However, delays in implementing these revisions can lead to significant financial and operational risks. For instance, in the last financial year, toll rates were revised from June 3, 2024, due to procedural delays. Such delays can lead to revenue losses, affecting debt servicing capabilities and financial projections. Additionally, delayed revisions can also impact investor sentiment and asset valuations, particularly when uncertainties arise around revenue forecasts. These uncertainties may influence the valuation of toll assets, potentially affecting ratings from financial institutions and agencies.

**22.** ***Changes in the policies adopted by governmental entities or in the relationships of any member of the Trust with the Government or State Governments could materially and adversely affect our business, financial condition, results of operations and ability to make distribution to our Unitholders.***

The Project SPV would be deriving almost all of its revenue from the Concession Agreements entered into with the NHAI and must maintain good relationships and strategic alliances with the Sponsor, the Government of India and relevant State Governments. We expect that we will continue to depend on, and benefit from, policies and decisions of the NHAI and other governmental authorities relating to the terms and administration of the concessions for its existing projects, as well as any future projects that may be awarded. Any adverse change in any existing governmental policies, incentives, allocations or resources, or deterioration of our relationship with the NHAI or governmental authorities, could materially and adversely affect our business, financial condition and results of operations.

Additionally, the toll roads may be subject to delays, extensive internal processes, changes in government policies, changes due to local, or national political pressures and variation in governmental or external budgetary allocations and insufficiency of funds. Since governmental authorities are responsible for awarding concessions and are a party to the development and operation of the awarded projects, our business will be directly and significantly dependent on their continued support. Any withdrawal of such support or any adverse changes in their policies, priorities or administrative practices of governmental authorities, even if not quantifiable monetarily, may lead to the Project SPV's agreements being restructured or renegotiated or the concession period being decreased, which could materially and adversely affect the Project SPV's financing, capital expenditure, revenues, development activities or ongoing operations.

**23.** ***Our revenues under the Transitional Support Agreement are dependent on successful continuation of underlying tolling contracts.***

The Sponsor, Project Manager and the Project SPV will enter into a transitional support agreement for the purpose of the Sponsor providing transitional support to: (i) the Project SPV in respect of its operation and maintenance ("**O&M**") obligations and tolling obligations in relation to the Concession Agreements; and (ii) the Project Manager in respect of its obligations under the Project Implementation and Management Agreement. As a result, the Sponsor is obligated, during the term of the Transitional Support Agreement, to undertake the tolling obligations/ tolling related responsibilities under and in compliance with the Concession Agreement(s) on behalf of the Concessionaire. In furtherance of this, the Sponsor will enter into tolling contracts with certain third-party contractors in respect of the project highways under which these contractors pay the Sponsor a fixed contracted fee on a regular basis irrespective of the actual quantum of fee collected in respect of the project highway. The Sponsor shall continue to operate tolling contracts on "as is basis" during the transition period from appointed date. Further, the remittance (which would be due to the Sponsor) under such tolling contracts would be credited directly to the Project SPV upon consummation of the transaction. These tolling contracts have a defined period and have set expiry dates. However, some contracts may expire during the transaction period or upon its completion, potentially delaying the handover over of the tolling operations. Additionally, tolling contracts contain provisions for pre-mature termination in cases of default by third-party contractors. In such scenarios, the Sponsor may need to enter into new contracts or extend existing ones, with the remittance from such renewed tolling contracts possibly being lower than the currently contracted amounts, posing a risk of lower revenue. Moreover, toll contracts are periodically awarded by NHAI to various tolling contractors with the understanding that they may be terminated for various reasons including, taking over of the operations of the relevant Toll Roads by Project SPV. However, such tolling contractors may contest termination of the tolling contracts, delay in handover of the toll plazas of the Toll Roads, fail to transfer the required amounts under the tolling contracts. Such uncertainties could materially impact the expected revenue, financial condition, and overall business prospects of Project SPV.

**24.** ***The Valuation Report by RBSA Valuation Advisors LLP (the "Valuer"), and any underlying reports, are not opinions on the commercial merits of the Trust or the InvIT Assets, nor are they opinions, expressed or implied, as to the future trading price of the Units or the financial condition of the Trust upon listing, and the valuation contained therein may not be indicative of the true value of the InvIT assets.***

RBSA Valuation Advisors LLP has been appointed as the independent valuer (the "**Valuer**") to undertake independent appraisals of the InvIT Assets. The Valuer has issued a valuation report (the "**Valuation Report**"), included in Annexure A to this Draft Offer Document, which sets out its opinion as to the fair enterprise value of the InvIT Assets as of December 31, 2025. In order to issue the Valuation Report, the Valuer has relied upon,

among other factors, assumptions regarding to the traffic volumes, toll rates, operation and maintenance costs, amortization, debt repayment schedules and non-cash net working capital projections and other financial and operational parameters. These assumptions are based on information provided by and discussions with or on behalf of the Sponsor, the Investment Manager and us, and which reflects current expectations and views regarding future events and, therefore, necessarily involves known and unknown risks and uncertainties. Please see the Valuation Report included in Annexure A to this Draft Offer Document for a more detailed description of all assumptions relied upon in the preparation thereof. The Valuation Report contains forecasts, projections and other "forward-looking" statements relating to future events. Such forward-looking statements are inherently subject to uncertainties and contingencies, many of which are beyond our control. Actual results or performance may differ materially from the future results or performance projected, expressed or implied in the Valuation Report.

The Valuation Report is neither an opinion on the commercial merits and structure of the Trust or the InvIT Assets, nor is it an opinion, expressed or implied, as to the future trading price of the Units in or the financial condition of the Trust upon listing. The Valuation Report does not purport to contain all the information that may be necessary or desirable to fully evaluate the Trust or the InvIT Assets or an investment in the Trust or the Units. The Valuation Report is not based on a comprehensive review of the business, operational or financial condition of the InvIT Assets and, accordingly, makes no representation or warranty, expressed or implied, in this regard. The Valuation Report does not confer rights or remedies upon investors or any other person, and does not constitute and should not be construed as any form of assurance as to the financial condition or future performance of the Trust or as to any other forward-looking statements included therein, including those relating to certain macro-economic factors, by or on behalf of the Sponsor, the Investment Manager, the Project Manager, the Trust, the Book Running Lead Managers or any other party that any person should take any action based on the Valuation Report. Further, we cannot assure you that the valuation prepared by the Valuer reflects the true value of the net future revenues of the InvIT Assets or that other valuers would arrive at the same valuation. Accordingly, the valuation contained therein may not be indicative of the true value of the InvIT Assets. The Valuation Report has been issued on January 12, 2026 and does not take into account any subsequent developments and should not be considered as a recommendation by the Sponsor, the Investment Manager, the Project Manager, the Trust or the Book Running Lead Managers or any other party that any person should take any action based on the Valuation Report. Accordingly, investors should not completely place on reliance on the Valuation Report in making an investment decision to purchase Units in the Trust.

**25.** ***We have referred to the data derived from (i) Technical Consultant Report commissioned from the Technical Consultant, (ii) Traffic Reports commissioned from the Traffic Consultants and (ii) CARE Industry Report which are based on certain bases, estimates and assumptions that are subjective in nature and may not be accurate.***

We have appointed the Technical Consultants to forecast the traffic volumes and operations and maintenance expenses for the InvIT Assets and to prepare technical reports on the InvIT Assets, which are set out in **Annexure B** to this Draft Offer Document (the "**Technical Consultant Reports**"). We have also appointed the Traffic Consultants to provide their own analysis and forecast of traffic volumes for the InvIT Assets which are set out in **Annexure C** to this Draft Offer Document (the "**Traffic Reports**"). Furthermore, we have also commissioned a report titled "*Research Report on Road Sector in India*" dated January 2026, prepared by CARE ("**CARE Industry Report**'), which was paid for by the Investment Manager on behalf of the Trust. All of the Technical Consultant Reports, the Traffic Reports and the CARE Industry Report (together referred to as "**Industry Expert Reports**") are subject to various limitations and are based upon certain bases, estimates and assumptions that are subjective in nature and that are based, in part, on information provided by and discussions with or on behalf of us, the Sponsor and the Investment Manager. The Industry Expert Reports reflect current expectations and views regarding future events, and therefore, necessarily involve known and unknown risks and uncertainties. The Industry Expert Reports contain forecasts, projections and other "forward-looking" statements that relate to future events, which are, by their nature, subject to significant risks and uncertainties, including population growth, gross domestic product growth, vehicle ownership rates, per capita income, agricultural output and fuel consumption. The future events referred to in the Industry Expert Reports involve risks, uncertainties and other factors which may cause the actual traffic volumes to be materially different from any future traffic volumes expressed or implied by the Industry Expert Reports. There can be no assurance that the bases, estimates and assumptions adopted by the Technical Consultant, CARE or the Traffic Consultants for the purposes of preparing their respective reports will prove to be accurate. If any of these bases traffic assumptions is incorrect, future traffic volumes for the InvIT Assets could be materially different from those that are set forth in the Industry Expert Reports and this Draft Offer Document.

**26.** ***Certain provisions of the standard form of Concession Agreements may be untested, and the Concession Agreements may contain certain restrictive terms and conditions which may be subject to varying interpretations.***

The Concession Agreements that we will be entering into is substantially based on a model concession agreement prescribed by NHAI For example, the toll fees under the Concession Agreements is fixed, subject to annual adjustments to account for wholesale price index as specified in the Concession Agreements. In addition, the operation and maintenance standards and specifications require the Project SPV to incur operation and maintenance costs on a regular and periodic basis. The Concession Agreements also provide for a fixed term concession and, although our Concession Agreements provide for an extension or reduction of the concession period based on certain factors, including actual traffic volumes on specified target dates, the Concession Agreements do not provide for renewal of the Concession Agreements after the expiry of the term.

The form of the Concession Agreements has evolved within the last decade and there is limited guidance available on the interpretation of a number of terms and conditions of the Concession Agreements. In addition, certain terms of the Concession Agreements, such as those related to an augmentation in the capacity of the toll roads, substitution of the concessioning authority in any or all of the project agreements, termination payments by the concessioning authority, construction of additional competing roads by the concessioning authority, the Government of India or relevant State Governments and payment of compensation by the concessioning authority for changes in law are untested. Accordingly, the interpretation of certain terms and conditions in the Concession Agreements of the Project SPV by the concessioning authority, the courts or regulators may be different from our interpretation of such terms and conditions.

The terms and conditions of the Concession Agreements contain restrictive terms and conditions. For example, the Concession Agreements contain provisions that mandate substitution clauses in the project agreements. Such substitution clauses allow the concessioning authority to step into project agreements in place of the Project SPV in the event of suspension of the Project SPV or termination of the Concession Agreements due to a breach or default by the Project SPV. The Concession Agreements also provides that the lenders to a Project SPV may substitute the Project SPV with new entities approved by the concessioning authority in the event of a default by the Project SPV under the relevant Concession Agreements or financing agreements. The terms of the Project SPV's Concession Agreements requires the Project SPV to indemnify the concessioning authority for losses arising out of breach of the obligations of the Project SPV under the Concession Agreements.

In the event the concessioning authority or a lender invokes any restrictive term or condition in the Concession Agreements, or the concessioning authority, a court, or regulator interprets any term or condition in an adverse manner, such invocation or interpretation may materially and adversely affect our business, financial condition and results of operations.

**27.** ***We may be subject to increases in costs, including operation and maintenance costs, which we cannot recover by increasing toll fees under the Concession Agreements.***

The terms and conditions of the Concession Agreements are fixed and are not negotiable during the concession period. The cost of operating and maintaining the InvIT Assets may increase due to factors beyond our control, including, among other things:

a. Unexpected increase in the cost of labour, materials and insurance;
b. the Project SPV being required to install intelligent toll-collection systems at their own costs;
c. the Project SPV being required to restore their project roads in the event of any landslides, floods, road subsidence, other natural disasters, accidents or other events causing structural damage or compromising safety;
d. increase in electricity tariff rates or other fuel costs resulting in an increase in the cost of energy;
e. the introduction of a levy on the usage of water for maintenance of the roads and highways;
f. adverse weather conditions;
g. unforeseen legal, tax and accounting liabilities relating to acquired assets; and
h. other unforeseen O&M costs.

In the event that our costs increase, we may be unable to offset such increases with higher revenues by increasing toll fees due to the restrictions of the Concession Agreements. Any significant increase in O&M costs beyond the amounts budgeted for by us, or any failure to meet quality standards, may reduce our profits, could expose us to penalties imposed by the concessioning authorities and could have a material, adverse effect on our business,

financial condition and results of operations. Such events may also impact the ability of the Project SPV to service the debt obtained from the Trust and our ability to make distributions to Unitholders. As such, the inability to change the terms and conditions, including the toll fees of the concession during the concession period, may materially and adversely affect our operational and financial flexibility.

**28.** ***We will depend on certain directors, executive officers and key employees of the Investment Manager, the Project Manager and the Project SPV, and such entities may be unable to appoint, retain such personnel or to replace them with similarly qualified personnel, which could have a material, adverse effect on the business, financial condition, results of operations and prospects of the Trust.***

Our performance will depend, in part, upon the continued service and performance of certain directors, executive officers and key employees of the Investment Manager, the Project Manager and the Project SPV. The continued operations and growth of our business will be dependent upon the Investment Manager, the Project Manager and the Project SPV being able to attract and retain personnel who have the necessary and required experience and expertise. Competition for qualified personnel with relevant industry expertise in India is intense due to the scarcity of qualified individuals in the toll-road business, and the aforesaid entities may not be able to retain their executive officers and key employees or attract and retain fresh talent in the future. Any inability by the Investment Manager, the Project Manager and the Project SPV to retain their directors, executive officers and key employees, or the inability to replace such individuals with similarly qualified personnel, could have a material, adverse effect on the business, financial condition, results of operations and prospects of the Trust.

**29.** ***There can be no assurance that we will be able to successfully undertake future acquisitions of road assets or efficiently manage the infrastructure road assets we have acquired or may acquire in the future.***

Our growth strategy in the future may involve strategic acquisitions of toll roads and other road assets. We may not be able to identify or acquire appropriate road assets or viable acquisitions in a timely manner. The success of our past acquisitions and any future acquisitions will depend upon several factors, including, among other things:

- our ability to identify, finance and acquire operational toll roads and other road assets on a cost-effective basis;
- our ability to integrate acquired personnel, operations, products and technologies into our organisation effectively;
- unanticipated problems or legal liabilities of the acquired businesses; and
- tax or accounting issues relating to the acquired businesses.

There can be no assurance that we will be able to achieve the strategic purpose of such acquisitions or operational integration or an acceptable return on such investments, which may materially and adversely affect our profits, financial condition and distributions.

Furthermore, Concession Agreements for future toll-road projects may also contain terms and conditions that are more restrictive than those under the current Project SPV's Concession Agreements for the toll roads. These restrictions may restrict our flexibility in managing our business or projects and could in turn materially and adversely affect our business prospects, financial condition, results of operations and cash flows.

**30.** ***The Project SPV may not be able to comply with its maintenance obligations under the Concession Agreements, which may result in the termination of the Concession Agreements, the suspension of the Project SPV's rights to collect tolls or the requirement that the Project SPV pay compensation or damages to the concessioning authority.***

The Project SPV is required to undertake operation and maintenance of the Toll Roads within the timelines and in the manner specified in the respective Concession Agreements. Accordingly, Project SPV must prepare a maintenance manual and a maintenance program in consultation with an independent engineer appointed by the NHAI or other concessioning authority for each toll road, and are required to abide by the same. The Project SPV's maintenance obligations primarily relate to ensuring the safe, smooth and uninterrupted flow of traffic and the related work and maintenance that they are required to undertake in order to fulfil such obligations. Such maintenance obligations include the repair of wear and tear of roads, among other things. There can be no assurance that the Project SPV will not breach the maintenance obligations under the Concession Agreements on account of the Project Manager's failure to undertake the stipulated maintenance work in a timely manner, or at all.

If the Project SPV is in breach or default of its obligations, then the NHAI may, among other rights (a) suspend the right of the Project SPV, including the right to collect tolls and other fees, (b) claim compensation for all direct, additional costs suffered or incurred by the concessioning authority arising out of such default, or (c) terminate the Concession Agreements.

If the Concession Agreements are terminated, the right to collect tolls is suspended or the Project SPV is required to pay compensation or damages, our business, financial condition and results of operations may be materially and adversely affected. For further details of the maintenance obligations, suspension and termination events under the Concession Agreements, see the section headed "*Summary of the Concession Agreements*" on page 195.

**31. *Our InvIT Assets are presently uninsured and any loss or damage to such assets may materially and adversely affect our operations.***

Under the terms of the Concession Agreements proposed to be entered into for the collection of fee for the InvIT Assets, such rights would be granted as on and with effect from the appointed date which shall occur upon the conditions specified in the Concession Agreements which would be subsequent to the allotment of the Units pursuant to the proposed issue of Units. As of the date of this Draft Offer Document, no insurance policies have been obtained in respect of the InvIT Assets by us. The Concession Agreements requires us to obtain insurance during the concession period and post the respective O&M handover dates. As a result, the InvIT Assets are currently uninsured or inadequately insured against certain risks, and there can be no assurance that adequate insurance coverage for the InvIT Assets will be obtained in the future, or that such coverage will be available on commercially reasonable terms. Further, even if insurance is procured, such insurance may be subject to deductibles, exclusions, conditions and limits on coverage, and may not cover all potential risks or losses, which could materially and adversely affect our operations, financial condition, results of operations and cash flows.

**32. *Our InvIT Assets, the Sponsor and the Trustee are or may, from time to time, be involved in certain legal proceedings, which if determined against such parties, may have an adverse effect on the reputation, business and results of operations of the Trust.***

Our InvIT Assets, the Sponsor, and the Trustee are involved in certain legal proceedings, including in relation to criminal matters, tax matters, civil and arbitration proceedings, which are or may be pending at different levels of adjudication before various courts, tribunals and appellate authorities. There is no assurance that these legal proceedings and regulatory matters will be decided in favour of the respective entities. Decisions in any of the aforesaid proceedings adverse to the Trust's or the Project SPV's interest may have an adverse effect on our business, future financial performance and results of operations. If the courts or tribunals rule against the Sponsor or its associates or the Trustee, we or the Sponsor may face monetary and/or reputational losses and may have to make provisions in our financial statements, which could increase expenses and liabilities. For more details, please see the section titled "*Material Litigation and Regulatory Action*" on page 236.

**33. *The Trust does not own the trademark "Raajmarg Infra Investment Trust" and the associated logo to be used by it for its business and its ability to use their respective trademark or logo may be impaired.***

As on the date of this Draft Offer Document, we have made an application dated December 31, 2025 bearing reference number 13510420, for registration of the trademark *"RAAJMARG InvIT an InvIT sponsored by NHAI"* along with the logo of the Trust, 

, under class 36 of the Trade Marks Act, 1999, with the Registrar of Trade Marks at Delhi.

The registration of trademark is a time-consuming process and there can be no assurance that such registration will be obtained in a timely manner including prior to the listing of the Trust or at all. If we fail to register our logo, we would not be able to protect relevant intellectual property or may have to cease the usage of the logo. The Investment Manager and the Trust's ability to use the trademark and the associated logo may be impaired if such application is rejected. Consequently, the Trust could be required to cease using "*RAAJMARG InvIT an InvIT sponsored by NHAI*" and the associated logo, which may have an adverse effect on its operations.

**34. *We will depend on NHAI to undertake certain activities in relation to the operation and maintenance of the InvIT Assets. Any delay, default or unsatisfactory performance by these third parties could materially and adversely affect our ability to effectively operate or maintain the InvIT Assets.***

The Project SPV is obligated to maintain the Projects according to standards specified in the concession agreements. In this regard, we will enter into the Transitional Support Agreement with NHAI. Under the Transitional Support Agreement, NHAI are required to provide support pertaining to the operation and maintenance and tolling obligations of the InvIT Assets. We will depend on the availability and skills of NHAI and its employee pertaining to the operation and maintenance of the InvIT Assets. The Project SPV may have limited control over the timing or quality of services, equipment or supplies provided by the NHAI. Further, any delay or failure by NHAI to undertake corrective measures or remedial actions as required under the Transitional Support Agreement could result in non-compliance with the Concession Agreements, exposing the Project SPV to contractual penalties and reputational risks. Inefficiencies or operational failures on the part of the Project SPV or the NHAI, as a result of defects in design, quality of construction or maintenance, could result in the Project SPV incurring increased costs, loss of revenue and penalties, thereby causing adverse impact on the financial position of the Project SPV. When the Transitional Support Agreement expires, we will need to appoint third-party entities to undertake operations and maintenance and tolling, and the terms of these future contracts may not be favourable to us. We can also make no assurance that the services of such third parties will continue to be available at reasonable rates in the areas in which we conduct our operations. We may also be exposed to risks relating to the ability of such third parties to obtain requisite approvals for the operation and maintenance activities, as well as the quality of their services, equipment and supplies. In particular, failure to ensure the reliability and sustainability of toll collectors who are required to man the toll booths continuously may materially and adversely affect our overall level of net revenue. We may also be exposed to civil and criminal liability in relation to the actions of other third parties, including our employees and contractors.

Further, if we undertake limited development, while we may sub-contract our construction work, we may still be liable for accidents on our projects due to defects in design and quality of construction of our projects during their construction and operation. In addition, we can make no assurance that such contractors or their sub-contractors will continue to hold or renew valid registrations under the relevant labour laws in India or be able to obtain the requisite approvals for undertaking such construction and operation. Any delay, default or unsatisfactory performance by these third parties could materially and adversely affect our ability to manage the operation and maintenance of the InvIT Assets under the Concession Agreements in a timely manner or at all. Any of the foregoing factors could have a material, adverse effect on our business, financial condition, reputation and results of operations.

**35.** ***The provisional completion certificate in respect of one of the InvIT Assets has not been granted and accordingly, alternate documents have been relied upon in relation to certain disclosures made in this Draft Offer Document.***

The provisional completion certificate ("**PCOD**") has not been granted in respect of one of the InvIT Assets, i.e., the Chennai Bypass. We understand that the PCOD has not been issued as the contractor responsible for the project has initiated litigation, which has delayed the issuance of the completion certificate/provisional completion certificate by the concessioning authority.

As the PCOD has not been issued, we have relied on alternate documents such as toll fee notification, letter from NHAI and technical records that were made available. While the alternate documents provide information relating to the completion status of the Chennai Bypass, there can be no assurance that such information is complete, current or not subject to future challenge, particularly in light of the ongoing dispute with the contractor. Any subsequent development, including an adverse determination regarding the completion status of the Chennai Bypass or outcome of the contractor litigation, may affect the accuracy of related disclosures and could have implications under the relevant Concession Agreement. Further, certain pending disputes and litigation in relation to the Chennai Bypass are currently pending between the concessioning authority and the contractor. Any adverse outcome of such proceedings may result in further delay in the issuance of the provisional completion certificate or could materially and adversely affect the Chennai Bypass and our rights and obligations under the relevant Concession Agreement. Moreover, the completion certificate for Chennai-Tada project has not been granted as of the date of this Draft Offer Document. For further details, see "*Material Litigation and Regulatory Action*" on page 236.

**36.** ***The Project SPV may be held liable for the payment of wages to the contract labourers engaged indirectly in our operations.***

The Project SPV may appoint independent contractors who, in turn, engage on-site contract labour to perform certain operations. The Project SPV will need to obtain registration as a principal employer under the Contract Labour (Regulation and Abolition) Act, 1970 ("**Contract Labour Act**") for certain locations where workmen

would be employed through contractors or agencies licensed under the Contract Labour Act. Although the Project SPV may not engage these labourers directly, in the event of default by any independent contractor, the Project SPV may be held responsible for any wage payments and other statutory benefits that must be made to such labourers. Any violation of the provisions of the Contract Labour Act by the Project SPV may result in penalties pursuant to the provisions of the Contract Labour Act. If the Project SPV is required to pay the wages of the contracted workmen and subjected to other penalties under the Contract Labour Act, the reputation, results of operations, cash flows and financial condition of the Trust could be adversely affected.

**37.** ***We may be unable to renew or maintain the statutory and regulatory permits and approvals required to operate the transport sector assets, including roads which may have an adverse effect on our business, results of operation, financial condition and cash flows.***

We are required to obtain and maintain certain permits, approvals, licenses, and registrations under various regulations, guidelines, circulars and statutes regulated by various regulatory and Governmental authorities for operating the transport sector assets, including roads. While the Project SPV secure the material permits required under the Concession Agreements, we must still maintain certain approvals during the operations and maintenance. If we or the Project Manager, fail to obtain the necessary permits, approvals, licenses, and registrations, or maintain them, or if there is any delay in obtaining or renewing them, or in making any payments in this respect, our business, financial condition, results of operations and cash flows could be adversely affected. These permits, approvals, licenses, registrations and permissions could also be subject to several conditions, and we or the Project Manager might not be able to meet such conditions or be able to prove compliance with such conditions to the statutory authorities. This could lead to the cancellation, revocation or suspension of relevant permits, licenses or approvals, which may result in the interruption of our operations and may adversely affect our business, prospects, financial condition, cash flows and results of operations. Furthermore, certain regulatory authorities may raise claims or issue notices in future, which may adversely affect our business, prospects, financial condition, cash flows and results of operations. Furthermore, we may not be able to recover damages or claims from the Project Manager. For further details, see "*Regulatory Approvals*" on page 234.

**38.** ***The results of operations of the Project SPV could be adversely affected by strikes, work stoppages or increased wage demands by the employees of the Project SPV, and independent contracts or other subcontractors.***

Under the Transitional Support Agreement, NHAI shall undertake the O&M obligations and discharge tolling obligation on behalf of the concessionaire during the term, in accordance with the Concession Agreements and the Project Implementation and Management Agreement. Accordingly, any strikes, work stoppages, or disruptions involving NHAI's employees, tolling contractors, or other subcontractors, or any inability of NHAI to retain or recruit personnel with suitable credentials, could adversely affect the ability of the Project SPV to maintain and operate the InvIT Assets in compliance with the Concession Agreements. Accordingly, any strikes, work stoppages, or disruptions involving NHAI's employees, contractors, or subcontractors, or any inability of NHAI to retain or recruit personnel with suitable credentials, could adversely affect the ability of the Project SPV to maintain and operate the InvIT Assets in compliance with the Concession Agreements. In addition, NHAI is required to take corrective measures and remedial actions to ensure that O&M and tolling obligations are fulfilled at all times, and any disruption to the services provided by them will have an adverse effect on the operations of the Project SPV. There can be no assurance that future disruptions will not be experienced due to disputes or other problems with the work force, which may adversely affect the business and results of operations of the Project SPV.

**39.** ***Failure to comply with and changes in, safety, health and environmental laws and regulations in India may adversely affect the business, prospects, financial condition and results of operations of the Project SPV.***

The Project SPV is required to adhere to various environmental, health and safety laws and regulations and various labour, workplace and related laws and regulations in India as per the requirements of the concession agreements. Please see the section titled "*Regulations and Policies*" on page 224. If the Project SPV fails to meet environmental, health or safety requirements, it may be subject to administrative, civil and criminal proceedings by government authorities, as well as civil proceedings by environmental groups and other individuals, which could result in substantial fines and penalties and orders that could limit or halt its operations. The Trust cannot assure investors that the Project SPV has been or will continue to be, in compliance with all environmental, health and safety and labour laws and regulations.

Further, any changes, or amendments to, these standards or laws and regulations could further regulate the operations of the projects and may require the Project SPV to incur additional, unanticipated expenses in order to comply with these changed standards. The scope and extent of any new environmental, health and safety regulations, including their effect on the operations of the projects and the cash flows of the Project SPV, cannot be predicted with certainty. The costs and management time required to comply with these requirements could be significant. The measures taken in order to comply with these new laws and regulations may not be deemed sufficient by government authorities and compliance costs may significantly exceed estimates. There can be no assurance that the Project SPV will not become involved in future litigation or other proceedings or be held responsible in any such future litigation or proceedings relating to safety, health and environmental matters in the future. Clean-up and remediation costs, as well as damages, payment of fines or other penalties, other liabilities and related litigation, could adversely affect the business, prospects, financial condition and results of operations of the Project SPV.

**40.** ***We have entered into material related party transactions and may continue to do so in the future, which may potentially involve conflict of interests with the Unitholders.***

The transactions resulting from the Project Implementation and Management Agreement, and the Investment Management Agreement, are related party transactions and their terms may not be deemed as favourable to us as if they had been negotiated solely amongst unaffiliated third parties. Furthermore, it is likely that we will enter into additional related party transactions in the ordinary course of our business. The terms of such transactions may not be as favourable to us as those negotiated solely amongst unaffiliated third parties and may involve conflicts of interest. Such transactions, individually or in the aggregate, could have a material adverse effect on our business, prospects, financial condition, results of operations and cash flows. For additional details, please see the sections entitled "*Related Party Transactions*", "*Formation Transactions in Relation to the Trust*" and "*Parties to the Trust*" on pages 220, 23 and 77, respectively.

**41.** ***Significant differences exist between Indian GAAP used to prepare the Sponsor's Audited Financial Statements and other accounting principles, such as Ind-AS and IFRS, with which investors may be more familiar.***

The Sponsor has prepared its audited financial statements in accordance with Indian GAAP in accordance with the NHAI Act and the rules thereunder. The Sponsor has not attempted to quantify the impact of Ind-AS or International Financial Reporting Standards ("**IFRS**") on the audited financial statements, nor will the Sponsor provide a reconciliation of our financial statements to those of IFRS or Ind-AS. If the Sponsor were to prepare its audited financial statements in accordance with such other accounting principles, its results of operations, financial condition and cash flows may be substantially different. Accordingly, the degree to which the Sponsor's audited financial statements will provide meaningful information is entirely dependent on your level of familiarity with Indian accounting practices under Indian GAAP. Any reliance by persons not familiar with such accounting practice on our financial disclosures presented in this Draft Offer Document should accordingly be limited. Persons not familiar with Indian accounting practices should, accordingly, consult their own professional advisors before relying on the financial disclosures presented in this Draft Offer Document.

**42.** ***We have received provisional credit ratings from credit rating agencies.***

The long term debt facilities proposed to be availed by the Trust have been given a credit rating of: (i) Provisional CARE AAA; Stable by CARE Ratings Limited for long term bank facilities aggregating to ₹ 40,000 million; and (ii) Provisional Ind AAA/Stable by India Ratings & Research Private Limited for proposed bank loan facilities aggregating to ₹ 40,000.00 million. The rating issued by CARE Ratings Limited is subject to transfer of the identified assets into Trust, execution of concession agreement with NHAI for the proposed assets and completion of offer and listing of the InvIT. The rating issued by India Ratings & Research Private Limited is subject to execution of certain documents and occurrence of certain steps. There is no assurance that CARE Ratings Limited and India Ratings & Research Private Limited will continue to provide a positive credit rating to the Trust or that the agencies will provide a rating without covenants. A negative or lower rating may adversely affect our ability to raise additional financing, and the interest rates and other terms at which such additional financing is available. This in turn could materially and adversely affect our business, prospects, financial condition, results of operations and cash flows.

**Risks Related to the Trust's Relationships with the Sponsor and the Investment Manager**

**43.** ***The Investment Manager has no experience in investment management activities for an InvIT and may not be able to implement its investment or corporate strategies and the fees payable to the Project Manager are dependent on various factors.***

The Investment Manager's strategies focus on three main areas:

- managing the underlying assets of the Trust;
- managing the Trust's acquisitions and disposals; and
- managing the Trust's capital structure to maximize distributions.

The Investment Manager is a newly incorporated entity and does not have any operational history of similar investment management or other activities in the infrastructure sector. There can be no assurance that the Investment Manager will be able to implement these strategies successfully or that it will be able to expand our portfolio at any specified rate or to any specified size or to maintain distributions at projected levels. The Investment Manager may not be able to make acquisitions or investments on favourable terms or within a desired time frame, and it may not be able to manage the operations of its underlying assets in a profitable manner. Factors that may affect this risk may include, but are not limited to, changes in the regulatory framework in India, competition for assets, partial award of concessions or licenses favouring local or other competitors of the Trust, changes in the Indian regulatory or legal environment or macro-economic conditions. If the Investment Manager is unable to implement these strategies successfully or expand our portfolio, we will nonetheless be required to pay the Investment Manager an annual management fee, exclusive of taxes, in accordance with the terms of appointment of the Investment Manager.

Even if the Investment Manager is able to successfully grow the operating business of the underlying assets and to acquire toll roads and other eligible infrastructure projects in India as desired, there can be no assurance that the Investment Manager will achieve its intended return on such acquisitions or capital investments. Furthermore, the Investment Manager's investment mandate involves a higher level of risk as compared to a portfolio which has a more diverse range of investments. The Investment Manager may only be removed by a resolution of Unitholders (excluding the Sponsor) such that the votes cast in favour of the resolution are not less than one-and-a-half times the votes cast against the resolution.

Accordingly, the fees payable to the Project Manager may vary each year based upon the operating and maintenance work that is actually required to be undertaken by the Project Manager with respect to the Project SPV, and accordingly, cannot be a flat rate or decided upfront for all periods. Additionally, any such payment of fees will be in the nature of a related party transaction and the approval of Unitholders will be required prior to making such a payment to the Project Manager. For further information, please see "*Overview of the Trust*" on page 21.

**44.** ***The Sponsor is under no obligation to provide the Trust with access to future assets, and the Trust may be unable to bid effectively for them.***

In accordance with the approval granted by the chairman of NHAI by way of letter dated December 1, 2025, the Sponsor may consider offering to us (but is under no obligation to do so) around 1,500 km of roads over the next three to five years to the Trust (the "**Future Assets**").

There can be no assurance that the Trust will be able to accurately or effectively assess the Future Assets on the basis of the information to it or in the time available, and its bids may provide to be uncompetitive. Furthermore, the Sponsor may accept or reject any binding offer made by the Trust, based on various factors regarding which the Trust may have no influence.

Access to future toll road assets sourced by the Sponsor or its existing or future subsidiaries will be an important source of growth in the future for the Trust, and any inability to bid competitively for Future Assets or the inability to win contracts from the Sponsor for their operation for any reason could have a material adverse effect on the Trust's operations, financial condition or prospects.

**45.** ***Parties to the Trust are required to maintain the eligibility conditions specified under Regulation 4 of the InvIT Regulations on an ongoing basis. The Trust may not be able to ensure such ongoing***

***compliance by the Sponsor, the Investment Manager, the Project Manager and the Trustee, which could result in the cancellation of the registration of the Trust.***

Each of the parties to the Trust are required to satisfy the eligibility conditions specified under Regulation 4 of the InvIT Regulations on an ongoing basis. These eligibility conditions include, among other things, that (a) the Sponsor, Investment Manager and Trustee are separate entities; (b) the Sponsor has a net worth of not less than ₹ 1,000 million and has a sound track record in the development of infrastructure or fund management in the infrastructure sector; (c) the Investment Manager has a net worth of not less than ₹ 100 million and has not less than five years' experience in fund management or advisory services or development in the infrastructure sector or the combined experience of the directors, partners and employees of the investment manager in fund management or advisory services or development in the infrastructure sector is not less than 30 years, (d) the Trustee is registered with the SEBI under Securities and Exchange Board of India (Debenture Trustees) Regulations, 1993 and is not an associate of the Sponsor or Investment Manager and (e) each of the Sponsor, Investment Manager, Project Manager and Trustee are "fit and proper persons" as defined under Schedule II of the Intermediaries Regulations on an ongoing basis. The Trust may not be able to ensure such ongoing compliance by the Sponsor, the Investment Manager, the Project Manager and the Trustee, which could result in the cancellation of the registration of the Trust.

**46.** ***The Investment Manager is required to comply with certain ongoing reporting and management obligations in relation to the Trust. There can be no assurance that the Investment Manager will be able to comply with such requirements.***

The Investment Manager is required to comply with certain ongoing reporting and management obligations in relation to the Trust in accordance with the InvIT Regulations. These requirements include, among other things, (a) making investment decisions with respect to the underlying assets or projects of the Trust, (b) overseeing the activities of the Project Manager, (c) investing and declaring distributions in accordance with the InvIT Regulations, (d) submitting reports to the Trustee and (e) ensuring the audit of the Trust's accounts. There can be no assurance that the Investment Manager will be able to comply with such requirements in a timely manner or at all, which could subject the Investment Manager, the other parties to the Trust, the Trust or any person involved in the activity of the Trust to applicable penalties under the InvIT Regulations, the Intermediaries Regulations and/or the SEBI Act. Any such failure to comply or the imposition of any penalty could have a material adverse effect on our business, financial condition and results of operations. Under the InvIT Regulations, the SEBI also has the right to inspect documents, accounts and records relating to the activity of the Trust, Project SPV or parties to the InvIT and may issue directions in the nature of, *inter alia*, (i) requiring the Trust to surrender its certificate of registration; (ii) requiring the Trust to wind-up; (iii) requiring the Trust to sell its assets; (iv) requiring the Trust or parties to the Trust to take such action as may be in the interest of investors; or (v) prohibiting the Trust or parties to the Trust from operating in the capital market or from accessing the capital market for a specified period.

**47.** ***It may be difficult for the Unitholders to remove the Trustee or the Investment Manager***.

Under the InvIT Regulations, the Trustee or the Investment Manager cannot be removed without the prior approval of Unitholders where the votes cast in favour of the resolution shall be at least 60% of the total votes cast against such resolution. Accordingly, the Unitholders may face difficulties in removing and replacing the Trustee or the Investment Manager. Further, under the InvIT Regulations, prior approval of SEBI is required for change in the Investment Manager of the Trust.

Similarly, Unitholders may remove the Trustee only if they believe that the acts of the Trustee are detrimental to the interests of the Unitholders and by way of a resolution where the votes cast in favour of the resolution must meet the required percentage as set out in the InvIT Regulations. Further, the Investment Manager and the Trustee cannot be discharged until a suitable replacement is appointed in their place, and there can be no guarantees that a suitable replacement will be appointed, or that appointment will take place in a timely manner, or at all.

**48.** ***Unitholders will have no vote in the election or removal of Directors in the Investment Manager***.

The Investment Manager has the responsibility of managing the Trust. Unitholders have no vote in the election or removal of Directors in the Investment Manager, except for Unitholders, holding not less than 10% of the total outstanding Units, either individually or collectively, have a right to nominate one director on the board of directors of the Investment Manager. Unitholders' recourse is the removal of the Investment Manager by way of a resolution where Unitholders holding at least 60% of the Units must vote in favour of the resolution. In comparison, the Companies Act, 2013 requires the removal of a director of a public company to be by way of an

ordinary resolution approved by a simple majority. Accordingly, as opposed to shareholders removing a director of a public company, it may not be possible for Unitholders to remove the Investment Manager or the Trustee.

**49.** ***We have not been able to obtain degree certificates of the educational qualification for some of our Directors and our Key Managerial Personnel and have relied on alternate documents for details of their profile included in this Draft Offer Document.***

Some of our Directors and our Key Management Personnel have been unable to trace copies of their educational degree certificates from their respective universities. They have made attempts to retrieve copies of their degrees but have not been successful in obtaining copies of their degrees. As a result, reliance has been placed on the alternate documents such as marksheets, information available on government portals and provisional certificates to disclose details of their educational qualification in this Draft Offer Document. We have been unable to independently verify these details prior to inclusion in this Draft Offer Document. Further, we cannot assure you that they will be able to trace the relevant documents pertaining to their educational qualifications in future, or at all.

**Risks related to India**

**50.** ***We are exposed to risks associated with the road sector in India.***

We derive and expect to continue to derive in the foreseeable future, most of our revenues and operating profits from India. Changes in macroeconomic conditions generally impact the road industry and could negatively impact our business. Accordingly, our business is highly dependent on the state of development of the Indian economy and the macroeconomic environment prevailing in India. Since the use of our InvIT Assets, our expansion plans and future projects depend or will depend on macroeconomic factors that may negatively impact the demand the development of road infrastructure projects in India, or the timely commencement of their operations could in turn have a material adverse effect on our growth prospects, business and cash flows. In addition, access to financing may be more expensive or not available on commercially acceptable terms during economic downturns. Any of these factors and other factors beyond our control could have a material adverse effect on our business, prospects, financial condition, results of operations and cash flows.

**51.** ***Changing laws, rules and regulations, legal uncertainties and political situation in India may materially and adversely affect our business, financial condition and results of operations.***

Our business, financial condition and results of operations could be materially and adversely affected by any change in laws or interpretations of existing, or the promulgation of new, laws, rules and regulations applicable to us and our business. There can be no assurance that the Government or State Governments will not implement new regulations and policies which will require the Trust and Project SPV to obtain additional approvals and licenses from governmental and other regulatory bodies or impose onerous requirements and conditions on our operations. The Investment Manager cannot predict the terms of any new policy, and there can be no assurance that such policy will not be onerous.

**52.** ***Significant increases in the price or shortages in the supply of crude oil and products derived therefrom, including petrol and diesel fuel, could materially and adversely affect the volume of traffic at the projects operated by the Project SPV and the Indian economy in general, including the infrastructure sector.***

India imports a most of its requirements of crude oil. Crude oil prices are volatile and are subject to a number of factors, including the level of global production and political factors, such as war and other conflicts, particularly in the Middle East, where a substantial proportion of the world's oil reserves are located. Any significant increase in the price of or shortages in the supply of crude oil could materially and adversely affect the volume of traffic at the projects operated by the Project SPV and materially and adversely affect the Indian economy in general, including the infrastructure sector, which could have a material, adverse effect on our business, financial condition and results of operations.

**53.** ***We may be affected by competition law in India and any adverse application or interpretation of the Competition Act could materially and adversely affect our business.***

The Competition Act, 2002, as amended (the "**Competition Act**"), regulates practices having an appreciable adverse effect on competition in the relevant market in India. Under the Competition Act, any formal or informal arrangement, understanding or action in concert, which causes or is likely to cause an appreciable adverse effect

on competition is considered void and results in the imposition of substantial monetary penalties. Further, any agreement among competitors which directly or indirectly involves the determination of purchase or sale prices, limits or controls production, supply, markets, technical development, investment or provision of services, shares the market or source of production or provision of services by way of allocation of geographical area, type of goods or services or number of customers in the relevant market or directly or indirectly results in bid-rigging or collusive bidding is presumed to have an appreciable adverse effect on competition. The Competition Act also prohibits abuse of a dominant position by any enterprise.

Pursuant to the Competition (Amendment) Act, 2023 and related regulations that have been brought into force from September 10, 2024 and thereafter, the Indian merger control regime has been substantially revised. These revisions, as reflected in the Competition Act, the Competition Commission of India (Combinations) Regulations, 2024 and the CCI's updated frequently asked questions published in May 2025, provide that a combination (being an acquisition of shares, voting rights, assets or control or a merger or amalgamation) which crosses the prescribed asset-and turnover-based thresholds or the newly introduced deal value threshold must be notified to and pre-approved by the CCI prior to consummation. Under the amended regime, any transaction where the value of the transaction exceeds ₹ 20,000.00 million and the target or merged entity has substantial business operations in India, as prescribed under applicable regulations and guidance, will require a prior notification and approval by the CCI, irrespective of whether the asset or turnover thresholds are met. The amended regime also clarifies the definition of "control" for the purposes of combination assessment to include the ability to exercise material influence over the management or strategic commercial decisions of an enterprise, and provides procedural refinements, including updated timelines for CCI review and implementation of combinations.

In the event the Project SPV or the Trust enters into any agreements or transactions that have an appreciable adverse effect on competition in the relevant market in India, including combinations that may be caught by the asset-and turnover-based thresholds or the deal value threshold, the provisions of the Competition Act will be applicable, and failure to comply with such provisions or obtain necessary approvals could result in prohibition of such combinations, cessation of implementation, substantial monetary penalties or other remedial measures by the CCI. Any prohibition or substantial penalties levied under the Competition Act could materially and adversely affect our financial condition and results of operations. Any adverse impact on our financial condition or operations due to the Competition Act may have a material adverse impact on our business, financial condition, results of operations and prospects and our ability to make distributions to the Unitholders.

**54.** ***Social, economic and political conditions and natural disasters could have a negative effect on our business.***

The Project SPV is incorporated in India and they derive all of their revenue from India. In addition, all of our assets are located in India. Consequently, our business and the trading price of our Units may be adversely affected by the social, economic and political conditions in India and its neighbouring countries. Specific risks, such as the following could adversely influence the Indian economy, thereby having a material adverse effect on our business, financial condition, results of operations and cash flows:

- political instability, riots or other forms of civil disturbance or violence;
- war, terrorism, invasion, rebellion or revolution;
- Government interventions, including expropriation or nationalization of assets, increased protectionism and the introduction of tariffs or subsidies;
- changing regulatory regimes;
- underdeveloped industrial and economic infrastructure;
- changes in exchange rates and controls, interest rates, government policies, taxation and economic and political developments;
- changes in policies such as, the fiscal and economic policy, industrial policy, direct and indirect taxes and the export-import policy; and
- changes in state specific regulation and conditions;

Pandemics, such as the outbreak of the COVID-19, and natural disasters such as floods, earthquakes or famines, events and conditions linked to climate change have in the past had a negative impact on the Indian economy. Potential effects may include damage to infrastructure and the loss of business continuity and business information. If our facilities are affected by any of these events, our operations may be significantly interrupted, which could materially and adversely affect our business, prospects, financial condition, results of operations and cash flows.

**55.** ***Any adverse revision to India's sovereign credit rating may have a negative impact on our business.***

India's sovereign credit ratings remain at investment grade (Baa3 with a stable outlook by Moody's and BBB- with a stable outlook by Fitch). India's sovereign credit rating is subject to periodic review by international credit rating agencies and may be adversely revised due to factors beyond our control, including changes in tax or fiscal policy or a decline in India's foreign exchange reserves, which are outside of our control. Any adverse revision to India's credit ratings may negatively affect investor sentiment and may adversely affect our ability to raise additional financing, as well as the interest rates and other terms on which such financing is available. Such developments could materially and adversely affect our ability to obtain financing for capital expenditure, which could in turn materially and adversely affect our business, prospects, financial condition, results of operations and cash flows.

**56.** ***Unitholders may not be able to enforce a judgment of a foreign court against the Trust or the Investment Manager.***

The Trustee, the Investment Manager and the Sponsor are incorporated in India, and the Trust is settled and registered in India. All of our assets are located in India, and we may, from time to time, invest in toll roads in India. Where investors wish to enforce foreign judgments in India, where our assets are or will be located, they may face difficulties in enforcing such judgments. India is not a party to any international treaty in relation to the recognition or enforcement of foreign judgments. India exercises reciprocal recognition and enforcement of judgments in civil and commercial matters with a limited number of jurisdictions, including Singapore. In order to be enforceable, a judgment obtained in a jurisdiction which India recognizes as a reciprocating territory must meet certain requirements of the Code of Civil Procedure, 1908 ("**Civil Code**"). Furthermore, the Civil Code only permits enforcement of monetary decrees not being in the nature of any amounts payable in respect of taxes, or other charges of a like nature or in respect of a fine or other penalty and does not provide for the enforcement of arbitration awards even if such awards are enforceable as a decree or judgment. Judgments or decrees from jurisdictions not recognized as a reciprocating territory by India cannot be enforced or executed in India except through a fresh suit upon judgment. Even if we or a Unitholder were to obtain a judgment in such a jurisdiction, we or it would be required to institute a fresh suit upon the judgment and would not be able to enforce such judgment by proceedings in execution. In addition, the party which has obtained such judgment must institute the new proceedings within three years of obtaining the judgment. It is unlikely that an Indian court would award damages on the same basis or to the same extent as was awarded in a judgment rendered by a foreign court if the Indian court believed that the amount of damages awarded was excessive or inconsistent with public policy in India. In addition, any person seeking to enforce a foreign judgment in India is required to obtain prior approval of the RBI to repatriate outside India any amount recovered pursuant to the execution of the judgment. Consequently, it may not be possible to enforce in an Indian court any judgment obtained in a foreign court, or effect service of process outside of India, against Indian companies, their directors and executive officers, and any other parties resident in India. Additionally, a suit brought in an Indian court in relation to a foreign judgment might not be disposed of in a timely manner.

**Risks Related to Ownership of the Units**

**57.** ***The Trust may be dissolved, and the proceeds from the dissolution thereof may be less than the amount invested by the Unitholders.***

The Trust is an irrevocable trust registered under the Registration Act, 1908 and it may only be extinguished (i) if it is impossible to continue with the Trust or if the Trustee, on the advice of the Investment Manager, deems it impracticable to continue with the Trust; (ii) on the written recommendation of the Investment Manager and upon obtaining the prior written consent of such number of the Unitholders as is required under the InvIT Regulations; (iii) if the Units of the Trust are delisted from the Stock Exchanges; (iv) if the SEBI passes a direction for the winding up of the Trust or the delisting of the Units; (v) if the Trust fails to make any offer of Units by way of public issue or a private placement (as applicable) within the time period stipulated in the InvIT Regulations or any other time period as specified by SEBI, in which case the Trust shall surrender its certificate to SEBI and cease to operate as an investment infrastructure trust, unless the period is extended by SEBI; or (vi) in the event the Trust becomes illegal. Under the Trust Deed, in the event of dissolution, the net assets of the Trust, remaining after settlement of all liabilities, and the retention of any reserves which the Trustee deems to be necessary to discharge contingent or unforeseen liabilities, shall be paid to the Unitholders. Should the Trust be dissolved, depending on the circumstances and the terms upon which assets of the Trust are disposed of, there is no assurance that a Unitholder will recover all or any part of his investment.

**58.** ***The reporting requirements and other obligations of infrastructure investment trusts post-listing are still evolving. Accordingly, the level of ongoing disclosures made to and the protection granted to Unitholders may be more limited than those made to or available to the shareholders of a company that has listed its equity shares upon a recognized stock exchange in India.***

The InvIT Regulations, along with the guidelines and circulars issued by the SEBI from time to time, govern the affairs of infrastructure investment trusts in India. However, as compared to the statutory and regulatory framework governing companies that have listed their equity shares upon a recognized stock exchanges in India, the regulatory framework applicable to infrastructure investment trusts is relatively nascent and thus, still evolving. Pursuant to a circular dated November 29, 2016, the SEBI has prescribed certain continuous disclosure requirements that will be applicable to an InvIT after listing of its units.

Accordingly, the ongoing disclosures made to Unitholders under the InvIT Regulations may differ from those made to the shareholders of a company that has listed its equity shares upon a recognized stock exchange in India in accordance with the Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015. Further, the rights of the Unitholders may not be as extensive as the rights of the shareholders of a company that has listed its equity shares upon a recognized stock exchange in India, and accordingly, the protection available to the Unitholders may be more limited than those available to such shareholders.

**59.** ***The sale or possible sale of a substantial number of Units by the Sponsor or Sponsor Group (if applicable) in the public market following the end of its lock-in requirement as prescribed under the InvIT Regulations could adversely affect the price of the Units.***

Under the InvIT Regulations, the Sponsor and Sponsor Group are required to, collectively, hold a minimum of 15.00% of our Units for a minimum period of three years from the date of listing pursuant to the initial offer and the balance of their unitholding in the Trust is required to be locked in for a period of not less than one year from the date of listing of the Units. Further, in accordance with the InvIT Regulations, the Sponsor and the Sponsor Group are required to lock-in our Units as follows:

| Period of unitholding | Percentage |
|---|---|
| From the beginning of 4$^{th}$ year after the date of listing pursuant to the initial offer and till the end of 5$^{th}$ year from the date of listing pursuant to the initial offer | 5% of total Units or ₹ 5,000.00 million, whichever is lower |
| From the beginning of 6$^{th}$ year after the date of listing pursuant to the initial offer and till the end of 10$^{th}$ year from the date of listing pursuant to the initial offer | 3% of total Units or ₹ 5,000.00 million, whichever is lower |
| From the beginning of 11$^{th}$ year after the date of listing pursuant to the initial offer and till the end of 20$^{th}$ year from the date of listing pursuant to the initial offer | 2% of total Units or ₹ 5,000.00 million, whichever is lower |
| After completion of the 20$^{th}$ year from the date of listing pursuant to the initial offer | 1% of total Units or ₹ 5,000.00 million, whichever is lower |

The Units are proposed to be listed on the Stock Exchanges. If the Sponsor and the Sponsor Group, subsequent to the end or lapse of either of the aforesaid lock-in periods directly or indirectly sells or is perceived as intending to sell a substantial number of its Units, or if a secondary offering of the Units is undertaken, the market price for the Units could be adversely affected.

**60.** ***Any additional debt financing or issuance of additional Units may have a material, adverse effect on the Trust's distributions, and your ability to participate in future rights offerings may be limited.***

The Investment Manager may require additional debt financing or the issuance of additional Units in order to support the operating business or to make acquisitions and investments. If obtained, any such additional debt financing may decrease distributable income, and any issuance of additional Units may dilute existing Unitholders' entitlement to distributions. Any additional leverage or issuance of Units may reduce the cash available for distribution to existing Unitholders.

We are not required to offer pre-emptive rights to existing Unitholders when issuing new Units. Compliance with securities laws or other regulatory provisions in some jurisdictions may prevent certain investors from participating in any future rights issuances and thereby result in dilution of their existing holdings in Units.

**61.** ***The Trust may be unable to dispose of its non-performing assets in a timely manner.***

Due to the nature of its structure, the Trust may be unable to dispose of its non-performing assets in a timely manner, or at all. Such inability may arise due to regulatory restrictions, minimum holding requirements, or structural limitations applicable to infrastructure investment trusts.As a result, no assurance can be given that the Trust may be able to adapt to market developments, changes in asset quality, or adverse macroeconomic factors in a way comparable to, or competitive with, its competitors or more traditional corporate entities in general. Any ability to dispose of non-performing assets may in turn adversely affect the financial condition, business and prospects of the Trust, as well as distributions that the holders of the Units may receive from the Trust.

**62.** ***Fluctuations in the exchange rate of the Indian Rupee with respect to the U.S. Dollar or other currencies will affect the foreign currency equivalent of the value of the Units and any distributions.***

Fluctuations in the exchange rates between the Indian Rupee and other currencies will affect the foreign currency equivalent of the Indian Rupee price of the Units. Such fluctuations will also affect the amount that holders of the Units will receive in foreign currency upon conversion of any cash distributions or other distributions paid in Indian Rupees by us on the Units, and any proceeds paid in Indian Rupees from any sale of the Units in the secondary trading market.

**63.** ***Unitholders are unable to require the redemption of their Units.***

Unitholders will not have the right to redeem Units or request or require the redemption of Units by the Investment Manager while the Units are listed on the Stock Exchanges, although the Trust Deed provides that the Trustee may subject to applicable law, repurchase Units from the Unitholders at any time. Accordingly, liquidity for Unitholders is dependent entirely on secondary market trading or permitted buyback mechanisms.

**64.** ***The Units have never been publicly traded and the listing of the Units on the Stock Exchanges may not result in an active or liquid market for the Units.***

There is no public market for the Units prior to the Issue and an active public market for the Units may not develop or be sustained after the Listing Date. Listing and quotation do not guarantee that a trading market for the Units will develop or, if a market does develop, that there will be liquidity of that market for the Units. Accordingly, prospective Unitholders should view the Units as illiquid and must be prepared to hold their Units for an indefinite length of time. There is no assurance that the Trust will continue to satisfy the listing requirements for Trusts. Furthermore, it may be difficult to assess the Trust's performance against domestic benchmarks.

**65.** ***Investors will not be able to sell immediately on an Indian stock exchange any of the Units purchased in the Issue until the Issue receives the appropriate trading approvals.***

The Units will be listed on the Stock Exchanges. Pursuant to Indian regulations, certain actions must be completed before the Units can be listed and trading may commence. Following the Allotment of the Units, the Investment Manager will apply for final listing and trading approval from the Stock Exchange. Furthermore, allotment of Units in the issue is subject to, *inter alia*, our ability to successfully undertake and complete the transactions pursuant to which we will make an offer to NHAI to grant us concessions for each of the five InvIT Assets, which are subject to certain conditions. There is no assurance that the Units will be credited to investors' demat accounts, or that the transactions contemplated above will be completed in time, or that trading in the Units will commence, within the time periods specified above. Any delay in obtaining final listing and trading approvals would restrict your ability to dispose of units.

**66.** ***There is no assurance that our Units will remain listed on the Stock Exchanges.***

Although it is currently intended that the Units will remain listed on the Stock Exchanges, there is no guarantee of the continued listing of the Units. Among other factors, we may not continue to satisfy the listing requirements of the Stock Exchanges. Accordingly, Unitholders will not be able to sell their Units through trading on the Stock Exchanges if the Units are no longer listed on the Stock Exchanges. While the InvIT Regulations state that we must provide Unitholders with an exit prior to delisting, the specific mechanism of such delisting and related exit offer has not yet been finalised by the SEBI.

Furthermore, under the InvIT Regulations, we are required to maintain a minimum number of Unitholders (other than the Sponsor, its related parties and its associates) at all times after the listing of the Units pursuant to the Issue

and certain minimum public holding requirements. Failure to maintain such minimum number of Unitholders or public holding may result in action being taken against us by the SEBI and the Stock Exchanges, including the compulsory delisting of our Units.

**67.** ***Any future issuance of Units by us or sales of Units by the Sponsor or any of other significant Unitholders may materially and adversely affect the trading price of the Units.***

Any future issuance of Units by us could dilute investors' holdings of Units. Any such future issuance of Units may also materially and adversely affect the trading price of the Units and could impact our ability to raise capital through an offering of our securities. There can be no assurance that we will not issue further Units. In addition, any perception by investors that such issuances might occur could also affect the trading price of the Units.

Units will be tradable on the Stock Exchanges. If the Sponsor (following the lapse of its lock-up arrangements including the minimum unitholding requirements prescribed under the InvIT Regulations or pursuant to any applicable waivers), directly or indirectly, sells or is perceived as intending to sell a substantial number of its Units, or if a secondary offering of the Units is undertaken, the market price for the Units could be materially and adversely affected. These sales may also make it more difficult for us to raise capital through the issue of new units at a time and at a price we deem appropriate.

**68.** ***Our rights and the rights of the Unitholders to recover claims against the Investment Manager or the Trustee are limited.***

Under the Investment Management Agreement, the Investment Manager is not liable for, among other things, any action or omission, if it has carried out its duties and exercised its powers with reasonable skill and care expected of an investment manager (except in the case of fraud, negligence or wilful misconduct). Pursuant to the Trust Deed, the Trustee is not liable for anything done or omitted to be done or suffered by the Trustee in good faith. Further, the Trustee is not liable for any action or omission that results in any depletion in the value of the trust fund and consequent losses of the Unitholder, except in situations where such depletion is a result of the gross negligence or wilful default on the part of the Trustee. The Investment Management Agreement provides that the Investment Manager is entitled to be indemnified out of the Trust Fund against all taxes and other liabilities, claims, costs, losses, damages and expenses (including reasonable attorney's fees and costs) ("**Losses**") incurred in connection with the Trust, unless arising out of gross negligence, dishonest acts or commissions or omissions, wilful misfeasance, reckless disregard of duty or breach of duties under the Investment Management Agreement. As a result, the Trust's rights and the rights of the Unitholders to recover claims against the Investment Manager are limited. Furthermore, recourse to the Trustee may be limited under the Trust Deed. The Trust Deed provides for the indemnification of the Trustee and the Investment Manager for all Losses, except Losses incurred due to any gross negligence, default, breach of duty or trust, or a failure to show a requisite degree of diligence and care. Accordingly, the liability of the Investment Manager and the Trustee are limited under the terms of these agreements and the Unitholders may not be able to recover claims against the Trustee or the Investment Manager, including claims with respect to any offer documents relating to the Issue.

Further, pursuant to the Trust Deed, the Trustee is not under any obligation to institute, acknowledge the service of, appear in, prosecute or defend any action, suit, proceeding or claim, which in its opinion might involve it in expense or liability that exceeds the value of the fund. The Trust (acting through the Trustee) and the Investment Manager intend to apply the proceeds of the Issue towards the objects set out in this Draft Offer Document. Accordingly, the Net Proceeds may not be sufficient to recover claims, including claims with respect to any offer documents in relation to the Issue.

**69.** ***Information and the other rights of Unitholders under Indian law may differ from such rights available to equity shareholders of an Indian company or under the laws of other jurisdictions.***

The Trust Deed and various provisions of Indian law govern our corporate affairs. Legal principles relating to these matters and the validity of corporate procedures, fiduciary duties and liabilities, and Unitholders' rights may differ from those that would apply to a company in India or a trust in another jurisdiction. Unitholders' rights and disclosure standards under Indian law may also differ from the laws of other countries or jurisdictions. See the section headed "*Rights of Unitholders*" on page 252.

**70.** ***No Investor are permitted to withdraw or lower their bids) in terms of quantity of Units or the bid amount) at any stage after submitting a bid.***

Pursuant to the InvIT Regulations, investors are required to pay the Bid Amount on submission of the Bid, and are not permitted to withdraw or lower their Bids (in terms of quantity of Units or the Bid Amount) at any stage after submitting a Bid, notwithstanding adverse developments in international or national monetary policy, financial, political or economic conditions, our business, cash flows, results of operations, or otherwise, at any stage after the submission of their bids. For details in relation to the Bidding process, see "*Issue Information*" on page 259.

**71.** ***The price of the Units may decline after the Listing Date.***

The Issue Price has been determined by the Investment Manager in consultation with the Book Running Lead Managers. The Issue Price may not be indicative of the market price of the Units upon completion of the Listing. The market price of the Units may also be highly volatile and could be subject to wide fluctuations. If the market price of the Units declines significantly, investors may be unable to resell their Units at or above their purchase price, if at all. There can be no assurance that the market price of the Units will not fluctuate or decline significantly in the future. The market price of the Units will depend on many factors, including, among others:

- the perceived prospects of our business and investments and the market for toll roads and other infrastructure projects;
- differences between our actual financial and operating results and those expected by investors and analysts;
- the perceived prospects of future toll roads and other infrastructure projects that may be added to our portfolio in accordance with our investment mandate;
- changes in research analysts' recommendations or projections;
- changes in general economic or market conditions;
- the market value of our assets;
- the perceived attractiveness of the Units against those of other business trusts, equity or debt securities;
- the balance of buyers and sellers of the Units;
- the size and liquidity of the Indian business trusts market;
- any changes to the regulatory system, including the tax system, both generally and specifically in relation to India business trusts;
- the ability of the Investment Manager to implement successfully its investment and growth strategies;
- foreign exchange rates;
- broad market fluctuations, including increases in interest rates and weakness of the equity and debt markets;
- variations in our quarterly operating results;
- difficulty in assessing our performance against either domestic or international benchmarks, as there are few listed comparables;
- publication of research reports about us, other road businesses, the road industry in general or other relevant sectors, or the failure of securities analysts to cover the Units after the Total Issue;
- additions or departures of key management personnel of the Trust and/or the Trust Group;
- changes in the amounts of our distributions, if any, and changes in the distribution payment policy or failure to execute the existing distribution policy;
- actions by Unitholders;
- changes in market valuations of similar business entities or companies;
- announcements by us or our competitors of significant contracts, acquisitions, disposals, strategic partnerships, joint ventures or capital commitments;
- speculation in the press or investment community; and
- changes or proposed changes in laws or regulations affecting the road industry and infrastructure development in India or enforcement of these laws and regulations, or announcements relating to these matters.

To the extent that we retain operating cash flow for investment purposes, working capital reserves or other purposes, these retained funds, while increasing the value of our underlying assets, may not correspondingly increase the market price of the Units. Our failure to meet market expectations with regard to future earnings and cash distributions may materially and adversely affect the market price of the Units.

Where new Units are issued at less than the market price of the Units, the value of an investment in the Units may be affected. In addition, Unitholders who do not, or are not able to, participate in the new issuance of Units may experience a dilution of their interest in the Trust. In addition, the Units are not capital-safe products and there is no guarantee that Unitholders can regain the amount invested, in full or in part. If the Trust is extinguished, it is possible that investors may lose a part or all of their investment in the Units.

**Risks Related to Tax**

**72.** ***Some of our road's assets enjoy certain benefits under Section 80-IA of the Income Tax Act and any change in these tax benefits applicable to us may materially and adversely affect our results of operations.***

Currently, surface transport infrastructure development projects, including toll-road concession projects, enjoy certain benefits under Section 80-IA of the Income Tax Act. In accordance with and subject to the condition specified in this section, the Project SPV is entitled to certain benefits for all of the operational infrastructure projects and would be entitled to a deduction of 100% of the profits derived from the development or operation and maintenance or development, operation and maintenance of the toll roads for any 10 consecutive tax assessment years out of 20 years, beginning from the year in which the Project SPV develops and begins to operate the infrastructure facility. The incentives for Section 80-IA of the Income Tax Act are available for a period of 10 consecutive tax years out of a block of 20 years from the year of commencement of operations. However, the Project SPV would be liable to pay tax on their respective book profits under the MAT Provisions at the rate of 18.5% (plus applicable surcharge and cess). When the tax incentives expire or terminate, our tax liability may increase, thereby impacting our profitability. Further, the India tax authorities may disallow the deduction availed if the conditions specified are not complied with or the computation of the profits and gains of the eligible business is not in accordance with the manner prescribed and there is no assurance that such projects will continue to enjoy the tax benefits. This may affect the overall tax liabilities of the Project SPV and result in significant additional taxes becoming payable thereby resulting in a material, adverse effect on our business, financial condition, cash flows and results of operations and consequently may have a material, adverse impact on our distributions.

**73.** ***Change in ownership of Project SPV may result in the inability to carry forward and set off accumulated losses and unabsorbed depreciation, which could adversely affect cash flows and distributions to Unitholders***.

Under the Income Tax Act, 1961, a company's ability to carry forward and set off accumulated losses from prior years is subject to shareholding continuity requirements. Where there is a change in shareholding, losses can only be carried forward if shares carrying not less than 51% of the voting power continue to be beneficially held by the same persons who held such shares on the last day of the year in which the loss was incurred.

In the event, tax authorities take a view that the Formation Transactions, or any subsequent restructuring or reorganization involving a Project SPV, amounts to a change in beneficial ownership of such Project SPV, it could result in the affected Project SPV losing its ability to carry forward and set off accumulated losses against future taxable income. There can be no assurance that the Project SPV will be able to retain the benefit of past period losses. Any loss of such tax benefits could materially and adversely affect the financial condition, results of operations and cash flows of the affected Project SPV and, consequently, the Trust's ability to make distributions to Unitholders.

**74.** ***Entities operating in India are subject to a variety of Government and state government tax regimes and surcharges and changes in legislation or the rules relating to such tax regimes and surcharges could materially and adversely affect our business, prospects, cash flows and results of operations.***

There have been two recent major reforms in Indian tax laws, namely the introduction of the GST and provisions relating to general anti-avoidance rules ("**GAAR**").

The GST regime came into effect on July 1, 2017, combining taxes and levies by the Government and state governments into a unified rate structure. Given the limited availability of information in the public domain concerning the GST, we cannot assure you as to the tax regime following implementation of the GST. Additionally, there is limited clarity on the availability of input tax credit, and any unfavourable orders, including in respect of grants or annuity from relevant concessioning authorities in this regard may have an adverse effect on our financial position and cash flows. Furthermore, any application of existing law or future amendments may affect our overall tax efficiency and may result in significant additional taxes becoming payable. The GAAR regime came into effect on April 1, 2017. The tax consequences of the GAAR provisions being applied to an arrangement could result in denial of tax benefit, amongst other consequences, including on the interest paid by the Project SPV on the debt from the Trust. In the absence of any precedents on the subject, the application of these provisions is uncertain. If the GAAR provisions are made applicable to any member of the Trust, it may have an adverse effect on the Trust.

Furthermore, by way of the Finance Act, 2021, the Government, amongst others, amended the SCRA to recognize pooled investment vehicles and recognize the Units, debentures, other marketable securities and other instruments issued by infrastructure investment trusts as "securities". The Finance Act, 2021 exempted the payment of tax deducted at source on dividends paid by the Project SPV to infrastructure investment trusts. For further details, see "*Risk Factors – Investors may be subject to Indian taxes arising out of capital gains on the sale of Units and on any dividend or interest component of any returns from the Units*" on page 66.

By way of the Finance Act, 2022, the applicability of section 94(7) of the IT Act has been extended to the units of business trust (with effect from Financial Year 2022-23), which provides that certain situation, loss, if any, arising from the sale and purchase of securities and units, to the extent of dividend or income received or receivable on such securities or unit, shall be ignored for computing income chargeable to tax. The Finance Act, 2022 extended the applicability of section 94(8) of the IT Act (commonly known as bonus stripping) to the units of business trusts (with effect from Financial Year 2022-23), which provides certain other situations where loss, if any, arising from the sale and purchase of all or any of the units shall be ignored for computing income chargeable to tax and notwithstanding anything contained in any other provision of the IT Act, the amount of loss so ignored shall be deemed to be the cost of purchase or acquisition of additional/ bonus units as are held on the date of such sale or transfer.

The Finance Act 2023 provides for tax on the unitholders for such portion of distribution received by them that is not covered under section 10(23FC) or 10(23FCA) of the IT Act and that which is not chargeable to tax under section 115UA(2) of the IT Act. Any distribution not covered under the aforementioned clauses will be taxed in the hands of the unitholders as 'income' under section 56(2)(xii) of the IT Act, provided the amount received (including similar distributions in earlier years to the same unitholder or any other unitholder) is in excess of the amount at which units were issued by the Trust, as reduced by the amount which would have been charged to tax earlier under this provision. The aforementioned amounts received by a unitholder being a specified person covered under section 10(23FE) of the IT Act shall not be subject to taxes upon the fulfilment of certain conditions set out in the IT Act. Further, any such distribution received by a unitholder to the extent not chargeable to tax under section 56(2)(xii) and 115UA(2) and not covered under sections 10(23FC), or 10(23FCA) shall be reduced from the cost of units. We cannot assure you that there will be no adverse impact on the tax incidence to the unitholders pursuant to the Finance Act 2023. For details, see "*Taxation*" on page 282.

Furthermore, pursuant to the Finance Act, 2024, the capital gains tax regime was amended, and the definitions of long-term capital assets, short term capital assets and their applicable tax rates were changed. The Finance Act, 2025, also introduced an amendment to section 115UA of the IT Act to provide that capital gains income, chargeable under section 112A of the IT Act will be taxed under the rates specified in section 112A of the IT Act, rather than the maximum marginal rate.

Tax laws and regulations are subject to differing interpretations by tax authorities. Differing interpretations of tax and other fiscal laws and regulations may exist within governmental ministries, including tax administrations and appellate authorities, thus creating uncertainty and potential unexpected results. The degree of uncertainty in tax laws and regulations, combined with significant penalties for default and a risk of aggressive action, including by retrospective legislation, by the governmental or tax authorities, may result in tax risks in the jurisdictions in which we operate being significantly higher than expected. These events may result in an adverse effect on our business, financial condition, cash flows, results of operations and prospects. Tax authorities in India may also introduce additional or new regulations applicable to our business which could adversely affect our business and profitability.

The Investment Manager has not determined the impact of such existing or proposed legislation on our business. Uncertainty in the applicability, interpretation or implementation of any amendment to, or change in, governing law, regulation or policy, including by reason of an absence, or a limited body, of administrative or judicial precedent, may be time consuming as well as costly for us to resolve and may impact the viability of our current business or restrict our ability to grow our business in the future. The Investment Manager intends to take measures to ensure that it is in compliance with all relevant tax laws. However, the tax authorities might take a position that differs from the position taken by us with regard to our tax treatment of various items.

**75.** ***Tax laws are subject to changes and differing interpretations, which may materially and adversely affect our operations.***

We are subject to a number of taxes and other levies imposed by the central and state governments in India, particularly GST, as well as certain other taxes, duties or surcharges introduced on a permanent or temporary basis. The central and state tax scheme in India is extensive and subject to change from time to time. Any adverse changes in any of the taxes levied by the central or state governments in India may adversely affect our business, financial condition, results of operations and cash flows.

The current tax laws and regulations in India provide certain exemptions to certain distributions received by business trusts from a SPV as a result of which the business trust and subsequently the Unitholders would be subject to relatively lower tax liabilities. These exemptions could be modified or removed at any time or clarified in a manner adverse to the Unitholders, which could adversely affect our profitability and the amount available for distribution to the Unitholders.

Tax laws and regulations are subject to differing interpretations by tax authorities. Differing interpretations of tax and other fiscal laws and regulations may exist within governmental ministries, including tax administrations and appellate authorities, thus creating uncertainty and potential unexpected results. The degree of uncertainty in tax laws and regulations, combined with significant penalties for default and a risk of aggressive action, including by retrospective legislation, by the governmental or tax authorities, may result in tax risks in the jurisdictions in which we operate being significantly higher than expected. For example, while our Investment Manager intends to take measures to ensure that it is in compliance with all relevant tax laws, we cannot assure you that the tax authorities will not take a position that differs from the position taken by our Investment Manager with regard to tax treatment of various items. Any of the above events may result in an adverse effect on our business, financial condition, results of operations and/or prospects and ability to make distributions to the Unitholders. Tax authorities in India may also introduce additional or new regulations applicable to our business, which could adversely affect our business and profitability.

We may incur increased costs relating to compliance with any new requirements, which may also require management time and other resources, and any failure to comply may adversely affect our business, results of operations and prospects. Uncertainty in the applicability, interpretation or implementation of any amendment to, or change in, governing law, regulation or policy, including by reason of an absence, or a limited body, of administrative or judicial precedent may be time consuming as well as costly for us to resolve and may affect the viability of the current business or restrict our ability to grow our business in the future.

**76.** ***Investors may be subject to Indian taxes arising out of capital gains on the sale of Units and on any dividend or interest component of any returns from the Units.***

Under current Indian tax laws, units of a business trust held for more than 12 months are considered as long term capital assets. In case of sale of such units through a recognised stock exchange in India, any gain exceeding ₹0.125 million realized on the sale of Units held for more than 12 months will be subject to capital gains tax in India at 12.5% (plus applicable surcharge and cess) without indexation benefits if STT has been paid on the transaction. Further, gains realized on the sale of Units held for 12 months or less will be subject to capital gains tax in India at 20% (plus applicable surcharge and cess) if STT is paid on the transaction. STT will be levied on and collected by a domestic stock exchange on which the Units are sold. Any gain realized on the sale of the Units held for more than 24 months to an Indian resident, on which no STT has been paid, will be subject to long-term capital gains tax in India at 12.5% (plus applicable surcharge and cess) without indexation benefits. Further, any gain realized on the sale of Units held for a period of 24 months or less and on which STT is not paid will be subject to short-term capital gains tax in India at normal rates at which the unitholder would be subject to tax on his other incomes. Capital gains arising from the sale of the Units will be exempt from taxation in India in cases where the exemption from taxation in India is provided under a treaty between India and the country of which the seller is resident. The above statements are based on the current tax laws and subject to change as a result of the introduction of new laws or amendments to existing laws.

More recently, the Government of India announced the Union Budget for Fiscal 2026, following which the Finance Bill, 2025 ("**Finance Bill**") was introduced in the Lok Sabha on February 1, 2025. Subsequently, the Finance Bill received the assent from the President of India on March 29, 2025, and became the Finance Act, 2025, with effect from April 1, 2025 ("**Finance Act**"). Additionally, the Government of India has introduced new GST rates on goods and services with effect from September 22, 2025. Potential investors are advised to consult their own tax advisors and to carefully consider the potential tax consequences of owning Units. There is no certainty on the impact that the Finance Act may have on our business and operations or on the industry in which we operate. Uncertainty in the applicability, interpretation or implementation of any amendment to, or change in, governing law, regulation or policy, including by reason of an absence, or a limited body, of administrative or

judicial precedent may be time consuming as well as costly for us to resolve and may affect the viability of our current business or restrict our ability to grow our business in the future.

## GENERAL INFORMATION

**Raajmarg Infra Investment Trust**

Raajmarg Infra Investment Trust ("**Trust**") was settled on November 24, 2025, in New Delhi pursuant to the Trust Deed as a contributory irrevocable trust in accordance with the Indian Trusts Act, 1882 and registered in India pursuant to the provisions of the Registration Act, 1908. The Trust was registered with SEBI on December 22, 2025, under Regulation 3(1) of the InvIT Regulations and has obtained a certificate of registration from SEBI bearing number IN/InvIT/25-26/0034. The principal place of business of the Trust is situated at G - 5 & 6, Sector 10, Dwarka, New Delhi – 110 075.

The Trust is an infrastructure investment trust established for making investments in special purpose vehicles as defined under Regulation 2(1)(zy) of the InvIT Regulations, or infrastructure projects or securities of Indian companies engaged in the infrastructure sector, as may be permitted in terms of Regulation 18(5) of the InvIT Regulations. For information on the background of the Trust and the description of the InvIT Assets, please see the sections entitled "*Overview of the Trust*" and "*Business*" on pages 21and 155, respectively.

***Compliance Officer of the Trust***

The Compliance Officer is Gunjan Rajpal. Her contact details are as follows:

**Gunjan Rajpal**
G - 5 & 6, Sector 10, Dwarka,
New Delhi – 110 075
**Telephone:** +91 2507 4100-1524
**E-mail:** compliance@riimpl.in

Bidders can contact the Compliance Officer or the Registrar to the Issue in case of any pre-Issue or post-Issue related problems such as non-receipt of Allotment Advice/letter of Allotment, non-credit of Allotted Units in the respective beneficiary account, non-receipt of refund orders and non-receipt of funds by electronic mode.

**The Sponsor – National Highways Authority of India**

***Head office and address for correspondence****:*

**National Highways Authority of India**
G-5 & 6, Sector – 10, Dwarka,
New Delhi – 110 075

***Contact Person of the Sponsor***

Soumya Mukhopadhyay, Deputy General Manager (Finance and Accounts) is the contact person of the Sponsor. His contact details are as follows:

**Soumya Mukhopadhyay**
G-5 & 6, Sector – 10, Dwarka,
New Delhi – 110 075
**Telephone:** +91 11 25074100/200 Extn: 1109
**E-mail:** s.mukhopadhyay@nhai.org

**The Investment Manager - Raajmarg Infra Investment Managers Private Limited**

***Registered office and address for correspondence****:*

**Raajmarg Infra Investment Managers Private Limited**
G - 5 & 6, Sector 10, Dwarka,
New Delhi – 110075, India
**Telephone:** +91 92356 13818
**E-mail:** mriduldubey@nhai.org
**Contact person:** Mridul Dubey

**The Project Manager – National Highways InvIT Project Managers Private Limited**

***Registered office and address for correspondence***

**National Highways InvIT Project Managers Private Limited**
G - 5 & 6, Sector 10,
Dwarka, New Delhi – 110075
**Telephone:** +91 11 4039 5336 Extn:11
**Contact person:** Akhil Khare

**The Trustee – IDBI Trusteeship Services Limited**

***Registered Office and correspondence address***

**IDBI Trusteeship Services Limited**
Ground Floor, Universal Insurance Building,
Sir Phirozshah Mehta Road, Fort,
Mumbai – 400 001, Maharashtra, India
**Telephone:** +91 11 4513 8885
**E-mail:** itsl@idbitrustee.com/ delhiitsl@idbitrustee.com
**Contact person :** Deepak Kumar and Mahendra Singh Chouhan
**Website:** www.idbitrustee.com

**Other Parties involved in the Trust**

**Auditors**

**A.R. & Co., Chartered Accountants**
A-403, Gayatri Apartment,
Airlines Group Housing Society,
Plot No-27, Sector-10,
Dwarka, New Delhi – 110075
**Telephone**: +91 9810195084, +91 9810444051
**E-mail:** ar_co1981@yahoo.co.in , pawankgoel1@gmail.com
**Contact person:** Mohd. Azam Ansari
**Firm registration no:** 002744C
**Peer review no:** 023024

**Valuer**

**RBSA Valuation Advisors LLP**
Unit 1081 & 1082, 8th Floor,
Building No. 10, Solitaire Corporate Park,
Guru Hargovindji Road, Chakala,
Andheri East, Mumbai – 400093
**Telephone**: +91 22 6130 6093
**E-mail:** ravishu.shah@rbsa.in
**Website:** www.rbsa.in
**Firm registration no:** IBBI/RV-E/05/2019/110
**Contact person:** Ravishu Vinod Shah

**Technical Consultants**

**URS Scott Wilson India Private Limited in JV with Marc Technocrats Private Limited**
3rd Floor, Tower 8 A, DLF Cyber City,
DLF Phase 2, Gurgaon – 122002
**Telephone**: +91 124 4871400
**E-mail:** shankar.lohani@aecom.com
**Website**: www.aecom.com
**Contact person**: Shankar Raj Lohani

**Chaitanya Projects Consultancy Limited in association with Shree Bhawani Consultancy Services Private Limited**
C-5, 2nd Floor, R. K. Tower,
Sector-4, Vaishali,
Ghaziabad 201012
**Telephone**: 01204110472
**E-mail:** chaitanya.projects@gmail.com
**Contact person:** Deepika Shukla

**Traffic Consultant**

**Translink Infrastructure Consultants Private Limited in association with Infra Brainiac Private Limited**
1103 , I Square Corporate Park,
Near Shukan Mall Cross Road,
Science City Road,
Sola, Ahmedabad, Gujarat – 380 060
**Telephone**: +91 79297 06769
**E-mail**: tejas@translinkinfra.com
**Contact person**: Tejas Patel

**Book Running Lead Managers to this Issue**

**SBI Capital Markets Limited**
1501, 15th Floor, A & B Wing
Parinee Crescenzo Building, G Block,
Bandra Kurla Complex,
Bandra (East), Mumbai 400 051
Maharashtra, India
**Telephone**: +91 22 4196 8300
**E-mail**: raajmarg.ipo@sbicaps.com
**Website**: www.sbicaps.com
**Investor grievance e-mail**:investor.relations@sbicaps.com
**Contact person**: Sanjay Sethia
**SEBI registration number**: INM000003531

**Axis Capital Limited**
1st Floor, Axis House
Pandurang Budhkar Marg, Worli
Mumbai 400 025
Maharashtra, India
**Telephone**: +91 22 4325 2183
**E-mail**: raajmarg.ipo@axiscap.in
**Investor grievance e-mail**: compliants@axiscap.com
**Contact person**: Harish Patel/ Mayuri Arya
**Website**: www.axiscapital.co.in
**SEBI registration number**: INM000012029

**ICICI Securities Limited**
ICICI Venture House,
Appasaheb Marathe Marg,
Prabhadevi, Mumbai 400 025,
Maharashtra, India
**Telephone**: +91 22 6807 7100
**E-mail**: raajmarg.ipo@icicisecurities.com
**Investor grievance e-mail**: customercare@icicisecurities.com
**Contact person**: Shri Subramanyam / Sumit Singh
**Website**: www.icicisecurities.com
**SEBI registration number**: INM000011179

**Motilal Oswal Investment Advisors Limited**
Motilal Oswal Tower,
Rahimtullah Sayani Road,
Opposite Parel ST Depot,
Prabhadevi, Mumbai – 400 025,
Maharashtra, India
**Telephone:** +91 22 7193 4380
**E-mail:** riit.ipo@motilaloswal.com
**Investor grievance e-mail:** moiaplredressal@motilaloswal.com
**Contact person:** Shashank Pisat
**Website:** www.motilaloswalgroup.com
**SEBI registration number:** INM000011005

**Inter-se allocation of responsibilities**

The following table sets forth the inter-se allocation of responsibilities for various activities amongst the Book Running Lead Managers for this Issue:

| Sr. No. | Activity | Responsibility | Co-ordination |
|---|---|---|---|
| 1. | Assist the Investment Manager in selecting the initial portfolio of the InvIT, capital structuring, with the relative components and formalities such as type of instruments, etc. | Book Running Lead Managers | SBICAPS |
| 2. | Due diligence of the InvIT's operations/management/ business plans/ legal, etc., Sponsor's / Investment Manager's / Project Manager's experience, the proposed formation transactions, the proposed and future assets arrangements, any other related party transactions (including any name licensing or other arrangements), drafting and design of offer documents and drafting of Statutory Advertisements. The Book Running Lead Managers shall ensure compliance with stipulated requirements and completion of prescribed formalities with the Stock Exchanges and the SEBI. | Book Running Lead Managers | SBICAPS |
| 3. | Assisting with the appointment of all intermediaries including registrar to the issue, escrow banks, printers, advertising agency, credit rating agencies, bankers to the issue, industry report provider and any other intermediaries | Book Running Lead Managers | SBICAPS |
| 4. | Coordination with the auditor deliverables and co-ordination with lawyers for legal opinion | Book Running Lead Managers | SBICAPS |
| 5. | Coordination for drafting of agreements like trust deed, investment management agreement, project implementation and management agreement and concession agreements | Book Running Lead Managers | SBICAPS |
| 6. | Coordination for drafting of various agreements like issue agreement, cash escrow and sponsor bank agreement, registrar agreement, transitional support agreement, syndicate agreement, ad agency agreement, etc. | Book Running Lead Managers | Axis |
| 7. | Finalisation of traffic and technical reports | Book Running Lead Managers | SBICAPS |
| 8. | Drafting and approval of all publicity material like corporate advertisement, brochure, hoardings etc. (other than statutory advertisement as mentioned above) | Book Running Lead Managers | Axis |
| 9. | Finalising road show marketing presentation | Book Running Lead Managers | I-Sec |
| 10. | Finalising FAQs | Book Running Lead Managers | I-Sec |
| 11. | Institutional Marketing of the Issue which will cover, inter alia:<br>• Formulating overall institutional marketing strategy;<br>• Finalising the list and division of investors for one-on-one meetings, institutional allocation; and<br>• Finalizing road show schedule and investor meeting schedules | Book Running Lead Managers | SBICAPS |
| 12. | Non-institutional marketing of the Issue | Book Running Lead Managers | Axis |
| 13. | Coordination with stock exchanges for book building software and submitting deposit | Book Running Lead Managers | I-Sec |
| 14. | Finalising of pricing and allocation in consultation with the Investment Manager | Book Running Lead Managers | SBICAPS |

| Sr. No. | Activity | Responsibility | Co-ordination |
|---|---|---|---|
| 15. | Assisting the investment manager in ensuring the completion of the formation transactions and the allotment of Units in consideration thereof | Book Running Lead Managers | SBICAPS |
| 16. | Post bidding activities including management of escrow account, coordinate non-institutional and institutional allocation, coordination with registrar and banks, intimation of allocation and dispatch of refund to bidders, etc. The post Issue activities of the Issue will involve essential follow up steps, which include finalization of basis of allotment, dispatch of certificates and demat delivery of Units, with the various agencies connected with the work such as Registrar to the Issue, Bankers to the Issue and the bank handling refund business. Any other activities related to post issue including redressal of investor grievances and listing/trading of Units. | Book Running Lead Managers | Motilal |

**Escrow Collection Bank, Refund Bank, Public Issue Account Bank, and Sponsor Bank(s)**

[●]

**Syndicate Members**

**[●]**

**Legal counsel to the Sponsor, Investment Manager and the Trust as to Indian law**

**JSA**
One Lodha Place, 27th Floor,
Senapati Bapat Marg, Lower Parel,
Mumbai – 400 013
Maharashtra, India

**Legal counsel to the Book Running Lead Managers as to Indian law**

**Shardul Amarchand Mangaldas & Co**
24th Floor, Express Towers
Nariman Point, Mumbai – 400021
Maharashtra, India

**Registrar to the Issue**

**KFin Technologies Limited**
Selenium, Tower B, Plot No-31 and 32,
Financial District, Nanakramguda,
Serilingampally, Hyderabad,
Rangareddy – 500 032
Telangana, India
**Telephone**: +91 1800 309 4001 / +91 40 6716 2222
**E-mail**: riimpl.invit@kfintech.com
**Investor grievance e-mail**: einward.ris@kfintech.com
**Website**: www.kfintech.com
**Contact person**: M. Murali Krishna
**SEBI registration number**: INR000000221

**Credit Rating Agencies**

**Care Ratings Limited**
32, Titanium,
Prahaladanagar Corporate Road,
Satellite, Ahmedabad – 380015
**Telephone**: +91 79 40265656 / 91-85111 90079
**E-mail**: maulesh desai@careedge.in
**Contact person**: Maulesh Desai

**India Ratings & Research Private Limited**
Wockhardt Towers, 4th Floor,
West Wing, Bandra Kurla Complex,
Bandra (E) Mumbai – 400 051
**Telephone**: +91 22 40001700
**E-mail:** infogrp@indiaratings.co.in
**Contact person:** Suryanarayanan S

**Self-Certified Syndicate Banks**

The list of SCSBs notified by SEBI for the ASBA process is available at http://www.sebi.gov.in/sebiweb/other/OtherAction.do?doRecognised=yes, or at such other website as may be prescribed by SEBI from time to time. For a list of the SCSB branches named by the respective SCSBs to receive ASBA Forms from the Designated Intermediary, please refer to the above-mentioned link.

**Registered Brokers**

The list of the Registered Brokers, including details such as postal address, telephone number and e-mail address, is provided on the websites of the Stock Exchanges at https://www.bseindia.com/ and https://www.nseindia.com, as updated from time to time.

**Registrar and Unit Transfer Agents**

The list of the RTAs eligible to accept ASBA Forms at the Designated RTA Locations, including details such as address, telephone number and e-mail address, is provided on the websites of BSE at https://www.bseindia.com/Static/PublicIssues/RtaDp.aspx and NSE at http://www.nseindia.com/products/content/equities/ipos/asba_procedures.htm, respectively, as updated from time to time.

**Collecting Depository Participants**

The list of the CDPs eligible to accept ASBA Forms at the Designated CDP Locations, including details such as name and contact details, is provided on the websites of BSE at https://www.bseindia.com/Static/PublicIssues/RtaDp.aspx and NSE at http://www.nseindia.com/products/content/equities/ipos/asba_procedures.htm, respectively, as updated from time to time.

**Investor Grievances**

Investors can contact our Compliance Officer, the Book Running Lead Managers or the Registrar to the Issue in case of any pre-Issue or post- Issue related problems, redressals of complaints, such as non-receipt of letters of Allotment, non-credit of Allotted Units in the respective beneficiary account, non-receipt of refund orders or non-receipt of funds by electronic mode.

All Issue related grievances, other than that of Anchor Investors, may be addressed to the Registrar to the Issue with a copy to the relevant Designated Intermediary to whom the Bid cum Application Form was submitted. The Bidder should give full details such as name of the first or sole Bidder, Bid cum Application Form number, Bidder's DP ID, Client ID, UPI ID, PAN, date of submission of the Bid cum Application Form, address of the Bidder, number of Units applied for, the name and address of the Designated Intermediary where the Bid cum Application Form was submitted by the first or sole Bidder and ASBA Account number (for Bidders other than UPI Bidders using the UPI Mechanism) in which the amount equivalent to the Bid Amount was blocked or the UPI ID in case of UPI Bidders.

Further, the first or sole Bidder shall also enclose a copy of the Acknowledgment Slip or provide the acknowledgement number received from the Designated Intermediaries in addition to the information mentioned hereinabove. All grievances relating to Bids submitted through Registered Brokers may be addressed to the Stock Exchanges with a copy to the Registrar to the Issue. The Registrar to the Issue shall obtain the required information from the SCSBs for addressing any clarifications or grievances of ASBA Bidders.

All Issue -related grievances of the Anchor Investors may be addressed to the Registrar, giving full details such as the name of the sole or First Bidder, Anchor Investor Application Form number, Bidders' DP ID, Client ID,

PAN, date of the Anchor Investor Application Form, address of the Bidder, number of Units applied for, Bid Amount paid on submission of the Anchor Investor Application Form and the name and address of the Book Running Lead Managers where the Anchor Investor Application Form was submitted by the Anchor Investor.

**Book Building Process**

Book building process, in the context of the Issue, refers to the process of collection of Bids from investors on the basis of the Offer Document, the Bid cum Application Forms and the Revision Forms within the Price Band. The Price Band, and minimum Bid Lot size will be decided by the Investment Manager in consultation with the Book Running Lead Managers and published in all editions of [●] (a widely circulated English national daily newspaper) and in all editions of [●] (a widely circulated Hindi national daily newspaper, Hindi also being the regional language of Delhi, where the registered office of the Investment Manager is located), at least two Working Days prior to the Bid/ Issue Opening Date and shall be made available to the Stock Exchanges for the purpose of uploading on their respective websites. The Issue Price shall be determined by the Investment Manager in consultation with the Book Running Lead Managers after the Bid/ Issue Closing Date. For further details, see "*Issue Information*" on page 259.

**All Bidders, other than Anchor Investors, shall participate in the Issue mandatorily through the ASBA process by providing the details of their respective ASBA Accounts in which the corresponding Bid Amount will be blocked by the SCSBs and Sponsor Banks, as the case may be. Anchor Investors are not permitted to participate in the Issue through the ASBA process. UPI Bidders may participate through the ASBA process by either (a) providing the details of their respective ASBA Account in which the corresponding Bid Amount will be blocked by the SCSBs or, (b) through the UPI Mechanism.**

**Each Bidder will be deemed to have acknowledged the above restrictions and the terms of the Issue, by submitting their Bid in the Issue.**

**The process of Book Building and the Bidding Process are subject to change from time to time and the investors are advised to make their own judgment about investment through this process prior to submitting a Bid in the Issue. The Book Building Process is in accordance with guidelines, rules, regulations prescribed by SEBI. Bidders are advised to make their own judgment about an investment through this process prior to submitting a Bid.**

Bidders should note the Issue is also subject to obtaining the final listing and trading approvals of the Stock Exchanges, which the Investment Manager shall apply for after Allotment.

## BASIS OF ISSUE PRICE

The Issue Price will be determined by the Investment Manager, in consultation with the Book Running Lead Managers, on the basis of assessment of market demand for the Units offered through the Book Building Process and on the basis of quantitative and qualitative factors as described below.

Bidders are requested to also refer to the sections entitled "*Risk Factors"* and "*Business*" on pages 35 and 155, respectively, to make an informed investment decision.

The Price Band is ₹ [●] to ₹ [●].

Based on the evaluation of the qualitative and quantitative factors listed below, the enterprise value and equity value at the Floor Price and the Cap Price and the Issue Price is as follows:

| Particulars | At Floor Price | At Cap Price | At Issue Price |
|---|---|---|---|
| Equity Value (Post Issue) | [●] | [●] | [●] |
| Total Units Post Issue | [●] | [●] | [●] |

**Qualitative Factors**

We believe that some of the qualitative factors which form the basis for computing the Issue Price are as follows:

- Attractive industry sector with strong underlying fundamentals and favourable government policies
- Experienced Sponsor with consistent track record in operating and maintaining projects in the roads and highways sector in India
- Sizeable portfolio of diversified long-term revenue generating Toll Road assets
- Portfolio of strategically located assets catering to key economic corridors of the country
- Significant growth visibility through a defined pipeline of future assets
- Concession Agreements terms with low counterparty risk
- Long term transitional support from NHAI ensuring operational continuity

For further details, please see the section entitled "*Business*" on page 155.

**Quantitative Factors**

**Some of the quantitative factors which may form the basis for computing the Issue Price are as follows:**

1. **Valuation provided by the Valuer**

The Valuer has used the discounted cash flows method to determine the value of the InvIT Assets as on December 31, 2025. The assumptions on which the value of the InvIT Assets is based have been disclosed in the section entitled "*Valuation Report*" attached as Annexure A. For further details, please refer to the "*Valuation Report*" attached as Annexure A.

2. **Enterprise Value / Cash flows from operations ratio in relation to Issue Price:**

*(in ₹ million)*

| Particulars | Amount | EV/Cash flow from operations | | |
|---|---|---|---|---|
| | | At Floor Price | At Cap Price | At Issue Price |
| Projected cash flows from operations for the financial year ended March 31, 2026 | Nil | [●] | [●] | [●] |
| Projected cash flows from operations for the financial year ended March 31, 2027 | 8,621.50 | [●] | [●] | [●] |
| Projected cash flows from operations for the financial year ended March 31, 2028 | 10,605.20 | [●] | [●] | [●] |
| Projected cash flows from operations for the financial year ended March 31, 2029 | 10,955.53 | [●] | [●] | [●] |

*[**]In accordance with the Projections of Revenue from Operations and Cash Flow from Operating Activities prepared by the Investment Manager. For details of the projections and notes thereto, please see the section entitled "Projections of Revenue from Operations and Cash Flow from Operating Activities" on page 320. Also see the section entitled "Risk Factors" on page 35.*

## 3. Price / Net Asset Value per Unit ratio in relation to Issue Price:

| Particulars | Amount (₹) | Price / Net Asset Value per Unit | | |
|---|---|---|---|---|
| | | At Floor Price | At Cap Price | At Issue Price |
| Net Asset Value per Unit as of [●] [(1)] | [●] | [●] | [●] | [●] |

*[(1)] The number of Units that the Trust will issue is not presently ascertainable. Hence, the disclosures in respect of number of Units and Net Asset Value per Unit have not been provided as on date of this Draft Offer Document.*

For further details, refer to "*Audited Financial Information*" on page 301.

## 4. Earnings Per Units

| Year/Period ended | Earnings per Unit (₹)[*] |
|---|---|
| [●] | [●] |

*Note: The number of Units that the Trust will issue is not presently ascertainable. Hence, the disclosures in respect of Earnings Per Unit have not been provided as on date of this Draft Offer Document.*

## 5. Comparison with Industry Peers

| Particulars | Net Asset Value per Unit ("NAV") (₹) | Premium / (Discount) to NAV%[***] |
|---|---|---|
| Cube Highways Trust | 143.00[*] | (4.20) |
| Vertis Infrastructure Trust | 103.55[*] | 3.33 |
| Interise Trust | 104.18[**] | 5.35 |
| National Highways Infra Trust | 137.32[^] | 7.78 |
| IRB Invit Fund | 96.60* | (35.46) |

*[*] NAV as of September 30, 2025.*
*[**] NAV as of March 31, 2025.*
*[^] NAV as of June 30, 2025.*
*[***] Premium / (Discount) to NAV% has been calculated as Unit Price, divided by Net Asset Value per unit minus one, based on the latest available price on the stock exchanges of the peers till January 12, 2026. The respective price available is as follows:*

*(i) Cube Highways Trust - ₹137.00 on NSE as on January 9, 2026.*
*(ii) Vertis Infrastructure Trust - ₹107.00 on NSE as on January 12, 2026.*
*(iii) Interise Trust - ₹109.75 on NSE as on September 16, 2025.*
*(iv) National Highways Infrastructure Trust - ₹148.00 on NSE as on January 9, 2026.*
*(v) IRB InvIT Fund - ₹62.35 on NSE as on January 12, 2026.*

## PARTIES TO THE TRUST

### A. The Sponsor and Sponsor Group– National Highways Authority of India

***History and Certain Corporate Matters***

NHAI is an autonomous body under MoRTH, and was established on June 15, 1989, by the NHAI Act, as a body corporate, having a perpetual succession and common seal. It was made operational in February, 1995, with the appointment of the Chairman and other Members. NHAI is responsible for the development, maintenance and management of the national highways in India entrusted to it by the Central Government.

NHAI has all India presence through its different offices (regional offices/project implementation units/corridor management units) in different cities. The functioning of NHAI is governed by NHAI Act, and the rules and regulations framed thereunder.

***Background of the Sponsor***

NHAI is an autonomous body under Ministry of Road, Transport and Highways. It is established and governed by the NHAI Act. NHAI is not a company in terms of the Companies Act, 2013 (or in terms of the Companies Act, 1956), and accordingly, does not have a share capital. Pursuant to Section 17 of the NHAI Act, NHAI may receive additional capital and grants from the Central Government to discharge its functions. Additionally, NHAI has not issued any shares against such capital or grants invested by the Central Government.

As per Section 3(3) of the NHAI Act, NHAI shall consist of: (i) a chairman; (ii) not more than six full-time members; and (iii) not more than six part-time members, and each of the above shall be appointed by the Central Government by notification in the official gazette.

In accordance with the eligibility criteria specified under the InvIT Regulations, NHAI has a shareholders' fund (net worth) of not less than ₹ 1,000.00 million as on September 30, 2025.

Neither the Sponsor nor any of the members of the Sponsor are: (i) debarred from accessing the securities market by SEBI; (ii) promoters, directors or persons in control of any other company or a sponsor, investment manager or trustee of any other infrastructure investment trust or an infrastructure investment trust which is debarred from accessing the capital market under any order or direction made by SEBI; or (iii) in the list of wilful defaulters published by the RBI.

***Details of the holding or the proposed holding by Sponsor in the Trust***

Pursuant to the Commitment Letter, the Sponsor has agreed contribute such amount towards subscription of such number of Units, which shall be equivalent to at least 15.00% of the total Units of the Trust on a post-Issue basis, to comply with the requirement under Regulations 12(3) and 12(3A) of the InvIT Regulations. Further, the Units held by the Sponsor will be subject to lock-in requirements in accordance with the InvIT Regulations. For further details, see '*Formation Transactions in relation to the Trust – Sponsor Contribution*' on page 23.

***Sponsor Group***

In accordance with Regulation 2(zxc) of the InvIT Regulations, sponsor group" includes (i) the sponsor(s); (ii) entities or person(s) which are controlled by such sponsor; (iii) entities or person(s) who control such body corporate; (iv) entities or person(s) which are controlled by entities or person(s) specified in clause (iii). Further, Regulation 4(2)(d) of the InvIT Regulations clarifies that of the entities categorized as sponsor group as per (ii), (iii) and (iv) above, only the following entities may be considered: a) a person or entity who is directly or indirectly holding an interest or shareholding in any of the assets or SPVs or holdco(s) proposed to be transferred to the InvIT; b) a person or entity who is directly or indirectly holding units of the InvIT on post- issue basis; c) a person or entity whose experience is being utilized by the sponsor for meeting with the eligibility conditions required under sub-clause (iii) of clause of sub-regulation (2) of regulation 4 of the InvIT Regulations.

Accordingly, National Highways Authority of India has been identified as the Sponsor Group of the Trust.

## B. The Trustee – IDBI Trusteeship Services Limited

***History and Certain Corporate Matters***

IDBI Trusteeship Services Limited is the Trustee of the Trust. The Trustee is a registered intermediary with SEBI under the Securities and Exchange Board of India (Debenture Trustees) Regulations, 1993, as a debenture trustee. The Trustee has obtained a certificate of registration dated February 14, 2017 (having registration code IND000000460), which is valid until suspended or cancelled by SEBI. The Trustee was incorporated in India under the Companies Act, 1956 with corporate identity number U65991MH2001GOI131154. The Trustee was originally incorporated on March 8, 2001 at Mumbai, Maharashtra. The Trustee's registered office is situated at Ground Floor, Universal Insurance Building, Sir Phirozshah Mehta Road, Fort, Mumbai, Maharashtra, India, 400001. The Trustee is jointly promoted by IDBI Bank Limited, Life Insurance Corporation and General Insurance Corporation for providing corporate and other trusteeship services.

***Background of the Trustee***

The Trustee is permitted to engage in the following activities: (a) to act as (i) a debenture or bond trustee; (ii) a security trustee or facility agent; (iii) a securitization trustee; (iv) a share pledge trustee or share monitoring agent; (v) an escrow agent; (vi) a venture capital fund trustees, trustee of an infrastructure investment trust or a trustee to an AIF; and (b) providing services including (i) safe keeping or locker services; (ii) management of private trusts or execution of wills; and (iii) special corporate services.

The Trustee confirms that it has maintained, and undertakes to ensure that it will at all times maintain, adequate infrastructure personnel and resources to perform its functions, duties and responsibilities with respect to the Trust, in accordance with the Trust Deed, the InvIT Regulations and other applicable law.

The Trustee is not an Associate of the Sponsor or the Investment Manager. Further, neither the Trustee nor any of the promoters or directors of the Trustee are: (i) debarred from accessing the securities market by SEBI; (ii) promoters, directors or persons in control of any other company or a sponsor, investment manager or trustee of any other infrastructure investment trust or an infrastructure investment trust which is debarred from accessing the capital market under any order or direction made by SEBI; or (iii) in the list of wilful defaulters published by the RBI.

***Board of directors of the Trustee***

The board of directors of the Trustee is entrusted with the responsibility for the overall management of the Trustee. Please see below the details in relation of the board of directors of the Trustee:

| Sr. No. | Name | DIN |
|---|---|---|
| 1. | Jayakumar S Pillai | 10041362 |
| 2. | Pradeep Kumar Malhotra | 09817764 |
| 3. | Balkrishna Variar | 10661169 |
| 4. | Arun Kumar Agarwal | 00063359 |
| 5. | Hare Krushna Dandapani Panda | 00479786 |
| 6. | Soma Nandan Satpathy | 10899299 |
| 7. | Lohit Kumar Neel | 06504417 |

***Brief profiles of the Directors of the Trustee***

1. Jayakumar S Pillai is the deputy managing director on the board of directors of the IDBI Trusteeship Services Limited.

2. Pradeep Kumar Malhotra is the managing director and chief executive officer on the board of directors of the IDBI Trusteeship Services Limited.

3. Balkrishna Variar is a non-executive director on the board of directors of the IDBI Trusteeship Services Limited.

4. Arun Kumar Agarwal is an independent director on the board of directors of the IDBI Trusteeship Services Limited.

5. Hare Krushna Panda is an independent director on the board of directors of the IDBI Trusteeship Services Limited.

6. Soma Nandan Satpathy is a director on the board of directors of the IDBI Trusteeship Services Limited.

7. Lohit Kumar Neel is an executive director on the board of directors of the IDBI Trusteeship Services Limited.

***Key Terms of the Trust Deed***

The Trustee has entered into the Trust Deed, in terms of the InvIT Regulations, the key terms of which, are provided below:

1. *Powers and Duties of the Trustee*

Without prejudice to the powers conferred upon the Trustee under the Indian Trusts Act, 1882, under the Trust Deed, the Trustee shall, in relation to the InvIT, have all powers that a Person competent to contract and acting as a legal and beneficial owner of such property would have. Such powers shall not be limited by any rule of construction and shall be interpreted with the widest generality, notwithstanding that certain powers are specifically set out herein:

(i) The Trustee shall have the power to appoint the Investment Manager as the investment manager of the InvIT and may delegate to it such powers of the Trustee, as permitted under the Trust Deed. The Trustee may execute the Investment Management Agreement, the Project Implementation and Management Agreement, and any other agreement with the Investment Manager or its nominees;

(ii) The Trustee shall determine, in accordance with the Investment Management Agreement and the Investment Objectives, distributions to Unitholders and other rights attached to Units, in compliance with the InvIT Regulations;

(iii) The Trustee shall oversee voting by Unitholders in accordance with the InvIT Regulations;

(iv) The Trustee shall have the power (which may be delegated to the Investment Manager) to:

(a) cause the offering of Units through any Offer Document;
(b) cause any Offer Documents to investors;
(c) issue and allot Units;
(d) summon and conduct meetings of Unitholders in accordance with the InvIT Documents and InvIT Regulations; and
(e) approve transfers of Units, subject to the InvIT Documents and InvIT Regulations.

(v) The Trustee shall, through the Investment Manager, invest and hold the InvIT Assets in the name of the InvIT in accordance with the InvIT Regulations, the Trust Deed and the Investment Objectives;

(vi) The Trustee may make investment decisions only to the extent delegated to and exercised exclusively by the Investment Manager. These powers include the ability to:

a. acquire, hold, trade, or dispose of securities of all kinds issued by SPVs or infrastructure projects;
b. deposit InvIT capital and monies with banks or institutions;
c. accept contributions;
d. receive income, dividends, return of capital and other proceeds;
e. invest in securities or mutual fund units permitted;
f. invest in money market instruments;
g. provide financial assistance to SPVs in the form of debt or equity instruments;

h. invest , acquire, purchase, hold, divest, sale, hypothecate, pledge or othrewise transfer immovable property and related rights.

(vii) The Trustee may, in consultation with the Investment Manager, create reserves out of income or capital as deemed appropriate, in compliance with the InvIT Regulations;

(viii) The Trustee may employ agents in any jurisdiction (including attorneys, solicitors, brokers, banks, trust companies, and others) and pay them from InvIT funds and shall not be liable for an agent's default if appointed in good faith;

(ix) The Trustee shall appoint the Investment Manager on behalf of the InvIT by executing the Investment Management Agreement within a reasonable time from the execution of the Trust Deed;

(x) The Trustee shall oversee the Investment Manager's activities, ensure compliance with InvIT Regulations and other applicable law, including in relation to Unitholder Nominee Directors, and obtain compliance certificates as prescribed by SEBI;

(xi) The Trustee shall appoint the Project Manager on behalf of the InvIT by executing the Project Implementation and Management Agreement;

(xii) The Trustee shall oversee the Project Manager's activities and obtain compliance certificates as prescribed by SEBI;

(xiii) The Trustee (through the Investment Manager) may appoint custodians and deposit InvIT property with them as permitted;

(xiv) The Trustee may pay taxes, duties, fees, penalties or interest payable in any jurisdiction in respect of the InvIT and may create reserves for future liabilities. No Unitholder shall be required to contribute capital other than the value paid for Units;

(xv) The Trustee may pay InvIT Expenses out of InvIT funds, subject to the advice of the Investment Manager;

(xvi) The Trustee may obtain legal or tax advice and pay related fees from InvIT funds;

(xvii) The Trustee may enter into transactions with trustees of other trusts or executors, including where the Trustee is the same Person, provided such power is delegated to and exercised exclusively by the Investment Manager and conflicts of interest are avoided;

(xviii) The Trustee may, subject to Investment Manager's advice, cause the InvIT to borrow funds and provide security over InvIT Assets, subject to Unitholder approvals and the InvIT Regulations;

(xix) The Trustee may retain and reinvest proceeds received from InvIT Assets;

(xx) The Trustee may, in consultation with the Investment Manager, make rules for implementing the Investment Objectives, including:

(a) maintaining records of Unitholders;
(b) investment norms;
(c) custodial procedures;
(d) administrative matters;
(e) procedures for Unitholder voting;
(f) procedures for convening Unitholder meetings.

The Trustee may delegate this rule-making power to the Investment Manager.

(xxi) The Trustee shall cause the Depository to maintain the Depository Register;

(xxii) The Trustee shall advise the Investment Manager regarding appointment of intermediaries such as valuer, auditors, merchant bankers, custodian, registrar, etc.;

(xxiii) The Trustee shall review reports submitted by the Investment Manager and, after follow-up, intimate SEBI of any delays;

(xxiv) The Trustee may open, operate, and manage one or more bank accounts for the InvIT;

(xxv) The Trustee may take up with SEBI or stock exchanges any matter approved by Unitholders requiring such action;

(xxvi) The Trustee may:

(a) initiate or defend legal proceedings involving the InvIT;
(b) issue receipts and releases;
(c) negotiate and execute contracts for the InvIT;
(d) execute deeds and documents;
(e) execute InvIT Documents and amendments thereto;
(f) take custody of InvIT assets;
(g) exercise all powers required under applicable law.

(xxvii) The Trustee may delegate powers for administrative convenience, subject to retaining liability except for powers delegated to the Investment Manager, Project Manager, or third-party experts as permitted.

2. *Rights of the Trustee*

The Trustee shall have the following rights:

(i) The Trustee may, in the discharge of its duties, act upon any written advice obtained from any bankers, accountants, brokers, lawyers, professionals, consultants or other experts acting as advisers to the Trustee.

(ii) No Unitholder shall be entitled to inspect or examine the InvIT's premises or properties (including those of any Holding Company or SPV) without the prior permission of the Trustee, who shall grant such permission, if necessary, in consultation with the Investment Manager. Further, no Unitholder shall be entitled to seek discovery of any information relating to the InvIT's activities or conduct of business, where in the opinion of the Trustee and the Investment Manager such disclosure may adversely affect the interests of the Unitholder(s).

(iii) Without prejudice to any other provision of the Trust Deed (save as otherwise provided in any InvIT Document), the Trustee shall be entitled to reimburse itself and to charge the InvIT, and shall be indemnified from the InvIT and from any distributions made to Unitholders, for all expenses, outgoings, taxes, levies and liabilities (including any indemnity obligations of the InvIT) as set out in Schedule I.

(iv) The Trustee may accept as sufficient evidence of the value, cost price, sale price or any other fact within its competence, a certificate issued by a Valuer or any other professional appointed by the Investment Manager.

3. *Liabilities of the Trustee*

The liabilities of the Trustee in terms of the Trust Deed are as follows:

(i). The Trustee shall be chargeable only for such monies, stocks, funds and securities as it has actually received and shall not be liable for any banker, broker, custodian or other Person with whom such assets are deposited, nor for any deficiency or depreciation in the value of the InvIT's investments, nor for any involuntary loss. Any receipt signed by the Trustee for any monies, stocks, funds, shares, securities, investments or property paid, delivered or transferred to the Trustee shall discharge the Trustee and the Person making such payment or transfer,

provided the Trustee and such Person acted in good faith, without negligence, and used best efforts in connection with such dealings.

(ii). The Trustee shall not be liable for anything done, omitted or suffered in good faith in accordance with, or pursuant to, any request or advice of the Investment Manager.

(iii). The Trustee shall not be obliged to institute, acknowledge service of, appear in, prosecute or defend any action, suit, proceeding or claim relating to the InvIT or the InvIT Assets if such action may involve expense or liability, unless the Investment Manager so requests in writing and the Trustee is satisfied that the value of the investment is sufficient to provide adequate indemnity. All costs incurred by the Trustee in connection with such actions (whether undertaken upon request or otherwise) shall be borne by the InvIT.

(iv). The Trustee shall not be liable for any action taken or damage suffered in reliance on any notice, resolution, direction, consent, certificate, affidavit, statement, stock certificate, plan of reorganization or other document believed to be genuine and duly passed, sealed or signed by the appropriate authority.

(v). The Trustee shall not be liable to Unitholders for performing or failing to perform any act required by any present or future law, regulation, decree, order, judgment, or any request or action of any governmental authority. If it becomes impossible or impracticable to carry out any provision of the Trust Deed, the Trustee shall not incur liability on that account.

(vi). The Trustee shall not be responsible for the authenticity of signatures affixed to any document, nor liable for acting upon any forged or unauthorized signature. The Trustee may, but is not obliged to, require verification of any Unitholder's signature to its reasonable satisfaction.

(vii). Nothing in the Trust Deed prevents the Trustee from acting as trustee for other trusts, AIFs, VCFs, PE funds, REITs, InvITs or any other fiduciary arrangements, and retaining for its own benefit all remuneration, profits and advantages derived therefrom, as permitted under any other applicable law.

(viii). Where the Trustee is required under the InvIT Regulations or any other applicable law to provide information regarding the InvIT, the Sponsor, the Unitholders or the investments of the InvIT, and complies with such request in good faith (whether or not enforceable), the Trustee shall not be liable to the Unitholders or any other Person for such compliance.

(ix). The Trustee shall not be liable for any loss to a Unitholder (including loss arising from depletion in the value of the InvIT Assets), except where such loss results directly from fraud, gross negligence or wilful default of the Trustee, or from a breach of the Trust Deed, as finally determined by a court of competent jurisdiction.

(x). If the Trustee engages external advisers or experts (as permitted under the Trust Deed) or undertakes additional work (in consultation with the Investment Manager and in the interest of Unitholders) beyond the scope of its obligations under the Trust Deed or any other applicable law, it shall be entitled to recover such costs and expenses from the InvIT funds. The Trustee shall not be required to utilize funds held for any other trust administered by IDBI Trusteeship Services Limited for meeting its obligations under the Trust Deed.

(xi). Nothing in the Trust Deed exempts or indemnifies the Trustee from liability for:

(a) breach of trust under the Indian Trusts Act, 1882;
(b) fraud, misconduct or gross negligence, as conclusively determined by a court of competent jurisdiction;
(c) violation of any applicable law by the Trustee that materially affects the InvIT or the Unitholders; or
(d) failure to exercise the degree of care and diligence required of a trustee under the Indian Trusts Act, 1882, as finally determined by a court of competent jurisdiction.

(xii). The Trustee shall promptly inform the Sponsor upon the occurrence of any cancellation, revocation, suspension, non-renewal, or breach of the terms of its trustee registration that materially impairs its ability to perform its obligations under the Trust Deed.

(xiii). The Trustee shall ensure that the InvIT, the Investment Manager, the Project Manager, the Holding Companies and the SPVs adopt, prior to filing of the relevant Offer Document for the initial offer, appropriate policies including corporate governance policies, asset acquisition policies, related party transaction policies, auditor and valuer appointment policies, Net Distributable Cash Flow policies, and leverage policies (together, **"Policies"**). The requirements and manner of Unitholder approval, applicability, amendment and termination of each Policy shall be set out within the respective Policy.

4. *Provisions relating to Unitholders*

(i) Notwithstanding anything to the contrary contained in any InvIT Document, the aggregate liability of each Unitholder (including any taxes, duties, fines, levies, liabilities, costs or expenses) shall be limited to making the Capital Contribution payable by it in respect of the Units subscribed by it. For the avoidance of doubt, no Unitholder shall be responsible or liable, directly or indirectly, for any act, omission or commission of the Trustee, the Investment Manager, the Sponsor or any other Person, whether or not such act, omission or commission has been approved by the Unitholders in accordance with the InvIT Regulations. Further, the Sponsors shall not be responsible or liable, directly or indirectly, for any act, omission or commission of the Trustee, the Investment Manager or any other Person, irrespective of whether such act, omission or commission has been approved by the Unitholders in accordance with the InvIT Regulation;

(ii) Each Unit allotted to the Unitholders shall carry one vote in respect of decisions requiring a vote of Unitholders and shall carry such other rights as provided under the InvIT Regulations;

(iii) No Unitholder shall enjoy preferential voting or any other rights over another Unitholder;

(iv) In no event shall the Trustee or the Investment Manager be obliged to make any payment to any Unitholder except out of funds held for that purpose under the Trust Deed;

(v) A Unitholder whose name and account details appear in the Depository Register shall be the sole Person entitled to be recognized by the Trustee as having any right, title or interest in the Units registered in his name. The Trustee shall treat such holder as the absolute owner thereof and shall not be bound by any notice to the contrary, nor required to take notice of, or ensure the execution of, any trust (express or implied), except where expressly provided or required by an order of a court of competent jurisdiction;

(vi) The Unitholders (acting in their capacity as unitholders) shall not give any directions to the Trustee or the Investment Manager (whether at a meeting or otherwise) if such directions would require the Trustee or the Investment Manager to:

(a) act or refrain from acting in a manner that results in the InvIT, the Trustee or the Investment Manager ceasing to comply with any other applicable law; or
(b) interfere with the exercise of any discretion expressly conferred on the Trustee under the Trust Deed or on the Investment Manager under the Investment Management Agreement, or determine any matter requiring the agreement of the Trustee or the Investment Manager.

(vii) The Depository Register shall, save in case of manifest error, be conclusive evidence of the number of Units held by each Depositor. In case of any discrepancy between the Depository Register and any statement issued by the Depository, the Depository Register shall prevail unless the Depositor proves to the satisfaction of the Trustee and the Depository that the Depository Register is incorrect;

(viii) Unitholders shall have the right to call for certain matters to be placed for their consent, to the extent required under the InvIT Regulations and any other applicable law;

(ix) Eligible Unitholders shall have the right to appoint Unitholder Nominee Directors on the board of the Investment Manager ("IM Board"), in the manner prescribed under the InvIT Regulations. The Trustee shall supervise and ensure that the Investment Manager undertakes all actions and compliances required under the InvIT Regulations in relation to such appointment rights;

(x) Unitholders may, in accordance with the InvIT Documents and any other applicable law, transfer any Units to an investor who accepts all rights and obligations of the transferor. The Trustee and the Investment Manager shall give effect to such transfer;

(xi) Unitholders shall be entitled to receive Distributions made by the InvIT in proportion to their respective Beneficial Interests. The Beneficial Interest of each Unitholder shall be equal and correspond to the proportion of the Units held by such Unitholder relative to the total number of Units issued by the InvIT on the relevant date;

(xii) After the initial offer, no Person (other than the Sponsor, its related parties and associates) ("Investor") shall acquire or receive Units which, together with Units held by the investor and persons acting in concert with it, exceed the threshold prescribed under the InvIT Regulations without prior approval of the Unitholders. If such approval is not obtained, the Investor shall provide an exit option to dissenting Unitholders in accordance with the InvIT Regulations and as specified by SEBI;

(xiii) The Trustee shall, and shall ensure that the Investment Manager shall, obtain Unitholder consent for all matters prescribed under the InvIT Regulations, in the manner and to the extent required under the InvIT Regulations.

5. *Indemnity*

In addition to the fees, distributions and expense reimbursements herein described, the InvIT Assets shall be utilized to indemnify and hold harmless the Trustee, the Sponsor and any of their respective officers, directors, shareholders, sponsors, partners, members, employees, advisors and agents ("**Indemnified Parties**") from and against any claims, losses, costs, damages, liabilities and expenses, including legal fees ("**Losses**") suffered or incurred by them by reason of their activities on behalf of the Trust, unless such Losses resulted from fraud, gross negligence, wilful default or wilful misconduct or breach of any obligations or duties under applicable law by the relevant Indemnified Party, as determined by a court of competent jurisdiction.

6. *Termination*

The InvIT is subject to dissolution and termination in accordance with and subject to the InvIT Regulations and applicable law:

(i). if the Trust fails to make any offer of Units by way of public issue or a private placement, within the time period stipulated in the InvIT Regulations or any other time period as specified by SEBI, the Trust shall surrender its certificate to SEBI and cease to operate as an investment infrastructure trust, unless the period is extended by SEBI;

(ii). upon the liquidation of InvIT Assets;

(iii). if there are no projects remaining under the Trust and the Trust does not invest in any project for six months thereafter;

(iv). delisting of the Units in accordance with the InvIT Regulations; or

(v). illegality of the InvIT under applicable law.

## C. The Investment Manager – Raajmarg Infra Investment Managers Private Limited

***History and Certain Corporate Matters***

Raajmarg Infra Investment Managers Private Limited was incorporated as a private limited company on August 22, 2025, under the Companies Act, 2013. The CIN of the Investment Manager is U66309DL2025PTC453624.

The principal business of the Investment Manager in terms of its memorandum of association is, *inter alia*:

(a) to carry on the business of acting as investment manager investment adviser, trustee, settler, sponsor, promoter, portfolio manager, manager, administrator, attorney, agent, consultant, representative or nominee of or for any collective investment schemes, trusts, special purpose vehicles, infrastructure investment trusts, real estate investment trusts, properties and/or assets of any kind, including any fund set up, formed or established in India or in any other country by the Company or by any other person including bodies corporate, limited liability partnerships, partnerships, trusts, societies, associations of persons or by government, state or local authority (whether incorporated or not) of any other agency or organisation with respect to any class of assets, and to thereby settle, administer, manage, deploy funds, acquire, take up, manage, invest, hold, sell, deal or dispose of all or any property, investments, securities or other assets of any kind whatsoever, acting in such capacity;

(b) to carry out the business of acting as investment manager investment adviser to Raajmarg Infra Investment Trust and to work for meeting out the targets set out by the Government of India for Raajmarg Infra Investment Trust. Alteration of this clause may require to be passed by special resolution as per provisions of Companies Act 2013;

(c) to negotiate and obtain concessions from the appropriate Government/ s for the rights to build, operate and own or transfer highways, interchangers, viaducts and bridges and any other structures, buildings and services that are ancillary thereto in India and upon such terms for such benefits as may be set forth in the concessions or negotiated from time to time and generally to carry on the business of owners, operators or toll collectors or concessionaires of highways, bridges, tunnels, railways, ports, airports, public utilities, telecommunication facilities and any other rights, properties, utilities and services wherever situated; and

(d) to carry on the business of builders and contractors for the construction, upgradation, maintenance and repairs of roads, highways, bridges, viaducts, buildings, interchangers, tunnels, railways, ports, airports, public utilities, telecommunication and other related works and generally to carry on the business of engineers, contractors, consultants, advisors, managers and administrators in all its branches, mechanical, electrical and telecommunication, engineering and incidental thereto, to provide financing or act as guarantors for project financing to owner where to required.

***Background of the Investment Manager***

RIIMPL has been appointed as the investment manager of the Trust, pursuant to the investment management agreement dated December 2, 2025, based on the recommendation of the Sponsor.

The Investment Manager confirms that it has, and undertakes to ensure that it will at all times maintain, adequate infrastructure, personnel and resources to perform its functions, duties and responsibilities with respect to the management of the Trust, in accordance with the InvIT Regulations, the Investment Management Agreement and applicable law.

In accordance with the eligibility criteria specified under the InvIT Regulations, the Investment Manager has a consolidated net worth of not less than ₹ 100.00 million as on November 30, 2025.

Neither the Investment Manager nor any of the promoters or directors of the Investment Manager are: (i) debarred from accessing the securities market by SEBI; (ii) promoters, directors or persons in control of any other company or a sponsor, investment manager or trustee of any other infrastructure investment trust or an infrastructure investment trust which is debarred from accessing the capital market under any order or direction made by SEBI; or (iii) in the list of wilful defaulters published by the RBI.

***The IM Board***

The IM Board is entrusted with the responsibility for the overall management of the Investment Manager. Pursuant to the share subscription and shareholder's agreement dated October 18, 2025 entered into between NHAI, the Investment Manager, National Bank for Financing Infrastructure and Development, State Bank of India, Punjab

National Bank, Axis Bank Limited, Bajaj Finserv Ventures Limited, HDFC Bank Limited, ICICI Bank Limited, IDBI Bank, IndusInd Bank Limited and YES Bank Limited, (i) NHAI shall have the right, but not the obligation to appoint one director on the IM Board; (ii) National Bank for Financing Infrastructure and Development shall, as long as it holds at least 5.00% of the equity share capital in Investment Manager, shall have the right but not the obligation to appoint one Director on the IM Board; (iii) other shareholders of the Investment Manager (exclusive of NHAI and National Bank for Financing Infrastructure and Development), shall, as long as they individually or together with their affiliates hold at least 5.00% of the equity share capital in Investment Manager, shall collectively have the right but not the obligation to appoint one director on the IM Board. The right to appoint directors on the IM Board shall be based on alphabetical order of the name of the other shareholders of the IM and the tenor of such director shall be one year.

Set forth below are the details of the IM Board:

| Sr. No. | Name | DIN |
|---|---|---|
| 1. | Ashish Kumar Singh | 09841587 |
| 2. | NRVVMK Rajendra kumar | 09494456 |
| 3. | Giridhar Aramane | 00483130 |
| 4. | Annie George Mathew | 11422154 |
| 5. | Dip Kishore Sen | 03554707 |
| 6. | Himanshu Gulliani | 11422736 |

***Brief Biography of the Directors of the Investment Manager***

Please see below a brief biography of the directors of the Investment Manager:

**Ashish Kumar Singh**, is a non-independent director on the board of the Investment Manager. He has a bachelor's degree in arts from the Lucknow University and a post graduate diploma in development studies from Institute of Developing Economics Advanced School-JETRO, Japan. He has also completed career training program on public financial management for the Indian Civil Accounts Service (2002 Batch) from Duke University, USA. and as part of mid-career training program, he has obtained a certificate in public financial management from National Institute of Financial Management, Faridabad. At present he is in the rank of Senior Administrative Grade in Government of India and currently serving as the Chief General Manager (Finance) in NHAI and has over 23 years of experience including finance, taxation and infrastructure development sector.

**Neti Ravi Vijay Venkat Murali Krishna Rajendrakumar** is a non-independent director on the board of the Investment Manager. He has a master's degree in public management from Harvard Kennedy School and Lee Kuan Yew School of Public Policy. He also holds a doctorate in economics from University of Hyderabad. He is also a nominee director on behalf of NHAI on the board of National Highways Infra Investment Managers Private Limited since 2022 and was a nominee director on the board of NHIT Western Projects Private Limited from April 2022 to November 2025He has over 29 years of experience in the financial management and asset management sectors.

**Giridhar Aramane,** is an independent director on the board of the Investment Manager. He has a bachelor's degree in technology (civil engineering) from Jawaharlal Nehru Technological University, Hyderabad, a master's degree in technology (civil engineering) from Indian Institute of Technology, Madras and a master's degree in economics from Kakatiya University, Warangal. He is a retired officer of the Indian Administrative Services and has served as the defence secretary at the Ministry of Defence, and the secretary of the Ministry of Road Transport and Highways. He has over 34 years of experience in administrative and public services.

**Annie George Mathew,** is an independent director on the board of the Investment Manager. She has a bachelor's degree in science (botany) and a master's degree in science (botany). She is a retired officer of Indian Audit and Accounts Service and has last served as the special secretary, Department of Expenditure. She was also Government of India's nominee, on the board of Indian Overseas Bank. She has over 33 years of experience in the public finance and financial management sectors.

**Dip Kishore Sen,** is an independent director on the board of the Investment Manager. He has a bachelor's degree in civil engineering from Indian Institute of Technology Kharagpur and a post graduate diploma in business management from XLRI Jamshedpur. He was previously associated with Larsen and Toubro Limited and last served as whole-time directors, and senior executive vice president (development projects). He has over 33 years of experience in the infrastructure development sector.

**Himanshu Gulliani,** is a non-independent director on the board of the Investment Manager. He has a bachelor's degree in arts (business economics) from the University of Delhi, a post graduate diploma from Fore School of Management, New Delhi and has completed post graduate programme in management from the Indian School of Business, Hyderabad. He currently serves as the executive vice president (corporate strategy and partnerships and ecosystem development) at the National Bank for Financing Infrastructure and Development. He was previously associated with IndusInd Bank Limited, ICICI Bank Limited, Macquarie Bank Limited, Axis Bank Limited and SOCIÉTÉ GÉNÉRALÉ. He has over 22 years of experience in the banking and finance sector across India, the UAE and Australia, spanning across investment banking, project/infrastructure finance, money markets, corporate banking, international banking, environmental, social and governance sustainability, environmental, social and governance sustainability risk management, corporate strategy and credit advisory. He has evaluated, financed and managed assets across sectors including power, roads, ports, airports, city gas distribution, transmission, mining, renewable energy, railways and metros, water and wastewater management, smart cities and defence. He is a Chartered Alternative Investment Analyst charter holder since 2009 and currently serves as the India chapter head for the Chartered Alternative Investment Analyst Institute.

***Brief profiles of the key personnel of the Investment Manager***

Set out below are the details of the key personnel of the Investment Manager:

**Mridul Dubey**, is chief financial officer of the Investment Manager. He has a bachelor's degree in science from Lucknow University, and bachelor's degree in law from Lucknow University and is a qualified chartered accountant. He was previously associated with THDC India Limited He has over 27 years of experience in the accounting and finance sector.

**Gunjan Rajpal**, is the Company Secretary and Compliance Officer of the Investment Manager. She is an fellow member of the Institute of Company Secretaries of India. She has a bachelor's degree in law from Chaudhury Charan Singh University, Meerut. She was previously associated with Prayag Polytech Private Limited, Mumbai-JNPT Port Road Company Limited and National Highways Logistics Management Limited. She has over 14 years of experience in legal compliance.

**Alok Kumar**, is a Senior Technical Officer of the Investment Manager. He has a bachelor's degree in engineering (civil) from Bangalore University. He has also obtained a certificate from the Indian School of Business for completing the advanced management programme for infrastructure. He has been associated with NHAI since 2008 and currently serves as the chief general manager (InvIT/toll operate transfer). He was previously associated with the road construction department of the government of Bihar as an assistant engineer. He has over 28 years of experience in infrastructure development and the highways sector.

**Rajesh Balajirao Pekam,** is Technical Officer of the Investment Manager. He holds a Diploma in Civil Engineering from the Board of Technical Examinations. He is a graduate AMIE degree holder from the Institute of Engineers (India) certifying him as a graduate. He also holds a Master's Degree in Technology (Environmental) from Visvesvaraya National Institute of Technology, Nagpur. He has been associated with NHAI since the year 2011 and currently serve as the General Manager (Technical) of the InvIT division. He has over 14 years of experience in the infrastructure development and road and highways sector.

***Key Terms of the Investment Management Agreement***

The Investment Manager has entered into the Investment Management Agreement, in terms of the InvIT Regulations, the key terms of which, are provided below.

1. *Powers of the Investment Manager*

   The Investment Manager has been provided with various powers under the Investment Management Agreement in accordance with the InvIT Regulations, including but not limited to:

   (i) The Investment Manager shall take all decisions relating to the management and administration of the InvIT Assets and the investments of the InvIT, as may be incidental or necessary for advancing or fulfilling the Investment Objectives of the InvIT, in accordance with the InvIT Regulations and any other applicable law.

(ii) Subject to such approvals as may be required from the Unitholders, the Investment Manager shall make all investment decisions relating to the underlying assets or projects of the InvIT and the InvIT Assets, including further investments or divestments, in accordance with the InvIT Regulations and the Offer Document. In this regard, the Investment Manager is empowered to perform, on behalf of the InvIT, the following acts:

(a) Acquire, subscribe, hold, manage, trade, transfer, dispose of, hypothecate, pledge or create encumbrances on all forms of securities of any Holding Company, SPV or infrastructure project.
(b) Avail loans and create encumbrances on InvIT Assets as collateral,
(c) Keep the capital and monies of the InvIT, Holding Companies and SPVs in deposits with banks, mutual funds or other institutions.
(d) Accept contributions as permitted.
(e) Collect and receive all income, including profits, interest, dividends, repayment of principal and returns of capital.
(f) Invest in securities/mutual funds in accordance with the InvIT Regulations.
(g) Invest in money market instruments, including government securities and commercial paper.
(h) Undertake lending to SPVs and other persons permitted.
(i) Enter into strategic investment/ pooling/ co-investment arrangements.
(j) Provide guarantees/security in connection with financings undertaken by the InvIT or its subsidiaries.
(k) Appoint advisors and service providers.
(l) Provide financial assistance to Holding Companies or SPVs in the form of equity, debt or convertibles.
(m) Deal with movable or immovable property of Holding Companies and SPVs, including acquiring, divesting, hypothecating, pledging or transferring the same.

(iii) Along with the Trustee, appoint a Project Manager within a reasonable time for operation and management of the InvIT Assets, through a Project Implementation and Management Agreement;

(iv) Oversee compliance of the Project Manager with InvIT Regulations and the Project Implementation and Management Agreement, and obtain quarterly (or as prescribed) compliance certificates;

(v) Carry out all acts necessary or incidental to fulfil the Investment Objectives of the InvIT as set out in the Offer Document;

(vi) Issue, allot and list Units; accept subscription monies; refund monies and pay interest where applicable; and undertake all activities relating thereto under any other applicable law. After the initial offer, no Investor (other than the Sponsor and its related parties/associates) may acquire Units exceeding 25.00% of outstanding Units without Unitholder approval. If such approval is not obtained, an exit option must be provided to dissenting Unitholders in accordance with InvIT Regulations;

(vii) Exercise all rights of the InvIT in the project SPVs and holding companies, including voting and appointment of directors. Ensure voting is exercised in all general meetings and appoint majority directors where required under any other applicable law;

(viii) Appoint advisors/consultants for administrative, accounting, due diligence, HR, tax, IT or other services. Advisors shall be accountable to the IM and not directly to the InvIT or its subsidiaries;

(ix) Cause the InvIT to repay, prepay or redeem debt or debt securities raised or issued by the InvIT, and the terms of such instruments;

(x) In consultation with the Trustee, appoint nominees to the governing boards of SPVs proportionate to the InvIT's holding;

(xi) Employ agents (attorneys, brokers, banks, etc.) to transact business or raise funds, without being

responsible for defaults committed in good faith;

(xii) Appoint a Custodian and permit InvIT property to be held by such custodian in India or elsewhere;

(xiii) Appoint and determine remuneration for auditors, valuers, registrars, merchant bankers, rating agencies, custodians, and other intermediaries;

(xiv) Auditor appointment shall follow SEBI-specified selection procedures, tenure and Unitholder approval requirements;

(xv) Pay or provide for taxes, duties, stamp duties, penalties, fees and related liabilities of the InvIT. File income tax returns on behalf of the InvIT and maintain appropriate reserves for tax matters;

(xvi) Pay InvIT Expenses from InvIT funds or assets, and seek reimbursement of expenses duly incurred;

(xvii) Seek opinions from legal or tax counsel, with fees to be paid out of InvIT funds;

(xviii) Retain proceeds received from SPVs or infrastructure projects, subject to InvIT Documents;

(xix) Appear before governmental/regulatory authorities, submit information, seek clarifications and file applications or documents for approvals/permissions;

(xx) Restrict Unitholder inspection of properties or records where such information may adversely affect other Unitholders;

(xxi) Buyback Units from Unitholders at the end of the InvIT term or otherwise;

(xxii) Advise the Trustee regarding extension of loans or subscription to debt/quasi-debt issued by Holding Companies or SPVs.

2. *Duties of the Investment Manager*

The Investment Manager shall perform its duties as required under the Investment Management Agreement in accordance with the InvIT Regulations, including but not limited to:

(i). The Investment Manager shall use best endeavours to carry on and conduct its business in a proper and efficient manner in the best interest of the Unitholders. Further, it shall at all times exercise due diligence in carrying out its duties and protecting the interest of the Unitholders.

(ii). The Investment Manager shall coordinate with the Trustee, as may be necessary, with respect to the operations and activities of the InvIT.

(iii). The Investment Manager shall appoint eligible Valuer(s) and ensure that valuation of the InvIT Assets is conducted in accordance with the InvIT Regulations at the prescribed frequency. It shall submit the Valuation Reports to the Trustee and, where required, to the stock exchange(s), within the timelines stipulated under the InvIT Regulations.

(iv). The Investment Manager shall arrange for adequate insurance coverage for the InvIT Assets in accordance with the InvIT Regulations and shall ensure that the InvIT Assets held by the holding companies or the SPVs are adequately insured.

(v). The Investment Manager shall maintain proper books of accounts, documents and records with respect to the Trust, to give a true, fair and accurate account of the investments, expenses, earnings, profits etc. of the Trust. The Investment Manager shall ensure that audit of the accounts of the Trust by the auditors is undertaken in accordance with the InvIT Regulations and such report is submitted to the stock exchange(s) within the time stipulated by the stock exchange(s), if any, and in accordance with the InvIT Regulations.

(vi). The Investment Manager shall declare distributions to Unitholders in accordance with the InvIT Regulations. Subject to applicable law, such percentage of the net distributable cash flows of the SPVs shall be distributed to the Trust in terms of the InvIT Regulations. Such declared distributions shall be made within the time period prescribed by the InvIT Regulations.

(vii). The Investment Manager shall convene meetings of the Unitholders and maintain records pertaining to the meetings in accordance with the InvIT Regulations and other applicable law.

(viii). The Investment Manager shall declare and ensure distributions to Unitholders in accordance with the InvIT Regulations, the Deed and the distribution policy. It shall ensure that the required percentage of Net Distributable Cash Flows is distributed upstream from the Holding Companies/SPVs to the InvIT, and shall maintain required records of all distributions made.

(ix). The Investment Manager shall convene meetings of the Unitholders and maintain records of such meetings in accordance with the InvIT Regulations.

(x). The Investment Manager shall notify the Trustee prior to any change in its control to enable the Trustee to obtain Unitholder approval and, where applicable, SEBI approval. No change in control shall take effect until such approvals are obtained or a new investment manager is appointed.

(xi). The Investment Manager shall manage the InvIT in accordance with the Investment Objectives, the InvIT Documents. Investments shall comply with the investment conditions set out in the InvIT Regulations.

(xii). The Investment Manager may review and amend the Investment Objectives in accordance with the InvIT Documents;

(xiii). The Investment Manager shall adopt (and ensure adoption by the InvIT, the Project Manager, and the SPVs) all policies required under the InvIT Regulations; including governance, related party transactions, acquisition of assets, auditor/valuer appointment, NDCF policy, leverage, anti-corruption, AML, EHS and other relevant policies prior to filing the Draft Offer Document. Each Policy shall specify its applicability, approval requirements, amendment process and termination terms.

(xiv). The Investment Manager shall review transactions between the Project Manager and its Associates. Where the Project Manager identifies a potential conflict of interest, the Investment Manager shall obtain confirmation from an independent practising chartered accountant or Valuer, as applicable, that the transaction is on an arm's-length basis.

(xv). The Investment Manager shall ensure adequate and timely redressal of all Unitholders' grievances pertaining to the activities of the InvIT in accordance with the InvIT Regulations.

(xvi). The Investment Manager shall submit to the Trustee:

(a) quarterly reports on the activities of the Trust including receipts for all funds received by it and for all payments made, status of compliance with the InvIT Regulations, performance report, status of development of under-construction projects, within the time period specified under the InvIT Regulations;

(b) valuation reports as required under the InvIT Regulations within the time period specified under the InvIT Regulations;

(c) proposal/decision to acquire, sell or develop, or bid for any asset or project or expand existing completed assets or projects along with rationale for the same;

(d) details of any action which requires approval from the Unitholders as may be stipulated under the InvIT Regulations;

(e) details of transactions it enters into with its associates;

(f) details of any other material fact including change in its directors, change in its shareholding, any legal proceedings that may have a significant bearing on the activity of the Trust, within such period as stipulated under applicable law;

(g) such information, document and records as pertaining to the activities of the Trust as may be reasonably necessary for, and sought by, the Trustee with respect to its responsibilities under the Trust Deed, the InvIT Regulations and applicable law; and

(h) such other information, document and records as pertaining to its activities, obligations, duties and responsibilities under the Investment Management Agreement, the InvIT Regulations and applicable law, as may be reasonably necessary for, and sought by, the Trustee.

(xvii). The Investment Manager shall be responsible for all activities pertaining to any issue and listing of the Units of the InvIT in accordance with applicable law, including:

(a) filing the offer document with SEBI and/or the stock exchange(s) within the prescribed time period;

(b) dealing with all matters up to the allotment of Units to the Unitholders;

(c) obtaining in-principle approval and final listing and trading approvals from the designated stock exchange; and

(d) dealing with all matters relating to the issue and listing of the Units.

It shall ensure correctness, adequacy and fairness of all disclosures in the Offer Document and compliance with minimum public holding and unitholder requirements (where applicable).

(xviii). The Investment Manager shall make half-yearly filings and provide all information required under the InvIT Regulations to the stock exchange(s), including price-sensitive information and information having a bearing on the operation or performance of the InvIT

(xix). The Investment Manager will also have the following duties and obligations:

(a) ensure that computation and declaration of Net Asset Value of the Trust is based on the valuation done by the valuer in accordance with the InvIT Regulations and applicable law;

(b) maintain regular interaction with the Trustee regarding performance of the Trust and providing the Trustee with any information in relation to the operations of the Trust as maybe required under applicable law;

(c) conducting its affairs and the affairs of the Trust in such a manner that no Unitholder will have any personal liability (except to the extent of their Unitholding, where such Unit is partly paid) with respect to any liability or obligation of the Trust;

(d) keeping the Unitholders of the Trust informed and updated on investment activities of the Trust in accordance with the terms of the InvIT Documents;

(e) collecting all dividends, fees, property and other payments due and receivable by the Trust declaring distribution to the Unitholders in the manner set out in the Deed and in terms of the InvIT Regulations and applicable law;

(f) to ensure that no commission or rebate or any other remuneration, by whatever name called, arising out of transactions pertaining to the Trust is collected by it or its associates for the purpose of the issue of the Units;

(g) to ensure that the InvIT Assets including the holding companies and the SPVs, have proper legal titles, to the extent applicable, and that all the material contracts entered into on behalf of the Trust or the InvIT Assets are legal, valid, binding and enforceable by and on behalf of the Trust or the InvIT assets, as applicable;

(h) to ensure that all the activities of the intermediaries or agents or service providers appointed by it are in accordance with the InvIT Regulations or any guidelines or circulars issued thereunder;

(i) to ensure that any possible conflict of interest involving its role as Investment Manager is reported to the Trustee;

(j) to ensure that disclosures or reporting to Unitholders, SEBI, the Trustee and the designated stock exchange(s) are in accordance with the InvIT Regulations and applicable law;

(k) provide SEBI, the designated stock exchange(s) and Trustee, where applicable, such information as may be sought by SEBI or by the designated stock exchange(s) or Trustee pertaining to the activity of the Trust;

(l) submit a compliance certificate to the Trustee, in the form and at such intervals as may be specified under the InvIT Regulations and applicable law;

(m) to inform the Trustee in writing about any change in the representations and warranties provided under the Investment Management Agreement; and

(n) take any other actions reasonably incidental to any of the foregoing, or necessary or convenient in order to fully effect or evidence any action or transaction contemplated under the Investment Management Agreement.

(xx). Related Party Transactions: The Investment Manager shall provide such assistance to ensure that all related party transactions shall be on an arms-length basis in accordance with relevant accounting standards, in the best interest of the Unitholders, consistent with the strategy and investment objectives of the InvIT and in accordance with the InvIT Regulations.

(xxi). The Investment Manager shall provide to the Trustee such assistance as may be required by the Trustee in fulfilling its obligation towards the Trust under applicable law or as may be required by any regulatory authority with respect to the Trust.

(xxii). The Investment Manager shall rectify any delay or discrepancy or non-compliance of reporting or disclosures requirements under the InvIT Regulations and applicable law on an urgent basis.

(xxiii). Disclose to the Trustee any pending business transactions, contracts under negotiation and other arrangements with the valuer and any other factors that may interfere with the valuer's ability to give an independent and professional valuation of the assets.

3. *Liabilities of the Investment Manager*

The liabilities of the Investment Manager in terms of the Investment Management Agreement are as follows:

(i). The Investment Manager shall not be liable in respect of any action taken or damage suffered by it on reliance upon any notice, resolution, direction, consent, certificate, affidavit, statement, certificate of stock, plan of reorganization or, without being limited in any way by the foregoing, other paper or document believed to be genuine and to have been passed, sealed or signed by appropriate authorities or entities.

(ii). The Investment Manager shall not be liable to the Unitholders for doing or failing to do any act or thing which by reason of any provision of any present or future law or regulation made

pursuant thereto, or of any decree, order or judgment of any court, or by reason of any request, announcement or similar action, whether of binding legal effect or not, which may be taken or made by any person or body acting with or purporting to exercise the authority of any government (legally or otherwise) it shall be directed or requested to do or perform or to forbear from doing or performing. If for any reason it becomes impossible or impracticable to carry out any of the provisions of the Investment Management Agreement, the Investment Manager shall not be under any liability.

(iii). The Investment Manager shall not be liable to the Unitholder or any of them or to any other party as a result of such compliance or in connection with such compliance if the Investment Manager is required by the InvIT Regulations or applicable law to provide information regarding the Trust or the Unitholders, the Trust investments and income therefrom and provisions of these presents and complies with such request in good faith, whether or not it was in fact enforceable. If permitted under applicable law and if reasonably practicable, the Investment Manager shall provide prior written notice to the Trustee and the relevant Unitholders of such disclosure requirement.

(iv). The Investment Manager shall not be liable to incur any act or omission which may result in a loss to a Unitholder by reason of any depletion in the value of the InvIT Assets or otherwise, except in the event that such loss is a result of fraud or gross negligence or wilful default on the part of the Investment Manager or where the Investment Manager fails to exercise due care in relation to its obligations under this Agreement.

(v). The Investment Manager shall be liable to pay interest to the Unitholders at the rate as may be prescribed in the InvIT Regulations until the distribution is made, and such interest shall not be recovered in the form of fees or any other form payable to the Investment Manager by the Trust.

(vi). The Investment Manager shall continue to be liable for all of its acts of omission and commission with respect to the activities of the InvIT, notwithstanding surrender of registration of the InvIT to SEBI.

(vii). The Investment Manager shall not be obligated to initiate, accept service of, appear in, prosecute, or defend any action, suit, proceeding or claim (including tax proceedings) relating to the agreement, the InvIT Documents, the Investments or any part thereof, or any corporate or shareholder action, if in its opinion such action may involve expense or liability, unless it is satisfied that the value of the Investments provides adequate indemnity against all potential costs, claims, damages, expenses, or demands that the Investment Manager may incur in its capacity as Investment Manager.

4. *Indemnity*

In addition to the fees, distributions and expense reimbursements described herein, the Trustee shall, from the InvIT Assets, indemnify and hold harmless the Investment Manager and its respective officers, directors, shareholders, partners, members, employees, advisors and agents ("**Indemnified Parties**") from and against any claims, losses, costs, damages, liabilities, suits, proceedings and expenses, including legal fees (collectively, "**Losses**"), incurred or suffered by them by reason of their activities undertaken on behalf of the InvIT; unless such Losses have resulted from fraud, gross negligence, wilful default, wilful misconduct or a material breach of any obligations or duties under applicable law by the relevant Indemnified Party, as determined by a court of competent jurisdiction.

The Trustee, its directors, employees and officers ("**Trustee Party**") shall be indemnified by the Investment Manager against all direct and actual losses, actions, claims, suits, proceedings, damages, liabilities, costs and expenses, including legal fees, incurred or suffered by a Trustee Party, arising from:

(a) a material breach by the Investment Manager of any terms of the agreement;
(b) failure to furnish information required by SEBI or any other regulatory authority with respect to the InvIT; or
(c) the furnishing of incorrect information by the Investment Manager under the InvIT Regulations or in any Offer Document,

In each case to the extent arising out of fraud, gross negligence, wilful default or misconduct by the Investment

Manager in the performance of its obligations under the agreement, the Trust Deed, other InvIT Documents, any information memorandum, Offer Document or applicable law.

The Trustee acknowledges and agrees that the aggregate maximum liability of the Investment Manager for any financial year shall be limited to the aggregate fees paid to the Investment Manager for the immediately preceding financial year.

5. *Termination*

The Investment Management Agreement shall be effective from the date of execution of the Investment Management Agreement and shall terminate in accordance with the terms of the Investment Management Agreement. The appointment of the Investment Manager may be terminated by the Trustee or the Unitholders in accordance with the procedure specified under the InvIT Regulations.

(i). The Unitholders, other than any party related to the transactions and its associates holding not less than such percentage by value as specified under the InvIT Regulations, may apply in writing to the Trustee for removal of the Investment Manager.

(ii). Subject to the approval of Unitholders (if required) and compliance with other requirements under applicable law, the Investment Management Agreement may be terminated:

(a) by the Investment Manager by delivery of a written notice to the Trustee at any time, subject to appointment of new Investment Manager in accordance with the Investment Management Agreement and the InvIT Regulations;

(b) by the Trustee by delivery of a written notice to the Investment Manager at any time, upon breach of any of the terms, covenants, conditions or provisions of the Investment Management Agreement by the Investment Manager and a failure of the Investment Manager to cure the said breach within a period that is earlier of: (a) the period stipulated under applicable law, or (b) 90 business days; or such other period as may be mutually agreed to cure such breach;

(c) by the InvIT (acting through the Trustee) pursuant to a resolution of Unitholders; or

(d) by any Party by delivery of a written notice to the other Party upon the bankruptcy of such other Party, or if winding up or liquidation proceedings are commenced against such other Party, and such proceedings persist for a period of more than three months.

(iii). After approval from the Unitholders in accordance with the InvIT Regulations, the Trustee shall appoint a new investment manager and execute a new investment management agreement within three months from the termination of the previous investment management agreement in accordance with applicable law. The Trustee shall also ensure that the new investment manager stands substituted as a party in all documents to which the Investment Manager was a party, in relation to the Trust in its capacity as the Investment Manager. The Investment Manager shall remain in office until the appointment of a new investment manager. The Investment Manager shall continue to be liable for all of its acts, omissions and commissions during its tenure as Investment Manager, notwithstanding the termination of the Investment Management Agreement.

(iv). Upon removal or replacement of the Investment Manager, the Investment Manager shall, within a period of 30 (thirty) business days, transfer custody of the Trust to the Trustee and give the Trustee all books of accounts, correspondence, documents and records relating to the InvIT which the Investment Manager has in its possession. In the event of removal or resignation of the Investment Manager, the Investment Manager shall be entitled to receive Management Fees only up to the date of such removal or resignation.

(v). Notwithstanding anything contained hereinabove, (i) in the event that the offer of Units does not occur within the time period stipulated in the InvIT Regulations or such other date as may be mutually agreed to between the Investment Manager and the Trustee, or (ii) in the event of cancellation of registration of the Trust by SEBI, or (iii) winding up of the Trust, then the Investment Management Agreement shall automatically terminate without any liability on any party.

## D. The Project Manager – National Highways InvIT Project Managers Private Limited

***History and Certain Corporate Matters***

National Highways InvIT Project Managers Private Limited was incorporated as a private limited company on March 9, 2021, under the Companies Act, 2013. The CIN of the Project Manager is U45201DL2021GOI378178.

***Background of the Project Manager***

The Project Manager is a wholly-owned subsidiary of NHAI.

The Project Manager shall (directly through the appointment of appropriate agents) undertake operations and management of the Trust, including making arrangements for the maintenance of assets held under the Trust. The Project Manager has been appointed as per the terms of the Project Implementation and Management Agreement.

Neither the Project Manager nor any of the promoters or directors of the Project Manager are: (i) debarred from accessing the securities market by SEBI; (ii) promoters, directors or persons in control of any other company or a sponsor, investment manager or trustee of any other infrastructure investment trust or an infrastructure investment trust which is debarred from accessing the capital market under any order or direction made by SEBI; or (iii) in the list of wilful defaulters published by the RBI.

***Key terms of the Project Implementation and Management Agreement***

The Project Manager has entered into the Project Implementation and Management Agreement, in terms of the InvIT Regulations, the key terms of which, are provided below.

1. *Scope of Services*

The scope of services of the Project Manager are as follows:

i. Whilst the primary obligation under the Concession Agreements remains with the SPV in the manner contemplated therein, the Project Manager shall ensure that the InvIT Assets are operated, maintained and managed as per the terms and conditions of the Concession Agreements, respective O&M Agreements and the InvIT Regulations, either directly or through the appointment and supervision of appropriate agents or contractors or consultants by the SPV or by the Project Manager, and perform obligations as stipulated therein. The Project Manager shall provide and/cause to procure and ensure procurement of all such services as are required to enable the SPV to perform its operation and maintenance related obligations under and in compliance with the Concession Agreements. The responsibilities and the scope of services of the Project Manager include, but not limited to, those specifically provided under the Project Implementation and Management Agreement, which may be modified from time to time.

ii. Costs and expenses to be paid to any third party (engaged by the SPV or Project Manager, on behalf of the Project SPV, with the consent of the Investment Manager) shall be borne by the SPV in accordance with the terms and conditions of the contract entered into between the SPV and such third party.

2. *Duties of the Project Manager*

The duties of the Project Manager in terms of the Project Implementation and Management Agreement and the InvIT Regulations are as follows:

i. The Project Manager shall undertake implementation, development, maintenance, operation and management of the InvIT Assets including making arrangements for the appropriate maintenance, either directly or through the appointment and supervision of agents or consultants, if any, as may be necessary for discharge of its duties under the terms of the Project Implementation and Management Agreement, the O&M Agreements and under the InvIT Regulations.

ii. The Project Manager shall facilitate and ensure, either directly or through appropriate agents or consultants engaged either by them or through the SPV, the progress of development, approval status and other aspects of the InvIT Assets that may be under development or, of any new projects, until its

completion in accordance with any agreement that may be entered into in this regard, including the supervision of agents or consultants appointed for such purpose.

iii. The Project Manager shall discharge all obligations in respect of achieving timely completion of the infrastructure projects, wherever applicable, implementation, development, operation, maintenance and management of the infrastructure projects in terms of the O&M Agreements, the Project Implementation and Management Agreement and the InvIT Regulations.

iv. The Project Manager acknowledges that the Trustee and the Investment Manager will be overseeing the activities of the Project Manager in accordance with the InvIT Regulations and accordingly, the Project Manager shall extend complete coordination to enable the Trustee and the Investment Manager to perform such obligations in accordance with the InvIT Regulations. Further, the Project Manager shall provide relevant documents in connection with the Projects, including reports and compliance certificate(s), as may be specified, to the Investment Manager and the Trustee in accordance with the InvIT Regulations, in the form prescribed by SEBI or the Investment Manager, if any.

v. The Project Manager shall provide the Investment Manager with details of transactions carried out between itself and its associates in relation to the Trust, and disclose any conflict of interest in such cases to the Investment Manager, in accordance with the InvIT Regulations.

vi. The Project Manager shall intimate the Trustee prior to any Change in Control of the Project Manager to enable the Trustee to seek approval from the relevant authority in accordance with the Concession Agreements or other project documents pertaining to the InvIT Assets, if applicable.

vii. The Project Manager shall provide to the Trustee and Investment Manager, or to such other person as the Trustee and/or the Investment Manager may authorise and direct, all information that may be necessary for each of them to maintain the records of the InvIT and as may be required for making submissions to SEBI or any other Governmental Authority, including documents with respect to relevant approvals, consents and other documents required in relation to the Projects and the reporting requirements under the InvIT Regulations, in a proper and timely manner, and in the format prescribed (if any), as required by the Trustee and /or Investment Manager.

viii. The Project Manager shall appoint one of its qualified employees acceptable to the Investment Manager and the SPV with adequate and appropriate experience as a principal contact for the board of directors of the SPV, the Trustee and the Investment Manager in relation to the Projects and the Services. The Project Manager shall receive directions and instructions from the Investment Manager, which directions or instructions shall have been issued by the Investment Manager on its own or on behalf of the Project SPV, and to take actions in relation to and ensure compliance with such directions and instructions and report back to the Trustee and the Investment Manager.

ix. The Project Manager shall at all times ensure that the transactions or arrangements entered into by the Project Manager with a related party are on an arm's length basis.

x. The Project Manager shall promptly inform the Parties in writing of any act, occurrence or event, which the Project Manager believes is reasonably likely to increase the cost of or the time for implementation taken in relation to any InvIT Asset, or materially to change the financial viability, quality or function of any InvIT Asset.

xi. If any defects are identified in the maintenance, materials and workmanship of the Services provided under the Project Implementation and Management Agreement by the Project Manager and/or by the PM Agents, the Project Manager shall promptly, in consultation and agreement with the other Parties, regarding appropriate remedying of the defects, and at its own cost, repair, replace or otherwise make good (as any SPV shall, at its discretion, determine) such defects as well as any damage caused by such defect.

xii. The Project Manager shall be liable to the other Parties for any direct loss or damage attributable to the non-performance or breach of the obligations of the Project Manager including those of the PM Agents, under the Project Implementation and Management Agreement The Trustee and the Investment Manager acknowledge and agree that the aggregate maximum liability of the Project Manager shall be limited to the fees payable to the Project Manager in accordance with the terms of the Project Implementation and

Management Agreement.

xiii. The duties of Project Manager shall also include the following:

a. providing the necessary certification as may be required under applicable laws and the InvIT Regulations;

b. facilitate and ensure execution and completion of activities in relation to any InvIT Assets under development in accordance with and in the manner contemplated in any agreement entered into by any or all the InvIT Assets;

c. exercising diligence and vigilance in carrying out its duties directly or through its agents/ contractors of the SPV and protecting the InvIT Assets;

d. keeping the Investment Manager informed on all matters which have a material bearing on the operations of the InvIT Assets, and attending meetings with the Investment Manager and/or the SPV, as may be required;

e. liaising with Governmental Authorities in respect of its obligations under the Project Implementation and Management Agreement and the O&M Agreements;

f. taking appropriate measures to mitigate the risks which may be encountered by the InvIT in respect of the InvIT Assets, including creation of risk registers and periodic risk auditors either directly or through its agents;

g. keeping proper records for actions taken in respect of the InvIT Assets; and

h. complying with the instructions of the Investment Manager and the Trustee and the provisions of the InvIT Regulations.

xiv. The Parties may, from time to time, agree to the provision of certain additional services to be rendered by the Project Manager. If, in the assessment of the Project Manager, such additional services are required for the purposes of carrying out its duties and obligations under the Project Implementation and Management Agreement, the O&M Agreements, and applicable law, the Project Manager shall notify the Parties in writing of such requirement, including the fee payable and the terms and conditions for such additional services, and obtain prior written approval of the Parties in this regard.

xv. In case of any inconsistency or discrepancy between the Project Implementation and Management Agreement and the O&M Agreements, the Project Manager shall bring the same into the notice of the Investment Manager. The Investment Manager shall issue instructions (in writing) for resolving the inconsistency, to the Project Manager. The Project Manager shall be bound to comply with the instructions of the Investment Manager.

xvi. Notwithstanding anything to the contrary contained in the Project Implementation and Management Agreement, nothing contained in the Project Implementation and Management Agreement shall be construed to limit or restrict the performance of any duties or obligations of the Project Manager, Investment Manager or the Trustee contained in the InvIT Regulations and other applicable law.

xvii. During the term of the Project Implementation and Management Agreement, in the event the representations provided by the Project Manager under the Project Implementation and Management Agreement, become untrue or incorrect or incomplete in any respect, the Project Manager shall, within a reasonable time, inform the Trustee and Investment Manager of such event.

xviii. The Project Manager shall promptly and periodically notify the Investment Manager regarding any deficiency in the services of the SPV Team or any third party contractor or service provider engaged either directly by the Project Manager or through the SPV, along with an assessment report covering, amongst others, the details of deficiency in service, remedial measures and financial impact on the Project SPV. Any such deficiency shall be remedied in the manner provided in the Project Implementation and Management Agreement.

xix. Other than on account of any non-compliance or deficiency, the Project Manager shall promptly notify the Investment Manager regarding any proposed change in the SPV Team along with an assessment report covering, amongst other things, rationale for the change and its assessment of the same and professional competence of the persons proposed to be appointed to the SPV Team. The Project Manager shall not grant consent for any change in the SPV Team without prior consultation with, and approval of, the Investment Manager, in accordance with the Project Implementation and Management Agreement.

3. *Indemnity*

The Trust, the Investment Manager, the Project SPV and their respective directors, employees, officers and the InvIT ("**Indemnified Parties**") shall be indemnified by the Project Manager against any claims, suits, proceedings, losses, costs, damages, liabilities and expenses, including legal fee from and incurred or suffered by the Indemnified Parties in connection with the breach of any of the terms of the Project Implementation and Management Agreement by the Project Manager, or failure in furnishing information required by SEBI or any regulatory authority with respect to the InvIT, or furnishing wrong information by the Project Manager under the InvIT Regulations or related to InvIT including in any offer documents, or arising out of gross negligence, wilful default, wilful misconduct or fraud on part of the Project Manager, in carrying out its obligations under the Project Implementation and Management Agreement, the other InvIT Documents and applicable law. The Trustee and the Investment Manager acknowledge and agree that the aggregate maximum liability of the Project Manager in each financial year shall be limited to the fees payable to the Project Manager in such financial year in accordance with the terms of the Project Implementation and Management Agreement, provided that such maximum aggregate liability shall not be applicable in the event such liability of the Project Manager arises out of any gross negligence, wilful default, wilful misconduct or fraud on the part of the Project Manager, as determined by a court of competent jurisdiction.

4. *Termination*

(i). The Project Implementation and Management Agreement shall remain effective, unless terminated by the parties in accordance with the provisions hereto or extended by mutual consent expressed in writing by the parties, for the period that the concession agreement is in force or such other period as may be mutually agreed between the Parties ("**Validity Period**").

(ii). Prior to the expiry of its Validity Period, the Project Implementation and Management Agreement, may be terminated:

(a) by the Investment Manager after consultation with the Trustee by delivery of a written notice of 30 (thirty) business days, specifying the reasons for such termination, to the Project Manager at any time, subject to appointment of new project manager in accordance with the Project Implementation and Management Agreement and the InvIT Regulations; or

(b) by the Investment Manager after consultation with the Trustee by delivery of a written notice to the Project Manager at any time, upon breach of any of the terms, covenants, conditions or provisions of the Project Implementation and Management Agreement by the Project Manager and a failure of the Project Manager to remedy the said breach within a period of 60 Business Days or such other period as may be mutually agreed by the parties; or

(c) by any party by delivery of a written notice to the other party upon the bankruptcy of such other party or if insolvency resolution process, winding up or liquidation proceedings, whether voluntary or involuntary, are commenced against such other party (and such proceedings persist for a period of more than three months).

(iii). Notwithstanding anything contained hereinabove, the Trustee in consultation with the Investment Manager shall appoint a new project manager and execute a new project implementation and management agreement within three months from the termination of the earlier project implementation and management agreement in accordance with applicable law. The Trustee and Investment Manager shall also ensure that the new project manager stands substituted as a party in all documents to which the Project Manager was a party. The Project Manager shall remain in office until the appointment of a new project manager. The Project Manager shall continue to be liable for all its acts and omissions and

commissions notwithstanding its termination until the appointment of a new project manager.

(iv). The termination of the Project Implementation and Management Agreement shall not affect the rights and obligations of the parties accrued prior to such termination.

(v). In case of early termination prior to the expiry of the Validity Period, the Project Manager shall be entitled to and the Trustee shall be liable to pay (from the funds of the InvIT) to the Project Manager the reimbursement of all out of pocket expenses incurred by the Project Manager while performing services in terms of the Project Implementation and Management Agreement up to that date. The fees shall be paid to the Project Manager within a period of 60 business days from the date of receipt of demand in this regard from the Project Manager failing which the fees, or any part thereof, which remains outstanding shall attract interest at the rate of 10% per annum on the outstanding amount.

(vi). Notwithstanding anything contained hereinabove, the termination of any of the O&M Agreements, as the case may be, will not result in the termination of Project Implementation and Management Agreement, and the Project Implementation and Management Agreement shall continue to be in force in respect of the other O&M Agreements that are not terminated and the InvIT Assets.

(vii). Notwithstanding anything herein contained, in the event of:

(a) any amendment or supplement or restatement of any of the O&M agreements or execution of a new O&M agreement;

the same shall be deemed to have been incorporated in the Project Implementation and Management Agreement and the Agreement shall stand modified to such extent.

(viii). Notwithstanding anything contained hereinabove, the Project Implementation and Management Agreement shall automatically terminate: (i) in the event the offer of the Units does not occur within the time period stipulated in the InvIT Regulations, or such other date as may be mutually agreed to between the parties; (ii) in the event of cancellation of the registration of the Trust by SEBI; or (iii) upon winding up of the Trust, in accordance with the InvIT Regulations.

## CORPORATE GOVERNANCE

*The section below is a summary of the corporate governance framework in relation to the Trust, adopted by the Investment Manager and the Project SPV, as applicable and as specified in this section.*

### 1. Investment Manager

Raajmarg Infra Investment Managers Private Limited is the investment manager of the Trust. For further details on the background of the Investment Manager, please see the section entitled "*Parties to the Trust – The Investment Manager – Raajmarg Infra Investment Mangers Private Limited"* on page 85.

#### *1.1. Board of directors*

*Composition of the IM Board*

In addition to applicable provisions of the InvIT Regulations, Companies Act, 2013, and the SEBI LODR Regulations, the board of directors should adhere to the following:

(a) The IM Board shall comprise not less than six directors and have not less than one woman independent director;

(b) Not less than 50% of the board of directors shall comprise independent directors, who are not directors or members of the governing board of the investment manager of another infrastructure investment trust registered under the InvIT Regulations;

(c) the independence of directors shall be determined in accordance with the InvIT Regulations and other applicable law; and

(d) collective experience of directors should cover a broad range of commercial experience, particularly experience in infrastructure sector (including the applicable sub-sector), investment management or advisory and financial matters.

*Quorum*

The quorum shall be 1/3rd of total strength or three directors whichever is higher including at least 1(one) independent director.

*Frequency of meetings*

The IM Board should meet at least four times in a financial year, with a maximum gap of 120 days between any two successive meetings. Additionally, the board of directors should meet prior to any meeting of the unitholders and approve the agenda for unitholders' meetings.

For details of the current composition of the board of directors, please see the section entitled "*Parties to the Trust – The Investment Manager – Raajmarg Infra Investment Managers Private Limited– The IM Board*" on page 85.

#### *1.2. Remuneration of directors*

Remuneration including sitting fees of the directors will be decided by the IM Board, from time to time.

#### *1.3. Committees of the IM Board*

| Name of the committee | Composition | Present Members | Quorum | Frequency of meetings |
|---|---|---|---|---|
| Audit Committee | The audit committee shall consist of at least three directors. At least two-thirds of the members of audit committee shall be independent directors. The chairperson of the | Annie George Mathew (chairperson); Giridhar Aramane | The quorum shall either be two members or one third of the members of the | The audit committee should meet at least four times every financial year, with |

| Name of the committee | Composition | Present Members | Quorum | Frequency of meetings |
|---|---|---|---|---|
| | audit committee should be an independent director. All members of the audit committee should be financially literate and at least one member should have accounting or related financial management expertise, in accordance with the SEBI LODR Regulations. The company secretary shall act as the secretary to the audit committee.<br><br>The audit committee at its discretion shall invite the finance director or head of the finance function, head of internal audit and a representative of the statutory auditor and any other such executives to be present at the meetings of the committee. Provided that occasionally the Audit Committee may meet without the presence of any executives | (member); Dip Kishore Sen (member); NRVVMK Rajendra Kumar (member) | audit committee, whichever is greater, including at least two independent directors in attendance. | a maximum gap of 120 days between any two meetings. |
| Nomination and Remuneration Committee | The Nomination and Remuneration Committee should comprise at least three directors. All the directors of the committee shall be non-executive directors. At least two-thirds of the members of this committee shall be independent directors. The chairperson of this committee shall be an independent director. Provided that the chairperson of the Board, may be appointed as a member of the Nomination and Remuneration Committee and shall not chair such committee. | Dip Kishore Sen (chairperson); Annie George Mathew (member); Himanshu Gulliani (member) | The quorum shall be either two members or one third of the members of the committee, whichever is greater, including at least one independent director in attendance. | The Nomination and Remuneration Committee shall meet at least once in a financial year or as necessary. |
| Stakeholders Relationship Committee | The stakeholders' relationship committee should comprise at least three members. At least one member of the committee shall be an independent director. The chairperson of this committee shall be an independent director. | Giridhar Aramane (chairperson); Annie George Mathew (member); Dip Kishore Sen (member); Himanshu Gulliani (member) | The quorum shall be at least one-third of the members of the stakeholders' relationship committee or two members, whichever is higher. | The stakeholders relationship committee shall meet at least once in a financial year. |
| Risk Management Committee | The risk management committee should comprise at least three members with majority of them being members of the board of directors, including at least one independent director. The chairperson of this committee shall be a member of the board of | Giridhar Aramane (chairperson); Dip Kishore Sen (member); NRVVMK Rajendra | The quorum shall either be two members or one third of the members of the committee, whichever is greater, | The risk management committee should meet at least twice in a financial year. The meetings of the risk management committee shall be |

| Name of the committee | Composition | Present Members | Quorum | Frequency of meetings |
|---|---|---|---|---|
| | directors and senior executives may be member of committee. | Kumar (member); Himanshu Gulliani (member) | including at least one members of the board in attendance. | conducted in such a manner that on a continuous basis not more than two hundred and ten days shall elapse between any two consecutive meetings. |

*(a).* *Audit Committee*

The IM Board has constituted the Audit Committee pursuant to a resolution dated December 29, 2025.

*Scope of the Audit Committee*

The terms of reference of the Audit Committee include amongst others, the following:

(i). recommending to the board of directors the appointment, re-appointment and replacement, remuneration and terms of appointment of the statutory auditor of the Trust and the audit fee, subject to the approval of the unitholders;

(ii). approving the payment to statutory auditors for any other services rendered by the statutory auditors;

(iii). discussion with statutory auditors before the audit commences, about the nature and scope of audit as well as post-audit discussion to ascertain any area of concern;

(iv). evaluation of internal financial controls and risk management systems;

(v). reviewing and monitoring with the management, the independence and performance of statutory and internal auditors of the Trust, and adequacy and effectiveness of the audit process and internal control systems, as necessary;

(vi). reviewing the adequacy of internal audit function, if any, including the structure of the internal audit department, staffing and seniority of the official heading the department, reporting structure coverage and frequency of internal audit;

(vii). reviewing management letters/letters of internal control weaknesses issued by the statutory auditors and the findings of any internal investigations in relation to the Trust, into matters where there is suspected fraud or irregularity or a failure of internal control systems of a material nature, discussing such findings with internal and statutory auditors and follow ups thereon and reporting the matter to the board of directors;

(viii). oversight of the Trust's financial reporting process and the disclosure of its financial information to ensure that the financial statement is correct, sufficient and credible;

(ix). reviewing the annual financial statements and auditor's report thereon of the Trust and the Investment Manager, before submission to the board of directors for approval, with particular reference to:

- matters required to be included in the director's responsibility statement to be included in the board's report of the Investment Manager in terms of clause (c) of sub-section (3) of Section 134 of the Companies Act, 2013;
- changes, if any, in accounting policies and practices and reasons for such change;

- major accounting entries involving estimates based on the exercise of judgment by management;
- significant adjustments made in the financial statements arising out of audit findings;
- compliance with listing and other legal requirements relating to financial statements;
- disclosure of any related party transactions; and
- modified opinions or qualifications in the draft audit report;

(x). reviewing, with the management, the Trust's financial disclosure and reporting process and all periodic financial statements, including but not limited to quarterly, half-yearly and annual financial statements of the Trust, whether standalone or consolidated or in any other form as may be required under applicable law, before submission to the board of directors for approval;

(xi). reviewing the management's discussion and analysis of financial condition and results of operations;

(xii). reviewing and evaluating the adequacy of financial controls, risk management systems and internal audit function if any of the Trust, including the structure of the internal audit department, staffing and seniority of the official heading the department, reporting structure coverage and frequency of internal audit;

(xiii). reviewing, with the management, the statement of uses/application of funds raised through an issue of units by the Trust (including but not limited to public issue, rights issue, preferential issue, private placements, etc.) and any issue of debt securities, and the statement of funds utilised for purposes other than those stated in the offer documents/ notice, and making appropriate recommendations to the board of directors for follow-up action;

(xiv). (a) reviewing the procedures put in place by the Investment Manager for reviewing related party transactions, the indemnification of expenses or liabilities incurred by the Investment Manager, and the setting of fees or charges payable out of the Trust's assets, (b) reviewing the statement of significant related party transactions, submitted by the management; and (c) approving or any subsequently modifying transactions of the Trust with related parties, and recommending such transactions to the board of directors or the unitholders, as may be required, in terms of the InvIT Regulations;

(xv). scrutiny of inter-corporate loans and investments of the Trust, including (a) reviewing the investment decisions with respect to the underlying assets or projects of the Trust from the Sponsor including any further investments or divestments and (b) approving any proposal in relation to acquisition of assets, further issue of units including in relation to acquisition or assets; and undertaking other functions to ensure protection of the interest of unitholders;

(xvi). reviewing the utilization of loans and/ or advances from/investment by the Trust in the SPVs exceeding rupees 1000 million or 10% of the asset size of the SPVs, whichever is lower including existing loans / advances / investments;

(xvii). valuation of undertakings or assets of the Trust, wherever it is necessary

(xviii). giving recommendations to the board of directors regarding appointment, re-appointment and replacement, remuneration and terms of appointment of the valuer of the Trust; as well as reviewing and monitoring the independence and performance of the valuer of the Trust;

(xix). providing recommendations to the board of directors regarding any proposed distributions, and evaluating any defaults or delay in payment of distributions to the unitholders or dividends by the Project SPV to the Trust and payments to any creditors or debenture holders of the Trust or the Project SPV, and recommending remedial measures; and

(xx). to review the functioning of the whistle blower mechanism;

(xxi). approval of appointment of chief financial officer after assessing the qualifications, experience and background, etc. of the candidate;

(xxii). consider and comment on rationale, cost-benefits and impact of schemes involving merger, demerger, amalgamation etc., on the Trust and its unitholders or Investment Manager and its shareholders.

(xxiii). formulating any policy for the Investment Manager as necessary, in relation to its functions, as specified above.

*(b).* *Nomination and Remuneration Committee*

The IM Board has constituted the Nomination and Remuneration Committee pursuant to a resolution dated December 29, 2025.

*Scope of the Nomination and Remuneration Committee*

The terms of reference of the nomination and remuneration committee include amongst others, the following:

(i) ensuring compliance with the requirements of the Companies Act, 2013;

(ii) making all decisions in relation to appointment or replacement or removal of (a) independent directors; (b) any key managerial personnel; and (c) directors on the board of directors of the Project SPV; and

(iii) formulating the following policies:

(a) the policy for appointment of independent directors (including the qualification and experience requirements, compensation model, performance parameters, process for appointment and removal);

(b) the policy for nomination of directors on the board of directors of the Project SPV (including qualification and experience requirements, compensation model, performance parameters, process for appointment and removal); and

(c) the human resources policy (in relation to employment terms including remuneration for the key managerial personnel.

(iv) for every appointment of an independent director, evaluation of the balance of skills, knowledge and experience on the board of directors and on the basis of such evaluation, prepare a description of the role and capabilities required of an independent director. The person recommended to the board of directors as an independent director shall have the capabilities identified in such description. For the purpose of identifying suitable candidates the Nomination and Remuneration Committee may
(a) use the services of an external agencies, if required;
(b) consider candidates from a wide range of backgrounds, having due regard to diversity; and
(c) consider the time commitments of the candidates.

(v) formulation of criteria for evaluation of performance of independent directors and the IM Board;

(vi) devising a policy on diversity of the IM Board;

(vii) identifying persons who are qualified to become Directors and who may be appointed in senior management in accordance with the criteria laid down and recommend to the Board their appointment and removal.

(viii) recommend to the Board, all remuneration, in whatever form, payable to senior management.

*(c).* *Stakeholders' Relationship Committee*

The IM Board has constituted the Stakeholders' Relationship Committee pursuant to a resolution dated

December 29, 2025.

*Scope of the Stakeholders' Relationship Committee*

The terms of reference of the stakeholders' relationship committee include amongst others, the following:

(i) consider and resolve grievances of the unitholders or debenture holders, including complaints related to the transfer/transmission of units, non-receipt of annual report, non-receipt of declared distributions and non-receipt of interest or principal repayment on debentures, general meetings;

(ii) review of measures taken for effective exercise of voting rights by shareholders;

(iii) review of any litigation related to unitholders' grievances;

(iv) review of adherence to the service standards adopted by the listed entity in respect of various services being rendered by the registrar transfer agent;

(v) review of the various measures and initiatives taken by the Trust or Investment Manager for reducing the quantum of unclaimed distributions and ensuring timely receipt of distribution warrants/annual reports/statutory notices by the unitholders of the Trust;

(vi) update unitholders on acquisition / sale of assets by the Trust and any change in the capital structure of the Project SPV;

(vii) reporting specific material litigation related to unitholders' grievances to the board of directors;

(viii) approve report on investor grievances to be submitted to the Trustee;

(ix) undertaking all functions in relation to resolution of any conflicts of interest;

(x) review of measures taken for effective exercise of voting rights by Unitholders; and

(xi) provide the unitholders with regular updates and information on the operation or performance of the Trust.

*(d)* *Risk Management Committee*

The IM Board has constituted the Risk Management Committee pursuant to a resolution dated December 29, 2025.

*Scope of the Risk Management Committee*

The terms of reference of the risk management committee include amongst others, the following:

(i) to formulate a detailed risk management policy which shall include:

  (a) a framework for identification of internal and external risks specifically faced by the listed entity, in particular including financial, operational, sectoral, sustainability (particularly, ESG related risks), information, cyber security risks or any other risk as may be determined by the Committee.

  (b) measures for risk mitigation including systems and processes for internal control of identified risks.

  (c) business continuity plan.

(ii) to ensure that appropriate methodology, processes and systems are in place to monitor and evaluate risks associated with the business;

(iii) to monitor and oversee implementation of the risk management policy, including evaluating the adequacy of risk management systems;

(iv) to periodically review the risk management policy, at least once in two years, including by considering the changing industry dynamics and evolving complexity;

(v) to keep the board of directors informed about the nature and content of its discussions, recommendations and actions to be taken;

(vi) the appointment, removal and terms of remuneration of the chief risk officer (if any) will be done as per the extant human resource policies of the Investment Manager by managing director and chief executive officer in consultation with the Risk Management Committee.

### *1.4. Articles of association of the Investment Manager*

The articles of association do not include any affirmative rights for the Sponsor.

### *1.5. Policies adopted by the IM Board*

The IM Board will adopt policies for corporate governance as may be required from time to time in accordance with applicable law and the InvIT Regulations. The Investment Manager has adopted the following policies, in relation to management of the Trust:

*Code of conduct of the Trust* ("***Code***")

The IM Board has adopted the Code pursuant to a resolution dated December 15, 2025, in relation to the Trust and conduct of the Trust and the Parties to the Trust. The policy provides for principles and procedures for the Sponsor, the Investment Manager, the Project Manager, the Trustee and their respective employees, as may be applicable, for ensuring interest of the Unitholders and proper conduct and carrying out of the business and affairs of the Trust in accordance with applicable law. The key principles of the Code are set out below:

1. the Trust and the Parties to the Trust shall conduct all affairs of the Trust in the interest of all the Unitholders;

2. the Trust and the Parties to the Trust shall make adequate, accurate, explicit and timely disclosure of relevant material information to all Unitholders, the stock exchanges and the SEBI in accordance with the InvIT Regulations and as may be specified by the stock exchanges from time to time;

3. the Trust and the Parties to the Trust shall try to avoid conflicts of interest, as far as possible, in managing the affairs of the Trust and keep the interest of all Unitholders paramount in all matters. In case such events cannot be avoided, it shall be ensured that appropriate disclosures are made to the Unitholders as required under the InvIT Regulations and they are fairly treated;

4. the Trust and the Parties to the Trust shall ensure that fees charged by them with respect to activities of the Trust shall be fair and reasonable;

5. the Investment Manager shall carry out the business of the Trust and invest in accordance with the investment objectives (as disclosed in the draft offer document and the offer document) and take investment decisions solely in the interest of Unitholders Each investment decision shall be supported by a documented evaluation of the proposed investment, a comprehensive risk assessment, and verification of compliance with applicable laws, regulations, and internal policies. Such decisions shall adhere to the internal approval frameworks established by the Trust;

6. the Trust, the Parties to the Trust and any third party appointed by the Investment Manager shall not use any unethical means to sell, market or induce any person to buy units of the Trust and where a third party appointed by the Investment Manager fails to comply with this condition, the Investment Manager shall be held liable for the same;

7. the Trust and the Parties to the Trust shall maintain high standards of integrity and fairness in all their dealings and in the conduct of their business;

8. the employees of the Trust and the Parties to the Trust shall not accept or offer gifts to past, current or prospective Unitholders of the Trust unless in accordance with the policies adopted by the Investment Manager, on behalf of the Trust;

9. the Compliance Officer shall ensure compliance in relation to anti-bribery and anti-corruption laws at all times. Further, the Compliance Officer shall not personally engage in or ignore any instance of someone paying or receiving any bribe or facilitate payment on behalf of any of the Parties of the Trust. Additionally, any instance of potential bribery or corruption shall be immediately reported to the Compliance Officer;

10. the Trust and the Parties to the Trust shall render at all times high standards of service, exercise due diligence, ensure proper care and exercise independent professional judgment;

11. the Trust and the Parties to the Trust shall not make any exaggerated statement, whether oral or written, either about their qualifications or capabilities or experience;

12. the employees of the Parties to the Trust shall avoid any action or behaviour that could be viewed as harassment. In case of any complain of sexual harassment, the relevant Party to the Trust shall put in place a process to appropriately, sensitively and expeditiously deal with it. Strict disciplinary action will be taken against any employee found guilty of any kind of sexual harassment;

13. the employees of the Parties to the Trust shall respect the intellectual property rights of others and never infringe them. Further, the employees should be cautious while preparing advertising and promotional materials using the name or logo of any of the Parties to the Trust. The employees shall ensure that only licensed software should be used on Trust's and Parties to the Trust's electronic devices. Any breach of these obligations shall attract penal consequences under applicable law and internal disciplinary policies as applicable. The relevant departmental head or such other designated Key Managerial Personnel shall be responsible for ensuring compliance and conducting periodic checks; and

14. The employees of the Parties to the Trust shall not disclose any confidential/ privileged information of the Trust and should direct any media queries or approaches to the appropriate spokesperson within the Trust.

*Policy on unpublished price-sensitive information and dealing in units by the Parties to the Trust ("**UPSI Policy**")*

The IM Board has adopted the UPSI Policy, pursuant to a resolution dated December 15, 2025, to outline the process and procedures for dissemination of information and disclosures in relation to the Trust on the website of the Trust, to the stock exchanges and to all stakeholders at large. The purpose of the UPSI is also to ensure that the Trust and the Investment Manager comply with applicable law, including the InvIT Regulations along with any guidelines, circulars, notifications and clarifications framed or issued thereunder, or such other Indian laws, regulations, rules or guidelines prohibiting insider trading and governing disclosure of material, unpublished price sensitive information.

*Acquisition policy*

The IM Board has adopted the acquisition policy pursuant to a resolution dated December 15, 2025. The acquisition policy provides for a framework for acquisition of assets in future. The Investment Manager shall ensure that all investment decisions in relation to the Trust are in accordance with applicable law, including the InvIT Regulations and the investment strategy of the Trust as specified under the Trust Deed and the acquisition policy.

*Policy in relation to related party transactions*

The IM Board has adopted the policy in relation to related party transactions pursuant to a resolution dated December 15, 2025, in relation to the Trust. The policy in relation to related party transactions to ensure proper approval, supervision and reporting of the transactions between the Trust and its related parties. For details of the policy, see "*Related Party Transactions*" on page 220.

*Policy on appointment of auditor and valuer*

The IM Board has adopted the distribution policy pursuant to a resolution dated December 15, 2025, in relation to the Trust. The policy provides a framework for ensuring compliance by the Trust in the appointment of its auditor, and the auditing standards to be followed, and the appointment of its valuer, in accordance with the InvIT Regulations and applicable law. For details of the policy, see "*Other Parties Involved in the Trust*" on page 109.

*Borrowing policy*

The IM Board has adopted the distribution policy pursuant to a resolution dated December 15, 2025, in relation to the Trust. The purpose of the borrowing policy provides a framework to ensure that all funds borrowed in relation to the Trust are in compliance with the InvIT Regulations. For details of the policy, see "*Financial Indebtedness and Deferred Payments*" on page 210.

*Distribution policy*

The IM Board has adopted the distribution policy pursuant to a resolution dated December 15, 2025, in relation to the Trust. The distribution policy provides a structure for distribution of the net distributable cash flows of the Project SPV to the Trust and the Trust to the Unitholders. For details of the policy, see "*Distribution*" on page 216.

Further, in accordance with the SEBI LODR Regulations, InvIT Regulations, and other applicable law the IM Board has also adopted the following policies vide resolution dated December 15, 2025:

(i). Code of conduct for the IM Board and senior management of the Investment Manager
(ii). Risk Management Policy
(iii). Policy for determining materiality of information for periodic disclosures of the Trust
(iv). Document archival policy
(v). Vigil mechanism and whistleblower policy
(vi). Policy for familiarisation programmes for independent directors of the Investment Managers
(vii). Nomination and remuneration policy
(viii). Policy for evaluation of the performance of the board of directors of the Investment Manager
(ix). Policy on succession planning for the IM Board and senior management of the Investment Manager
(x). Policy to promote diversity on the IM Board
(xi). Policy on appointment of unitholders' nominee directors
(xii). Investor grievance redressal policy

## 2. Project SPV

***Board of directors of Project SPV***

The Investment Manager, in consultation with the Trustee, shall appoint majority of the board of directors of the Project SPV, in accordance with the InvIT Regulations.

## OTHER PARTIES INVOLVED IN THE TRUST

### The Auditor

***Background and terms of appointment***

The Investment Manager, in consultation with the Trustee, has appointed A.R. & Co., Chartered Accountants (Firm Registration No. 002744C) as the statutory auditors of the Trust, for the financial year 2025-2026, until the first annual general meeting of the Unitholders. The Auditors have audited the Audited Financial Information and have examined the Projections of Revenue from Operations and Cash Flow from Operating Activities, and their reports in relation to such Audited Financial Information and Projections of Revenue from Operations and Cash Flow from Operating Activities, each dated January 12, 2026, have been included in this Draft Offer Document.

***Functions, Duties and Responsibilities of the Auditor***

The functions, duties and responsibilities of the Auditor will be in accordance with the InvIT Regulations. Presently, in terms of the InvIT Regulations, the Auditor is required to comply with the following conditions at all times:

- the Auditor shall conduct audit of the accounts of the Trust and draft the audit report based on the accounts examined and after taking into account the relevant accounting and auditing standards, as may be specified by SEBI;
- the Auditor shall, to the best of his information and knowledge, ensure that the accounts and financial statements give a true and fair view of the state of the affairs of the Trust, including profit or loss and cash flow for the period and such other matters as may be specified;
- the Auditor shall have a right of access at all times to the books of accounts and vouchers pertaining to activities of the Trust; and
- the Auditor shall have a right to require such information and explanation pertaining to activities of the Trust as he may consider necessary for the performance of his duties as auditor from the employees of the Trust or holding company or Parties to the Trust or holding company or the special purpose vehicles or any other person in possession of such information.
- undertake a limited review of the audit of all the entities or companies whose accounts are to be consolidated with the accounts of the Trust as per the applicable Indian Accounting Standards and any addendum thereto as defined in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015, in such manner as may be specified by SEBI.

### The Valuer

***Background and terms of appointment***

The Investment Manager, in consultation with the Trustee, has appointed RBSA Valuation Advisors LLP, as the valuers of the Trust for the financial year 2025-2026. In accordance with the InvIT Regulations, the Valuers have undertaken a full valuation of the InvIT Assets which is proposed to be acquired by the Trust, and their report in relation to such valuation as on December 31, 2025, has been included in this Draft Offer Document.

***Functions of the Valuer***

The functions, duties and responsibilities of the Valuer will be in accordance with the InvIT Regulations in the manner and withing timelines as specified under the InvIT Regulations and other applicable law. Presently, in terms of the InvIT Regulations, the Valuer is required to comply with the following conditions at all times:

- the Valuer shall ensure that the valuation of the project SPVs is impartial, true and fair and is in accordance with Regulation 21 of the InvIT Regulations;
- the Valuer shall ensure adequate and robust internal controls to ensure the integrity of its valuation reports;
- the Valuer shall ensure that it has sufficient key personnel with adequate experience and qualification to perform valuations;
- the Valuer shall ensure that it has sufficient financial resources to enable it to conduct its business effectively and meet its liabilities;

- the Valuer and any of its employees involved in valuing of the assets of the Trust, shall not, (i) invest in Units of the Trust or in the assets being valued; and (ii) sell the assets or Units of Trust held prior to being appointed as the Valuer, till the time such person is designated as Valuer of the Trust and not less than six months after ceasing to be valuer of the Trust;
- the Valuer shall conduct valuation of the project SPVs with transparency and fairness and shall render, at all times, high standards of service, exercise due diligence, ensure proper care and exercise independent professional judgment;
- the Valuer shall act with independence, objectivity and impartiality in performing the valuation;
- the Valuer shall discharge its duties towards the Trust in an efficient and competent manner, utilising its knowledge, skills and experience in best possible way to complete given assignment;
- the Valuer shall not accept remuneration, in any form, for performing a valuation of the project SPVs from any person other than the Trust or its authorised representative;
- the Valuer shall before accepting any assignment, from any related party of the Trust, disclose to the Trust any direct or indirect consideration which the Valuer may have in respect of such assignment;
- the Valuer shall disclose to the Trust any pending business transactions, contracts under negotiation and other arrangements with the Investment Manager or any other party whom the Trust is contracting with and any other factors that may interfere with the Valuer's ability to give an independent and professional valuation of the assets;
- the Valuer shall not make false, misleading or exaggerated claims in order to secure assignments;
- the Valuer shall not provide misleading valuation, either by providing incorrect information or by withholding relevant information;
- the Valuer shall not accept an assignment which interferes with its ability to do fair valuation; and
- the Valuer shall, prior to performing a valuation, acquaint itself with all laws or regulations relevant to such valuation.

**Policy on appointment of auditor and valuer**

The Investment Manager has adopted a policy on the appointment of auditor and valuer of the Trust, vide a resolution passed by the IM Board dated December 15, 2025, which will stand amended, to the extent of any amendment to the InvIT Regulations or applicable law, details of which are provided below:

*Appointment and role of Auditor of the Trust*

(i). The Investment Manager, in consultation with the Trustee, shall appoint the auditor of the Trust (the "**Auditor**"), in a timely manner and in accordance with the InvIT Regulations.

(ii). The Investment Manager shall ensure that the appointment of the Auditor and the fees payable to the Auditor is approved by the Unitholders in accordance with the InvIT Regulations.

(iii). The Investment Manager shall ensure that if the removal of the Auditor and appointment of another auditor to the Trust is taken up at a meeting of the Unitholders at the request of the Unitholders, such removal of the Auditor shall be approved by the Unitholders in accordance with the InvIT Regulations.

(iv). The Investment Manager shall appoint an individual or a firm as the Auditor, who shall hold office from the date of conclusion of the annual meeting in which the Auditor has been appointed till the date of conclusion of the sixth annual meeting of the Unitholders in accordance with the procedure for selection of auditors, in accordance with the InvIT Regulations.

(v). The Investment Manager shall not appoint or re-appoint

(a) an individual as the Auditor for more than one term of five consecutive years, provided that such individual, upon completion of one term of five consecutive years, shall not be eligible for re-appointment as the auditor in the Trust for a period of five years from the date of completion of the term; and

(b) an audit firm as the Auditor for more than two terms of five consecutive years, provided that, upon completion of two terms of five consecutive years, such audit firm shall not be eligible for re-appointment as the auditor in the Trust for a period of five years from the date of completion of its term.

(vi). The Investment Manager shall ensure that the audit of accounts of the Trust by the Auditor is done not less than once in a year and such report is submitted to the stock exchanges within the timelines prescribed under the InvIT Regulations.

(vii). The Auditor shall conduct the audit of the accounts of the Trust and draft the audit report based on the accounts examined by it after taking into account the relevant accounting and auditing standards under applicable law, including the InvIT Regulations and any guidelines, circulars, notifications and clarifications framed or issued by the SEBI, as may be specified from time to time.

(viii). The Auditor shall undertake a limited review of the audit of all the entities or companies whose accounts are to be consolidated with the accounts of the Trust as per the relevant auditing standards under applicable law and in accordance with the InvIT Regulations.

(ix). The Auditor shall comply with the conditions prescribed under the InvIT Regulations at all times, including the following:

(a). the accounts of the Trust shall be subjected to audit by the Auditors and shall be accompanied by a report of the Auditors in such manner and at such intervals as may be prescribed under applicable law, including the InvIT Regulations;
(b). the Auditor shall, to the best of his information and knowledge, ensure that the accounts and financial statements give a true and fair view of the state of the affairs of the Trust, including profit or loss and cash flow for the period and such other matters as may be specified by SEBI;
(c). the Auditor shall have a right of access at all times to the books of accounts and vouchers pertaining to activities of the Trust;
(d). the Auditor shall have a right to obtain such information and explanation pertaining to activities of the Trust as he may consider necessary for the performance of his duties as auditor from the employees of Trust or any holding company or parties to the Trust or any holding company or the special purpose vehicle(s) or any other person in possession of such information; and
(e). The auditor shall undertake a limited review of the audit of all the entities or companies whose accounts are to be consolidated with the accounts of the InvIT as per the applicable Indian Accounting Standards (Ind AS) and any addendum thereto as defined in Rule 2 (1) (a) of the Companies (Indian Accounting Standards) Rules, 2015, in such manner as may be specified by the Board.

(x). The Investment Manager, in consultation with the Trustee, shall have the right to take all necessary steps to remove the Auditor who ceases to comply with the eligibility criteria required under the InvIT Regulations and applicable law. In case of removal of the auditor and appointment of another auditor to the Trust, approval from the Unitholders shall be required in accordance with the InvIT Regulations.

*Appointment and role of Valuer of the Trust*

(i). The Investment Manager, in consultation with Trustee, shall appoint the valuer of the Trust ("**Valuer**"), in a timely manner and shall determine the remuneration of such Valuer, in accordance with the InvIT Regulations. A 'Valuer' shall have the meaning provided under the InvIT Regulations.

(ii). The remuneration of the Valuer shall not be linked to or based on the value of the assets being valued.

(iii). The Valuer shall not be an associate of any of the Sponsors or the Investment Manager or Trustee. The Valuer shall have the minimum number of years of experience in valuation of infrastructure assets as may be required under the InvIT Regulations.

(iv). The Valuer shall be eligible to act as a valuer in accordance with the InvIT Regulations or any clarifications, guidelines, notifications or exemptions issued by SEBI.

(v). A Valuer shall not undertake valuation of the same project for more than four years consecutively, provided that the Valuer may be reappointed after a period of not less than two years from the date it ceases to be the Valuer of the Trust.

(vi). The Valuer shall not undertake valuation of any assets in which it has either been involved with the acquisition or disposal within the last twelve months other than such cases where the Valuer was engaged by the Trust for such acquisition or disposal.

(vii). The Valuer shall comply with the following conditions at all times:

(a) the Valuer shall ensure that the valuation of the Trust assets is impartial, true and fair and is in accordance with the Regulation 21 of InvIT Regulations;

(b) the Valuer shall ensure adequate and robust internal controls to ensure the integrity of its valuation reports;

(c) the Valuer shall ensure that it has sufficient key personnel with adequate experience and qualification to perform valuations;

(d) the Valuer shall ensure that it has sufficient financial resources to enable it to conduct its business effectively and meet its liabilities;

(e) the Valuer and any of its employees involved in valuing of the assets of the Trust, shall not:

- invest in units of the Trust or in the assets being valued; and
- sell the assets or units of the Trust held prior to being appointed as the Valuer,

until the time such person is designated as Valuer of the Trust and not less than six months after ceasing to be Valuer of the Trust;

(f) the Valuer shall conduct valuation of the Trust assets with transparency and fairness and shall render, at all times, high standards of service, exercise due diligence, ensure proper care and exercise independent professional judgment;

(g) the Valuer shall act with independence, objectivity and impartiality in performing the valuation;

(h) the Valuer shall discharge its duties towards the Trust in an efficient and competent manner, utilizing its knowledge, skills and experience in best possible way to complete given assignment;

(i) the Valuer shall not accept remuneration, in any form, for performing a valuation of the Trust assets from any person other than the Trust or its authorized representative;

(j) the Valuer shall before accepting any assignment, from any related party of the Trust, disclose to the Trust, by disclosing to the Investment Manager or the Trustee, any direct or indirect consideration which the Valuer may have in respect of such assignment;

(k) the Valuer shall disclose to the Trust, through the Investment Manager, any pending business transactions, contracts under negotiation and other arrangements with the Investment Manager or any other party whom the Trust is contracting with and any other factors that may interfere with the Valuer's ability to give an independent and professional valuation of the assets, and other necessary disclosures required under the InvIT Regulations;

(l) the Valuer shall not make false, misleading or exaggerated claims in order to secure assignments;

(m) the Valuer shall not provide misleading valuation, either by providing incorrect information or by withholding relevant information;

(n) the Valuer shall not accept an assignment which interferes with its ability to do fair valuation; and

(o) the Valuer shall, prior to performing a valuation, acquaint itself with all laws or regulations relevant to such valuation.

(viii). The Investment Manager in consultation with the Trustee shall have the right to take all necessary steps to remove the Valuer who ceases to comply with the eligibility criteria required under the InvIT Regulations and applicable law. If the removal of the Valuer and appointment of another valuer to the Trust is taken up at a meeting of the Unitholders at the request of the Unitholders, such removal of the Valuer shall be approved by the Unitholders in accordance with the InvIT Regulations.

## INDUSTRY OVERVIEW

*The information in this section is extracted from an industry report titled "Research Report on Road Sector in India" dated January 10, 2026, prepared and released by CARE Analytics and Advisory Private Limited ("**CARE Industry Report**"). Industry sources and publications generally state that the information contained therein has been obtained from sources generally believed to be reliable, but that their accuracy, completeness and underlying assumptions are not guaranteed, and their reliability cannot be assured. Industry publications are also prepared based on information available as of specific dates and may no longer be current or reflect current trends. Accordingly, investment decisions should take these limitations into account. All references to years refer to calendar years except as otherwise stated. References to Indian financial years ("**FY**" or "**Fiscal**") are to the one-year period ending March 31 of the named year.*

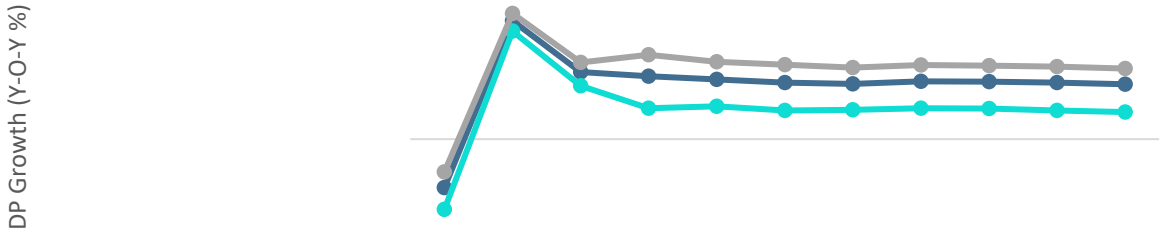
# Economic Outlook

### Global Economy

### Global economic growth expected to sustain at ~3% in near term

Global growth, which reached 3.5% in CY23, stabilized at 3.3% for CY24 and projected to decrease at 3.2% for CY25. Global trade is expected to be disrupted by new US tariffs and countermeasures from trading partners, leading to historically high tariff rates and negatively impacting economic growth projections. The global landscape is expected to change as countries rethink their priorities and policies in response to these new developments. Central banks priority will be to adjust policies, while smart fiscal planning and reforms are key to handling debt and reducing global inequalities.

**Chart 1: Global Growth Outlook Projections (Real GDP, Y-o-Y change in %)**




| | CY20 | CY21 | CY22 | CY23 | CY24 | CY25P | CY26P | CY27P | CY28P | CY29P | CY30P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| World | -2.7% | 6.6% | 3.8% | 3.5% | 3.3% | 3.2% | 3.1% | 3.2% | 3.2% | 3.2% | 3.1% |
| Advanced Economies | -3.9% | 6.0% | 3.0% | 1.7% | 1.8% | 1.6% | 1.6% | 1.7% | 1.7% | 1.6% | 1.5% |
| Emerging Market and Developing Economies | -1.8% | 7.0% | 4.3% | 4.7% | 4.3% | 4.2% | 4.0% | 4.2% | 4.1% | 4.1% | 4.0% |

Source: IMF – World Economic Outlook, October 2025; Note: P-Projection

**Table 1: GDP growth trend comparison - India v/s Other Economies (Real GDP, Y-o-Y change in %)**

| | Real GDP (Y-o-Y change in %) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CY20 | CY21 | CY22 | CY23 | CY24 | CY25P | CY26P | CY27P | CY28P | CY29P | CY30P |
| India | -5.8 | 9.7 | 7.6 | 9.2 | 6.5 | 6.6 | 6.2 | 6.4 | 6.5 | 6.5 | 6.5 |
| China | 2.3 | 8.6 | 3.1 | 5.4 | 5.0 | 4.8 | 4.2 | 4.2 | 4.0 | 3.7 | 3.4 |
| Indonesia | -2.1 | 3.7 | 5.3 | 5.0 | 5.0 | 4.9 | 4.9 | 5.0 | 5.0 | 5.1 | 5.1 |
| Saudi Arabia | -3.8 | 6.5 | 12.0 | 0.5 | 2.0 | 4.0 | 4.0 | 3.3 | 3.3 | 3.3 | 3.3 |
| Middle East | -2.3 | 4.7 | 6.4 | 2.6 | 2.6 | 3.5 | 3.8 | 3.8 | 3.7 | 3.7 | 3.7 |
| Latin America | -6.9 | 7.4 | 4.3 | 2.4 | 2.4 | 2.4 | 2.3 | 2.6 | 2.7 | 2.8 | 2.6 |
| Brazil | -3.3 | 4.8 | 3.0 | 3.2 | 3.4 | 2.4 | 1.9 | 2.2 | 2.3 | 2.4 | 2.5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Euro Area | -6.0 | 6.4 | 3.6 | 0.4 | 0.9 | 1.2 | 1.1 | 1.4 | 1.3 | 1.2 | 1.1 |
| United States | -2.1 | 6.2 | 2.5 | 2.9 | 2.8 | 2.0 | 2.1 | 2.1 | 2.1 | 1.9 | 1.8 |

Source: IMF- World Economic Outlook Database (October 2025); Note: P- Projections, India's fiscal year (FY) aligns with the IMF's calendar year (CY). For instance, FY24 corresponds to CY23.

**Indian Economic Outlook**

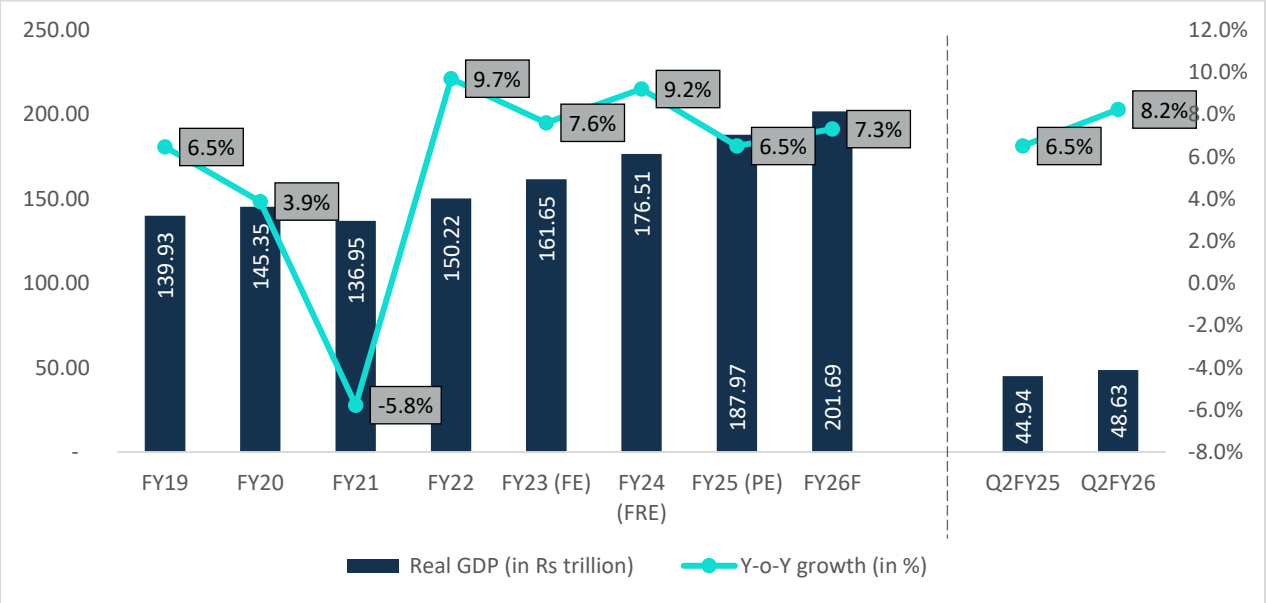
**GDP Growth and Outlook**

**Resilience to External Shocks remains Critical for Near-Term Outlook**

India's economy continues to show rapid growth. In the second quarter of FY26, the country's GDP grew by 8.2% compared to the same period last year, which saw a 6.5% increase. For the full year FY26, GDP is expected to grow by 7.3%, supported by rising rural demand, better job opportunities, and active business conditions.

In FY25, provisional estimates show a growth of 6.5% (Rs 187.97 trillion), led by robust performance in manufacturing, construction, and financial services. Consumer spending rose by 7.6%, and government spending increased by 3.8%, both contributing to the overall growth. In FY24, India's GDP grew by 9.2% (Rs 176.5 trillion), the highest in over a decade (excluding the pandemic year).

**Chart 2: Trend in Real Indian GDP growth rate**




Source: MOSPI, Reserve Bank of India; Note: FE – Final Estimates, FRE- First Revised Estimates, PE – Provisional Estimates, F - Forecasted

**GDP Growth Outlook (December 2025)**

**FY26 GDP Outlook:** The RBI projects real GDP growth at 7.3% for 2025–26, driven by industrial and services sectors. The upward trajectory of growth is also due to income tax and goods and services tax (GST) rationalisation, softer crude oil prices, increase of government capital expenditure, and facilitative monetary and financial conditions lower inflation rates.

However, risks from prolonged geopolitical tensions, global trade disruptions, and weather-related uncertainties remain. Taking these into account, the RBI has reaffirmed its growth projections.

**Table 2: RBI's GDP Growth Outlook (Y-o-Y %)**

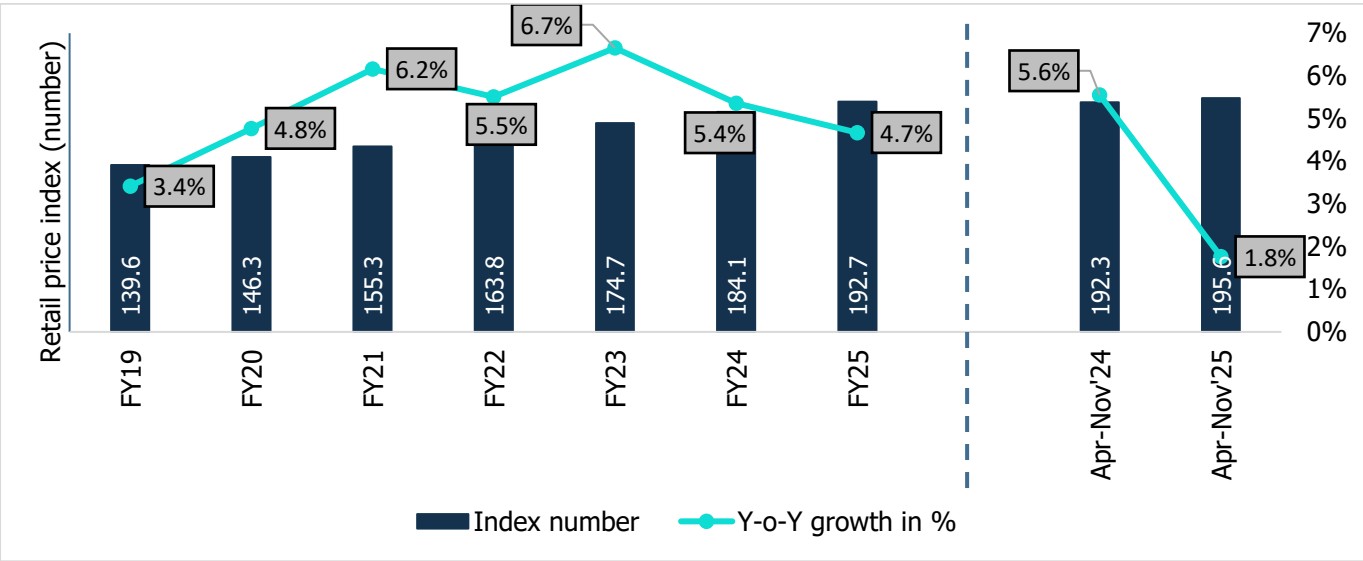
| FY26P (complete year) | Q3FY26P | Q4FY26P | Q1FY27P | Q2FY27P |
|---|---|---|---|---|
| 7.3% | 7.0% | 6.5% | 6.7% | 6.8% |

Source: Reserve Bank of India; Note: P-Projected

**Performance of key macro-economic indicators**

The Consumer Price Index (CPI) for the April–November 2025 recorded a combined inflation rate of 1.8%, there was an increase of 46 basis points in November, 2025 from October, 2025. The increase in inflation in November 2025 was driven by increase in inflation of Vegetables, Egg, Meat and fish, Spices and Fuel and light.

**Chart 3: Retail Price Inflation in terms of index and Y-o-Y Growth in % (Base: 2011-12=100)**

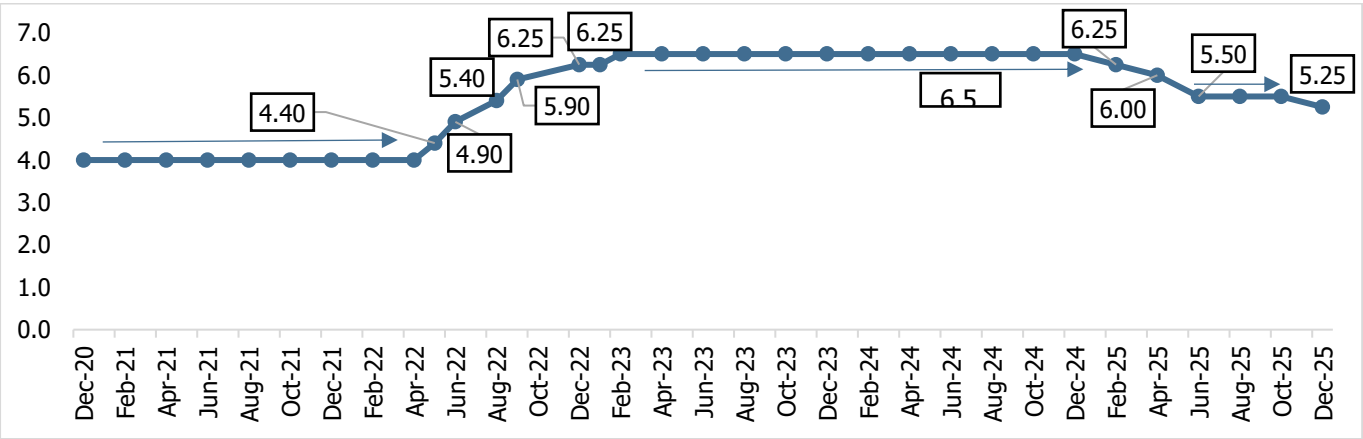



Source: MOSPI

The CPI is primarily factored in by RBI while preparing their bi-monthly monetary policy. At the bi-monthly meeting held in December 2025, RBI projected inflation at 2.0% for FY26 with inflation during Q3FY26 at 0.6% and Q4FY26 at 2.9%, Q1FY27 at 3.9% and Q2FY27 at 4.0%.

Considering the current inflation situation, RBI has reduced the repo rate by 25 basis points to 5.25% in the December 2025 meeting of the Monetary Policy Committee.

**Chart 4: RBI historical Repo Rate**




Source: RBI

The RBI maintained a 'neutral' monetary policy stance, continuing to signal confidence that India's economic growth would remain resilient, underpinned by robust private consumption and sustained expansion in fixed capital formation, while also emphasising persistent external risks. The domestic demand conditions remain supportive even as global uncertainties prevail. On trade policy, the temporary pause on US tariff increases concluded in August 2025, and higher duties on certain Indian exports have since taken effect, although bilateral trade talks continue to manage tariff-related tensions.

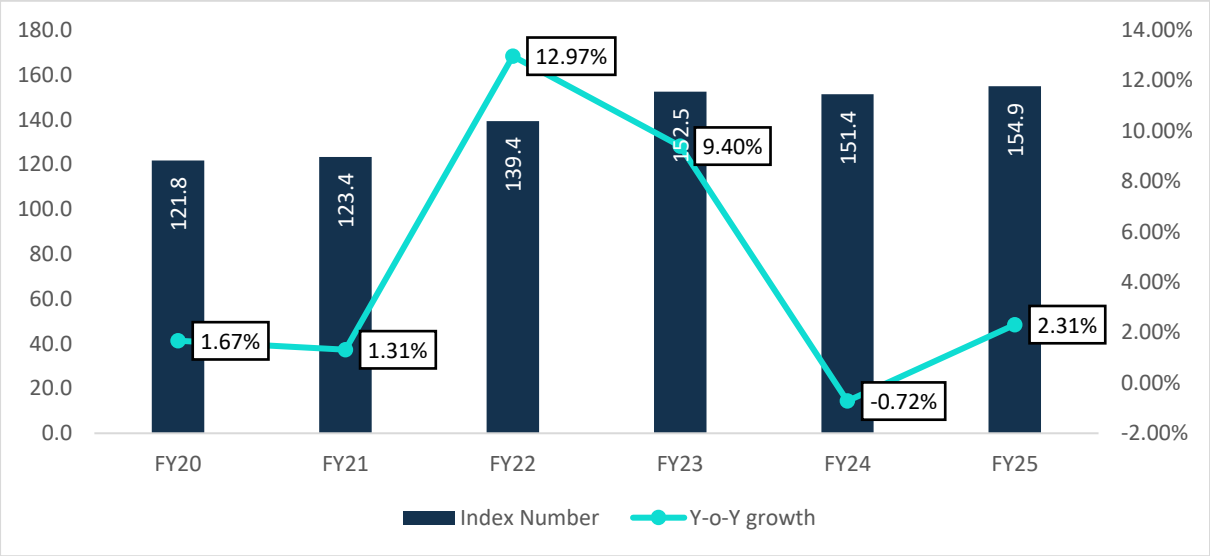
The RBI has adopted for a non-inflationary growth with the foundations of strong demand and supply with a good macroeconomic balance. The domestic growth and inflation curve require the policies to be supportive with the volatile trade conditions.

**Wholesale Price Index**

Wholesale Price Index (WPI) is an index number that measures the average movement in prices of a defined basket of goods at the wholesale level in the domestic market, broadly capturing prices at the first point of bulk sale.

From FY23 to FY25, WPI index stayed high and broadly flat, easing slightly from 152.5 (FY23) to 151.4 (FY24) before rising to 154.9 (FY25). This pattern is consistent with easing and re-firming in wholesale input costs, this can be attributed to the geopolitical tensions and sanctions contributed to supply disruptions and higher global prices.

**Chart 5: Wholesale Price Index**




Source: Office of Economic Advisor

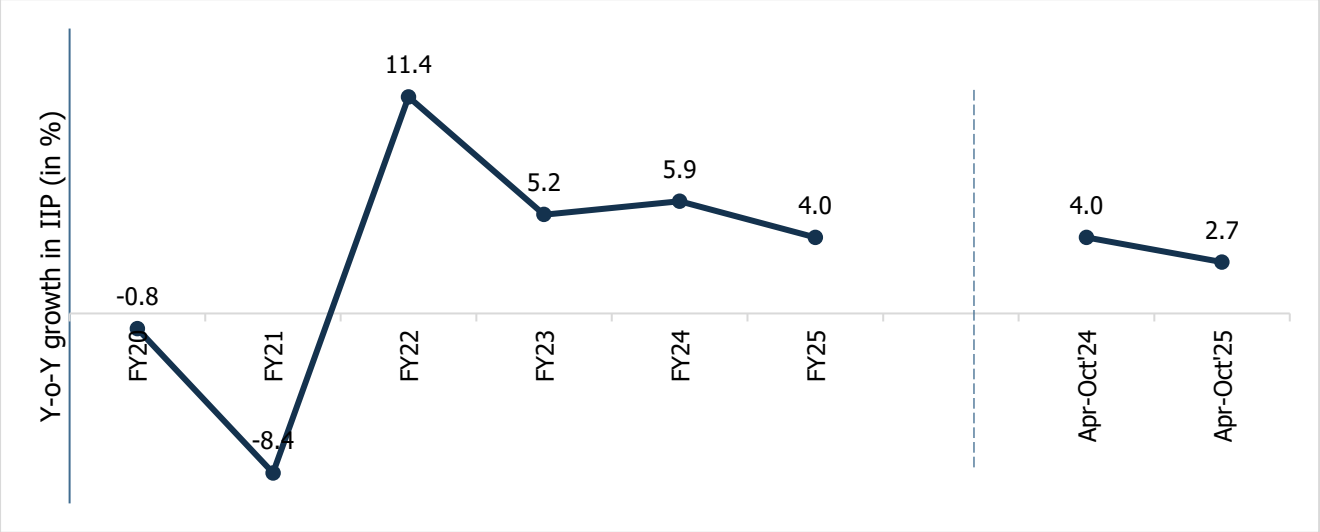
**Index of Industrial Production**

The Quick Estimates of the Index of Industrial Production (IIP) for October 2025 show a growth of 0.4%, a decline from 4.0% from October 2024. The year-on-year decline in IIP reflects weakness across major segments, primarily due to contractions in electricity, mining, and consumer non-durables.

In October 2025, industrial growth weakened due to less number of working days because of a number of festivals in the month. Within manufacturing, notable growth was recorded in basic metals, petroleum products, motor vehicles, trailers and semi-trailers.

Use-based indices reflected mixed trends, with strong growth in Infrastructure/Construction goods, Intermediate and Capital goods. Manufacturing contributed significantly to overall industrial growth. This was primarily driven by strong performance in segments such as pharmaceuticals, motor vehicles, beverages, and electrical equipment.

**Chart 6: Y-o-Y growth in IIP (in %)**




Source: MOSPI

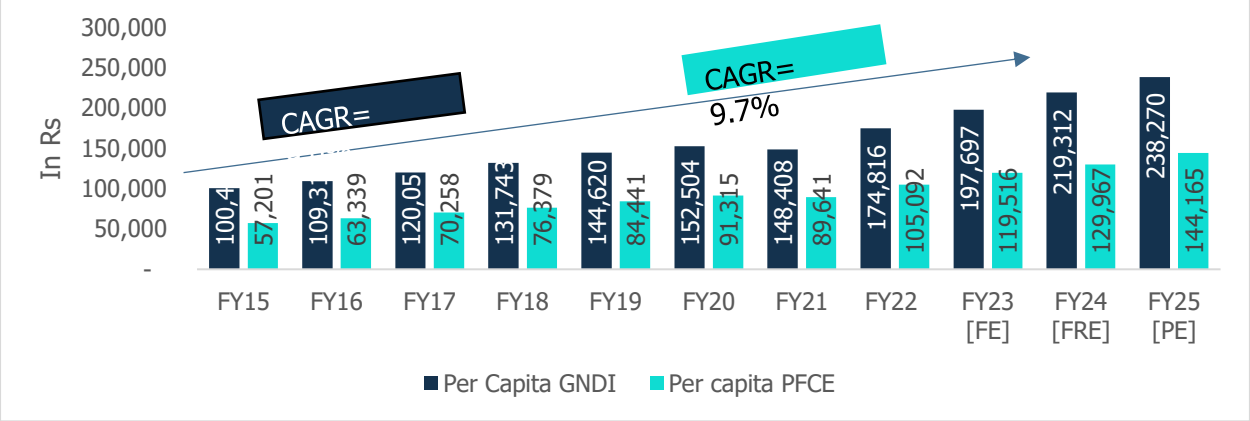
**Per capita income trends of the economy**

**Increasing Disposable Income and Consumer Spending**

Gross National Disposable Income (GNDI) is a measure of the income available to the nation for final consumption and gross savings. Between the period FY15 to FY25, per capita GNDI at current prices registered a CAGR of 9.0%. More disposable income drives more consumption, thereby driving economic growth.

With increase in disposable income, there has been a gradual change in consumer spending behaviour as well. Per capita Private Final Consumption Expenditure (PFCE) which is measure of consumer spending has also showcased significant growth from FY15 to FY25 at a CAGR of 9.7%.

**Chart 7: Trend of Per Capita GNDI and Per Capita PFCE (Current Price)**




Source: MOSPI; Note: FRE – First Revised Estimates, FE – Final Estimates, PE- Provisional Estimates

**Gross Value Added (GVA) Trend**

Gross Value Added (GVA) is the measure of the value of goods and services produced in an economy. GVA gives a picture of the supply side whereas GDP represents consumption. India's recovery in FY25 was powered by a broad-based rebound across sectors. The gap between GDP and GVA growth stood at 0.1 percentage point in

FY25, with GDP growing at 6.5% and GVA at 6.4%, as per MoSPI's provisional estimates released in August 2025.

The agriculture and allied sector grew by 4.6% in FY25 (up from 2.7% in FY24), supported by a good monsoon, better crop output, and strong allied activities. The industrial sector grew by 5.9% in FY25, down from 10.8% in FY24 due to weaker manufacturing, with FY24 growth driven by strong manufacturing sales, construction (9.4%), utilities, and supportive policies. The services sector grew by 7.2% in FY25, down from 9.0% in FY24, supported by public administration (8.9%), financial services (7.2%), and trade and transport (6.1%), contributing Rs 94.4 trillion to the economy.

From H1FY25 to H1FY26, the overall GVA at basic price had a Y-o-Y growth from 5.8% to 8.1%, indicating a stronger economic performance. Most sectors showed growth, with Services sector growing significantly from 7.2% to 9.2%, and Industrial sector had a growth from 3.8% to 7.7% in H1FY26. However, Mining & Quarrying declined sharply from -0.4% to -0.04%, and Electricity, Gas & Water supply increased considerably from 3.0% to 4.2%.

**Table 3: Sectoral Growth (Y-o-Y % Growth) - at Constant Prices**

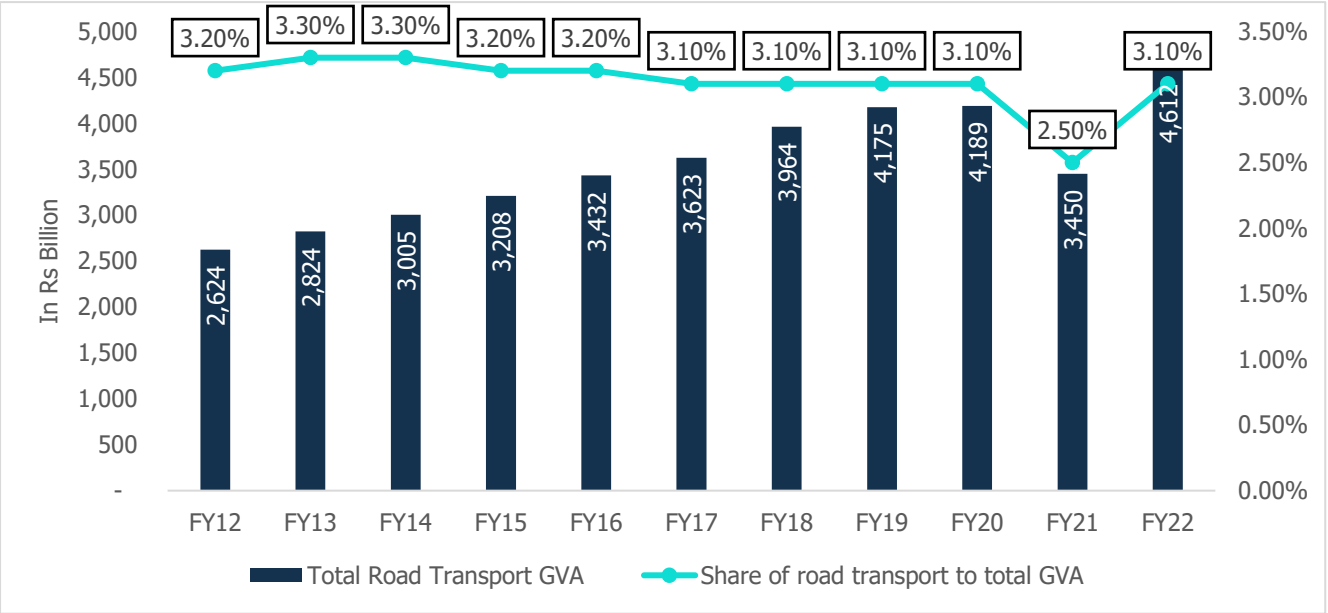
| At constant Prices | FY19 | FY20 | FY21 | FY22 | FY23 (FE) | FY24 (FRE) | FY25 (PE) | H1FY25 | H1FY26 |
|---|---|---|---|---|---|---|---|---|---|
| **Agriculture, Forestry & Fishing** | **2.1** | **6.2** | **4.1** | **4.6** | **5.1** | **2.7** | **4.6** | **4.1** | **3.5** |
| **Industry** | **5.3** | **-1.4** | **-0.9** | **12.2** | **2.0** | **10.8** | **5.9** | **3.8** | **7.7** |
| Mining & Quarrying | -0.9 | -3.0 | -8.6 | 6.3 | 2.8 | 3.2 | 2.7 | -0.4 | -0.04 |
| Manufacturing | 5.4 | -3.0 | 2.9 | 10.0 | -3.0 | 12.3 | 4.5 | 2.2 | 9.1 |
| Electricity, Gas, Water Supply & Other Utility Services | 7.9 | 2.3 | -4.3 | 10.3 | 11.5 | 8.6 | 5.9 | 3.0 | 4.4 |
| Construction | 6.5 | 1.6 | -5.7 | 19.9 | 10.0 | 10.4 | 9.4 | 8.4 | 7.2 |
| **Services** | **7.2** | **6.4** | **-8.2** | **9.2** | **11.3** | **9.0** | **7.2** | **7.2** | **9.2** |
| Trade, Hotels, Transport, Communication & Broadcasting | 7.2 | 6.0 | -19.7 | 15.2 | 14.4 | 7.5 | 6.1 | 6.1 | 7.4 |
| Financial, Real Estate & Professional Services | 7.0 | 6.8 | 2.1 | 5.7 | 10.7 | 10.3 | 7.2 | 7.2 | 10.2 |
| Public Administration, Defence and Other Services | 7.5 | 6.6 | -7.6 | 7.5 | 8.2 | 8.8 | 8.9 | 8.9 | 9.7 |
| **GVA at Basic Price** | **5.8** | **3.9** | **-4.2** | **9.4** | **7.2** | **8.6** | **6.4** | **5.8** | **8.1** |

Source: MOSPI; Note: FRE – First Revised Estimates, FE- Final Estimates, PE – Provisional Estimates

**Contribution of Road Transport to Total Gross Value Added (GVA)**

Road transport has been a preferred mode of domestic transport for any passengers and goods movement vis-à-vis other modes of transport due to ease of first and last mile connectivity and significant development of the road network across the country over the past two decades. The road sector generated highest gross value addition of Rs. 4.61 trillion in FY22 at current prices and contributed ~78% to overall GVA added by the transportation sector. Wherein, the other mode of transports like railways contributed ~15%, while water contributed ~3% and air 1%. From FY12 to FY22, factors like growing urbanization and population led to growth of road transport segment at a CAGR of 6.5%.

**Chart 8: Contribution of Road Transport to total Gross Value Added (Current Prices)**

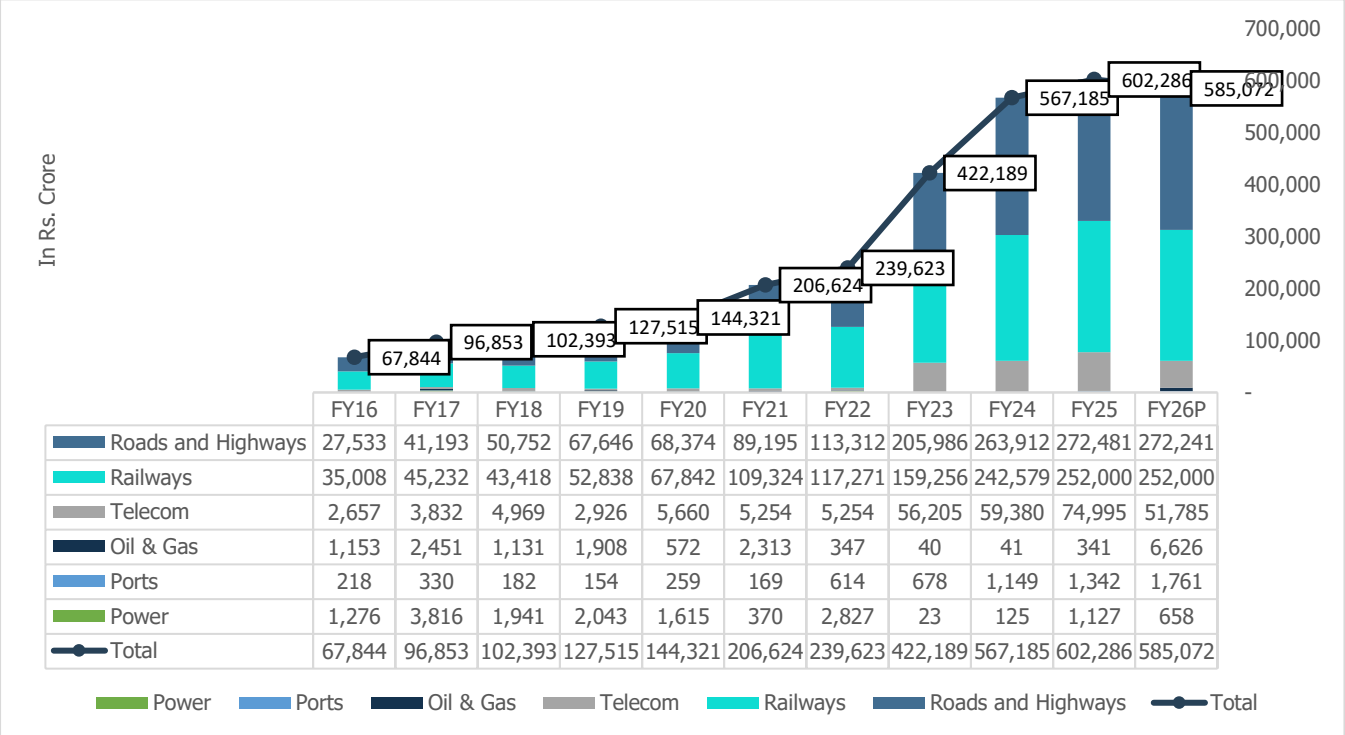



Source: MOSPI

**Budget Outlay towards Infrastructure**

With the growing population, the long-term need for robust infrastructure is necessary for economic development. This generates the need for massive investments in the development and modernization of infrastructure facilities, which will not only cater to the growing demand but will also ensure competitiveness in the global market.

**Chart 9: Budgetary outlay towards infrastructure**




| | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Roads and Highways | 27,533 | 41,193 | 50,752 | 67,646 | 68,374 | 89,195 | 113,312 | 205,986 | 263,912 | 272,481 | 272,241 |
| Railways | 35,008 | 45,232 | 43,418 | 52,838 | 67,842 | 109,324 | 117,271 | 159,256 | 242,579 | 252,000 | 252,000 |
| Telecom | 2,657 | 3,832 | 4,969 | 2,926 | 5,660 | 5,254 | 5,254 | 56,205 | 59,380 | 74,995 | 51,785 |
| Oil & Gas | 1,153 | 2,451 | 1,131 | 1,908 | 572 | 2,313 | 347 | 40 | 41 | 341 | 6,626 |
| Ports | 218 | 330 | 182 | 154 | 259 | 169 | 614 | 678 | 1,149 | 1,342 | 1,761 |
| Power | 1,276 | 3,816 | 1,941 | 2,043 | 1,615 | 370 | 2,827 | 23 | 125 | 1,127 | 658 |
| Total | 67,844 | 96,853 | 102,393 | 127,515 | 144,321 | 206,624 | 239,623 | 422,189 | 567,185 | 602,286 | 585,072 |

Source: Union Budget FY26 document

Some of the key government infrastructure schemes include:

- The government has announced plans for the National Monetization Pipeline (NMP) and Development Finance Institution (DFI) to improve the financing of infrastructure projects

- The government has helped the growth of urbanization through a number of schemes and projects, including the **Smart Cities Mission,** the **Atal Mission for Rejuvenation and Urban Transformation (AMRUT),** and the **Pradhan Mantri Awas Yojana (Urban).**

**Concluding Remarks**

Global economic growth faces headwinds from geopolitical tensions, volatile commodity prices, high interest rates, inflation, financial market volatility, climate change, and rising public debt. However, India's economy remains relatively strong, with an IMF forecast of 6.6% GDP growth in CY25 (FY26 according to the fiscal year), compared to the global projection of 3.2%. Key drivers include strong domestic demand, government capital expenditure and moderating inflation.

Public investment is expected to exhibit healthy growth as the government has allocated a strong capital expenditure of about Rs. 11.21 lakh crores for FY26. The private sector's intent to invest is also showing improvement as per the data announced on new project investments and resilience shown by the import of capital goods. Additionally, improvement in rural demand owing to healthy sowing, improving reservoir levels, and progress in south-west monsoon along with government's thrust on capex and other policy support will aid the investment cycle in gaining further traction.

The recent 56$^{th}$ meeting of the Goods and Services Tax (GST) Council announced some major changes in the existing GST structure. The focus is majorly on simplifying it to a two-tiered GST tax structure of 5% and 18%, phasing out the currently existing 12% and 28% slabs. There is also a de-merit tax rate for luxury and 'sin' goods at a 40% tax slab. These changes are typically aimed at increasing the disposable income and in turn boosting consumption, as well as promoting the ease of doing business. The GST rationalization is expected to be a positive step towards economic growth, stimulating private consumption and ease inflationary pressures. The recent revisions in income tax rates, coupled with the reduction in GST, are expected to result in savings of over Rs 2.5 lakh crore, which is likely to further boost the consumption.

The impact of U.S. tariffs on India's export trade is anticipated to be minimal. The engineering goods sector will have a potential U.S. tariff impact, whereas steel industry is affected by the 50% tariffs although the impact is expected to be minimal given the volume of goods exported is less.

On February 13$^{th}$, 2025, India and US discussed enhancing the U.S.-India trade relationship, with a target to increase bilateral trade from USD 200 billion to USD 500 billion by 2030. As of September 2025, India and the U.S discussions seem "positive and forward looking"

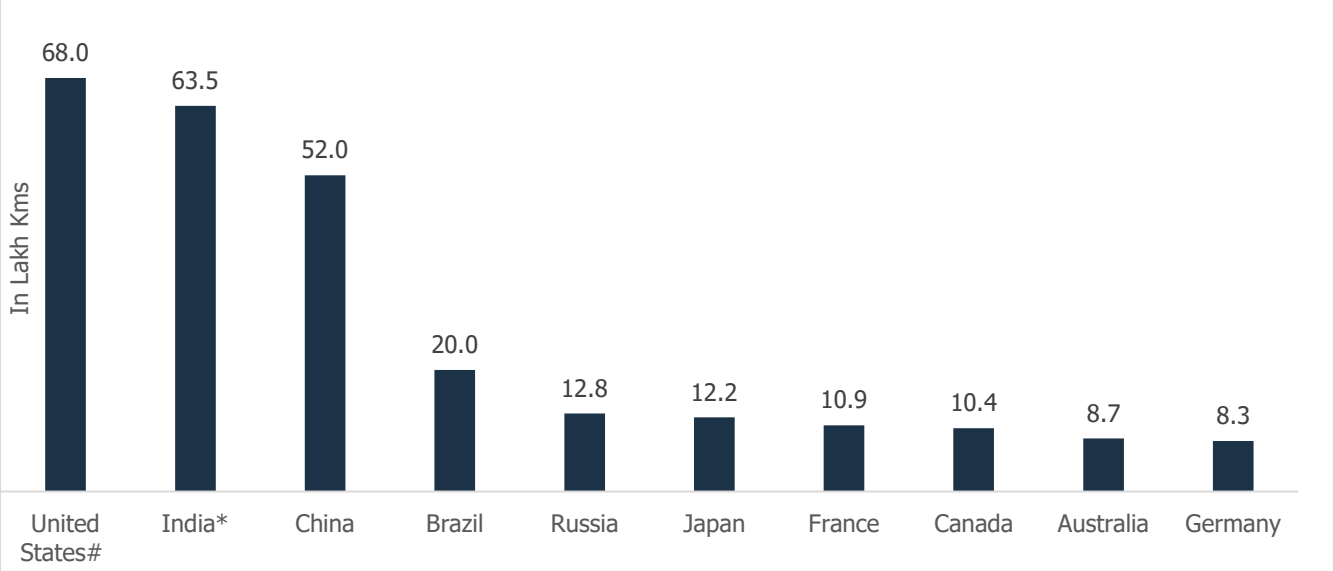
Thus, while U.S. tariffs may have a limited impact on India's exports, ongoing trade negotiations and India's competitive manufacturing advantage position it well for continued growth in global trade.

## Road Sector in India

**Global Road Network**

The number and spread of roads in a country is a vital factor in a country's development and economic potential. However, there are some incredibly significant differences in road network size around the world.

**Chart 10: Road Network Size by Country**




Source: World Population Review, Industry Sources, CareEdge Research, Data as of 2024
Note 1: *Data for India is taken from Ministry of Road Transport and Highways of India, while
Note 2: #United States data is from Media reports

The United States leads the world with the most extensive road network, encompassing nearly 4.2 million miles (6.8 million kilometres) of roads. This network is not limited to the famous interstate highways, which are integral for long-distance travel and transportation, but also includes a wide range of state, county, and local roads that connect even the most remote areas. The vastness of the U.S. Road system is a result of its large geographic area, its high population, and the country's historical investment in transportation infrastructure, which supports not only domestic travel but also international trade and logistics.

India ranks second globally with over 4 million miles (6.6 million kilometres) of roadways, despite having a smaller land area than the U.S. Its road network is vital for the movement of over a billion people across a densely populated country. The extensive system includes highways, urban roads, and rural paths, addressing challenges posed by diverse topography, rapid urbanization, and population growth. Many roads connect rural areas to urban centres, supporting economic activities and providing access to essential services.

These figures are constantly changing as countries build new roads and, in some cases, as existing roads deteriorate.

**Overview and Investment Trend in Infrastructure**

**Infrastructure Overview**

India's infrastructure sector is witnessing robust growth, fuelled by significant government investments and strategic initiatives aimed at strengthening the nation's economic framework. For the fiscal year 2025–26, the government allocated a record Rs. 11.21 trillion, underscoring its dedication to infrastructure development as a cornerstone of economic progress and employment generation.

Transport and logistics remain key focus areas, particularly roads, with over 45,000 kilometres, including 5,000 kilometres of specialised structures such as elevated roads, tunnels, and bridges, under consideration for awards. The National Highways Authority of India (NHAI) plans to award approximately 5,000 kilometres annually through Build-Operate-Transfer (BOT) and Engineering, Procurement, and Construction (EPC) models. This approach presents significant opportunities for infrastructure construction companies. Furthermore, ongoing bidding for third-party operations and maintenance (O&M) projects, with Rs. 77,210 million worth of projects in

the pipeline, provides additional growth avenues. The government has also announced plans to expand the national highway network to 2,00,000 kilometres by FY37 which is 1,46,204 kilometres as of FY25.

Urban mobility is another priority, as of November 2025, India has around 1,028 kilometres of operational metro rail across 23 cities. Additionally, approximately 861 kilometres of metro projects, including the remaining portion of the Delhi-Meerut RRTS, are under construction in various cities such as Delhi, Bangalore, Kolkata, Chennai, Kochi, Mumbai, Nagpur, Ahmedabad, Gandhinagar, Pune, Kanpur, Agra, Bhopal, Indore, Patna, Surat, and Meerut. Investments in this segment are expected to grow at a CAGR of 5-10% from FY24 to FY28. Similarly, investments in the Water Supply and Sanitation (WSS) sector are projected to grow at a CAGR of 10-12% from FY24 to FY28.

In the airport sector, 159 operational airports currently manage approximately 327 million passengers annually. Opportunities for EPC players are expected to expand with plans to increase operational airports to 220 and add an additional 200 over the next two decades.

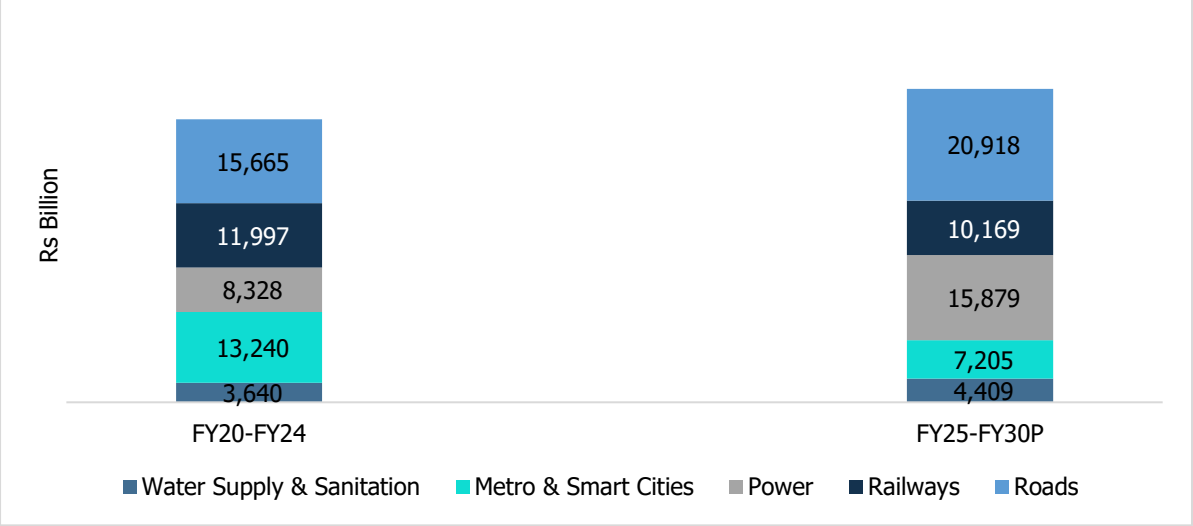
The government is also prioritising multi-modal logistics parks under its PM Gati Shakti National Master Plan. This initiative integrates key projects such as Bharatmala, Sagarmala, and UDAN, ensuring streamlined infrastructure planning and monitoring. Public-Private Partnerships (PPPs) are being emphasised as critical to achieving India's goal of becoming a USD 5 trillion economy, particularly in the development of airports, ports, highways, and logistics parks. Overall, the infrastructure sector is expected to grow at a CAGR of approximately 8% from CY24 to CY30, driven by investments across roads and highways, railways, metros, and the water supply and sanitation sectors. These ambitious initiatives collectively position India's infrastructure sector as a pivotal driver in its aspiration to achieve developed nation status by 2047.

**Investment Trend Towards Infrastructure**

Further, infrastructure projects are often expensive and have a long gestation period. To address this issue, fundraising and generating returns, the government is continuously striving to create a favourable operating environment for its players. Accordingly, national, and state-level agencies like the National Highways Authority of India (NHAI), state-level bodies, and private sector companies (both domestic and international), are actively participating in infrastructure development.

With the growing population, the long-term need for robust infrastructure is necessary for economic development. This generates the need for massive investments in the development and modernization of infrastructure facilities, which will not only cater to the growing demand but will also ensure competitiveness in the global market.

**Chart 11: Continued High Investment Momentum in Indian Key Infrastructure Sectors**

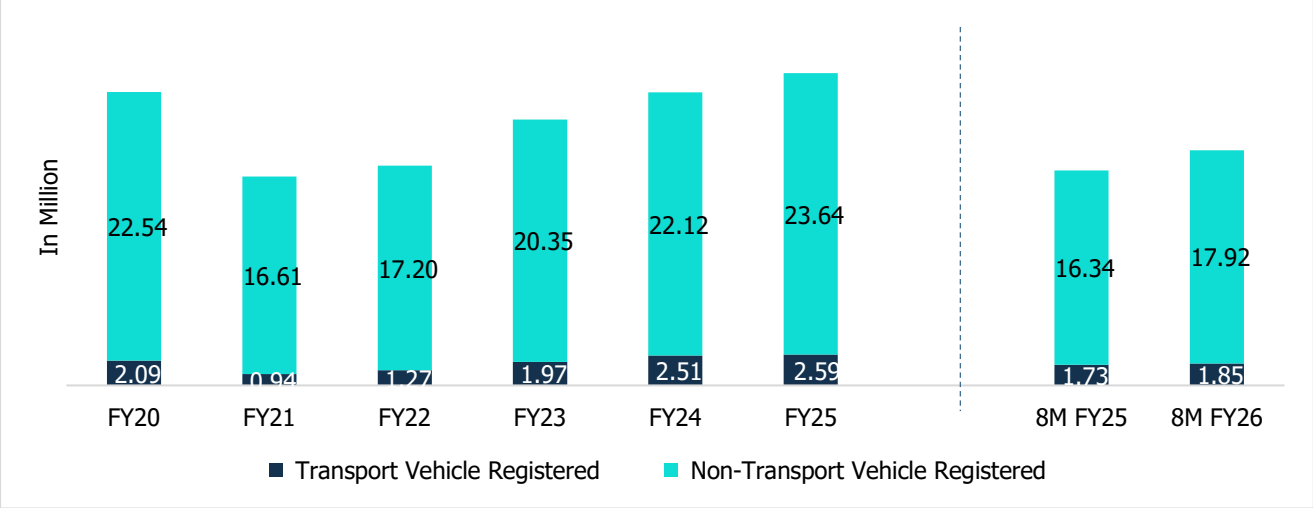



Source: CareEdge Research, NITI Aayog, NIP

Note: The projections are based on our estimations for multiple sectors which have been derived from respective government department sources.

**Registered Motor Vehicles**

**Chart 12: Motor Vehicle Registered in India**




Source: CMIE, CareEdge Research

Vehicle registrations in India have shown a steady recovery post Covid-19, where total registrations dropped to 17.55 million amid disruptions, down from 24.63 million in FY20. Since then, there has been consistent growth, reaching 26.23 million in FY25. Transport vehicle registrations increased from 0.91 million in FY21 to 2.58 million in FY25, indicating rising commercial demand. Similarly, non-transport vehicle registrations also grew from 16.64 million in FY21 to 23.66 million in FY25, reflecting improved consumer sentiment and personal mobility uptake.

**Current Scenario of Road Sector**

**Road Network in India**

India has the second-largest road network in the world, with about 63,45,463 km as of FY25. This comprises national highways, expressways, state highways, major district roads, other district roads, and village roads. To accelerate the country's growth, the development of national highways has been the key focus area. On the other hand, state highways, district and rural roads continue to be a large part of the overall road network.

**Table 4: Road Network of Past 6 Years (In Km)**

| Particulars | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 |
|---|---|---|---|---|---|---|
| **National Highways** | 1,32,500 | 1,36,440 | 1,40,995 | 1,44,955 | 1,46,145 | 1,46,204 |
| **State Highways** | 1,56,694 | 1,76,818 | 1,71,039 | 1,67,079 | 1,79,535 | 1,79,535 |
| **Other Roads** | 56,08,477 | 59,02,539 | 60,59,813 | 60,19,757 | 60,19,757 | 60,19,723 |
| **Total** | **58,97,671** | **62,15,797** | **63,71,847** | **63,31,791** | **63,45,437** | **63,45,462** |

Source: Ministry of Road Transport and Highways of India Annual Reports, CareEdge Research

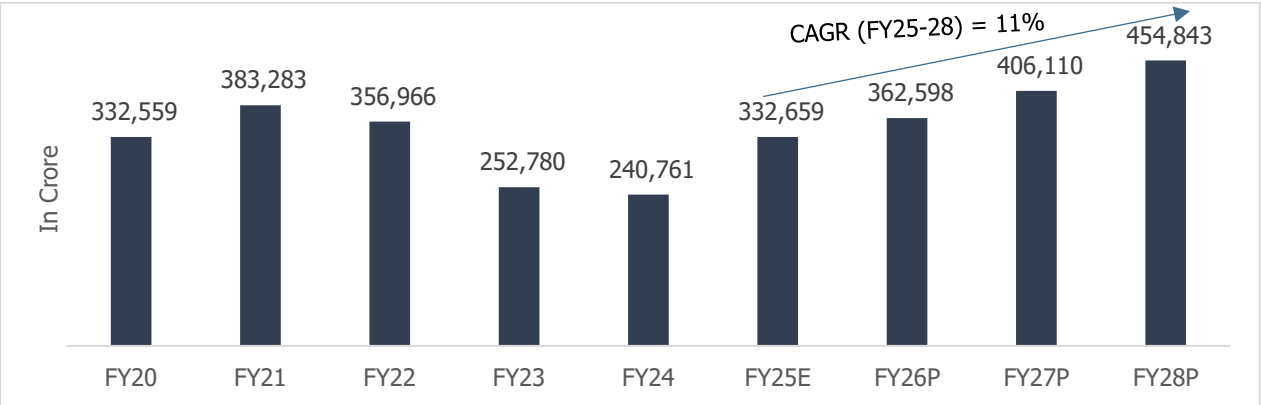
Road transportation, the most common mode of transportation in India, accounts for about 87% of passenger traffic. Despite having a network of 1,46,145 km, Indian national highways account for ~2% of total road network and ~ 40% of total road traffic. State highways and major district roads make up the country's secondary road transportation system, accounting for 60% of traffic and 98% of road length.

As of FY25, the road sector budget contributes ~1.53% of total India's GDP, highlighting its crucial role in driving economic growth through infrastructure development, creating employment, facilitating trade and logistics, and enhancing connectivity across regions, which in turn stimulates various industries and supports overall national productivity

**Investment in Road Sector in India**

CareEdge research anticipates Rs. 15,50,000 crores of investments from FY25-28 which will be invested in national highways with expected CAGR of around 11% in the same period.

**Chart 13: Investments in Roads sector**



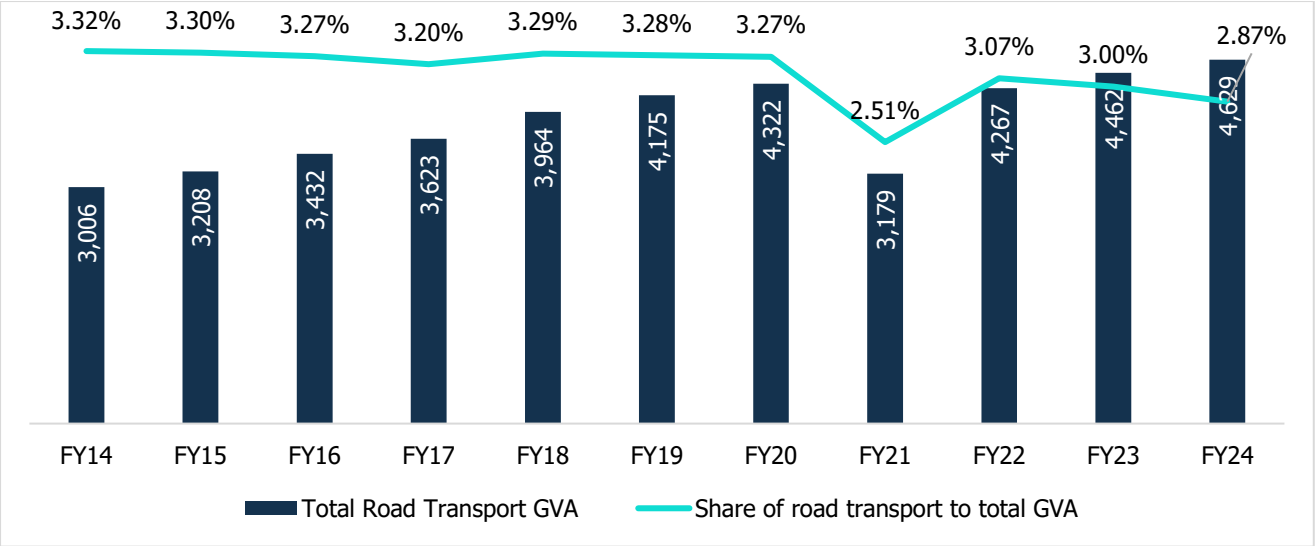

Source: NITI Aayog report on National Infrastructure Pipeline, CareEdge Research

**Contribution of Road to Total GVA**

Road transport has been a preferred mode of domestic transport for any passengers and goods movement vis-à-vis other modes of transport due to ease of first and last mile connectivity and significant development of the road

network across the country over the past two decades. The road sector generated highest gross value addition of Rs. 4.63 trillion in FY24 at current prices and contributed ~78% to overall GVA added by the transportation sector. Wherein, the other mode of transports like railways contributed ~15%, while water contributed ~3% and air 1%. From FY14 to FY24, factors like growing urbanization and population led to growth of road transport segment at a CAGR of 4.4%.

**Chart 14: Contribution of Road Transport to total Gross Value Added (Current Prices)**




Source: MOSPI

**Outlook on Toll Collection**

The Government mandated the use of FASTag from February 2021 onwards. In addition, the convenience of using digital payment modes has resulted in considerable growth in toll payments through the NETC platform. There has been an upside in toll collection after increase in Toll Operate Transfer (TOT) models and Monetization of assets by Government of India. Under this model, NHAI has monetised four TOT Bundle 11,12,13 and 14 and realised Rs. 15,968 crores during the FY24 and TOT Bundle 16 with realization of 6,681 crores, totalling Rs. 48,995 crores so far.

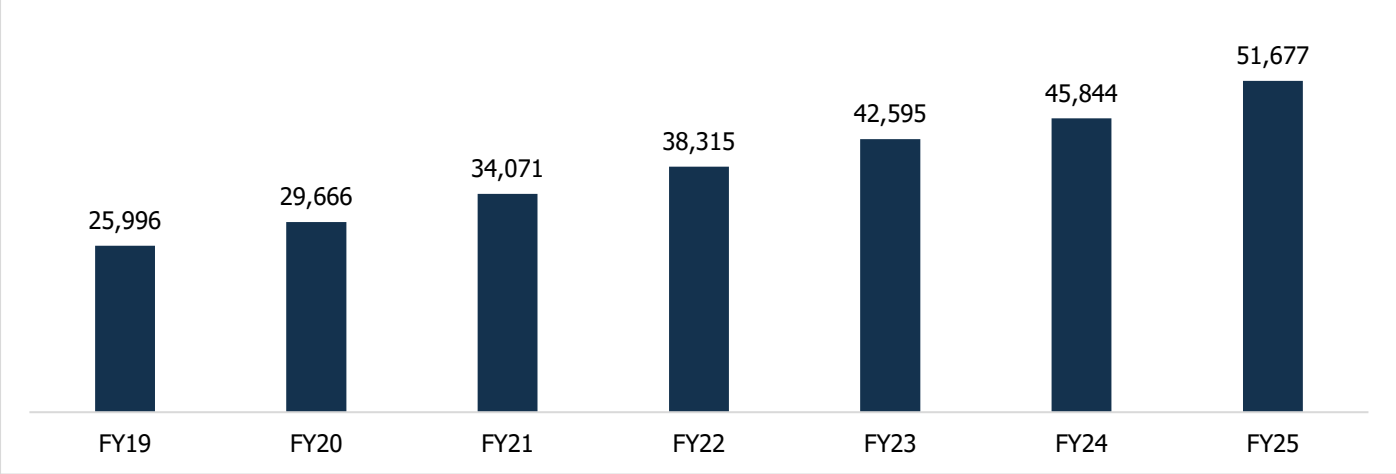
**Table 5: User Fee Collection Revenue (Rs. Crore)**

| Financial Year | Total Amount |
|---|---|
| **FY19** | 25,154.8 |
| **FY20** | 27,637.6 |
| **FY21** | 27,923.8 |
| **FY22** | 33,907.7 |
| **FY23** | 48,028.2 |
| **FY24** | 64,809.9 |
| **FY25** | 72,931.0 |

Source: PIB, CareEdge Research

The tolling length has also increased on yearly basis. It has grown by 98.8% when compared with FY19 implying government shifts towards increasing toll plaza and efficient toll collection with Fastag collection system. As of March 2025, the toll length stands at around 51,677 Km.

**Total Tolling Length (In Km)**




Source: PIB, CareEdge Research

Total Tolling Length is expected to grow in future with increasing toll revenue for the government. The government's upcoming NHAI projects focused on connectivity and increasing expressways which will help increase in cargo and passenger vehicle movement. The investments made in projects will be recovered through toll collection for a period of 15-20 years, this will eventually lead to increase in toll collection in future for NHAI.

**Recent Road Projects Announcements**

**Table 6: Below table depicts Major Projects Announced**

| Project Name | Project Announcement Date | Cost (Rs. Crore) | Km | State |
|---|---|---|---|---|
| Elevated Highway Corridor (Nallamala Hills) Project | 12-05-2025 | 7,700 | 63.0 | Andhra Pradesh, Telangana |
| Expressway (Nashik-Vadhavan Port) Project | 26-03-2025 | 18,000 | 103.0 | Maharashtra |
| Expressway (Somnath-Dwarka) Project | 18-03-2025 | 57,120 | 680.0 | Gujarat |
| Namo Shakti Expressway (Deesa-Pipavav) Project | 18-03-2025 | 39,120 | 430.0 | Gujarat |
| Expressway (Jewar Airport-Ganga Expressway) Project | 03-03-2025 | 4,415 | 83.0 | Uttar Pradesh |
| Underground Tunnel (Yerawada-Katraj) Project | 21-02-2025 | 7,500 | 20.0 | Maharashtra |
| Greenfield Expressway (Sri Ganganagar-Kotputli) Project (Package-8) | 19-02-2025 | 7,015 | 290.0 | Rajasthan |
| High Speed Corridor (Shillong-Silchar) Project | 06-02-2025 | 25,000 | 167.0 | Assam, Meghalaya |
| Elevated Corridor (Kilambakkam Terminus-Mahindra City) Project | 06-02-2025 | 3,500 | 18.4 | Tamil Nadu |
| Greenfield Expressway (Jaipur-Pachpadra) Project | 23-07-2025 | 11,492 | 350.0 | Rajasthan |
| High Speed Corridor (Lakhnadon-Raipur) Project | 28-08-2025 | 10,000 | 220.0 | Madhya Pradesh, Chhattisgarh |
| High Speed Access Controlled Corridor (Ayodhya-Varanasi) Project | 16-09-2025 | 9,200 | 200.0 | Uttar Pradesh |
| New Outer Ring Road (Nagpur) Project | 15-09-2025 | 8,948 | 148.0 | Maharashtra |
| Tunnel (Seshadri Road-Silk Board) Project (Package 2) | 19-08-2025 | 8,928 | 8.0 | Karnataka |

| | | | | |
|---|---|---|---|---|
| Tunnel (Hebbal Esteem Mall-Silk Board KSRP) Project (Package 1) | 19-08-2025 | 8,770 | 8.7 | Karnataka |

Source: Projects Today

**Freight Traffic Scenario**

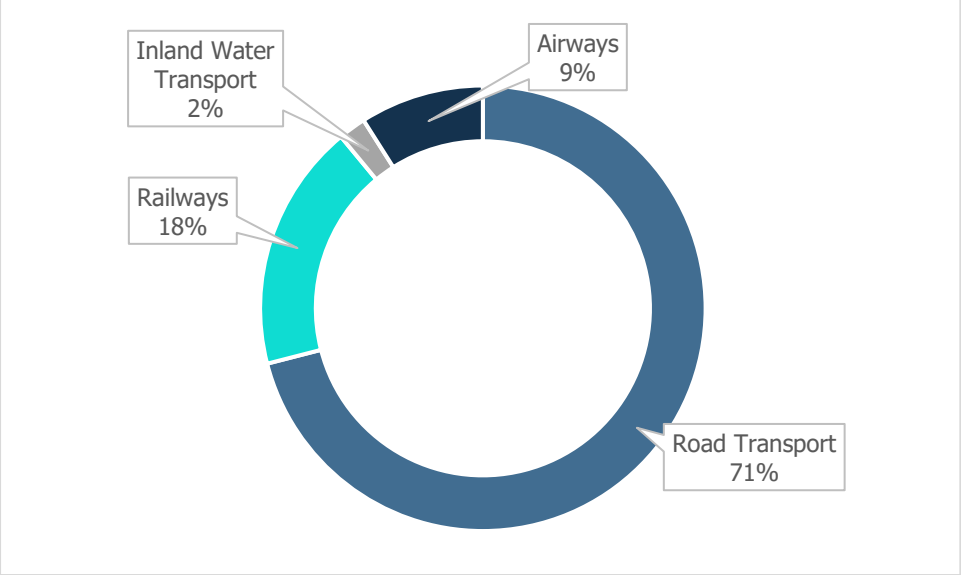
India handles more than 4.6 billion tonnes of goods each year, amounting to a total annual cost of USD 1.2 Trillion. These goods represent a variety of domestic industries and products - 22% are agricultural goods, 39% are mining products and 39% are manufacturing-related commodities. Trucks and other vehicles handle most of the movement of these goods. Railways, coastal and inland waterways, pipelines, and airways account for the rest.

The freight traffic (rail, air and port) is an indicator of the movement of goods by any means of transportation. Major domestic freight as at FY25 is still transported by road which accounts for 71% (25% globally) followed by rail - 18% (60% globally), Inland Water Transport- 2% and Airways- 9%.

Freight movement in India is dominated by road transport, which carries nearly 71 percent of the country's total freight volumes. Over the past decade, road freight traffic has expanded steadily in line with industrial output, consumer demand, and the growth of organized logistics. The increase has been supported by multiple drivers. Expansion in core industries such as steel, cement, automobiles, and FMCG has added significant freight volumes, while the rapid penetration of e-commerce platforms has boosted demand for last-mile and regional distribution services. Infrastructure development, including new highways under Bharatmala and the widening of existing corridors, has reduced transit times and improved efficiency.

Going forward, Railways are expected to gain share owing to the Dedicated Freight Corridors (DFCs) and comparatively higher road freight rates. DFCs are aimed at decongesting India's railway network. It will help carry freight at higher speed with increased load-carrying capacity.

**Chart 15: Share of Major Domestic Freight Traffic (FY25)**




Source: PIB

**Key Demand Drivers and Emerging Trends**

| Category | Details |
|---|---|
| **Population Growth and Economic Development** | India's increasing population and economic growth necessitate enhanced transport infrastructure. Investments in roads, railways, aviation, shipping, and inland waterways are vital. |
| **Recent Initiatives** | • **September 2025**: GOI announced Rs 11 trillion investment to build 17,000 km of high speed, access-controlled expressways by 2033. |

| | |
|---|---|
| | • India plans to upgrade 25,000 km of two-lane highways to four-lanes at Rs 10 trillion and 16,000 km of four-lane highways to six-lanes for Rs 6 trillion. The work is expected to start by 2027. |
| **National Infrastructure Pipeline (NIP)** | Projects worth Rs. 54.3 trillion is at various stages of implementation, demonstrating the government's commitment to infrastructure development. |
| **Infrastructure Development in Roads and Highways** | The pace of construction for NH projects has relatively increased from 15km/day in FY19 to 29KM/day in FY25. |
| **Public-Private Partnerships (PPPs) and Investment Opportunities** | Models like the Hybrid Annuity Model (HAM) and toll-operate-transfer (ToT) have encouraged private sector participation. India allows 100% FDI in roads and highways under the automatic route, offering lucrative opportunities. |
| **Innovation and Efficiency** | The adoption of digital platforms and artificial intelligence in project management enhances efficiency and transparency, showcasing India's potential for innovative infrastructure projects. |

**Emerging Trend**

- **Technology integration** in road infrastructure for traffic control, real-time monitoring, and intelligent mobility solutions is known as "smart infrastructure."
- **Sustainable Practices:** Using renewable energy sources, green building methods, and environmentally friendly materials in road constructions.
- **Multimodal connection**: For seamless connection, there is a focus on combining road networks with other forms of transportation like railroads, waterways, and air travel.
- **Public-Private Partnerships (PPPs):** Using PPP models to generate finances and skills, the private sector is becoming more involved in road development projects.
- **Electric Vehicles:** As more people use electric more improvements and innovations in the road infrastructure are required to accommodate these innovative technologies.

## National Highways in India

**Overview of National Highways**

India's national highways constitute the core of the country's road infrastructure, serving as the primary corridors for freight and passenger movement. The network has expanded steadily over the past five years, increasing from 1,32,500 km in FY20 to 1,46,204 km in FY25 at CAGR of 2%. The most significant addition was recorded between FY22 and FY23, when nearly 3,960 km were added, underscoring accelerated execution under government programs such as Bharatmala Pariyojana and the National Infrastructure Pipeline. Despite accounting for only about 2 percent of India's total road length, national highways carry more than 40 percent of road traffic, highlighting their critical role in economic activity and logistics efficiency. Going forward, policy emphasis is expected to move towards widening existing stretches, improving safety standards, and integrating technology solutions such as digital tolling and smart asset monitoring, thereby positioning the sector for efficiency-driven growth rather than sheer expansion.

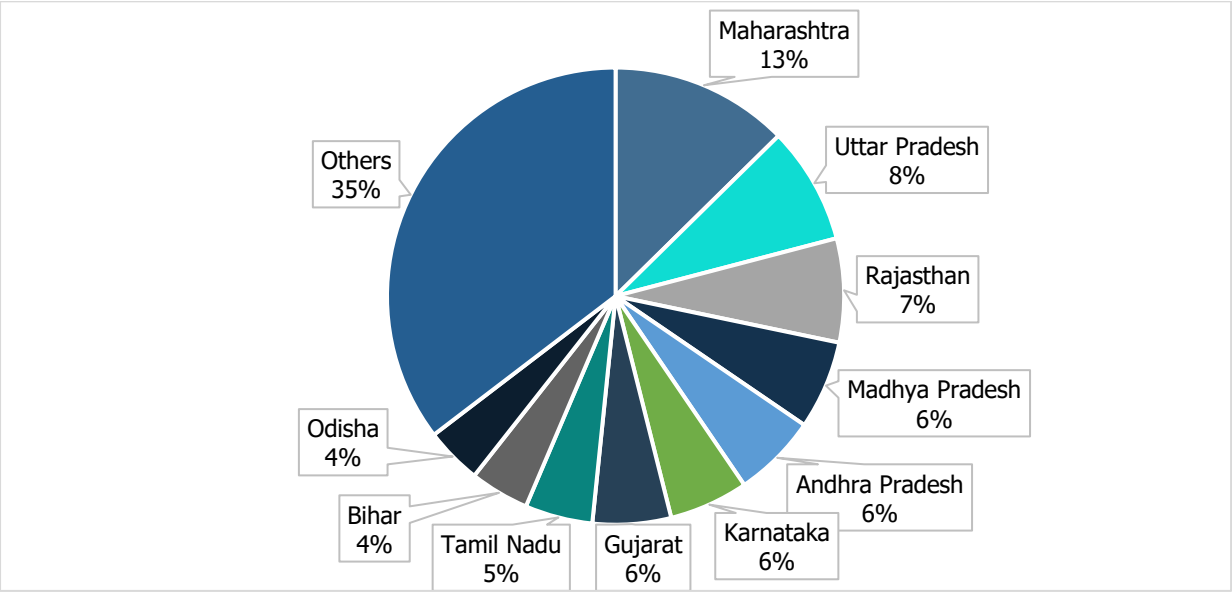
**Table 7: State-wise Length of National Highways**

| States | Total NH length as on 30/09/2019 | Total NH length as on 31/12/2024 |
|---|---|---|
| Andhra Pradesh | 6,914 | 8,683 |
| Arunachal Pradesh | 2,537 | 4,367 |

| | | |
|---|---|---|
| Assam | 3,909 | 4,077 |
| Bihar | 5,358 | 6,132 |
| Chandigarh | 15 | 15 |
| Chhattisgarh | 3,606 | 3,620 |
| Delhi | 157 | 157 |
| Goa | 293 | 299 |
| Gujarat | 6,635 | 8,111 |
| Haryana | 3,166 | 3,347 |
| Himachal Pradesh | 2,607 | 2,607 |
| Jammu & Kashmir and Ladakh | 2423.2 | 2741 |
| Jharkhand | 3,367 | 3,633 |
| Karnataka | 7,335 | 8,191 |
| Kerala | 1,782 | 1,858 |
| Madhya Pradesh | 8,772 | 9,160 |
| Maharashtra | 17,757 | 18,462 |
| Manipur | 1,750 | 1,840 |
| Meghalaya | 1,156 | 1,156 |
| Mizoram | 1,423 | 1,499 |
| Nagaland | 1,548 | 1,670 |
| Odisha | 5,762 | 5,867 |
| Puducherry | 27 | 64 |
| Punjab | 3,274 | 4,264 |
| Rajasthan | 10,342 | 10,733 |
| Sikkim | 463 | 709 |
| Tamil Nadu | 6,742 | 7,000 |
| Telangana | 3,796 | 4,926 |
| Tripura | 854 | 889 |
| Uttar Pradesh | 11,737 | 12,123 |
| Uttarakhand | 2,949 | 3,664 |
| West Bengal | 3,665 | 3,910 |
| Andaman and Nicobar Island | 331 | 331 |
| Dadra and Nagar Haveli | 31 | 37 |
| Daman and Diu | 22 | 22 |

Source: MORTH Annual Report, NHAI website, CareEdge Research

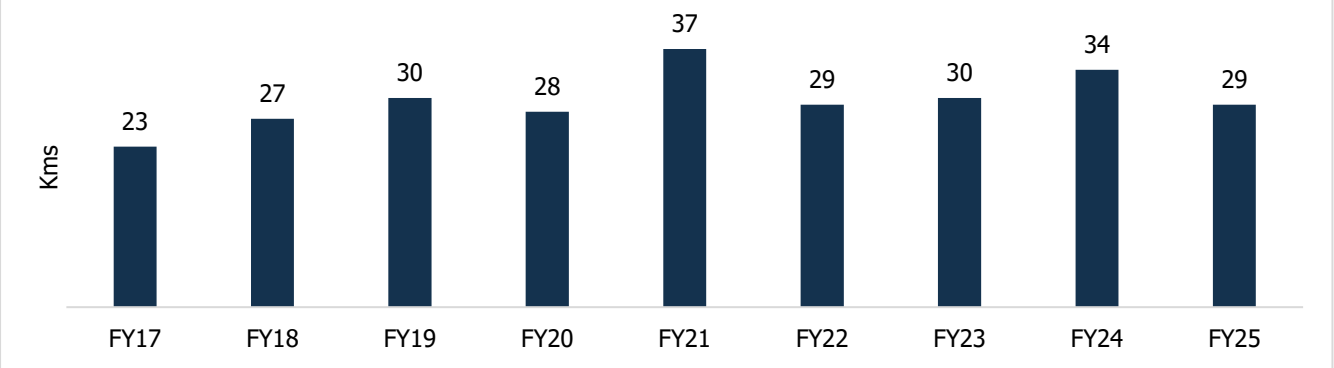
**Chart 16: Share of Top 10 states as on 31st December 2024**




Source: NHAI website, CareEdge Research

**Rate of Highway Construction per day**

**Chart 17: Pace of Construction (Km/Day)**

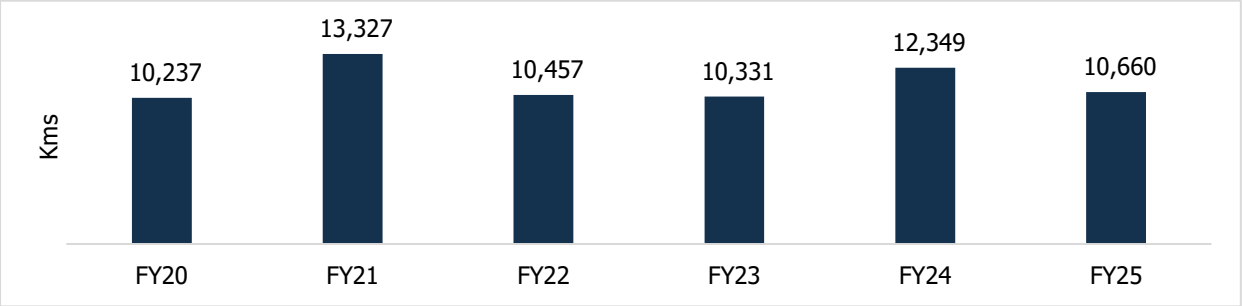



Source: Ministry of Road Transport and Highways of India Annual Reports & CareEdge Research

Highway construction activity has shown notable fluctuations over the years, with the highest pace recorded in FY21 at 37 km per day, driven by government stimulus and increased infrastructure spending during the COVID-19 period. In the subsequent years, construction remained steady, averaging 30 km per day in FY23 and rising to 34 km per day in FY24, reflecting consistent execution momentum. As of FY25, the pace has moderated to 29 km per day, mainly due to the slowdown typically seen during general election periods, which tends to delay project approvals, fund disbursements and construction activity.

**Construction of National Highway**

**Chart 18: Year-wise Construction of National Highway**

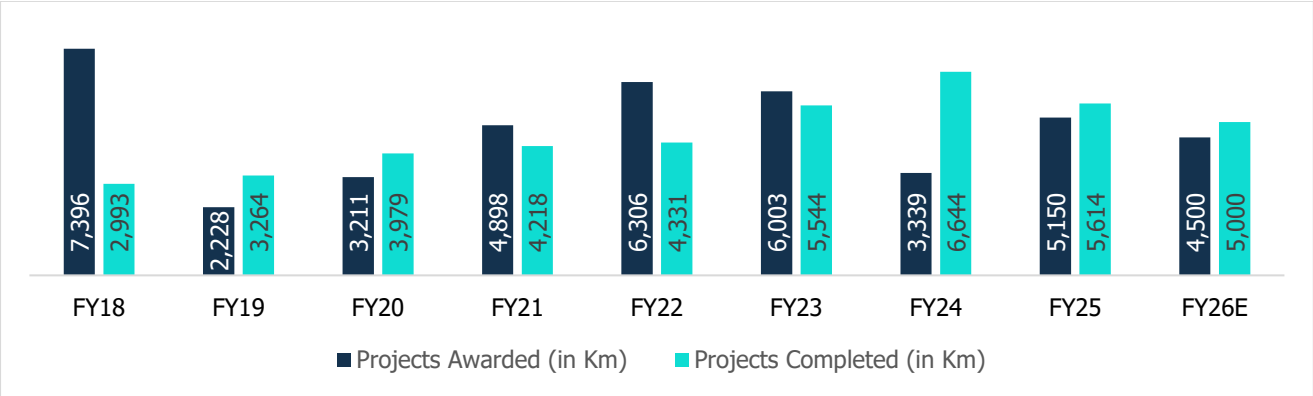


Source: MORTH FY24-25, CareEdge Research

Highway construction peaked in FY21, primarily due to aggressive government capital expenditure aimed at reviving the economy post-COVID. This period saw a record 13,327 km of construction, supported by faster clearances, liquidity support, and strong policy thrust. In the years that followed, construction moderated, reflecting a normalization of activity. However, FY24 saw renewed momentum with 12,349 km of highways built one of the highest in recent years. In FY25, highway construction declined to 10,660 km, primarily due to delays in state-level clearances during the extended election period and a shift in focus towards the development of high-speed corridors and expressways.

**National Highway Projects Awarded and Completed**

**Chart 19: Projects Awarded by NHAI**



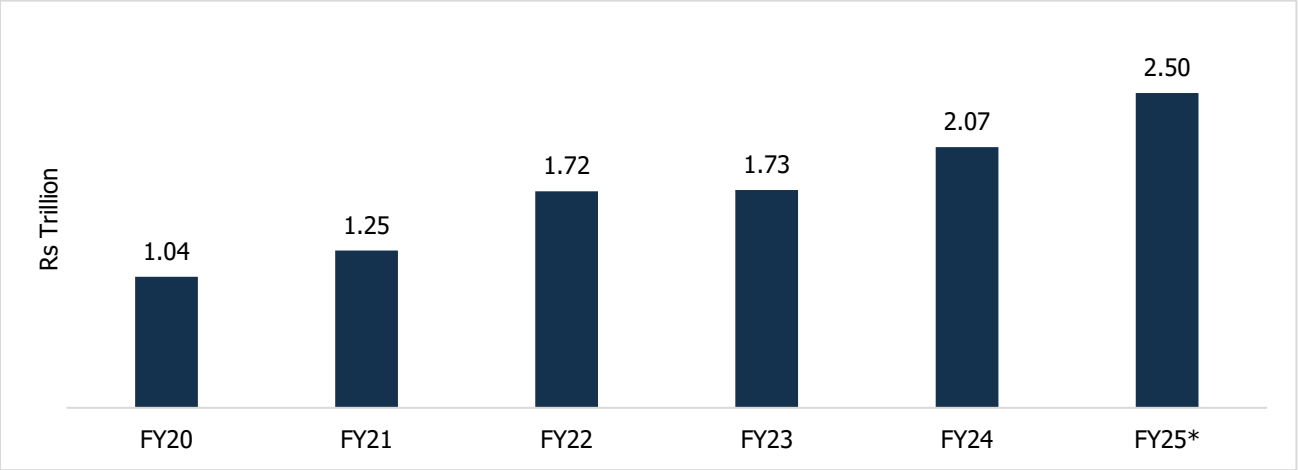

Source: NHAI Annual Reports, Industry Resources, CareEdge Research

For FY26, NHAI is expected to award 4,500 km and complete 5,000 km of highway projects. In FY25, the National Highways Authority of India (NHAI) awarded 5,150 km of highway projects and completed 5,614 km of construction, continuing the strong execution momentum seen in recent years. While project awards have reduced from the peak of 6,003 km in FY23 and 6,306 km in FY22, primarily due to a halt in projects under the Bharatmala Pariyojana pending revised cost approvals, the general elections and associated Model Code of Conduct, and new tighter bidding norms aimed at curbing aggressive bidding.

On the execution side, FY24 recorded the highest completion to date at 6,644 km, driven by improved coordination, efficiency, and policy push under initiatives such as Gati Shakti, Bharatmala Pariyojana, the National Infrastructure Pipeline, and the revised Hybrid Annuity Model (HAM) framework. FY25 sustained this performance with 5,614 km completed, indicating that the groundwork laid in prior years is translating into consistent delivery.

**Budgetary Outlay for NHAI**

**Chart 20: Capital Expenditure by NHAI**




Source: PIB, CareEdge Research

An amount of about Rs 2.40 trillion has been allocated and released to NHAI during FY25 through budgetary resources. NHAI has incurred actual expenditure of Rs 2.50 trillion during FY25. Additionally, expenditure of Rs 19,245 crore through private investment has also been incurred during FY25.

In last 6 years, NHAI has constructed 29,664 km of National Highways (NHs) with estimated 45 Crore man days of direct employment, 57 Crore man days of indirect employment and 532 Crore man days of induced employment. This substantial job creation highlights the socio-economic benefits of infrastructure development. Furthermore, Expressways and 22 Access Controlled Highways, having total length of 9,860 km with approved / estimated project cost of Rs. 4,19,130 crores have been taken up by NHAI as greenfield corridors.

**National Highway Development Project (NHDP)**

The primary objective of the NHDP is to build International standard roads with facilities for uninterrupted traffic flow with:

- Enhanced Safety Features
- Better Riding Surface
- Better Road Geometry
- Better Traffic Management and Noticeable Signage
- Divided Carriageways and Service Roads Grade Separators
- Over Bridges and Underpasses
- Bypasses
- Wayside Amenities

The project is being carried out by NHAI in association with various state public works departments.

Over time, as the scale and ambition of India's highway development expanded, the NHDP framework was gradually integrated into the broader Bharatmala Pariyojana, which now serves as the umbrella program for national highway expansion and modernization. While NHDP laid the foundation for systematic highway development and corridor-based planning, Bharatmala has taken forward this vision with a more comprehensive approach, focusing on economic corridors, border and coastal connectivity, and efficiency-driven logistics integration.

**Vision 2047 – Bharatmala**

The Bharatmala Pariyojana represents the Government of India's flagship program for national highway expansion and modernization, subsuming earlier initiatives such as the NHDP. While Phase I of Bharatmala,

covering 34,800 km at an estimated cost of Rs 5.35 trillion, has faced delays and is now expected to be completed by FY27–28, the program continues to anchor India's long-term infrastructure vision.

**Table 8: Status of Bharatmala as on 31st December, 2024**

| Component | Length (in Km) | Total Length Completed (in km) |
|---|---|---|
| Economic Corridors | 8,737 | 5,986 |
| Inter Corridors Roads | 2,889 | 2,108 |
| Feeder Roads | 973 | 540 |
| National Corridors | 1,777 | 1,394 |
| National Corridor Efficiency Improvement | 824 | 732 |
| Expressways | 2,422 | 1,791 |
| Border Roads & International Connectivity Roads | 1,619 | 1,400 |
| Coastal Roads | 77 | 72 |
| Port Connectivity Roads | 348 | 120 |
| Balance Road Works under NHDP | 6,758 | 5,058 |
| **Total - Bharatmala** | **26,425** | **19,201** |

Source: MORTH Annual Report 2024-25, CareEdge Research

Aligned with the Ministry of Road Transport and Highways' Vision 2047, Bharatmala is envisaged as a transformative framework to deliver high-speed corridors within 100–150 km of all citizens, ensuring seamless freight and passenger movement across the country. The vision emphasizes not only network expansion but also efficiency-driven development, including economic corridors, border and coastal connectivity, logistics integration, and adoption of advanced contracting and asset monetization models.

By 2047, the program aims to:

- Establish 50 national corridors, expanding beyond the six legacy corridors under NHDP.
- Connect over 550 districts with highway infrastructure, compared to ~300 today.
- Shift freight movement share on highways from ~40% to 70–80%, reducing logistics costs and improving India's competitiveness.
- Integrate highways with logistics parks, multimodal hubs, and smart monitoring systems, ensuring resilience and sustainability

**Annual Toll Collections**

**NETC FASTag statistics**

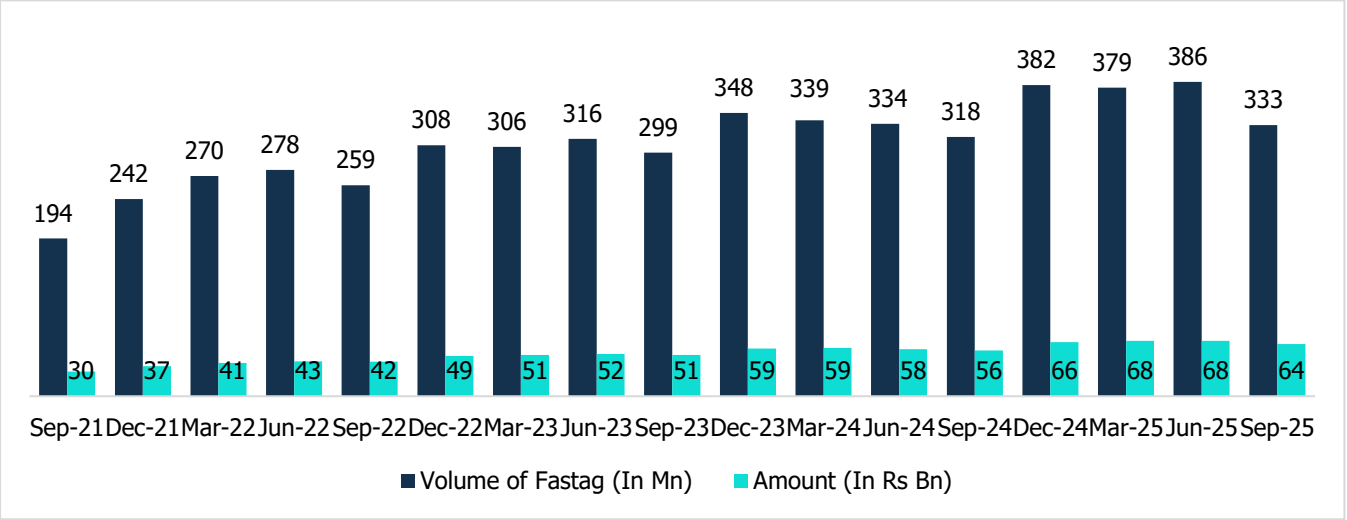
Over the past few years, the Indian roadways infrastructure has been constantly upgraded due to the increasing vehicle density. At the same time, digital transactions in the country have steadily grown. The National Electronic Toll Collection (NETC) programme using FASTags on vehicles has played a crucial role in the growth of digital transactions across the country. It has moved many vehicles to the payments ecosystem and reduced the use of cash for toll payments on roads and highways.

Though the national highways constitute just 2% of the overall road network in the country, around 40%of the total traffic is concentrated on these highways. Any congestion at these highways or at toll plazas results in wastage of fuel, money and time and has significant environmental impacts. Another critical factor is the revenue leakage from toll plazas due to irregularities in reporting the actual toll money collected in cash and non-standardised vehicle classification. To provide the public with convenient, easy, and cashless modes of payments at toll plazas across the country, the Indian Highways Management Company Limited (IHMCL) and National Highways Authority of India (NHAI) introduced FASTag. FASTag is a toll collection mechanism that uses radio

frequency identification (RFID) tags and is placed on vehicles. The National Payments Corporation of India (NPCI) is running it.

The programme has seen 11.9% growth on y-o-y basis as of Mar-25, with a collection of Rs 68 billion in FY25 and as of Sep-25 stands at Rs 64 billion. In terms of volume and the amount collected Jun-25 has been the highest q-o-q sales.

**Chart 21: NETC FAStag Statistics**

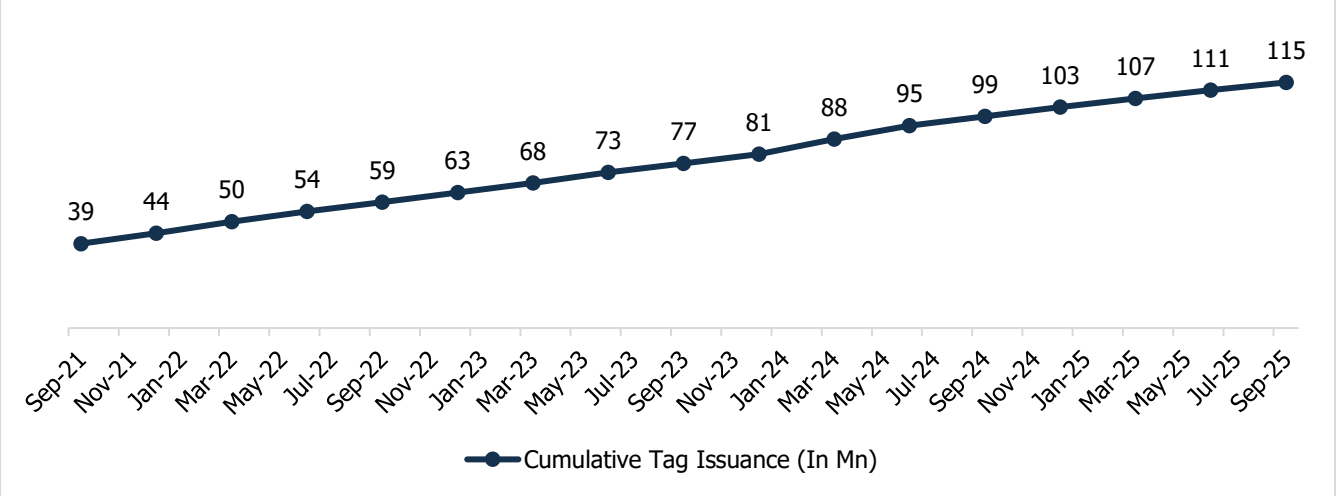



Source: NPCI, CareEdge Research

**Cumulative Tag Issuance**

The landscape of toll collection in India is evolving, with a growing emphasis on improving road infrastructure and traffic management. As tolling becomes an integral part of the nation's road development strategy, the willingness of people to pay tolls is emerging as a significant factor in the growth of toll collection systems. The openness of the Indian populace to toll payments is shaped by a variety of elements, from infrastructure quality to economic and social perceptions, which directly impact the sustainability and scalability of toll-based financing models for road development.

**Chart 22: Cumulative Tag Issuance**




Source: NPCI, CareEdge Research

## Overview of the Government Policies and Regulatory Framework in the industry

### Overview of the Government Policies

### Policy Framework at the central level

Road construction is a critical sub-segment for infrastructure development, economic growth, and employment creation. The government has placed significant emphasis on infrastructure development. For example, in the Union Budget 2025–26, the government allocated an outlay of Rs 2,870 billion for road construction, surpassing the estimated expenditure of Rs 2,803 billion for 2024-25.

Moreover, Rs. 111 trillion of investments had been projected in infrastructure projects for FY20-FY25 by the Task Force on National Infrastructure Pipeline (NIP), with ~18% of the targeted investment expected to be made in the road sector in India. As of now, overall projects worth Rs 37.3 trillion have been completed, accounting for 31% of the revised target. While the original horizon was set for FY2020–2025, the program will continue beyond FY25, aligning with India's long-term infrastructure and economic growth objectives.

Also, under the recently announced Asset Monetization Pipeline, around Rs. 1,600 billion are to be raised through the monetisation of roads.

**Table 9: Authority and Responsibility**

| Authority | Responsibility |
|---|---|
| The **Ministry of Road Transport and Highways (MoRTH)**, a central government apex body, formulates and implements policies for road transport, national highways, and transport research. It collaborates with other central ministries, state governments, union territories, organisations, and individuals to enhance the mobility and efficiency of the road transport system across the country. | The **National Highways Authority of India (NHAI)** is responsible for the development and maintenance of national highways. The **National Academy of Highway Engineers** (formerly National Institute of Training for Highway Engineers) is responsible for sharing of knowledge and pooling of experience on the entire range of subjects dealing with the construction and maintenance of roads, bridges, tunnels, and road transportation including technology, equipment, research, planning, finance, taxation, organization, and all connected policy issues. A wholly owned company of MoRTH, **National Highways and Infrastructure Development Corporation (NHIDCL)**, is responsible for promoting, surveying, establishing, designing, building, operating, maintaining, and upgradation of national highways and strategic roads including interconnecting roads in parts of the country which share international boundaries with neighbouring countries. |

- **Financial Incentives for Road Developers**

To encourage private sector participation and investment in road development, the government has introduced several financial incentives and mechanisms:

a) **Public Private Participation:** Traditionally, the road projects were fully financed and controlled/ supervised by the Government. The implementation of road projects was purely dependent on the availability/allocation of funds out of the budget of the Government. The Government has announced several incentives to attract private sector participation and foreign direct investment, which include the following.

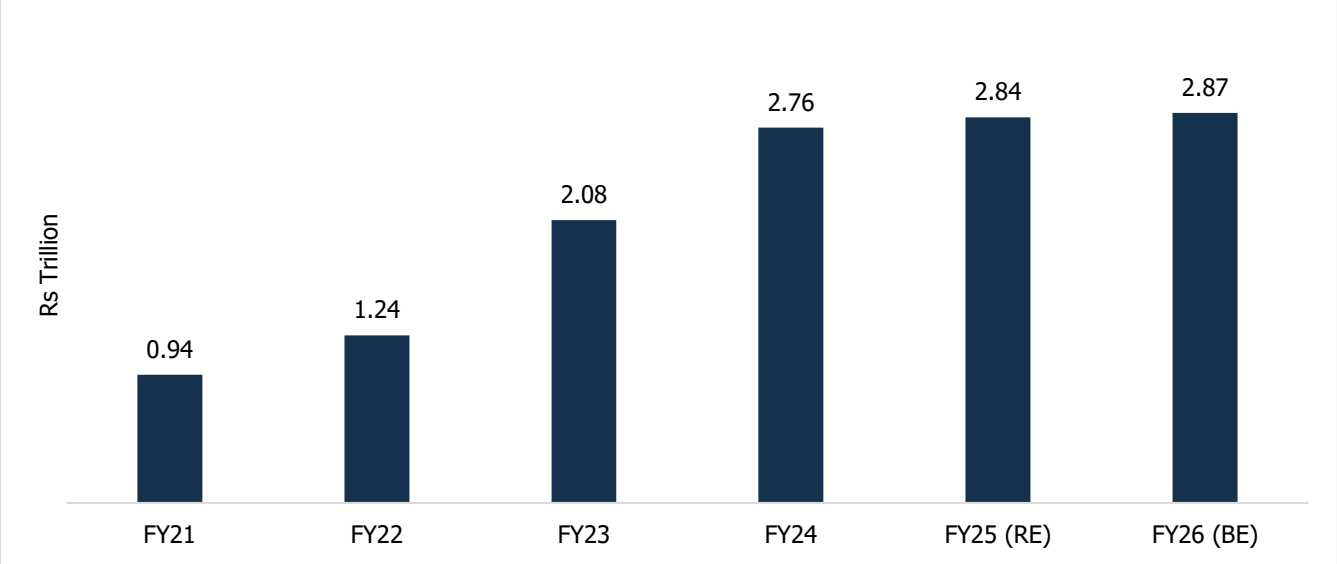
- Government to bear the cost of-
    - Project Feasibility Study
    - Land for the right of way and way side amenities
    - Shifting of utilities
    - Environment clearance, cutting of trees, etc.
- Foreign Direct Investment up to 100 % in road sector.
- Provision of subsidy up to 40% of project cost to make projects viable. The quantum of subsidy to be decided on a case-to-case basis.
- 100% tax exemption in any consecutive 10 years out of 20 years after commissioning of the project.
- Duty free import of high capacity and modern road construction equipment's.
- Declaration of the road sector as an industry (Infrastructure as defined in section 18(1) (12) of the Infrastructure Act includes Roads).
- Easier external commercial borrowing norms.
- Right to retain Toll rates are indexed to the wholesale price index.

**Make in India:** The Make in India initiative promotes indigenous manufacturing, reducing reliance on imports and boosting the economy, with significant benefits for the road sector. It encourages the local production of essential materials like asphalt, bitumen, cement, and steel for road construction and maintenance. Additionally, the initiative has driven the local manufacturing of road construction equipment, machinery, and technology, lowered costs and enhancing self-sufficiency. Furthermore, the government's focus on creating a favourable business environment has attracted foreign direct investment (FDI), leading to collaborations between international and domestic firms, fostering a more competitive road development sector.

**Budgetary Outlay for the Road Sector**

Road construction plays a vital role in developing infrastructure, boosting the economy, and creating jobs. The government is putting a lot of emphasis on infrastructure. Overall, though, MoRTH's budget increased to Rs 2.9 trillion in the 2025-26 budget estimate, up from Rs 2.8 trillion in the revised estimate for 2024-25. However, the capital expenditure for the Ministry of Road Transport and Highways (MoRTH) remained flat at Rs 2.7 trillion in 2025-26, as compared to the revised estimate for 2024-25. It is expected that the centre is focusing on asset monetisation along with increasing the share of BOT-Toll projects to boost Capex in the sector.

**Chart 23: Budgetary Outlay for Road Sector**




Source: Union Budget 2025-26 Analysis, CareEdge Research

**Regulatory Framework**

**Overview of PPP framework and models in operation**

Connectivity has been a key priority for the government, with roads recognised as the most effective and economical means of enhancing last-mile connectivity. Constructing roads across every corner of the country solely through government agencies poses challenges, as it would significantly increase both time and cost. To address this, the government partnered with private players through Public-Private Partnerships (PPPs) to achieve comprehensive road connectivity. Initially, PPP road projects were categorised broadly into toll-based and annuity-based models.

Private sector participation, however, began to decline after 2012 due to several issues, including aggressive bidding, over-leveraged balance sheets of developers, deficiencies in project preparation, and challenges with land acquisition. To reinvigorate private sector involvement in the road sector, the government introduced the Hybrid Annuity Model (HAM), which prioritises the equitable allocation of risks between stakeholders.

In recent years, the operational asset monetisation model has gained traction, particularly with the introduction of the Toll-Operate-Transfer (TOT) framework. Additionally, alternative asset monetisation mechanisms, such as Infrastructure Investment Trusts (InvITs) and the securitisation of toll revenue, have been implemented to further attract investment and enhance efficiency in the sector.

**Table 10: Key Features**

| Type of Project | Development Risk | Financing Risk | Traffic Risk and accrual of toll fee collection | Award Criteria | Concession Period | Cash Outflow for Government | Revenue for Private Party |
|---|---|---|---|---|---|---|---|
| **BOT-HAM** | Concessionaire | Concessionaire | Authority | Lowest project and O&M cost | 15-20 years | 40% of project cost paid by authority during construction, and 60% in semi-annuity | Construction grants, annuity payments, interest on annuity. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | along with interest. | |
| **EPC** | Concessionaire | Authority | Authority | Lowest contract price | No concession | 100% of project cost borne by authority | Limited to contract payments |
| **OMT** | No to minimal development risk | Concessionaire | Concessionaire | Highest % of toll revenue share or highest premium per year | 5-9 years | Nil | Toll revenues accrue to concessionaire, subject to revenue share/premium |
| **Tolling** | No development risk | Concessionaire | Concessionaire | Highest revenue sharing bid | 1-3 years | Nil | Toll revenues accrue to concessionaire, shared with authority |
| **TOT** | Authority in case of lane upgradation in the concession period | Concessionaire | Concessionaire | Highest upfront payment | 15-30 years | Nil | Toll revenues accrue to concessionaire for concession period |

Source: MORTH

**PPP models**

To boost private participation, the government has produced various models including the PPP model.

**Build Operate and Transfer (BOT) Toll Model**

This is a simple and conventional PPP model where the private partner is responsible for designing, building, operating (during the concession period), and transferring back the facility to the public sector. The role of the private sector partner is to bring the finance for the project and take the responsibility to construct and maintain it. In return, the public sector will allow it to collect revenue from the users by way of tolls. To increase the viability of projects, a capital grants up to a maximum of 40% is provided by NHAI.

**BOT (Annuity) Model**

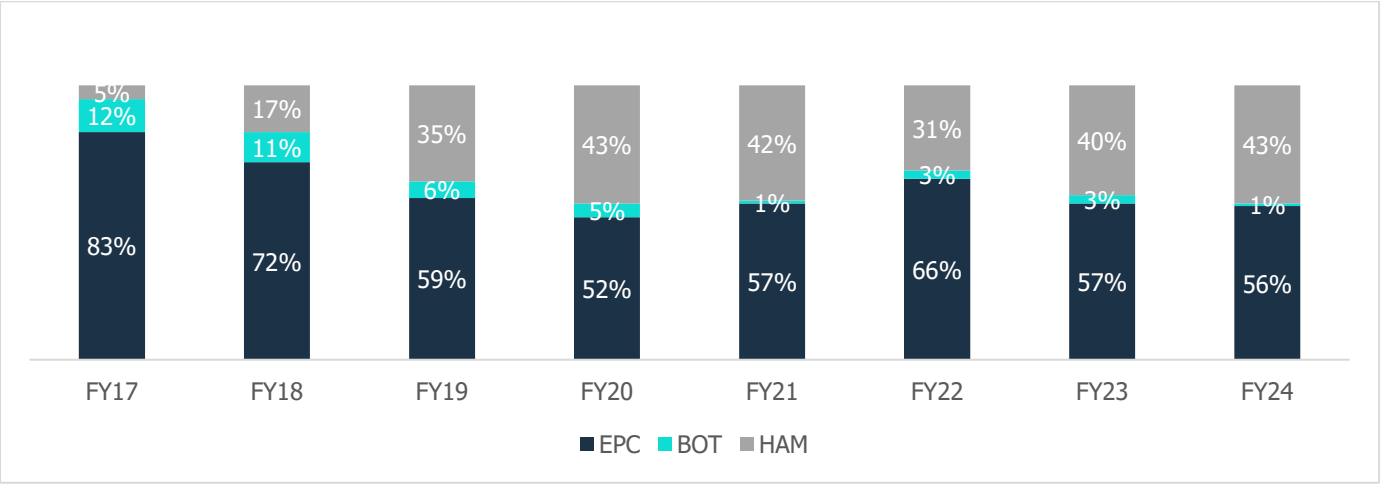
In the BOT (Annuity) mode, the private partner is responsible for building, operating, and transferring the road at the end of the agreement period to the public sector. The toll collection is however undertaken by the government agency and the payment is made on a semi-annual basis to the private players.

**Hybrid Annuity Model (HAM)**

The Hybrid Annuity Model (HAM), introduced in January 2016, is a type of Public-Private Partnership (PPP) model used for the construction and development of roads in India, ensuring better risk allocation between the government and private developers. The National Highways Authority of India (NHAI) has widely employed this model to develop national highways across the country, which has attracted private capital, accelerated road infrastructure development, and improved road quality. Under the HAM, the government funds 40% of bid the project cost, paid to the private developer in ten equal instalments, while the remaining cost is arranged by the developer. Upon project completion, although NHAI collects tolls, and the private developer is repaid through annuity payments. Traffic risk is borne by the government, with developers receiving fixed annuities. Additionally, all payments are inflation-indexed using a Price Multiple Index, a 70:30 weighted average of the

Wholesale Price Index (WPI) and Consumer Price Index (CPI), which helps mitigate inflation risk for the developer.

**Chart 24: Breakup of Capital Expenditure Mix of NHAI**




Source: NHAI Annual Reports, Projects Today, CareEdge Research

The trend shows that government is now focusing on Hybrid Annuity Model (HAM) because the responsibility of maintenance of roads lies with the contractor, and he must pay the price.

In a bid to address the key issues faced by the stakeholders under existing concession agreement and to enhance the bidding appetite for Hybrid Annuity Model (HAM) based road projects, Ministry of Road Transport and Highways (MoRTH), on November 10, 2020, issued revised model concession agreement for new HAM-based road projects.

Some of the Amendments to HAM after Model Concession Agreement (2020) are as follows:

1. Interest annuities for upcoming HAM projects are now linked to average of one-year MCLR of top five scheduled commercial banks as against bank rate linked interest annuities payable under existing agreement.
2. Release of construction annuity in ten tranches as against five tranches of existing concession agreement.
3. Increase in effective interest rate on mobilization advances from authority
4. Allowing 100% change of ownership post six months from commercial operations date (COD) as against current lock in a period of two years from COD

**Engineering, Procurement and Construction (EPC)**

In the EPC mode, the cost is completely borne by the public sector (government). The public sector invites bids for engineering knowledge from the private players. Procurement of raw materials and construction costs are met by the public player. The private sector's participation is limited to the provision of engineering expertise.

**Service contract**

In this approach, the private promoter performs a particular operational or maintenance function for a fee over a specified period. In addition, there are modes such as TOT and Operate-Maintain-Transfer (OMT) for monetizing future toll earnings of completed projects.

**Toll Collection**

In 2009, the concept of Toll collection emerged as a distinct business model like outsourcing. In this arrangement, the authority invites the private parties to collect tolls on highways built under EPC and BOT-annuity contracts. It is often used for projects which last less than a year.

The project is given to the private player with the highest bid and the contracting authority determines the user fee. During the concession time, the private player has the power to collect user fees.

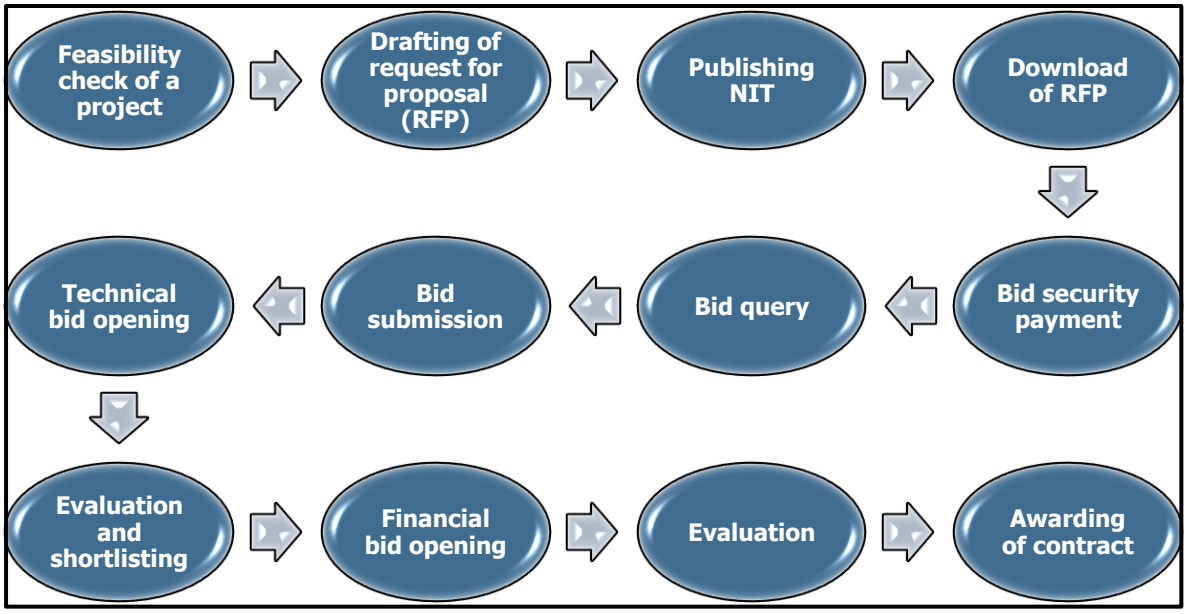
**OMT**

Under the OMT model, the private party is responsible for maintenance for a set period. The concept of OMT was established to ensure optimum quality and safety for road travellers. An OMT project includes a contract for the right to collect tolls as well as a contract for the stretch's management and maintenance.

**TOT**

Under the TOT model, the right of collection and appropriation of fees for selected operational NH projects constructed with public funds shall be assigned to developers for a pre-determined concession period in exchange for an upfront payment to NHAI. Such rights assignment shall be based on the toll income potential of the identified NH projects. The developer will be responsible for the operation and maintenance (O&M) of such projects until the concession period expires.

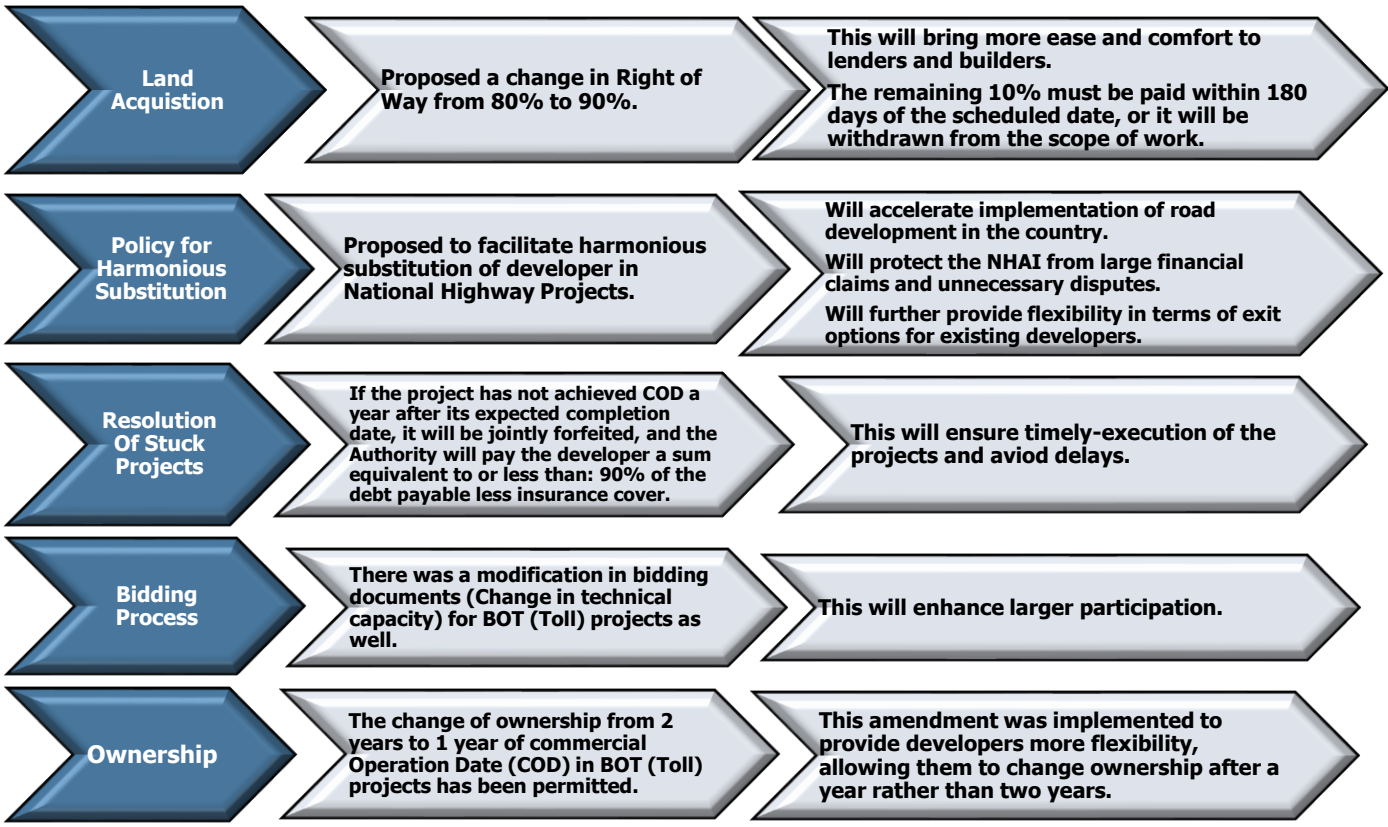
### Bidding Process of a Construction Project




**Key Parameters of Existing BOT MCA and Bidding Process**

**Key Challenges Addressed in BOT MCA Model by the Ministry in order to Promote Private Participation**

| Parameters | Proposed Clause | Impact |
|---|---|---|




The total budget for the roads sector in FY26 increased marginally to Rs 2,873.33 billion from Rs 2,780 billion in FY25, supported by a rise in revenue expenditure. The rise in revenue expenditure indicates increased maintenance needs and possible higher operational costs.

The 2025-26 budget by the Government highlights the impetus for growth by focusing on big public investments for modern infrastructure, which shall be guided by PM Gati Shakti and benefited from the synergy of a multi-modal approach.

- In FY26 budget, Centre has launched Asset Monetization Plan 2025-30 with an aim to raise Rs 10 trillion by monetizing brownfield assets, including highways with NHAI identifying 24 road projects for monetization in FY26.
- The budgetary outlay of Rs 2.50 trillion towards the NHAI for FY26 has increased by 21% as compared to FY25.
- In FY26 budget, the NHAI aims to increase project awards by modifying the build-operate-transfer (BOT) model with fast-tracked clearance, as its share has decreased in recent years.

**Qualitative views on asset monetisation of HAM projects by EPC players to aid in deleveraging balance sheet**

**Roads sector to hold significant potential for asset monetisation in the medium term**

The potential is expected to be realized through an expanded portfolio of NHAI HAM assets, as well as through EPC projects.

CareEdge projects a substantial monetisation potential for HAM projects, with Business Project Cost ranging from Rs. 1.75 trillion to Rs. 2.2 trillion during FY24-FY28. Additionally, NHAI is expected to commission EPC-roads length of 4,000- 4,500 km each year, which could potentially be transferred to either InvIT or TOT.

Notwithstanding the large pipeline of operational highways, CareEdge opines quality of roads construction, robustness of Operations and Maintenance assumptions and movement in bank rates shall be key determinants for fructification of asset monetization deals.

Asset monetization of HAM projects by EPC players to aid in deleveraging their balance sheets is a strategy that involves selling ownership stakes in operational Highway Asset Management projects to external investors. This can help EPC players achieve several key benefits:

| Key Point | Details |
|---|---|
| **Reduce Developer's Debt Levels** | The upfront capital from asset sales provides significant cash flow for EPC players, enabling them to bid for new projects and deleverage their balance sheets. |
| **Free Up Capital for New Projects** | Reduced debt obligations allow EPC players to redeploy capital into new infrastructure projects, expand operations, and accelerate overall infrastructure development. |
| **Improve Cash Flow** | HAM projects provide periodic payments, but asset monetization offers immediate cash flow, improving liquidity, cash flow predictability, and operational expense management. |
| **Attract New Investors** | Monetization diversifies the funding base and attracts long-term institutional investors seeking stable returns from infrastructure assets. |

Overall, asset monetization of HAM projects creates a win-win situation for both EPC players and the government. EPC players improve their financial health and gain resources for further growth, while the government benefits from increased efficiency in project execution and access to diverse funding sources.

**Change in the Model Concession Agreement (MCA) of the Hybrid Annuity Model (HAM) of road project implementation**

The introduction of HAM in India provides private developers with valuable opportunities in annuity-based infrastructure projects. The Model Concession Agreement (MCA) for Hybrid Annuity Model (HAM) road projects has seen several updates to improve the efficiency and attractiveness of these projects. Here are some of the key changes:

**Bidding Process**: Bids will be evaluated on the basis of the lowest Bid Project Cost. The Concession Period is pre- determined. The Bid Project Cost shall constitute the sole criteria for evaluation of bids. In this, the term "Lowest Bidder" shall mean the Bidder who's Bid Project Cost is the lowest.

**O&M Payments:** The O&M payments are now more structured, with specific amounts payable for maintenance adjusted for price index variations. This provides more clarity and predictability for concessionaires.

a) For flexible perpetual pavement including structures, no maintenance charges shall be paid for the first year; it will be 0.40% of the Bid Project Cost each for the second, third and fourth year, and 0.60% of the Bid Project Cost each for the subsequent years till laying of the renewal layer or end of concession period, whichever is earlier.
b) For rigid pavement with 10 years Maintenance Period including structures: no maintenance charges shall be paid for the first year; 0.20% of the Bid Project Cost each for the second, third & fourth year, 0.40% of the Bid Project Cost each for fifth, sixth, seventh & eighth year, and 0.60% of the Bid Project Cost each till the end of concession period.
c) For stand-alone Bridge/ Tunnel works, the concessionaire shall be paid no maintenance charges for the first year; 0.20% of the Bid Project Cost each for the next five years, and 0.40% of the Bid Project Cost each for the remaining years till the end of concession period.

**Overview of TOT projects and its advantages to the government**

In 2016, the TOT model was introduced by Cabinet Committee on Economic Affairs (CCEA). CCEA authorized NHAI to monetize publicly funded NH projects in 2016. In TOT model, developers are chosen through a fair and competitive bid process, assuring fairness and transparency in the selection.

The NHAI had begun an asset recycling project using the TOT concept. Through the TOT model, NHAI has been authorized to monetize publicly funded NH Projects that have been operational and collected tolls for at least one year.

The TOT model is a new idea for asset recycling that envisions long-term investment opportunities in the highway sector for Indian developers, as well as a platform built by Pension and Foreign Infrastructure and Pension Funds.

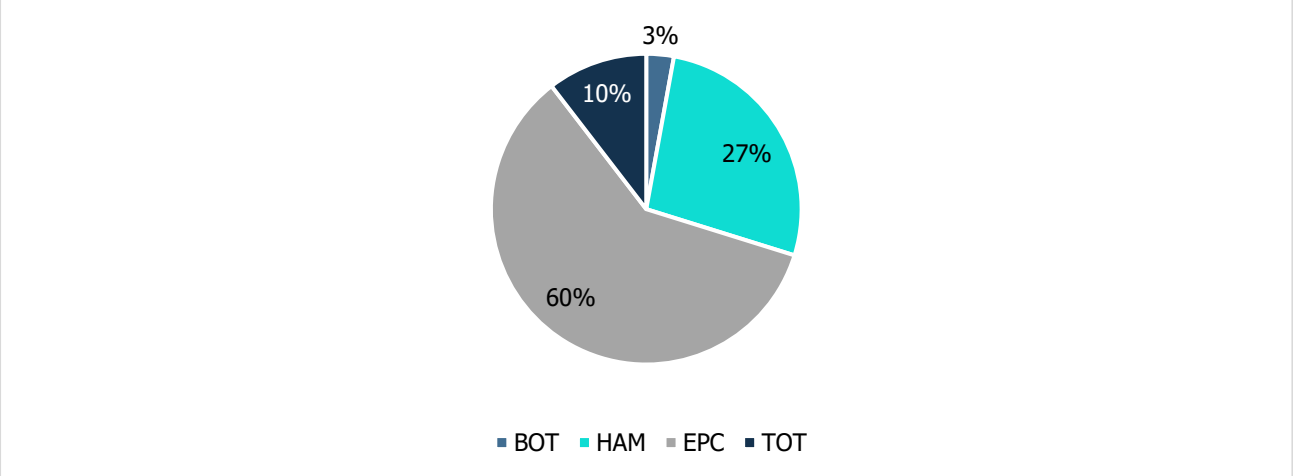
**Benefits to the government**

- The developer's upfront payments in the TOT model provide the government with immediate revenues, serving as a vital financial source for highway expansion and maintenance in future.
- The TOT model encourages private participation by allowing private enterprises to invest in highway construction. The model attracts private investment which supplements government resources allowing for greater and efficient development. This also helps in reducing the load on the government's budget and enables them to grant funds to other critical sectors.
- Private enterprises are responsible for the development and operation of toll roads under the TOT concept. These firms usually have the skills, expertise and resources necessary for effective project execution which can result in faster project completion, minimizing the time and expense associated with road construction.
- The model will also assist the government in utilizing the corpus (produced from the proceeds of project monetization) to satisfy financing requirements for future development and O&M of roads in the country.

**Success of BOT, HAM and TOT projects in terms of bid interest**

A total of ongoing projects worth Rs 4,694.6 billion are being executed under various contract models, with different percentages of shares. Among these, the Engineering, Procurement, and Construction (EPC) contracts account for the largest portion, making up 60% of the total, highlighting a preference for this model due to its comprehensive approach encompassing design, procurement, and execution within a single contract. The Hybrid Annuity Model (HAM) projects come next, with a share of 27%. Toll-Operate-Transfer (TOT) projects represent 10% of the total, while Build-Operate-Transfer (BOT) projects have the smallest share, contributing just 3%.

**Chart 25: Share between PPP models**




Source: Projects Today

**HAM Projects**

The HAM model has seen considerable success thanks to its balanced approach to risk-sharing, financial sustainability, and strong government backing.

Additionally, the Indian government's preference for HAM, which facilitates quicker project execution and effective risk-sharing, has resulted in a notable increase in projects being developed under this model. With milestone-based payments fostering financial discipline and lowering capital exposure for private entities, HAM is especially advantageous for projects with unpredictable toll revenues but significant public benefits, such as national highways and rural connectivity efforts. However, according to NHAI, HAM projects are proving to be expensive for the government as they involve both upfront grants and repayment with interest to concessionaires. Despite this, HAM remains attractive due to assured returns and reduced private sector risk, leading to higher participation.

**Table 11: Details of Top 25 Ongoing projects under HAM model**

| Project Name | Project Cost (Rs. billion) | Location | State |
|---|---|---|---|
| Outer Ring Road (Mangalapuram-Thekkada-Vizhinjam) (Southern Ring) | 48.71 | Mangalapuram-Thekkada-Vizhinjam | Kerala |
| Satellite Town Ring Road (Kunigal-S Mudugadapali) Project (Phase-II) | 27.79 | Kunigal-S Mudugadapali | Karnataka |
| Satellite Town Ring Road (Obalapura-Kunigal) Project (Phase-I) | 26.42 | Obalapura-Kunigal | Karnataka |
| Raipur-Dhanbad Economic Corridor (Turua Ama-Putrichoura) Project (Pkg-7) | 23.82 | Turua Ama-Putrichoura | Chhattisgarh |
| Access-Controlled Coastal Highway (Kakatpur-Erasama) Project (Package-III) | 22.01 | Kakatpur-Erasama | Odisha |
| Outer Ring Road (Navaikulam-Thekkada) (Northern Ring) | 20.95 | Navaikulam-Thekkada | Kerala |
| Access Controlled Greenfield Highway (Kereya-Latra) Project (Package-II) | 20.51 | Latra, Kereya | Jharkhand |
| Highway (Chehedi Khurdh-Khandalwadi) Project (Package-V) | 17.29 | Chehedi Khurdh-Khandalwadi | Maharashtra |
| Capital Region Ring Road (Rameswar-Gobindpur) Project (Package-I) | 17.15 | Rameswar-Gobindpur | Odisha |
| Greenfield Highway (Surat-Nashik-Ahmadnagar-Solapur) Project (Package-VIIA) | 16.96 | Manjarsumba, Mominakhada | Maharashtra |
| Greenfield Highway (Ambegaon-Chehedi Khurdh) Project (Package-IV) | 16.71 | Ambegaon-Chehedi Khurdh | Maharashtra |
| Highway (AP/KN Border-KN/TS Border) Project | 16.33 | AP/KN Border-KN/TS Border | Karnataka |
| Access Controlled Greenfield Highway (Latra-Sithiyo) Project (Package-III) | 16.13 | Latra, Sithiyo | Jharkhand |
| Greenfield Highway (Surat-Nashik-Ahmadnagar-Solapur) Project (Package-VIII) | 15.82 | Shiral, Sarola Baddi | Maharashtra |
| Tharad Ahmedabad Expressway (Khimana-Diodarda) Project (Package-II) | 15.25 | Khimana-Diodarda | Gujarat |
| Greenfield Highway (Surat-Nashik-Ahmadnagar-Solapur) Project (Package-X) | 15.16 | Nagobachiwadi, Chinchpur Budruk | Maharashtra |
| Greenfield Highway (Surat-Nashik-Ahmadnagar-Solapur) Project (Package-VI) | 15.13 | Chincholigurav-Mominakhada | Maharashtra |
| Kharagpur-Moregram Highway (ChandrakonaGhatal-Bowaichandi) Project (Pkg-II) | 15.03 | Chandrakona-Ghatal Road Crossing-Bowaichandi | West Bengal |
| Varanasi-Kolkata Highway (Malpura-Lerua) Project (Package-5) | 14.71 | Malpura-Lerua | Bihar |

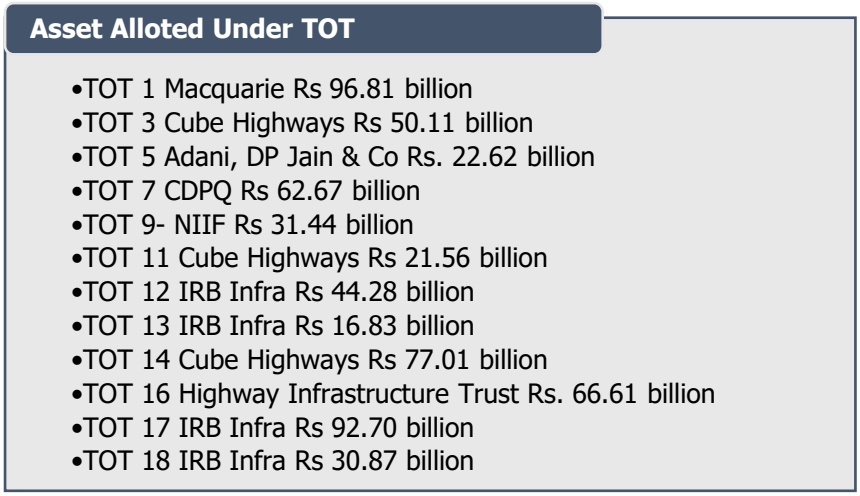
| Project Name | Project Cost (Rs. billion) | Location | State |
|---|---|---|---|
| Coastal Road (Rameshwar-Puri) Project (Package-I) | 14.36 | Rameshwar-Puri | Odisha |
| Patna-Arrah-Sasaram Greenfield Highway (Garhani-Patar) Project (Pkg-2) | 13.98 | Patna-Arrah-sasaram Corridor | Bihar |
| AP/KN-Raichur-KN/TS Border Access Controlled Highway Project | 13.81 | Deosugur | Karnataka |
| Capital Region Ring Road (Rameswar-Gobindpur) Project (Package-II) | 13.74 | Rameswar-Gobindpur | Odisha |
| Access Controlled Highway (Sirhind-Sehna) Project (Package-II) | 13.66 | Sirhind-Sehna | Punjab |
| Chambal Expressway (Sada ka Pada-Chhavar) Project (Atal Progressway PKG-3) | 13.59 | Sada ka Pada-Chhavar | Madhya Pradesh |

Source: Projects Today

**TOT Projects**

The Toll-Operate-Transfer (TOT) model has seen significant success in attracting bid interest due to its low-risk profile and the maturity of the assets involved. It allows private developers to operate and maintain existing toll roads for a fixed period in exchange for an upfront lump sum payment, providing investors with predictable revenue streams and minimal financial uncertainty compared to models like BOT and HAM. The model has gained traction among institutional investors such as pension funds, sovereign wealth funds, and private equity firms, which favor its stable returns and lower operational risks. The recent success of TOT Bundle 16, awarded for Rs. 66.61 billion, highlights the model's effectiveness in securing investor interest. Moreover, NHAI's achievement of raising Rs. 159.68 billion in FY24, surpassing the Rs. 100 billion targets, underscores the strong demand for TOT assets. With the National Monetization Pipeline driving further asset sales, NHAI has crossed Rs. 1 Trillion in total monetization which includes Rs. 489.95 billion through TOT, indicating sustained investor confidence and a promising future for the TOT model.

**Chart 26: Investments under Toll-Operate-Transfer (TOT) model**




Source: CareEdge Research

**BOT Projects**

In recent years, the Build-Operate-Transfer (BOT) model has witnessed a decline in bid interest due to inherent financial risks, substantial upfront capital requirements, and revenue uncertainties. Key challenges include inaccurate traffic projections, extended payback periods, and past project failures, which have led to diminished investor confidence and reluctance from financial institutions to extend funding. These issues have prompted the government to pivot towards alternative models such as the Hybrid Annuity Model (HAM) and Toll-Operate-Transfer (TOT), which offer improved risk-sharing frameworks and reduced financial exposure, thereby attracting greater private sector participation.

However, recent policy efforts indicate a renewed push to revive BOT projects. The National Highways Authority of India (NHAI) has targeted awarding BOT projects worth Rs 621.3 billion in FY26, covering approximately 1,250 km of highways, as part of its broader pipeline. This is a significant scale-up compared to earlier plans of 15 projects worth Rs 440 billion, underlining the government's intent to re-establish BOT as a viable model within the sector. Developers, however, continue to seek an overhaul of BOT terms, including longer concession periods, improved traffic risk-sharing, and enhanced viability gap funding, to make projects financially sustainable.

NHAI has introduced measures such as extending tolling periods, offering construction support, and monetizing assets worth USD 2.4 billion through InvITs. These initiatives are expected to attract fresh participation and drive renewed interest in BOT projects.

**Updates on recent regulatory changes**

| | |
|---|---|
| Revision of WPI-linked toll escalation | •The National Highways Authority of India (NHAI) revised the Wholesale Price Index (WPI) linking factor used for toll rate escalation, reducing it from 1.641 to 1.561. This adjustment lowered toll charges by about 3–5 percent across national highways. While commuters benefit from reduced travel costs, concessionaires face slightly lower equity returns. The move reflects the government's intent to balance affordability with investor sustainability, supported by alternative monetization mechanisms like InvITs and TOT. |
| Introduction of FASTag Annual Pass | •In August 2025, NHAI launched a nationwide annual pass priced at Rs 3,000, valid for either 200 toll trips or one year. Linked directly to existing FASTags, the pass simplifies travel for frequent highway users by reducing congestion and eliminating the need for repeated recharges. Adoption was immediate, with over 1.4 lakh users activating the pass on launch day. For operators, this reform enhances predictability of toll revenues and demonstrates the government's push toward digital convenience. |
| Refinancing flexibility for HAM projects | •New guidelines allow concessionaires under the Hybrid Annuity Model (HAM) to refinance debt more efficiently. This provides developers with greater flexibility in managing long-term financing costs, improving project viability and encouraging wider participation. The change is particularly relevant given the capital-intensive nature of HAM projects, where annuity payments are spread over extended durations. |
| Updated qualification criteria for HAM and EPC projects | •NHAI revised Request for Proposal (RFP) norms to ensure only bidders with proven execution capacity and authentic bid securities participate. This addresses the issue of aggressive bidding that often led to delays and cost overruns. By tightening eligibility, the government aims to improve project delivery standards and reduce execution risks. |
| Performance security norms adjustment | •The Ministry of Road Transport and Highways (MoRTH) reduced the threshold for Additional Performance Security (APS) from bids 20 percent below authority cost to 10 percent, while removing the earlier cap of 3 percent of project cost. This discourages abnormally low bids and strengthens contractual discipline, ensuring that projects are awarded to financially capable developers. |
| National Road Safety Policy 2025 | •MoRTH advanced a comprehensive safety framework focusing on behavioral change, enforcement, and technology adoption. This policy sets the roadmap for reducing accident rates and improving compliance over the next decade. |

## InvITs in India

### Overview

In India, infrastructure has limited funding options, and traditionally, financing has been met through bank finance with a tenure of 10 to 15 years. In this backdrop, Union Budget in February 2014 introduced Infrastructure Investment Trusts (InvITs) in India, and subsequently in September 2014, SEBI had notified InvIT regulations. InvITs provide long-term capital and unlock the developer's capital, which can be deployed for further growth.

InvITs utilise the pooled capital of investors to buy and manage income-generating infrastructure assets, such as roads, transmission towers, wind power, solar power, seaports, airports, telecom, etc. InvITs are permitted to issue units (equivalent to equity) that are listed and traded on the bourses. Public InvITs invest not less than 80% of the value of InvIT assets in revenue-generating infrastructure assets. InvITs must distribute not less than 90% of the net distributable cash flows to the unit holders. The aggregate consolidated borrowings and deferred payments of the InvIT, net of cash and cash equivalents, is restricted to 70% of the value of the InvIT assets. According to the Bharat InvITs Association, as of January 2025, 26 SEBI-registered InvITs have collectively raised over Rs 1.2 trillion in equity since 2019 and currently, manage assets over Rs 5.0 trillion.

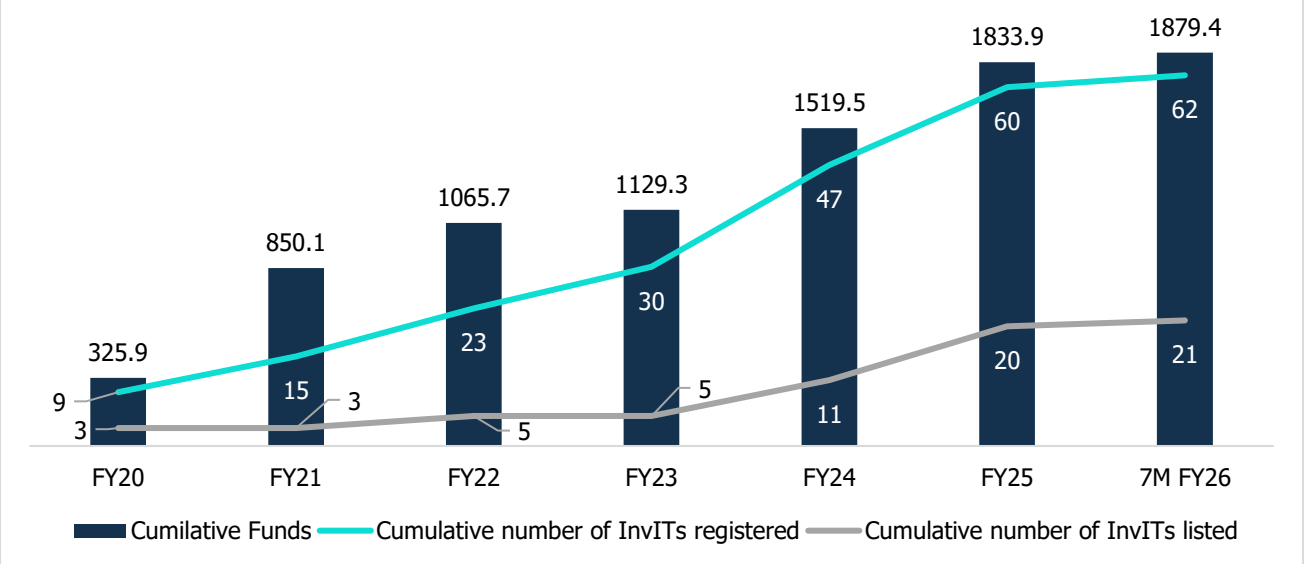
### InvIT by NHAI

The National Highways Authority of India (NHAI) established the National Highways Infra Trust (NHIT) in 2020 as part of the Government of India's asset monetization program. The InvIT structure allows NHAI to pool completed highway assets and monetize them by offering units to institutional and retail investors, thereby recycling capital for new infrastructure projects. NHIT was created to provide a transparent, regulated platform for monetizing operational highway assets. By channelling funds from long-term investors such as pension funds, sovereign wealth funds, and insurance companies, NHIT reduces reliance on budgetary allocations and debt financing. NHIT has attracted participation from leading domestic institutions (LIC, SBI, HDFC Bank) and global investors (CPP Investments, OTPP, GIC), reflecting strong confidence in India's highway assets. By FY25, NHIT has raised over Rs 46,000 crore, making it the largest monetization platform in India's road sector.

In FY26 Budget, the Government announced NMP-2, setting a monetisation target of Rs 10 trillion, with NHAI's share estimated at around Rs 3.6 trillion. To support this scale of monetisation, NHAI has proposed sponsoring and launching an additional public InvIT. Unlike privately placed InvITs, a public InvIT enables participation from retail investors, with a substantially lower minimum investment of about Rs 10,000–15,000. While private InvITs raise funds through private placement among a select group of investors, in view of large target, NHAI intends to establish one more InvIT which will also do retail public issue as well. Through Public InvIT, domestic and retail investor will get the opportunity to contribute in the growth of national infrastructure.

### Growth of InvITs in India

**Chart 27: Cumulative Funds Raised via InvITs gaining some traction (Rs billion)**

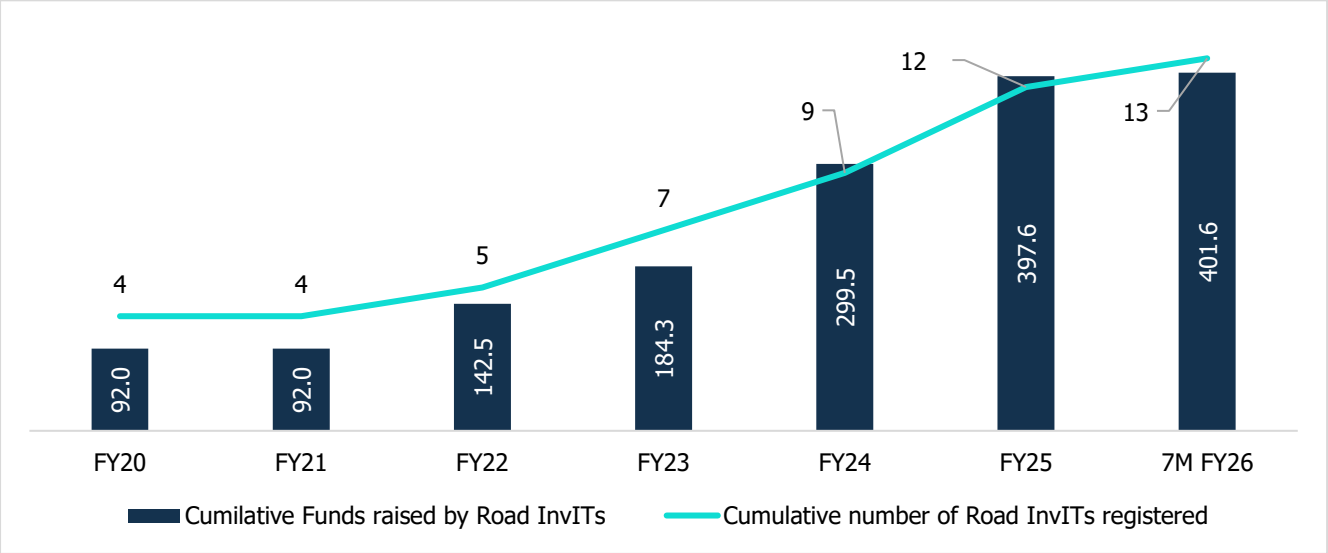


Source: SEBI, CareEdge Research; Note: Cumulative funds raised across years; includes funds raised through public issue, private placement, preferential issue, institutional placement, rights issue

Cumulative funds raised via InvITs have increased substantially from Rs 325.9 billion in FY20 to Rs 1,879.4 billion in 7MFY26, reflecting the growing acceptance of InvITs as a preferred infrastructure financing vehicle. The sharp rise in recent years highlights strengthening investor confidence, supportive regulatory framework, and a deepening market for alternative funding sources in the infrastructure sector.

As of November 2025, the number of InvITs in India stood at 62, of which 21 are public issue and rest are private placement.

**Chart 28: Cumulative Funds Raised via Road InvITs (Rs billion)**



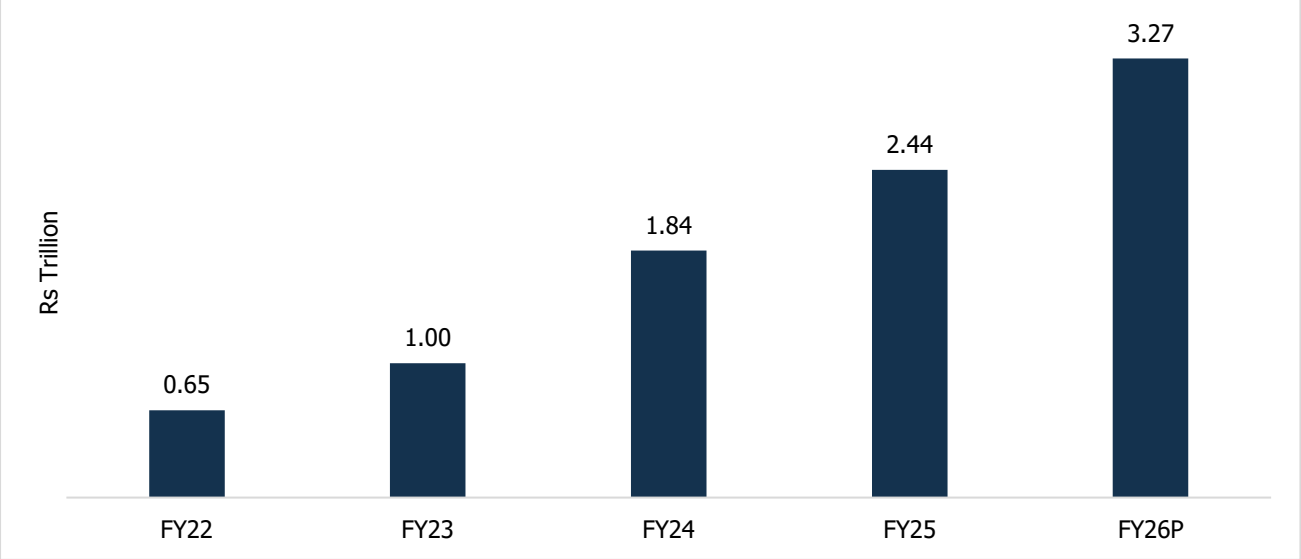

Source: SEBI, CareEdge Research; Note: Cumulative funds raised across years; includes funds raised through public issue, private placement, preferential issue, institutional placement, rights issue

Cumulative funds raised via Road InvITs have increased substantially from Rs 92.0 billion in FY20 to Rs 401.6 billion in 7MFY26. Further, the number of Road InvITs in India as of 7MFY26 stood at 13, of which 4 are public issue and rest are private placement. The growth is driven by rise in number of InvITs from 3 in FY20 to 12 till date which have contributed through private placement and public issues, policy emphasis on asset monetization under the National Monetization Pipeline, regulatory clarity under SEBI's InvIT framework, and the ability of InvITs to support debt reduction and capital recycling for new highway projects.

**Growth in AUM of Road InvIT**

The monetisation of road assets through InvITs is reflected in the growth in AUM over the years. The AUM of Road InvITs have grown from Rs 0.65 trillion in FY22 to Rs 2.44 trillion in FY25, at a CAGR of 55% for the same period. It is estimated to reach Rs 3.27 trillion by FY26, indicating a potential y-o-y growth of 34%. The strong asset monetisation pipeline of 1,472 kms by NHAI, the gaining monetisation popularity of NH-HAM projects and, the transfer of mature operational toll roads will continue to drive this growth.

**Chart 29: Growth in Road AUM**




Source: CareEdge Research

**Salient Features of Listed InvITs**

**Table 12: Salient Features of Listed InvITs**

| Particulars | Description |
|---|---|
| Entity style | Trust under Indian Trusts Act 1882 |
| Underlying asset type | Majority operational |
| Lock-in period for sponsors and strategic investors | Three years for minimum of 15% stake and 1 year for holding exceeding 15%. One-year lock-in for strategic investor |
| Shareholding by the sponsors | 15% collectively as sponsors on a post issue basis for not less than three years |
| Aggregate consolidated borrowings and deferred payments net of cash and cash equivalents | Cap at 49% of the asset's valuation. Cap at 70% of the assets valuation (AAA rated entities and track record of six distributions on a continuous basis). |
| Distribution | At least 90% of the net distributable cash flow. |
| Frequency of dividend distribution | At least once every half-year for public InvITs, and at least once a year for privately placed InvITs. |
| Investments | Listed/unlisted debt of companies in the infrastructure sector, government securities, money market instruments, liquid mutual funds, equity share of companies, which derive not less than 80% of their operating income from infrastructure sector |
| Requirement of credit rating | Consolidated borrowings and deferred payments net of cash exceed 25% of the assets value. |

**Advantages of InvITs**

| Particulars | Description |
|---|---|
| Capital Recycling | Allows sponsors to monetise operational road assets and redeploy capital into new EPC/HAM projects, enabling higher bidding capacity and faster business growth. |
| Stable and Predictable Cash Flows | Operational toll/annuity road assets provide steady long-term revenues, making InvITs attractive for pension funds, sovereign funds and institutional investors seeking yield stability. |

| Particulars | Description |
|---|---|
| Diversification of Funding Sources | Offers an alternate financing platform beyond bank loans; InvITs can raise equity and debt at the trust level, reducing funding concentration risk for the sector. |
| Lower Cost of Capital | Strong asset pools and predictable revenues help InvITs secure financing at competitive rates, improving net distributable cash flows and enhancing investor returns. |
| Deleveraging and Balance Sheet Strengthening | Asset transfer to InvITs reduces developer leverage, improves debt metrics and strengthens credit profile, enabling participation in future projects. |
| Attractive Long-Term Yield Instrument | InvITs provide regular cash distributions (often semi-annual/quarterly), offering investors a stable, long-duration, inflation-linked income stream. |
| Support to Government Monetisation Programme | Key tool under NMP; enables NHAI and private sponsors to unlock value through TOT concessions and InvIT listings, attracting large-scale private capital. |
| Better Asset Management and O&M Efficiency | Professional InvIT managers prioritise tolling efficiency, traffic analytics and lifecycle O&M practices, improving asset performance and durability. |

**Asset Monetization through InvITs and TOTs by NHAI**

The government launched the National Monetization Pipeline (NMP-1) with a target of Rs 6 trillion for FY22–25. Out of this, a target of Rs 1.6 trillion was assigned to the NHAI. NHAI achieved 72% of its target, mobilizing Rs 1.15 trillion through TOT, InvITs and SPV model.

NHAI has monetized operational highway assets through InvITs and TOTs, monetizing a cumulative Rs 779 billion between FY22 and FY25. These mechanisms are part of the National Monetization Pipeline and have been used to recycle capital from completed projects and reduce reliance on budgetary support.

**InvITs Model**

**Table 13: Year-wise details of the amount realised so far through monetisation of NHs by InvIT**

| Year | InvIT (Amt Rs in Billion) |
|---|---|
| FY22 | 73.5 |
| FY23 | 28.5 |
| FY24 | 157.0 |
| FY25 | 177.4 |
| **Total** | 436.4 |

Source: Asset Monetization Strategy by NHAI, CareEdge Research

InvITs have mobilized a cumulative Rs 436.4 billion over FY22–FY25. The FY25 round was the largest, raising Rs 177.4 billion at an enterprise value of Rs 183.8 billion, with participation from marquee investors such as CPP Investments, OTPP, GIC, LIC, SBI, and HDFC Bank. Further, NHAI is expected to launch InvIT Bundle-5 for 9 Stretches in 550 km length (expected fund raising of Rs 125 billion), covering Maharashtra, Odisha, Andhra Pradesh and West Bengal. The proceeds from InvITs are earmarked for repayment of borrowings and funding of new highway construction, ensuring liquidity for upcoming EPC and HAM awards.

**TOTs Model**

**Table 14: Year-wise details of the amount realised so far through monetisation of NHs by TOTs**

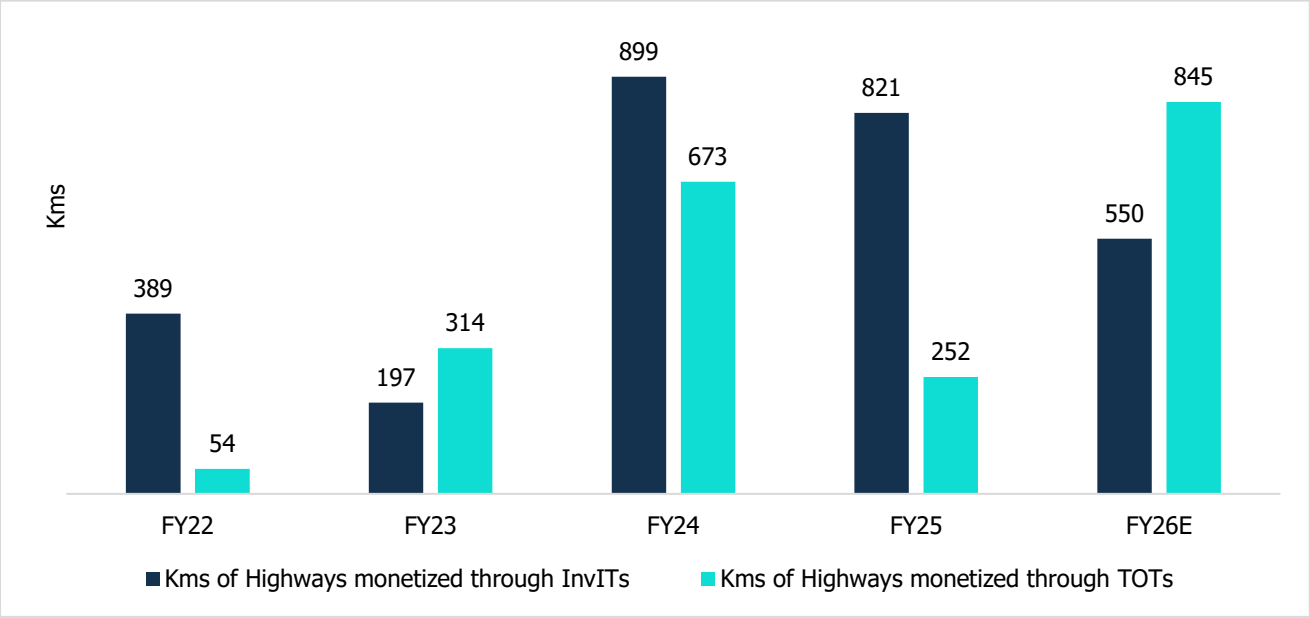
| Year | TOT (Amt Rs in billion) |
|---|---|
| FY22 | 10.1 |
| FY23 | 106.2 |

| | |
|---|---|
| FY24 | 159.7 |
| FY25 | 66.6 |
| **Total** | **342.6** |

Source: Asset Monetization Strategy by NHAI, CareEdge Research

TOT bundles have raised a cumulative Rs 343 billion over FY22–FY25. The FY24 recorded the highest monetization, while FY25 saw lower realizations as concession terms were revised. The recently awarded 17th TOT bundle to IRB Infrastructure for Rs 93 billion for 333 kms highway network, reflects continued activity. Other than TOT-Bundle 17, bidding for another five bundles of highways, i.e. ToT Bundle 18, 19, 20, 21 and 22 are open. In FY26, monetisation of some of them are expected to be completed. The total length of highways on offer on these five bundles are of 845 km. This proceeds from TOT transactions are directed toward financing new highway projects and strengthening NHAI's balance sheet, reducing reliance on budgetary allocations.

**Chart 30: Length of Highways monetized**




Source: Asset Monetization Strategy by NHAI, CareEdge Research

For FY26, NHAI had targeted Rs 300 billion for monetization of highway assets, which has been enhanced to Rs 400 billion. Out of the total target, Rs 150 billion has been targeted for monetization via TOTs and InvITs and remaining from project-based financing. Additionally, NHAI has identified 24 assets spanning 1,472 km for monetisation through TOT and InvIT.

## Key Threats and Challenges

- **Traffic Risk**: Toll revenues are highly sensitive to traffic volume and vehicle composition. Any decline in economic activity, rise in fuel prices, changes in freight movement, or external disruptions like pandemics can lead to reduced vehicle flow on highways, directly impacting toll collections and revenue stability.

- **Regulatory and Policy Risk**: Infrastructure investment trusts operate within a regulatory environment influenced by government policies and sectoral norms. Any changes in tolling regulations, concession agreements, taxation rules, or InvIT specific frameworks may alter the expected cash flows, reduce investor confidence, or delay new acquisitions.

- **Refinancing and Interest Rate Risk**: Since asset acquisitions are often funded through a mix of debt and equity, rising interest rates can lead to higher borrowing costs and tighter refinancing conditions. This can erode returns for unitholders, reduce the attractiveness of the trust's distributions, and increase financial stress if not managed prudently.

- **Limited Asset Pipeline**: The number of mature revenue-generating road assets suitable for monetization is finite. As competition intensifies from private equity investors, infrastructure funds, and other bidders, acquisition prices may rise, making it challenging to maintain targeted return thresholds and scale operations sustainably.

- **Market Liquidity and Investor Sentiment**: InvITs are still a developing investment product in the broader market. Their ability to raise capital and maintain healthy unit valuations depends on overall investor sentiment, macroeconomic conditions, and awareness. Any dip in confidence or liquidity constraints can affect fundraising and secondary market performance.

- **Environmental and Social Risks**: Infrastructure assets, particularly those involving land and public access, are vulnerable to environmental scrutiny and social resistance. Issues such as land acquisition disputes, community opposition, or noncompliance with environmental norms can result in operational delay.

- **Dependence on Government Ecosystem:** The entire lifecycle from asset identification and transfer to regulatory clearances relies heavily on coordination with government authorities. Delays in approvals, shifts in political priorities, or changes in the monetization policy framework can disrupt expansion plans and reduce visibility on future opportunities.

## Company Profile

**About the company**

Raajmarg Infra Investment Managers Private Limited (RIIMPL) was incorporated on 22 August 2025, as a non-government private company. It has been established as the Investment Manager for the proposed Raajmarg Infra Investment Trust (RIIT), a Public InvIT sponsored by NHAI. RIIMPL's mandate is to manage the assets and investments of RIIT in accordance with SEBI (Infrastructure Investment Trusts) Regulations, 2014, and the Investment Management Agreement. RIIMPL has a paid-up capital of Rs 200 million with 51.1% shareholding with private and 48.9% with public out of which NHAI holds 26%. Private shareholders includes equity participation from leading banks and financial institutions including State Bank of India, Punjab National Bank, NaBFID, Axis Bank, Bajaj Finserv Ventures Ltd., HDFC Bank, ICICI Bank, IDBI Bank, IndusInd Bank, and Yes Bank.

**Assets proposed for monetization**

**Table 15: Assets Proposed for monetization**

| Sr No. | Section Name | Mode of Execution | Length (Kms) | State |
|---|---|---|---|---|
| 1 | Gorhar-Barwa Adda | HAM | 80.5 | Jharkhand |
| 2 | Chilkaluripeta-Vijayawada | 0.2 km in EPC,16.50 km in HAM & remaining under PBMC(O&M) | 69.4 | Andhra Pradesh |
| 3 | Chennai Bypass | EPC | 32.6 | Tamil Nadu |
| 4 | Chennai-Tada | EPC | 33.0 | Tamil Nadu |
| 5 | Neelmangla-Tumkur | 20.4 km in EPC & 11.62 km in O&M | 44.7 | Karnataka |

Source: Company Disclosures

## Competitive Landscaping

### Peer Company Profile

| Name of the Company | Business Overview |
|---|---|
| **National Highways Infra Trust (NHIT)** | NHIT was established in 2020 by NHAI as a contributory irrevocable trust under the Indian Trusts Act, 1882. It is registered with SEBI as an Infrastructure Investment Trust. NHIT holds a portfolio of 26 operating toll roads with an aggregate length of 2,345 km across 12 states. The trust has raised over Rs 46,000 crore across four rounds of monetization. The investment manager is National Highways Infra Investment Managers Pvt. Ltd and investors include CPP Investments, OTPP, GIC, LIC, SBI, and HDFC Bank. |
| **Interise Trust** | Interise Trust was listed in May 2018 on NSE and BSE through private placement. It manages 17 road projects aggregating 7,300 lane km across 8 states, with ~450,000 vehicles traversing daily. The trust focuses on operations and maintenance of highways, with investor participation from global and domestic institutions. |
| **Oriental Infra Trust** | Oriental Infra Trust was registered with SEBI in March 2019 as an InvIT sponsored by Oriental Structural Engineers Pvt. Ltd. and Oriental Tollways Pvt. Ltd. The trust holds six operating road assets totalling 769 km, including 5 toll roads and 1 annuity project. The investment manager is OIT Infrastructure Management Limited. |
| **Vertis Infrastructure Trust** | Vertis Infrastructure Trust is an InvIT platform backed by KKR India Infrastructure. It manages a portfolio of toll road assets acquired from GVK and other developers, with a focus on long-term operations and monetization. The trust has raised capital from global infrastructure investors and has been used as a vehicle for institutional participation in India's road sector. The trust's portfolio includes 14 HAM assets, 2 Annuity assets and 12 Toll assets with an aggregate length of 8,300 lane km across 11 states. |
| **IRB InvIT Fund** | IRB InvIT Fund was India's first listed InvIT, sponsored by IRB Infrastructure Developers Ltd. It holds portfolio of 8 BOT assets and 1 HAM assets across Maharashtra, Gujarat, Rajasthan, Karnataka, Tamil Nadu, and Punjab. The investment manager is IRB Infrastructure Pvt. Ltd. |
| **Cube Highways Trust** | Cube Highways Trust is a privately managed InvITs, sponsored by Cube Highways and Infrastructure III Pte Ltd. It manages a portfolio of 18 - Toll Assets, 6 - HAM Assets, 3 - Annuity Assets across India, covering 8,819 lane km and operating 27 toll plazas. The trust is backed by global investors including I Squared Capital, ADIA, IFC, and Japanese infrastructure funds. |

### Operational Benchmarking

**Table 16: Operational Parameters**

| Particulars | RIIT | NHIT | Interise Trust | Oriental Infra Trust | Vertis Infrastructure Trust | IRB InvIT Fund | Cube Highway Trust |
|---|---|---|---|---|---|---|---|
| No. of Assets (Toll, HAM, Annuity) | 5 – Toll Assets | 26 – Toll | 17 - BOT / Annuity Road | 5 - Toll, 1 - annuity | 14 - HAM Assets<br>2 - Annuity Assets<br>12- Toll Assets | 8 - BOT assets<br>1 - HAM assets | 18 - Toll Assets<br>6 - HAM Assets<br>3 - Annuity Assets |
| No. of States | 4 | 11 | 8 | 4 | 11 | 6 | 13 |
| Kilometres | 260.2 Km | 2,345 Km | 7,300 - Lane KM | 769 Km | 8,300 - Lane Km | NA | 8,819 Lane Km |
| Sponsor Stake (%) | 100% | 11% | 60.83% | 59.20% | 57.80% | 16% | 41% |

## BUSINESS

*Some of the information in this section, including information with respect to our plans, strengths, and strategies, contain forward-looking statements that involve risks and uncertainties. You should read "Forward-Looking Statements" on page 17 for a discussion on the risks and uncertainties related to those statements and also "Risk Factors", and "Discussion and Analysis by the Directors of the Investment Manager of the Financial Condition, Results of Operations and Cash Flows of the Project SPV of the Trust" on pages 35 and 211 respectively, and the "Projections of Revenue From Operations and Cash Flow from Operating Activities" on page 320, for a discussion of certain factors that may affect our business, financial condition, or results of operations.*

*Our actual results may differ materially from those expressed in or implied by these forward-looking statements. Unless otherwise stated or the context requires otherwise, references in this section to "we", "our", or "us" are to the Trust along with the Project SPV.*

*We have included various operational and financial performance indicators in this section. The manner in which such operational and financial indicators are calculated and presented, and the assumptions and estimates used in such calculations, may vary from that used by other entities in the business similar to ours. Investors are accordingly cautioned against placing undue reliance on such information in making an investment decision.*

*Unless otherwise indicated, the industry, macro-economic and market data and all other industry related statements in this section have been derived or extracted from the CARE Industry Report. For further details in relation to the CARE Industry Report, please see the section entitled "Industry Overview" on page 113. Additionally, for further details and risks in relation to CARE Industry Report, please see the section entitled "Risk Factors" on page 35.*

### Overview

Raajmarg Infra Investment Trust ("**Trust**") is an infrastructure investment trust which is registered with SEBI under the InvIT Regulations on December 22, 2025, under Regulation 3(1) of the InvIT Regulations. The Trust intends to acquire, operate and maintain the InvIT Assets pursuant to the terms of the Concession Agreements. The Trust is sponsored by NHAI, an autonomous authority of the GoI under the MoRTH constituted on June 15, 1989 under the NHAI Act. NHAI was operationalised in February 1995 with the appointment of a full-time chairman and other members of the board. The functioning of NHAI is governed by the NHAI Act and the rules, and regulations framed thereunder. We are managed by qualified personnel of the Investment Manager with majority of the personnel who have management and operational experience in the roads and highways sector for over two decades. For further details, see the sections headed "*Parties to the Trust – The Investment Manager – Raajmarg Infra Investment Managers Private Limited*" on page 85.

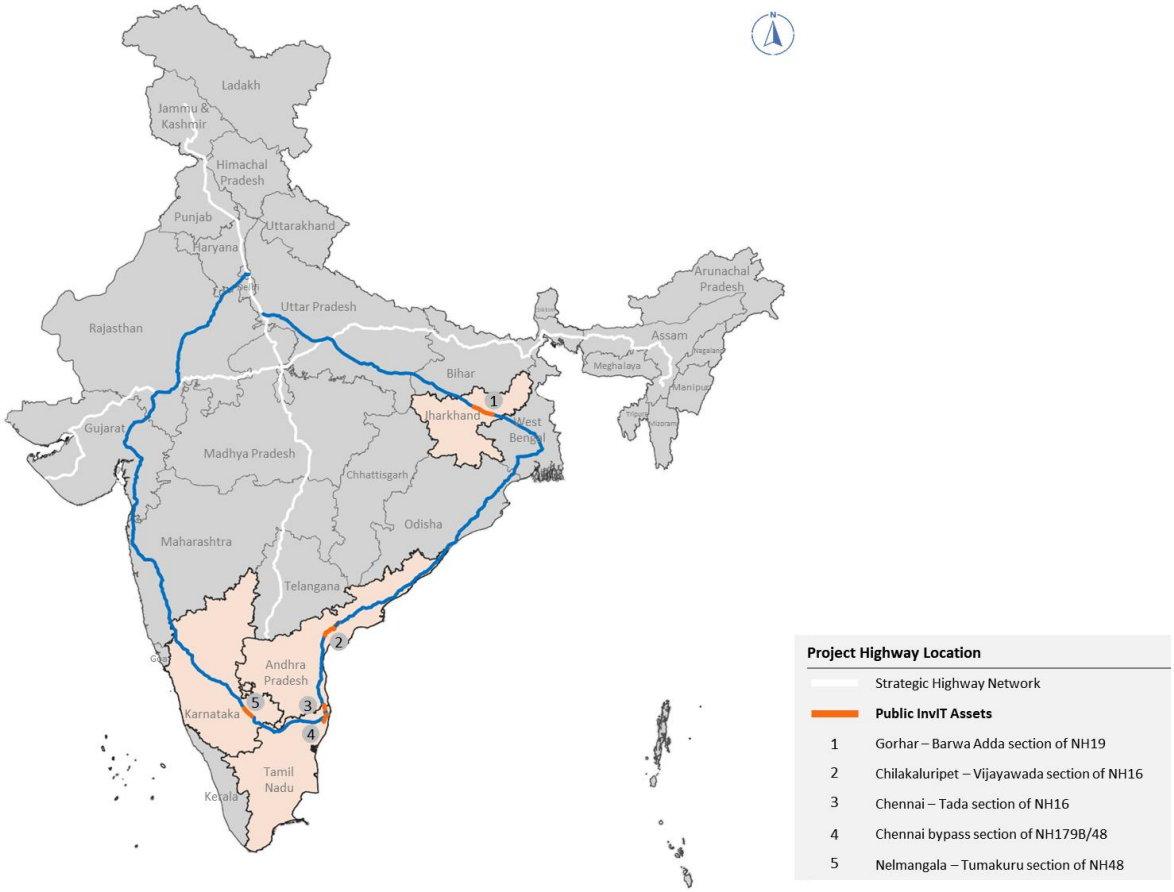
The Trust proposes to have an initial portfolio of five Toll Roads in the Indian states of Jharkhand, Andhra Pradesh, Tamil Nadu and Karnataka under the Toll Operate Transfer ("**TOT**") model conceived by NHAI. These Toll Roads will be operated and maintained pursuant to concessions granted by the NHAI to the Project SPV. The Toll Roads comprise five toll roads spanning a total length of 260.198 kms and forms part of the Golden Quadrilateral project. The Project SPV proposes to have an exclusive right, license and authority to demand, collect and appropriate fee, operate, manage and maintain the Toll Roads. We expect to satisfy all conditions precedent and commence our concessions in accordance with the terms of the Concession Agreements. For further details, see "*Summary of the Concession Agreements*", "*Discussion and Analysis by the Directors of the Investment Manager of the Financial Condition, Results of Operations and Cash Flows of the Project SPV of the Trust*" and "*Use of Proceeds*" on page *195, 211 and 206,* respectively.

The Concession Agreements, once executed between the Project SPV and NHAI (as concessioning authority) will provide the Project SPV, the exclusive right, license and authority to demand, collect and appropriate fee, operate, manage and maintain the initial portfolio assets for a period of 15 years from users of each Toll Road and perform and fulfil all of the concessionaire's obligations under and in accordance with respective Concession Agreements. The responsibility for the supervision of the operation and maintenance of the Toll Roads from the O&M handover date will also vest with us. In return, the Project SPV is required to pay the concession fee to the NHAI prior to the commencement of the concession, as set out in the respective Concession Agreements. For further information on the provisions of the Concession Agreements, see "*Summary of the Concession Agreements"* on page 195.

From the appointed date (i.e., the date on which all conditions precedent have been satisfied in accordance with Concession Agreement, hereinafter, "**Appointed Date**"), the Project SPV will acquire, operate and maintain the following toll road assets ("**Toll Roads**"):

| S No. | Asset | Details |
|---|---|---|
| 1. | Gorhar to Barwa Adda | The four/six lane section from Gorhar to Barwa Adda from km 320+810 to km 400+632 (design km 401+332) of NH-19 (old NH-2), comprising km 320+810 to km 326+000 between Gorhar and Atka, being a four lane section; Atka to Khairatunda from km 326+000 to km 360+300 (design km 361+000) and Khairatunda to Barwa Adda from km 360+300 (design km 361+000) to km 400+632 (design km 401+332), being six lane sections, in the state of Jharkhand, having total length of 80.522 km. |
| 2. | Chilakaluripet-Vijayawada | The six lane section from Chilakaluripet to Vijayawada from km 355+000 to km 357+342 and from km 372+038 to km 422+605 along with Chilakaluripet bypass section from 0+000 to km 16+499 ("**Chilakaluripet Bypass**") of NH 16, in the state of Andhra Pradesh, having total length of 69.408 km. |
| 3. | Chennai Bypass | The six lane section from km 0+000 to km 32+600 of NH-32 and NH-48, in the state of Tamil Nadu, having total length of 32.600 km. |
| 4. | Chennai -Tada | The six lane section from km 21+400 to km 54+400 of NH-16, in the state of Tamil Nadu, having total length of 33.000 km. |
| 5. | Neelmangla Tumkur | The four/six lane section from Neelmangla to Tumkur from km 29+500 to km 74+168 of NH-48, comprising km 29+500 to km 49+900 between Neelmangla to Dobbaspet being a six lane section; Dobbaspet to Tumkur from km 49+900 to km 61+520, being a four lane section and Tumkur Bypass from km 61+520 to km 74+168 being a 6 lane section, in the state of Karnataka, having total length of 44.668 km. |

The following map depicts the location of the InvIT Assets:




*Map not to scale*

**Strengths of the Trust**

***Attractive industry sector with strong underlying fundamentals and favourable government policies***

India's infrastructure sector is witnessing robust growth, fuelled by significant government investments and strategic initiatives aimed at strengthening the nation's economic framework. For the fiscal year 2025–26, the government allocated a record Rs. 11.21 trillion, underscoring its dedication to infrastructure development as a

cornerstone of economic progress and employment generation. *(Source: CARE Industry Report)*

Transport and logistics remain key focus areas, particularly roads, with over 45,000 kilometres, including 5,000 kilometres of specialised structures such as elevated roads, tunnels, and bridges, under consideration for awards. The National Highways Authority of India (NHAI) plans to award approximately 5,000 kilometres annually through Build-Operate-Transfer (BOT) and Engineering, Procurement, and Construction (EPC) models. This approach presents significant opportunities for infrastructure construction companies. Furthermore, ongoing bidding for third-party operations and maintenance (O&M) projects, with Rs. 77,210 million worth of projects in the pipeline, provides additional growth avenues. The government has also announced plans to expand the national highway network to 2,00,000 kilometres by FY37 which is 1,46,204 kilometres as of FY25. *(Source: CARE Industry Report)*

India has the second-largest road network in the world, with about 63,45,463 km as of FY25. This comprises national highways, expressways, state highways, major district roads, other district roads, and village roads. To accelerate the country's growth, the development of national highways has been the key focus area. On the other hand, state highways, district and rural roads continue to be a large part of the overall road network. *(Source: CARE Industry Report)*

With the growing population, the long-term need for robust infrastructure is necessary for economic development. This generates the need for massive investments in the development and modernization of infrastructure facilities, which will not only cater to the growing demand but will also ensure competitiveness in the global market. The tolling length has also increased on yearly basis. It has grown by 98.8% when compared with FY19 implying government shifts towards increasing toll plaza and efficient toll collection with Fastag collection system. As of March 2025, the toll length stands at around 51,677 Km. (*Source: CARE Industry Report*).

The total tolling length is expected to grow in future with increasing toll revenue for the government. The government's upcoming NHAI projects focused on connectivity and increasing expressways which will help increase in cargo and passenger vehicle movement. The investments made in projects will be recovered through toll collection for a period of 15-20 years, this will eventually lead to increase in toll collection in future for NHAI. (*Source: CARE Industry Report*).

The government launched the National Monetization Pipeline (NMP-1) with a target of Rs 6 trillion for FY22–25. Out of this, a target of Rs 1.6 trillion was assigned to the NHAI. NHAI achieved 72% of its target, mobilizing Rs 1.15 trillion through TOT, InvITs and SPV model. NHAI has monetized operational highway assets through InvITs and TOTs, monetizing a cumulative Rs 779 billion between FY22 and FY25. These mechanisms are part of the National Monetization Pipeline and have been used to recycle capital from completed projects and reduce reliance on budgetary support. (*Source: CARE Industry Report*)

For further details on the market opportunity for the road infrastructure industry in India, please see the section entitled *"Industry Overview"* on page 113.

***Experienced Sponsor with consistent track record in operating and maintaining projects in the roads and highways sector in India***

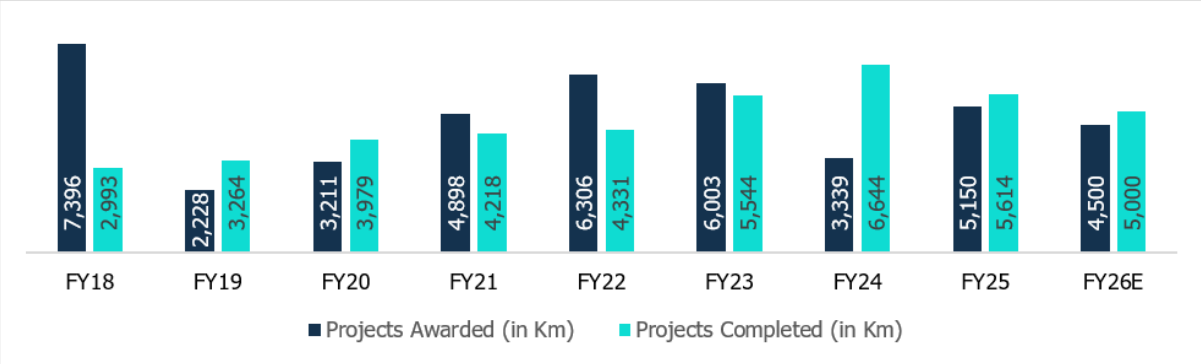
Our Sponsor, NHAI is India's national agency responsible for the development, maintenance and management of India's national highways network. Our Sponsor has a consistent track record of growth and operational performance. Our Sponsor manages the development of National Highways Development Project ("**NHDP**") under the mandate of MoRTH, Government of India, which along with other minor projects, has vested in national highways for development, maintenance and management. As part of the NHDP, our Sponsor infuses funds into immediate areas of development and enables private sector participation bringing about a healthy participatory economy.

India's national highways constitute the core of the country's road infrastructure, serving as the primary corridors for freight and passenger movement. The network has expanded steadily over the past five years, increasing from 1,32,500 km in FY20 to 1,46,204 km in FY25 at CAGR of 2%. The most significant addition was recorded between FY22 and FY23, when nearly 3,960 km were added, underscoring accelerated execution under government programs such as Bharatmala Pariyojana and the National Infrastructure Pipeline. *(Source: CARE Industry Report)*

Aligned with the Ministry of Road Transport and Highways' Vision 2047, Bharatmala is envisaged as a transformative framework to deliver high-speed corridors within 100–150 km of all citizens, ensuring seamless

freight and passenger movement across the country. The vision emphasizes not only network expansion but also efficiency-driven development, including economic corridors, border and coastal connectivity, logistics integration, and adoption of advanced contracting and asset monetization models. *(Source: CARE Industry Report)*

The following growth sets forth our Sponsor's performance and growth in terms of kilometres of roads awarded and constructed for the financial years indicated:




*Source: CARE Industry Report*

Backed by NHAI as our Sponsor, we believe we are well positioned to drive new initiatives in the road sector in India. For more details about our Sponsor and the projects, please see *"Industry Overview"* on page 113.

***Sizeable portfolio of diversified long-term revenue generating Toll Road assets***

Upon signing of the Concession Agreements, the Project SPV will acquire, operate and maintain five toll-road projects in India with a concession period of 15 years, forming part of the Golden Quadrilateral project. We believe the Toll Roads currently have a healthy mix of passenger and commercial traffic which will drive the revenue generation/cash inflows post completion of the formation transactions. For further details in relation to toll segmentation please see – *"Description of our toll roads"* on page. The Concession Agreements will provide the Project SPV the right to collect toll for a period of 15 years. For details of the project traffic for each of the Toll Roads, please see "*Traffic Reports*" at Annexure C.

We also believe that the Toll Roads possess a good mix of captive short distance traffic and long-distance traffic. In addition, the range of commodities transported by commercial traffic across the Toll Roads varies from agricultural products and other perishable goods to steel, cement, coal, containers and multiple industrial products, representing a broad cross-section of the Indian economy. For further details in relation to strategic locations of the InvIT Assets and key growth drivers please see – *"Description of our toll roads"* on page 164. Each Toll Road has a distinct set of users based on its local economy, which results in significant independence of traffic across the Toll Roads. As a result, we expect the geographical diversification of the Toll Roads to reduce our reliance on the local economy of any single state or district. The diversified composition of traffic along the Toll Roads is expected to provide us with stable cash flows.

The table below provides the revenue projections for each of the InvIT Assets for the following years basis the Traffic Reports:

| Toll Plaza | Unit | FY27 | FY28 | FY29 | FY30 | FY31 | FY36 | FY41 |
|---|---|---|---|---|---|---|---|---|
| *Gorhar Barwa Adda* | | | | | | | | |
| Kulgo | ₹ *(in million)* | 1,551 | 1,773 | 1,901 | 2,056 | 2,220 | 2,562 | 3,856 |
| | PCU | 33,383 | 34,599 | 35,951 | 37,516 | 39,023 | 38,103 | 48,033 |
| *Chilakaluripet Vijayawada* | | | | | | | | |
| Kaza | ₹ *(in million)* | 2,257 | 2,480 | 2,697 | 2,995 | 3,275 | 3,351 | 5,054 |
| | PCU | 62,377 | 63,234 | 66,596 | 71,224 | 75,337 | 65,233 | 81,752 |
| *Chennai Bypass* | | | | | | | | |
| Vanagram / Tiruneermalai | ₹ *(in million)* | 966 | 1,184 | 1,362 | 1,514 | 1,694 | 3,112 | 4,034 |
| | PCU | 65,092 | 71,566 | 78,317 | 85,036 | 93,147 | 1,39,066 | 1,51,494 |
| Surapattu | ₹ *(in million)* | 1,089 | 1,347 | 1,331 | 1,328 | 1,469 | 2,530 | 4,163 |
| | PCU | 49,943 | 53,908 | 52,696 | 51,349 | 55,780 | 80,663 | 1,12,496 |
| *Chennai - Tada* | | | | | | | | |

| Toll Plaza | Unit | FY27 | FY28 | FY29 | FY30 | FY31 | FY36 | FY41 |
|---|---|---|---|---|---|---|---|---|
| Nallur / Durainallur | ₹ *(in million)* | 1,475 | 865(H1), 768 (H2) | 1,694 | 1,866 | 2,008 | 3,110 | 4,745 |
| | PCU | 78,689 | 83,664(H 1) 68,410 (H2) | 72,944 | 77,472 | 80,515 | 1,03,294 | 1,30,545 |
| *Neelmangla Tumkur* | | | | | | | | |
| Kulumepalya* | ₹ *(in million)* | 899 | - | - | - | - | - | - |
| | PCU | 92,939 | - | - | - | - | - | - |
| Chokkenhalli* | ₹ *(in million)* | 1,017 | 1,205 | 654 | - | - | - | - |
| | PCU | 85,035 | 89,960 | 95,316 | - | - | - | - |
| Bharathipura and Honnenahalli Check Plaza | ₹ *(in million)* | - | 303 | 307 | 317 | 336 | 431 | 591 |
| | PCU | - | 26,485 ( H1) 26,485(H 2) | 26,241 (H1) 26,241 (H2) | 25,909 | 26,404 | 28,812 | 32,822 |
| Halenijagal and Dobbaspet Check Plaza | ₹ *(in million)* | - | - | 238 | 675 | 752 | 1,133 | 1,461 |
| | PCU | - | - | 30,019 (H1) 30,019 (H2) | 40,398 | 43,243 | 53,893 | 58,179 |
| Halenijagal** | ₹ *(in million)* | - | 1,356 | 1,623 | 1,781 | 1,866 | 2,612 | 3,483 |
| | PCU | - | 99,485 (H1) 99,485 (H2) | 96,090 (H1) 71,101 (H2) | 65,440 | 66,845 | 77,307 | 85,126 |

**According to Traffic Report, these are the existing toll plazas which will be dismantled on completion of four to six lane widening.*

*** According to Traffic Report, this will be a new single mainline plaza, instead of two mainline plazas.*

We believe that the Toll Roads have revenue growth potential due to expected growth in traffic volumes as a result of regional growth and expected increases in toll fees as a result of inflation adjustments.

***Portfolio of strategically located assets catering to key economic corridors of the country***

The Trust proposes to have an initial portfolio of five Toll Roads in the Indian states of Jharkhand, Andhra Pradesh, Tamil Nadu and Karnataka forming part of the Golden Quadrilateral project under the Toll Operate Transfer ("**TOT**") model conceived by NHAI. Four Toll Roads are located in southern India while the remaining one Toll Road is located in eastern India. According to the Traffic Report, these corridors have witnessed high traffic growth rates in the past few years due to offering enhanced connectivity and economic opportunities offered and are expected to experience a steady rise in traffic. The project highways are strategically located in the states with high economic activities. For further details on major economic activities in the influence region of project highways please see *"- Description of Our Toll Roads"* on page 164.

We believe that future development of highways along the Toll Roads and the increased government initiatives such as *Bharatmala Pariyojana* to improve efficiency across roads in India, will provide an impetus to the growth in traffic on the Toll Roads. Furthermore, each of the Toll Roads lie upon inter-city connection routes within the states of Jharkhand, Andhra Pradesh, Tamil Nadu and Karnataka, with passenger and commercial traffic.

***Significant growth visibility through a defined pipeline of future assets***

Through our relationship with the Sponsor, and in accordance with the approval granted by the chairman of NHAI *vide* letter dated December 01, 2025, our Sponsor will offer around 1,500.00 km of completed and operational national highways to the Trust over the next three to five years for monetization ("**Future Assets**"). We believe this structured access to the Sponsor's future portfolio provides a distinct competitive advantage and a structured roadmap for scaling the Trust.

To ensure disciplined growth, the Investment Manager has established a defined framework for identifying and selecting assets to be transferred to the Trust. This framework is designed to streamline the evaluation process with clear visibility on future scaling opportunities. The selection and acquisition of these Future Assets are governed by the Trust's rigorous investment criteria, which include assessments of yield accretion, traffic

diversity, residual concession periods, and geographic distribution. For a detailed description of these criteria and our acquisition framework, please see *"Our Strategy—Acquisition of toll road projects"* on page 161.

We believe that this access to future toll road assets of the Sponsor or its existing or future subsidiaries will be an important source of growth in the future

***Concession Agreement terms with low counterparty risk***

We believe that the Concession Agreements proposed to be entered into by the Project SPV have terms with low counterparty risk due to the creditworthiness of our Sponsor, being NHAI, a statutory body. We believe this, along with the following factors, provide for excellent prospects for our business:

- *Long concession life with the possibility for an extension:* Our Concession Agreements will be for a period of 15 years from the relevant Appointed Date, subject to the provisions of extension mentioned in the respective Concession Agreement. We believe this is a sufficiently long period that provides us with ample opportunity to refinance the assets on a fully amortized basis.

- *Termination payments:* Furthermore, our Concession Agreements provide for termination payments under various default scenarios such as NHAI events of default or *force majeure* events or concessionaire event of default. Under the Concession Agreements, NHAI is obligated to make termination payments in case of an event of default. NHAI's strong track record of meeting its obligations when they become due gives us confidence that any termination payments will be made in a timely manner. Such termination payments may be used to compensate our creditors.

- *Minimal price risk:* The toll rates for all Toll Roads are determined with reference to published base toll rates and are adjusted annually at the beginning of each fiscal year equal to 40% of the movement in the wholesale price index measured in December of the preceding year plus a fixed 3% as per NHAI Fee Rules. Given India's long track record of inflation rates as well as the 3% fixed portion of the increase, we anticipate an increase in toll rates over the life of the concession. We expect that this formula will minimize any risk of increasing operating costs over time.

- *Prohibition against additional tollways:* Subject to certain exemptions, NHAI is prohibited from constructing, or permitting the construction of, any competing expressway or other toll road ("**Additional Tollway**") between specified stretches of each Toll Road at any time during the relevant concession period. We will be compensated in line with the terms of the Concession Agreement if our toll collection activities are impacted by the Additional Tollway. NHAI is also obligated to use its best efforts to ensure that the tolls to be levied on vehicles using the Additional Tollway are at least 25.00% higher than the toll rates of the impacted Toll Road.

- *Prohibition against competing roads:* Subject to certain exemptions, NHAI is prohibited from constructing a Competing Road (as such term is defined in the Concession Agreements) of each of the Toll Roads during the respective concession periods.

- *Installation of additional check plazas:* Under the Concession Agreements, subject to certain restrictions we are permitted to install temporary or permanent fee collection booths to prevent fee evasion by users of the Toll Roads. We believe the installation of these check plazas will significantly decrease leakage in the Toll Roads, increasing cash collections and performance.

For details, see "*Summary of the Concession Agreements*" on page 195.

***Experienced management team with industry experience***

We will be managed by qualified personnel of the Investment Manager with majority of the personnel who have management and operational experience in the roads and highways sector for over two decades. In addition, qualified personnel of the Project Manager will manage our projects. For further details, in relation to the qualified personnel of the Investment Manager, see the section headed "*Parties to the Trust – The Investment Manager – Raajmarg Infra Investment Managers Private Limited*" on page 85. We believe that the experience and leadership of these teams will contribute to our growth and success and will position the Toll Road assets to be operated and managed in an efficient manner.

***Long term transitional support from NHAI ensuring operational continuity***

We will also benefit from a comprehensive and long-term Transitional Support Agreement to be entered into among the Sponsor, Project Manager, and the Project SPV. This agreement will ensure a seamless transition of the Toll Roads from NHAI-appointed contractors to our Project SPV by leveraging the Sponsor's expertise in managing O&M and tolling obligations. By providing support for a period of thirty months from the appointed date, the Transitional Support Agreement proposes to minimize execution risk and ensures that road service levels and tolling operations remain uninterrupted. The operational framework is designed to provide immediate revenue stability through fixed-fee tolling contracts with third-party contractors. Under these arrangements, the Sponsor will receive a fixed contracted fee on a regular basis from the third party contractors, which is independent of the actual quantum of toll collected by such third party contractors, thereby mitigating traffic volume volatility during the toll contracting period. Upon the consummation of the transaction, these remittances will be credited directly to the Project SPV, ensuring immediate cash flow accrual. This arrangement, combined with the Sponsor's obligation to operate tolling contracts on an "as is basis" from the appointed date, provides a highly visible and de-risked revenue stream for the Trust.

**Strategies of our Trust**

***Organic growth through proactive management***

Our principal investment strategy is to proactively manage the Toll Road assets to support growth. In particular, the Investment Manager will seek to maintain or improve the Project SPV's net incomes by, among other initiatives, curbing leakages, conducting proper due diligence, formulating and adopting policies and procedures and structuring investments to address tax or regulatory considerations. The Project Manager will assist the Investment Manager by carrying out the operations, management and maintenance of the project in accordance with the Concession Agreement and the Project Implementation and Management Agreement and by procuring, operating and maintaining the project's toll management systems, including but not limited to, employing staff for toll collection, monitoring toll collection and providing security arrangements at toll plazas.

The Investment Manager will also focus on minimizing project operating expenses. The roads and highways sector are a highly competitive sector that is capital intensive and requires significant expenditure. Our ability to efficiently manage the costs associated with the Toll Road assets is critical to maintaining the Project SPV's profit margins. The Investment Manager also intends to focus on increasing the margins of the Project SPV by strengthening internal processes and systems so as to improve utilization of resources and reduce costs. As part of our operations and maintenance systems and processes, the Investment Manager intends to work closely with the Project Manager to promote best practices, to minimize downtime or defects with respect to the Toll Road assets and to monitor performance of toll booth operators and maintenance contractors. The Investment Manager also intends to work with the Project Manager and the Project SPV to upgrade technology as needed, to manage any leakages in toll collections and to streamline collection, route and maintenance operations. With this focus on proactive asset management and operating expense minimization, the Investment Manager hopes to increase our profit margins and achieve long-term growth.

***Acquisition of toll road projects***

The Investment Manager intends to expand our initial portfolio by identifying and selectively acquiring additional toll road projects that meet our investment criteria described below. The Investment Manager intends to capitalize on opportunities to acquire road projects in India that provide attractive cash flows and yields. While evaluating acquisition opportunities, the Investment Manager intends to focus on, among other things, the following investment criteria in order to make asset selections:

- *Traffic characteristics*. The Investment Manager will seek to acquire assets with potential for traffic growth;
- *Residual concession period*. The Investment Manager will actively seek projects with residual concession periods of sufficient duration to meet the investment objectives of the Trust to generate stable returns and ensure long-term growth;
- *Geographic diversity*. The Investment Manager will seek projects in a variety of geographical locations in India to mitigate concentration risk and to take advantage of regional growth;
- *Traffic Diversity*: The current portfolio of InvIT Assets demonstrates a diversified traffic profile with a balanced mix of passenger and commercial vehicles, ensuring revenue is not overly reliant on any single vehicle class. This multi-modal traffic stream mitigates the risks of sectoral cyclicity and concentration,

providing high revenue resilience against localized economic shifts in specific industries or tourism. For further details please see – *"Description of our toll roads "* on page 164; and

- *Other*. In addition, the Investment Manager will also take into account factors such as estimated maintenance costs based on technical assessments of projects under evaluation, the impact of acquisitions on our expected distributions, and the requirements under the InvIT Regulations to propel our portfolio of completed and revenue generating projects.

***Optimization of capital structure***

The Investment Manager seeks to employ appropriate financing policies and diversify its sources of financing with the objective of minimizing the overall cost of capital, while maintaining a sustainable capital structure. Such financing and capital allocation decisions are undertaken within the framework of the Risk Management Policy adopted by the board of directors of the Investment Manager pursuant to the investment management agreement, which provides a structured and disciplined approach to the identification, assessment, monitoring and mitigation of risks associated with the Trust's business.

The Investment Manager operates within the borrowing limits prescribed under the InvIT Regulations, pursuant to which the maximum level of external debt of the Trust Group will not exceed 70.00% (or such other percentage as may be prescribed from time to time) of the value of the Trust's assets, and may adopt more conservative internal thresholds where considered appropriate to manage financial risk and protect Unitholder interests.

If it is in the interests of the Unitholders, the Investment Manager may also pursue growth opportunities that require raising additional capital through the issuance of new Units following an evaluation of the associated financial and risk implications in accordance with the Risk Management Policy.

***Seamlessly transition all aspects of the Toll Roads upon acquisition***

Each of the Toll Roads are publicly funded toll roads which have been operated, pursuant to annual toll contracts, by contractors or sub-contractors appointed by NHAI. Upon acquisition of the Toll Roads pursuant to the respective Concession Agreements, the operation and maintenance of each of the Toll Roads will be undertaken by the Project SPV, either directly or through third-party operation and maintenance contractors appointed by the Project SPV, from the concession commencement date or within such timelines as may be prescribed under the applicable Concession Agreements or Transitional Support Agreement. We expect to seamlessly transition the O&M of each of the Toll Roads in a timely and efficient manner to ensure continuity of operations and to minimize any disruption to toll collection, road usage or service levels.

Furthermore, we will also enter into a Transitional Support Agreement for the purpose of the Sponsor providing the transitional support to (i) the Project Manager in respect of its obligations under the Project Implementation and Management Agreement, and (ii) the Project SPV in respect of its O&M obligations and tolling obligations (*as provided under the Concession Agreements*). The terms and conditions of the Transitional Support Agreement shall, in respect of each Concession Agreement and the Project Implementation and Management Agreement, be effective and binding on the Parties for a period of thirty months from the appointed date, unless terminated earlier by mutual consent.

***Improve toll collection efficiencies across the Toll Roads***

We intend to transition from the existing hybrid ETC toll collection methods currently employed at the Toll Roads to automated toll collection system which we expect will improve efficiency, reduce leakage and decongest toll plazas. The adoption of automated toll collection system involves, among other things, the upgradation of toll management software to record vehicles crossing toll plazas, the usage of robust two-fold toll monitoring (including an automated traffic counter and vehicle classifiers to be installed at each toll lane and a remote video monitoring center to be established at our head office) and strict implementation of ETC at the toll lanes. This strategy is in line with the Government of India's initiatives to increase digitization, including the adoption of FASTags for all toll collections across India. Hitherto, the Toll Roads have seen an increasing share of ETC/FASTag-based toll collection, and according to the Traffic Report, this share is expected to grow further post the Government of India's initiative in the year 2021 mandating electronic toll payments.

Additionally, pursuant to the terms of the respective Concession Agreements, we propose to implement a barrier-less Multi-Lane Free Flow ("**MLFF**") tolling system at the proposed toll plaza location on each project highway stretch. The MLFF system will be based on Automatic Number Plate Recognition ("**ANPR**") cameras and RFID

technology, enabling electronic toll collection without physical barriers. The system is intended to facilitate seamless traffic movement, reduce congestion and improve tolling efficiency. The MLFF infrastructure will be integrated with the Central Clearing House and other authority-mandated platforms in accordance with applicable guidelines. The implementation and operation of the MLFF system will be undertaken in compliance with the specifications and performance standards prescribed by the authority under the Concession Agreements.

**Summary of our toll roads**

| Particulars | Gorhar-Barwa Adda | Chilakaluripet - Vijayawada | Chennai Bypass | Chennai - Tada | Neelmangla Tumkur |
|---|---|---|---|---|---|
| **Highway** | NH 19 | NH16 | NH 32 and NH 48 | NH 16 | NH 48 |
| **State** | Jharkhand | Andhra Pradesh | Tamil Nadu | Tamil Nadu | Karnataka |
| **PCOD** | October 16, 2021 and October 9, 2021 and October 5, 2010 (taking over certificate) | July 20, 2015 and October 29, 2024 | May 14, 2013* | February 9, 2022 | November 1, 2011 |
| **Length (km)** | 80.522 | 69.408 | 32.600 | 33.000 | 44.668 |
| **Length (lane km)** | 472.752 | 416.448 | 195.600 | 198.000 | 244.768 |
| **Number of lanes** | four/six | six | six | six | four/six |
| **Km chainage (km)** | Gorhar to Barwa Adda from km 320+810 to km 400+632 (design km 401+332) of NH-19 (old NH-2) | Chilakaluripet to Vijayawada from km 355+000 to km 357+342 and from km 372+038 to km 422+605 along with Chilakaluripet bypass section from 0+000 to km 16+499 of NH 16 | km 0+000 to km 32+600 of NH-32 and NH-48 | km 21+400 to km 54+400 of NH-16 | Neelmangla to Tumkur from km 29+500 to km 74+168 of NH-48 |
| **Toll plaza location** ***(Kilometric point location)*** | Kulgo (km 352+100) | Kaza (km 420+500) | Vanagram (km 16+500) / Tiruneermalai (km 6+500) Surapattu (km 28+600) | Nallur (km 21+625) / Durainallur (km 34+180) | Kulumepalya (km 30+000) Chokkenahalli (km 61+500), or Halenijagal (km 53+100) Bharathipura (km 46+375) Honnenahalli CP (km 47+425) Halenijagal (km 53+100) Dobbaspet (km 49+900) |
| **Pavement type** | Flexible/ Rigid at toll plaza | Flexible/ Rigid at toll plaza | Flexible/ Rigid at toll plaza | Flexible/ Rigid at toll plaza | Flexible/ Rigid at toll plaza |
| • **% of flexible** | 98% | 99.14% | 99.56% | 98.59% | 98.21% |
| • **% of rigid** | 2% | 0.86% | 0.44% | 1.41% | 1.79% |
| **Other concession end dates** | HAM-1: October 15, 2036 HAM-2: October 8, 2036 | HAM: October 28, 2039 | EPC: May 30, 2028 | EPC (six laning): February 09, 2026 | EPC and EPC (six laning): March 31, 2032 |
| **Current concessionaire**[(3)] | HAM- 1DBL Gorhar Khairatunda Highways Private Limited HAM-2: Ashoka Khairatunda Barwa Adda Road | HAM: Chilakaluripet Bypass Private Limited | EPC: Babuji Civil construction Private Limited | EPC: SPL Infrastructure Private Limited | EPC: H G Infra Engineering Limited |

| Particulars | Gorhar-Barwa Adda | Chilakaluripet - Vijayawada | Chennai Bypass | Chennai - Tada | Neelmangla Tumkur |
|---|---|---|---|---|---|
| | Limited | | | | |
| **Tolling handover date** | April 1, 2026 | | | | |
| **Concession agreement end date** | March 31, 2041 | | | | |
| **Concession Period** | 15 years | | | | |
| **O&M handover date** | Stretch-1: April 1, 2026;<br>Stretch-2: October 15, 2036<br>Stretch-3: October 8, 2036 | Stretch 1 and 3: March 24, 2032<br>Stretch 2: October 28, 2039 | April 1, 2026 | April 1, 2026 | Stretch 1 and 3: March 31, 2032;<br>Stretch-2: June 5, 2029 |
| **Capacity augmentation** | Please see note 4 below | NA | NA | NA | Please see note 5 below |

**date of toll notification*

*Notes:*

*(1) Maintenance for project stretches to continue under scope of existing concessionaire until end of current concession.*

*(2) Appointed date as per the relevant Concession Agreements. Transition agreement to be entered into between NHAI and the Trust to manage tolling and O&M for the first 6 months*

*(3) The PCOD dates mentioned herein are for the respective stretches for which the PCOD certificates were granted for such InvIT Assets*

*(4) DPR for Stretch 1 in progress. NHAI to decide on capacity augmentation post DPR acceptance.*

*(5) The EPC contract for six laning of Stretch 1 and 3 awarded to H G Infra Engineering Limited with expected PCOD of March 31, 2027. The bids for preparation of DPR for six laning for Stretch 2 has been invited. NHAI to decide on capacity augmentation post DPR acceptance.*

**Description of our Toll Roads**

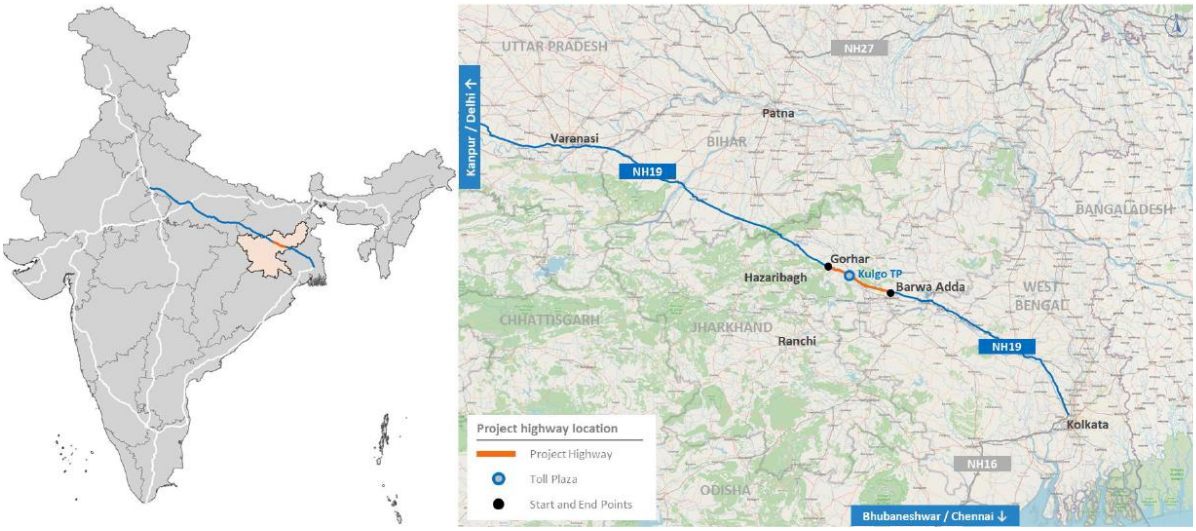
- ***Gorhar to Barwa Adda***

*Project overview*

The asset comprise the four/six lane section from Gorhar to Barwa Adda from km 320+810 to km 400+632 (design km 401+332) of NH-19 (old NH-2), comprising km 320+810 to km 326+000 between Gorhar and Atka, being a four lane section; Atka to Khairatunda from km 326+000 to km 360+300 (design km 361+000) and Khairatunda to Barwa Adda from km 360+300 (design km 361+000) to km 400+632 (design km 401+332), being six lane sections, in the state of Jharkhand, having total length of 80.522 km. According to Traffic Report, the project

highway is an integral part of golden quadrilateral along NH19, a strategic long-distance transport corridor linking Delhi/Agra and Kolkata.

The map below illustrates the location of the project and the corridor it covers



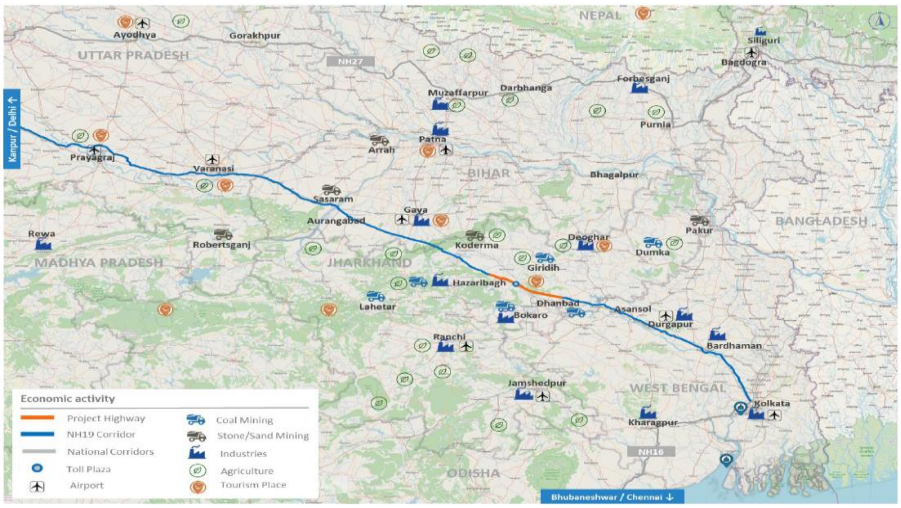

*Source: Traffic Report.*

*Salient growth features and traffic generators*

The project highway serves as critical inter-state traffic, ensuring all-weather connectivity among Uttar Pradesh, Bihar, Jharkhand and West Bengal and supporting efficient regional freight and passenger movement. In addition to providing national connectivity, the project highway also provides regional and local linkages across eastern India. It facilitates medium-distance movement between key urban and industrial centres in Bihar, Uttar Pradesh, Jharkhand, West Bengal and Odisha, supporting the transport of manufacturing goods, construction materials and petroleum products. The corridor additionally serves short-distance commuter and commercial traffic between regional nodes such as Gaya, Ranchi, Dhanbad, Barhi, Chouparan, and Hazaribagh, ensuring year-round connectivity. Notably, it enables the movement of coal from Dhanbad, the mining capital of Jharkhand, to industrial centres in West Bengal, reinforcing its importance to regional supply chains. *(Source: Traffic Report)*

The project highway is strategically located in Jharkhand which consists of about 40% of the country's mineral wealth which includes coal, iron ore, copper ore, etc. The Jharkhand's industries enjoy location advantage within eastern India being close to the in the region, raw material and access to ports of Kolkata, Haldia and Paradip. *(Source: Traffic Report)*

The map below illustrates the major economic activities in the influence region:




*Source: Traffic Report.*

**Traffic volume and composite of vehicles**

**Historical traffic data**

Gorhar to Barwa Adda demonstrates a growth trajectory with a projected total CAGR of 6.3% (3.5% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025. The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

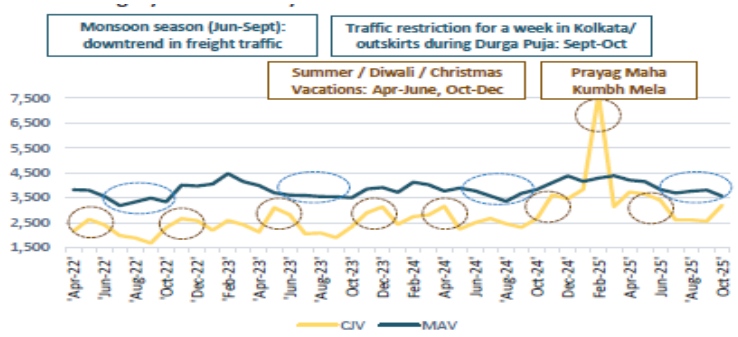
Vehicle category-wise traffic growth trend - ETC

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 2,287 | 561 | 251 | 283 | 938 | 901 | 3,762 | 8,983 | 26,518 |
| FY24 | 2,533 | 552 | 300 | 301 | 1,022 | 876 | 3,759 | 9,343 | 27,047 |
| FY25 | 3,273 | 608 | 345 | 343 | 1,162 | 890 | 3,931 | 10,553 | 29,274 |
| FY26 till Oct'25 | 3,106 | 746 | 387 | 316 | 1,208 | 847 | 3,859 | 10,470 | 28,913 |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 10.8% | (1.6%) | 19.3% | 6.6% | 8.9% | (2.8%) | (0.1%) | 4.0% | 2.0% |
| FY25 vs FY24 | 29.2% | 10.2% | 15.1% | 13.7% | 13.7% | 1.6% | 4.6% | 13.0% | 8.2% |
| FY26* vs FY25 | (5.1%) | 22.6% | 12.1% | (7.9%) | 3.9% | (4.8%) | (1.8%) | (0.8%) | (1.2%) |
| CAGR (FY23 – FY26 YTD) | 13.0% | 12.1% | 18.9% | 4.5% | 10.6% | (2.4%) | 1.0% | 6.3% | 3.5% |

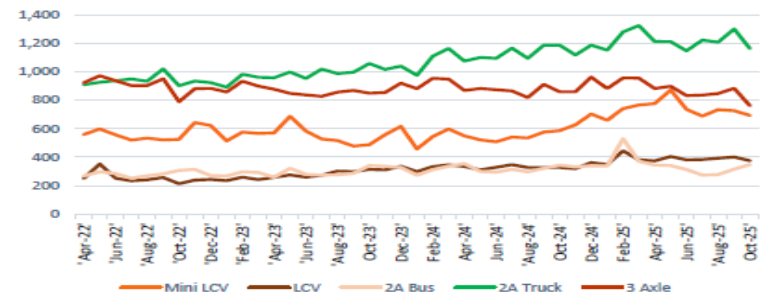
*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October, 2025*

**Monthly Average Daily Traffic**

The chart below presents data available on a monthly basis starting April 2022 up to October 2025 for the Kulgo toll plaza on Gorhar to Barwa Adda.




*Source: Traffic Report*



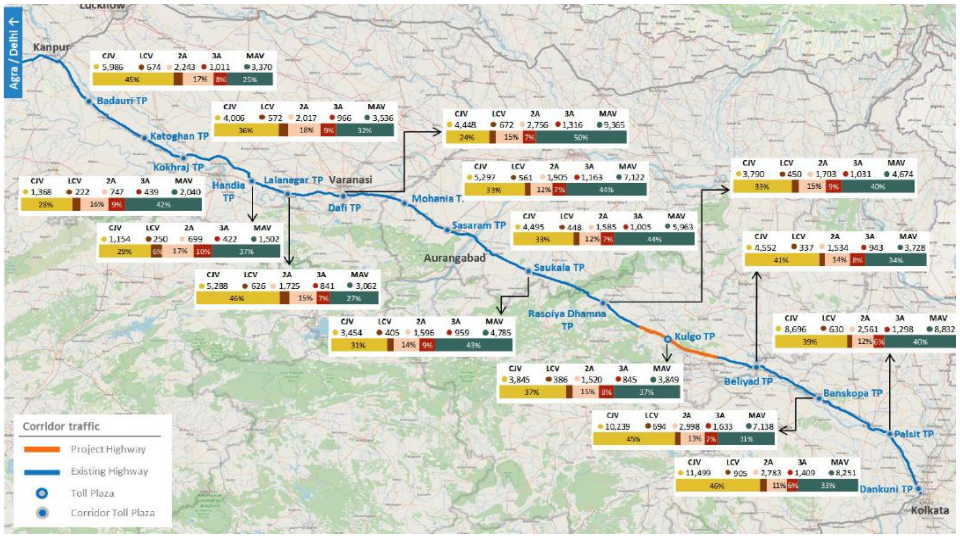

*Source: Traffic Report*

**Monthly reported traffic on the surrounding assets/connecting roads**

The Gorha -Barwa Adda project highway serves as a critical link within the Kanpur - Kolkata Corridor of NH19, with the Kulgo toll plaza. According to the Traffic Report, this asset's traffic profile is benchmarked against

proximal upstream and downstream plazas, such as Rasoiya Dhamna (~34,000 PCU) and Beliyad (~30,000 PCU). Additionally, the project highway section of Gorhar to Barwa Adda demonstrates a stable medium-term growth trajectory with a projected total CAGR of ~5% (~3.5% in PCU terms), closely aligning with the ~5% (~6% in PCU terms) CAGR observed in the neighbouring Barachatti - Gorhar section.

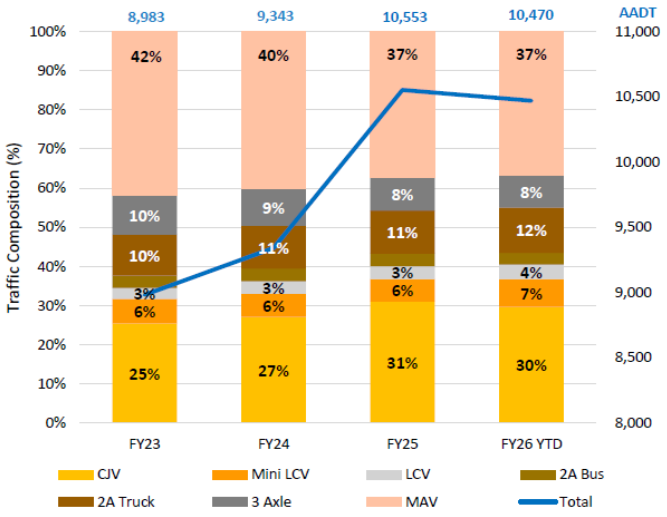
Growth projections for the section are tied to regional industrial outputs, specifically the production of finished steel and coal from the influence regions of Jharkhand and West Bengal. High-capacity freight, including MAVs and 3A Trucks, represents a significant portion of the corridor's AADT, reflecting the specialized commodity movement of the region. Consequently, the traffic composition and elasticity values are aligned with the weighted average GSDP of the surrounding four-state influence zone. Hence, according to the Traffic Report it is reasonable to believe that the traffic profile on this asset will mirror the profile of surrounding assets/connecting roads. The chart below indicates the traffic profile on the surrounding assets/connecting roads of Kulgo toll plaza for 7 months ADT of Fiscal 2026 till October 2025.




*Source: Traffic Report*

**Toll Segmentation**

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Kulgo toll plaza. For further details in this regard, please refer to Annexure C:




*Source: Traffic Report*

**Base year Annual Average Daily Traffic**

The table below shows Fiscal 2026 Annual Average Daily Traffic ("**AADT**") estimated using the counts and the variance factors:

| Particulars | Kulgo toll plaza |
|---|---|
| Car / Jeep/ Van | 4,617 |
| Mini LCV | 909 |
| Minibus/LCV | 391 |
| Buses | 342 |
| 2A Truck | 1,228 |
| 3A Truck | 876 |
| MAV | 4,135 |
| OSV | 3 |
| **AADT** | 12,500 |
| **PCU** | 32,069 |

*Source: Traffic Report*

**Elasticity recommendations**

As per the Traffic Report, travel demand elasticity for the project highway is driven by a combination of macro-economic trends and regional industry-specific factors. For passenger and light commercial vehicles, elasticity is primarily benchmarked against the weighted average GSDP of Jharkhand, West Bengal, Bihar, and Uttar Pradesh. For heavy commercial vehicle demand, particularly for 2A Trucks, 3A Trucks is influenced by industrial output, including the production of finished steel within the primary influence regions of Jharkhand, West Bengal, and Odisha. For multi-axle vehicle, elasticity is primarily benchmarked against influence region by industrial output, including the production of finished steel and coal within the primary influence regions of Jharkhand, West Bengal, and Odisha and production of coal from Jharkhand and West Bengal. Consequently, adopted elasticity values ranging from 0.85 - 1.00 for MAV to 0.75 - 1.10 for light commercial vehicles reflecting the diverse socio-economic conditions of the corridor. These estimates sourced from the Traffic Report rely on historical traffic data and benchmark references from proximal toll plazas to align growth projections with regional economic activity.

**Projected Traffic Data: Growth in Passenger Car Unit (PCU)**

The Traffic Report also projects that there will be growth in PCU of Gorhar to Barwa Adda across all vehicle types from Fiscal 2026 till Fiscal 2041. For detailed analysis on the traffic growth rates, please refer to Annexure C.

**Operation and maintenance**

Two stretches Gorhar to Barwa Adda Toll Road is currently operated under the HAM model, whereby the HAM concessionaire is responsible for construction, operation and maintenance of the toll road while the relevant authority collects tolls and makes annuity payments to the HAM concessionaire. The current concessionaires are DBL Gorhar Khairatunda Highway Private Limited and Ashoka Khairatunda Barwa Adda Road Limited with October 15, 2036 and October 8, 2036 being the O&M handover date. We expect the current concessionaire /contractor to operate and maintain the respective works/stretches up to the DLP/maintenance period as per the provisions of the respective concession agreements. After end of DLP/maintenance period, the works/stretches shall be handed over to the InvIT -Concessionaire for operation and maintenance as per scope of the Concession Agreement.

**Tollable Length and Toll Rates**

In terms of tollable length, the Gorhar to Barwa Adda Toll Road comprises 87.231 km of roads. In India, toll rates are as per notification by the Ministry of Road Transport and Highways in the Gazette of India. The present toll rates are determined with reference to the published base toll rates and are adjusted annually at the beginning of each fiscal year equal to 40% of the movement in the wholesale price index in December of the preceding year plus a fixed 3%.

According to the NHAI's revision of user fee letter dated September 30, 2025, the toll rates at the Kulgo toll plaza for the Gorhar to Barwa Adda Toll Road are as follows:

| **Vehicle Type** | **Single Journey** | **Multiple Journey** | **Monthly Pass (50 single-journeys in a month)** | **Fee for Commercial Vehicle Registered within the district of the toll plaza** |
|---|---|---|---|---|
| | | | | *(Rs.)* |
| Car/Jeep/Van or LMV | 130 | 195 | 4,285 | 65 |
| LCV, LGV or Minibus | 210 | 310 | 6,925 | 105 |
| Bus/Truck (2 Axle) | 435 | 655 | 14,505 | 220 |
| 3 Axle Commercial Vehicles | 475 | 710 | 15,825 | 235 |
| HCM/EME or MAV (4 to 6) | 680 | 1,025 | 22,750 | 340 |
| Oversized vehicles (7 or more axles) | 830 | 1,245 | 27,695 | 415 |

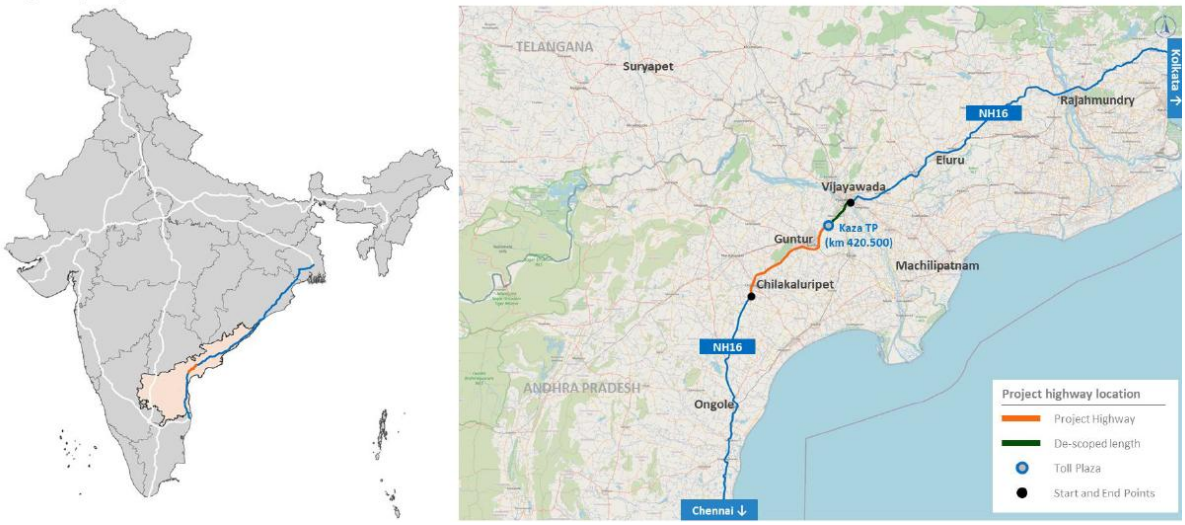
*The rate of monthly pass applicable for local non-commercial residing within a distance of 20km from the toll plaza for the year 2025-2026 shall be Rs. 340*

- ***Chilakaluripet-Vijayawada:***

*Project overview*

The project comprises the six lane section from Chilakaluripet to Vijayawada from km 355+000 to km 357+342 and from km 372+038 to km 422+605 along with Chilakaluripet Bypass section from 0+000 to km 16+499 of NH 16, in the state of Andhra Pradesh, having total length of 69.408 km. This project is a part of NH16 which is a major Indian highway running along the country's, to eastern coast, connecting Kolkata, West Bengal and Chennai, Tamil Nadu. It forms part of the Golden Quadrilateral project/east coast corridor and connects key urban cities such as Bhubaneswar, Visakhapatnam and Vijayawada.

Project highway location in national and state context




*Source: Traffic Report.*

*Salient growth features and traffic generators*

According to the Traffic Report, the project highway is strategically located at the central region of Andhra Pradesh and, hence, acts as the spinal cord for the state by extending connectivity to different parts of the country, namely West Bengal and Odisha in the north and Karnataka and Tamil Nadu in the south. The NH16 corridor has evolved over the past few years and has witnessed an increase in traffic volumes along with an improvement in the level of service across the corridor. Its improved connectivity boosts economic activities, supports agriculture and manufacturing hubs, and strengthens links to major ports and markets along the east coast.

According to the Traffic Report, the project highway is strategically located in Andhra Pradesh which is the 8$^{th}$ largest state in country and contributes approximately 4.9% of India's GDP. The presence of 15 operational ports along the coastline helps in uplifting the industry landscape. Andhra Pradesh is among the top five exporting States in India.

The map below illustrates the major economic activities in the influence region:




*Source: Traffic Report.*

**Traffic volume and composite of vehicles**

**Historical traffic data**

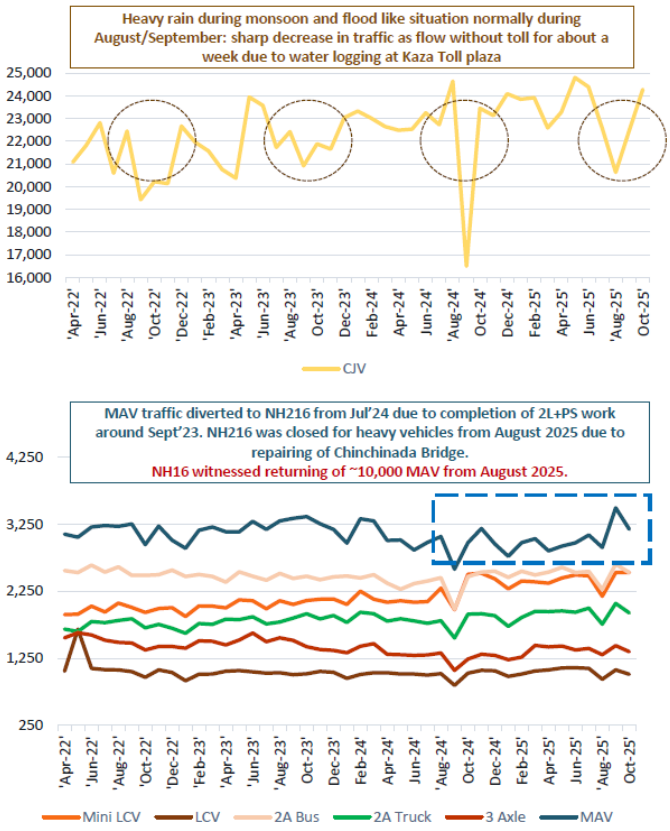
Chilakaluripet - Vijayawada demonstrates a growth trajectory with a projected total CAGR of 2.8% (1.6% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025. The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 21,295 | 1,976 | 1,091 | 2,528 | 1,739 | 1,492 | 3,125 | 33,246 | 56,246 |
| FY24 | 22,385 | 2,099 | 1,030 | 2,462 | 1,850 | 1,494 | 3,229 | 34,518 | 57,886 |
| FY25 | 22,774 | 2,264 | 1,013 | 2,407 | 1,819 | 1,283 | 2,951 | 34,512 | 56,367 |
| FY26 till Oct'25 | 23,207 | 2,431 | 1,060 | 2,523 | 1,941 | 1,387 | 3,058 | 35,609 | 58,546 |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 5.1% | 6.2% | (5.6%) | (2.6%) | 6.4% | (1.9%) | 3.3% | 3.8% | 2.9% |
| FY25 vs FY24 | 1.7% | 7.9% | (1.6%) | (2.2%) | (1.6%) | (12.4%) | (8.6%) | 0.0% | (2.6%) |
| FY26* vs FY25 | 4.3% | 12.3% | 6.5% | 8.2% | 8.7% | 9.7% | 4.4% | 5.6% | 6.0% |
| CAGR (FY23 - FY26 YTD) | 3.5% | 8.6% | (1.1%) | (0.1%) | 4.5% | (2.9%) | (0.9%) | 2.8% | 1.6% |

*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October.*

**Monthly Average Daily Traffic**

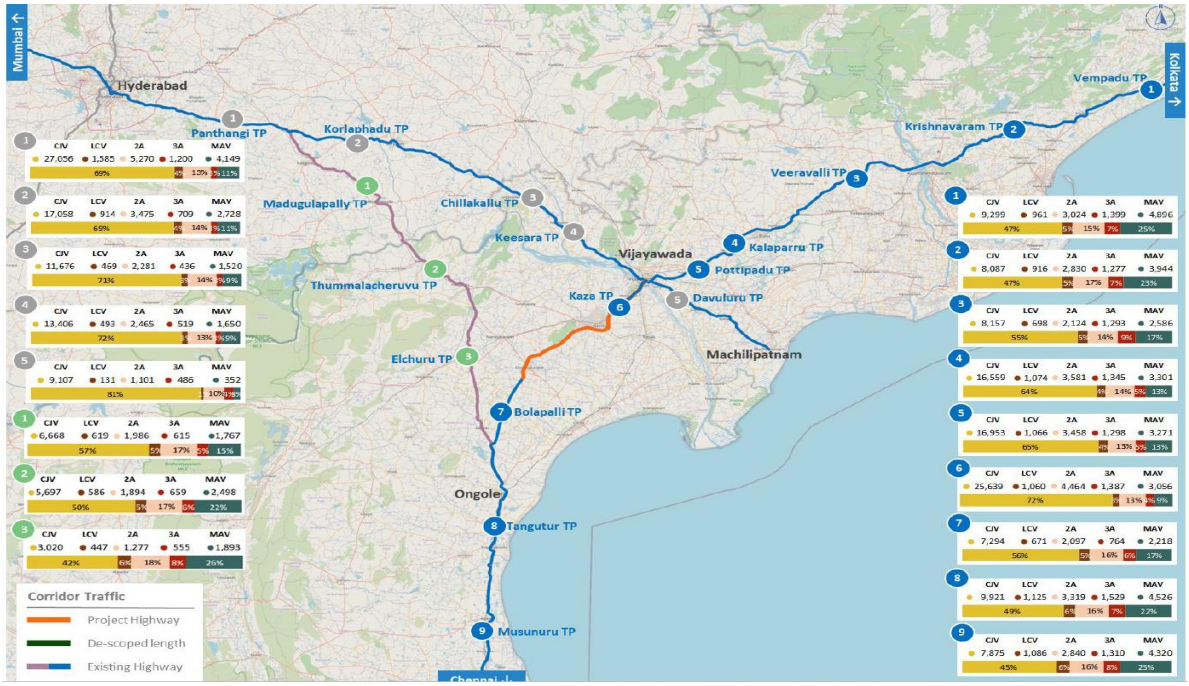
The chart below presents data available on a monthly basis starting April 2022 up to October 2025 for the Kaza toll plaza on Chilakaluripet - Vijayawada.




*Source: Traffic Report.*

**Monthly reported traffic on the surrounding assets/connecting roads**

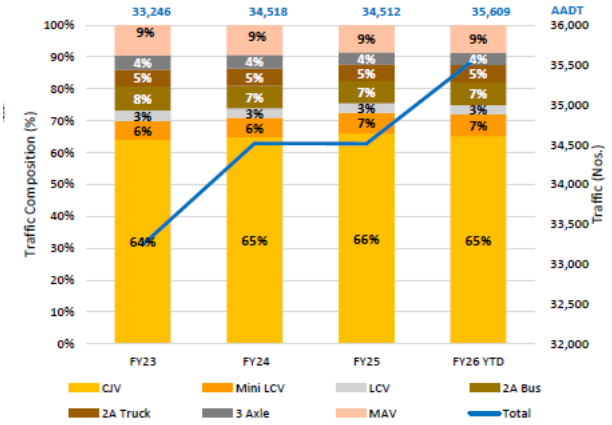
Chilakaluripet - Vijayawada project highway is integral part of strategic NH16. The traffic growth was witnessed at healthy and sustainable pace every year till Fiscal 2020. According to the Traffic Report, only immediate tollable section in south of the project highway can act as benchmark for determining long term growth rate. The neighbouring highway section (Pottipadu TP) on north of the project highway (Kaza TP) witness traffic of Hyderabad and till Vijayawada and hence, traffic characteristics are different. The corridor has witnessed a CAGR of 6.7% (5% in PCU terms) over the period of fiscal 2015 to fiscal 2019 and a CAGR of 5% (3% in PCU terms) over the period of fiscal 2019 to fiscal 2024. The chart below indicates the traffic profile on the surrounding assets/connecting roads at the Kaza toll plaza for 7 months ADT of Fiscal 2026 till October 2025:




*Source: Traffic Report*

**Toll Segmentation**

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Kaza toll plaza. For further details in this regard, please refer to Annexure C:




*Source: Traffic Report*

**Base year Annual Average Daily Traffic**

The table below shows Fiscal 2026 AADTs estimated using the counts and the variance factors:

| Asset | Kaza toll plaza |
|---|---|
| Car/Jeep/Van | 25,073 |
| Mini LCV | 2,482 |
| Mini Bus/LCV | 1,089 |
| Buses | 2,525 |
| 2A Truck | 2,000 |
| 3A Truck | 1,388 |
| MAV | 3,164 |
| OSV | 3 |
| **Total AADT** | **37,725** |
| **Total PCU** | **61,180** |

*Source: Traffic Report*

**Elasticity recommendations**

As per the Traffic Report, travel demand elasticity for the project highway is driven by a combination of macro-economic trends and regional industry-specific factors. For passenger vehicles and buses, elasticity is primarily benchmarked against the GSDP of Andhra Pradesh, while for Mini LCVs, 2A Trucks and 3A Trucks, it is influenced by the weighted average of GDP and the GSDP of Andhra Pradesh and Tamil Nadu. The adopted elasticity values reflect the corridor's role in industrial and agricultural trade across the eastern coastal influence zone. These estimates, sourced from the Traffic Report, rely on historical traffic data and benchmark references from proximal toll plazas to align growth projections with regional economic activity.

**Projected Traffic Data: Growth in Passenger Car Unit (PCU)**

The Traffic Report also projects that there will be growth in PCU of Chilakaluripet - Vijayawada across all vehicle types from Fiscal 2026 till Fiscal 2041. For detailed analysis on the traffic growth rates, please refer to Annexure C .

**Operation and maintenance**

The Project Highway Vijayawada- Chilakaluripet section is under performance based maintenance contract ("**PBMC**") from Km 355+000 to Km 357+342 & from Km 372+038 to Km 422+605 and under HAM from Km 0+000 to Km 16+499. In the HAM concession, the HAM concessionaire is responsible for construction, operation and maintenance of the toll road while the relevant authority collects tolls and makes annuity payments to the concessionaire. The current PBMC contractor is Shiva Build Tech Private Limited and the current HAM concessionaire is Chilakaluripet Bypass Private Limited. We expect the current concessionaire/contractor to

operate and maintain the project up to the O&M Handover Date pursuant to and in accordance with the existing concession/contract agreements. The O&M Handover Date for the Chilakaluripet-Vijayawada Toll Road on March 24, 2032 from Shiva Build Tech Private Limited for PBMC and on October 28, 2039 from Chilakaluripet Bypass Private Limited for HAM.

**Tollable Length and Toll Rates**

In terms of tollable length, the Chilakaluripet-Vijayawada Toll Road comprises 80.802 km of roads. In India, toll rates are as per notification by the Ministry of Road Transport and Highways in the Gazette of India. The present toll rates are determined with reference to the published base toll rates and are adjusted annually at the beginning of each fiscal year equal to 40% of the movement in the wholesale price index in December of the preceding year plus a fixed 3%.

According to the NHAI's letter dated September 30, 2025, the toll rates at the Kaza toll plaza for the Chilakaluripet-Vijayawada Toll Road are as follows:

| Vehicle Type | Single Journey | Multiple Journey | Monthly Pass (50 single-journeys in a month) | Fee for Commercial Vehicle Registered within the district of the toll plaza |
|---|---|---|---|---|
| | | *(Rs.)* | | |
| Car/Jeep/Van or LMV | 170 | 255 | 5,620 | 85 |
| LCV, LGV or Minibus | 270 | 410 | 9,080 | 135 |
| Bus/Truck (2 Axles) | 570 | 855 | 19,020 | 285 |
| 3 Axle Commercial Vehicles | 625 | 935 | 20,750 | 310 |
| HCM/EME or MAV (4 to 6 Axles) | 895 | 1,340 | 29,830 | 445 |
| Oversized vehicles (7 or more axles) | 1,090 | 1,635 | 36,315 | 545 |

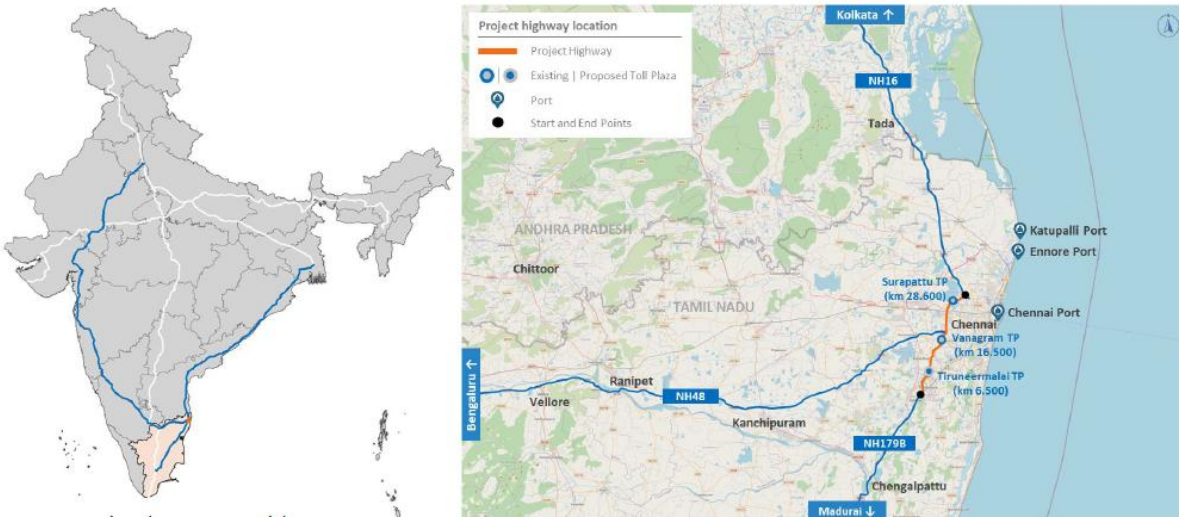
*The rate of monthly pass applicable for local non-commercial residing within a distance of 20km from the toll plaza for the year 2025-2026 shall be Rs. 340.*

- ***Chennai Bypass***

*Project overview*

Chennai Bypass is a six lane section from km 0+000 to km 32+600 of NH-32 and NH-48, in the state of Tamil Nadu, having total length of 32.600 km, connecting Chennai to south Tamil Nadu.

Project highway plays a significant role in reducing congestion within Chennai city and streamlining traffic flow along the north-south corridor in the state and upwards journey towards Andhra Pradesh when conceptualized. It caters to substantial intra-city and port-related traffic, including movements between Bengaluru/western and Chennai maritime cluster covering ports of Chennai, Ennore and Kattupalli.



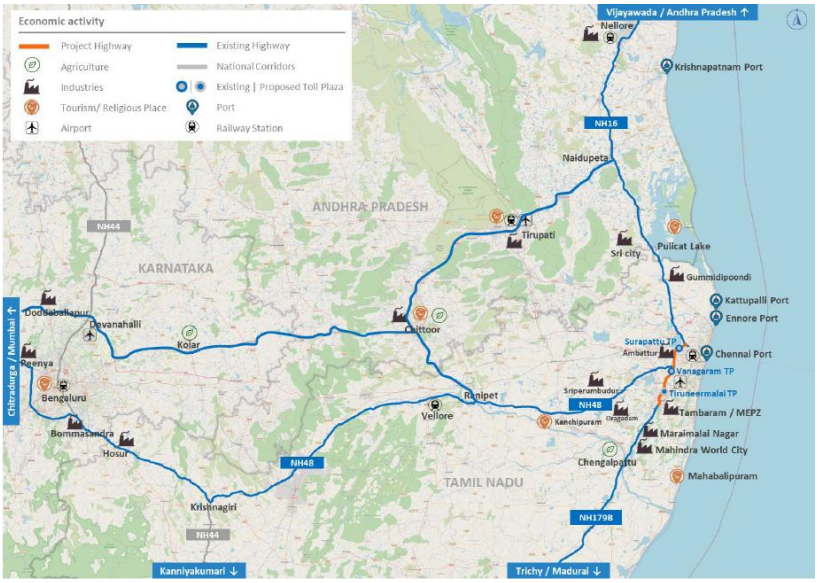

*Source: Traffic Report.*

*Note:*
*Present toll plaza at Vanagram location is to be shifted to Tiruneermalai due to identified black spot near toll plaza and proposed construction of Vehicular Underpass (VUP) at km 16.890*

### *Salient growth features and traffic generators*

According to the Traffic Report, Tamil Nadu is one of India's most industrialized state, with a diversified economy driven by manufacturing, services and agriculture. Tamil Nadu's strategic coastal location along the Bay of Bengal supports strong maritime trade through Chennai, Ennore, Kattupalli and Thoothukudi ports. Due to the rapid urbanization of Chennai, the bypass now functions as an integral part of the city's internal road network, handling substantial intra-city and suburban traffic. It supports the daily movement of commuters, goods vehicles, and port related transport between industrial clusters, residential zones, and logistics parks. Additionally, it provides last-mile connectivity to city distribution centers and container yards, contributing to the efficient functioning of the urban freight ecosystem within the Chennai region.

The map below illustrates the major economic activities in the influence region:




*Source: Traffic Report.*

## Traffic volume and composite of vehicles

### Historical traffic data

Surapattu toll plaza of Chennai Bypass demonstrates a growth trajectory with a projected total CAGR of 9.7% (4.1% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025. The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

Vehicle category-wise traffic growth trend

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 8,139 | 2,282 | 2,365 | 168 | 1,333 | 1,417 | 3,836 | **19,538** | **39,980** |
| FY24 | 9,558 | 2,706 | 2,491 | 193 | 1,297 | 1,185 | 3,633 | **21,064** | **40,377** |
| FY25 | 10,652 | 3,057 | 2,542 | 220 | 1,231 | 1,021 | 3,686 | **22,409** | **41,526** |
| FY26 till Oct'25 | 12,197 | 3,464 | 2,737 | 208 | 1,283 | 990 | 3,765 | **24,645** | **44,154** |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 17.4% | 18.6% | 5.3% | 15.1% | (2.7%) | (16.4%) | (5.4%) | **7.8%** | **1.0%** |
| FY25 vs FY24 | 11.4% | 13.0% | 2.0% | 14.0% | (5.1%) | (13.8%) | 1.5% | **6.4%** | **2.8%** |
| FY26* vs FY25 | 15.9% | 16.5% | 5.0% | (7.3%) | 0.5% | (9.3%) | (3.3%) | **9.1%** | **3.3%** |
| CAGR (FY23 – FY26 YTD) | 17.6% | 18.2% | 6.0% | 8.9% | (1.5%) | (13.4%) | (0.7%) | **9.7%** | **4.1%** |

*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October.*

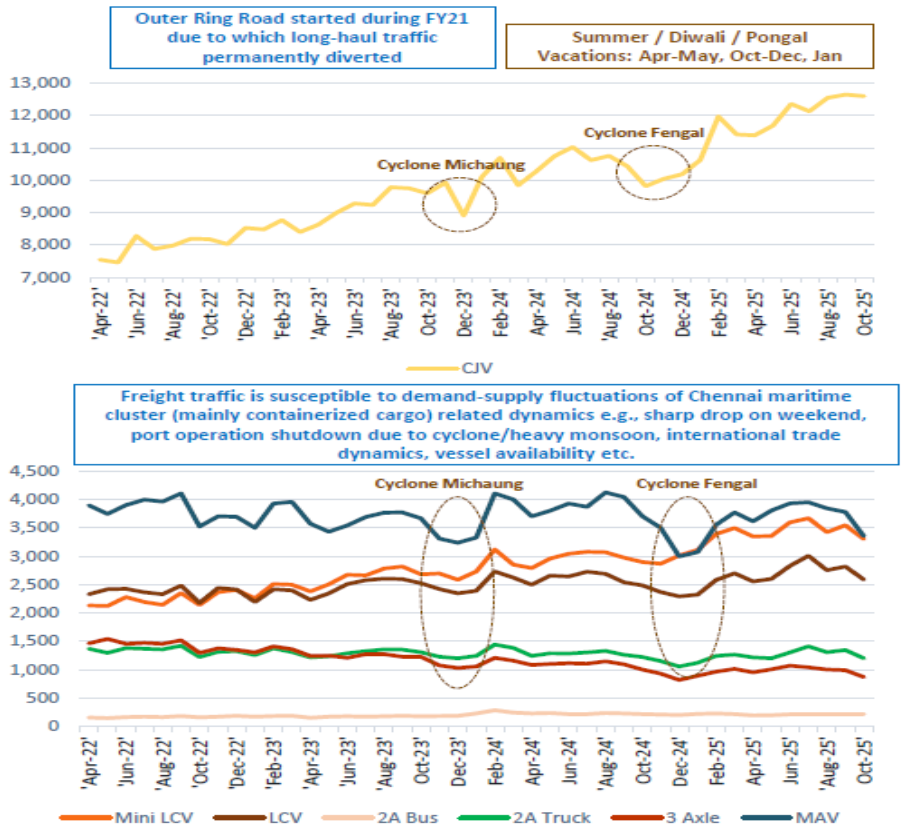
Vanagram toll plaza of Chennai Bypass demonstrates a growth trajectory with a projected total CAGR of 16.0% (12.3% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025. The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 17,566 | 2,772 | 1,970 | 890 | 1,100 | 788 | 1,781 | **26,867** | **39,641** |
| FY24 | 19,468 | 2,927 | 1,826 | 998 | 990 | 653 | 1,866 | **28,728** | **41,454** |
| FY25 | 23,197 | 3,549 | 1,874 | 1,328 | 887 | 560 | 1,869 | **33,264** | **46,293** |
| FY26 till Oct'25 | 27,725 | 4,166 | 2,034 | 1,505 | 934 | 565 | 2,007 | **38,936** | **52,985** |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 10.8% | 5.6% | (7.3%) | 12.2% | (10.0%) | (17.1%) | 4.5% | **6.9%** | **4.6%** |
| FY25 vs FY24 | 19.2% | 21.2% | 2.6% | 33.0% | (10.4%) | (14.3%) | 0.4% | **15.8%** | **11.7%** |
| FY26* vs FY25 | 23.7% | 22.7% | 3.3% | 16.8% | (3.9%) | (9.9%) | (2.3%) | **19.0%** | **13.5%** |
| CAGR (FY23 – FY26 YTD) | 20.0% | 17.7% | 1.3% | 23.4% | (6.3%) | (12.5%) | 4.9% | **16.0%** | **12.3%** |

*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October.*

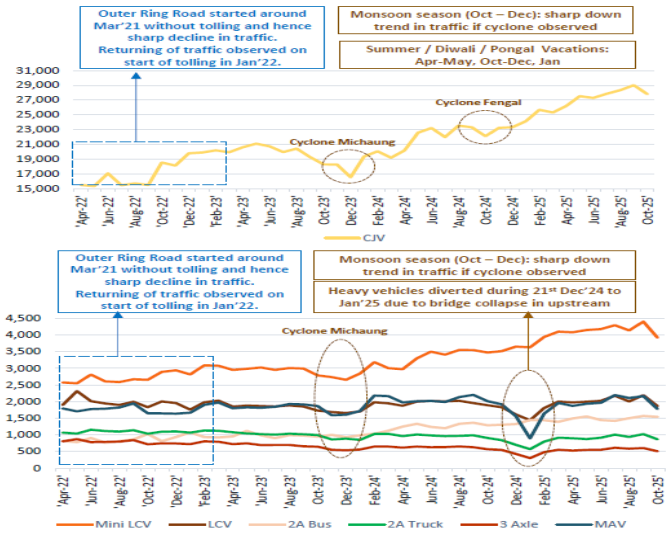
### Monthly Average Daily Traffic

The chart below presents the reported traffic volume for Surapattu toll plaza on Chennai Bypass, in terms of monthly traffic trend from April 2022 to October 2025.




*Source: Traffic Report*

The chart below presents the reported traffic volume for Vanagram toll plaza on Chennai Bypass, in terms of monthly traffic trend from April 2022 to October 2025.



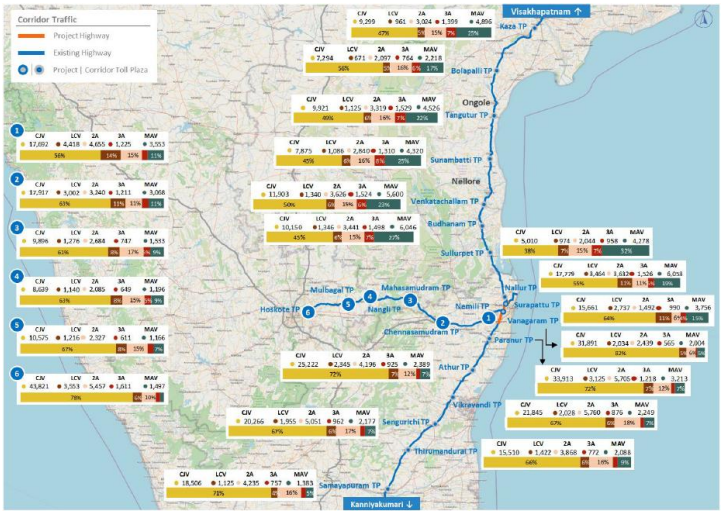

*Source: Traffic Report*

**Monthly reported traffic on the surrounding assets/connecting roads**

Chennai Bypass serves as a vital arterial link connecting NH16 and NH45, with the Vanagram and Surapattu toll plazas. According to the Traffic Report, this asset's traffic profile is benchmarked against proximal plazas such as Nallur and Paranur, which demonstrate consistent heavy urban and port-bound flow patterns.

Growth projections for the section are tied to regional economic drivers, including the rapid urbanization of the Chennai Metropolitan Area and industrial output from the surrounding automotive and manufacturing districts.

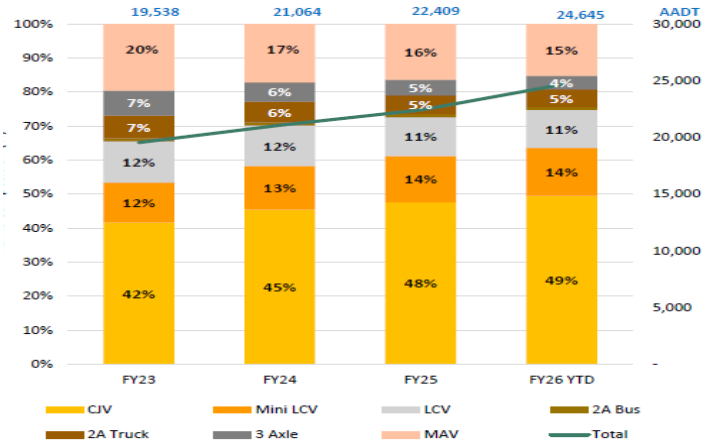
Additionally, the project corridor demonstrates a robust demand profile, driven significantly by heavy freight and high-frequency urban passenger traffic. Hence, it is reasonable to believe that the traffic profile on Chennai Bypass will mirror the profile of immediate tollable sections north and south of the project highway. The chart below indicates the traffic profile on the surrounding assets/connecting roads at the Chennai Bypass toll plaza for 7 months ADT of Fiscal 2026 till October 2025.




*Source: Traffic Report*

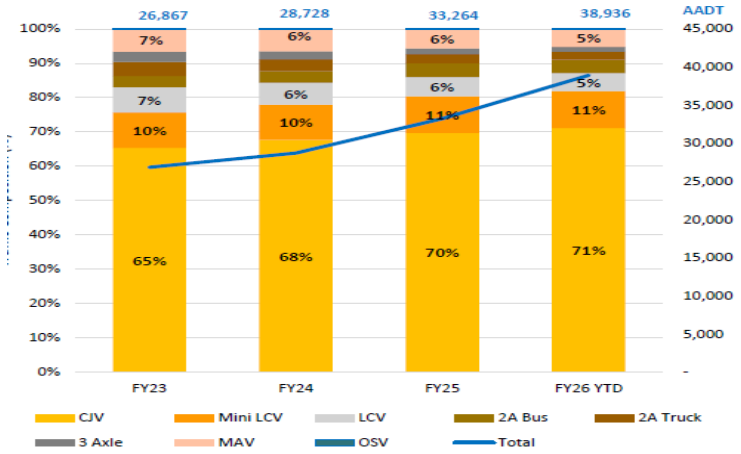
**Toll Segmentation**

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Surapattu toll plaza:




*Source: Traffic Report*

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Vanagram toll plaza:




*Source: Traffic Report*

For further details in this regard, please refer to Annexure C.

**Base year Annual Average Daily Traffic**

The below shows Fiscal 2026 ADTs estimated using the counts and the variance factors:

| **Asset** | **Surapattu TP** | **Vanagram TP** |
|---|---|---|
| Car/Jeep/Van | 14,081 | 29,235 |
| Mini LCV | 3,579 | 4,546 |
| Mini Bus/LCV | 2,791 | 2,049 |
| Bus | 265 | 2,945 |
| 2A Trucks | 1,332 | 1,060 |
| 3A Trucks | 1,007 | 551 |
| MAV | 3,765 | 2,008 |
| OSV | 13 | 7 |
| **Total AADT** | **26,833** | **42,400** |
| **PCU** | **46,659** | **59,587** |

*Source: Traffic Report*

**Elasticity recommendations**

As per the Traffic Report, travel demand elasticity for the project highway is driven by a combination of macro-economic trends and specific regional urban drivers. For passenger vehicles, mini LCVs, and LCVs, elasticity is primarily benchmarked against the weighted average GSDP of Tamil Nadu and the Gross District Domestic Product of the Chennai, Kancheepuram, Chengalpattu, and Thiruvallur districts. For heavy commercial vehicles, particularly 2A Trucks, 3A Trucks and MAVs, demand is further influenced by Chennai port cluster container traffic in addition to regional economic metrics. These estimates, sourced from the Traffic Report, rely on historical traffic data and benchmark references from proximal toll plazas to align growth projections with regional economic activity.

**Projected Traffic Data: Growth in Passenger Car Unit (PCU)**

The Traffic Report also projects that there will be growth in PCU of Chennai Bypass across all vehicle types from Fiscal 2026 till Fiscal 2041. For detailed analysis on the traffic growth rates, please refer to Annexure C.

**Operation and maintenance**

The Chennai Bypasss section is under O&M (Annual Maintenance) from km 0+000 to Km 32+600 and under EPC (major maintenance) from Km 0+000 to Km 32+600. The existing concessionaire/ contractor shall operate

and maintain the project up to O&M handover date pursuant to and in accordance with the existing concession/contract agreements. The current O&M contractor is Arjunvaishanvi Infrastructure & Developers Private Limited and the current EPC concessionaire for major maintenance is Babuji Civil construction. We expect the current concessionaire to operate and maintain the project up to Handover date pursuant to and in accordance with the existing concession/contract agreements. Our O&M Handover Date for the Chennai Bypass Toll Road is with effect from April 1, 2026 and May 30, 2028 in respect of major maintenance.

**Tollable Length and Toll Rates**

In terms of tollable length, the Chennai Bypass Toll Road comprises 85.408 km of roads. In India, toll rates are as per notification by the Ministry of Road Transport and Highways in the Gazette of India. The present toll rates are determined with reference to the published base toll rates and are adjusted annually at the beginning of each fiscal year equal to 40% of the movement in the wholesale price index in December of the preceding year plus a fixed 3%.

According to the NHAI's letter dated September 29, 2025, the toll rates at the Vanagram toll plaza are as follows:

| Vehicle Type | Single Journey | Multiple Journey | Monthly Pass (50 single-journeys in a month) | Fee for Commercial Vehicle Registered within the district of the Vanagram toll plaza |
|---|---|---|---|---|
| | | *(Rs.)* | | |
| Car/Jeep/Passenger Van | 55 | 80 | 1,760 | 25 |
| LCV | 85 | 130 | 2,840 | 45 |
| Bus/Truck | 180 | 270 | 5,955 | 90 |
| 3 Axle commercial vehicle | 195 | 290 | 6,495 | 95 |
| HCM or EME or MAV (4 to 6 Axle) | 280 | 420 | 9,340 | 140 |
| Oversized (7 or more axles) | 340 | 510 | 11,370 | 170 |

*The rate of monthly pass applicable for local non-commercial residing within a distance of 20km from the toll plaza for the year 2025-2026 shall be Rs. 340*

The toll rates at the Surapattu toll plaza of the Maharashtra Border - Belgaum Toll Road are as follows:

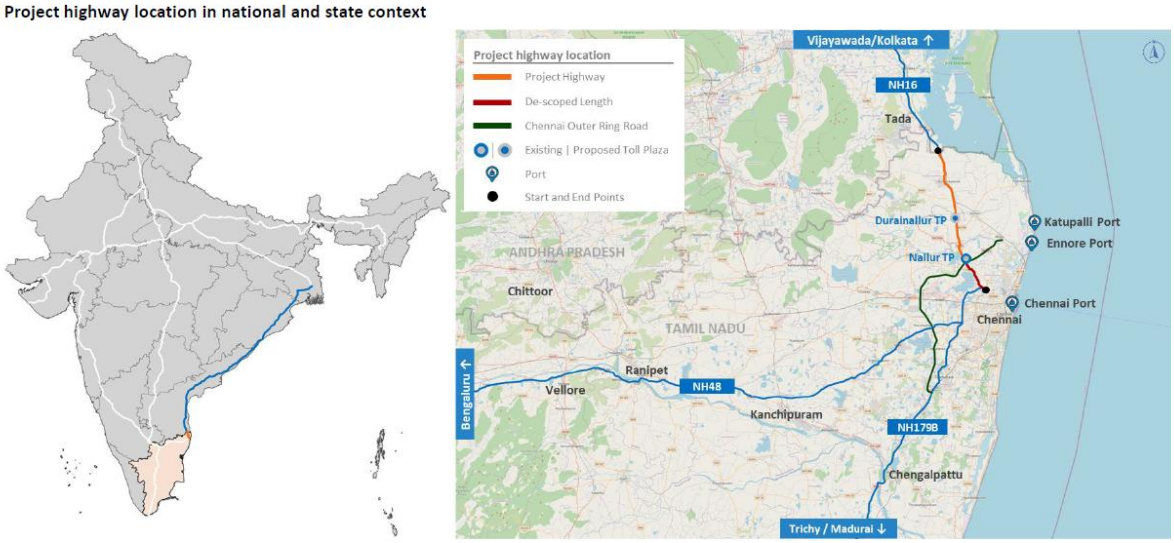
| Vehicle Type | Single Journey | Multiple Journey | Monthly Pass (50 single-journeys in a month) | Fee for Commercial Vehicle Registered within the district of the Surapattu toll plaza |
|---|---|---|---|---|
| | | *(Rs.)* | | |
| Car/Jeep/Passenger Van | 75 | 110 | 2,445 | 35 |
| LCV | 120 | 180 | 3,945 | 60 |
| Bus/Truck | 250 | 370 | 8,270 | 125 |
| 3 Axle commercial vehicle | 270 | 405 | 9,020 | 135 |
| HCM or EME or MAV (4 to 6 Axle) | 390 | 585 | 12,965 | 195 |
| Oversized (7 or more axles) | 475 | 710 | 15,785 | 235 |

*The rate of monthly pass applicable for local non-commercial residing within a distance of 20km from the toll plaza for the year 2025-2026 shall be Rs. 340*

- ***Chennai - Tada***

*Project overview*

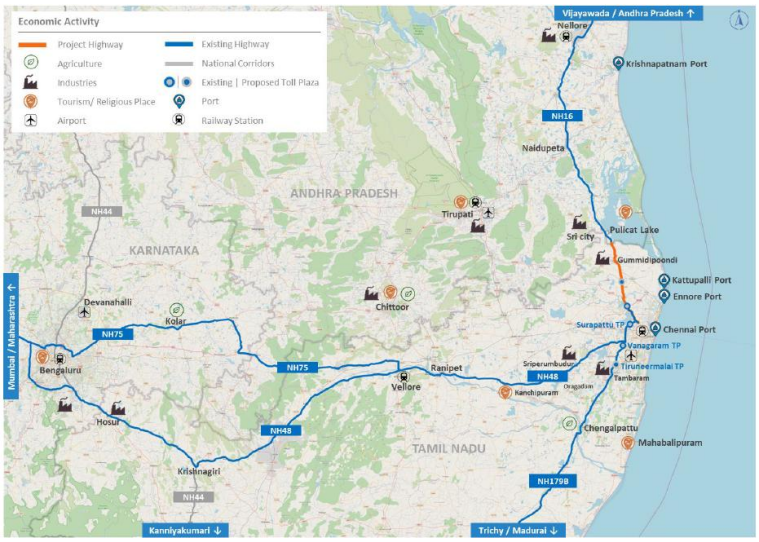
It is a six lane section from km 21+400 to km 54+400 of NH-16, in the state of Tamil Nadu, having total length of 33.000 km in the state of Tamil Nadu. The total length of Project Stretch is 33.00 km. Chennai – Tada comprises end section of NH16 corridor with high contribution of traffic originated/destined at Chennai Port Cluster. It forms the southern terminal stretch of NH16 under the Golden Quadrilateral, providing east coast connectivity between Chennai, Andhra Pradesh, Odisha and West Bengal and further towards eastern and north-eastern India.




*Source: Traffic Report.*

*Salient growth features and traffic generators*

According to the Traffic Report, Tamil Nadu is one of India's most industrialized state, with a diversified economy driven by manufacturing, services and agriculture. Chennai, Coimbatore, Tiruppur, Hosur, Salem, and Madurai are major industrial and commercial hubs, hosting automobile, textile, leather, and electronic clusters. Tamil Nadu's strategic coastal location along the Bay of Bengal supports strong maritime trade through Chennai, Ennore, Kattupalli and Thoothukudi ports.




*Source: Traffic Report.*
*Note:*

*Nallur toll plaza will be shifted to Durainallur at km 34.180 from 1st October 2027 (H2 Fiscal 2028) in context of development of Chennai Peripheral Ring Road*

**Traffic volume and composite of vehicles**

Historical traffic data

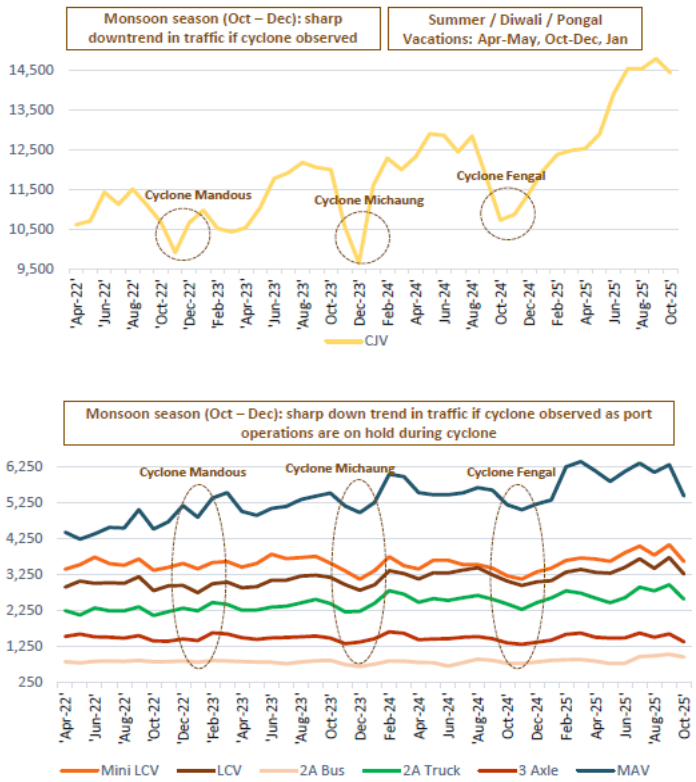
Chennai – Tada demonstrates a growth trajectory with a projected total CAGR of 8.0% (7.9% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025. The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 10,803 | 3,546 | 2,984 | 846 | 2,287 | 1,518 | 4,810 | **26,794** | **54,424** |
| FY24 | 11,461 | 3,566 | 3,094 | 816 | 2,437 | 1,504 | 5,352 | **28,231** | **58,025** |
| FY25 | 12,079 | 3,481 | 3,233 | 835 | 2,574 | 1,471 | 5,589 | **29,262** | **60,201** |
| FY26 till Oct'25 | 13,953 | 3,826 | 3,464 | 919 | 2,713 | 1,526 | 6,070 | **32,471** | **65,764** |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 6.1% | 0.6% | 3.7% | (3.5%) | 6.6% | (0.9%) | 11.3% | **5.4%** | **6.6%** |
| FY25 vs FY24 | 5.4% | (2.4%) | 4.5% | 2.3% | 5.6% | (2.2%) | 4.4% | **3.7%** | **3.7%** |
| FY26* vs FY25 | 13.7% | 9.4% | 5.7% | 12.2% | 5.7% | 3.7% | 9.8% | **10.4%** | **9.4%** |
| CAGR (FY23 – FY26 YTD) | 10.8% | 3.1% | 6.1% | 3.4% | 7.1% | 0.2% | 9.8% | **8.0%** | **7.9%** |

*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October.*

**Monthly Average Daily Traffic**

The chart below presents data available on a monthly basis starting April 2022 up to October 2025 for the Nallur toll plaza on Chennai - Tada.

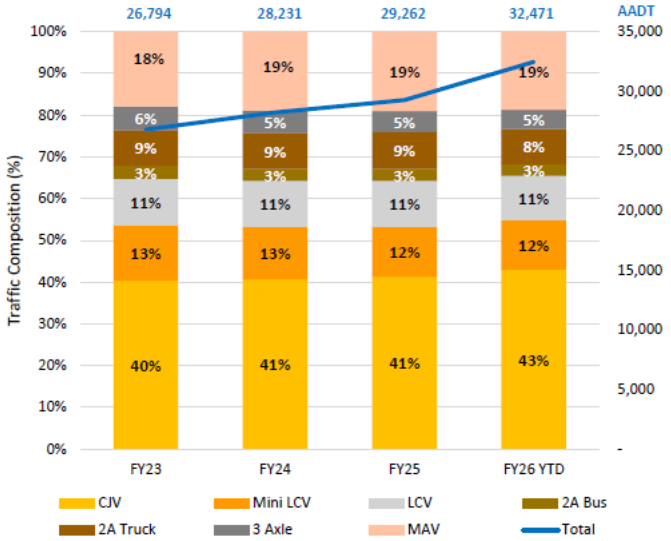



*Source: Traffic Report*

**Monthly reported traffic on the surrounding assets/connecting roads**

**Toll Segmentation**

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Nallur toll plaza. For further details in this regard, please refer to Annexure C:




*Source: Traffic Report*

**Base year Annual Average Daily Traffic**

The table below shows Fiscal 2026 AADTs estimated using the counts and the variance factors:

| Asset | Nallur toll plaza | Durainallur toll plaza |
|---|---|---|
| Car/Jeep/Van | 17,704 | 10,246 |
| LCV | 4,216 | 2,526 |
| Mini Bus / LCV | 3,648 | 3,359 |
| Buses | 1,850 | 1,048 |
| 2A Truck | 2,809 | 2,638 |
| 3A Truck | 1,545 | 1,394 |
| MAV | 6,195 | 6,099 |
| OSV | 25 | 18 |
| **Total AADT** | **37,992** | **27,329** |
| **PCU** | **73,994** | **60,578** |

*Source: Traffic Report*

**Elasticity recommendations**

As per the Traffic Report, travel demand elasticity for the project highway is driven by a combination of macro-economic trends and regional industry-specific factors. For passenger vehicles, Mini LCVs, Buses, and LCVs, elasticity is primarily benchmarked against the weighted average GSDP of Tamil Nadu and Andhra Pradesh. For heavy commercial vehicles, particularly 2A Trucks, 3A Trucks and MAVs, demand is influenced by the Weighted average of GDP, GSDP of Tamil Nadu, Andhra Pradesh and Chennai port cluster – container and general traffic. The adopted elasticity values reflects the corridor's strategic role in industrial and port-related trade within the

southern coastal influence zone. These estimates, sourced from the Traffic Report, rely on historical traffic data and benchmark references from proximal toll plazas to align growth projections with regional economic activity.

**Projected Traffic Data: Growth in Passenger Car Unit (PCU)**

The Traffic Report projects that Chennai - Tada will undergo a period of traffic stabilization till Fiscal 2030 following an initial contraction in H2 of Fiscal 2028 and eventually transitioning into a steady growth trajectory from Fiscal 2030 through Fiscal 2041. For detailed analysis on the traffic growth rates, please refer to Annexure C.

**Operation and maintenance**

The operation and maintenance of the Chennai -Tada Toll Road will be the responsibility of the Project SPV with effect from April 1, 2026. As per the transition support agreement, NHAI will be handling the O&M for a period of 30 months from the appointed date.

**Tollable Length and Toll Rates**

In terms of tollable length, the Chennai-Tada Toll Road comprises 43.278 km of roads. In India, toll rates are as per notification by the Ministry of Road Transport and Highways in the Gazette of India. The present toll rates are determined with reference to the published base toll rates and are adjusted annually at the beginning of each fiscal year equal to 40% of the movement in the wholesale price index in December of the preceding year plus a fixed 3%.

According to NHAI's letter dated September 29, 2025, the toll rates at the Nallur toll plaza are as follows:

| **Vehicle Type** | **Single Journey** | **Multiple Journey** | **Monthly Pass (50 single-journeys in a month)** | **Fee for Commercial Vehicle Registered within the district of the Nallur toll plaza** |
|---|---|---|---|---|
| | | *(Rs.)* | | |
| Car/Jeep/Passenger Van | 80 | 120 | 2,640 | 40 |
| LCV | 130 | 190 | 4,260 | 65 |
| Bus/Truck | 270 | 400 | 8,925 | 135 |
| 3 Axle commercial vehicle | 290 | 440 | 9,740 | 145 |
| HCM or EME or MAV (4 to 6 Axle) | 420 | 630 | 14,000 | 210 |
| Oversized (7 or more axles) | 510 | 765 | 17,040 | 255 |

*The rate of monthly pass applicable for local non-commercial residing within a distance of 20km from the toll plaza for the year 2025-2026 shall be Rs. 340*

- ***Neelmangla Tumkur:***

*Project overview*

It is a four/six lane section from Neelmangla to Tumkur from km 29+500 to km 74+168 of NH-48, comprising km 29+500 to km 49+900 between Neelmangla to Dobbaspet being a six lane section; Dobbaspet to Tumkur from km 49+900 to km 61+520, being a four lane section and Tumkur Bypass from km 61+520 to km 74+168 being a 6 lane section, in the state of Karnataka, having total length of 44.668 km.

Currently, toll is collected at Kulumepalya (Ch. 30+000) and Chokkenahalli (Ch. 61+500). Upon completion of six-laning of the respective stretch, toll collection will be shifted to the new toll plazas at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425), and the existing toll plazas at Kulumepalya and Chokkenahalli will be demolished.

Neelmangla Tumkur part of the Golden Quadrilateral (NH48: Delhi–Mumbai–Bengaluru–Chennai corridor), serving as link for long-distance freight traffic towards Bengaluru and western India. With rapid industrialization and urban sprawl around Bengaluru, Neelmangla, and Tumkur, the section has transitioned from a pure intercity corridor to a mixed-use urban-industrial route, accommodating substantial commuter, logistics, and regional goods traffic.

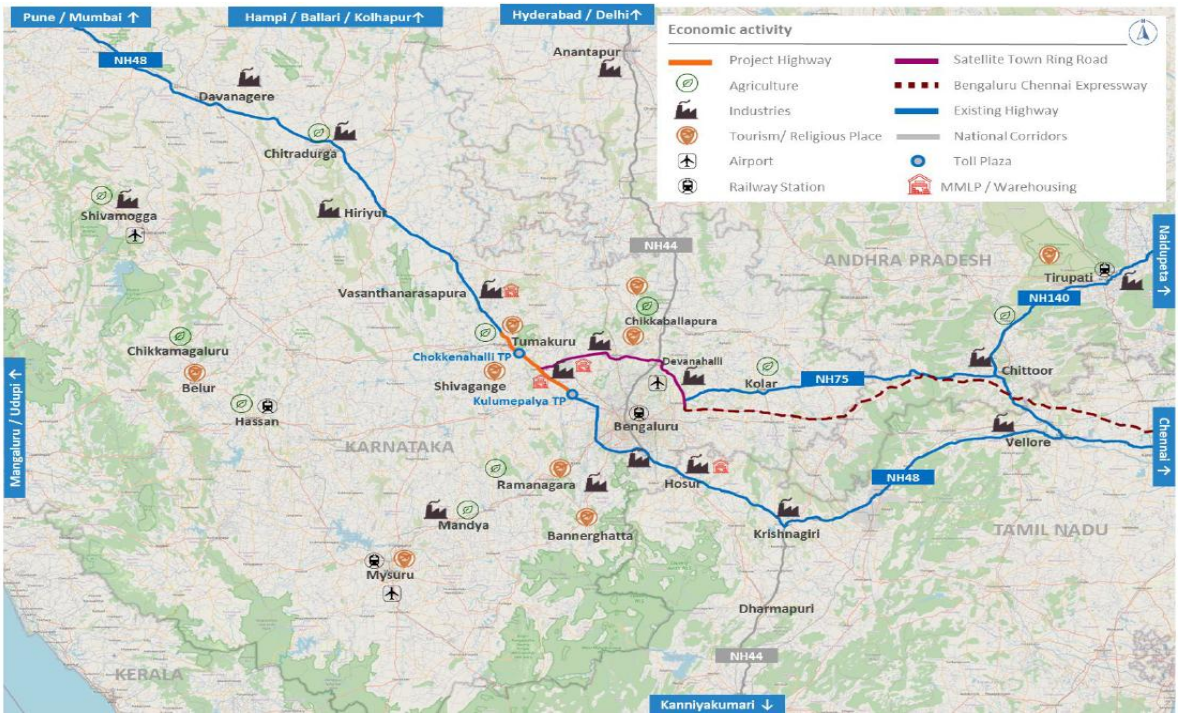



*Source: Traffic Report.*

*Salient growth features and traffic generators*

According to the Traffic Report, the project highway provides strong local connectivity between Bengaluru's western outskirts, Neelmangla, Dobbaspet, and Tumkur, acting as a major conduit for goods from local industries to larger markets as well as passenger and employee commute along the Bengaluru–Tumkur growth corridor. The project highway connects key industrial and logistics hubs, such as including the Dobbaspet Industrial Area and the Tumkur Industrial Node (under the Chennai–Bengaluru Industrial Corridor), boosting regional manufacturing and export activity. The project highway, being a part of NH48, acts as a spinal cord for Karnataka which includes Belagavi, Dharwad, Haveri, Davangere, Chitradurga, Tumkur, Bengaluru Urban and Rural district. It also facilitates the movement of goods and raw materials between Bengaluru, Hubballi, Belagavi, and Pune, supporting strengthening industrial supply chains and distribution networks across Karnataka.

The map below illustrates the major economic activities in the influence region:




*Source: Traffic Report.*

**Traffic volume and composite of vehicles**

**Historical traffic data**

Kulumepalya toll plaza of Neelmangla Tumkur demonstrates a growth trajectory with a projected total CAGR of 4.6% (4.8% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025.The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

**Vehicle category-wise traffic growth trend**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 17,117 | 2,349 | 4,276 | 2,549 | 2,787 | 1,865 | 4,227 | **35,170** | **66,506** |
| FY24 | 19,685 | 2,752 | 4,566 | 3,139 | 3,217 | 1,807 | 4,536 | **39,702** | **74,187** |
| FY25 | 17,780 | 2,944 | 4,264 | 3,371 | 3,206 | 1,743 | 4,459 | **37,767** | **72,145** |
| FY26 till Oct'25 | 18,382 | 3,462 | 4,329 | 3,688 | 3,257 | 1,723 | 4,525 | **39,367** | **74,707** |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 15.0% | 17.2% | 6.8% | 23.1% | 15.5% | (3.1%) | 7.2% | **12.9%** | **11.5%** |
| FY25 vs FY24 | (9.7%) | 6.9% | (6.6%) | 7.4% | (0.3%) | (3.5%) | (1.6%) | **(4.9%)** | **(2.8%)** |
| FY26* vs FY25 | 3.6% | 25.1% | 1.7% | 10.1% | 2.7% | 0.2% | 5.0% | **5.5%** | **5.2%** |
| CAGR (FY23 – FY26 YTD) | 2.9% | 16.8% | 0.5% | 15.9% | 6.4% | (3.1%) | 2.8% | **4.6%** | **4.8%** |

*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October.*

Chokkenahalli toll plaza of Neelmangla Tumkur demonstrates a growth trajectory with a projected total CAGR of 9.0% (9.2% in PCU terms) from Fiscal 2023 to Fiscal 2026 till October 2025. The following table shows the vehicle category-wise traffic growth from Fiscal 2023 to Fiscal 2026 till October 2025:

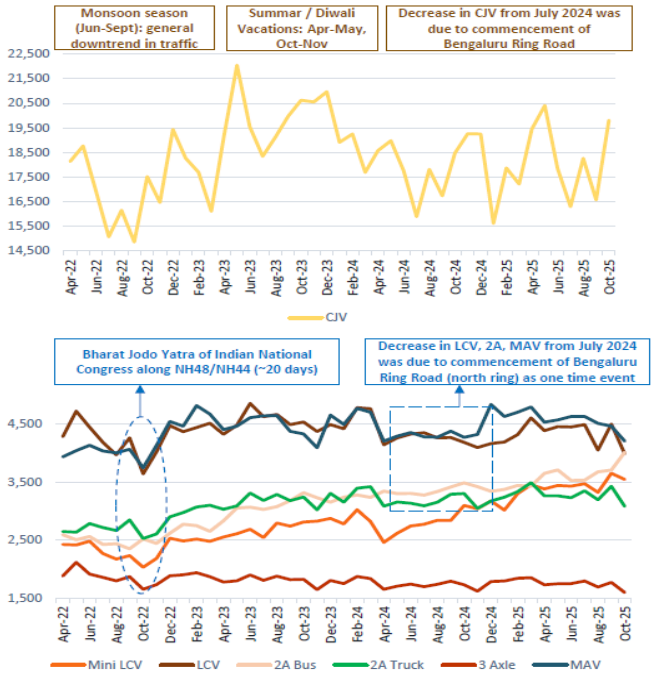
Vehicle category-wise traffic growth trend

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| Annual Average Daily Traffic (AADT) | | | | | | | | | |
| FY23 | 13,492 | 1,483 | 2,590 | 2,278 | 2,321 | 1,654 | 4,240 | 28,059 | 56,701 |
| FY24 | 15,262 | 1,769 | 2,868 | 2,801 | 2,814 | 1,696 | 4,604 | 31,813 | 63,981 |
| FY25 | 15,393 | 2,181 | 3,157 | 3,226 | 3,128 | 1,689 | 4,956 | 33,730 | 68,739 |
| FY26 till Oct'25 | 15,538 | 2,613 | 3,253 | 3,458 | 3,246 | 1,696 | 4,974 | 34,778 | 70,612 |
| Growth trends | | | | | | | | | |
| FY24 vs FY23 | 13.1% | 19.3% | 10.7% | 23.0% | 21.2% | 2.6% | 8.4% | 13.4% | 12.8% |
| FY25 vs FY24 | 0.9% | 23.3% | 10.1% | 15.2% | 11.2% | (0.4%) | 7.8% | 6.0% | 7.4% |
| FY26* vs FY25 | 1.1% | 28.3% | 4.7% | 8.1% | 5.4% | 1.6% | 4.4% | 4.7% | 4.9% |
| CAGR (FY23 – FY26 YTD) | 5.8% | 25.4% | 9.5% | 18.2% | 14.4% | 1.0% | 6.6% | 9.0% | 9.2% |

*Source: Traffic Report.*
** Against Fiscal 2025 for 7 months i.e., April-October.*

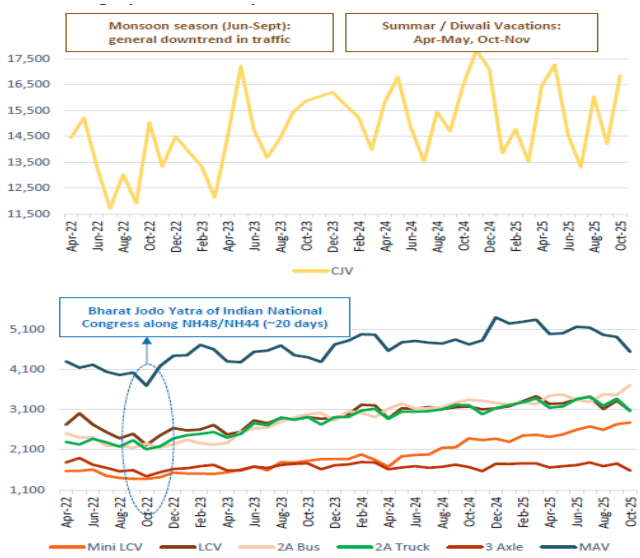
**Monthly Average Daily Traffic**

The chart below presents the reported traffic volume for Kulumepalya toll plaza on Neelmangla Tumkur, in terms of monthly traffic trend from April 2022 to October 2025.




*Source: Traffic Report*

The chart below presents the reported traffic volume for Chokkenahalli toll plaza on Neelmangla Tumkur, in terms of monthly traffic trend from April 2022 to October 2025.

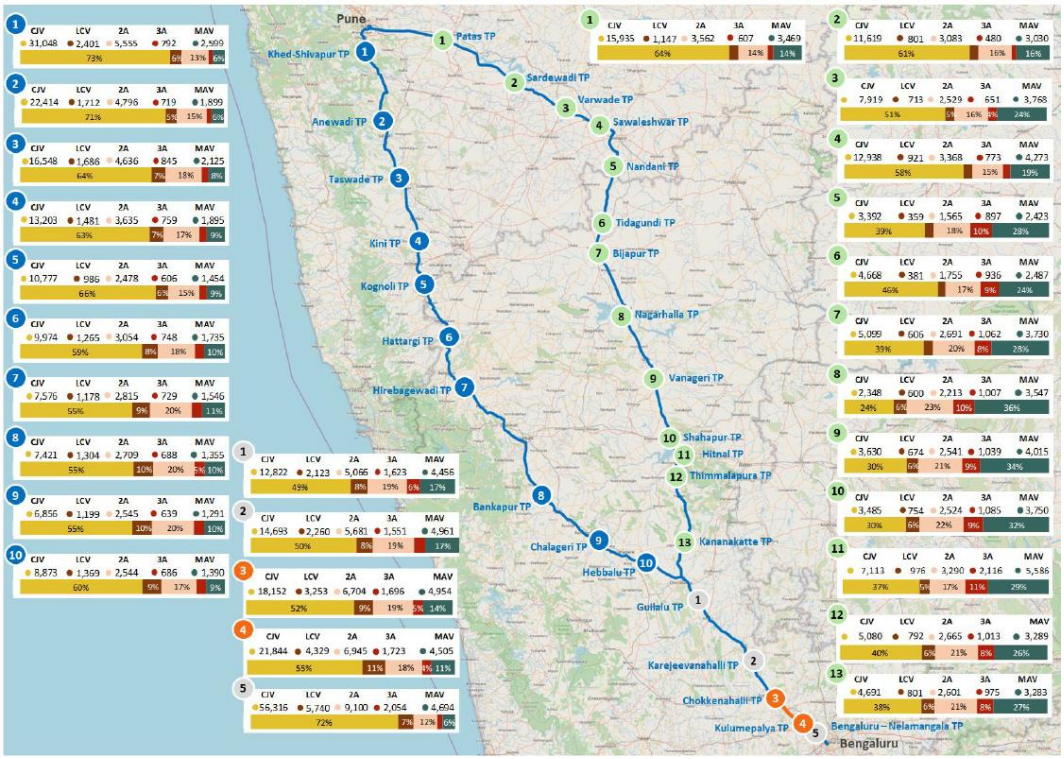



*Source: Traffic Report*

**Monthly reported traffic on the surrounding assets/connecting roads**

**Neelmangla Tumkur** serves as a vital link within the NH48 corridor. According to the Traffic Report, this asset's traffic profile is benchmarked against proximal plazas such as Karjeevanhalli toll plaza, which demonstrate consistent heavy urban flow patterns. Growth projections for the section are tied to regional economic drivers, including the rapid urbanization of the Bengaluru metropolitan area and large-scale industrialization. Hence, according to the Traffic Report, it is reasonable to believe that the traffic profile on Neelmangla Tumkur will mirror the profile of surrounding assets and connecting roads.

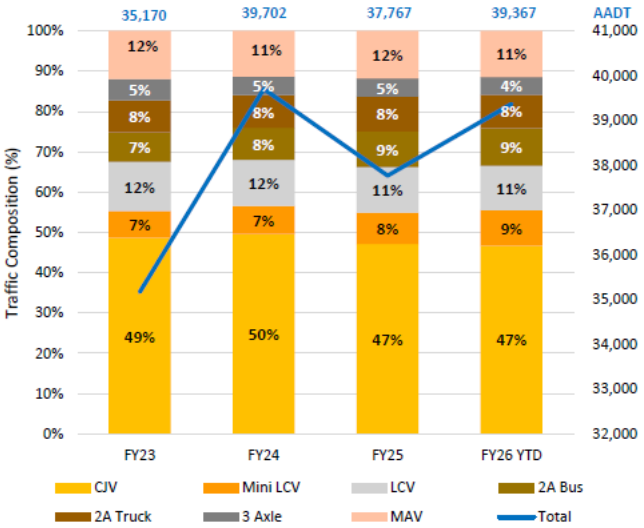
The chart below indicates the traffic profile and historical trends observed at the Neelmangla Tumkur toll plazas for 7 months ADT of Fiscal 2026 till October 2025.




*Source: Traffic Report*

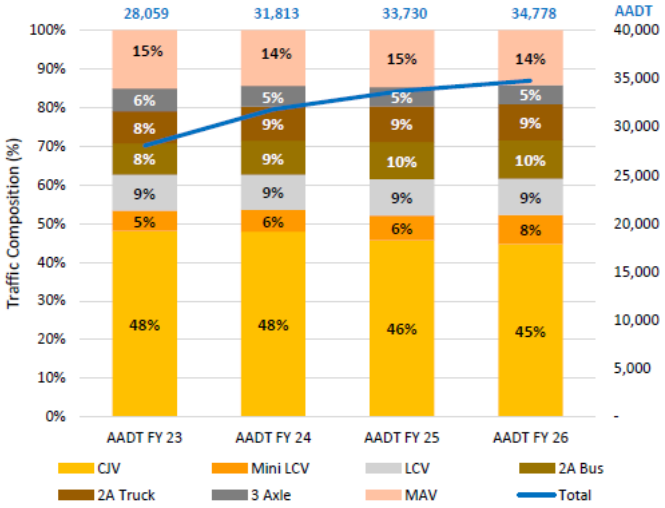
**Toll Segmentation**

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Kulumepalya toll plaza:




*Source: Traffic Report*

The chart below presents the estimated segmentation based on traffic data from Fiscal 2023, Fiscal 2024 and Fiscal 2025 and from April 2025 to October 2025 for Chokkenahalli toll plaza:




*Source: Traffic Report*

For further details in this regard, please refer to Annexure C.

**Base year Annual Average Daily Traffic**

The table below shows Fiscal 2026 AADTs estimated using the counts and the variance factors:

| Asset | Kulumepalya toll plaza | Chokkenahalli toll plaza |
|---|---|---|
| Car/Jeep/Van | 26,217 | 20,078 |
| Mini LCV | 3,990 | 2,966 |
| Mini Bus/LCV | 4,725 | 3,811 |
| Buses | 3,850 | 3,610 |
| 2A Truck | 3,664 | 3,642 |

| Asset | Kulumepalya toll plaza | Chokkenahalli toll plaza |
|---|---|---|
| 3A Truck | 1,874 | 1,859 |
| MAV | 4,940 | 5,389 |
| OSV | 25 | 23 |
| **Total AADT** | **49,312** | **41,378** |
| **Total PCU** | **87,839** | **80,448** |

*Source: Traffic Report.*

**Elasticity recommendations**

As per the Traffic Report, travel demand elasticity for the project highway is driven by a combination of macro-economic trends and regional industry-specific factors. For passenger vehicles, Mini LCV and buses, elasticity is primarily benchmarked against the GSDP of Karnataka, while for Mini Bus/ LCV, 2A Truck , 3A Truck, and MAVs, it is influenced by the weighted average of GDP and GSDP of Karnataka and Tamil Nadu. The adopted elasticity values reflects the corridor's strategic role as gateway to Bengaluru handling high volume of freight traffic, supporting inter-state trade movement. These estimates, sourced from the Traffic Report, rely on historical traffic data and benchmark references from proximal toll plazas.

**Projected Traffic Data: Growth in Passenger Car Unit (PCU)**

According to the Traffic Reports, the existing toll plazas (Kulumepalya and Chokkenhalli) will be dismantled on completion of four to six lane widening. Additionally, new single mainline plaza will be constructed instead of the existing two mainline plazas. The Traffic Report projects that the toll plazas will undergo growth in PCU of Neelmangla Tumkur for Bharathipura and Honnenahalli Check Plaza, Halenijagal and Dobbaspet Check Plaza and, Halenijagal across all vehicle types until Fiscal 2041. For detailed analysis on the traffic growth rates, please refer to Annexure C.

*Operation and maintenance*

The Project Highway Neelmangla- Tumkur section is under EPC (Six Laning) from Km 29+500 to Km 49+900, from Km 61+520 to 74+168 is under EPC. The existing concessionaire/ contractor shall operate and maintain the project up to the O&M handover date pursuant to and in accordance with the existing concession/contract agreements. The current EPC concessionaire (including six laning) is H G Infra Engineering Limited and the O&M contractor is Sri Chowdeshwari Concrete India Private Limited. The O&M Handover Date for the Neelmangla Tumkur Toll Road from H G Infra Engineering Limited is expected to be March 31, 2032 and is expected to be on June 5, 2029 from Sri Chowdeshwari concrete India Private Limited.

*Tollable Length and Toll Rates*

In terms of tollable length, the Neelmangla Tumkur Toll Road comprises 48.646 km which will increase to 52.516 km post completion of six laning of the roads. In India, toll rates are as per notification by the Ministry of Road Transport and Highways in the Gazette of India. The present toll rates are determined with reference to the published base toll rates and are adjusted annually at the beginning of each fiscal year equal to 40% of the movement in the wholesale price index in December of the preceding year plus a fixed 3%.

The toll rates at the Chokkenahalli toll plaza with effect from October 1, 2025 are as follows:

| Vehicle Type | Single Journey | Multiple Journey | Monthly Pass (50 single-journeys in a month) | Fee for Commercial Vehicle Registered within the district of the Chokkenahalli toll plaza |
|---|---|---|---|---|
| | | *(Rs.)* | | |
| Car/Jeep/Van/LMV | 20 | 30 | 655 | 10 |

| Vehicle Type | Single Journey | Multiple Journey | Monthly Pass (50 single-journeys in a month) | Fee for Commercial Vehicle Registered within the district of the Chokkenahalli toll plaza |
|---|---|---|---|---|
| LCV/LGV/Mini Bus | 30 | 50 | 1,060 | 15 |
| Truck/ Bus (2 axle) | 65 | 100 | 2,220 | 35 |
| 3 axle commercial vehicles | 75 | 110 | 2,420 | 35 |
| HCM/EME/MAV (4 to 6 Axles) | 105 | 155 | 3,480 | 50 |
| Oversized vehicles (7 or more axles) | 125 | 190 | 4,240 | 65 |

*The rate of monthly pass applicable for local non-commercial residing within a distance of 20km from the toll plaza for the year 2025-2026 shall be Rs. 340.*

The toll rates at the Kulumepalya toll plaza with effect from October 1, 2025 are as follows:

| Vehicle Type | Single Journey | Multiple Journey | Monthly Pass (50 single-journeys in a month) | Fee for Commercial Vehicle Registered within the district of the Kulumepalya toll plaza |
|---|---|---|---|---|
| | | *(Rs.)* | | |
| Car/Jeep/Van/LMV | 25 | 35 | 825 | 10 |
| LCV/LGV/Mini Bus | 40 | 60 | 1,335 | 20 |
| Truck/ Bus (2 axle) | 85 | 125 | 2,800 | 40 |
| 3 axle commercial vehicles | 90 | 135 | 3,055 | 45 |
| HCM/EME/MAV (4 to 6 Axles) | 130 | 200 | 4,390 | 65 |
| Oversized vehicles (7 or more axles) | 160 | 240 | 5,345 | 80 |

*The rate of monthly pass applicable for local non-commercial residing within a distance of 20 km from the toll plaza for the year 2025-2026 shall be Rs. 340*

**Operation and Maintenance Services**

One of our key business activities will be the operation and maintenance of the InvIT Assets pursuant to, and in accordance with, the provisions of the Concession Agreements and other road project related agreements (as applicable). The Project SPV is required to operate and maintain the InvIT Assets in accordance with the Concession Agreement, including by modifying, repairing or otherwise making improvements to the roads. In particular, the Concession Agreement requires the Project SPV to maintain the Toll Roads to certain standards during the concession period. NHAI has used, and will likely continue to use, independent engineers to carry out periodic tests to assess the quality of the roads or bridges and their related maintenance.

The Project Manager, together with the Project SPV, will be responsible for managing the critical day-to-day operation and maintenance of the Toll Road assets. The Project Manager, through the Project Management and Implementation Agreement, will provide project and contract management support, such as liaising with and supervising sub-contractors, managing design, planning and the obtaining of necessary licenses and approvals for the projects.

A project SPV is generally responsible for carrying out operation and maintenance activities at its toll road during its concession period. The scope of a project SPV's operation and maintenance activities is usually defined in the relevant concession agreement. Within the scope of such operation and maintenance obligations, the project SPV may be required to undertake routine and periodic maintenance of project roads, maintain and comply with safety standards to ensure smooth and safe traffic movement, deploy adequate human resources for incident management, maintain proper medical and sanitary arrangements for personnel deployed at the site and prevent any unauthorized entry to and exit from the project as may be required.

A maintenance management system is used to ensure that all maintenance is systematically and correctly scheduled, carried out and recorded. In addition, it is used to assure planning, control and monitoring of each maintenance activity. Maintenance methodologies and system performance are regularly reviewed and examined for optimisation of resource deployment.

**Operations**

***Toll collection system***

Toll is collected for each journey through each of the toll plazas. Signs setting out the toll rates for the Toll Road assets are displayed at the toll booths and tolls can be paid or tendered by the driver of any vehicle in the following manners:

*Cash*

Tolls paid by means of cash are collected by toll collectors at the manual toll booths.

*Electronic toll collection*

In 2014, an electronic toll collection ("**ETC**") system based on radio-frequency identification ("**RFID**") technology was introduced. The RFID technology based FASTags required vehicles to affix FASTags on windscreens to enable toll plazas to auto-debit toll fees from a linked account, without requiring vehicles to stop for transactions. This ETC based on RFID did not pick up until a transport ministry directive in July 2019 called for equipping all toll lanes across national highways in India to mandate the same. The authority has made FASTag (cashless payment mechanism) at toll plazas mandatory. The National Electronic Toll Collection programme using FASTags on vehicles has played a crucial role in the growth of digital transactions across the country. It has moved many vehicles to the payments ecosystem and reduced the use of cash for toll payments on roads and highways. This programme has seen 11.9% growth on y-o-y basis as of Mar-25, with a collection of Rs 68 billion in FY25 and as of Sep-25 stands at Rs 64 billion. (*Source: CARE Industry Report)*.

Additionally, pursuant to the terms of the respective Concession Agreements, the Project SPV will be required to implement a barrier-less MLFF tolling system at the proposed toll plaza location on each project highway stretch. The MLFF system will be based on ANPR cameras and RFID (FASTag) technology, enabling electronic toll collection without physical barriers.

***Monitoring***

*Toll collection*

Payments at the toll plazas, both electronic as well as cash payments, are processed through a semi-automated or a fully automated toll collection system, depending on complexity of the project. Both these systems collect and store traffic and payment data, thereby reducing the need for manual operation. A semi-automated system consists of a revenue collection software desktop, a barrier gate, smart cards and monitoring cameras and a fully automated system includes equipment such as vehicle counting classifier, vehicle audit system, communication channels and traffic control equipment in addition to all the components of a semi-automated system.

For the purpose of identifying categories of vehicles and to charge an appropriate toll rate, the automatic vehicle identification based in-road/infrared sensors are also used. The Project SPV would use weigh-in-motion technology for projects where weight-based toll collection is mandated. The weight based tolling systems are integrated with the fully automatic toll collection system for enhanced revenue controls.

There are cameras installed particularly for capturing and recording any toll evasion incidents by vehicles. There is also a back-up power supply system to ensure that there is no interruption to power supply at the toll plazas in order to maintain a stable power supply for the sub-systems and equipment. Servers used in the toll collection systems at the toll plazas are capable of real time uploading of transaction data from toll lane equipment and performing an automatic daily backup to prevent any toll data loss and to enable quick system recovery, which would allow the Project SPV to collect variable amounts of tolls depending on the class of motor vehicles and serves as a traffic information system.

Only certain authorised persons have access to the toll collection systems and the activities are recorded for security purposes. The Project SPV is responsible for operating the toll collection system at its toll plaza and taking regular preventive and corrective measures to maintain such systems at the highest levels of security and reliability.

***Traffic control***

There are helpline numbers displayed along the national highways for communication between the road users and the control room in case of any emergency. This provides a reliable communication channel for the road users in cases of an exigency where they need to communicate with staff at the Control Room. The Project SPV would take regular preventive and corrective measures to maintain the emergency telephone system at the highest levels of reliability and safety. The Project SPV is required to carry out regular patrolling and regulate and maintain traffic order within the projects. Emergency telephone systems and emergency helpline numbers are provided at all projects where such systems and numbers are required by the Concession Agreement. There are also patrol vehicles that continuously move on the section of the project that it is assigned to, which will intervene to regulate traffic and carry out surveillance activities.

***Traffic and motorway assistance services***

*Traffic assistance*

The Project SPV would provide emergency assistance to motorists using the toll roads. They station patrol/light recovery vehicles on each toll road, which are deployed to patrol the toll roads on a continuous basis.

In the case of a vehicle breakdown or traffic accident, the Control Room will announce the occurrence via mobile phones or handsets to instruct a mobile supervisor and a recovery supervisor to proceed to the scene immediately, and file relevant reports with the police if personal injury is involved. At the scene of a traffic accident or vehicle breakdown, the mobile supervisor will report to the Control Room on the situation of the incident, ensure safety of the scene and apply first aid to injured persons, if any. The recovery supervisor will determine whether the vehicle can be recovered on site or deploy recovery vehicles for towing. The traffic officer will stop the traffic, close the affected lane where necessary and direct trapped vehicles away to other unaffected lanes.

***Safety Measures***

Under the Concession Agreement, the concessionaire is obligated to abide by certain safety requirements, which include measures such as road signs, pavement marking, traffic control devices, roadside furniture, highway design elements, enforcement and emergency response. The concessionaire must abide by among others, applicable laws and applicable permits, the Manual for Safety in Road Design as issued by the Ministry of Road Transport and Highways, relevant standards and guidelines of the Indian Roads Congress and good industry practice. NHAI also carries out safety audits of the projects by appointing a safety consultant employing a team comprising of, among others, one road safety expert and one traffic planner. These safety requirements apply to all phases of construction, operation and maintenance with emphasis on identification of factors associated with accidents and implementation of appropriate remedial measures.

**Management**

We will be managed, upon the listing of the Units on the Stock Exchanges, by qualified personnel of the Investment Manager, with members who will have management and operational experience in the roads and highways sector. For further details about the Investment Manager, please see the sections headed "*Parties to the Trust – The Investment Manager – Raajmarg Infra Investment Managers Private Limited*" on page 85.

Consequent to the completion of the formation transactions, the Investment Manager, in consultation with the Trustee, will appoint a majority of the directors on the board of the Project SPV in accordance with the InvIT Regulations, and such directors would form part of the quorum. The Project SPV's board of directors will also thereafter form committees, if required, under the Companies Act, 2013 and rules made thereunder.

**Seasonality**

Traffic volume tends to decrease during the monsoon season and conversely tends to increase during holiday seasons. While the northern parts of India experience monsoon rains during the period from June or July until September or October every year, the southern parts of India, especially coastal parts of Andhra Pradesh, experience monsoon rains even during the months of October to December. The monsoon season may also restrict the Trust's ability to carry on activities related to its operation and maintenance of toll roads. For further details on risk associated with seasonality, please see the section headed "*Risk Factors – Risks Relating to Our Business and the Concession Agreements –Our business will be subject to seasonal fluctuations and business and economic cycles that may affect our cash flows.*" on page 44. Conversely, traffic volume tends to increase during holiday seasons.

**Property**

The Investment Manager's registered and corporate office are located within the premises of NHAI in New Delhi from which all its administrative and reporting activities are conducted.

**Insurance**

The Trust's operations are subject to hazards that are inherent in providing operation and maintenance services, such as risk of equipment failure, work accidents, fire, earthquake, flood and other force majeure events. This includes hazards that may cause injury and loss of life, damage and destruction of property, equipment and environmental damage. The insurance in respect of the InvIT Assets, will be taken by the Project SPV for the InvIT Assets after the O&M handover date in accordance with the terms of the Concession Agreements.

## SUMMARY OF THE CONCESSION AGREEMENTS

*The following is a brief summary of the Concession Agreements proposed to be entered into by the Project SPV and NHAI in relation to the InvIT Assets. The descriptions and summary of the Concession Agreements below are not, nor do they purport to be complete descriptions or summaries of all terms of such Concession Agreements. The actual terms of the Concession Agreements, once executed may differ from the summaries provided below. Certain terms used in this section have the meaning assigned to them in the respective concession agreements. Copies of the concession agreements will also be made available for inspection at the registered office of the Investment Manager, once executed. For details, refer to "Material Contracts and Documents for Inspection" on page 336.*

1. *Certain Definitions*

**"Accounting Year"** means the financial year commencing from the first day of April of any calendar year and ending on the thirty-first day of March of the next calendar year.

**"Change in Ownership"** means a transfer of the direct and/or indirect legal or beneficial ownership of any shares, or securities convertible into shares, that causes the aggregate holding of the InvIT, together with its Associates, in the total equity share capital of the Concessionaire to decline below 51% (fifty one percent) of the subscribed and issued share capital of the Concessionaire during the first 2 (two years) of the Concession Period.

**"Encumbrances"** means, in relation to the Project Highway, any encumbrances such as mortgage, charge, pledge, lien, hypothecation, security interest, assignment, privilege or priority of any kind having the effect of security or other such obligations, and shall include any designation of loss payees or beneficiaries or any similar arrangement under any insurance policy pertaining to the Project Highway, where applicable herein but excluding utilities referred to as existing utilities and roads in the Concession Agreement and charge on Project receivables only for purposes of securing debt repayment and for no other purpose.

**"Good Industry Practice"** means the practices, methods, techniques, designs, standards, skills, diligence, efficiency, reliability and prudence which are generally and reasonably expected from a reasonably skilled and experienced operator engaged in the same type of undertaking as envisaged under this Agreement and which would be expected to result in the performance of its obligations by the Concessionaire in accordance with this Agreement, Applicable Laws and Applicable Permits in reliable, safe, economical and efficient manner

"**Independent Engineer**" means the consulting engineering firm appointed by NHAI from a panel of 10 (ten) firms or bodies corporate, constituted by NHAI substantially in accordance with the selection criteria set forth in Schedule-L, to be the independent consultant under the Concession Agreement.

**"O&M Contractor"** means the person, if any, with whom the Concessionaire has entered into an O&M Contract for discharging O&M obligations for and on behalf of the Concessionaire.

"**O&M Handover Date**" shall mean the dates as set out in the respective Concession Agreements:

"**Project**" means the operation and maintenance of the Project Highway in accordance with the provisions of this Agreement and includes all works, services and equipment relating to or in respect of the Scope of the Project.

"**Project Assets**" means all physical and other assets relating to and forming part of the Site including (a) rights over the Site in the form of licence, Right of Way or otherwise; (b) tangible assets such as civil works and equipment including foundations, embankments, pavements, road surface, interchanges, bridges, culverts, road overbridges, drainage works, traffic signals, sign boards, kilometre- stones, toll plazas, electrical systems, communication systems, rest areas, relief centers, maintenance depots and administrative offices; (d) all rights of the Concessionaire under the Project Agreements; (security deposits (e) insurance proceeds; and (g) Applicable Permits and authorisations relating to or in respect of the Project Highway, but does not include Additional Facilities

**"Project Agreements"** means this Agreement, O&M Contract, Tolling Contract, and any other material

agreements or contracts that may be entered into by the Concessionaire with any person in connection with matters relating to, arising out of or incidental to the Project, or any agreement for procurement of goods and services involving a consideration of upto ₹ 5 crore;

"**Safety Requirements**" means the safety requirements set forth in Schedule-H of the Concession Agreement

"**Scope of Project**" means the scope of the Project as defined in Schedule A and Schedule B hereto, shall mean and include, during the Concession Period:

(a) Tolling, operation, management, maintenance and transfer of the Project Highway subject to and in accordance with the provisions of this Agreement; and

(b) performance and fulfilment of all other obligations of the Concessionaire in accordance with the provisions of this Agreement and matters incidental thereto or necessary for the performance of any or all of the obligations of the Concessionaire under this Agreement.

**"Specifications and Standards"** means the specifications and standards relating to the quality, quantity, capacity and other requirements for the Project Highway as set forth in Schedule-C of the Concession Agreement and any modifications thereof, or additions thereto as included in the operations, maintenance and other related obligations of the Concessionaire under this Agreement;

**"Transfer Date"** means the date on which this Agreement and the Concession hereunder expires pursuant to the provisions of this Agreement or is terminated by a Termination Notice.

**"Termination"** means the expiry or termination of this Agreement and the Concession hereunder;

**"Termination Notice"** means the communication issued in accordance with this Agreement by one Party to the other Party terminating this Agreement;

2. *Concession Fee*

In consideration of the grant of Concession, the Concessionaire shall pay to NHAI, in accordance with the terms of the Concession Agreement and prior to the Appointed Date, the lump sum upfront concession fee of an amount as specified in the Concession Agreement.

3. *Change of Scope*

Under the Concession Agreement, NHAI may require the Concessionaire to make alterations or modifications to the Scope of the Project ("**Change of Scope**") by issuing a notice specifying the proposed works ("**Change of Scope Notice**"). Upon agreement between the Concessionaire and NHAI, with the assistance of the Independent Engineer, on the time and cost for implementation, NHAI shall issue an order requiring the Concessionaire to carry out such works ("**Change of Scope Order**"). The Concessionaire may also propose a Change of Scope by issuing a written request ("**Change of Scope Request**"), which NHAI may accept (with or without modifications) ("**Change of Scope Acceptance**") or reject without any liability. NHAI shall make an advance payment equal to 20% (twenty per cent) of the cost of the Change of Scope (or, in the event of a Dispute, 20% of the cost assessed by the Independent Engineer), with the balance payable against certified bills. If the cumulative cost of all Change of Scope Orders exceeds 5% (five per cent) of the Concession Fee in any continuous period of 3 (three) years or exceeds 25.00% (twenty five per cent) of the Concession Fee at any time during the Concession Period, the Concessionaire shall have the option to match the first-ranked bid in the relevant bidding process, subject to participation, eligibility and payment of 2% (two per cent) of the bid amount to NHAI. Where such thresholds are not exceeded, the Concessionaire may accept or reject any Change of Scope Order at its discretion. If the Concessionaire or the entity appointed by the Concessionaire shall have failed to complete any construction works on account of Force Majeure or for reasons solely attributable to NHAI, NHAI may, in its discretion, require the Concessionaire to pay 80% (eighty percent) of the sum saved therefrom, and upon such payment to NHAI, the obligations of the Concessionaire in respect of such works shall be deemed to have been fulfilled.

4. *O&M*

With effect from O&M Handover Date and thereafter during the remaining Concession Period, the

Concessionaire shall operate and maintain the Project Highway in accordance with the Concession Agreement either by itself, or through the O&M Contractor and if required, modify, repair or otherwise make improvements to the Project Highway to comply with the provisions of the Concession Agreement, and conform to Specifications and Standards and Good Industry Practice. The obligations of the Concessionaire hereunder shall include:

RPPL shall operate and maintain the Project, in accordance with the Concession Agreement either by itself, or through the O&M contractor, and if required, modify, repair or otherwise make improvements to the Project to comply with provisions of the Concession Agreement applicable laws, applicable permits and conform to Specifications, Standards and Good Industry Practice. The obligations of RPPL, among other things, shall include:

(a) permitting safe, smooth and uninterrupted flow of traffic on the Project Highway during normal operating conditions;
(b) collecting and appropriating the Fee;
(c) minimising disruption to traffic in the event of accidents or other incidents affecting the safety and use of the Project Highway by providing a rapid and effective response and maintaining liaison with emergency services of the State;
(d) carrying out periodic preventive maintenance of the Project Highway;
(e) undertaking routine maintenance including prompt repairs of potholes, cracks, joints, drains, embankments, structures, pavement markings, lighting, road signs and other traffic control devices;
(f) undertaking major maintenance such as resurfacing of pavements, repairs to structures, and repairs and refurbishment of tolling system and other equipment;
(g) preventing, with the assistance of concerned law enforcement agencies, any unauthorised use of the Project Highway;
(h) preventing, with the assistance of the concerned law enforcement agencies, any encroachments on the Project Highway;
(i) protection of the environment and provision of equipment and materials therefore;
(j) operation and maintenance of all communication, control and administrative systems necessary for the efficient operation of the Project Highway;
(k) maintaining a public relations unit to interface with and attend to suggestions from the Users, government agencies, media and other agencies; and
(l) complying with Safety Requirements in accordance with the relevant provisions of the Concession Agreement.

5. *Maintenance Requirements*

The Concessionaire shall procure that at all times during the Concession Period, the Project Highway conforms to the maintenance requirements set forth in Schedule-F of the Concession Agreement (**"Maintenance Requirements"**).

6. *Maintenance manual*

No later than 90 (ninety) days prior to O&M Handover Date, the Concessionaire shall, in consultation with the Independent Engineer, evolve a repair and maintenance manual (**"Maintenance Manual"**) for the regular and preventive maintenance of the Project Highway in conformity with the Specifications and Standards, Maintenance Requirements, Safety Requirements and Good Industry Practice. The Maintenance Manual shall be revised and updated once every three years.

7. *Maintenance programme*

On or before O&M Handover Date and no later than 45 (forty five) days prior to the beginning of each Accounting Year during the Concession Period, as the case may be, the Concessionaire shall provide to NHAI and the Independent Engineer, its proposed annual programme of preventive, urgent and other scheduled maintenance (the **"Maintenance Programme"**) to comply with the Maintenance Requirements, Maintenance Manual and Safety Requirements. Such Maintenance Programme shall include:

(a) preventive maintenance schedule;

(b) arrangements and procedures for carrying out urgent repairs;
(c) criteria to be adopted for deciding maintenance needs;
(d) intervals and procedures for carrying out inspection of all elements of the Project Highway;
(e) intervals at which the Concessionaire shall carry out periodic maintenance;
(f) arrangements and procedures for carrying out safety related measures; and
(g) intervals for major maintenance works and the scope thereof.

Within 15 (fifteen) days of receipt of the Maintenance Programme, the Independent Engineer shall review the same and convey its comments to the Concessionaire with particular reference to its conformity with the Maintenance Requirements, Maintenance Manual and Safety Requirements. The Concessionaire may modify the Maintenance Programme as may be reasonable in the circumstances, and the procedure specified in the relevant provisions of the Concession Agreement shall apply *mutatis mutandis* to such modifications.

8. *Obligations relating to change in ownership*

The Concessionaire shall not undertake or permit any Change in Ownership, except with the prior approval of NHAI. The obligations relating to change in ownership as provided in the Concession Agreement shall apply to the Concessionaire in the event the aggregate shareholding of the InvIT together with its Associates, in the issued and paid-up equity share capital of the Concessionaire declines below 51% (fifty one percent) thereof during the first 2 (two) years of the Concession Period. Notwithstanding anything to the contrary contained in this Agreement, the Concessionaire agrees and acknowledges that:

(i) all acquisitions of equity by an acquirer, either by himself or with any person acting in concert, directly or indirectly, including by transfer of the direct or indirect legal or beneficial ownership or control of any equity, in aggregate of not less than 25.00% (twenty five per cent) of the total equity of the Concessionaire, or
(ii) acquisition of any control directly or indirectly of the Board of Directors of the Concessionaire by any person either by himself or together with any person or persons acting in concert with him,

shall constitute a change in ownership requiring prior approval of NHAI from national security and public interest perspective, the decision of NHAI in this behalf being final, conclusive and binding on the Concessionaire, and undertakes that the Concessionaire shall not give effect to any such acquisition of equity or control of the board of directors of the Concessionaire without such prior approval of NHAI. It has been expressly agreed that approval of NHAI hereunder shall be limited to national security and public interest perspective, and NHAI shall endeavour to convey its decision within a period of 60 days from the date of receipt of such request. It has also been agreed that NHAI shall not be liable in any manner on account of grant or otherwise of such approval and that such approval or denial thereof shall not in any manner absolve the Concessionaire from any liability or obligation under the Concession Agreement. It has also been agreed that merger of the Concessionaire with its parent company and/or the Selected Bidder and/or any of the constituents thereof shall also constitute Change in Ownership.

9. *Indemnities*

The Concessionaire will indemnify, defend, save and hold harmless NHAI and its officers, servants, agents, Government Instrumentalities and Government owned and/or controlled entities/enterprises, (the **"NHAI Indemnified Persons"**) against any and all suits, proceedings, actions, demands and claims from third parties for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the Concessionaire of any of its obligations under this Agreement or any related agreement or on account of any defect or deficiency in the provision of services by the Concessionaire to any User or from any negligence of the Concessionaire under contract or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, breach or default of this Agreement on the part of the NHAI Indemnified Persons.

The Concessionaire shall fully indemnify, hold harmless and defend NHAI and the NHAI Indemnified Persons from and against any and all loss and/or damages arising out of or with respect to:

(a) failure of the Concessionaire to comply with Applicable Laws and Applicable Permits;

(b) payment of Taxes required to be made by the Concessionaire in respect of the income or other Taxes of the Concessionaire's Contractors, suppliers and representatives; or

(c) non-payment of amounts due as a result of materials or services furnished to the Concessionaire or any of its Contractors which are payable by the Concessionaire or any of its Contractors.

The Concessionaire shall fully indemnify, hold harmless and defend the NHAI Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the NHAI Indemnified Persons may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other Intellectual Property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Concessionaire or by the Concessionaire's Contractors in performing the Concessionaire's obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Concessionaire shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Project Highway, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Concessionaire shall promptly make every reasonable effort to secure for NHAI a license, at no cost to NHAI, authorising continued use of the infringing work. If the Concessionaire is unable to secure such license within a reasonable time, the Concessionaire shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing.

NHAI will indemnify, defend, save and hold harmless the Concessionaire against any and all suits, proceedings, actions, demands and claims from third parties for any loss, damage, cost and expense of whatever kind and nature arising out of (i) defect in title and/or the rights of NHAI in the land comprised in the Site, and/or (ii) breach by NHAI of any of its obligations under this Agreement or any related agreement, which materially and adversely affect the performance by the Concessionaire of its obligations under this Agreement save and except that where any such claim, suit, proceeding, action, and/or demand has arisen due to a negligent act or omission, or breach of any of its obligations under and/or any provision of this Agreement or any related agreement and/or breach of its statutory duty on the part of the Concessionaire, its subsidiaries, affiliates, contractors, servants or agents, the same shall be the liability of the Concessionaire.

10. *Suspension of the Concessionaire's rights*

Upon occurrence of a concessionaire default (as defined in the Concession Agreement), ("**Concessionaire Default**"), NHAI shall be entitled, without prejudice to its other rights and remedies under the Concession Agreement including its rights of Termination, thereunder, to (i) suspend all rights of the Concessionaire under this Agreement including the Concessionaire's right to collect Fee, and other revenues pursuant hereto, and (ii) exercise such rights itself and perform the obligations hereunder or authorise any other person to exercise or perform the same on its behalf during such suspension (the **"Suspension"**). Suspension hereunder shall be effective forthwith upon issue of notice by NHAI to the Concessionaire and may extend up to a period not exceeding 120 (one hundred and twenty) days from the date of issue of such notice; provided that upon written request from the Concessionaire and the Lenders, NHAI shall extend the aforesaid period of 120 (one hundred and twenty) days by a further period not exceeding 90 (ninety) days. At any time during the period of Suspension, the Lenders', shall be entitled to substitute RPPL under and in accordance with the substitution agreement, as defined in the Chenai Bypass Concession Agreement ("**Substitution Agreement**"), and upon receipt of notice thereunder from the Lenders', NHAI shall withhold Termination for a period not exceeding 120 days from the date of Suspension, and any extension thereof, for enabling the Lenders' to exercise its rights of substitution.

11. *Effect of force majeure event on the Concession*

Upon the occurrence of any force majeure event (as defined in the Concession Agreement) ("**Force Majeure Event**") prior to the Appointed Date, the period for achieving the Appointed Date shall be extended by a period equal in length to the duration of the Force Majeure Event.

If any Force Majeure Event occurs after the Appointed Date, whereupon the Concessionaire is unable to collect Fee despite making best efforts or it is directed by NHAI to suspend the collection thereof during the subsistence of such Force Majeure Event, the Concession Period shall be extended by a period, equal in length to the period during which the Concessionaire was prevented from collection of Fee on account thereof; provided that in the event of partial collection of Fee where the daily collection is less than 90% (ninety per cent) of the Average Daily Fee, NHAI shall extend the Concession Period in proportion to the loss of Fee on a daily basis. For the avoidance of doubt, loss of 25.00% (twenty five per cent) in collection of Fee as compared to the Average Daily Fee for four days shall entitle the Concessionaire to extension of 1 (one) day in the Concession Period.

12. *Allocation of costs arising out of Force Majeure*

Upon occurrence of any Force Majeure Event prior to the Appointed Date, the parties to the Concession Agreement shall bear their respective costs and no party shall be required to pay to the other party any costs thereof.

Upon occurrence of a Force Majeure Event after the Appointed Date, the costs incurred and attributable to such event and directly relating to the Project ("**Force Majeure Costs**") shall be allocated and paid as follows:

(a) upon occurrence of a non-political event as defined in the Concession Agreement ("**Non-Political Event**"), the Parties shall bear their respective Force Majeure Costs and neither Party shall be required to pay to the other Party any costs thereof; or
(b) upon occurrence of an indirect political event as defined in the Concession Agreement ("**Indirect Political Event**"), all Force Majeure Costs attributable to such Indirect Political Event and not exceeding insurance cover for such Indirect Political Event, shall be borne by Concessionaire, and to the extent Force Majeure Costs exceeds such insurance cover one half of such costs shall be reimbursed by NHAI to the Concessionaire.
(c) upon occurrence of a political event as defined in the Concession Agreement ("**Political Event**"), all Force Majeure Costs attributable to such Political Event shall be reimbursed by NHAI to the Concessionaire.

Force Majeure Costs may include interest payments on debt, O&M expenses, and all other costs directly attributable to the Force Majeure Event, but shall not include loss of Fee revenues or debt repayment obligations, and for determining such costs in respect of debt, information contained in the copy of financing agreement and financial package, as defined in the Concession Agreement ("**Financial Package**"), furnished by the Concessionaire may be relied upon to the extent that such information is relevant.

Neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

13. *Divestment Requirements*

Upon Termination, the Concessionaire shall comply with and conform to the following requirements:

(a) notify to NHAI forthwith the location and particulars of all Project Assets;
(b) deliver forthwith the actual or constructive possession of the Project Highway free and clear of all Encumbrances;
(c) cure all Project Assets, including the road, bridges, structures and equipment, of all defects and deficiencies so that the Project Highway is compliant with the Maintenance Requirements;
(d) deliver and transfer relevant records, reports, intellectual property and other licences pertaining to the Project Highway and its, operation and maintenance, including all programmes and manuals pertaining thereto, and complete 'as built' drawings in respect of maintenance works, if applicable, as on the Transfer Date. For the avoidance of doubt, the Concessionaire represents and warrants that the intellectual property delivered hereunder shall be adequate and complete for the operation and maintenance of the Project Highway and shall be assigned to the Government free of any Encumbrance;
(e) transfer and/ or deliver all applicable permits to the extent permissible under applicable laws;

(f) execute such deeds of conveyance, documents and other writings as NHAI may reasonably require for conveying, divesting and assigning all the rights, title and interest of the Concessionaire in the Project Highway, including manufacturers' warranties in respect of any plant or equipment and the right to receive outstanding insurance claims to the extent due and payable to NHAI, absolutely unto NHAI or its nominee; and

(g) comply with all other requirements as may be prescribed or required under applicable laws for completing the divestment and assignment of all rights, title and interest of the Concessionaire in the Project Highway, free from all Encumbrances, absolutely unto NHAI or to its nominee.

Subject to the exercise by NHAI of its rights under the Concession Agreement or under any of the Project Agreements to perform or procure the performance by a third party of any of the obligations of the Concessionaire, the parties to the Concession Agreement shall continue to perform their obligations under the Concession Agreement, notwithstanding the giving of any Termination Notice, until the Termination of the Concession Agreement becomes effective in accordance with its terms.

14. *Termination for Concessionaire Default*

Save as otherwise provided in this Agreement, in the event that any of the defaults specified below shall have occurred, and the Concessionaire fails to cure the default within the Cure Period set forth below, or where no Cure Period is specified within a Cure Period of 60 (sixty) days, the Concessionaire shall be deemed to be in default of this Agreement (the **"Concessionaire Default"**) unless the default has occurred solely as a result of any breach of this Agreement by NHAI or due to Force Majeure. The defaults referred to herein shall include the following:

(a) the Performance Security as defined under the Concession Agreement ("**Performance Security**") has been encashed and appropriated in accordance with the Concession Agreement and the Concessionaire fails to replenish or provide fresh performance security within a cure period of 15 (fifteen) days;

(b) subsequent to the replenishment or furnishing of fresh Performance Security in accordance with the Concession Agreement, the Concessionaire fails to cure, within a cure period of 60 (sixty) days, the Concessionaire Default for which whole or part of the Performance Security was appropriated;

(c) the Concessionaire abandons or manifests intention to abandon the operation and maintenance of the Project Highway without the prior written consent of NHAI;

(d) the Concessionaire fails to roll over, renew and furnish new bank guarantee towards Performance Security subject to and in accordance with terms of the Concession Agreement, at least three months prior to expiry of subsisting bank guarantee;

(e) the Concessionaire is in breach of the Maintenance Requirements or the Safety Requirements, as the case may be;

(f) the Concessionaire has failed to make any payment to NHAI within the period specified in this Agreement;

(g) upon occurrence of a financial default as defined under the Concession Agreement ("**Financial Default**"), the lenders' representative has by notice required NHAI to undertake Suspension or Termination, as the case may be, in accordance with the Substitution Agreement and the Concessionaire fails to cure the default within the cure period specified hereinabove;

(h) a breach of any of the Project Agreements by the Concessionaire has caused a material adverse effect as defined under the Concession Agreement ("**Material Adverse Effect**");

(i) the Concessionaire creates any Encumbrance in breach of the Concession Agreement;

(j) the Concessionaire repudiates this Agreement or otherwise takes any action or evidences or conveys an intention not to be bound by the Concession Agreement;

(k) a Change in Ownership has occurred in breach of the provisions of the Concession Agreement;

(l) there is a transfer, pursuant to law either of (i) the rights and/or obligations of the Concessionaire under any of the Project Agreements, or of (ii) all or part of the assets or undertaking of the Concessionaire, and such transfer causes a Material Adverse Effect;

(m) an execution levied on any of the assets of the Concessionaire has caused a Material Adverse Effect;

(n) the Concessionaire is adjudged bankrupt or insolvent, or if a trustee or receiver is appointed for the Concessionaire or for the whole or material part of its assets that has a material bearing on the Project;

(o) the Concessionaire has been, or is in the process of being liquidated, dissolved, wound-up,

amalgamated or reconstituted in a manner that would cause, in the reasonable opinion of NHAI, a Material Adverse Effect;

(p) a resolution for winding up of the Concessionaire is passed or any petition for winding up of the Concessionaire is admitted by a court of competent jurisdiction and a provisional liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Concessionaire is ordered to be wound up by Court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Concessionaire are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Concessionaire under the Concession Agreement and the Project Agreements; and provided that:

(i) the amalgamated or reconstructed entity has the capability and operating experience necessary for the performance of its obligations under this Agreement and the Project Agreements;

(ii) the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and the Project Agreements and has a credit worthiness at least as good as that of the Concessionaire as at Appointed Date; and

(iii) each of the Project Agreements remains in full force and effect;

(q) any representation or warranty of the Concessionaire herein contained which is, as of the date hereof, found to be materially false, incorrect or misleading;

(r) the Concessionaire submits to NHAI any statement, notice or other document, in written or electronic form, which has a material effect on NHAI's rights, obligations or interests and which is false in material particulars;

(s) the Concessionaire has failed to fulfil any obligation, for which failure Termination has been specified in this Agreement;

(t) the Concessionaire commits a default in complying with any other provision of this Agreement if such default causes a Material Adverse Effect on NHAI;

(u) an escrow default as defined under the Concession Agreement ("**Escrow Default**") has occurred and the Concessionaire fails to cure the default within a cure period of 15 (fifteen) days;

15. *Termination for NHAI Default*

In the event that any of the defaults specified below shall have occurred, and NHAI fails to cure such default within a Cure Period of 90 (ninety) days or such longer period as has been expressly provided in the Concession Agreement, NHAI shall be deemed to be in default of this Agreement (the "**NHAI Default**") unless the default has occurred as a result of any breach of this Agreement by the Concessionaire or due to Force Majeure. The defaults referred to herein shall include the following:

(a) NHAI commits a material default in complying with any of the provisions of the Concession Agreement and such default has a Material Adverse Effect on the Concessionaire;

(b) NHAI repudiates the Concession Agreement or otherwise takes any action that amounts to or manifests an irrevocable intention not to be bound by the Concession Agreement; or

(c) the state commits a material default in complying with the provisions of the state support agreement as defined under the Concession Agreement ("**State Support Agreements**") if such default has a Material Adverse Effect on the Concessionaire and the breach continues for a period of 90 (ninety) days from the date of notice given in this behalf by the Concessionaire to NHAI.

Without prejudice to any other right or remedy which the Concessionaire may have under the Concession Agreement, upon occurrence of an NHAI Default, the Concessionaire shall, be entitled to terminate the Concession Agreement by issuing a Termination Notice to NHAI; provided that before issuing the Termination Notice, the Concessionaire shall by a notice inform NHAI of its intention to issue the Termination Notice and grant 15 (fifteen) days to NHAI to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

16. *Defects liability after termination*

The Concessionaire shall be responsible for all defects and deficiencies in the Project Highway for a period of 60 (sixty) days after Termination, and it shall have the obligation to repair or rectify, at its own

cost, all defects and deficiencies observed by the Independent Engineer in the Project Highway during the aforesaid period (the "**Defects Liability Period**"). In the event that the Concessionaire fails to repair or rectify such defect or deficiency within a period of 15 (fifteen) days from the date of notice issued by NHAI in this behalf, NHAI shall be entitled to get the same repaired or rectified at the Concessionaire's risk and cost so as to make the Project Highway conform to the Maintenance Requirements. All costs incurred by NHAI hereunder shall be reimbursed by the Concessionaire to NHAI within 15 (fifteen) days of receipt of demand thereof, and in the event of default in reimbursing such costs, NHAI shall be entitled to recover the same from the escrow account as defined under the Concession Agreement ("**Escrow Account**"). A sum equal to the Performance Security shall be retained in the Escrow Account for a period of 90 (ninety) days after Termination for meeting the liabilities, if any, arising out of or in connection with the provisions of the Concession Agreement.

17. *Modification of Concession period due to variation in Target Fee*

In the event Actual Fee shall have fallen short of the Estimated Toll Collection at Target Point ("**Target Fee**") by more than 5% (Five percent), then for every 1% (one percent) shortfall as compared to the Target Fee , the remaining Concession Period, subject to fulfilment of terms of this Agreement, shall be increased by 1% (one percent) respectively thereof.
In the event Actual Fee shall have exceeded the Estimated Toll Collection at Target Point ("**Target Fee**") by more than 5% (Five percent), then for every 1% (one percent) increase as compared to the Target Fee, the remaining Concession Period, subject to fulfilment of terms of this Agreement, shall be decreased by 1% (one percent) thereof.
Provided that such increase or decrease in Concession Period shall not in any case exceed the limits specified in concession Agreement.
Concession Period shall not be reduced by more than 5 (five) years, or shall not be increased by more than 10 (ten) years on any account or for any reason whatsoever.

## INFORMATION CONCERNING THE UNITS

### Unit holding of the Trust

| Particulars | Number of Units |
|---|---|
| Units issued and outstanding prior to this Issue | Up to [●] |
| Units issued and outstanding after this Issue | Up to [●]* |

** To be determined upon finalisation of the Issue Price and updated in the Final Offer Document prior to filing with SEBI and the Stock Exchange.*

### Unitholders holding more than 5% of the Units

| Sr. No. | Name of Unitholders* | Pre-Issue* | | Post-Issue** | |
|---|---|---|---|---|---|
| | | Number of Units | Percentage of holding (%) | Number of Units | Percentage of holding (%) |
| 1. | Sponsor | Up to [●] | [●] | Up to [●] | [●] |
| 2. | [●] | [●] | [●] | [●] | [●] |

** To be determined upon finalisation of the Issue Price and updated in the Final Offer Document prior to filing with SEBI and the Stock Exchange.*

### Unitholding of the Sponsor, Sponsor Group, Investment Manager, Project Manager and Trustee

The Sponsor has agreed contribute such amount towards subscription of such number of Units which shall be equivalent to at least 15.00% of the total Units of the InvIT on a post-Issue basis, to comply with the requirement under Regulations 12(3) and 12(3A) of the InvIT Regulations. For details, see "*Formation Transactions in relation to the Trust – Sponsor Contribution"* on page 23.

Further, the Sponsor has undertaken to hold 15.00% of the total Units of the InvIT for a period of five years from the date of Allotment and 10.00% of the total Units of the InvIT thereafter.

The Trustee, Project Manager and the Investment Manager do not hold any Units and shall not acquire any Units in this Issue.

### Unitholding of the directors of the Investment Manager

As on the date of this Draft Offer Document, none of the directors of the Investment Manager hold any Units or propose to hold any Units.

### Sponsor and Sponsor Group lock-in

Under the InvIT Regulations, the Sponsor and Sponsor Group are required to, collectively, hold a minimum of 15.00% of our Units on a post- Issue basis for a minimum period of three years from the date of listing pursuant to the initial offer and the balance of their unitholding in the Trust is required to be locked in for a period of not less than one year from the date of listing of the Units.

Further, in accordance with the InvIT Regulations, the Sponsor and the Sponsor Group are required to lock-in our Units as follows:

| | |
|---|---|
| From the beginning of 4$^{th}$ year after the date of listing pursuant to the initial offer and till the end of 5$^{th}$ year from the date of listing pursuant to the initial offer | 5% of total Units on a post-Issue basis or ₹ 5,000.00 million, whichever is lower* |
| From the beginning of 6$^{th}$ year after the date of listing pursuant to the initial offer and till the end of 10$^{th}$ year from the date of listing pursuant to the initial offer | 3% of total Units on a post-Issue basis or ₹ 5,000.00 million, whichever is lower* |
| From the beginning of 11$^{th}$ year after the date of listing pursuant to the initial offer and till the end of 20$^{th}$ year from the date of listing pursuant to the initial offer | 2% of total Units on a post- Issue basis or ₹ 5,000.00 million, whichever is lower* |

| | |
|---|---|
| After completion of the 20th year from the date of listing pursuant to the initial offer | 1% of total Units on a post- Issue basis or ₹ 5,000.00 million, whichever is lower* |

** Provided that the maximum value of Units to be held by the Sponsor and Sponsor Group for compliance with the above shall not exceed ₹ 5,000.00 million or such other value as may be decided by SEBI from time to time wherein such valuation shall be based on the latest available asset value of the Trust.*

In terms of the InvIT Regulations, the Sponsor and Sponsor Group shall, collectively, hold not less than 15.00% of Units on a post-Issue basis, aggregating up to [●] Units (being, [●] % of the unitholding). 15.00% of the Sponsor's and Sponsor Group's unitholding, collectively, shall be locked-in for a period of three years from the date of listing of the Units. Further, the Sponsor and Sponsor Group, undertake and agree to lock-in its unitholding in the manner specified above for the period subsequent to the three years after Listing, in the manner as may be mutually agreed.

Additionally, any unitholding held by the Sponsor and Sponsor Group exceeding the 15.00% of Units on a post-Issue basis set out above, shall be locked in for a period of not less than one year from the date of listing of the Units. Any person other than the Sponsor holding units of the Trust prior to the initial offer shall hold the units for a period of not less than one year from the date of listing of the Units.

In terms of the InvIT Regulations, the locked-in units held by the Sponsor or its Sponsor Group entities may be transferred only amongst such Sponsor or its Sponsor Group entities subject to the condition that lock-in on such units shall continue for the remaining period with the transferee and such transferee shall not be eligible to transfer such units till the lock-in period has expired. In case of an InvIT with multiple sponsors, the locked in units held by a sponsor or its sponsor group entities can be transferred only amongst such sponsor or its own sponsor group entities and shall not be transferred to any other sponsor or their sponsor group entities. Provided further that in case of change in sponsor, locked-in units held by the outgoing sponsor or its sponsor group entities may be transferred to the incoming sponsor or its sponsor group entities subject to the condition that the incoming sponsor or its group entities shall meet the minimum unitholding requirements after the transfer. Provided also that in case of conversion to self-sponsored investment manager, locked-in units held by the outgoing sponsor or its sponsor group entities may be transferred to the self-sponsored investment manager or its shareholders or group entities of self-sponsored investment manager subject to the condition that the self-sponsored investment manager or its shareholders or group entities of self-sponsored investment manager shall meet the minimum unitholding requirements after the transfer.

**Anchor Investor lock-in**

Any Units Allotted to Anchor Investors in the Issue shall be locked-in for a period of 30 days from the date of Allotment.

**Other Lock-In Requirements**

Any pre-Issue unitholding in the Trust held by any Unitholders other than the Sponsor and Sponsor Group will be locked in for a period of one year in accordance with the InvIT Regulations.

## USE OF PROCEEDS

**The Fresh Issue**

The gross proceeds of the Fresh Issue (including the Sponsor Contribution) will be up to ₹ [●] million and the Net Proceeds will be ₹ [●] million. The Net Proceeds will be utilised towards the following objects:

- Infusion of debt and/or equity into the Project SPV, which shall be utilized by the Project SPV for the payment of concession value of the InvIT Assets to NHAI and payment of improvement costs of the InvIT Assets; and
- General purposes.

The details of the Net Proceeds, which shall include the Sponsor Contribution, are set forth in the following table:

| Particulars | Estimated Amount*(in ₹ million)* |
|---|---|
| Gross proceeds of the Fresh Issue (including the Sponsor Contribution) | Up to 57,000.00 |
| Less: Issue related expenses and other expenses to be borne by the Trust | ([●])* |
| **Net Proceeds (including the Sponsor Contribution)** | [●] |

* *To be updated in the Final Offer Document to be filed with SEBI and the Stock Exchange.*

**Requirements of Funds**

The Net Proceeds are proposed to be used in accordance with the details provided in the following table:

| Sr. No. | Particulars | Amount**(in ₹ million)* |
|---|---|---|
| 1. | Infusion of debt and/or equity into the Project SPV, which shall be utilized by the Project SPV for the payment of concession value of the InvIT Assets to NHAI and payment of improvement costs of the InvIT Assets | 56,000.00 |
| 2. | General purposes | [●] |
| **Total** | | [●] |

** To be updated in the Final Offer Document to be filed with SEBI and the Stock Exchange. The amount to be utilised for general purposes shall not exceed 10.00% of the Gross Proceeds.*

We believe that the infusion of the funds into the Project SPV, in order to meet its obligations under the Concession Agreements, will enable the Project SPV to acquire the necessary rights under the Concession Agreements. Accordingly, we believe that the proposed infusion of funds will be beneficial to the Trust and the Unitholders.

The fund requirements mentioned above and the proposed deployment are based on the estimates of the Investment Manager and have not been appraised by any bank, financial institution or any other external agency. The fund requirements may vary due to factors beyond the Investment Manager's control, such as market conditions and competitive environment. Consequently, the fund requirements are subject to revisions in the future at the discretion of the Investment Manager. In the event of any shortfall of funds for the activities proposed to be financed out of the Net Proceeds as stated above, the Investment Manager may re-allocate the Net Proceeds to the activities where such shortfall has arisen, subject to compliance with applicable law.

**Proposed schedule of implementation and deployment of Net Proceeds**

We propose to deploy the Net Proceeds towards the Objects in accordance with the estimated schedule of implementation and deployment of funds as set forth in the table below:

*(in ₹ million)*

| S. No. | Particulars | Estimated amount proposed to be funded from the Net Proceeds | Estimated utilisation of the Net Proceeds | |
|---|---|---|---|---|
| | | | Fiscal 2026 | Fiscal 2027 |
| 1. | Infusion of debt and/or equity into the Project SPV, which shall be utilized by the Project SPV for the payment of concession value of the InvIT Assets to NHAI and payment of improvement costs of the | 56,000.00 | 56,000.00 | Nil |

| S. No. | Particulars | Estimated amount proposed to be funded from the Net Proceeds | Estimated utilisation of the Net Proceeds | |
|---|---|---|---|---|
| | | | Fiscal 2026 | Fiscal 2027 |
| | InvIT Assets | | | |
| 2. | General purposes[(1)] | [●] | [●] | [●] |
| | **Total** | [●] | [●] | [●] |

[(1)] *The amount to be utilised for general purposes shall not exceed 10.00% of the Gross Proceeds.*

We intend to deploy the Net Proceeds towards the Issue as disclosed in the table above. However, the actual deployment of funds will depend on a number of factors, including the timing of completion of the Issue and we may have to revise our funding requirements and deployment on account of a variety of factors such as our financial conditions, market conditions, NHAI accepting our bid for the InvIT Assets, signing of the Concession Agreements, raising of debt and other external factors such as changes in the business environment or regulatory climate, which may not be within our control. This may entail rescheduling the proposed utilization of the Net Proceeds and changing the allocation of funds from its planned allocation at our discretion, subject to compliance with applicable law. Further, in the event, the Net Proceeds are not utilized (in full or in part) for the objects of the Issue during the period stated above due to any reason, including (i) the timing of completion of the Issue; (ii) market conditions outside our control; and (iii) any other economic, business and commercial considerations, the remaining Net Proceeds shall be utilized in subsequent periods as may be determined by the Investment Manager, in accordance with applicable laws.

**Details of Utilisation of Net Proceeds**

The details of utilisation of the Net Proceeds are set forth herein below:

***Infusion of debt and/or equity into the Project SPV, which shall be utilized by the Project SPV for the payment of concession value of the InvIT Assets to NHAI and payment of improvement costs of the InvIT Assets***

Pursuant to the Issue, the Project SPV will be entering into the Concession Agreements with NHAI, in its capacity as the concessioning authority to acquire, operate and maintain the InvIT Assets and shall be required to pay the relevant concession fee to NHAI in terms of the Concession Agreements. The Trust proposes to utilise an amount of up to ₹ 56,000.00 million from the Net Proceeds to infuse debt and/or equity into the Project SPV to enable the Project SPV to pay the concession value of the InvIT Assets. The debt will be infused in accordance with the terms of the Facility Agreement. In accordance with applicable law, the Trust may, subject to authorization of the IM Board, also consider infusion of capital by way of equity into the Project SPV.

The Project SPV will utilize the funds raised through the Facility towards payment of concession value to NHAI, in terms of the Concession Agreements. Further, in terms of the Concession Agreements, the Project SPV is obligated to undertake certain improvement works and repairs and refurbishment of tolling system and other equipment. The funds raised through the Facility are also proposed to be used towards payment for such improvement and repairs costs. For details of the Concession Agreements, please see the section entitled "*Summary of the Concession Agreements*" on page 195.

***General Purposes***

In terms of the InvIT Regulations, the Investment Manager shall, at its discretion, deploy the balance Net Proceeds aggregating to ₹ [●] million towards general expenses for the operation of the Trust, subject to such utilization not exceeding 10.00% of the Gross Proceeds, in compliance with the InvIT Regulations. The general purposes for which the Trust proposes to utilize Issue Proceeds include meeting exigencies and expenses incurred, by way of the Trust in the ordinary course of business, cost of debt financing to be incurred and any other expenses. Further, the Trust may also utilise it towards funding the DSRA required to be maintained by the Trust. In addition, the Trust may utilize the Issue Proceeds towards other expenditure (in the ordinary course of business) considered expedient and as approved by the Investment Manager or the Trustee, as the case may be, subject to compliance with applicable law. In case of a shortfall in Net Proceeds, the Investment Manager may, in compliance with the InvIT Regulations, have the flexibility to meet such shortfall including, by utilising the Trust's internal accruals or availing facilities from lenders. The Investment Manager will have flexibility in utilizing the proceeds earmarked for general purposes. The Investment Manager, in accordance with the investment objectives of the Trust, policies of its board of directors and the InvIT Regulations, will have flexibility in utilising any surplus amounts.

**Issue Expenses**

The total expenses of this Issue are estimated to be approximately ₹ [●] million. The Issue expenses consist of fee and commissions payable to the Lead Managers, fee payable to legal counsels, fee payable to Escrow Collection Banks and Registrar to the Issue, printing and stationery expenses, and all other incidental and miscellaneous expenses for listing the Units on the Stock Exchange. For ease of operations, if required, the expenses of in relation to the Issue as stated above, at the outset, may be borne by the Sponsor on behalf of the Trust, and the Investment Manager (on behalf of the Trust) agrees that it will reimburse the Sponsor for all such expenses as may be incurred by the Sponsor. The break-up for the Issue expenses is as follows:

*(in ₹ million)*

| Activity | Estimated expenses* | As a % of the total estimated Issue expenses* | As a % of the total Issue size* |
|---|---|---|---|
| Fee and commission payable to the Book Running Lead Managers (including brokerage and selling commission) | [●] | [●] | [●] |
| Selling commission payable to SCSBs for Bids directly procured by them and processing fees payable to SCSBs for Bids (other than Bids submitted by UPI Bidders using the UPI Mechanism) procured by the members of the Syndicate, the Registered Brokers, CRTAs or CDPs and submitted to SCSBs for blocking, Bankers to the Offer, fees payable to the Sponsor Bank for Bids made by RIBs | [●] | [●] | [●] |
| Processing fees payable to the Sponsor Bank | [●] | [●] | [●] |
| Fees payable to Registrar to the Issue | [●] | [●] | [●] |
| Printing and stationery expenses | [●] | [●] | [●] |
| Listing fees, SEBI fees, BSE and NSE processing fees, book-building software fees, and other regulatory expenses | [●] | [●] | [●] |
| Fee payable to other advisors and any other fees and expenses | [●] | [●] | [●] |
| Total estimated Issue expenses | [●] | [●] | [●] |

* *To be determined upon finalisation of the Issue Price and updated in the Final Offer Document prior to filing with SEBI and the Stock Exchanges.*

***Selling Commissions***

*Selling commission on the Non-Institutional Investor Portion which are procured by Members of the Syndicate (including their Sub-syndicate Members), SCSBs, RTAs and CDPs would be as set forth:*

***Non-Institutional Investor Portion*** *[●]% of the amount Allotted* (plus applicable tax)*

**Amount Allotted is the product of the number of Units Allotted and the Issue Price. Selling commission payable to the SCSBs will be determined on the basis of the bidding terminal ID as captured in the bid book of BSE or NSE. No processing fees shall be payable by to the SCSBs on the applications directly procured by them.*

*No processing fees shall be payable to the SCSBs on the applications directly procured by them. Any additional amounts to be paid by the InvIT shall be, as mutually agreed upon the Lead Managers, their affiliate Syndicate Member(s) and the Investment Manager (on behalf of the InvIT) prior to the Bid/ Issue Opening Date.*

***ASBA Processing Fees to SCSBs***

*Processing fees payable to the SCSBs on the Non-Institutional Investor Portion which are procured by the Members of the Syndicate/ Sub-syndicate/ Registered Brokers/ RTAs/ CDPs and submitted to SCSBs for blocking would be as set forth:*

***Non-Institutional Investor Portion*** *₹[●] per valid application* (plus applicable tax)*

**Based on valid Applications*

*SCSBs will be entitled to a processing fee of ₹[●] (plus applicable taxes), per valid ASBA Form, for processing ASBA Forms procured by Members of the Syndicate, Sub-Syndicate Member(s), Registered Brokers, RTAs or CDPs from Non-Institutional Bidders submitted to the SCSBs.*

***Registered Brokers***

*Selling commission payable to the Registered Brokers on the Non-Institutional Investor Portion, which are directly procured by the Registered Brokers and submitted to SCSBs for processing, would be as set forth:*

| | |
|---|---|
| ***Non-Institutional Investor Portion*** | *₹[●] per valid application* (plus applicable tax)* |

**Amount of selling commission payable to Registered Brokers shall be determined on the basis of applications which have been considered eligible for the purpose of Allotment.*

In the event the actual Issue expenses differ from the estimated Issue expenses, the Investment Manager will have the flexibility to utilize such a difference, subject to applicable law.

**Interim use of Net Proceeds**

The Net Proceeds shall be retained in the Public Issue Account until receipt of the listing and trading approvals from the Stock Exchanges by the Investment Manager. Pending utilization of the Net Proceeds for the purposes described above, the Investment Manager may deposit the Net Proceeds only in one or more scheduled commercial banks included in the Second Schedule of the Reserve Bank of India Act, 1934, as may be approved by the IM Board.

***Retention of oversubscription in the Issue, if any***

The Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to retain oversubscription of up to 25.00% of the Issue Size in accordance with the InvIT Regulations. In the event that the Investment Manager, in consultation with the Book Running Lead Managers, exercises the aforesaid right, the proceeds from the Allotment pursuant to such oversubscription shall be utilized in a manner that is proportional to the proposed utilisation of the Issue Proceeds and towards the same objects. However, in compliance with the InvIT Regulations, proceeds from the Allotment pursuant to such oversubscription shall not be utilized towards general purposes.

## FINANCIAL INDEBTEDNESS AND DEFERRED PAYMENTS

The Trust or the Project SPV do not have any outstanding borrowings as of the date of this Draft Offer Document. However, the Trust may avail borrowings from external lenders in the future, as deemed appropriate, subject to commercial considerations and applicable law.

***Status of lender consents***

As on date of this Draft Offer Document, neither the Trust nor the Project SPV have availed any borrowings. Accordingly, there are no consents required to be obtained from the lenders in relation to the Issue.

***Borrowing Policy***

The Investment Manager shall ensure that all funds borrowed in relation to the Trust are in compliance with the InvIT Regulations. Accordingly, the Investment Manager has formulated the Borrowing Policy to outline the process for borrowing monies in relation to the Trust. The key terms of the Borrowing Policy include the following:

1. The Trust may raise debt and avail borrowings and deferred payments from time to time, including through (i) issuance of debt securities, commercial paper or loans from banks and financial institutions, in the manner specified by the SEBI, and in accordance with applicable law, and (ii) availing loans from banks and financial institutions in accordance with applicable law (including the InvIT Regulations). The Trust shall, in all cases, comply with the borrowing limits and approval requirements prescribed under Regulation 20 of the InvIT Regulations. Transaction-specific covenants, shall be documented in the respective offer or financing agreements. The Trust shall be permitted to borrow monies through any permitted means, by any instrument, in Indian or foreign currency, as permitted by applicable law, including as prescribed by the Reserve Bank of India, from time to time.
2. The Investment Manager and the Trustee (on behalf of the Trust) shall be permitted to borrow monies in relation to the Trust, subject to the approval of its board of directors or such other committee of the board of directors of the Investment Manager as may be constituted in this regard. The Investment Manager may engage such intermediaries (include any other group companies of the Investment Manager) as may be necessary to facilitate the borrowings in relation to the Trust, holding companies or SPVs at such remuneration as may be reasonable and at arm's length, as permitted by applicable law.
3. In the event the aggregate consolidated borrowings and deferred payments (net of cash and cash equivalents) of the Trust, holding companies and the SPVs, exceed any thresholds prescribed under the Regulation 20 of the InvIT Regulations in this regard or any other applicable law, any further borrowings by the Trust shall be availed in accordance with the requirements prescribed under the InvIT Regulations, including any approval from Unitholders under Regulation 22 of the InvIT Regulations.
4. The Investment Manager shall ensure that if the value of funds borrowed from related parties in a financial year, exceeds 5% of the total consolidated borrowings of the Trust, any holding company and the SPVs or any other thresholds prescribed under the InvIT Regulations, approval from the Unitholders shall be obtained prior to entering into any such subsequent transaction with any related party, in accordance with Regulation 22 of the InvIT Regulations.
5. The Trust also has the power to create mortgage or secure any of its assets or provide guarantees in order to borrow funds. However, the Investment Manager shall not be allowed to create any obligation which would allow the liabilities to extend beyond the assets held by the Trust or making such liabilities unlimited except with obtaining the necessary approvals as may be required under the applicable law including the InvIT Regulations.
6. Except with prior approval of the Unitholders and obtaining any other approvals required under applicable law (including the InvIT Regulations), any such obligation will not allow the Investment Manager to make the liabilities of the Trust or its Unitholders unlimited.
7. In addition to the above, any borrowing by the Holding Companies or the SPVs, incorporated under the Companies Act, 1956 or the Companies Act, 2013, will be in accordance with the conditions prescribed therein.

## DISCUSSION AND ANALYSIS BY THE DIRECTORS OF THE INVESTMENT MANAGER OF THE FINANCIAL CONDITION, RESULTS OF OPERATIONS AND CASH FLOWS OF THE PROJECT SPV OF THE TRUST

*Due to the nature of the Project SPV and the InvIT Assets, there is limited financial information available in respect of us which can be presented in this Draft Offer Document. No separate financial information, including actual revenue data for the InvIT Assets, are currently available, which could be used to clearly assess financial information, including revenue and expenses, in respect of each of the InvIT Assets. Accordingly, in lieu of combined financial statements of the Trust, the InvIT Assets and/or Project SPV, the revenue data that NHAI has collected through toll collection and maintenance contracts has been included in the section entitled "Asset Revenue Information" on page 298.*

*Furthermore, this limited historical revenue data available in respect of the InvIT Assets may not reflect their operation in the future and are not indicative of our expected future financial condition, results of operations or cash flows. Investors are cautioned that the lack of financial information in this Draft Offer Document may make it difficult to assess our financial position or future prospects or results of operations.*

*The following discussion is intended to convey management's perspective on our expected financial condition and results of operations.*

*This discussion contains forward-looking statements that involve risks and uncertainties. Actual results may differ materially from those discussed in or implied by any of the forward-looking statements as a result of various factors, including those listed under "Risk Factors" and "Forward-Looking Statements*" on pages 35 and 17.

### Overview

Raajmarg Infra Investment Trust ("**Trust**") is an infrastructure investment trust which is registered with SEBI under the InvIT Regulations on December 22, 2025, under Regulation 3(1) of the InvIT Regulations. The Trust intends to acquire, operate and maintain the InvIT Assets pursuant to the terms of the Concession Agreements. The Trust is sponsored by NHAI, an autonomous authority of the GoI under the MoRTH constituted on June 15, 1989 under the NHAI Act. NHAI was operationalised in February 1995 with the appointment of a full-time chairman and other members of the board. The functioning of NHAI is governed by the NHAI Act and the rules, and regulations framed thereunder. We are managed by qualified personnel of the Investment Manager with majority of the personnel who have management and operational experience in the roads and highways sector for over two decades. For further details, see the sections headed "*Parties to the Trust – The Investment Manager – Raajmarg Infra Investment Managers Private Limited*" on page 85.

The Trust proposes to have an initial portfolio of five Toll Roads in the Indian states of Jharkhand, Andhra Pradesh, Tamil Nadu and Karnataka under the Toll Operate Transfer ("**TOT**") model conceived by NHAI. These Toll Roads will be operated and maintained pursuant to concessions granted by the NHAI to the Project SPV. The Toll Roads comprise five toll roads spanning a total length of 260.198 kms and forms part of the Golden Quadrilateral project. The Project SPV proposes to have an exclusive right, license and authority to demand, collect and appropriate fee, operate, manage and maintain the Toll Roads. We expect to satisfy all conditions precedent and commence our concessions in accordance with the terms of the Concession Agreements. For further details, see "*Summary of the Concession Agreements*" and "*Use of Proceeds*" on page 195 and 206, respectively.

The Concession Agreements, once executed between the Project SPV and NHAI (as concessioning authority) will provide the Project SPV, the exclusive right, license and authority to demand, collect and appropriate fee, operate, manage and maintain the initial portfolio assets for a period of 15 years from users of each Toll Road and perform and fulfil all of the concessionaire's obligations under and in accordance with respective Concession Agreements. The responsibility for the supervision of the operation and maintenance of the Toll Roads from the O&M handover date will also vest with us. In return, the Project SPV is required to pay the concession fee to the NHAI prior to the commencement of the concession, as set out in the respective Concession Agreements. For further information on the provisions of the Concession Agreements, see "*Summary of the Concession Agreements"* on page 195.

From the appointed date (i.e., the date on which all conditions precedent have been satisfied in accordance with Concession Agreement, hereinafter, "**Appointed Date**"), the Project SPV will acquire, operate and maintain the following toll road assets ("**Toll Roads**"):

| S No. | Asset | Details |
|---|---|---|
| 1. | Gorhar to Barwa Adda | The four/six lane section from Gorhar to Barwa Adda from km 320+810 to km 400+632 (design km 401+332) of NH-19 (old NH-2), comprising km 320+810 to km 326+000 between Gorhar and Atka, being a four lane section; Atka to Khairatunda from km 326+000 to km 360+300 (design km 361+000) and Khairatunda to Barwa Adda from km 360+300 (design km 361+000) to km 400+632 (design km 401+332), being six lane sections, in the state of Jharkhand, having total length of 80.522 km. |
| 2. | Chilakaluripet-Vijayawada | The six lane section from Chilakaluripet to Vijayawada from km 355+000 to km 357+342 and from km 372+038 to km 422+605 along with Chilakaluripet bypass section from 0+000 to km 16+499 ("**Chilakaluripet Bypass**") of NH 16, in the state of Andhra Pradesh, having total length of 69.408 km. |
| 3. | Chennai Bypass | The six lane section from km 0+000 to km 32+600 of NH-32 and NH-48, in the state of Tamil Nadu, having total length of 32.600 km. |
| 4. | Chennai -Tada | The six lane section from km 21+400 to km 54+400 of NH-16, in the state of Tamil Nadu, having total length of 33.000 km. |
| 5. | Neelmangla Tumkur | The four/six lane section from Neelmangla to Tumkur from km 29+500 to km 74+168 of NH-48, comprising km 29+500 to km 49+900 between Neelmangla to Dobbaspet being a six lane section; Dobbaspet to Tumkur from km 49+900 to km 61+520, being a four lane section and Tumkur Bypass from km 61+520 to km 74+168 being a 6 lane section, in the state of Karnataka, having total length of 44.668 km. |

The Investment Manager has confirmed that the Trust shall have the ability to meet its working capital requirements for at least 12 months from the date of listing of the Units.

**SEBI Exemptions**

The Sponsor has submitted a request to SEBI dated January 14, 2026, seeking exemptions under the InvIT Regulations and the SEBI InvIT Master Circular in respect of (i) preparation and disclosure of consolidated financial statements of the Sponsor prepared on a consolidated basis in accordance with Indian Accounting Standards for financial years ended March 31, 2022, March 31, 2023 and March 31, 2024; (ii) disclosure of summary audited financial statements of the Sponsor for the financial year ended March 31, 2025; (iii) exemption from strict application of certain provisions of the InvIT Regulations and SEBI InvIT Master Circular in respect of disclosure of financial statements of the InvIT Assets proposed to be held by the Trust and related disclosure requirements including combined financial statements of the Trust and any other applicable disclosure requirements arising in relation to preparation and disclosure of combined financial statements under the SEBI; (iv) exemption from disclosure of material litigation and regulatory actions pending against the associates of the Trust, Sponsor, Investment Manager, and Project Manager; (v) exemption from compliance with Regulation

Accordingly, only the following information is presented in this Draft Offer Document:

- The audited standalone financial information of the Trust for the period from its date of settlement, i.e. November 24, 2025, till December 31, 2025;
- Projections of Revenue from Operations and Cash Flow from Operating Activities on page 320;
- Summary financial information of the Sponsor, as of and for the financial years ended March 31, 2024, March 21, 2023, and March 31, 2022, derived from the audited standalone financial statements of the Sponsor for the respective years. For further details, please see the sections entitled *"Summary Financial Information of the Sponsor"* on page 28;
- Summary financial information of the Investment Manager from the date of its incorporation i.e. August 22, 2025, to November 30, 2025;
- In lieu of the combined financial statements, of the Trust along with the InvIT Assets and/or SPV, the revenue data that NHAI has been collecting through toll collection and maintenance contracts, has been included in the section entitled "*Asset Revenue Information*" on page 298. This revenue data has been provided from April 1, 2022 till December 31, 2025, separately for each InvIT Asset, to the extent that such data is available for such InvIT Asset. The said amounts being collected are at times intermittent on account of gaps in tolling contract periods and would not be a true reflection of the revenue that these InvIT Assets are actually generating. Please refer to "*Risk Factors – The Trust is a newly settled trust with no operating history and limited historical financial information and, as a result, investors may not be able to assess its prospects on the basis of past records and the financial information disclosed in this Draft Offer Document* ." on page 35 in this regard.

The absence of meaningful historical operating data or financial statements may make it difficult for investors to evaluate our ability to operate, manage and maintain the Toll Roads and assess our financial position or future prospects or results of operations.

**Significant factors affecting our results of operations**

We expect our results of operations, financial condition and liquidity to be influence by the following events, facts, developments and market characteristics.

***Toll revenues***

The operation of toll roads principally involves collection of tolls and maintenance. Revenues from the Toll Roads will substantially comprise receipts collected at toll plazas from vehicles passing through the Toll Roads. Toll revenues generated by each of the Toll Roads will be subject to a number of factors, including traffic volume by vehicle categories, weight of the vehicle, applicable toll rates and distance travelled. The volume can vary with the location of the asset and the period of operation, as well as seasonal effects. Meanwhile, toll rates are ultimately determined by the Indian government in accordance with certain national laws and regulations. We anticipate a continuing increase in toll rates for the Toll Roads given the annual inflation-linked adjustment.

***Operation and maintenance costs***

We will be responsible for the operation and maintenance of the Toll Roads upon commencement of the respective concession. We expect to take over the operation and maintenance of the InvIT Assets post 30 months from the appointed date. Pursuant to each of the Concession Agreements, we will be required to ensure that the relevant Toll Road conforms to the maintenance requirements set forth in the Concession Agreements. For each Toll Road, we will be required to prepare an annual program of preventive, urgent and other scheduled maintenance to comply with the standards and requirements set out in the Concession Agreements.

***Local state economies***

We expect our financial results from the Toll Road to be dependent upon growth in the local state economies in which they are operated, namely Jharkhand, Andhra Pradesh, Tamil Nadu and Karnataka. We expect trends in the economic development and population growth of each of these states to have a direct impact on the traffic utilizing the Toll Road.

***Access to and cost of financing***

Our ability to obtain financing, as well as the cost of such financing, affects our business. Our ability to access such additional financing is subject to a variety of factors, including interest rates and other funding costs and market conditions. Any lack of access or higher costs in relation to additional financing that may be required by us could negatively impact our results of operations.

***Arrangement with respect to future assets***

In accordance with the approval granted by the Chairman of NHAI, by way of communication dated December 01, 2025, our Sponsor will offer around 1,500.00 km of completed and operational national highways to the Trust over the next three to five years for monetization ("**Future Assets**"). The process of identification of Future Assets, offer of Future Assets to Trust and completion of transfer of Future Assets to the Trust including valuation mechanism may be refined and/or modified in line with the internal policies of NHAI.

**Liquidity and Capital Resources**

Pursuant to the Concession Agreement, we are required to pay certain concession fees and make certain improvement works to each of the Toll Road relating to overlay activities and construction of additional toll lanes, among other things. We expect to finance our operations for the next 12 months primarily from cash flow from the operation of the Toll Roads. We may also from time to time seek other sources of funding, which may include debt or equity financings, depending on our financing needs and market conditions.

**Qualitative Disclosures About Market Risk**

Market risk is the risk of loss arising from adverse changes in market rates and prices, such as foreign currency exchange rates and commodity prices. We do not hold or issue financial instruments for trading purposes and does not enter into derivative transactions that would be considered speculative positions. We intend to minimize our exposure to currency risk by minimizing our non-Rupee borrowings.

***Interest Rate Risk***

We expect the bulk of our borrowings to be at fixed rates of interest. Our borrowings are exposed to market risk relating to changes in interest rates upon any refinancing or additional financing.

***Liquidity Risk***

We may not have sufficient cash flows to meet our operation and maintenance expense requirements and our financing obligations when they come due. We manage liquidity risks by forecasting projected cash flows. Management closely monitors our future and contingent obligations and set up required cash reserves as necessary in accordance with internal requirements.

## CAPITALIZATION STATEMENT

The following table sets forth the Trust's capitalization, on a standalone basis, as at December 31, 2025, on the basis of amounts derived from the Audited Financial Information and as adjusted for the Issue.

*(in ₹ million, other than ratio)*

| Particulars | Pre-Issue as at December 31, 2025 | As adjusted for Issue* |
|---|---|---|
| **Financial liabilities** | | |
| Non current borrowings | Nil | [●] |
| Current borrowings | Nil | [●] |
| **Total borrowings (A)** | Nil | [●] |
| **Equity** | | |
| Initial contribution to the Trust | 0.01 | [●] |
| Unit capital | Nil | [●] |
| Other Equity | Nil | [●] |
| **Total Equity (B)** | 0.01 | [●] |
| **Total Borrowings / Total Equity Ratio (A/B) times** | 0 | [●] |

** Corresponding details post Issue are not available, hence the required disclosures in respect of the same have not been provided in the above table.*

## DISTRIBUTION

*Statements contained in this section entitled "Distribution" that are not historical facts are forward-looking statements. Such statements are subject to certain risks and uncertainties that could cause actual results to differ materially from those that may be projected. Under no circumstances should the inclusion of such information herein be regarded as a representation, warranty or prediction with respect to the accuracy of the underlying assumptions by the Trust, the Trustee, the Sponsor, the Investment Manager, the Book Running Lead Managers or any other person. Bidders are cautioned not to place undue reliance on these forward-looking statements that are stated only as at the date of this Draft Offer Document. For details, please see the section entitled "Forward-Looking Statements" on page 17. For details on the risks relating to distribution, please see the section entitled "Risk Factors" on page 35.*

The distribution policy (the "**Distribution Policy**") aims to outline the process and procedure for the distribution to be undertaken by Trust, subject to the provisions of the InvIT Regulations.

The net distributable cash flows of the Trust (the "**Distributable Income**") shall be based on the cash flows generated from the underlying operations undertaken by the SPV and/or any HoldCo held by the Trust. For details of the business and operations presently undertaken by the InvIT Assets, please see "*Business*" on page 155. Presently, cash flows receivable by the Trust may be in the form of dividend, interest income or principal repayment received from the Trust Assets in relation to any debt sanctioned by the Trust, or a combination of both. The computation of the Distributable Income will at all times be compliant with the prevailing provisions of the InvIT Regulations. Distributions may be made from the monies received by the Trust, in accordance with the provisions of the documents executed in relation to the InvIT and applicable law.

In terms of the InvIT Regulations and SEBI InvIT Master Circular, each SPV shall distribute not less than 90% of its net distributable cash flows ("**NDCF**") to its respective HoldCo or the Trust, as applicable, in the proportion of its holding in the SPV, subject to applicable provisions of the Companies Act, 2013, as amended or Limited Liability Partnership Act, 2008, as amended, as applicable. In terms of the InvIT Regulations, with regard to distribution of NDCF by the Holdco, if any, to the Trust, 100% of cash flows received by the Holdco from underlying SPVs shall be distributed to the Trust (net of any expenses and applicable taxes including withholding taxes and adjustment for negative cash flows of the Holdco as permitted under InvIT Regulations) and with respect to the cash flows generated by a Holdco on its own, not less than 90% of such NDCF shall be distributed by the Holdco to the Trust.

In terms of the InvIT Regulations, the Trust shall distribute at least 90% of the Distributable Income to the Unitholders in proportion to their respective unit holdings. The distributions shall be made in accordance with the timelines as prescribed under the InvIT Regulations. The Trust shall ensure that such distribution of available Distributable Income is made at least once in every quarter during the financial year. All distributions shall be effected within the prescribed timelines from the record date, as stipulated under the InvIT Regulations. The first distribution (whether monthly/quarterly/half-yearly, etc.) out of the NDCF computed for a financial year (or period thereof) should be as mandated in the InvIT Regulations. Thereafter, minimum distribution requirement should be met on a cumulative basis for the subsequent distributions out of the NDCF for such financial year.

In the event any infrastructure asset is sold by the Trust or any Holdco or SPV, or if the equity shares or interest in any Holdco or SPV is sold by the Trust, then in accordance with the InvIT Regulations and the Distribution Policy:

- if the Trust proposes to re-invest the sales proceeds into any other infrastructure asset, it shall not be required to distribute any sales proceeds to the Unitholders or the Trust; and
- if the Trust proposes not to invest the sales proceeds into any other infrastructure asset within a period of one year, it shall be required to distribute the same in accordance with the InvIT Regulations.

All distributions to the Unitholders shall be made in compliance with the InvIT Regulations, Income-tax Act, 2025 ("**IT Act**"), and other applicable law.

For the purposes of the IT Act, any income distributed by the Trust to the Unitholders shall be deemed to be of the same nature and in the same proportion in the hands of the Unitholder as if it had been received by, or accrued to, the Trust. Accordingly, the Trust may follow either the receipt approach or the accrual approach subject to the provisions of the IT Act and applicable accounting standards, however, the same shall be followed on a consistent basis.

The Distributable Income and the NDCF of any SPV shall be calculated in accordance with the InvIT Regulations. The indicative method of calculating NDCF for the SPV and the Trust is provided below:

***a. Calculation of net distributable cash flows at the HoldCo / SPV level:***

| **Particulars** |
|---|
| **Cash flow from operating activities as per Cash Flow Statement of HoldCo/ SPV** |
| **(+) Cash Flows received from** SPV's which represent distributions of NDCF computed as per relevant framework **(refer note 1 and 8 below)** ***(relevant in case of HoldCos)*** |
| (+) Treasury income / income from investing activities (interest income received from FD, tax refund, any other income in the nature of interest, profit on sale of Mutual funds, investments, assets etc., dividend income etc., excluding any Ind AS adjustments. Further clarified that these amounts will be considered on a cash receipt basis) |
| (+) Proceeds from sale of infrastructure investments, infrastructure assets or shares of SPVs or Investment Entity adjusted for the following<br>• Applicable capital gains and other taxes<br>• Related debts settled or due to be settled from sale proceeds<br>• Directly attributable transaction costs<br>• Proceeds reinvested or planned to be reinvested as per Regulation 18(7) of InvIT Regulations or any other relevant provisions of the InvIT Regulations |
| (+) Proceeds from sale of infrastructure investments, infrastructure assets or sale of shares of SPVs or Investment Entity not distributed pursuant to an earlier plan to reinvest as per Regulation 18(7) of InvIT Regulations or any other relevant provisions of the InvIT Regulations, if such proceeds are not intended to be invested subsequently |
| (-)Finance cost on Borrowings as per Profit and Loss Account excluding finance cost on any shareholder debt/loan from trust. The amortization of any transaction costs can be excluded provided such transaction costs have already been deducted while computing NDCF of previous period when such transaction costs were paid |
| (-) Debt repayment (to include principal repayments as per scheduled EMI's except if refinanced through new debt including overdraft facilities and to exclude any debt repayments / debt refinanced through new debt, in any form or equity raise as well as repayment of any shareholder debt / loan from Trust) |
| (-) any reserve required to be created under the terms of, or pursuant to the obligations arising in accordance with, any:<br>(i). loan agreement entered with banks / financial institution from whom the Trust or any of its SPVs/ HoldCos have availed debt, or<br>(ii). terms and conditions, covenants or any other stipulations applicable to debt securities issued by the Trust or any of its SPVs/ HoldCos, or<br>(iii). terms and conditions, covenants or any other stipulations applicable to external commercial borrowings availed by the Trust or any of its SPVs/ HoldCos, or<br>(iv). agreement pursuant to which the SPV/ HoldCo operates or owns the infrastructure asset, or generates revenue or cashflows from such asset (such as, concession agreement, transmission services agreement, power purchase agreement, lease agreement, and any other agreement of a like nature, by whatever name called); or<br>(v). statutory, judicial, regulatory, or governmental stipulations; or – (**refer note 2 below**) |
| (-) any capital expenditure on existing assets owned / leased by the SPV or HoldCo, to the extent not funded by debt / equity or from reserves created in the earlier years (**refer note 9 below**) |
| **NDCF for HoldCo/SPVs** |

***b. Calculation of net distributable cash flows at the Trust level:***

| **Particulars** |
|---|
| **Cashflows from operating activities of the Trust** |
| (+) Cash flows received from SPV's / Investment entities which represent distributions of NDCF computed as per relevant framework **(refer note 1 and 8 below)** |
| (+) Treasury income / income from investing activities of the Trust (interest income received from FD, any investment entities as defined in Regulation 18(5), tax refund, any other income in the nature of interest, profit on sale of Mutual funds, investments, assets etc., dividend income etc., excluding any Ind AS adjustments. Further clarified that these amounts will be considered on a cash receipt basis) |
| (+) Proceeds from sale of infrastructure investments, infrastructure assets or shares of SPVs/HoldCos or Investment Entity adjusted for the following<br>• Applicable capital gains and other taxes<br>• Related debts settled or due to be settled from sale proceeds<br>• Directly attributable transaction costs<br>• Proceeds reinvested or planned to be reinvested as per Regulation 18(7) of InvIT Regulations or any other relevant provisions of the InvIT Regulations |
| (+) Proceeds from sale of infrastructure investments, infrastructure assets or sale of shares of SPVs/ HoldCos or Investment Entity not distributed pursuant to an earlier plan to re-invest as per Regulation 18(7) of InvIT Regulations or any other relevant provisions of the InvIT Regulations, if such proceeds are not intended to be invested subsequently |

| |
|---|
| (-)Finance cost on Borrowings as per Profit and Loss Account. However, amortization of any transaction costs can be excluded provided such transaction costs have already been deducted while computing NDCF of previous period when such transaction costs were paid |
| (-) Debt repayment at Trust level (to include principal repayments as per scheduled EMI's except if refinanced through new debt including overdraft facilities and to exclude any debt repayments / debt refinanced through new debt in any form or funds raised through issuance of units) |
| (-) any reserve required to be created under the terms of, or pursuant to the obligations arising in accordance with, any:<br>(i). loan agreement entered with financial institution, or<br>(ii). terms and conditions, covenants or any other stipulations applicable to debt securities issued by the Trust or any of its SPVs/ HoldCos, or<br>(iii). terms and conditions, covenants or any other stipulations applicable to external commercial borrowings availed by the Trust or any of its SPVs/ HoldCos, or<br>(iv). agreement pursuant to which the Trust operates or owns the infrastructure asset, or generates revenue or cashflows from such asset (such as, concession agreement, transmission services agreement, power purchase agreement, lease agreement, and any other agreement of a like nature, by whatever name called); or<br>(v). statutory, judicial, regulatory, or governmental stipulations; or – (**refer note 2 below**) |
| (-) any capital expenditure on existing assets owned / leased by the InvIT, to the extent not funded by debt / equity or from contractual reserves created in the earlier years (**refer note 9 below**) |
| **NDCF at Trust Level** |

***Notes / other rules:***

1. *NDCF computed at SPV level for a particular period to be added under this line item, even if the actual cashflows from SPV to the Trust has taken place post that particular period, but before finalization and adoption of accounts of the Trust.*
2. *The Trust retains the option to distribute any surplus amounts, unless such surplus is required to create reserves for any subsequent period. However, any reserve created out of debt funds at the time of availing debt as per the terms of the financing documents shall not be reduced.*
3. *The option to retain 10% distribution under Regulation 18(6) of the InvIT Regulations needs to be computed by taking together the retention done at SPV level and Trust level.*
4. *Surplus cash available in Trust/ Holdco/SPVs due to:*
   - i. *10% of NDCF withheld in line with the InvIT Regulations in any earlier year or half year or;*
   - ii. *Such surplus being available in a new Holdco/SPV on acquisition of such Holdco/SPV by the Trust; or*
   - iii. *Any other reason, excluding if such surplus cash is available due to any debt raise;*

   *could be considered for distribution by the Holdco/SPV to the Trust/ Holdco, or by the Trust to its Unitholders in part or in full. Also, such distribution of surplus funds shall be separately disclosed after the NDCF computation for the respective period.*

   *Provided that with regard to the point 4 (ii) above, if an acquisition of such SPV was funded by external debt, then surplus cash available with such SPV should first be used to repay such external debt. After such debt repayment, remaining surplus, if any, can be used for distribution.*
5. *Similarly, any restricted cash (disclosed as such) should not be considered for NDCF computation by the SPV/ Holdco or Trust (e.g. unspent CSR balance for any year deposited in a separate account as per Companies Act, 2013 which will be utilized in subsequent years, DSRA reserve, major maintenance reserve etc.)*
6. *Further, it is expressly provided that no Trust or Holdco/SPV can distribute any cashflows by obtaining external debt, except to the extent clarified in note 2 and 7 (this will exclude any working capital / OD facilities obtained by Trust / SPVs as part of Treasury management / working capital purposes as long as they are squared off within the quarter).*
7. *Further, it is also clarified that proceeds from sale of infrastructure investments, infrastructure assets or shares of SPVs or Investment Entity adjusted for transaction costs or repayment of debt taken for such assets or other items as mentioned above which is intended to be reinvested or planned to be reinvested as per Regulation 18(7) of the InvIT Regulations, could be temporarily parked in Overdraft accounts or used to repay any additional / unrelated debt. Further if such proceeds are not intended to be reinvested as per the timeline provided in the InvIT Regulations and such net proceeds are to be distributed back to Unitholders, then redrawing such temporarily parked funds to distribute such net proceeds will not be considered as a contravention of note 6 above.*
8. *Cash flows received from Holdco/SPV's / Investment entities which represent distributions of NDCF computed as per relevant framework at the Trust and/or Holdco level for further distribution to Unitholders shall exclude any such cash flows used by the Trust and/or Holdco for onward lending to any other Holdco/SPVs / Investment entities to meet operational / interest expenses or debt servicing of entities.*
9. *Capital expenditure include amounts incurred and paid towards asset enhancement and are capitalized to asset value in the financial statements including lease payments. It is further clarified that Existing Assets as referred to in this line item includes any new structure / building / other infrastructure constructed on an existing infrastructure asset which is already a part of the Trust.*
10. *Debt repayment at Trust level will not be reduced from NDCF to the extent such debt is refinanced at the Holdco/SPV level and such proceeds from refinancing have been transferred by the Holdco/SPV to the Trust for such debt repayment. Similarly, debt repayment at Holdco/SPV level will not be reduced from NDCF to the extent such debt is refinanced at the Trust level and such proceeds from refinancing have been transferred by the Trust to the Holdco/SPV for such debt repayment.*

In terms of the InvIT Regulations, if the distribution is not made in accordance with the prescribed timeline under the InvIT Regulations, the Investment Manager shall be liable to pay interest to the Unitholders at the rate of 15.00% per annum or such other rate as may be specified under applicable law, whichever is lower, until the distribution is made. Such interest shall not be recovered in the form of fees or any other form payable to the Investment Manager by the Trust.

In accordance with the InvIT Regulations, in the event any amount remains unclaimed or unpaid out of the Distributions declared by the Trust, such amount shall be transferred to the "Investor Protection and Education Fund" constituted by SEBI in terms of Section 11 of the Securities and Exchange Board of India Act, 1992 in a manner as may be specified by SEBI, provided such amount transferred shall not bear any interest.

For risks in relation to distribution, please see "*Risk Factors*" on page 35.

## RELATED PARTY TRANSACTIONS

In terms of Regulation 2(1)(zv) of the InvIT Regulations, related party shall be as defined as under the Companies Act, 2013 or under the applicable accounting standards and shall also include: (i) Parties to the Trust; and (ii) promoters, directors, and partners of the Parties to the Trust. Further, related parties also include such persons and entities as defined in terms of the applicable accounting standards, being Ind AS 24 on "*Related Party Disclosures*" ("**Related Parties**") in relation to related party transactions. The Parties to the Trust, may, from time to time, enter into related party transactions, in accordance with applicable law.

**Procedure for dealing with Related Party Transactions**

The IM Board has adopted the policy on related party transactions ("**RPT**") of the Trust (the "**RPT Policy**") pursuant to its resolution dated December 15, 2025.

The key terms of the RPT Policy are provided below:

(i). In accordance with the InvIT Regulations, the Investment Manager will ensure that all future RPTs shall be:
- (a). on an arm's length basis;
- (b). in accordance with the relevant accounting standards;
- (c). in the best interest of the Unitholders;
- (d). consistent with the strategy and investment objectives of the Trust; and
- (e). compliant with applicable law, including the InvIT Regulations.

(ii). Review and approval of RPT:

(a). Each transaction which is identified as a RPT shall be pre-approved by the Audit Committee prior to entering into such transaction.

(b). The Audit Committee may grant omnibus approval for RPT. Each such omnibus approval shall be valid for a period not exceeding one year from the date of such approval, and RPTs undertaken after the expiry of such period shall require fresh approval of the Audit Committee. The Audit Committee shall review, on a periodic basis, the details of RPTs entered into by the Trust pursuant to the omnibus approval.

(iii). Information for approval - For considering approval of RPTs, the Audit Committee will be provided with all relevant material information, including but not limited to:

i. Type, material terms, and particulars of the proposed transaction.

ii. Name of the related party and its relationship with the Trust including nature of its concern or interest (financial or otherwise).

iii. Tenure of the proposed transaction (particular tenure shall be specified).

iv. Value of the proposed transaction.

v. The percentage of the annual consolidated turnover of the Trust or value of Trust's asset, as applicable, as on immediately preceding financial year, that is represented by the value of the proposed transaction;

vi. If the transaction relates to any loans, inter-corporate deposits, advances or investments made or given by the Trust :
- details of the source of funds in connection with the proposed transaction
- where any financial indebtedness is incurred to make or give loans, interoperate deposits, advances or investments,
  - nature of indebtedness;
  - cost of funds; and
  - tenure
- applicable terms, including covenants, tenure, interest rate and repayment schedule, whether secured or unsecured; if secured, the nature of security; and
- the purpose for which the funds will be utilized by the ultimate beneficiary of such funds pursuant to the RPT.

vii. Justification as to why the RPT is in the interest of the Trust

viii. A copy of the valuation or other external party report, if any such report has been relied upon

ix. Percentage of the counter-party's annual consolidated turnover that is represented by the value of the proposed RPT (on a voluntary basis);

x. Any other information that may be relevant

(iv). The Investment Manager will establish an internal control system so as to ensure that all future RPTs are compliant with the InvIT Regulations and applicable accounting standards. Further, the Investment Manager shall comply with the InvIT Regulations in relation to RPTs. The Investment Manager shall also ensure compliance with any additional guidelines issued in this regard by Securities and Exchange Board of India and other relevant regulatory, statutory or governmental authorities from time to time.

(v). In addition to any other requirement that may be prescribed in terms of the InvIT Regulations or other applicable laws, all RPTs to be entered into in the future will be decided by the Board after the examination of the nature of the transaction and its supporting documents or such other data as may be deemed necessary by the Board.

(vi). The Investment Manager will ensure that if with respect to RPTs entered into after the initial offer of Units, the total value of all the RPTs in a financial year pertaining to acquisition or sale of assets, whether directly or through a holding company or SPV, or investments into securities, exceeds 5% of the value of the assets of the Trust or any other threshold prescribed by the InvIT Regulations, approval from the Unitholders shall be obtained prior to entering into any such subsequent transaction with any Related Party, in accordance with Regulation 22 of the InvIT Regulations.

(vii). The Investment Manager will ensure that if with respect to RPTs entered into after the initial offer of Units, the value of the funds borrowed from related parties in a financial year exceeds 5% of the total consolidated borrowings of the Trust, any holding company and the SPVs, or any other threshold prescribed by the InvIT Regulations, approval from the Unitholders shall be obtained prior to entering into any such subsequent transaction with any related party, in accordance with Regulation 22 of the InvIT Regulations.

(viii). As a general rule, the Investment Manager must demonstrate to the Board that future RPTs satisfy the criteria set out in (i) above at the time of recommending the same for the approval of the Board.

(ix). The Investment Manager will also incorporate into its internal audit plan a review of all material RPTs entered into by the Trust during each financial year, including a review of the implementation of the agreements, including any right of first offer or right of first refusal arrangements, to acquire assets from the Sponsor, Sponsor Group and its associates.

(x). The Investment Manager shall ensure that the profits from RPTs have arisen from legitimate business transactions.

(xi). While considering a RPT, any director on the Board who has a potential interest in any Related Party Transaction will recuse himself or herself and abstain from discussion, review and voting on the RPT in terms of the InvIT Regulations and applicable law. Further, while considering voting on a RPT which requires approval of the Unitholders, voting by any person who is a related party of the Trust in such transaction as well as associate of such person(s) shall not be considered on the specific issue.

(xii). In connection with any review of related party transaction, the Audit Committee/Unitholders has authority to modify or waive any procedural requirements of the RPT Policy in the best interest of the Trust.

*Potential conflict of interest*

(i). Subject to applicable law and the RPT Policy, all resolutions in writing of the IM Board in relation to matters concerning RPTs of the Trust must be approved by a majority of the directors of the Investment Manager.

(ii). Where matters concerning the Trust relate to transactions entered into or to be entered into by the Investment Manager for and on behalf of Trust with a related party, the IM Board is required to consider the terms of the transactions to satisfy itself that the transactions are conducted in accordance with the parameters set out in the RPT Policy.

(iii). As part of its review of the internal audit reports, the IM Board will review the internal audit reports of the implementation of the agreements to acquire assets from the Sponsor to ensure compliance. The review will include an examination of supporting documents and such other data deemed necessary to the IM Board.

***Present and On-going Related Party Transactions***

*Related party transactions of the Trust in relation to the setting up of the Trust and this Issue*

A number of present and on-going transactions with certain related parties have been, or will be, entered into in relation to the setting up of the Trust. The Trustee and the Investment Manager confirm that the following related party transactions have been, or shall be, entered into, on an arm's length basis in accordance with the relevant accounting standards, in the best interest of the Unitholders, consistent with:

**(A) Trust Deed**

Please see the section entitled "*Parties to the Trust – Key Terms of the Trust Deed*" on page 79 for a description of the terms of the Trust Deed.

**(B) Investment Management Agreement**

Please see the section entitled "*Parties to the Trust – Key Terms of the Investment Management Agreement*" on page 87 for a description of the terms of the Investment Management Agreement.

**(C) Project Implementation and Management Agreement**

Please see the section entitled "*Parties to the Trust – Key terms of the Project Implementation and Management Agreement*" on page 95 for a description of the terms of the Project Implementation and Management Agreement.

**(D) Concession Agreements**

Please see the section entitled "*Summary of the Concession Agreements*" on page 195 for a description of the terms of the Concession Agreements.

**(E) Transitional Support Agreement**

The Sponsor, Project Manager and the Project SPV will enter into a transitional support agreement for the purpose of the Sponsor providing the transitional support to (i) the Project Manager in respect of its obligations under the Project Implementation and Management Agreement, and (ii) the Project SPV in respect of its O&M obligations and tolling obligations (as provided under the Concession Agreements). The terms and conditions of the Transitional Support Agreement shall, in respect of each Concession Agreement and the Project Implementation and Management Agreement, be effective and binding on the Parties for a period of thirty (30) months commencing from the appointed date of the respective Concession Agreements, unless terminated earlier by mutual consent. The Sponsor's fee for the services provided under the Transitional Support Agreement shall be such amount as may be mutually agreed amongst Sponsor, Project Manager and the Project SPV.

**(F) Sponsor Contribution**

Pursuant to the Commitment Letter, the Sponsor has agreed to contribute such amount towards subscription of such number of Units which shall be equivalent to at least 15.00% of the total Units of the Trust on a post-Issue basis, to comply with the requirement under Regulations 12(3) and 12(3A) of the InvIT Regulations. For details, see "*Formation Transactions in relation to the Trust – Sponsor Contribution*" on page 23.

**Arrangement with respect to future assets**

In accordance with the approval granted by the Chairman of NHAI, by way of communication dated December 01, 2025, our Sponsor will offer around 1,500.00 km of completed and operational national highways to the Trust over the next three to five years for monetization ("**Future Assets**"). The process of identification of Future Assets, offer of Future Assets to Trust and completion of transfer of Future Assets to the Trust including valuation mechanism may be refined and/or modified in line with the internal policies of NHAI.

**Borrowings from Related Parties**

As on date of this Draft Offer Document, no borrowings have been availed by the Trust or Project SPV.

**Potential Conflicts of Interest**

The Investment Manager has established certain procedures to deal with conflict-of-interest issues. For further details on management of potential conflicts of interest, please see the section entitled "– *Procedure for dealing with Related Party Transactions*" on page 220.

**Conflicts of the Investment Manager and the Sponsor**

Certain related party transactions may be entered into by the Investment Manager and the Sponsor in the future which will be undertaken in compliance with applicable law.

## REGULATIONS AND POLICIES

*The following description is a summary of certain sector specific laws currently in force in India, which are applicable to the Trust. The information detailed in this chapter has been obtained from publications available in the public domain. The description of the regulations set out below may not be exhaustive, and is only intended to provide general information to Bidders, and is neither designed as, nor intended to substitute, professional legal advice. Judicial and administrative interpretations are subject to modification or clarification by subsequent legislative, judicial or administrative decisions.*

*Provided below are certain significant legislations, regulations and policies that generally govern the road infrastructure sector in which the Project SPV operates.*

### Laws Relating to the Business and Operations of the Trust and the Project SPV

The regulatory framework in India in the highways sector, implemented on a public-private partnership ("**PPP**") basis, mainly derives its source from the primary legislations of National Highways Authority of India Act, 1988 (the "**NHAI Act**") and the National Highways Act, 1956 (the "**NH Act**") enacted by the Indian parliament, each as amended or supplemented. The Indian government, through the NHAI and the MoRTH, is actively promoting the digitalization of highway management by using artificial intelligence for traffic monitoring and geographic information system mapping for asset management.

#### *The National Highways Act, 1956*

The policy of the MoRTH, in implementing the NH Act, is to vest the MoRTH with the power to declare a national highway and for acquisition of land for this purpose. The GoI, by notification, can declare the intention to acquire any land for a 'public purpose' as envisaged by the law and such land can be used for the purposes of building, maintenance and operation of the declared national highways throughout the country. The NH Act prescribes the procedure for such land acquisition. The procedure includes, amongst others, a declaration of an intention to acquire, entering and inspecting such land, hearing of objections, a declaration of the acquisition and the power to take possession. The NH Act also provides for payment of compensation to owners and any other person whose right of enjoyment or ownership in the land has been affected. The NH Act vests MoRTH with the power to appoint a competent authority for the effective implementation of the NH Act and its policies. The said appointed authority retains the right and power to (a) survey, make any inspection, valuation or enquiry; (b) take levels; (c) dig or bore into sub-soil; (d) set out boundaries and intended lines of work; (e) mark such levels, boundaries and lines placing marks and cutting trenches; or (f) do such other acts or things as may be laid down by rules made in this behalf by that government. All the notified national highways shall vest in the name of the Union and for the purposes, shall include all lands appurtenant thereto and all the bridges, culverts, tunnels and other enlisted constructions under the said NH Act. The Central Government shall assume the responsibility of maintaining and construction of national highways in proper condition in accordance to the law. The Central Government also retains the right to levy fee over the services and benefits rendered in relation to the use of such national highways.

The GoI is responsible for the development and maintenance of national highways. However, it may direct that such functions may also be exercised by the government of a state in which the highway is located or by any officer or authority subordinate to the GoI or to the state government. Further, the GoI has the power to enter into an agreement with any person for the development and maintenance of a part or whole of the highway. Such person would have the right to collect and retain fees at such rates as may be notified by the GoI and will also have the powers to regulate and control the traffic, for proper management of the highway, in accordance with the provisions of the Motor Vehicles Act, 1988, as amended. The GoI also has the power to make rules for carrying out the purposes of the NH Act.

The National Highways (Amendment) Act, 2017, entails the competent authority to issue reports to the Central Government in respect of any land (either acquired or proposed to be acquired) which is, either under incorrect revenue record or which is not required due to change in geometry or alignment of the construction, to issue order for the de-notification of such land from the acquisition for development and maintenance of the national highway. In pursuance of the foregoing amendment to the statute, the National Highways Rules, 1957, have been amended to ensure the exercise of the power under the NH Act. These rules provide for periodic regulatory compliance and reporting standards to be followed by the competent authority in reporting to the Central Government.

#### *The National Highways Authority of India Act, 1988*

The NHAI Act was enacted in pursuance of the powers of the Central Government for appointing a competent

authority under the NH Act and provides for the constitution of an authority for the development, maintenance and management of national highways and for matters connected therewith or incidental thereto. In accordance with the NHAI Act, the GoI carries out development and maintenance of the national highways through NHAI. Subject to the provisions of the NHAI Act, the NHAI has the power to enter into and perform any contract necessary for the discharge of its functions. The NHAI has the power to acquire any land to discharge its functions, and such acquired land will be deemed to be land needed for a 'public purpose'. The NHAI Act prescribes a limit in relation to the value of the contracts that may be entered into by NHAI. However, the NHAI may enter into contracts exceeding the specified value, on obtaining prior approval of the GoI. The NHAI Act provides that the contracts for acquisition, sale, or lease of immovable property on behalf of the NHAI cannot exceed a term of 30 years unless previously approved by the GoI. NHAI's objective is to ensure that all contract awards and procurements conform to the best industry practices with regard to transparency of process, adoption of bid criteria to ensure healthy competition in award of contracts. In accordance with the NHAI Act, the NHAI shall consist of a full-time chairman, not more than six full time members and not more than six part time members who are being appointed by the Central Government. Additionally, various project implementation units headed by project director have been set at various sites to oversee timely completion of the projects.

In view of the challenging task of construction, development, and management of national highways being undertaken by NHAI, the Committee on Public Undertakings selected the subject "National Highways Authority of India (NHAI)" for comprehensive examination and report. The National Highways Authority of India (Amendment) Act, 2013, received the assent of the President of India on September 10, 2013, and aimed at increasing the institutional capacity of NHAI to help execute the powers delegated to it. National Highways Development Project ("**NHDP**") was launched in 1998 with the objective of developing roads of international standards which facilitate smooth flow of traffic. The NHDP envisages creation of roads with enhanced safety features, better riding surface, grade separator and other salient features.

As per the NHAI Works Manual, 2006, NHAI's mandate is the time and cost bound implementation of the NHDP. The sources of finance available to the NHAI include fund assistance from external funding agencies like the International Bank of Reconstruction and Development and the Asian Development Bank. NHAI's role encompasses involving the private sector in provision, maintenance, and operation of the national highways.

***Financing of the NHDP***

Under the Central Road and Infrastructure Fund Act, 2000, the Government of India established the Central Road Fund, which was later renamed as the Central Road and Infrastructure Fund pursuant to the Finance Act, 2018. The Fund is mandated to be utilized for the development and maintenance of national highways and other specified infrastructure projects. Section 18 of the NHAI Act also provides for the creation of a separate NHAI Fund. Any capital grant or aid received, loan taken, borrowing made, or any other sum received by the NHAI is credited to the NHAI Fund. Certain sources for financing of the NHDP are through dedicated accruals under the Central Road and Infrastructure Fund by levy of cess on fuel as well as involving the private sector and encouraging public private partnerships. The NHDP is also financed through long-term external loans from the International Bank of Reconstruction and Development, the Asian Development Bank and the Japan Bank for International Cooperation as well as through tolling of roads for different projects undertaken by the NHAI.

***Private Participation in NHDP***

In an effort to attract private sector participation in the NHDP, the NHAI has issued model concession agreements ("**MCAs**") which have been formulated by Planning Commission of India or NITI Aayog and other departments of Central Government where a private entity, being the concessionaire, is, through an international competitive bidding process, awarded a concession (in form of a license) to build, own, operate and collect toll on a highway for a specified period of time, which is usually up to 30 years. The concession to develop highway projects is given by the NHAI or other governmental authorities under various models of PPP like:

(i) Build, Operate, Transfer (BOT)/ Design, Build, Finance, Operate and Transfer (DBFOT) – In this model, the entire designing, financing and construction is undertaken by the concessionaire at its own cost. The concessionaire is entitled to collect toll or receive annuity payments from the NHAI, as the case may be, during the concession period after the construction of the highway project. The bid for the project may either be selected basis the lowest grant wanted by the private developer from the NHAI or the highest premium the private developer is willing to pay to NHAI, in the form of additional concession fee. The concessionaire at the end of the concession period transfers the highway project to the NHAI (free of charge and clear of all encumbrances). The concessionaire's investment in the highway project is recovered directly through user fees collected by way of tolls. Under the BOT model, the projects which

are generally not viable based on toll revenue alone, the NHAI or the relevant governmental authority provides concessionaire with a capital grant up to certain percentage of the project cost to increase the viability of projects and the quantum of such grant is determined on a case-to-case basis. For certain projects with high traffic volumes, concessionaire also offers a negative grant (i.e., premium) to the NHAI.

(ii) Hybrid Annuity Model (HAM) – In this model, the NHAI or the relevant governmental authority invests 40% (forty percent) of the construction cost of the project in (five) equal instalments and the balance amount is infused by the private developer. The private developer recovers his investment in the form of annuity payments received by it over a period of 15 (fifteen) years. Additionally, there is no revenue risk for the private developer under HAM model because the toll is collected by the NHAI or relevant governmental authorities unlike the BOT model where the private developer collects it.

(iii) Toll, Operate and Transfer (TOT) – In this model, the road projects which are in operational phase are awarded by the NHAI or relevant governmental authorities to the concessionaire. The NHAI passes on the toll collection rights and operation and maintenance obligations to the concessionaire against payment of upfront concession fees quoted by the concessionaire as a part of the bidding process.

The bidding for the projects takes place in two stages as per the process provided below:

1. in the qualification (RFQ) stage, the NHAI selects certain applicants on the basis of technical and financial expertise, prior experience in implementing similar projects and previous track record; and

2. in the proposal (RFP) stage, the NHAI invites financial bids from the applicants qualified at the RFQ stage on the basis of which the concession is awarded to the successful bidder by the NHAI for implementation of the project.

In accordance with the MCAs for projects above ₹1,000 million, the concessionaire meets the upfront cost and expenditure on annual maintenance and recovers the entire cost along with the interest from toll collections during the concession period. As per the 'Guidelines for Investment in Road Sector' issued by MORTH in 2009, in order to increase the viability of projects, a capital grant of up to 40% of the project cost is provided by the NHAI or the GoI. The quantum of grant is determined on a case-to-case basis and typically constitutes the bid parameter in BOT projects which are generally not viable based on toll revenue alone. For certain projects with high traffic volumes, concessionaire also offers a negative grant (i.e., premium) to the NHAI. The concessionaire at the end of the concession period transfers the road back to the Government (free of charge and clear of all encumbrances). The concessionaire's investment in the road is recovered directly through user fees collected by way of tolls. As per the MCAs for annuity-based projects, the concessionaire is required to meet the entire upfront cost (no grant is paid by the NHAI or the GoI) and the expenditure on annual maintenance for annuity-based projects. The concessionaire recovers the entire investment through pre- determined annuity payments to be made by the NHAI or the GoI.

***Exit Policy***

The CCEA in May 2015 approved a comprehensive exit policy framework with the objective to mobilize funds in the market. In pursuance thereto, NHAI, vide Circular No. NHAI/1103/CGM(FA)/4/2015 dated June 9, 2015 permitted divestment of 100% equity by concessionaires/developers after two years of completion of construction of all BOT projects to facilitate unlocking of funds for new infrastructure projects. The equity divested is required to be invested by promoters in their new projects. This comprehensive exit policy framework is expected to harmonize certain conditions across all concessions signed prior to 2009 with the policy framework for post 2009 contracts which permit divestment of equity up to 100%, two years after completion of construction. In line with the spirit of quoted circular, the NHAI issued another circular dated September 9, 2015 followed by the circular dated November 19, 2015, on the same subject, allowing the promoter to use the proceeds from the sale of divested equity of the concessionaire in one or more of the following:

(i) to reinvest in incomplete NHAI projects;

(ii) to reinvest any other highway projects;

(iii) to reinvest in any other power sector projects; or

(iv) to retire their debt to financial institutions in any other infrastructure projects.

***Relaxation in the 'change in ownership' clause in Hybrid Annuity Model (HAM) projects***

The MoRTH, *vide* circular dated November 10, 2020 and November 27, 2020, read along with the NHAI circular dated December 31, 2020, amended the MCAs in respect of project implemented under the HAM model, and permitted the selected bidder/consortium members, for the new as well as subsisting national highways project under the HAM-model, to dilute their equity six months after COD is achieved for the respective project.

***Rationalized Compensation***

The CCEA in November 2015 approved a policy for rationalized compensation to concessionaires for languishing national highway projects in BOT mode for delays that are not attributable to the concessionaires. Under the policy, the NHAI is authorized to allow an extension of the concession period for BOT (Toll) projects while the tenure for the operations period as envisaged originally in the concession agreement may remain unchanged which would result in a corresponding increase in concession period. The NHAI has also been authorised to pay compensatory annuities to the concessionaire corresponding to the actual period of delay that is not attributable to the concessionaire upon successful completion of the project.

***One Time Fund Infusion Scheme***

The CCEA in October 2015 gave its approval to the NHAI for a one-time infusion of funds with the purpose of reviving and physically completing stalled projects in the advanced stages of completion. As per the policy, the amount of funds required in each case shall be approved by NHAI on a case-to-case basis.

***Bidder Information***

MoRTH has developed the Bidder Information Management System ("**BIMS**") to streamline the process of pre-qualification of bidders for EPC mode of contracts for all national highway works, with enhanced transparency and objectivity. BIMS works as a data base of bidder information that covers basic details, civil works experience, cash accruals and network, and annual turnover so that bidders' pre-qualification can be assessed based on evaluation parameters like threshold capacity and bid capacity from already stored data and the technical evaluation can be carried out in a faster manner.

***Land Acquisition***

While land is acquired for national highway projects under the NH Act, the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (the "**Land Acquisition Act**") must also be complied with. MoRTH has issued comprehensive guidelines on land acquisition for national highways taking into account the applicability of the Land Acquisition Act.

***Arbitral Awards***

CCEA on August 31, 2016 approved various measures to revive the construction sector. An office memorandum dated September 5, 2016 was issued by the National Institute for Transforming India with certain proposals. On November 20, 2019, the CCEA approved certain proposals in relation to the arbitrations by or against government entities, for the effective implementation of the CCEA's decision on August 31, 2016 on its initiatives to revive the construction sector. Initially, the CCEA had approved the proposal that government agencies will be required to pay 75.00% of the arbitral award to the concessionaire against a bank guarantee, in cases where the award already announced is challenged. However, pursuant to a press release dated November 20, 2019, the CCEA approved, inter-alia, that where a government entity has challenged an arbitral award, resultant of which the amount of the arbitral award has not been paid, 75.00% of such award will be paid by the government entity to the contractor or the concessionaire against a bank guarantee only for the said 75.00% and not for its interest component. In relation to interest payable to the government entity, if a subsequent court order required the refund of 75.00% of the amount, the payment of such amounts will be required to be made as per the court orders.

The NHAI through policy circulars dated April 9, 2021 and May 26, 2021 and MoRTH through letter dated December 18, 2019 provide for expedited mechanism for settlement of claims arising out of projects via establishment of Conciliation of Independent Experts. The Department of Expenditure, Ministry of Finance has also launched a scheme detailing a one-time settlement initiative for resolving pending contractual disputes involving the Government of India or its related entities. Disputes where the award by court/ arbitral tribunal is only for monetary value were eligible for settlement under this scheme.

***Applicable Rules***

As per the NH Act and the NHAI Act, the Central Government is empowered to make rules in order to further the objects of NH Act and NHAI Act. In exercise of such power, the Central Government has framed certain rules which are as follows:

- The National Highways Rules, 1957, as amended;
- National Highways Authority of India (Budget, Accounts Audit, Investment of Funds and Powers to enter Premises) Rules, 1990, as amended;
- The National Highways (Manner of Depositing the Amount by the Central Government with Competent Authority for Acquisition of Land) Rules, 1998;
- The National Highways Tribunal (Procedure for Appointment as Presiding Officer of the Tribunal) Rules, 2003, as amended;
- The Central Road Fund (State Roads) Rules, 2014, as amended;
- The National Highways Tribunal (Procedure) Rules 2003;
- National Highways Authority of India (The Term of Office and Other Conditions of Service of Members) Rules, 2003, as amended;
- The National Highways Tribunal (Financial and Administrative Powers) Rules, 2004;
- The National Highways Tribunal (Procedure for Investigation of Misbehaviour or Incapacity of Presiding Officer) Rules, 2003;
- The National Highways Fee (Determination of Rates and Collection) Rules, 2008, as amended;
- The Highway Administration Rules, 2004;
- The National Highways (Collection of Fees by any person for the use of Section of National Highways/Permanent Bridges/Temporary bridge on National Highways) Rules, 1997;
- The National Highways (Fee for the use of National Highways and Permanent Bridge public Funded Project) Rules, 1997;
- The National Highways (Rate of Fee) Rules, 1997.
- The Building and other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 and Central Rules, 1998
- Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023
- Indian Electricity Rules, 1956; and
- The Central Motor Vehicle Rules 1989.

***Other legislations relevant to the road sector***

In addition to the above, there are also certain other legislations that are relevant to the road sector which include the Road Transport Corporation Act, 1950, Central Road and Infrastructure Act, 2000, etc.

***Environmental Compliances and Regulations***

Infrastructure projects must also ensure compliance with environmental legislations such as the Water (Prevention and Control of Pollution) Act, 1974 ("**Water Pollution Act**"), the Air (Prevention and Control of Pollution) Act, 1981 ("**Air Pollution Act**") and the Environment Protection Act, 1986 ("**Environment Act**", together with the Water Pollution Act and the Air Pollution Act, the "**Environment Protection Acts**"). The Water Pollution Act aims to prevent and control water pollution. This legislation provides for the constitution of a central pollution control board ("**Central Pollution Control Board**" or "**CPCB**") at the Central level and state pollution control boards ("**State Pollution Control Boards**" or "**SPCBs**", together with the Central Pollution Control Board, the

"**PCBs**") at the State levels. The functions of the CPCB includes, among other things, coordination of activities of the SPCBs, collecting data relating to water pollution and the measures devised for the prevention and control of water pollution and prescription of standards for streams or wells. The SPCBs are responsible for, among other things, the planning for programmes for prevention and control of pollution of streams and wells, collecting and disseminating information relating to water pollution and its prevention and control, inspection of sewage or trade effluents, works and plants for their treatment and to review the specifications and data relating to plants set up for treatment and purification of water, laying down or annulling the effluent standards for trade effluents and for the quality of the receiving waters, and laying down standards for treatment of trade effluents to be discharged. These authorities issue consent to establish and consent to operate which are to be required to be renewed periodically. These authorities also have the power of search, seizure and investigation if the authorities are aware of or suspect violation of such regulations. This legislation prohibits any person from establishing any industry, operation or process or any treatment and disposal system, which is likely to discharge trade effluent into a stream, well or sewer, or bring into use any new or altered outlet for discharge of sewage, or begin to make any new discharge of sewage without taking prior consent of the SPCBs.

In context of the environmental compliances and regulations, the National Green Tribunal Act, 2010 (the "**NGT Act**") is an important legislation which provides for the establishment of a National Green Tribunal ("**NGT**") for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. In accordance with the Forest (Conservation) Act, 1980 as amended by the Forest (Conservation) Amendment Act, 2023, state governments are not permitted to make any order directing the use of forest land for a non-forest purpose, or assignment of any forest land through lease or otherwise to any private person or corporation without the approval of the GoI. The Ministry of Environment, Forest and Climate Change ("**MoEF**") mandates the Environment Impact Assessment ("**EIA**") must be conducted for specified projects. In the process, the MoEF receives proposals or the setting up of projects and assesses their impact on the environment before granting clearances to the projects. The EIA Notification S.O. 1533, issued on September 14, 2006 (the "**EIA Notification**") and amended from time to time, under the provisions of the Environment Protection Act, prescribes that new construction of specified projects require prior environmental clearance from the MoEF. The environment clearance must be obtained from MoEF according to the procedure specified in the EIA Notification. No construction work or preparation of land by the project management except for securing the land, relating to the setting up of a specified project can be undertaken until such clearance is obtained. Under the EIA Notification, the environmental clearance process for new projects consists of four stages – screening, scoping, public consultation and appraisal. After completion of public consultation, the applicant is required to make appropriate changes in the draft 'EIA Report' and the 'Environment Management Plan.' The final EIA Report has to be submitted to the concerned regulatory authority for appraisal. The regulatory authority is required to give its decision within 105 days of the receipt of the final EIA Report. The EIA Guidance Manual for Highways, 2010 explains the four stages of the environmental clearance process and the contents of the EIA Report required to be submitted by highway projects.

***Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (as amended)***

The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, impose an obligation and duty on the owners and operators of any facility or industry with a capability to create hazardous materials to safely dispose of such material in transport and other means of collecting and storing. Each occupier and operator of any facility generating hazardous waste is required to obtain an approval from the relevant state pollution control board for collecting, storing and treating the hazardous waste.

***Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy, 2015***

In September 2015, MoRTH has launched Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy, 2015, which will require road developers to earmark 1% of a project's total cost for planting of trees and shrubs along the national highways. Under this policy, the maintenance of such plantations will be outsourced through a bidding process to plantation agencies. MoRTH/NHAI will appoint the authorized agency for empanelment of such plantation agencies.

***Public Liability Insurance Act, 1991***

The Public Liability Insurance Act, 1991 (the "**Public Liability Act**"), imposes liability on the owner or controller of hazardous substances for any damage arising out of an accident involving such hazardous substances. A list of 'hazardous substances' covered by the legislation has been enumerated by the GoI by way of a notification. The

owner or handler is also required to take out an insurance policy insuring against liability under the legislation. The rules made under the Public Liability Act mandate that the employer has to contribute towards the Environment Relief Fund, a sum equal to the premium paid on the insurance policies. This amount is payable to the insurer.

**Other applicable law**

***The Motor Vehicles Act, 1988***

The development, maintenance and management as well as control of the National Highways are regulated by the NH Act and the NHAI Act. Under the Motor Vehicles Act, 1988, some powers have been delegated to the Transport Authority of the State Governments. Section 138 of the Motor Vehicles Act, 1988 further empowers the State Governments to make rules for the control of traffic, including for the purpose of the removal and the safe custody of vehicles including their loads which have broken down or which have been left standing or have been abandoned on roads; the installation and use of weighing devices; the maintenance and management of wayside amenities complexes; the exemption from all or any of the provisions of relating to fire brigade vehicles, ambulances and other special classes or descriptions of vehicle, subject to such conditions as may be prescribed; the maintenance and management of parking places and stands and the fee, if any, which may be charged for their use; prohibiting the taking hold of or mounting of a motor vehicle in motion; prohibiting the use of foot-paths or pavements by motor vehicles, generally, the prevention of danger, injury or annoyance to the public or any person, or of danger or injury to property or of obstruction to traffic. The Motor Vehicles (Amendment) Act, 2019 is targeted towards bringing changes in the transport sector to encourage safer driving practices among Indian motor vehicle drivers and imposing strict fines on the violators of traffic rules. The Act proposes to create a National Road Safety Board, which was notified by Ministry of Road Transport & Highways in 2021. The Board will advise the Central and State governments on all aspects of road safety and traffic management.

***Indian Trusts Act, 1882***

The Indian Trusts Act, 1882 ("**Trusts Act**"), as amended, governs all private trusts in India. The Trusts Act sets out the purpose for which private trusts can be established, the manner in which they may be created, executed and extinguished. The person creating a trust under the Trusts Act is the author of such trust, the person to whom the author grants the power and authority to regulate the trust is the trustee and the persons for whose benefit such trust has been created are the beneficiaries of such trust. The Trust Act sets out the rights, duties, liabilities and powers of the trustees and the beneficiaries *vis-a-vis* the trust. The Trust has been settled in accordance with the provisions of the Trusts Act.

***Control of National Highways (Land and Traffic) Act, 2002***

The Control of National Highways (Land and Traffic) Act, 2002 (the "**Control of NH Act**") provides for control of land within national highways, right of way and traffic moving on national highways and also for removal of unauthorised occupation thereon.

In accordance with the provisions of the Control of NH Act, the Central Government has established Highway Administrations. Under the Control of NH Act, all land that forms part of a highway which vests in the Central Government, or that which does not already vest in the Central Government but has been acquired for the purpose of highways shall be deemed to be the property of the Central Government. The Control of NH Act prohibits any person from occupying any highway land or discharging any material through on such land without the permission of the Highway Administration or any officer authorised by such administration. The Control of NH Act permits the grant of lease and license for use of highway land for temporary use.

***Indian Tolls Act, 1851***

In accordance with the Indian Tolls Act, 1851, as amended (the "**Tolls Act**"), the state governments have been vested with the power to levy tolls at such rates as they deem fit, to be levied upon any road or bridge, made or repaired at the expense of the Central or any state government. The tolls levied under the Tolls Act, are deemed to be 'public revenue' and the collection of tolls can be placed under any person the State governments' deem fit. Such persons are enjoined with the same responsibilities as if they were employed in the collection of land revenue. Further, all police officers are bound to assist the toll collectors when required in the implementation of the Tolls Act. The Tolls Act further gives power for recovery of toll and exempts certain category of people from payment of toll.

***National Highways Fee (Determination of Rates and Collection) Rules, 2008***

The National Highways Fee (Determination of Rates and Collection) Rules, 2008 (the "**NH Fee Rules**"), as amended, regulates the collection of fee for the use of national highways. In accordance with the NH Fee Rules, the GoI may, by a notification, levy fee for use of any section of a national highway, permanent bridge, bypass or tunnel forming part of a national highway, as the case may be. However, the GoI may, by notification, exempt any section of a national highway, permanent bridge, bypass or tunnel constructed through a public funded project from levy of such fee. The NH Fee Rules supersede the National Highways (Temporary Bridges) Rules, 1964, the National Highways (Collection of Fees by any Person for the Use of Section of National Highways/ Permanent Bridge/ Temporary Bridge on National Highways) Rules, 1997, the National Highways (Fees for the use of National Highways Section and Permanent Bridges Public Funded Project) Rules, 1997 and the National Highways (Rate of Fees) Rules, 1997 other than in respect of things done or omitted to be done under such rules prior to supersession. The NH Fee Rules do not apply to agreements and contracts executed or bids invited prior to the publication of such rules i.e. prior to December 5, 2008. The collection of fee in case of a public funded project shall commence within 45 days from the date of completion of the project. The NH Fee Rules further provide for the base rate of fee applicable for the use of a section of the national highway for different categories of vehicles and the fees collected by the executing authority shall be remitted to the GoI. However, the GoI may, by notification, allow any or all of the executing authorities to appropriate the whole, or part of such fees for purposes as may be specified.

FASTag lanes on fee plazas is an initiative of the GoI in which there is an exclusive lane in the fee plaza for movement of vehicles fitted with FASTag. The FASTag is a device which is fitted on the front windscreen of vehicles to indicate online toll payment. The amended NH Fee Rules impose a penalty equivalent to two times the fee applicable if a vehicle not fitted with FASTag enters the exclusive FASTag lane. However, in case a user is unable to pay, due to malfunctioning electronic toll collection infrastructure, the user will be permitted to pass the fee plaza without payment. GNSS-based tolling introduced distance-based charges using GNSS-OBU devices, with zero toll for trips up to 20 km and double toll for vehicles without GNSS in exclusive lanes. Beyond 20 km, toll is calculated based on actual distance travelled. The NH Fee rules were also amended to provide that the driver or owner of a mechanical vehicle which is loaded in excess of permissible load specified for its category, (i) shall be liable to pay fee at such rate which is applicable for the next higher category of mechanical vehicles, and (ii) Payment of such fee shall not entitle the driver or owner, to use the national highway until the excess load has been remove from such mechanical vehicle. However, in case no weighbridge has been installed at the toll plaza, no fee for overloading shall be levied.

***The National Highways Rules, 1957 (the "NH Rules")***

The NH Rules provide that in situations where the estimate cost of the execution of any original work on a national highway exceeds ₹ 5,000,000, a detailed estimated of the cost is to be forwarded to the GoI. An application for allotment of funds for meeting expenditure on an original work on a national highway must also be made to the GoI. The executing agency of the highway is required to furnish monthly progress reports and a completion report on the conclusion of the work. The NH Rules also give the consulting engineer of the GoI the right to inspect the work while it is in progress or after completion.

**Provisions under the Constitution of India and other legislations in relation to collection of toll**

Entry 59, List II of Schedule VII read with Article 246 of the Constitution of India vests state governments with the power to levy tolls. Further, in accordance with the Tolls Act, state governments have been vested with the power to levy tolls at such rates as they deem fit.

**National Monetisation Pipeline (NMP)**

NITI Aayog has developed the pipeline, in consultation with infrastructure line ministries, based on the mandate for 'Asset Monetisation' for roads and highways, amongst others, under Union Budget 2021-22. The framework for monetisation of core asset monetisation has three key imperatives: (i) monetization of 'rights' not 'ownership' i.e. assets will be handed back to the government at the end of transaction life; (ii) brownfield de-risked assets and stable revenue streams; and (iii) structured partnerships under defined contractual frameworks with strict performance standards. This shall include selection of de-risked and brownfield assets with stable revenue generation profile with the overall transaction structured around revenue rights. The primary ownership of the assets under these structures shall be with the government.

**Foreign Investment Regulations**

Foreign investment in Indian securities is governed by the provisions of the FEMA, read with the applicable

FEMA Rules, the FEMA (Mode of payment and Reporting of Non-Debt Instruments) Regulations, 2019 and the consolidated FDI Policy issued by the Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, Government. Foreign investment is permitted (except in the prohibited sectors) either through the automatic route or the approval route, depending upon the sector in which foreign investment is sought to be made. Under the FEMA Rules and the current consolidated FDI Policy, effective from October 15, 2020, an infrastructure investment trust registered and regulated by the SEBI under the InvIT Regulations, being an 'investment vehicle', is permitted to receive foreign investment from a person resident outside India (subject to Press Note 3 (2020 series)), including an FPI or an NRI subject to the terms and conditions specified in the FEMA Rules.

Downstream investment by an infrastructure investment trust shall be regarded as indirect foreign investment if neither the sponsor nor the investment manager of such an infrastructure investment trust is Indian 'owned and controlled' as defined in FEMA Rules.

Downstream investment by an 'investment vehicle' shall have to conform to the sectoral caps and conditions/restrictions, if any, as applicable to the company in which the downstream investment is made as per the FDI Policy. Foreign investment of up to 100% through the automatic route is permitted in the infrastructure sector in India. An infrastructure investment trust that receives foreign investment shall be required to make such report and in such format to the RBI or to the SEBI as may be prescribed by them from time to time.

The payment for the units of an infrastructure investment trust acquired by a person resident or registered/ incorporated outside India shall be made by an inward remittance from abroad through banking channels or by way of swap of shares of an SPV, or out of funds held in a Non-resident External ("**NRE**") or Foreign Currency Non-resident Bank ("**FCNR(B)"**) account maintained in accordance with the Foreign Exchange Management (Deposit) Regulations, 2016.

Further, any person who is a non-resident and holds units of an infrastructure investment trust in accordance with the FEMA Rules may pledge such units (i) in favour of a bank in India to secure the credit facilities being extended to the Indian company for bona fide purposes; (ii) in favour of an overseas bank to secure the credit facilities being extended to the person, or a person resident outside India who is the promoter of the Indian company or the overseas group company of the Indian company; (iii) in favour of a Non-Banking Financial Company registered with the RBI to secure credit facilities being extended to the Indian company for bona fide purposes; and (iv) subject to the authorized dealer bank satisfying itself of the compliance of the conditions stipulated by the RBI in this regard.

**Provisions under the Constitution of India and other legislations in relation to collection of toll**

Entry 59, List II of Schedule VII read with Article 246 of the Constitution of India vests state governments with the power to levy tolls. Further, in accordance with the Tolls Act, state governments have been vested with the power to levy tolls at such rates as they deem fit.

**Labour laws and regulations**

In order to rationalize and reform the existing labour laws in India, the Government of India has framed four labour codes, namely the (i) Occupational Safety, Health and Working Conditions Code, 2020, (ii) Industrial Relations Code, 2020, (iii) Code on Wages, 2019, and (iv) the Code on Social Security, 2020 (collectively the "**Labour Codes**"). The Labour Codes were notified by the Central Government on November 21, 2025, subsuming the existing labour laws.

*(i) **The Occupational Safety, Health and Working Conditions Code, 2020***

The Occupational Safety, Health and Working Conditions Code, 2020 ("**OSHWC Code**") subsumes certain existing legislations, including the Factories Act, 1948, the Contract Labour (Regulation and Abolition) Act, 1970, The Mines Act, 1952, and the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979. This code provides for, among other things, standards for health, safety and working conditions for employees of establishments. The OSHWC Code broadly applies to an establishment where 10 or more workers are employed and include a place where any industry, trade, business, manufacturing or occupation is carried out, places undertaking motor transport, a newspaper establishment, an audio-video production, building and other construction work or plantations and applies to all establishments involving hazardous processes regardless of the threshold of workers. It also defines a "factory" to cover any premises which employees or had employed 20 or more workers on any day of the preceding twelve months, and in which a manufacturing process

is carried on with the aid of power or, 40 or more workers on any day of the preceding twelve months, and in which a manufacturing process is carried on without the aid of power. The OSHWC Code also ensures that contract labour falls under safety and welfare protections provided by the establishment, and introduces the concept of core activity, restricting the scope of outsourcing of an establishment's primary function while allowing contract labour for non-core services such as housekeeping or maintenance. It expands protection for inter-state migrant workers, covering those recruited directly or through contractors, and introduces entitlements such as journey allowances. The OSHWC Code also defines hazardous processes based on activities involving dangerous substances and mandates higher safety standards for such operations. The OSHWC Code also subsumes the Mines Act, 1952, consolidating all safety, health and welfare provisions relating to mining operations into a single unified framework, ensuring comprehensive coverage for mine workers.

Prior to the enactment of OSHWC Code, the Company was operating in accordance with the Mines Act, 1952, the Mine Rules, 1955 and Mine Rescue Rules, 1985. These rules shall remain in-effect till the time the Government of India and state governments enact further rules under the OSHWC Code.

*(ii)* ***The Industrial Relations Code, 2020***

The Industrial Relations Code, 2020 ("**IR Code**") subsumes three existing legislations, namely, the Industrial Disputes Act, 1947, the Trade Unions Act, 1926 and the Industrial Employment (Standing Orders) Act, 1946 and provides a unified framework governing trade unions, conditions of employment, layoffs, retrenchment, and dispute resolution mechanisms. The IR Code introduces certain uniform definitions such as 'worker' which has been expanded to include sales promotion employees, working journalists, and supervisory employees earning up to ₹18,000/- per month, thereby extending statutory labour protections to a wider segment of workers, 'employee' which includes managerial and supervisory personnel and employer which includes any person or authority with control over an establishment, including those employing through contractors. The IR Code establishes that an industrial establishment, employing 300 or more workers, shall require prior permission from the appropriate government authority, for lay-off, retrenchment, or closing down its industrial establishment, with flexibility for States to enhance this limit further. It also introduces fixed-term employment, granting such employees benefits similar to permanent workers including gratuity on a pro-rata basis.

*(iii)* ***The Code on Wages, 2019***

The Code on Wages, 2019 ("**COW**") subsumes four separate legislations, namely, the Payment of Wages Act, 1936, the Minimum Wages Act, 1948, the Payment of Bonus Act, 1965 and the Equal Remuneration Act, 1976. It provides a framework governing wage regulation, minimum wages, payment timelines, and bonus entitlements across sectors. The provisions related to wages apply to all employees in both organised as well as unorganised sectors, irrespective of wage threshold. The COW also introduces floor wages, which will be fixed by the Central Government on the basis of minimum living standards of an employee which will be revised at regular intervals. It also directs the State governments to ensure that the minimum wages in their respective regions are not lower than the prescribed floor wage.

*(iv)* ***The Code on Social Security, 2020***

The Code on Social Security, 2020 ("**CSS**") subsumes several separate legislations including the Employee's Compensation Act, 1923, the Employees' State Insurance Act, 1948, the Employees' Provident Funds and Miscellaneous Provisions Act, 1952, the Employment Exchanges (Compulsory Notification of Vacancies) Act, 1959, the Maternity Benefit Act, 1961, and the Payment of Gratuity Act, 1972. It provides a framework for social security of employees. CSS provides coverage of schemes such as employee provident fund, employee state insurance, maternity benefits, gratuity, employee compensation, and social-security funds to fixed-term employees, contract workers, inter-state migrant workers, and gig and platform workers through dedicated welfare funds. CSS also enables portability of benefits through Aadhaar-based registration and provides a framework for state and central governments to roll out social-security schemes for unorganised, gig, and platform workers.

***Other Laws and Regulations***

In addition to the above, compliance with the provisions of various tax-related legislations, intellectual-property related legislations, Shops and Establishment Act, Companies Act, 2013, Competition Act, 2002, Property Laws and other applicable laws for our day-to-day operations are also required.

## REGULATORY APPROVALS

*The Trust and the Project SPV are required to obtain consents, licenses, registrations, permissions and approvals for carrying out their present business activities which include, approvals for registration as an infrastructure investment trust and for carrying out its present business, as applicable. Other than as stated in this section, the Trust and the Project SPV have obtained necessary consents, licenses, permissions, registrations and approvals from various governmental, statutory and regulatory authorities, required for the registration as an infrastructure investment trust and for carrying out its present business, as applicable.*

*Unless otherwise stated, these approvals are all valid as on date of this Draft Offer Document. For details in connection with the regulatory and legal framework within which we operate, please refer to the section entitled "Regulations and Policies" on page 224.*

### I. Material approvals in relation to the Issue

1. In-principle approval from the NSE dated [●].
2. In-principle approval from the BSE dated [●].
3. Resolution dated January 12, 2026 passed by the IM Board in relation to the Issue and other incidental matters.

### II. Material approvals in relation to the Trust

1. Certificate of registration bearing number IN/InvIT/25-26/0034 dated December 22, 2025, with SEBI as an infrastructure investment trust.
2. The permanent account number issued by the Income Tax Department, Government of India, under the Income-tax Act, 1961 is AAFTR8639H.
3. The tax deduction account number issued by the Income Tax Department under the Income-tax Act, 1961 is DELR54168C.
4. The goods and services tax registration certificate issued by the relevant authority having GST identification number 07AAFTR8639H1Z0.

### III. Material approval in relation to the Project SPV

1. Certificate of incorporation dated November 21, 2025 issued by the Registrar of Companies with CIN U42101DL2025PTC459067.
2. The permanent account number issued by the Income Tax Department, Government of India, under the Income-tax Act, 1961 is AAPCR2760N.
3. The tax deduction account number issued by the Income Tax Department under the Income-tax Act, 1961 is DELR53937C.
4. The goods and services tax registration certificate issued by the relevant authority having GST identification number 07AAPCR2760N1ZQ.

### IV. Material Approvals received in respect of the InvIT Assets

*Gorhar- Barwa Adda*

(i) Completion certificates dated March 31, 2022 and April 21, 2022.
(ii) Provisional completion certificates dated October 5, 2010 (taking over certificate), October 9, 2021 and October 16, 2021.

*Chilakaluripet - Vijayawada*

(i) Completion certificates dated June 30, 2025 and May 03, 2016.
(ii) Provisional completion certificate dated July 20, 2015 and October 29, 2024.

*Chennai- Tada*

(i) Provisional completion certificate dated February 9, 2022.

*Chennai Bypass (Tamil Nadu)*

(i) Toll fee notification with effect from May 14, 2013

*Neelmangla Tumkur*

(i) Provisional completion certificate dated November 1, 2011

## V. Material approvals applied for but not yet received

As on the date of this Draft Offer Document, except as stated below, there are no material approvals required to be obtained by the Trust and the Project SPV, for which applications have been made but approvals have not been received:

(i) Application dated December 31, 2025, bearing reference number 13510420, for registration of the trademark *"RAAJMARG InvIT an InvIT sponsored by NHAI"* along with the logo of the Trust, under class 36 of the Trade Marks Act, 1999, with the Registrar of Trade Marks at Delhi.

## VI. Material approvals for which applications are yet to be made

As on the date of this Draft Offer Document, there are no material approvals required to be obtained by Trust and the Project SPV, for which applications are yet to be made.

## MATERIAL LITIGATION AND REGULATORY ACTION

*Except as stated in this section, there are no outstanding material litigations and actions by regulatory authorities involving the Project SPV or the InvIT Assets as on the date of this Draft Offer Document. Further, except as stated in this section, there are no outstanding material litigations and actions by regulatory authorities against the Trust, the Investment Manager, the Project Manager, the Sponsor/Sponsor Group and the Trustee as on the date of this Draft Offer Document.*

*For the purpose of this section, details of all outstanding regulatory actions and criminal matters involving the Project SPV or the InvIT Assets, or against the Trust, the Investment Manager, the Project Manager, the Sponsor/Sponsor Group or the Trustee have been disclosed.*

*Further, any outstanding civil matter involving an amount equivalent to or more than the amount as disclosed below, involving the Project SPV or the InvIT Assets, or against the Trust, the Investment Manager, the Project Manager or the Sponsor/Sponsor Group have been disclosed. Further, in relation to the Trustee, all the outstanding civil matters against the Trustee have been disclosed.*

*In respect of the Sponsor/Sponsor Group, all outstanding civil matters against the Sponsor/Sponsor Group which involve an amount exceeding ₹5,000.00 million, have been considered material. Further, all outstanding civil matters against the Sponsor/Sponsor Group, where the amount is not ascertainable but considered material, have been disclosed.*

*In respect of the Trust, Investment Manager and the Project Manager, all outstanding civil matters against the Trust, Investment Manager or the Project Manager which involve an amount exceeding ₹1.00 million, have been considered material. Further, all outstanding civil matters against the Trust, Investment Manager or the Project Manager where the amount is not ascertainable, but considered material, have been disclosed.*

*In respect of the Project SPV and the InvIT Assets, all outstanding civil matters involving the Project SPV or the InvIT Assets which involve an amount exceeding ₹1.00 million, have been considered material. Further, all outstanding civil matters involving the Project SPV or the InvIT Assets where the amount is not ascertainable, but considered material, have been disclosed.*

*Further, in cases where the outcome of one matter impacts one or more other matters, which individually are below the amounts mentioned above, but collectively above, such cases have also been disclosed.*

*It is clarified that notices received by the Project SPV, the InvIT Assets, the Trust, the Investment Manager, the Project Manager, the Sponsor/Sponsor Group or the Trustee from third parties (excluding notices from regulatory or tax authorities or notices threatening criminal action) shall not be evaluated for materiality until they have been impleaded as defendants in proceedings before any judicial forum.*

*Further, taxation proceedings against the Project SPV, the InvIT Assets, the Trust, the Investment Manager, the Project Manager, the Sponsor/Sponsor Group or the Trustee have been disclosed in a consolidated manner.*

### I. Litigation involving the InvIT Assets

*Chennai Bypass*

1. NHAI, in its capacity as the concessioning authority, has filed a petition dated August 24, 2012 before the High Court of Delhi (challenging the award of the arbitral tribunal passed on March 21, 2012) against Hindustan Construction Company in relation to the contract agreement dated February 26, 2005 for construction of Chennai Bypass Phase-II connecting NH-4 & NH-5 and widening of Chennai Bypass Phase-I connecting NH-45 & NH-4 in the State of Tamil Nadu. The claims challenged are determination of additional costs incurred for piling works due to change in the sequence of piling, and reimbursement of additional costs incurred on account of change in norms for bonus payment to workers and introduction/increase of service tax due to subsequent legislation. The amount challenged before the High Court of Delhi is ₹217.30 million. The matter is currently pending.

2. NHAI, in its capacity as the concessioning authority has filed a petition dated April 27, 2022 before the High Court of Delhi (challenging the award of the arbitral tribunal passed on June 05, 2013)

against Hindustan Construction Company in relation to the contract agreement dated February 26, 2005 for construction of Chennai Bypass Phase-II connecting NH-4 & NH-5 and widening of Chennai Bypass Phase-I connecting NH-45 & NH-4 in the State of Tamil Nadu. The claims challenged include determination of rates for a new item of 40 mm thick bituminous concrete (treated as variation) and reimbursement of additional costs incurred during the extended contract period due to delays not attributable to the contractor, covering overheads, equipment charges, labour costs, financing charges, loss of profit, and uncovered escalation on materials and fuel. The amount challenged before the High Court of Delhi is ₹1,505.34 million. The matter is currently pending.

3. NHAI, in its capacity as the concessioning authority has filed a petition dated November 13, 2024, before the High Court of Delhi (challenging the award of the arbitral tribunal passed on August 12, 2024) against MEP Chennai Bypass Toll Road Private Limited in relation to the concession agreement for operation and maintenance of Chennai Bypass (Km 0.00 to Km 32.600) on operate, maintain and transfer basis in the State of Tamil Nadu. The claims challenged relate to non-remittance of concession fee, non-completion of project facilities, non-compliance with maintenance obligations, interest amount, and costs. The amount challenged before the High Court of Delhi is ₹2,776.22 million. The matter is currently pending.

4. MEP Chennai Bypass Toll Road Private Limited has filed a petition dated January 1, 2025 before the High Court of Delhi (challenging the arbitral award passed on August 14, 2024) against NHAI in relation to the concession agreement for operation and maintenance of Chennai Bypass (Km 0.00 to Km 32.600) on operate, maintain and transfer basis in the State of Tamil Nadu. The claims relate to compensation for losses due to failure to notify correct user fee and exclusion of Maduravoyal Junction Structure in fee notification, losses due to toll evasion through illegal/unplanned entry and exit points, loss of future business, reimbursement of costs for maintaining collaterals in the form of bank guarantees, interest for pre-award and post-award periods, and costs incurred in the proceedings. The amount involved is ₹301.55 million. The matter is currently pending.

*Gorhar-Barwa Adda*

DBL Gorhar Khairatunda Highways Private Limited. has initiated arbitration proceedings against NHAI under Society for Affordable Redressal of Disputes ("**SAROD**") in relation to six-laning of Gorhar to Khairatunda section of NH-2 (Km 320.810 to Km 360.300) in the State of Jharkhand. The claims relate to compensation for delayed and withheld payments including milestone and change of scope works, reimbursement of expenses for extension of performance bank guarantee, compensation for additional costs due to change in law (royalty rates and fuel taxes), release of withheld annuity and O&M payments due to incorrect CPI index application, and interest on delayed payments. The amount involved is ₹ 1,558.21 million. The matter is currently pending.

*Neelmangla-Tumkur*

Mushtafa Khan, Jinesh Kumar Jain, K. Anjan Kumar, Doddahanumaiah, Sri Siddalingaswamigalu and 147 other landowners have initiated arbitration proceedings against NHAI in relation to Neelmangla to Tumkur section of NH – 48 (Km 30.00 to Km 75.00) in the state of Karnataka. NHAI had acquired land and fixed compensation as per the right to fair compensation and transparency in Land Acquisition and Rehabilitation and Resettlement Act, 2013. The claims in the arbitration proceedings relate to enhancement of compensation for the acquired land. The matters are currently pending.

**II. Litigation against the Trust**

There are no pending criminal, regulatory or other material litigations against the Trust as on the date of this Draft Offer Document.

**III. Litigations against the Project SPV**

There are no pending criminal, regulatory or other material litigations against the Project SPV as on the date of this Draft Offer Document.

**IV. Litigations against the Sponsor/Sponsor Group**

*Criminal matters*

There are no pending criminal litigations against the Sponsor/Sponsor Group as on the date of this Draft Offer Document.

*Regulatory matters*

1. An application was filed by Amresh Singh against Union of India and others including NHAI before the National Green Tribunal alleging the rampant dumping of soil by NHAI contractors directly in the river Chenab and Tawi without prior environmental clearance. After considering all the documents placed on record, while referring the report of monitoring committee, the Tribunal was not satisfied with the actions taken by NHAI, and accepted the recommendations of the monitoring committee and directed the Jammu and Kashmir Pollution Control Board to take appropriate actions in consultation with CPCB against the names mentioned in the report of the monitoring committee. The Bench also directed NHAI to take strict actions against the non- compliant contractors and sub-contractors at the HQ level. The matter is currently pending.

2. An application was filed before the National Green Tribunal Principal Bench, New Delhi regarding the Ghazipur Dump Site and the environmental problems that are caused due to the unsegregated, un-recycled large mountain of dump. The Sponsor was not a party to these proceedings till 2017 and East Delhi Municipal Corporation had been exploring the implementation of a project to undertake the removal and processing of the municipal solid waste dumped at the site. In view of the same, the East Delhi Municipal Corporation held discussions with the Sponsor for use of solid waste for construction of embankments in the expansion of NH-24 or other National Highway projects undertaken by the Sponsor. In view of our role, we were impleaded in the case in 2017. The matter is currently pending.

*Material civil matters*

The following material civil cases are initiated by contractors/concessionaires against the Sponsor in relation to various projects across India:

1. Madhucon Projects Limited (Barasat Krishnagar Expressway Limited) has initiated arbitration proceedings against the Sponsor in relation to Barasat-Krishnagar Section BOT (Annuity) in West Bengal. The claims have been filed for loss due to interest on debt, loss due to interest on equity infused into the project, losses due to idling/underutilisation of machinery and equipment, losses due to idling/underutilisation of manpower, losses due to miscellaneous expenditure incurred at site, compensation due to delay in handing over of site, losses due to price escalation on the works already executed, losses due to expenses incurred on the works executed, loss of overheads and profit and total termination payment. The claimant has raised a claim for ₹ 19,001.40 million. The Sponsor has also filed counter claims for ₹ 10,606.80 million. The matter is currently pending.

2. GVK Deoli Kota Expressway Private Limited has initiated arbitration proceedings against the Sponsor in relation to design, construction, development, finance, operation and maintenance of four laning of Deoli- Kota Section of NH-12 from km 165.000 to Junction of NH-76 on Kota Bypass (approx. length 83.04 km) in Rajasthan on BOT(Toll) project on DBFOT pattern under NHDP phase–II. The claims filed by the claimant for claim on account of prolongation costs and extended stay at the site, loss suffered on account of additional overhead and loss of profit, loss of toll revenue, claim on account of increase in cost of the project due additional works done by the claimant owing to the change of scope, claim on account of additional expenses incurred by the claimant towards tunnel work, claim on account of excessive repair and prolonged maintenance duration of existing road, claim on account of the Sponsor in making the termination payment and claim on account of future loss to claimant. The claimant has raised a claim for ₹ 60,130.00 million. The Sponsor has also filed counter claims against the claimant for ₹ 7,495.00 million. The matter is currently pending.

3. Bareilly Highways Project Limited has initiated arbitration proceedings against the Sponsor in relation to four laning of Bareilly-Sitapur section of NH-24 from km 262.000 to km 413.200 (approx. 151.200km) in Uttar Pradesh under NHDP Phase-III of DBFOT basis on BOT basis. The claims filed by the claimant were in relation to claim for additional interest on debt beyond SPCD (i.e. between August 23, 2013 to January 31, 2019), interest for additional interest on debt beyond SPCD, claim for interest due on

additional promoters contribution infused in the project, claim for interest due on delay release of grant, claim for expenses incurred by SPV company beyond SPCD, claim for interest for cost of land compensation, claim for net revenue loss from SPCD till January 31, 2019, interest for net revenue loss from SPCD till January 31, 2019, claim for interest on excess 50.00% independent engineering cost debit by the Sponsor, claim for reimbursement of GST on regular EPC invoices-change of law, claim for interest on claim of GST on change of scope & utility shifting, claim for direct expenses incurred by EPC contractor beyond SPCD, claim for plant and machinery rental/rehandling for extended period, claim for interest for plant and machinery/rental/rehandling for extended period, claim for price escalation during the extended period, claim for interest for price escalation during the extended period, claim for expenses incurred on change of scope/variation items, claim for interest for change of scope/variation items, claim for additional transportation cost due to ban in local mining at sites, claim for interest for additional transportation cost due to ban in local mining at sites. The claimant has raised a claim for ₹ 5,450.00 million. The Sponsor has also filed counter claims against the claimant for ₹ 12,594.30 million. The matter is currently pending.

4. Lucknow-Sitapur Expressways Limited has initiated arbitration proceedings against the Sponsor in relation to improvement, operation and maintenance including strengthening and widening of existing two-lane road to four lane dual carriageway from km 488.270 – km. 413.200 of NH -24 (Lucknow Sitapur Section) in Uttar Pradesh on BOT basis. The claims filed by the claimant for revenue loss, revenue loss due to delay in COD, revenue loss from start of toll collection, EPC escalation, EPC additional overhead, EPC overstay of plant and equipment, additional maintenance cost of EPC, loss of profit earning capacity, extra cost IDC, revenue loss due to overloading and claims for underpasses. The claimant has raised a claim for ₹ 7,470.00 million. The Sponsor has also filed counter claims against the claimant for ₹ 3,270.00 million. The matter is currently pending.

5. Tantia Raxaul Private Limited has initiated arbitration proceedings against the Sponsor in relation to two laning with paved shoulder of Pioprakothi to Raxaul Section of NH-28A from km 0.600 to km 62.064 in the state of Bihar. The claims filed by the claimant were in relation to claim for termination payment for default of respondent , claim for non-finalisation of location and correct notification for toll plaza (along with interest at the rate of 18%), claim for delay in handover for land/ right of way/ site (along with interest at the rate of 18%), claim for additional interest during construction on account of extended construction period, claim for increased distance/lead for stone aggregate, claim for inflation/ price escalation (along with interest at the rate of 18%), claim for additional cost of maintenance, claim for increased overheads of concessionaire (along with interest at the rate of 18%), claim for increased overheads of EPC contractor (along with interest at the rate of 18%), claim for idling/underutilisation of plant, machinery and equipment, and claim for loss of profits of EPC contractor. The claimant has raised a claim for ₹ 9,861.70 million. The Sponsor has also filed counter claims against the claimant for ₹ 2,873.60 million. The matter is currently pending.

6. Haridwar Highways Project Limited has initiated arbitration proceedings against the Sponsor in relation to the four laning of Muzaffarnagar-Haridwar Section from km 131.00 to km 211.000 of NH-28 in the state of UP and Uttarakhand under NHDP Phase-II as BOT (Toll) on DBFOT pattern. The claims filed by the claimant were in relation to financial expenses incurred by the claimant beyond the scheduled commercial operation date till February 2019, interest payable on compensation for delay in handing over of the land form from appointed date till February, 2019, interest due on delay towards release of grant from February 7, 2013, up to February, 2019, claim for reimbursement of GST on regular bills/invoices of the claimant from July, 2016, claims for expenses incurred by the claimant on rentals of plants and machinery beyond SCOD, claims for expenses incurred by the claimant on rentals of plants and machinery beyond SCOD till February 2019, claim for expenses incurred by the claimant due to price escalation beyond the SCOD up to February 2019, additional transportation cost due to ban on mining at sites, claim for direct expenses incurred beyond SCOD up to February 2019, expenses incurred on existing road maintenance beyond SCOD and claim on account of amount recovered for Dehradun Highway Project Limited. The claimant has raised a claim for ₹ 32,692.10 million. The Sponsor has also filed counter claims against the claimant for ₹ 27,019.89 million. The matter is currently pending.

7. Madhucon (Madurai-Tuticorin Expressways Limited) has initiated arbitration proceedings against the Sponsor in relation to the "Design, Engineering, Finance, Construction, Operation and Maintenance of Madurai- Tuticorn Section from km 138.800 to km 264.50 of NH-45B Ref.1 in the State of Tamil Nadu under NHDP Phase IIIA". The claims relate to compensation payable due to prolongation of the project, refund of liquidated damages, change of scope of work, loss of business opportunity, loss on account of

shortfall in revenue from the project and amount payable on account of price escalation during the extended period of construction. The claim raised by claimant amounts to ₹ 81,993.10 million. The Sponsor has also filed counter claims against the claimant for ₹ 2,902.60 million. The said matter is currently pending.

8. Ranchi Expressway Limited has initiated arbitration proceedings against the Sponsor in relation to the four laning of Ranchi- Rargaon-Jamshedpur Section from km 114.00 to km 277.500 of NH-33 in the State of Jharkhand on BOT(Annuity) basis under NHDP Phase-II. The claims filed by the claimant were in relation to payment towards value of work done, amount payable towards maintenance of existing road, refund of amount expended on interest during construction, compensation payable due to delay in handling over of land, extra expenditure due to escalation of cost of work done, loss incurred due to idling of machinery due to prolongation of project, loss of overheads due to prolongation of project, loss of overheads and profits on value of work done due to illegal termination and claim for amount of revenue loss (loss of annuity). The claimant has raised a claim for ₹ 89,402.50 million. The Sponsor has also filed counter claims against the claimant for ₹ 26,471.10 million. The matter is currently pending.

9. Millennium City Expressways Private Limited has initiated arbitration proceedings against the Sponsor in relation to the 8/6 lane highway from km.14.300 to km. 42.000 at Delhi-Gurgaon section of NH-8 on BOT basis. The claims filed by the claimant were in relation to the Loss of profit on account of closure of the km. 24 Toll Plaza (such amount calculated until June 24, 2021), Loss of profit on account of commissioning of the competing/alternate road facilities alternatively, extend Concession Period by a period of ninety four (94) months, Loss of profit suffered due to failure to provide requisite security at the Main Toll Plaza, thereby resulted in loss of toll revenue from the residents of nearby 31 villages, various works carried out by the claimant as change of scope, which were over and above the project agreements, payment for which remains pending despite the claimant having already completed such additional works, compensation/extension due to Demonetization, Compensation/extension due to Pandemic/Covid, On account of additional compliance with the Joint Action Plan that was over and above the Project Agreements. The claimant has raised a claim for ₹ 36,099.70 million. The Sponsor has also filed counter claims against the claimant for ₹ 10,200.00 million. The matter is currently pending.

10. AE Tollway Limited. has initiate arbitration proceedings against the Sponsor in relation to the 6-laning of Agra-Etawah Bypass Section of NH-2 from km. 199.660 to km, 323.525 under NHDP Phase-V in the State of UP on BOT (Toll) basis. The claims filed by the claimant were in relation to the Additional cost incurred towards Interest during Construction (IDC) for the delayed Period, Additional direct cost incurred during the delayed period, Fixed Overhead (FOH) payable to EPC Contractor, Escalation cost. The claimant has raised a claim for ₹ 13,179.80 million. The Sponsor has filed a counter claim of ₹ 11,875.10 million against the claimant. The matter is currently pending before the arbitral tribunal.

11. Pink City Expressway Private Limited has initiate arbitration proceedings against the Sponsor in relation to the 6 laning of Gurgaon-Kotputli-Jaipur Section of NH-8 from km 42.700 to km 273.00 (Length 225.60 km.) in the State of Haryana & Rajasthan to be executed as BOT (Toll) on DBFOT pattern under NHDP PH-V. (Ref-III). The claims filed by the claimant were in relation to the delay in handing over of ROW, idle of resources deployed in the way of man power, towards machineries, plant and equipment beyond the date of completion. The claimant has raised a claim for ₹ 66,320.00 million. The Sponsor has filed the counter claims of ₹ 149,310.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

12. KM Toll Road Private Limited has initiated arbitration proceedings against the Sponsor in relation to the Construction, operation and maintenance of National Highway No. 8A extension including section from km to km 71.40 (approximately 71.40 km) on the Gandhidham (Kandla) – Mundra Port section of National Highway No. 8A Extension in the state of Gujarat by Four-Laning and subsequent Six-Laning thereof on design, build, finance, operate and transfer ("DBFOT") basis. The claims filed by the claimant for declaration for valid termination of the concession agreement by the claimant, termination payment, refund to the claimant of sum wrongfully deducted purportedly towards non-compliance of punch list items, pay towards Change in Law etc. The claimant has raised a claim for ₹ 18,730.00 million. The Sponsor has filed the Counter- claims of ₹ 1,572.40 million against the claimant. The matter is currently pending before the arbitral tribunal.

13. Gorakhpur Infrastructure Co. Private Limited has initiated arbitration proceedings against the Sponsor in

relation to Design construction Finance Operation and Maintenance of km.0.000 to km. 32.270 of Gorakhpur Bypass on NH-28 (existing km. 255.700 to km. 279.800) in Uttar Pradesh on BOT (Annuity) basis. The claimant has raised a claim for ₹ 12,373.00 million. The Sponsor is yet to file the counter claim against the claimant. The matter is currently pending before the arbitral tribunal.

14. Raebareilly Allahabad Highway Private Limited has initiated arbitration proceedings against the Sponsor in relation to Two Laning with Paved shoulder of Raebareli to Allahabad section of NH-24B from km 82.000 to km 188.600 in Uttar Pradesh through public private partnership on design, build, finance, operate and transfer on the toll basis under NHDP-IVA. The claimant has raised a claim for ₹ 6,842.40 million. The Sponsor has filed a counter claim of ₹ 315,340.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

15. Solapur Tollways Private Limited has initiated arbitration proceedings against the four laning of Solapur-Mah/Knt border Section of NH-9 from km. 249+000 to km.348.800 in the State of Maharashtra is being executed on DBFOT basis. The claimant has raised a claim for ₹ 8,260.60 million. The Sponsor has filed the counter claim of ₹ 8,100.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

16. Solapur Yedeshi Tollway Limited has initiated arbitration proceedings against the Four laning of Solapur- Yedeshi section of NH-21 from km.0.000 to km 100.000 (Design Length -98.717 km) in the state of Maharashtra to be executed for BOT (Toll) on DBFOT pattern under NHDP Phase IV. The claimant has raised a claim for ₹ 7,900.00 million. The Sponsor has filed the counter claim of ₹ 1,400.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

17. Kishangarh Gulabpura Tollway Limited has initiated arbitration proceedings against the Six Lanning of Kishangarh to Gulabpura Section of NH 79A and NH 79 in the State of Rajasthan (Length 90.000 KM) on DBFOT. The claimant has raised a claim for ₹ 8,689.60 million. The Sponsor has filed the counter claim of ₹ 3,560.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

18. Transstroy Dindigul-Theni-Kumli Tollways Private Limited has initiated arbitration proceedings against Two laning with paved shoulder of Dindigul-Theni Section from km 2.750 to km 73.400 of NH-45 (Extn.) and Theni- Kumli section of NH-220 from km 215.500 to km 273.600 in the State of Tamil Nadu under DBFOT Annuity basis. The claimant has raised a claim for ₹ 7,481.00 million. The Sponsor has filed the counter claim for ₹7,657.00 against the claimant. The matter is currently pending before the arbitral tribunal.

19. JR Toll Road Private Limited has initiated arbitration proceedings against the Sponsor in relation to the Design, Engeneering, Construction, Development, Finance, Operation and Maintainance of Jaipur to Reengus Section of NH-11 (KM 246.300 to km 298.075) in the state of Rajasthan under NHDP Phase-III on Design, Build, Finance, Operate and Transfer (DBFOT) Basis. The claims raised by the claimant amount to ₹ 8,440.00 million. The Sponsor has also filed counter claim for ₹ 8,210.00 million. The matter is currently pending.

20. Dilip Buildcon Limited. has initiated arbitration proceedings against the Sponsor in relation to the Six Laning of Gorhar to Khairtunda Section of NH-2 from km. 320.810 to km. 360.300 section on HAM in the State of Jharkhand under NHDP phase V. The claims raised by the claimant amount to ₹ 155.00 million. The Sponsor has filed the counter claim of ₹ 9,795.20 against the claimant. The matter is currently pending before the arbitral tribunal.

21. Simplex Infrastructures Limited initiated arbitration proceedings against the Sponsor in relation to the rehabilitation and up-gradation to 4-laning of NH-31D from km 113+200 to km 154+854 (Pkg-2A) Falakata- Salsalabari Section in West Bengal on EPC basis. The claims raised by the claimant amount to ₹9,000.00 million. The Sponsor has filed the counter claim of ₹8,434.50 million. The matter is currently pending before the arbitral tribunal.

22. PNC Infratech Limited initiated arbitration proceedings against the Sponsor in relation to rehabilitation and upgradation of Barabanki - Jarwal road junction in Uttar Pradesh. The claims raised by the claimant amount to ₹1,627.00 million. The Sponsor has filed the counter claim of ₹ 5,244.00 million. The matter

is currently pending before the arbitral tribunal.

23. Dilip Buildcon Limited- Mahagaon Yavatmal Highways Private Limited initiated arbitration proceedings against the Sponsor in relation to the four laning of Mahagaon to Yavatmal section of NH- 361 from km 320.580 to km 400.575 in the state of Maharashtra under the NHDP Phase IV on Hvbrid Annuity Mode. The claims raised by the claimant amount to ₹ 1,434.00 million. The Sponsor has filed the counter claim of ₹ 5,451.00 million. The matter is currently pending before the arbitral tribunal.

24. Shamlaji Expressway Private Limited initiated arbitration proceedings against the Sponsor in relation to the six laning of Shamlaji to Motachiloda from km 401.200 to 494.410 section of NH-8 in Gujarat under NHDP Phase-V (Package -VI) on HAM. The claims raised by the claimant amount to ₹ 11,863.40 million. The Sponsor has filed counter claim of ₹39,748.40 million. The matter is currently pending before the arbitral tribunal.

25. NK Toll Road Limited initiated arbitration proceedings against the Sponsor in relation to the design, construction, development, finance, operation and maintenance of km 258.645 (end of Namakkal Bypass) to km 292.6 (start of Karur Bypass) and improvement of operation, maintenance of km 248.625 (start of proposed flyover on Namakkal Bypass) to km 258.645 (end of Namakkal Bypass) on NH- 7 in the State of Tamil Nadu on BOT basis. The claims raised by the claimant amount to ₹ 5,521.40 million. The Sponsor has filed counter claim of ₹884.30 million. The matter is currently pending before the arbitral tribunal.

26. IL&LFS Engineering & Construction Company Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Balance work of Patna-Gaya-Dobhi Section of NH-83 from km.83.000 to km.127.217 (Pkg-III) on EPC (Item Rate) in the State of Bihar executed under JICA ODA Loan Assistance. The claims raised by the claimant ₹ 6,000.00 million. The Sponsor has filed the counter claim of ₹ 22,780.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

27. Appollo Enterprises, JLI and D S Construction Limited (JV) has filed a petition before the High Court of Delhi against the sponsor in relation to Improvement, Operation, Maintenance and Strengthening of existing 2- lane road and widening to 4-lane divided highway from km 239.000 to km 281.000 of NH-6 (Raipur- Aurung Section) in the state of Chhattisgarh on BOT basis. (Ref-1) ICA Case No.2145. The claims raised by the claimant ₹ 10,121.00 million. The Sponsor has filed the counter claim of ₹ 4,232.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

28. Bilaspur Pathrapali Road Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to 4-lane with paved shoulder configuration of Bilaspur-Pathrapali (km. 0+000 to km. 53+300) section of NH-111 (New NH-130) in the State of Chhattisgarh under Bharatmala on Hybrid Annuity. The claims raised by the claimant ₹7,432.10 million. The Sponsor has not filed the counter claim yet. The matter is now reserved for pronouncement of order on the Application for amendment. No next date has been notified.

29. VK1 Expressway Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Construction of Eight Lane Vadodara Kim Expressway from 355+000 km to 378+740 km (Padra to Vadodara section of Vadodara Mumbai Expressway) in the State of Gujarat under NHDP Phase-VI on HAM mode (Phase - IA- Package-I). The claims raised by the claimant ₹ 7,425.40 million. The Sponsor has filed the counter claim of ₹ 7,911.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

30. Panipat Jalandhar NH-1 Tollway Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Six laning of Panipat-Jalandhar Section of NH-1 from km. 96.000 to km. 387.100 in the State of Haryana and Punjab on BOT (Toll) basis on DBFOT pattern under NHDP Phase-V 9 (Ref-II). The claims raised by the claimant ₹54,436.50 million. The Sponsor has filed the counter claim of ₹ 13,037.8 million against the claimant. The matter is currently pending before the arbitral tribunal.

31. West Haryana Highways Projects Private Limited (WHHPPL) has filed a petition before the High Court of Delhi against the sponsor in relation to 4/6 Laning of Delhi/Haryana Border to Rohtak section of NH-10 from km. 29.700 to km. 93.140 including Bahadurgarh and Rohtak bye-passes in the State of Haryana

under NHDP Phase IIIA on Build, Operate and Transfer (BOT) basis (Ref-III). The claim raised by the claimant is ₹ 56,846.60 million and no counter claim yet. The matter is currently pending before the arbitral tribunal.

32. Srinagar Banihal Expressway Ltd has filed a petition before the High Court of Delhi against the sponsor in relation to Rehabilitation, Strengthening and Four laning of Srinagar to Banihal Section from km220.700 to km286.110 of NH-44 (old NH 1A) in the UT of Jammu and Kashmir on BOT (Annuity) Basis. The claims raised by the claimant ₹42,372.40 million. The Sponsor has filed the counter claim of ₹ 2,763.8 million. The matter is currently pending before the arbitral tribunal.

33. IRB Tumkur - Chitradurga Tollways Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to 6-laning of Tumkur-Chitradurga (excluding Tumkur & Chitradurga bypass) Section from km 75.00 to km 189.00 of NH-4 (Approx. 114.00 km) in the State of Karnataka to be executed as BOT (Toll) Project on DBFOT pattern under NHDP. The claims raised by the claimant ₹949.80 million. The Sponsor has filed the counter claim of ₹ 7,804.00 million against the claimant. The matter is currently reserved for award.

34. Hampi Expressways Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Four Laning of Hospet - Chitradurga section of NH 13 (New NH-50) from km 299+000 to km 418 + 750 in the state of Karnataka under National Highways Development Project (NHDP) Phase III on DBFOT (Toll) basis. The claims raised by the claimant is of ₹8,776.00 million. The Sponsor has filed the counter claim of ₹ 2,254.30 million against the claimant. The matter is currently pending before the arbitral tribunal.

35. IRB West Coast Tollway Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Four laning of Goa-Karnataka Border to Kundapur section of NH-66 (formerly NH-17) from km. 93.700 to km. 283.300 in the State of Karnataka to be executed as BOT Project on DBFOT Pattern under NHDP-IV. The claims raised by the claimant ₹ 31,080.00 million. The Sponsor has not filed the counter claim yet. The matter is currently pending before the arbitral tribunal.

36. Guruvayorr Infrastructure Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Design, Construction, Development, Finance, Operation and Maintenance of (i) KM 270.000 (Trissur) to km 316.700 (Angamali) and (ii) Improvement, Operation and Maintenance of km 316.700 (Angamali) to km 342.000(Edapally) of NH-47 in the State of Kerala on BOT basis. The claims raised by the claimant ₹15,260.00 million. The Sponsor has filed the counter claim of ₹ 3,735.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

37. Gwalior Jhansi Expressway Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Design, Construction, Development, Finance, Operation and maintenance of the work of rehabilitation and upgradation of four lane from km. 16.00 to km. 96.127 on NH-75 in the state of U.P and M.P under North-South Corridor (NHDP Phase-II) on BOT (Annuity). The claims raised by the claimant ₹ 20,915.20 million. The Sponsor has filed the counter claim of ₹ 13,980.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

38. Indore Dewas Tollways Limited has filed a petition before the High Court of Delhi against the sponsor in relation to 6-laning of Indore-Dewas Section of Nh-3 from km 577.550 to km 610.000 and km 0.000 to km 12.600 (approx length 45.05km) in the State of Madhya Pradesh under NHDP Phase-V to be executed as BOT(Toll) project on DBFOT pattern. The claims raised by the claimant ₹10,709.60 million. The Sponsor has filed the counter claim of ₹ 535.3 million against the claimant. The matter is currently pending before the arbitral tribunal.

39. Biaora-Dewas Highway Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to 4-laning of Biaora - Dewas section from km 426.100 to km 566.450 of NH-3 (Package- III) in the State of Madhya Pradesh to be executed on BOT (Toll) on DBFOT pattern under NHDP Phase-IV. The claims raised by the claimant ₹7,487.30 million. The Sponsor has filed the counter claim of ₹ 23,520 million against the claimant. The matter is currently pending before the arbitral tribunal.

40. Supreme Panvel Indapur Tollway Pvt Ltd has filed a petition before the High Court of Delhi against the sponsor in relation to Four laning of Panvel-Indapur Section of NH-17 from km 0.00 to km 84.00 under NHDP Phase III on BOT Basis on design, build, finance, operate and transfer (DBFOT) pattern in the

State of Maharashtra. The claims raised by the claimant ₹75,048.60 million. The Sponsor has filed the counter claim of ₹ 17,330.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

41. Udaipur Tollway Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Six Lanning of from KM. 287.400 to KM 401.200 Section of NH-8 in the States of Rajasthan and Gujarat on DBFOT (Toll)) IRB-ARBITRATION Ref NO.1. The claims raised by the claimant ₹ 9,060.00 million. The Sponsor has filed the counter claim of ₹ 2,150.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

42. CG Tollways Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Six Lanning of Kishangarh Udaipur Ahmedabad Section from KM 90.000(near Gulabpura) to KM 214.870 (end of Chittorgarh Bypass) of NH 79 in the State of Rajasthan on BOT(Toll) mode) IRB-arbitration Ref NO.2. The claims raised by the claimant ₹ 5,021.20 million. The Sponsor has filed the counter claim of ₹ 3,040 million against the claimant. The matter is currently pending before the arbitral tribunal.

43. Trichy Thanjavur Expressways Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Design, engineering, finance construction, operation and maintenance of 4 laning of Thanjavur – Trichy section from km 80.000 to km.135.750 of NH -67 in the State of Tamil Nadu under NHDP- IIIA on BOT basis. The claims raised by the claimant ₹13,494.20 million. The Sponsor has filed the counter claim of ₹ 4,918.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

44. TN (DK) Expressways Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Design, Construction, Development, Finance, Operation and Maintenance of km.305.600 (End of Karur Bypass) to km 373.725 (Dindigul) and Improvement, Operation and Maintenance of km 292.600 (Start of Karur Bypass) to km 305.600 (End of Karur Bypass) on NH-7 in the State of Tamil Nadu under North- South Corridor (NHDP-Phase-II) on Build, Operate and Transfer (BOT) Basis (Contract Package No. NS 2/BOT/TN-4). The claims raised by the claimant ₹ 10,589.5 million. The Sponsor has filed the counter claim of ₹ 2,741.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

45. HK Toll Road Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Six laning of Hosur to Krishnagiri section of NH-44(Old NH-7) from km. 33/130 to km.93/000 in the state of Tamil Nadu under NHDP Phase V on BOT (toll) basis under DBFOT pattern. The claims raised by the claimant ₹11,980.90 million. The Sponsor has filed the counter claim of ₹6,428.30 million against the claimant. The matter is currently pending before the arbitral tribunal.

46. DS Toll Road Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Design Construction, Development, Finance, Operation and Maintenance of km 373+726 (Start of Proposed Fly Over at Dindigul Bypass) to km 426+775 (Samayanallur) [Actual Chainage km 368+147 to km 421+196] of NH-7 (TN05) on BOT Mode in the state of TN. The claims raised by the claimant ₹ 6,360.80 million. The Sponsor has filed the counter claim of ₹ 6,402.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

47. SU Toll Road Private Limited has filed a petition before the High Court of Delhi against the sponsor in relation to Design, Engineering, Finance, Construction Operation and Maintenance of Four laning of Salem to Ulundurpet section from km.0/313 to km. 136.670 of NH-68-Package no. NHDP /BOT-I/TN/06 on BOT basis. The claims raised by the claimant ₹ 8,412.00 million. The Sponsor has filed the counter claim of ₹ 2,004.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

48. Oriental Structural Engineers Private Limited KMC Construction Limited (Jv) OSE KMC-JV has filed a petition before the High Court of Delhi against the sponsor in relation to Rehabilitation and upgradation of Barabanki - Jarwal road Junction section (km 0.000 to km 43.000) of NH-28C (new NH no. 972) in the State of Uttar Pradesh. The claims raised by the claimant is ₹2,305.20 million and the Sponsor has not filed the counter claim yet against the claimant. The matter is currently pending before the arbitral tribunal.

49. Appollo Enterprises, JLI and D S Construction Limited (JV) initiated arbitration proceedings against the sponsor in relation to Improvement, Operation & Maintenance, Rehabilitation and Strengthening of existing 2-lane road and widening to 4-lane divided carriageway from km. 239.000 km. to 281.000 of NH-6 (Raipur-Aurang Section) on Build, Operate and Transfer (BOT) basis (Ref-2) AC-2384 on EPC Basis. The claims raised by the claimant ₹ 9,090.00 million. The Sponsor has not filed the counter claim yet against the claimant. The matter is currently pending before the arbitral tribunal.

50. IRB Ahmedabad Vadodra Super Express initiated arbitration proceedings against the sponsor in relation to Construction of Eight Lane access-controlled Expressways from km. 154.000 to km. 190.500 of Vadodra Mumbai Expressways (gandeva to Jujuwa) in the State of Gujarat on HAM mode under Bharatmal Pariyojna (Phase IB-Package IX) on HAM Basis. The claims raised by the claimant ₹ 2,858.00 million. The Sponsor has filed the counter claim of ₹6,352.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

51. Panipat Jalandhar NH-1 Tollway Private Limited initiated arbitration proceedings against the sponsor in relation to Six laning of Panipat-Jalandhar Section of NH-1 from km. 96.000 to km. 387.100 in the State of Haryana and Punjab on BOT (Toll) basis on DBFOT pattern under NHDP Phase-V 9 (Ref-III) on BOT basis. The claims raised by the claimant ₹ 29,320.00 million. The Sponsor has filed the counter claim of ₹15,850.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

52. Rohtak-Hisar Tollway Private Limited initiated arbitration proceedings against the sponsor in relation to Four Laning of Rohtak to Hisar section of NH-10 (from km. 87+000 to km. 170+000) including connecting link from km. 87+000 (NH-10) to km 348+000 (NH-71) to be executed as BOT (Toll) Project on DBFOT Pattern under NHDP Phase III in the State of Haryana on BOT basis. The claims raised by the claimant ₹19,290.00 million. The Sponsor has filed the counter claim of ₹3,666.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

53. West HaryanaHighways Projects Private Limited (WHHPPL) has filed a petition before the High Court of Delhi against the sponsor in relation to 4/6 Laning of Delhi/Haryana Border to Rohtak section of NH-10 from km. 29.700 to km. 93.140 including Bahadurgarh and Rohtak bye-passes in the State of Haryana under NHDP Phase IIIA on Build, Operate and Transfer (BOT) basis (Ref-II). The claims raised by the claimant ₹9,640.00 million. The Sponsor has not filed the counter claim yet against the claimant. The matter is currently pending before the arbitral tribunal.

54. Viva Highways Limited initiated arbitration proceedings against the sponsor in relation to "Reconstruction, Strengthening, Widening and Rehabilitation of a section on State Highway-27 connecting Indore Sanawad Khandwa Burhanpur from km 0.00 to km 203.00 Edlabad Road (2001 to 2015) on SH-27 Indore – Edlabad stretch on design build, finance operate and transfer basis"on BOT Basis. The claims raised by the claimant ₹9,636.10 million. The Sponsor has not filed the counter claim yet against the claimant. The matter is currently pending before the arbitral tribunal.

55. PS Toll Road Private Limited initiated arbitration proceedings against the sponsor in relation to "Six laning of Pune-satara section of NH-4 from km.725.00 to km 865.35 (Length-km 140.35) in the state of Maharashtra to executed as BOT (TOLL) on DBFOT pattern under NHDP Phase-V on BOT Basis. The claims raised by the claimant ₹25,810.00 million. The Sponsor has filed the counter claim of ₹29,720.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

56. Dilip Buildcon Limited initiated arbitration proceedings against the sponsor in relation to Four Lanes with paved shoulders of End of Sangrur Bypass to Tapa Section of NH-64(New NH No. 7) from Existing km 116.170 to km 138.030 and Existing km 142.950 to km168.000 in the State of Punjab on EPC Mode. The claims raised by the claimant ₹625.50 million. The Sponsor has filed the counter claim of ₹29,720.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

57. Ceigall India Limited—Krishna Constructions (JV) initiated arbitration proceedings against the sponsor in relation to Construction of four lane Greenfield Amritsar conncectivity for Connection of Amritsar with Delhi- Amritsar-Katra Expressway from MDR Junction at ch. 40+900 Dhunda Village to Junction with NH3 and Taran Bypass near Mannawalla village chainage 70+950(km 40+ 900 to km 70+950 of Amritsar Connectivity) on EPC mode under Bharatmala Pariyojna in the State of Punjab on EPC Mode. The claims raised by the claimant ₹2,115.40 million. The Sponsor has not filed the counter claim yet

against the claimant. The matter is currently pending before the arbitral tribunal.

58. Roadway Solutions India Infra Limited (RSIIL) initiated arbitration proceedings against the sponsor in relation to Strengthening/ overlaying on Six lane Gurgaon- Kotputli Jaipur section of NH-48 (Old NH-8) from km.107.100 to 273.000 in the state of Rajasthan at the Risk & Cost of Concessionaire on item rate (Percentage) Basis. The claims raised by the claimant is ₹4,280.00 million. The Sponsor has filed the counter claim of ₹5,188.50 million against the claimant. The matter is currently pending before the arbitral tribunal.

59. IRCON PB Tollway Limited initiated arbitration proceedings against the sponsor in relation to Widening & strengthening of existing Bikaner – Phalodi section to four lanes from km 4.200 to km 55.250 and two lanes with paved shoulder from km 55.250 to km 163.500 of NH-15 on BOT (Toll) basis in the state of Rajasthan, (Ref-II). The claims raised by the claimant is ₹ 13,837.60 million. The Sponsor has filed the counter claim of ₹ 4249.40 million against the claimant. The matter is currently pending before the arbitral tribunal.

60. Madurai Tuticorin Expressway Limited initiated arbitration proceedings against the sponsor in relation to Madurai- Tuticorin Section NH-38 (Old NH-45B) From km138.800 to km.264.500 (Madurai Tuticorin Section BOT (Toll) (Ref-2) on BOT basis. The claims raised by the claimant is ₹42,320.00 million. The Sponsor has filed the counter claim of ₹11,810.00 million against the claimant. The matter is currently pending before the arbitral tribunal.

61. Bareilly Highways Project Limited has initiated arbitration proceedings against the Sponsor in relation to Four laning of Bareilly-Sitapur section of NH-24 from km 262.000 to km 413.200 (approx. 151.200km) in the State of UP under NHDP Phase-III of DBFOT basis (Ref-1) on BOT basis. The claims filed by the claimant were in relation to claim for additional interest on debt beyond SPCD (i.e. between August 23, 2013 to January 31, 2019), interest for additional interest on debt beyond SPCD, claim for interest due on additional promoters contribution infused in the project, claim for interest due on delay release of grant, claim for expenses incurred by SPV company beyond SPCD, claim for interest for cost of land compensation, claim for net revenue loss from SPCD till January 31, 2019, interest for net revenue loss from SPCD till January 31, 2019, claim for interest on excess 50% independent engineering cost debit by the Sponsor, claim for reimbursement of GST on regular EPC invoices-change of law, claim for interest on claim of GST on change of scope & utility shifting, claim for direct expenses incurred by EPC contractor beyond SPCD, claim for plant and machinery rental/rehandling for extended period, claim for interest for plant and machinery/rental/rehandling for extended period, claim for price escalation during the extended period, claim for interest for price escalation during the extended period, claim for expenses incurred on change of scope/variation items, claim for interest for change of scope/variation items, claim for additional transportation cost due to ban in local mining at sites, claim for interest for additional transportation cost due to ban in local mining at sites. The claimant has raised a claim for ₹ 31,767.60 million. The Sponsor has also filed counter claims against the claimant for ₹ 17,049.90 million. The matter is currently pending.

*Other material litigation*

Considering the business and purpose of the Sponsor, it is imperative for the Sponsor to have an effective mechanism for the acquisition of land for building roads. Taking this need of the Sponsor into account, the parliament has enacted the NH Act, a special enactment which overrides the Land Acquisition Act, 1894 in cases where the land is acquired for the purposes of building National Highways. The Parliament has enacted the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, which is applicable to land acquisitions under NH Act with effect from January 1, 2015 (i.e. one year from the date of commencement of the Act, subject to notification by Central Government). The process of acquiring land is a very cumbersome process and it leads to a large number of disputes. At present there are approximately 72,000 land acquisition cases pending before various Courts/Tribunals/Competent Authorities for adjudication.

## V. Litigations against the Trustee

As per the details provided by the Trustee, the Trustee, in its capacity as trustee for its clients, has been party to the following show cause notices, advisory letters, administrative warnings, adjudication orders, and other such letter from the Securities Exchange Board of India and the Securities Appellate Tribunal:

1. SBI Cap Trustee (the "Plaintiff") had filed a suit before the City Civil Court, Bangalore against the Trustee and others (the "Defendants") requiring sale of pledged shares for a particular price by SREI Fund/Investors, for whom the Trustee was acting as the share pledge trustee. India Competitive Global Fund ("ICGC") acting through the SREI Investment Manager had a first and exclusive charge over the pledged shares. At the instructions of the ICGC and SREI Investment Manager, the Trustee had transferred the pledged shares to their demat account as they has first and exclusive right over the shares. The Trustee as the share pledge trustee has acted on the instructions of the Lenders/Investors. ICGC/SREI sold the shares and appropriated the amounts towards their dues and transferred the surplus amount to the Plaintiff. The Trustee has filed its written statement on August 12, 2022 and application for deletion of its name from array of the parties. The matter is currently pending.

2. The Competition Commission of India vide its order dated the March 14, 2024 rejected the application dated March 21, 2023 and held that director general may continue its investigation for alleged cartelization. Additional Director General, CCI vide his letter dated the March 15 2024 addressed to the Trustee, directed to provide the requisite information/documents as sought by CCI vide notice dated February 18, 2022 latest by March 26, 2024. We have submitted the required information on April 11, 2024 and April 15, 2024. The director general filed its report dated October 10, 2024. The matter is currently pending.

3. Authum Investments and Infrastructure Limited ("AIIL") has filed a petition against the R.K. Mohata Family Trust and others, at the Supreme Court of India. The Supreme Court of India vide their order dated the March 3, 2023 allowed the resolution plan filed by AIIL and directed AIIL to make the payments prior to March 31, 2023. AIIL has made the payment. Formal closure of the suit is awaited.

4. Certain investors have filed a suit ("**Suit**")seeking compensation and damages of USD 103, 699, 976 for the loss of their investments in Dynamic India Fund III against Dynamic India Fund III, International Financial Services, ICICI Venture Funds Management Company Limited, ICICI Bank and the Trustee. All the defendants including ICICI Venture Funds Management Company Limited have raised preliminary jurisdiction objections to the Suit. At the hearing held on 17th July,2025 we have opposed suit on the ground that the Trustee being a government company is an instrumentality of the State under Article 12 of the Constitution of India unlike the erstwhile trustee, Western India Trustee & Executors Co, the Trustee cannot become a party to these proceedings. The matter is currently pending.

5. Pawan Kapoor and Amri Resorts Private Limited, the debenture holders (together the "**Petitioners**") have filed a writ petition before Delhi High Court, inter alia against the Trustee alleging various non-compliances by the Trustee and for not initiating action against Karvy Data Management Services Limited for defaults in payment of interest and principal. The Trustee has filed a reply. The Delhi High Court had enquired from the counsel for SEBI as to what steps SEBI has taken in the present matter, to which they apprised the Delhi High Court that on the receipt of the complaints from the Petitioners, SEBI has considered the same and since the matter pertains to unlisted NCDs issued on private placement basis, it has been forwarded to Ministry of Corporate Affairs for its necessary action. MCA has filed its status report. The matter is currently pending.

6. The suit is for declaration of deed of mortgage dated June 15, 2021 executed by defendant no. 2 to no.7 in favour of the Trustee as defendant no. 1 as void, illegal, invalid, non-est, not binding on the plaintiffs together with relief for permanent injunction from entering into the suit property, selling in auction and/or agreeing to sale in auction the suit property under the garb or colour whatsoever. The issuer company has mortgaged different property and disputed property has been released. The Trustee has filed an application for deletion of their name from array of the parties. The matter is currently pending.

7. In the case of Spenta Suncity Private Limited., Monivedda Consultant LLP, one of the stakeholder has filed a civil appeal and contempt petition against the Trustee and MD P.K. Malhotra for alleged violations of order dated December 16, 2022 passed by the Supreme Court of India. The order was to not make further allotment of debentures and create further liabilities on the assets. The Trustee has filed counter replies in both civil appeal and contempt petition before Supreme Court of India. The Trustee was directed to file affidavit/undertaking confirming that it is not carrying out any constructions nor it has authorised anyone to carry out constructions including Spenta Suncity Private Limited. The required affidavit/undertaking was filed in stipulated time. Spenta filed an injunction application for urgent listing. The Supreme Court of India allowed the injunction application and directed the matter to be listed. The matter is currently pending.

8. Credit Opportunities III PTE. Limited ("**Claimant**") has initiated arbitration proceedings against IIFL management Services Limited, IIFL Finance Limited, 360 One Investment Advisors and Trustee Services Limited and the Trustee under the arbitration rules of the Singapore Arbitration Centre ("SIAC"). IDBI Trusteeship Services Limited was appointed as the trustee on November 7, 2023. Under SIAC Rules one an arbitrator was appointed and arguments were held, wherein the arbitrator directed the parties to file written submissions (including submissions on costs) of not more than 25 pages by July 9, 2025. Further. the arbitrator asked parties to file additional written submissions on whether the correct approach would be to apply Singapore law (which is the seat of arbitration) or Indian law (which governs contribution agreement) in the context of the pre-conditions to the arbitration. The arbitrator has asked for filing of the additional submissions on the aforementioned issues by August 8, 2025 and the same has been filed. The arbitrator vide a jurisdiction award dated December 14, 2025 has held that the online dispute resolution mechanism is applicable and terminated the arbitration against respondent No. 1 (IIFL Management Services Limited.); and held that the law governing the arbitration agreement and contribution agreement is Indian Law with the seat of arbitration at Singapore and has directed respondent nos. 2, 3, 5, 6 and 8 to jointly and severally pay costs of USD 86,550.83 to the Claimant. The matter is currently pending.

9. Francis Cassian Mendis has filed a suit against Heida Aloysious Gomes and nine others including the Trustee, challenging the conveyance deed dated May 18, 1981 including all other conveyances executed thereafter and mortgage dated September 9, 2021 created in favour of the Trustee by Spenta Suncity Private Limited, and the permanent order and injunction restraining the defendants from carrying out any constructions/development activity on the suit property i.e., land bearing CTS No.336, Survey No.23, Hissa No.13/7 admeasuring 1622.8 sq. mtrs., village Mogra, Taluka Andheri, Mumbai. The matter is currently pending.

10. The Trustee has received a summons from the court of district and sessions judge, Rohini Commercial Court, North West Delhi on July 11, 2024 for the alleged unpaid amount of Rs. 80,35,732/- towards construction contracts executed by them. The Trustee has filed an application for deletion of their name from array of the parties for filing with the court of district and sessions judge, Rohini Commercial Court, North West Delhi. The matter is currently pending

11. Spanhaus Traders LLP ("**Plaintiff**") has filed a suit against Spenta Suncity Private Limited ("**Spenta**"), the Trustee and Rajat Jhunjhunwala, which pertains to a loan allegedly advanced by Spanhaus Traders LLP to JLS Realty Private Limited ("**JLS**"). The Plaintiff's contention is that the sale of the disputed land by JLS to Spenta was carried out fraudulently, illegally, and with the intent to defeat and frustrate the Plaintiff's claims. The Plaintiff has sought that the deed of conveyance dated September 8, 2021 executed by JLS in favour of Spenta, the indenture of mortgage dated September 9, 2021 by Spenta in favour of the Trustee be declared is invalid, illegal, non-est, void and not binding on the Plaintiff and ordered to be cancelled same and JLS, Spenta and the Trustee jointly and severally be directed to make payment of sum of Rs. 118,16,80,355/- as on April 23, 2021, along with interest. The matter is currently pending.

12. Pawan Kappor and others ("**Petitioners**") who were the debenture holders of Karvy Data Management Services Limited ("Karvy") have filed a criminal revision petition for reinstating the investigation in Karvy which was previously rejected at the Tis Hazari Court, New Delhi, alleging the following: (i) there has been breach of trust by the Trustee as a Debenture Trustee; (ii) alleged collusion between the Trustee and Karvy; (iii) the Trustee has not taken any action against Karvy after the default in payment of dues to debenture holders. The Trustee has filed its reply. The court directed Petitioner to file note of arguments with advance copy to the respondents. The matter is currently pending.

13. In the matter of Narayanamma versus Thammaiah and others, the Trustee has been impleaded as a proposed respondent in summons without suit papers being received, in relation to non-release of a property. The Trustee has filed an interlocutory application stating that the said property has been released. The matter is currently pending.

14. In the matter of Sulochana versus India Cement Limited and other before the Principal District Court, Ariyalur, Chennai, the Trustee has been impleaded as a respondent. The Trustee has written to the Registrar, District Court, Ariyalur, Chennai for suit papers. The matter is currently pending and the next date of hearing is January 9, 2026.

15. In the matter of Madhu Prasad versus Punniyama and others before Principal Subordinate Court, Krishnagiri, Tamil Nadu, the Trustee has been made a party to the suit which pertains to partition of properties, however, the Trustee has released the charge on the disputed properties and executed a release deed and has accordingly filed its reply in the matter. The matter is currently pending.

16. Gyanchand Mootha ("**Plaintiff**") has filed a suit against the Industrial Development Bank of India ("**IDBI**") and the Trustee for declaration and recovery of 1160 debentures having face value of ₹ 40,600 along with interest accrued thereon amounting to ₹ 38,512, with further interest at12.5% till realisation and for relief that the resolution dated March 31, 1998 be declared as void and illegal. The trial court vide order dated July 31, 2006, ("**Order**") has granted decree on the ground that the IDBI as a lender was responsible for payment to the Plaintiff, which is a mistake apparent on the face of the record when it has mixed role of IDBI as a "lender" and as "trustee". The role of IDBI as a lender is distinctive which could not have been mixed for the purposes of awarding decree against the defendant No.1 and therefore, the trial court committed a jurisdictional error. IDBI has filed a civil suit before High Court of Rajasthan at Jaipur for quashing/setting aside of the Order. The IDBI and the Trustee have filed an application for early listing and hearing of the case with the High Court of Rajasthan. The matter is currently pending.

17. Faisal Rashid ("**Plaintiff**") has filed a civil suit against Lokhandwala Kataria Constructions Private Limited ("**LKCPL**"), the Trustee and others (collectively the "**Defendants**"). before the Bombay High Court, seeking inter alia direction to the Defendants for cancellation/rectification of mortgages attempted to be created on Flat No. 7001 and Flat No.7101 ("**Flats**") by LKCPL in favour of the Trustee and defendant no. 3, respectively. It is submitted by the Plaintiff that the Flats have been sold by Defendant No. 1 to the him by the registered agreements of sale dated February 11, 2019 prior to the said attempted mortgages. Shapoorji Pallonji the sole debenture holder has taken up the matter with LKCPL for release of the flat from security and amendment to the documents. The matter is currently pending.

## VI. Taxation Proceedings

The details of direct tax and indirect tax against the Trust, Project SPV, InvIT Assets, Investment Manager, Project Manager, Sponsor/Sponsor Group and the Trustee, as of the date of this Draft Offer Document is as follows:

| Sr. No. | Nature of Case | Number of cases | Amount involved (to the extent quantifiable) (in ₹ million) |
|---|---|---|---|
| **Trust** | | | |
| 1. | Direct Tax | Nil | Not applicable |
| 2. | Indirect Tax | Nil | Not applicable |
| **Investment Manager** | | | |
| 1. | Direct Tax | Nil | Not applicable |
| 2. | Indirect Tax | Nil | Not applicable |
| **Project Manager** | | | |
| 1. | Direct Tax | Nil | Not applicable |
| 2. | Indirect Tax | Nil | Not applicable |
| **Sponsor /Sponsor Group** | | | |
| 1. | Direct Tax | Nil | Not applicable |
| 2. | Indirect Tax | 6 | 96,326.75 |
| **Project SPV** | | | |
| 1. | Direct Tax | Nil | Not applicable |
| 2. | Indirect Tax | Nil | Not applicable |
| **InvIT Assets** | | | |
| 1. | Direct Tax | Nil | Not applicable |
| 2. | Indirect Tax | Nil | Not applicable |
| **Trustee** | | | |
| 1. | Direct Tax | 2 | 2.35 |
| 2. | Indirect Tax | Nil | Not applicable |

## SECURITIES MARKET IN INDIA

*The information in this section has been extracted from documents available on the website of SEBI and the Stock Exchanges and has not been prepared or independently verified by the Parties to the Trust or the Book Running Lead Managers or any of their respective affiliates or advisors. The information below is given for the benefit of investors in the Issue. Investors are advised to make their independent investigations and ensure that they are eligible to subscribe to, purchase or otherwise acquire the Units they Bid for under Indian laws or regulations.*

### The Indian Securities Market

India has a long history of organized securities trading. In 1875, the first stock exchange was established in Mumbai. The BSE and the NSE, together hold a dominant position among the stock exchanges in terms of the number of listed companies, market capitalisation and trading activity.

### Stock Exchange Regulation

Indian stock exchanges are regulated primarily by SEBI, as well as by the Government acting through the Ministry of Finance, Capital Markets Division, under the Securities Contracts (Regulation) Act, 1956 ("**SCRA**") and the Securities Contracts (Regulation) Rules, 1957 ("**SCRR**"). SEBI, in exercise of its powers under the SCRA and the SEBI Act, notified the SCR (SECC) Regulations, which regulate *inter alia* the recognition, ownership and internal governance of stock exchanges and clearing corporations in India together with providing for minimum capitalisation requirements for stock exchanges. The SCRA, the SCRR and the SCR (SECC) Regulations along with various rules, bye-laws and regulations of the respective stock exchanges, regulate the recognition of stock exchanges, the qualifications for membership thereof and the manner, in which contracts are entered into, settled and enforced between members of the stock exchanges.

The SEBI Act empowers SEBI to regulate the Indian securities markets, including stock exchanges and intermediaries in the capital markets, promote and monitor self-regulatory organisations and prohibit fraudulent and unfair trade practices. Regulations concerning minimum disclosure requirements by public companies, rules and regulations concerning investor protection, insider trading, substantial acquisitions of shares and takeover of companies, buy-backs of securities, employee stock option schemes, stockbrokers, merchant bankers, underwriters, mutual funds, foreign portfolio investors, credit rating agencies and other capital market participants have been notified by the relevant regulatory authority.

### Listing and Delisting of Units

The InvIT Regulations provide for listing and delisting of units of infrastructure investment trusts on the stock exchanges.

### BSE

Established in 1875, it is the oldest stock exchange in India. In 1957, it became the first stock exchange in India to obtain permanent recognition from the Government under the SCRA. It has evolved over the years into its present status as one of the premier stock exchanges of India. The BSE provides a market for trading in equity. Currencies, debt instruments, derivatives and mutual funds. Pursuant to the BSE (Corporatization and Demutualization) Scheme 2005 of SEBI, with effect from August 19, 2005, BSE was incorporated as a company under the Companies Act, 1956. The equity shares of BSE were listed on NSE on February 3, 2017.

### NSE

NSE was established by financial institutions and banks to provide nationwide online, satellite-linked, screen-based trading facilities with market-makers and electronic clearing and settlement for securities including government securities, debentures, public sector bonds and units. It has evolved over the years into its present status as one of the premier stock exchanges of India. NSE was recognised as a stock exchange under the SCRA in April 1993 and commenced operations in the wholesale debt market segment in June 1994. The capital market (equities) segment commenced operations in November 1994 and operations in the derivatives segment commenced in June 2000. Presently, the products on the exchange are organized into three assets classes for trading, namely (i) equity and equity-linked products such as stocks, IDRs, ETFs and units of closed ended mutual fund schemes, (ii) derivates and (iii) fixed income securities and debt products, including corporate bonds, sovereign gold bonds and other debt securities.

**Internet-based Securities Trading and Services**

Internet trading takes place through order routing systems, which route client orders to exchange trading systems for execution. Stockbrokers interested in providing this service are required to apply for permission to the relevant stock exchange and also have to comply with certain minimum conditions stipulated by SEBI. The NSE became the first exchange to grant approval to its members for providing internet-based trading services. Internet trading is possible on both the "equities" as well as the "derivatives" segments of the NSE.

**Trading Hours**

Trading on both NSE and BSE occurs from Monday to Friday, between 9:15 a.m. and 3:30 p.m. 1ST (excluding the 15 minutes pre-open session from 9:00 a.m. to 9:15 a.m. that has been introduced recently). BSE and NSE are closed on public holidays. The recognised stock exchanges have been permitted to set their own trading hours (in the cash and derivatives segments) subject to the condition that (i) the trading hours are between 9.00 a.m. and 5.00 p.m. and (ii) the stock exchange has in place a risk management system and infrastructure commensurate to the trading hours.

**Trading Procedure**

This totally automated screen based trading in securities was put into practice nationwide. This has enhanced transparency in dealings and has assisted considerably in smoothening settlement cycles and improving efficiency in back-office work. In the year 2004, BSE introduced its new generation trading platform, BOLT Plus.

NSE has introduced a fully automated trading system called National Exchange for Automated Trading ("**NEAT**"), which operates on strict time/price priority besides enabling efficient trade. NEAT has provided depth in the market by enabling large number of members all over India to trade simultaneously, narrowing the spreads.

**Depositories**

The Depositories Act provides a legal framework for the establishment of depositories to record ownership details and effect transfer in book-entry form. Further, SEBI framed regulations in relation to the registration of such depositories, the registration of participants as well as the rights and obligations of the depositories, participants, companies and beneficial owners. The depository system has significantly improved the operation of the Indian securities markets.

## RIGHTS OF UNITHOLDERS

*The rights and interests of Unitholders are included in this Draft Offer Document and the InvIT Regulations. Under the Trust Deed and the Investment Management Agreement, these rights and interests are safeguarded by the Trustee and the Investment Manager, respectively. Any rights and interests of Unitholders as specified in this Draft Offer Document would stand qualified by and deemed to be amended to the extent of any amendment to the InvIT Regulations.*

***Beneficial Interest***

Each Unit represents an undivided beneficial interest in the Trust. The beneficial interest of each Unitholder shall be equal and limited to the proportion of the number of Units held by the Unitholder to the total number of Units. A Unitholder has no equitable or proprietary interest in the InvIT Assets and is not entitled to transfer of the InvIT Assets (or any part thereof) or any interest in the InvIT Assets (or any part thereof) of the Trust. A Unitholder's right is limited to the right to require due administration of the Trust in accordance with the provisions of the Trust Deed and the Investment Management Agreement.

***Ranking***

No Unitholder of the Trust shall enjoy superior voting or any other rights over another Unitholder. Further, the Units shall not have multiple classes, except for any subordinate Units that may be issued only to the Sponsor, where such subordinate units carry only inferior voting or any other rights compared to other Units in the future in accordance with Regulation 4(2)(h) and Chapter IV A of the InvIT Regulations.

***Redressal of grievances***

The Investment Manager shall ensure adequate and timely redressal of all Unitholders' grievances pertaining to the activities of the Trust, and the Trustee shall periodically review the status of Unitholders' complaints and their redressal undertaken by the Investment Manager. The Stakeholders' Relationship Committee of the Investment Manager shall monitor the status of complaints and their redressal, and maintain records of grievances and actions taken for the same. For details, please see the section entitled "*Corporate Governance*" on page 100.

***Distribution***

The Unitholders shall have the right to receive distributions in accordance with the InvIT Regulations, Distribution Policy, and in the manner provided in this Draft Offer Document. For details, please see the section titled "*Distribution*" on page 216.

***Nominee Directors***

Unitholder(s), holding not less than 10% of the total outstanding Units, either individually or collectively, shall be entitled to nominate one director on the board of directors of the Investment Manager. In this regard, we shall undertake the relevant actions in due course in accordance with the SEBI InvIT Master Circular and the InvIT Regulations.

***Meeting of Unitholders***

Meetings of Unitholders will be conducted in accordance with the InvIT Regulations.

*Passing of resolutions*

1. With respect to any matter requiring approval of the Unitholders:

    (i). a resolution shall be considered as passed when the votes cast by Unitholders, so entitled and voting, in favour of the resolution exceed a certain percentage as specified in the InvIT Regulations, of total votes cast;

    (ii). the voting threshold specified under the InvIT Regulations shall be calculated on the basis of unit holders present and voting;

    (iii). the voting may be done by postal ballot or electronic mode;

(iv). a notice of not less than 21 (twenty one) days shall be provided to the Unitholders: Provided that a meeting of unit holders may be called after giving shorter notice than that specified in this clause if consent, in writing or by electronic mode, is accorded thereto: (a) in case of an annual meeting, by not less than ninety-five percent of the unit holders entitled to vote thereat; and (b) in case of any other meeting, by majority of the unitholders in number entitled to vote thereat and who represent not less than ninety-five percent of such part of the units by value as gives a right to vote at the meeting;

(v). voting by any person who is a related party in such transaction, as well as associates of such person(s) shall not be considered on the specific issue;

(vi). the Investment Manager shall be responsible for all the activities pertaining to conducting of meeting of the Unitholder, subject to oversight by the Trustee. However, for issues pertaining to the Investment Manager, including a change in Investment Manager, removal of Investment Manager or change in control of Investment Manager; the Trustee shall convene and handle all activities pertaining to conduct of the meetings. Additionally, for issues pertaining to the Trustee, including change in Trustee, the Trustee shall not be involved in any manner in the conduct of the meeting; and

(vii). for all unit holder meetings, the Investment Manager shall provide an option to the Unitholders to attend the meeting through video conferencing or other audio visual means and the option of remote electronic voting in the manner as may be specified by SEBI.

2. For the Trust:

(i). an annual meeting of all Unitholders shall be held not less than once a year within 120 days from the end of each financial year and the time between two meetings shall not exceed 15 months;

(ii). with respect to the annual meeting of Unitholders,

(a). any information that is required to be disclosed to the Unitholders and any issue that, in the ordinary course of business, may require approval of the Unitholders may be taken up in the meeting including:

- latest annual accounts and performance of the Trust;
- approval of auditors and fee of such auditors, as may be required;
- latest valuation reports;
- appointment of valuer, as may be required; and
- any other issue;

(b). for any issue taken up in such meetings which require approval from the Unitholders, votes cast in favour of the resolution shall be more than fifty per cent of the total votes cast for the resolution unless otherwise specified under the InvIT Regulations.

3. In case of the following, approval from the Unitholders shall be required where the votes cast in favour of the resolution shall be more than the fifty per cent of the total votes cast for the resolution:

(i). any approval from the Unitholders required in terms of Regulation 18 (*Investment conditions and dividend policy)*, Regulation 19 (*Related Party Transactions*) and Regulation 21 *(Valuation of assets*) of the InvIT Regulations;

(ii). any transaction, other than any borrowing, the value of which is equal to or greater than 25.00% (twenty five per cent) of the InvIT Assets;

(iii). any borrowings, in terms of the limits specified under Regulation 20(3)(a) of the InvIT Regulations;

(iv). any issue of units after initial public offer by an InvIT, in whatever form, other than any issue of units which may be considered by SEBI under Regulation 22(5);

(v). increasing period for compliance with investment conditions to one year in accordance with Regulation 18(5)(c) of the InvIT Regulations;

(vi). any issue, in the ordinary course of business, which in the opinion of the Sponsors or the Trustee or the Investment Manager, is material and requires approval of the Unitholders, if any; and

(vii). any issue for which SEBI or the stock exchanges requires approval;

4. In case of the following, approval from the Unitholders shall be required where the votes cast in favour of the resolution shall be at least sixty per cent of total votes cast for the resolution:

(i). any change in Investment Manager including removal of the Investment Manager or change in control of the Investment Manager;

(ii). any material change in investment strategy or any change in the management fees of the Trust;

(iii). the Trustee and Investment Manager proposing to seek delisting of units of the Trust under clause (e) of sub-regulation (1) of regulation 17 of the InvIT Regulations;

(iv). any issue, not in the ordinary course of business, which in the opinion of the Sponsor or Investment Manager or Trustee requires approval of the Unitholders;

(v). any issue for which SEBI or the designated stock exchanges require approval;

(vi). any issue taken up on request of the Unitholders including:

(a). removal of the Investment Manager and appointment of another investment manager to the Trust;

(b). removal of the Statutory Auditor and appointment of another auditor to the Trust;

(c). removal of the Valuer and appointment of another valuer to the Trust;

(d). any issue which the Unitholders have sufficient reason to believe that is detrimental to the interest of the Unitholders;

(e). change in the Trustee, if Unitholders have sufficient reason to believe that acts of the Trustee are detrimental to the interest of Unitholders;

(f). delisting of the Trust, if the Unitholders have sufficient reason to believe that such delisting would act in the interest of the Unitholders;

(g). introduction of unit based employee benefit scheme after an initial offer;

(h). unit based employee benefit scheme proposed at the time of initial offer;

(i). acquisition of units by the employee benefit trust as specified in regulation 17I(3) of the InvIT Regulations;

(j). issuance of units to the employee benefit trust as specified in regulation 17I(1)(a) of the InvIT Regulations;

(k). transfer of units to the employee benefit trust as specified in regulation 17I(1) (b) and 17I(1)(c) of the InvIT Regulations;

(l). a separate resolution that shall be required for grant of options to identified employees, during any one year, equal to or exceeding one per cent of the unit capital of the Trust at the time of grant of options; and

(m). variation of the terms of the unit based employee benefit scheme including repricing of the options

With respect to the rights of the Unitholders under clause 4(vi) above:

(i). not less than 25.00% of the Unitholders by value, other than any party related to the transactions and its associates, shall apply, in writing, to the Trustee for the purpose;

(ii). on receipt of such application, the Trustee shall require, with the Investment Manager to place the issue for voting in the manner as specified in the InvIT Regulations;

(iii). with respect to clause 4(iv)(e) above, not less than 60% of the Unitholders by value shall apply, in writing, to the Trustee for the purpose.

5. In case of the following, approval from 75.00% of Unitholders by value excluding the value of units held by parties related to the transaction shall be:

(i) In case of any borrowing by the Trust in terms of limit specified in clause (b) of sub-regulation 3 of Regulation 20 of the InvIT Regulations;

(ii) In case that any person other than the Sponsor, its related parties and its associates, acquires Units of the Trust, which taken together with Units held by such person and by persons acting in concert with such persons in the Trust, exceeds 25.00% of the value of the outstanding Units of the Trust (value of Units held by parties related to the transaction shall not be considered for this specific purpose);

Provided that if the required approval is not received, the person acquiring the Units shall provide an exit option to the dissenting Unitholders to the extent and in the manner as may be specified by SEBI;

(iii) Prior to any change in Sponsor or inducted sponsor or change in control of Sponsor or inducted sponsor or conversion to Self-Sponsored Investment Manager (value of Units held by parties related to the transaction shall not be considered for this specific purpose).

If the required approval is not received:

a. in case of change in Sponsor or inducted sponsor, the proposed inducted sponsor shall provide the dissenting Unitholders an option to exit by buying their units in the manner specified by SEBI;

b. in case of change in control of the Sponsor or inducted sponsor, the said Sponsor or inducted sponsor shall provide the dissenting Unitholders an option to exit by buying their Units in the manner specified by SEBI; and

c. in case of conversion to Self-Sponsored Investment Manager, the Investment Manager shall provide the dissenting unit holders an option to exit by buying their units in the manner specified by the Board

***Information rights***
The Investment Manager, on behalf of the Trust, shall also submit such information to Stock Exchange and the Unitholders, on a periodical basis as may be required under the InvIT Regulations and the Listing Agreement to be entered into with Stock Exchange. The Investment Manager (on behalf of the Trust) shall disclose to Stock Exchange, the Unitholders and SEBI, all such information and in such manner as specified under the InvIT Regulations and such other requirements as may be specified by SEBI. The Investment Manager, on behalf of the Trust, shall also provide disclosures or reports specific to the sector or sub-sector in which the Trust has invested or proposes to invest, in the manner as may be specified by SEBI.

***Nomination rights***
Unitholder(s), holding not less than 10% of the total outstanding Units, either individually or collectively, shall be entitled to nominate one director on the board of directors of the Investment Manager in accordance with the InvIT Regulations and Trust Deed, and in the manner specified by SEBI.

***Buyback of Units***
Any buyback of Units shall be in accordance with the Trust Deed and the InvIT Regulations.

***De-listing of Units***
Any delisting of Units shall be in accordance with the Trust Deed and the InvIT Regulations.

## ISSUE STRUCTURE

Initial public offer of up to [●] Units by the Trust for cash at price of ₹ [●] per Unit aggregating up to ₹ 57,000.00 million. This Issue is being made through the Book Building Process. This Issue shall constitute at least 10% of the total outstanding Units on a post-Issue basis.

| Particulars | Institutional Investors(1) | Non-Institutional Investors |
|---|---|---|
| Number of Units available for Allotment/Allocation (2) | Not more than [●] Units | Not less than [●] Units |
| Percentage of Issue Size available for Allotment/Allocation | Not more than 75.00% of the Net Issue(1) | Not less than 25.00% of the Net Issue |
| Basis of Allotment/ Allocation if respective category is oversubscribed | Proportionate | Proportionate |
| Minimum Bid | Such number of Units that the Bid Amount exceeds ₹ [●] and in multiples of [●] Units thereafter | Such number of Units that the Bid Amount exceeds ₹[●] and in multiples of [●] Units thereafter |
| Maximum Bid | Such number of Units (in multiples of [●] Units) not exceeding the size of the Issue, subject to applicable limits | Such number of Units (in multiples of [●] Units) not exceeding the size of the Issue, subject to applicable limits |
| Mode of Allotment | Compulsorily in dematerialised form | Compulsorily in dematerialised form |
| Bid Lot | [●] Units and in multiples of [●] Units thereafter | [●] Units and in multiples of [●] Units thereafter |
| Allotment Lot | [●] Units and in multiples of [●] Units thereafter | [●] Units and in multiples of [●] Units thereafter |
| Trading Lot | [●] Units | [●] Units |
| Who can apply(3) | (i) QIBs; or<br>(ii) family trusts or intermediaries registered with SEBI, with net-worth of more than ₹ 5,000 million, as per their last audited financial statements | Bidders other than Institutional Investors, eligible to apply in this Issue |
| Terms of Payment | Full Bid Amount shall be blocked by the SCSBs in the bank account of the ASBA Bidder that is specified in the Bid cum Application Form.<br><br>In case of case of Anchor Investors, full Bid Amount shall be payable by the Anchor Investors at the time of submission of their Bids (4) | For individual Non-Institutional Investors Bidding with a Bid Amount of up to ₹ 0.50 million or less and Bidding through the UPI Mechanism: Full Bid Amount shall be blocked by the Sponsor Bank in the bank account of the Non-Institutional Investor that is specified in the Bid cum Application Form; Full Bid Amount shall be blocked by the SCSBs in the bank account of the ASBA Bidder that is specified in the Bid cum Application Form |

*(1) The Investment Manager in consultation with the Book Running Lead Managers may allocate up to 60.00% of the Institutional Investor Portion to Anchor Investors on a discretionary basis.*

*(2) Subject to valid Bids being received at or above the Issue Price. This Issue will be made through the Book Building Process wherein not more than 75.00% of the Net Issue will be available for allocation on a proportionate basis to Institutional Investors, provided that the Investment Manager, in consultation with the Book Running Lead Managers may allocate up to 60.00% of the Institutional Investor Portion to Anchor Investors on a discretionary basis.*

*(3) In case of joint Bids, the Bid cum Application Form should contain only the name of the First Bidder whose name should also appear as the first holder of the beneficiary account held in joint names. The signature of only the First Bidder would be required in the Bid cum Application Form and such First Bidder would be deemed to have signed on behalf of the joint holders. Bidders are advised to consult their own advisors with respect to any restrictions or limitations that may be applicable to them, including any restrictions or limitations in relation to their ability to invest in the Units. By making a Bid (including any revision thereof), the Bidder will be deemed to have represented to the Investment Manager, the*

*Trustee, the Book Running Lead Managers and the Syndicate Members that it is eligible to participate in the Issue and be Allotted Units under applicable law.*

*(4) Full Bid Amount shall be payable by the Anchor Investors at the time of submission of the Anchor Investor Application Forms, provided that any difference between the price at which Units are allocated to the Anchor Investors and the Anchor Investor Issue Price, shall be payable by the Anchor Investor Pay-in Date as mentioned in the CAN.*

In case of under-subscription in any investor category, the unsubscribed portion in either the Institutional Investor Portion or the Non-Institutional Investor Portion may be Allotted to Applicants in the other category at the discretion of the Investment Manager, in consultation with the Book Running Lead Managers and the Designated Stock Exchange.

**Indicative Issue Timeline**

| Event | Indicative Date |
|---|---|
| Bid/ Issue Opening Date | [●](1) |
| Bid/ Issue Closing Date | [●](2) |
| Closing Date | On or about [●] |
| Designated Date | On or about [●] |
| Finalisation of the Basis of Allotment | On or about [●] |
| Initiation of refunds | On or about [●] |
| Listing Date | On or about [●] |

*(1) The Investment Manager may, in consultation with the Book Running Lead Managers, consider participation by Anchor Investors in accordance with the InvIT Regulations. The Anchor Investor Bidding Date shall be one Working Day prior to the Bid/ Issue Opening Date.*

*(2) The Investment Manager may in consultation with the Book Running Lead Managers, consider closing the Bid/ Issue Period for QIBs one Working Day prior to the Bid/ Issue Closing Date in accordance with the InvIT Regulations.*

**The above timetable is indicative and does not constitute any obligation or liability on the Trust, the Investment Manager, the Sponsor, the Trustee or the Book Running Lead Managers.**

**While the Investment Manager shall ensure that all steps for the completion of the necessary formalities for the listing and the commencement of trading of the Units on the Stock Exchanges are taken within 6 Working Days of the Bid/ Issue Closing Date, the timetable may change due to various factors, including any extension of the Bid/ Issue Period by the Investment Manager due to any revision(s) of the Price Band or any delay in receiving the final listing and trading approval from the Stock Exchanges. The commencement of trading of the Units will be entirely at the discretion of the Stock Exchanges and in accordance with the applicable laws.**

Except in relation to the Bids received from the Anchor Investors, Bids and any revision in Bids shall be accepted only between 10.00 a.m. and 5.00 p.m. (Indian Standard Time) during the Bid/ Issue Period (except the Bid/ Issue Closing Date) at the Bidding Centres and the Designated Branches mentioned on the Bid cum Application Form. Investors are not allowed to withdraw or lower their Bid (in terms of number of Units or the Bid Amount) at any stage. Bidders can make upward revisions in their Bids, subject to applicable law. It is clarified that Bids not uploaded on the electronic bidding system would be rejected. Due to limitation of the time available for uploading the Bids on the Bid/ Issue Closing Date, Investors are advised to submit their Bids one day prior to the Bid/ Issue Closing Date and, in any case, no later than 1.00 p.m. IST on the Bid/ Issue Closing Date. Any time mentioned in this Draft Offer Document is IST. Investors are cautioned that, in the event a large number of Bids are received on the Bid/ Issue Closing Date, some Bids may not get uploaded due to lack of sufficient time. Such Bids that cannot be uploaded will not be considered for allocation under the Issue. Bids will be accepted only on Business Days i.e. Monday to Friday (excluding any public holiday). None among the Trust, the Investment Manager, the Trustee or any member of the Syndicate is liable for any failure in uploading the Bids due to faults in any software/hardware system or otherwise.

In case of any discrepancy in the data entered in the electronic book *vis-à-vis* the data contained in the physical Bid cum Application Form, for a particular Investor, the details as per the Bid file received from the Stock Exchanges may be taken as the final data for the purpose of Allotment.

The Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to revise the Price Band during the Bid/ Issue Period. In case the Price Band is revised, the Issue Period shall be extended for a minimum period of one Working Day, subject to the total Bid/ Issue Period not exceeding 30 days. The revised Price Band and Issue Period will be widely disseminated by notification to the SCSBs and Stock Exchanges, and also by indicating the change on the websites of the Trust, the Book Running Lead Managers, the Sponsor, the

Investment Manager and the Stock Exchanges and at the terminals of the members of the Syndicate. In accordance with the InvIT Regulations, the Price Band cannot be revised more than two times during the Bid/ Issue Period.

## ISSUE INFORMATION

*Below is a summary, intended to provide a general outline of the procedures for the bidding, application, payment, Allocation and Allotment.*

*Bidders are advised to inform themselves of any restrictions or limitations that may be applicable to them and are required to consult their respective advisers in this regard. Bidders that apply in the Issue will be required to confirm and will be deemed to have represented to the Trustee, the Investment Manager, the Book Running Lead Managers and their respective directors, officers, agents, affiliates and representatives that they are eligible under all applicable laws, rules, regulations, guidelines and approvals to acquire the Units. Bidders are also advised to make their independent investigations submitted in accordance with applicable laws and do not exceed the investment limits or maximum number of Units that can be held by them under applicable law or as specified herein. The Investment Manager, the Trustee, the Book Running Lead Managers, the Syndicate Member(s) and their respective directors, officers, agents, affiliates and representatives accept no responsibility or liability for advising any Bidder on whether such Bidder is eligible to acquire the Units. The Investment Manager, the Trustee, the Book Running Lead Managers and Syndicate Member(s)do not accept any responsibility for the completeness and accuracy of the information stated in this chapter and are not liable for any amendment, modification or change in the applicable law which may occur after the date hereof.*

**Authority for the Issue**

The Trust is making this Issue in accordance with Regulation 14(4) of the InvIT Regulations. The Issue was authorised and approved by the IM Board on January 12, 2026.

The Trust has received the in-principle approval of Stock Exchanges for the listing of the Units pursuant the letters, each dated [●].

The Investment Manager has filed a copy of the Draft Offer Document, and will file a copy of the Offer Document and the Final Offer Document, with SEBI and the Stock Exchanges.

The Units have not been and will not be registered, listed or otherwise qualified in any jurisdiction outside India and may not be offered or sold, and Bids may not be made by persons in any such jurisdiction, except in compliance with the applicable law of such jurisdiction. The Units shall not be offered or sold where such offer or sale would require registration, qualification or listing.

Bidders should note that Allotment to successful Bidders will only be in the dematerialized form. Application forms which do not have the details of the Bidders' demat accounts including DP ID, PAN and Client ID will be treated as incomplete and rejected. Bidders will not have the option of receiving Allotment in physical form. On Allotment, the Units will be traded only on the dematerialized segment of BSE and NSE.

**Issue procedure**

This section applies to all Bidders. All Bidders other than Anchor Investors shall mandatorily participate in the Issue through the ASBA process. Bidders applying in this Issue should carefully read the provisions applicable to them before submitting a Bid through the ASBA process. All Bidders are required to pay the full Bid Amount at the time of Bidding, by way of instructing the relevant SCSB to block the full Bid Amount at the time of Bidding, or in the case of Anchor Investors, by making payment by electronic methods.

By making a Bid (including any revision thereof), the Bidder will be deemed to have represented to the Investment Manager, the Trustee, the Book Running Lead Managers and the Syndicate Member that it is eligible to participate in the Issue and be Allotted Units under applicable law. Bidders are also advised to make their independent investigations and ensure that their Bids are submitted in accordance with applicable laws and do not exceed the investment limits or maximum number of Units that can be held by them under applicable law or as specified herein.

**Book Building Procedure**

This Issue is being made through the Book Building Process, wherein not more than 75.00% of the Net Issue shall be available for allocation to Institutional Investors on a proportionate basis, provided that the Investment Manager may, in consultation with the Book Running Lead Managers, allocate up to 60.00% of the Institutional Investor

Portion to Anchor Investors on a discretionary basis, in accordance with the InvIT Regulations. Further, not less than 25.00% of the Net Issue shall be available for allocation on a proportionate basis to Non-Institutional Investors, subject to valid Bids being received at or above the Issue Price. In case of under-subscription in any category, the unsubscribed portion in any category may be Allotted to Bidders in the other category at the discretion of the Investment Manager in consultation with the Book Running Lead Managers and the Designated Stock Exchange.

**Bidders do not have the right to withdraw or lower their Bid (in terms of number of Units or the Bid Amount) at any stage. Bidders can only make upward revisions in their Bids, subject to applicable law.**

Bidders should note that Allotment to successful Bidders will be only in the dematerialized form. Bid cum Application Forms which do not have the details of the Bidders' depository accounts including DP ID, PAN ID, UPI ID (for Non-Institutional Investors Bidding for a Bid Amount of ₹0.50 million or less using the UPI Mechanism) and Client ID will be treated as incomplete and rejected. Bidders will not have the option of receiving Allotment in physical form. On Allotment, the Units will be traded only on the dematerialized segment of the Stock Exchanges.

**Bid cum Application Form**

Copies of the Bid cum Application Form and the Abridged Offer Document will be available at the offices of the Book Running Lead Managers, the Syndicate Members, if any, the principal place of business of the Trust and the Designated Intermediaries at the Bidding Centres. An electronic copy of the Bid cum Application Form will also be available on the websites of the SCSBs, NSE (www.nseindia.com) and BSE (www.bseindia.com). The Anchor Investor Application Forms will be made available at the principal place of business of the Trust and the registered office of the Investment Manager and the Book Running Lead Managers.

Bidders should use only the specified Bid cum Application Form bearing the stamp of a Designated Intermediary submitted at Bidding Centres (except in case of electronic Bid cum Application Forms), for the purpose of making a Bid in terms of the Offer Document. Bid cum Application Forms not being such specified stamp are liable to be rejected. Before being issued to Bidders, the Bid cum Application Form will be serially numbered. All Bidders other than Anchor Investors shall mandatorily participate in the Issue only through the ASBA process. Anchor Investors are not permitted to participate in the Issue through the ASBA process. All Bidders (other than Anchor Investors) must provide bank account details and authorization to block funds in the relevant space provided in the Bid cum Application Form and Bid cum Application Forms that do not contain such details will be rejected.

UPI Bidders using the UPI Mechanism must provide the UPI ID in the relevant space provided in the ASBA Form. ASBA Forms for such UPI Bidders, that do not contain the UPI ID are liable to be rejected. UPI Bidders using the UPI Mechanism may also apply through the SCSBs and mobile applications using the UPI handles as provided on the website of SEBI. UPI Bidders using the UPI Mechanism may submit the Bid cum Application with SCSBs, Syndicate Member, Registered Stock Brokers, RTAs and Depository Participants along with details of their bank account for blocking of funds. The relevant intermediary is required to the upload the Bid on the Stock Exchange bidding platform and forward the Bid cum application Form to an SCSB for blocking of funds. The Bid cum Application form will contain information about the Bidder and the price and number of Units that the Bidder wishes to Bid for. Bidders will have the option to make a maximum of three Bids in the Bid cum Application Form and such options will not be considered multiple Bids.

On filing of the Final Offer Document with SEBI and the Stock Exchanges, the Bid cum Application Form will be treated as a valid application form for Allotment of the Units. On submission of the completed Bid cum Application Form to a Designated Intermediary or the Book Running Lead Managers (in case of Anchor Investors), the Bidder is deemed to have authorized the Investment Manager to make the necessary changes in the Offer Document as may be required under the InvIT Regulations, and other applicable laws, for filing the Final Offer Document with SEBI and the Stock Exchanges without prior or subsequent notice of such changes to the Bidder.

The prescribed colour of the Bid cum Application Forms for various categories is as follows:

| Category | Colour of Bid cum Application Form including Bid cum Application Form* |
|---|---|
| Resident Indians | [●] |
| Non-Residents including Eligible NRIs and FPIs and multilateral and | [●] |

| Category | Colour of Bid cum Application Form including Bid cum Application Form* |
|---|---|
| bilateral development financial institutions, excluding Anchor Investors | |
| Anchor Investors* | [●] |

* *Bid cum Application Forms for Anchor Investors will be made available at the principal place of business of the Trust and the registered office of the Investment Manager and the Book Running Lead Managers.*

Designated Intermediaries shall submit/deliver the Bid cum Application Forms of Bidders (other than Anchor Investors) to the respective SCSBs where the Bidder has a bank account and shall not submit it to any non-SCSB Bank or Escrow Collection Bank (unless such Escrow Collection Bank is also an SCSB). For UPI Bidders using the UPI Mechanism, the Stock Exchanges shall share the Bid details (including UPI ID) with the Sponsor Bank(s) on a continuous basis to enable the Sponsor Bank(s) to initiate a UPI Mandate Request to such UPI Bidders for blocking of funds. Designated Intermediaries (other than SCSBs) shall not accept any ASBA Form from a UPI Bidder who is not Bidding using the UPI Mechanism.

Stock Exchanges shall validate the electronic bids with the records of the depository for DP ID/Client ID and PAN, on a real time basis through API integration and bring inconsistencies to the notice of the relevant Designated Intermediaries, for rectification and re-submission within the time specified by Stock Exchanges. Stock Exchanges shall allow modification of either DP ID/Client ID or PAN ID (but not both), bank code and location code in the Bid details already uploaded. For UPI Bidders using UPI Mechanism, the Stock Exchanges shall share the Bid details (including UPI ID) with the Sponsor Bank(s) on a continuous basis through API integration to enable the Sponsor Bank(s) to initiate UPI Mandate Request to UPI Bidders for blocking of funds. The Sponsor Bank(s) shall initiate request for blocking of funds through NPCI to UPI Bidders, who shall accept the UPI Mandate Request for blocking of funds on their respective mobile applications associated with UPI ID linked bank account. The Sponsor Bank(s) will undertake a reconciliation of Bid responses received from Stock Exchanges and sent to NPCI and will also ensure that all the responses received from NPCI are sent to the Stock Exchanges platform with detailed error code and description, if any.

**Sponsor Contribution**

Pursuant to the Commitment Letter, the Sponsor has agreed contribute such amount towards subscription of such number of Units which shall be equivalent to at least 15.00% of the total Units of the Trust on a post-Issue basis, to comply with the requirement under Regulations 12(3) and 12(3A) of the InvIT Regulations ("**Sponsor Contribution**"). Upon Sponsor Contribution, the Issue Size will be reduced to the extent of such Sponsor Contribution.

While the Sponsor shall subscribe to the Units prior to the Bid/ Issue Closing Date, such Units shall be allotted to the Sponsor on the date of Allotment.

Subsequently, the Investment Manager (on behalf of the InvIT) may utilize the Sponsor Contribution towards the objects of the Issue specified in the section titled "*Use of Proceeds*" on page 206.

**Who can Bid?**

Each Bidder should check if it is eligible to Bid under applicable law. Furthermore, certain categories of Bidders may not be permitted to Bid in the Issue or hold Units in excess of the limits specified under applicable law. Each Bidder (other than Anchor Investor) is required to Bid for a Minimum Bid Size in the range of ₹10,000 and ₹15,000.

The Unitholders shall be required to be qualified to invest or hold interest in highways projects of NHAI in India under applicable laws, including Foreign Exchange Management Act, 1999, read with rules and regulations thereunder, the foreign direct investment policy of India, as amended, InvIT Regulations. Further, acquisition of control, directly or indirectly, of the board of directors of the Project SPV require prior approval from NHAI from national security and public interest perspective under the respective Concession Agreements entered into by the Project SPV with NHAI.

**The maximum subscription in the Issue from any investor other than the Sponsor, its related parties and its associates shall not exceed 25.00% of the total post-Issue outstanding Units.**

**The Units will be offered and sold only in India and the Units have not been and will not be registered,**

**listed or otherwise qualified in any other jurisdiction outside India and may not be offered or sold, and Bids may not be made by persons in any such jurisdiction, except in compliance with the applicable laws of such jurisdiction.**

The Parties to the Trust, and the Book Running Lead Managers are not liable for any amendment or modification or change to applicable laws, which may occur after the date of this Draft Offer Document. Investors are advised to make independent investigations and satisfy themselves that they are eligible to apply. Bidders are advised to ensure that any single application from them does not exceed the investment limits or maximum number of Units that can be held by them under applicable law. The Trustee, the Valuer and the employees of the Valuer who were involved in the valuation of the InvIT Assets are not permitted to Bid in this Issue.

**Participation by Associates and affiliates of the Book Running Lead Managers and Syndicate Members**

The Book Running Lead Managers and the Syndicate Members are not entitled to Bid for Units in this Issue in any manner. However, associates and affiliates of the Book Running Lead Managers and Syndicate Members may Bid for Units in the Issue, either in the Institutional Investor Portion (excluding the Anchor Investor Portion) or in the Non- Institutional Investor Portion, where allocation will be on a proportionate basis, either on their own account or on behalf of their clients. All categories of investors, including associates or affiliates of the Book Running Lead Managers shall be treated equally for the purpose of allocation to be made on a proportionate basis. Neither the Book Running Lead Managers nor any associate of the Book Running Lead Managers, other than mutual funds sponsored by entities which are associate of the Book Running Lead Managers or insurance companies promoted by entities which are associate of the Book Running Lead Managers or pension funds of entities which are associate of the Book Running Lead Managers or Alternate Investment Funds (AIFs) sponsored by the entities which are associate of the Book Running Lead Managers or FPIs other than Category III sponsored by the entities which are associate of the Book Running Lead Managers can apply in the Issue under the Anchor Investor Portion.

**Bids by Anchor Investors**

The Investment Manager, in consultation with the Book Running Lead Managers may allocate up to 60% of the Institutional Investor Portion on a discretionary basis to the Anchor Investors, in accordance with the InvIT Regulations. The Institutional Investor Portion will be reduced in proportion to the allocation under the Anchor Investor Portion. Only Institutional Investors are eligible to invest in the Anchor Investor Portion. In the event of under-subscription in the Anchor Investor Portion, the balance Units will be added to the Institutional Investor Portion. In accordance with the InvIT Regulations, the key terms for participation in the Anchor Investor Portion are provided below.

(i) Anchor Investors are not permitted to participate in the Issue through the ASBA process. Anchor Investor Application Forms will be made available for the Anchor Investor Portion at the principal place of business of the Trust, and the registered offices of the Investment Manager and the Book Running Lead Managers.

(ii) A Bid by an Anchor Investor must be for a minimum of such number of Units so that the Bid Amount is at least ₹100.00 million. A Bid cannot be submitted for more than 60% of the Institutional Investor Portion.

(iii) The Bidding for Anchor Investors will open one Working Day before the Bid/ Issue Opening Date and Allocation to Anchor Investors will be completed on the same day.

(iv) The Investment Manager, in consultation with the Book Running Lead Managers, will finalize allocation to the Anchor Investors on a discretionary basis, provided that the minimum number of Allottees in the Anchor Investor Portion will not be less than:

- two, where the allocation under Anchor Investor Portion is up to ₹2,500 million; and
- five, where the allocation under Anchor Investor Portion is over ₹2,500 million.

(v) Allocation to Anchor Investors will be completed on the Anchor Investor Bidding Date. The number of Units allocated to Anchor Investors and the Anchor Investor Allocation Price, will be made available on the websites of the Stock Exchanges, the Sponsor, the Investment Manager and the Book Running Lead Managers, prior to the Bid/Issue Opening Date.

(vi) If the Issue Price is higher than the Anchor Investor Allocation Price, the additional amount being the difference between the Issue Price and the Anchor Investor Allocation Price will be payable by the Anchor Investors by the Anchor Investor Pay-in Date. If the Issue Price is lower than the Anchor Investor Allocation Price, Allotment to successful Anchor Investors will be at the higher price, i.e., the Anchor Investor Allocation Price and the amount in excess of the Issue Price paid by Anchor Investors will not be refunded to them.

(vii) The Units Allotted in the Anchor Investor Portion will be locked in for a period of 30 days from the date of Allotment.

(viii) Bids made by Institutional Investors Bidding under both the Anchor Investor Portion and the Institutional Investor Portion will not be considered as multiple Bids.

(ix) The Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to reject any Bid received from Anchor Investors without assigning any reasons.

(x) Neither the Book Running Lead Managers nor any their associates, other than mutual funds sponsored by entities which are associates of the Book Running Lead Managers, insurance companies promoted by entities which are associates of the Book Running Lead Managers or pension funds of entities which are associates of the Book Running Lead Managers or AIFs sponsored by the entities which are associates of the Book Running Lead Managers or FPIs other than category III sponsored by the entities which are associates of the Book Running Lead Managers, shall apply under the Anchor Investors Portion.

All Non-Resident Investors including Eligible NRIs and FPIs should note that refunds, dividends and other distributions, if any, will be payable in Indian Rupees only and net of bank charges and / or commission. **There is no reservation for NRIs, FPIs and FVCIs and all Bidders will be treated on the same basis with other categories for the purpose of allocation.**

Anchor Investors cannot withdraw or lower the size of their Bids (in terms of number of Units or the Bid Amount) at any stage after submission of the Bid.

**Bids by SEBI registered VCFs and AIFs**

The SEBI VCF Regulations prescribe, amongst others, the investment restrictions on VCFs registered with SEBI under the said regulations. Further, the SEBI AIF Regulations prescribe, amongst others, the investment restrictions on AIFs. Further, VCFs which have not re-registered as an AIF under the SEBI AIF Regulations shall continue to be regulated by the SEBI VCF Regulations until the existing fund or scheme managed by the fund is wound up and such funds shall not launch any new scheme after the notification of the SEBI AIF Regulations. Additionally, VCFs and AIFs are subject to certain investment restrictions, including with respect to the percentage of investible funds held in each investee entity. Under the SEBI AIF Regulations, Category I and II AIFs are permitted to invest not more than 25.00% of the investable funds in one "investee company" (which includes the Trust) and Category III AIFs are permitted to invest not more than 10% of the investable funds in one "Investee company". Allotments made to VCFs and AIFs in the Issue are subject to the rules and regulations that are applicable to each of them respectively.

**Bids by Banking Companies**

Bids may be made by banks as permitted by the RBI and are subject to conditions specified in the Prudential Guidelines – Banks' investment in units of REITs and InvITs dated April 18, 2017. In case of Bids made by banking companies registered with the RBI, certified copies of (i) the certificate of registration issued by the RBI, and (ii) the approval of such banking company's investment committee are required to be attached to the Application Form. Banks may participate in public issuances by Trusts within the overall ceiling of 20% of their net worth permitted for direct investments in shares, convertible bonds/ debentures, units of equity-oriented mutual funds and exposures to VCFs, subject to the following conditions: (i) Banks should put in place a board approved policy on exposures to the Trust which lays down an internal limit on such investments within the overall exposure limits in respect of the real estate sector and infrastructure sector; (ii) Banks shall not invest more than 10% of the unit capital of the Trust; (iii) Banks should ensure adherence to the prudential guidelines issued by RBI from time to time on Equity investments by Banks, Classification and Valuation of Investment Portfolio, Basel III Capital requirements for Commercial Real Estate Exposures and Large Exposure Framework, as applicable. Failing this, the Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to reject the Bid.

**Bids by LLPs**

In case of Bids made by limited liability partnerships registered under the Limited Liability Partnership Act, 2008, a certified copy of certificate of registration issued under the Limited Liability Partnership Act, 2008, must be attached to the Bid cum Application Form. Failing this, the Bid(s) may be rejected.

**Bids by Provident Funds/Pension Funds**

On March 2, 2015, the Ministry of Finance issued a notification allowing investments by non-government provident funds, superannuation funds and gratuity funds up to 5% in infrastructure investment trusts, as specified. On May 29, 2015, the Ministry of Labour and Employment issued a notification allowing investments by provident funds up to 5% in infrastructure investment trusts, as specified. The Pension Fund Regulatory and Development Authority issued circulars dated June 3, 2015 and September 2, 2015, respectively, allowing investments by national pension funds up to 5% in infrastructure investment trusts, as specified. However, such investments by provident funds and pension funds will be subject to, amongst others, the sponsor having a minimum of AA or equivalent rating from at least two credit rating agencies registered with SEBI. In case of Bids made by provident funds/ pension funds (registered with the Pension Fund Regulatory and Development Authority established under section 3(1) of the Pension Fund Regulatory and Development Authority Act, 2013), subject to applicable laws, with minimum corpus of ₹ 250 million, a certified copy of certificate from a chartered accountant certifying the corpus of the provident fund/pension fund must be attached to the Bid cum Application Form. Failing this, the Bid(s) may be rejected.

**Bids by NPS Schemes**

The Pension Fund Regulatory and Development Authority issued circulars dated June 3, 2015 and September 2, 2015, respectively, allowing investments by national pension fund schemes ("**NPS Schemes**") up to 5% in infrastructure investment trusts, as specified. However, in accordance with the circular dated May 4, 2017 (effective from May 8, 2017), as amended by the circular dated May 8, 2018, issued by PFRDA, such investments by NPS Schemes will be subject to, amongst others, such securities having a minimum of AA or equivalent rating in the applicable rating scale from at least two credit rating agencies registered with SEBI. In case of Bids made by NPS Schemes, subject to applicable laws, with minimum corpus of ₹250 million, a certified copy of certificate from a chartered accountant certifying the corpus of the provident fund/pension fund must be attached to the Bid cum Application Form. Failing this, the Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to reject the Bid.

**Bids by Insurance Companies**

Bids may be made by insurance companies as permitted by the Insurance Regulatory and Development Authority of India in terms of the Master Circular – Investments, 2016 and the circular issued by the IRDAI titled 'Investment in Units of Real Estate Investment Trusts (REIT) & Infrastructure Investment Trusts (InvIT)' and dated March 14, 2017. In case of Bids made by insurance companies registered with the IRDAI, a certified copy of the certificate of registration issued by IRDAI must be attached to the Bid cum Application Form. Failing this, the Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to reject the Bid. An insurer can invest not more than 3% of respective fund size of the insurer or not more than 5% of the units issued by a single InvIT, whichever is lower.

**Bids by Mutual Funds**

Bids may be made by mutual funds under all its schemes, existing and future, subject to the investment conditions and other restrictions prescribed under the Securities and Exchange Board of India (Mutual Funds) Regulations, 1996 (including, the circular on mutual funds dated July 27, 2024 and any other circulars, notifications and guidelines issued thereunder). A mutual fund may invest in the Units subject to the following:

(a) No mutual fund under all its schemes shall own more than 10% of the units; and

(b) A mutual fund scheme shall not invest:

    (i) more than 10% of its net asset value in the units issued by InvIT; and

    (ii) More than 5% of its net asset value in the units,

provided that the limits mentioned in sub-clauses (i) and (ii) above shall not be applicable for investments in case of index fund or sector or industry specific scheme pertaining to Trusts.

**Bids by Eligible NRIs**

In accordance with Schedule IV of the FEMA Rules, Eligible NRIs, including companies, trusts and partnership firms incorporated outside India which are owned and controlled by NRIs, are permitted to purchase units issued by an 'investment vehicle' without any limit, either on the stock exchange or outside it. The FEMA Rules define an 'investment vehicle' to mean an entity registered and regulated under the regulations framed by the SEBI or any other authority designated for that purpose, including an InvIT governed by the SEBI.

Investments by Eligible NRIs in the Units shall be on a non-repatriation basis and shall be deemed to be domestic investment at par with investments made by residents of India.

Only Bids accompanied by payment in freely convertible foreign exchange will be considered for Allotment. Eligible NRIs bidding on a repatriation basis by using the Bid cum Application Form for Non-Residents should authorize their respective SCSB (if they are Bidding directly through the SCSB) or confirm or accept the UPI Mandate Request (in case of Bidding through the UPI Mechanism) to block their Non-Resident External ("**NRE**") accounts, or Foreign Currency Non-Resident ("**FCNR**") accounts, and eligible NRIs bidding on a non-repatriation basis by using the Bid cum Application Form for residents should authorize their respective SCSB (if they are Bidding directly through SCSB) or confirm or accept the UPI Mandate Request (in case of Bidding through the UPI Mechanism) to block their Non-Resident Ordinary ("**NRO**") accounts for the full Bid Amount, at the time of the submission of the Bid cum Application Form.

**Bids by FPIs**

Foreign Portfolio Investors (other than individuals, corporate bodies and family offices) are permitted to participate in the Issue subject to compliance with Schedule VIII of FEMA Rules. In case of Bids by FPIs the payment should be paid as inward remittance from abroad through banking channels or out of funds held in NRE, SNRR or FCNR(B) account maintained in accordance with the Foreign Exchange Management (Deposit) Regulations, 2016, along with documentary evidence in support of the remittance. In case of Bids made by FPIs, a verified true copy of the certificate of registration issued by the designated depository participant under the SEBI FPI Regulations is required to be attached along with the Application Form, failing which the Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to reject the Bid.

It is hereby clarified that bids received from FPIs bearing the same PAN shall be treated as multiple Bids and are liable to be rejected, except for Bids from FPIs that utilize the multiple investment manager structure in accordance with the operational guidelines for FPIs and designated Depository Participants issued to facilitate implementation of SEBI FPI Regulations (such structure referred to as "**MIM Structure**"), provided such Bids have been made with different beneficiary account numbers, Client IDs and DP IDs. Accordingly, it should be noted that multiple Bids received from FPIs, who do not utilize the MIM Structure, and bear the same PAN, are liable to be rejected. In order to ensure valid Bids, FPIs making multiple Bids using the same PAN, and with different beneficiary account numbers, Client IDs and DP IDs, are required to provide a confirmation in the Bid cum Application Forms that the relevant FPIs making multiple Bids utilize the MIM Structure. In the absence of such confirmation from the relevant FPIs, such multiple Bids shall be rejected.

Please note that, the maximum Bid by any Bidder including a QIB Bidder should not exceed the investment limits prescribed for them under applicable laws. Further, multiple Bids by a FPI Bidder utilising the MIM Structure shall be aggregated for determining the permissible maximum Bid. Further, please note that, Bid cum Application Forms are liable to be rejected in the event that the Bid in the Bid cum Application Form "exceeds the Issue size and/or investment limit or maximum number of Units that can be held under applicable laws or regulations or maximum amount permissible under applicable laws or regulations, or under the terms of the Offer Document".

**Bids by SCSBs**

SCSBs participating in the Issue are required to comply with the terms of the SEBI circulars dated September 13, 2012 (CIR/CFD/DIL/12/2012) and January 2, 2013 (CIR/CFD/DIL/1/2013). Such SCSBs are required to ensure that for making applications on their own account using ASBA, they should have a separate account in their own name with any other SCSBs. Further, such account shall be used solely for the purpose of making application in public issues and clear demarcated funds should be available in such account for such applications.

**Bids under Power of Attorney**

In case of Bids made pursuant to a power of attorney by Institutional Investors or bodies corporate, registered societies, etc. a certified copy of the power of attorney or the relevant resolution or authority, as the case may be,

along with a certified copy of the memorandum of association and articles of association and/or bye laws must be submitted along with the Bid cum Application Form. Failing this, the Bid is liable to be rejected.

The Investment Manager, in consultation with the Book Running Lead Managers, in its absolute discretion, reserves the right to relax the above condition of simultaneous lodging of the power of attorney along with the Bid cum Application Form.

Allotments, if any, made to FVCIs in the Issue are subject to the respective rules and regulations that are applicable to each of them.

The above information is given for the benefit of the Bidders. Each Bidder should check whether it is eligible to apply under applicable law and ensure that any prospective Allotment to it in the Issue is in compliance with the investment restrictions under applicable law. Certain categories of Bidders may not be allowed to Bid in the Issue or hold Units exceeding certain limits specified under applicable law.

The Parties to the Trust, and the Book Running Lead Managers are not liable for any amendments or modification or changes in applicable laws or regulations, which may occur after the date of this Draft Offer Document. Bidders are advised to make their independent investigations and ensure that any single Bid from them does not exceed the applicable investment limits or maximum number of the Units that can be held by them under applicable law or regulation or as specified herein.

**Maximum and Minimum Bid Size**

Each Bidder (other than an Anchor Investor) is required to Bid for a Minimum Bid Size in the range of ₹10,000 and ₹15,000 and in multiples of [●] thereafter.

(i) No Bidder shall Bid for such number of Units which exceeds the Issue Size.

(ii) The maximum Bid by any Bidder including Institutional Investors should not exceed the investment limits prescribed for them under the applicable law.

The price and quantity options submitted by a Bidder in the Bid cum Application Form may be treated as optional bids from the Bidder and may not be cumulated. After determination of the Issue Price, the highest number of Units Bid for by a Bidder at or above the Issue Price may be considered for Allotment and the rest of the Bid(s), irrespective of the Bid Amount may automatically become invalid.

**Information for the Bidders:**

(i) The Offer Document will be filed by the Investment Manager with SEBI and the Stock Exchanges at least five Working Days before the Bid/Issue Opening Date.

(ii) After the filing of the Offer Document with SEBI and the Stock Exchanges, the Book Running Lead Managers/ Investment Manager shall make a Pre-Issue advertisement on the websites of the Trust, the Sponsor, the Investment Manager and the Stock Exchanges. Further, such Pre-Issue advertisement will also be published in all editions of [●] (a widely circulated English national daily newspaper) and in all editions of [●] (a widely circulated Hindi national daily newspaper, Hindi also being the regional language of Delhi, where the registered office of the Investment Manager is located).

(iii) Any Bidder (who is eligible to invest in the Units) may obtain the Bid cum Application Form or both from the principal place of business of the Trust, the registered office of the Investment Manager or from any Designated Intermediary at the Bidding Centres. Anchor Investor Application Forms will be made available at the principal place of business of the Trust and the registered office of the Investment Manager and the Book Running Lead Managers.

(iv) The Bid/Issue Period shall be for a minimum of three Working Days. In case the Price Band is revised, the Bid/Issue Period shall be extended for a minimum period of one Working Day, subject to the total Bid/Issue Period not exceeding 30 Working Days. In case of *force majeure*, banking strike or similar circumstances, the Bid/Issue Period may be extended for a minimum period of three Working Days, subject to the total Bid/Issue Period not exceeding 30 Working Days. The revised Price Band and Bid/Issue Period will be widely disseminated by notification to the SCSBs and Stock Exchanges, and also by indicating the change on the websites of the Trust, the Book Running Lead Managers, the Sponsor, the Investment Manager and the Stock Exchanges and at the terminals of the members of the

Syndicate. In accordance with the InvIT Regulations, the Price Band cannot be revised more than two times.

(v) The Designated Intermediaries will accept Bids during the Bid/Issue Period in accordance with the terms of the Offer Document, provided that the Book Running Lead Managers will accept the Bids from Anchor Investors only on the Anchor Investor Bidding Date.

(vi) The Bids should be submitted on the prescribed Bid cum Application Form only. Bids by ASBA Bidders will be accepted by the Designated Intermediaries at the Bidding Centres in accordance with applicable law and any circulars issued by SEBI in this regard. Bid cum Application Forms should bear the stamp of a Designated Intermediary. Bid cum Application Forms (except electronic Bid cum Application Forms) which do not bear the stamp of a Designated Intermediary are liable to be rejected.

(vii) The Bidding Centres will acknowledge the receipt of the Bid cum Application Forms by stamping and returning to the Bidder the Acknowledgement Slip. This Acknowledgement Slip will serve as the duplicate of the Bid cum Application Form for the records of the Bidder.

**Instructions for completing the Bid Cum Application Form**

Bidders may note that Bid cum Application Forms not filled completely or correctly as per instructions provided in the Offer Document and the Bid cum Application Form are liable to be rejected.

Bids must be:

(i) made only in the prescribed Bid cum Application Form or Revision Form, as applicable;

(ii) completed in full, in BLOCK LETTERS in ENGLISH and in accordance with the instructions contained here and in the Bid cum Application Form. Incomplete Bid cum Application Forms or Revision Forms are liable to be rejected. Bidders must provide details of valid and active DP ID, Client ID and PAN clearly and without error. Invalid accounts, suspended accounts or where such account is classified as invalid or suspended shall not be considered for Allotment. Bidders should note that the members of the Syndicate and/or the SCSBs (as appropriate) will not be liable for errors in data entry due to incomplete or illegible Bid cum Application Forms; and

(iii) in a single name or in joint names (not more than three, and in the same order as their Depository Participant details).

Bidders should also note that:

(i) information provided by Bidders will be uploaded in the online system by the Designated Intermediaries and the electronic data will be used to make allocation/Allotment. Bidders are advised to ensure that the details are correct and legible;

(ii) only the First Bidder is required to sign the Bid cum Application Form. Bidders should ensure that thumb impressions and signatures other than in the languages specified in the Eighth Schedule to the Constitution of India are attested by a Magistrate or a Notary Public or a Special Executive Magistrate under official seal; and

(iii) if the ASBA Account holder is different from the ASBA Bidder, the Bid cum Application Form should also be signed by the account holder as provided in the Bid cum Application Form.

**General Instructions**

**Dos:**

(i) Check if you are eligible to apply as per the terms of the Offer Document and under applicable laws and approvals;

(ii) Ensure that you have Bid within the Price Band;

(iii) Read all the instructions carefully and complete the relevant Bid cum Application Form;

(iv) Ensure that the details about the PAN, DP ID, Client ID and UPI ID (where applicable) are correct, and the Beneficiary Account is activated, as Allotment will be in dematerialized form only;

(v) Ensure that the Bids are submitted at the Bidding Centres only on the Bid cum Application Forms bearing the stamp of a Designated Intermediary;

(vi) Ensure that if you are the Bidder you have mentioned the correct ASBA Account number (for all Bidders other than UPI Bidders using the UPI Mechanism) in the Bid cum Application Form (with a maximum length of 45 characters) and such ASBA account belongs to you and no one else. Further, UPI Bidders using the UPI Mechanism must also mention their UPI ID and shall use only his/her own bank account which is linked to his/her UPI ID;

(vii) UPI Bidders using the UPI Mechanism through the SCSBs and mobile applications shall ensure that the name of the bank appears in the list of SCSBs which are live on UPI, as displayed on the SEBI website. UPI Bidders shall ensure that the name of the app and the UPI handle which is used for making the application appears on the list displayed on the SEBI website. An application made using incorrect UPI handle or using a bank account of an SCSB or bank which is not mentioned on the SEBI website is liable to be rejected;

(viii) Ensure that your Bid is submitted at a Bidding Centre of a Designated Intermediary. Further, ensure that the Bid cum Application Form is signed by the ASBA Account holder if the Bidder is not the ASBA Account holder;

(ix) Ensure that the full Bid Amount is paid for Bids submitted by Anchor Investors and funds equivalent to the Bid Amount are blocked by the SCSBs in case of Bids submitted through the ASBA process;

(x) Ensure that you have correctly checked the authorization/undertaking box in the Bid cum Application Form, or have otherwise provided an authorization to the SCSB via the electronic mode for the Designated Branch to block funds in the ASBA Account equivalent to the Bid Amount mentioned in the Bid cum Application Form at the time of submission of the Bid;

(xi) Instruct your respective banks to not release the funds other than in relation to the Issue, blocked in the ASBA Accounts;

(xii) Ensure that you request for and have received an Acknowledgement Slip for all your Bid options;

(xiii) Ensure that you receive an Acknowledgement Slip from the Designated Intermediary for the submission of your Bid cum Application Form;

(xiv) Submit revised Bids at the same Bidding Centre of a Designated Intermediary, through which the original Bid was placed and obtain a revised Acknowledgement Slip, as the case may be;

(xv) Except for Bids (i) on behalf of the Central or State Governments and the officials appointed by the courts, who, in terms of the SEBI circular dated June 30, 2008, may be exempt from specifying their PAN for transacting in the securities market, and (ii) Bids by persons resident in Sikkim, who, in terms of a SEBI circular dated July 20, 2006, may be exempted from specifying their PAN for transacting in the securities market, all Bidders should mention their PAN allotted under the IT Act. The exemption for the Central or the State Government and officials appointed by the courts and for Bidders residing in Sikkim is subject to (a) the Demographic Details received from the respective depositories confirming the exemption granted to the beneficiary owner by a suitable description in the PAN field and the beneficiary account remaining in "active status"; and (b) in the case of residents of Sikkim, the address as per the Demographic Details evidencing the same. All other applications in which the PAN is not mentioned will be rejected;

(xvi) In cases where the PAN is same, such Bids will be treated as multiple applications. Bidders should not submit the GIR number instead of the PAN as the Bid is liable to be rejected on this ground. With effect from August 16, 2010, the demat accounts of Bidders for whom PAN details have not been verified shall be "suspended for credit" and no credit of Units pursuant to the Issue will be made into the accounts of such Bidders;

(xvii) Ensure that your PAN is linked with Aadhaar and are in compliance with Central Board of Direct Taxes notification dated February 13, 2020 and press release dated June 25, 2021;

(xviii) Ensure that the Demographic Details (as defined below) are updated, true and correct in all respects;

(xix) In case of joint Bids, the Bid cum Application Form should contain the name of only the First Bidder whose name should also appear as the first holder of the beneficiary account held in joint names. Ensure that the signature of the First Bidder in case of joint Bids, is included in the Bid cum Application Forms;

(xx) Ensure that the name(s) given in the Bid cum Application Form is exactly the same as the name(s) in which the beneficiary account is held with the Depository Participant;

(xxi) Ensure that the category and the Bidder status is indicated;

(xxii) Bidders (except UPI Bidders using the UPI Mechanism) should instruct their respective banks to release the funds blocked in the ASBA Account under the ASBA process. UPI Bidders using the UPI Mechanism, should ensure that they approve the UPI Mandate Request generated by the Sponsor Bank(s) to authorise blocking of funds equivalent to Bid Amount and subsequent debit of funds in case of Allotment, in a timely manner;

(xxiii) Ensure that in case of Bids under power of attorney or by limited companies, corporates, trusts, etc., relevant documents are submitted;

(xxiv) UPI Bidders using the UPI Mechanism shall ensure that details of the Bid are reviewed and verified by opening the attachment in the UPI Mandate Request and then proceed to authorize the UPI Mandate Request using his/her UPI PIN. Upon the authorization of the mandate using his/her UPI PIN, the UPI Bidders may be deemed to have verified the attachment containing the application details of the UPI Bidders using the UPI Mechanism in the UPI Mandate Request and have agreed to block the entire Bid Amount and authorized the Sponsor Bank(s) to offer a request to block the Bid Amount mentioned in the ASBA Form in his/her ASBA Account;

(xxv) UPI Bidders using the UPI Mechanism should mention valid UPI ID of only the Bidder (in case of single account) and of the first Bidder (in case of joint account) in the ASBA Form;

(xxvi) UPI Bidders using the UPI Mechanism, who have revised their Bids subsequent to making the initial Bid, should also approve the revised UPI Mandate Request generated by the Sponsor Bank(s) to authorise blocking of funds equivalent to the revised Bid Amount in their account and subsequent debit of funds in case of allotment in a timely manner;

(xxvii) Ensure that Bids submitted by any person outside India are in compliance with applicable foreign and Indian laws; and

(xxviii) With respect to Bids by SCSBs, ensure that you have a separate account in your own name with any other SCSB having clear demarcated funds for applying under the ASBA process and that such separate account (with any other SCSB) is used as the ASBA Account with respect to your Bid.

The Bid cum Application Form is liable to be rejected if the above instructions, as applicable, are not complied with.

**Don'ts*:***

(i) Do not Bid for lower than the Minimum Bid Size;

(ii) Do not submit a Bid without payment of the entire Bid Amount;

(iii) Do not Bid less than the Floor Price or higher than the Cap Price;

(iv) Do not Bid on another Bid cum Application Form after you have submitted a Bid;

(v) Do not pay the Bid Amount in cash, by money order or postal order and in relation to ABSA Bidders, in any other

(vi) mode other than blocked amounts in the ASBA Accounts;

(vii) Do not send Bid cum Application Forms by post and only submit the same to a Designated Intermediary at a Bidding Centre;

(viii) Do not fill up the Bid cum Application Form such that the Units Bid for exceed, the Issue Size or investment limits, or the maximum number of Units that can be held or the maximum amount permissible under applicable laws or under the terms of the Offer Document;

(ix) Do not submit more than five Bid cum Application Forms per ASBA Account;

(x) Do not submit the GIR number instead of the PAN as the Bid is liable to be rejected on this ground;

(xi) Do not submit incorrect details of DP ID, Client ID and PAN or give details for which demat account is suspended or for which such details cannot be verified by the Registrar;

(xii) Do not instruct your respective banks to release the funds blocked in the ASBA Account under the ASBA process, other than in relation to the Issue;

(xiii) Do not submit the Bid for an amount more than funds available in your ASBA Account;

(xiv) Do not submit Bids on plain paper or on incomplete or illegible Bid cum Application Forms or on Bid cum Application Forms in a colour prescribed for another category of Bidders;

(xv) Do not submit a Bid in case you are not eligible to acquire Units under applicable law or your relevant constitutional documents or otherwise;

(xvi) Do not Bid if you are not competent to contract under the Indian Contract Act, 1872 (other than minors having valid depository accounts as per demographic details provided by the Depository);

(xvii) Anchor Investors should not Bid through the ASBA process; and

(xviii) Do not withdraw your Bid or lower the size of your Bid (in terms of quantity of the Units or the Bid Amount) at any stage.

**Method and Process of Bidding**

(i) The Investment Manager and the Book Running Lead Managers will declare the Bid/Issue Opening Date and Bid/Issue Closing Date at the time of filing the Offer Document with SEBI and the Stock Exchanges.

(ii) Post filing of the Offer Document with SEBI and the Stock Exchanges, the Book Running Lead Managers/ Investment Manager shall make a Pre-Issue advertisement on the websites of the Sponsor, the Investment Manager and the Stock Exchanges. Further, such Pre-Issue will also be published in all editions of [●] (a widely circulated English national daily newspaper) and in all editions of [●] (a widely circulated Hindi national daily newspaper, Hindi also being the regional language of Delhi, where the registered office of the Investment Manager is located).

(iii) The Price Band will be decided by the Investment Manager in consultation with the Book Running Lead Managers and shall be disclosed at least two Working Days prior to the Bid/Issue Opening Date on the websites of the Trust, the Sponsor, the Investment Managers and the Stock Exchanges and in the newspapers where the Pre-Issue advertisement was published.

(iv) The Book Running Lead Managers will accept Bids from the Anchor Investors on the Anchor Investor Bidding Date, *i.e.* one Working Day prior to the Bid/Issue Opening Date. Bidders, except Anchor Investors, who are interested in subscribing to the Units should approach any of the Designated Intermediaries at Bidding Centres to register their Bids during the Bid/Issue Period. The Designated Intermediaries will accept Bids from all Bidders and will have the right to vet the Bids during the Bid/Issue Period in accordance with the terms of the Syndicate Agreement and/or the Offer Document. The Bid/Issue Period will be for at least three Working Days and not exceeding 30 Working Days (*including* the days for which the Issue is open in case of revision in Price Band). If the Price Band is revised, the revised Price Band and the Bid/Issue Period will disclosed on the websites of the Trust, the Sponsor, the Investment Managers, Book Running Lead Managers, Syndicate Member, SCSBs and the Stock Exchanges and in the newspapers where the Pre-Issue advertisement will be published.

(v) UPI Bidders may submit the Bid cum Application form with the Designated Intermediaries and use their bank account linked with UPI ID for the purpose of blocking funds. The Designated Intermediaries shall upload the Bid on the Stock Exchange bidding platform and the application amount would be blocked through the UPI Mechanism.

(vi) Each Bid cum Application Form will give the Bidder the choice to Bid for up to three optional prices within the Price Band and specify the demand (*i.e.*, the number of Units Bid for) in each option. The price and demand options submitted by the Bidder in the Bid cum Application Form will be treated as optional demands from the Bidder and will not be cumulated. In case of an upward revision in the Price

Band, in the event the Bidder does not either revise the Bid or make additional payment and the Issue Price is higher than the Cap Price prior to revision, the number of Units Bid for will be adjusted downwards for the purpose of Allotment, such that no additional payment will be required from the Bidder and the Bidder shall be deemed to have approved such revised Bid. The Bidder can Bid at any price within the Price Band. The Bidder has to Bid for the desired number of Units at a specific price.

(vii) No Bidder shall either withdraw or lower its Bid at any stage.

(viii) After determination of the Issue Price, the maximum number of Units Bid for by a Bidder at or above the Issue Price will be considered for allocation/Allotment and the rest of the Bid(s), irrespective of the Bid Amount, will become automatically invalid.

(ix) Except in relation to the Bids received from the Anchor Investors, the Designated Intermediary will enter each Bid option into the electronic bidding system as a separate Bid and generate an Acknowledgement Slip, and SCSBs will generate an Acknowledgement Slip for each price and demand option and will, on demand, give the same to the Bidder. Therefore, a Bidder can receive up to three Acknowledgement Slips for each Bid cum Application Form.

(x) On receipt of the Bid cum Application Form (whether in physical or electronic mode) the Designated Branch of the SCSB will verify if sufficient funds equal to the Bid Amount are available in the ASBA Account, as mentioned in the ASBA Bid cum Application Form, prior to uploading such Bids with the Stock Exchanges. If sufficient funds are not available in the ASBA Account, the Designated Branch of the SCSB will reject such Bids and will not upload such Bids with the Stock Exchanges. If sufficient funds are available in the ASBA Account, the SCSB will block an amount equivalent to the Bid Amount mentioned in the ASBA Bid cum Application Form and will enter each Bid option into the electronic bidding system as a separate Bid.

(xi) Along with the Bid cum Application Form, all Bidders will make payment in the manner described under the paragraph titled "*– Payment Instructions*" in this section.

**Bidders' Depository Account and Bank Account Details**

Bidders should note that on the basis of Bidders' PAN, DP ID and Client ID provided by them in the Bid cum Application Form and as entered into the electronic bidding system of the Stock Exchanges by the Members of the Syndicate and the SCSBs as the case may be, the Registrar will obtain from the Depository the demographic details including the Bidders' address, occupation and bank account details (including the nine-digit Magnetic Ink Character Recognition ("**MICR**") code as appearing on a cheque leaf (the "**Demographic Details**")), from the Depository. The Demographic Details will be used for giving refunds and allocation advice (including through physical refund warrants, direct credit, NACH, NEFT and RTGS) to Anchor Investors. Hence, Bidders are advised to immediately update their bank account details, PAN and Demographic Details as appearing on the records of the Depository Participant and ensure that they are true and correct. Accordingly, Bidders should carefully fill in their depository account details in the Bid cum Application Form.

By signing the Bid cum Application Form, the Bidder is deemed to have authorized the Depositories to provide to the Registrar, on request, the required Demographic Details as available in their records.

Bids with no corresponding record available with the Depositories matching the three parameters (namely, PAN (in case of joint Bids, PAN of First Bidder), the DP ID and Client ID), are liable to be rejected.

**Payment mechanism for ASBA Bidders**

The ASBA Bidders will specify the ASBA Account in the Bid cum Application Form and the SCSB will block an amount equivalent to the Bid Amount in the ASBA Account so specified. The SCSB will keep the Bid Amount in the relevant ASBA Account blocked until finalization of the Basis of Allotment and consequent transfer of the Bid Amount to the Public Issue Account, or until withdrawal/failure of the Issue or until rejection of the Bid, as the case may be.

In the event of rejection of the Bid cum Application Form, failure of the Issue or for unsuccessful Bid cum Application Forms, the Registrar will give instructions to the SCSB to unblock the Bid Amount in the relevant ASBA Account and the SCSBs will unblock the Bid Amount on receipt of such instruction.

**Payment Instructions**

The Investment Manager and the Syndicate will open Escrow Accounts with one or more Escrow Collection Bank(s) in whose favour Anchor Investors will offer payment instruments. The payment instruments for payment into the Escrow Accounts should be drawn in favour of:

In case of resident Anchor Investors: "[●]"

In case of non-resident Anchor Investors: "[●]"

The Bidders should note that the escrow mechanism is not prescribed by SEBI and has been established as an arrangement amongst the Investment Manager, the Trustee (acting on behalf of the Trust), the Syndicate, the Escrow Collection Banks and the Registrar to facilitate collections from Bidders.

The Escrow Collection Banks will act in terms of the Offer Document and the Escrow Agreement. The monies deposited in the Escrow Accounts will be held for the benefit of the Anchor Investors until the Designated Date. On the Designated Date, the Escrow Collection Banks will transfer the funds from the Escrow Accounts as per the terms of the Escrow Agreement into the Public Issue Account with the Escrow Collection Banks and the Refund Account. The Escrow Collection Banks will not exercise any lien whatsoever over the monies deposited therein and will hold the monies therein in trust for the Anchor Investors. The balance amount after transfer to the Public Issue Account will be transferred to the Refund Account. Payments of refund to the Anchor Investors will be made from the Refund Account as per the terms of the Escrow Agreement and the Offer Document. Payments should be made by Anchor Investors only in electronic mode through direct credit/NEFT/NACH/RTGS. Cheques or bank drafts, cash, money orders or postal orders will not be accepted and is liable to be rejected.

**Payment Mechanism for UPI Bidders**

In relation to UPI Bidders, the Sponsor Bank shall initiate a UPI Mandate Request on the UPI Bidder, i.e., request the UPI Bidder to authorize blocking of funds equivalent to application amount and subsequent debit of funds in case of Allotment. The request raised by the Sponsor Bank would be electronically received by the UPI Bidder as an SMS / intimation on their mobile number / mobile application associated with the UPI ID linked bank account. The UPI Bidder shall be able to view the details of the request in their UPI application and authorize the transaction. In UPI, the SCSBs / UPI applications eligible for public issues shall send SMS alerts to UPI Bidders for all ASBA applications and may also provide invoices in the inbox as an additional feature to verify the UPI mandate details. After reviewing the details properly, the UPI Bidder shall be required to authorize the mandate, which shall be a one-time mandate for each application in the Issue. The payment accompanied with any upward revision of the Bid shall be adjusted against the payment made at the time of the original Bid or previously revised Bid.

**Other Instructions**

**Joint Bids in case of Individuals**

Bids may be made in single or joint names (not more than three). In the case of joint Bids, all payments will be made out in favour of the Bidder whose name appears first in the Bid cum Application Form or Revision Form. All communications will be addressed to the First Bidder and will be dispatched to his or her address as per the Demographic Details received from the Depository.

**Multiple Bids**

A Bidder should submit only one Bid for the total number of the Units required. Two or more Bids will be deemed to be multiple Bids if the sole or First Bidder is the same. However, a Bidder can revise the Bid through the Revision Form.

In case of a mutual fund, subject to investment conditions as per applicable law, a separate Bid can be made in respect of each scheme of the mutual fund registered with SEBI and such Bids in respect of more than one scheme of the mutual fund will not be treated as multiple Bids, provided that the Bids clearly indicate the scheme concerned for which the Bid is made. Bids by QIBs under the Anchor Investor Portion and Institutional Investor Portion (excluding Anchor Investor Portion) will not be considered as multiple Bids.

After Bidding on an ASBA Form either in physical or electronic mode, where such ASBA Bid is submitted to the Designated Intermediaries and uploaded with the Stock Exchanges, an ASBA Bidder cannot Bid, either in physical or electronic mode, on another ASBA Form or a non-ASBA Form. Submission of a second Bid cum Application Form, whether an ASBA Form, to either the same or to another Designated Intermediary, or a non-ASBA Form, will be treated as multiple Bids and will be liable to be rejected either before entering the Bid into the electronic bidding system, or at any point of time prior to the allocation or Allotment of Units in this Issue. However, the ASBA Bidder can revise the Bid through the Revision Form.

More than one ASBA Bidder may Bid for Units using the same ASBA Account, provided that the SCSBs will

not accept a total of more than five Bid cum Application Forms from ASBA Bidders with respect to any single ASBA Account.

The Investment Manager, in consultation with the Book Running Lead Managers, reserves the right to reject, in its absolute discretion, all or any multiple Bids in any or all categories. A check will be carried out for the same PAN. In cases where the PAN is same, such Bids will be treated as multiple applications.

**Right to Reject Bids**

In case of QIBs Bidding in the Institutional Investor Portion and Anchor Investors, the members of the Syndicate may reject Bids provided that such rejection will be made at the time of acceptance of the Bid and the reasons for rejecting such Bids will be provided to such Bidder in writing. The Members of the Syndicate may also reject Bids if all information required is not provided and the Bid cum Application Form is incomplete in any respect.

**Grounds for Technical Rejections**

Bidders are advised that incomplete or illegible Bid cum Application Forms will be rejected by Designated Intermediaries. Bidders are advised to note that Bids are liable to be rejected on technical grounds including the following:

(i) The amounts mentioned in the Bid cum Application Form does not tally with the amount payable for the value of the Units Bid for;

(ii) Application on plain paper;

(iii) In case of partnership firms, Units may be registered in the names of the individual partners and no firm as such will be entitled to apply;

(iv) Bid by persons not competent to contract under the Indian Contract Act, 1872, as amended, including minors;

(v) PAN not stated (except for Bids on behalf of the Central or State Government, residents of Sikkim and the officials appointed by the courts);

(vi) GIR number furnished instead of PAN;

(vii) Where PAN details are not verified by demat accounts, i.e. where the demat account is "suspended for credit";

(viii) Bids for lower value of Units than specified for that category of Bidders;

(ix) Bids at a price less than the Floor Price;

(x) Bids at a price over the Cap Price;

(xi) Submission of more than five Bid cum Application Forms per ASBA Account;

(xii) Bids for a value of less than ₹0.01 million and Bids by UPI Bidders for a value of more than ₹ 0.50 million;

(xiii) Individual Non-Institutional Investors Bidding for a Bid Amount of ₹ 0.50 million or less using the UPI Mechanism have not provided the valid UPI ID in the relevant space provided in the Bid cum Application Form;

(xiv) Bidder category not specified;

(xv) Multiple Bids as described in this Draft Offer Document;

(xvi) In case of Bids under power of attorney or by limited companies, corporate, trust etc., relevant documents not being submitted;

(xvii) Bids accompanied by cash, stock invest, money order or postal order;

(xviii) Signature of sole and/or the First Bidder (in case of joint Bids) is missing;

(xix) The Bid cum Application form not being signed by the ASBA Account holder, if the ASBA Account holder is different from the Bidder;

(xx) Bid cum Application Form does not have the stamp of a Designated Intermediary (except for electronic ASBA Bids), as the case may be;

(xxi) Bid cum Application Forms are not submitted within the time prescribed as per the Bid cum Application Form, Bid/Issue Opening Date advertisement and this Draft Offer Document and as per the instructions in this Draft Offer Document and the Bid cum Application Forms;

(xxii) Inadequate funds in the ASBA Account to block the Bid Amount specified in the Bid cum Application Form at the time of blocking such Bid Amount in the ASBA Account;

(xxiii) Authorisation for blocking funds in the ASBA Account not provided;

(xxiv) Bids for amounts greater than the maximum permissible amounts prescribed by applicable law;

(xxv) Bids by OCBs;

(xxvi) Bank account details for the refund not given, as applicable;

(xxvii) Bids by persons in United States;

(xxviii) Bids by persons prohibited from buying, selling or dealing in the Units directly or indirectly by SEBI or any other regulatory authority;

(xxix) Bids by persons who are not eligible to acquire Units under applicable law or their relevant constitutional documents or otherwise; and

(xxx) Bids that do not comply with the securities laws of their respective jurisdictions.

**IN CASE THE DP ID, CLIENT ID, PAN AND UPI ID (WHERE APPLICABLE) MENTIONED IN THE BID CUM APPLICATION FORM AND ENTERED INTO THE ELECTRONIC BIDDING SYSTEM OF THE STOCK EXCHANGES BY THE LEAD MANAGER/THE DESIGNATED INTERMEDIARIES DO NOT MATCH WITH THE DP ID, CLIENT ID, UPI ID (FOR INDIVIDUAL NON-INSTITUTIONAL INVESTORS BIDDING FOR A BID AMOUNT OF ₹0.50 MILLION OR LESS USING THE UPI MECHANISM) AND PAN AVAILABLE IN THE RECORDS WITH THE DEPOSITORIES THE APPLICATION IS LIABLE TO BE REJECTED.**

**Electronic Registration of Bids**

(i) The Designated Intermediaries will register the Bids received, except Bids received from Anchor Bidders, using the online facilities of the Stock Exchanges. Details of Bids in the Anchor Investor Portion will not be registered on the online facilities of the Stock Exchanges. The Book Running Lead Managers, the Investment Manager and the Registrar are not responsible for any acts, mistakes or errors or omission and commissions in relation to (i) the Bids accepted by Designated Intermediaries, (ii) the Bids uploaded by Designated Intermediaries, (iii) the Bids accepted but not uploaded by the Designated Intermediaries or (iv) Bids accepted and uploaded without blocking funds in the ASBA Accounts. It will be presumed that for the Bids uploaded by the SCSBs, the Bid Amount has been blocked in the relevant ASBA Account.

(ii) The Stock Exchanges will offer a screen-based facility for registering such Bids for the Issue. This facility will be available on the terminals of the Designated Intermediaries during the Bid/Issue Period. The Designated Intermediaries can also set up facilities for offline electronic registration of Bids subject to the condition that it will upload the offline data file into the on-line facilities for book building on a regular basis.

(iii) On the Bid/Issue Closing Date, the Designated Intermediaries will upload the Bids until such time as may be permitted by the Stock Exchanges. This information will be available with the Book Running Lead Managers on a regular basis. In order to ensure that the data uploaded is accurate, the Syndicate may be permitted one Working Day after the Bid/Issue Closing Date to amend some of the data fields (currently DP ID, Client ID and PAN) entered by them in the electronic bidding system, after which the Registrar will proceed with the Allotment of the Units. Bidders are cautioned that a high inflow of Bids is typically experienced on the last Working Day of the Bidding, which may lead to some Bids received on the last Working Day not being uploaded due to lack of sufficient uploading time. Such Bids that

could not uploaded will not be considered for allocation. Bids will only be accepted on Working Days (excluding any public holiday).

(iv) Based on the aggregate demand and price for Bids registered on the electronic facilities of the Stock Exchanges a graphical representation of consolidated demand and price will be made available at the Bidding Centres and on the websites of each of the Stock Exchanges during the Bid/Issue Period.

(v) At the time of registering each Bid, the Designated Intermediaries will enter the following details of the Bidder in the electronic system:

- Name of the infrastructure investment trust;
- Bid cum Application Form number;
- Bidder Category – QIB, Eligible NRI, FPI, etc.;
- PAN of the first applicant;
- DP ID;
- UPI ID (for UPI Bidders);
- Client ID;
- Number of Units Bid for; and
- Price option.

(vi) A system generated Acknowledgement Slip will be given to the Bidder (only on demand) as a proof of the registration of each of the Bidding options. It is the Bidders' responsibility to obtain the Acknowledgement Slip from Designated Intermediaries. The registration of the Bid by Designated Intermediaries does not guarantee that the Units will be allocated/Allotted. Such Acknowledgement Slip will be non-negotiable and by itself will not create any obligation of any kind.

(vii) In relation to Bids by UPI Bidders, once the Bid details are entered on the Stock Exchange platform, the Stock Exchange shall validate the PAN and demat account combination details of the Bidder with the Depository. The Depository shall validate the PAN and demat account details on a near real time basis and send responses to the Stock Exchanges which would be shared by the Stock Exchanges with the Designated Intermediaries through its platforms for corrections, if any. Once Bid details are uploaded on the platforms of the Stock Exchanges, the Stock Exchanges shall send an SMS to the UPI Bidder on their mobile number associated with demat account regarding submission of their Bid cum Application Form at the end of the day during the Bidding period. For the last day of Bidding, the SMS may be sent the next Working Day.

(viii) The permission given by the Stock Exchanges to use their network and software of the online IPO system should not in any way be deemed or construed to mean that the compliance with various statutory and other requirements by the Investment Manager and/or the Book Running Lead Managers are cleared or approved by the Stock Exchanges; nor does it in any manner warrant, certify or endorse the correctness or completeness of any of the compliance with the statutory and other requirements nor does it take any responsibility for the financial or other soundness of the Trust, the management of the Investment Manager or the Trustee or any project of the Trust nor does it in any manner warrant, certify or endorse the correctness or completeness of any of the contents of the Draft Offer Document; nor does it warrant that the Units will be listed or will continue to be listed on the Stock Exchanges.

**Build-up of the book and revision of Bids**

(i) Bids received from various Bidders through the Designated Intermediaries will be electronically uploaded to the Stock Exchanges mainframe on a regular basis.

(ii) The book gets built up at various price levels. This information will be available with the Book Running Lead Managers at the end of the Bid/Issue Period.

(iii) During the Bid/Issue Period, any Bidder who has registered his or her interest in the Units at a particular price level is free to revise the Bid upwards within the Price Band using the printed Revision Form, which is a part of the Bid cum Application Form.

(iv) Upward revisions can be made in both the desired number of Units and the Bid Amount by using the Revision Form. Apart from mentioning the revised options in the Revision Form, the Bidder must also mention the details of all the options in his or her Bid cum Application Form or its previous Revision Form. For example, if a Bidder has Bid for three options in the Bid cum Application Form and such Bidder is changing only one of the options in the Revision Form, he must still fill the details of the other two options that are not being revised, in the Revision Form. The Members of the Syndicate and the Designated Branches will not accept incomplete or inaccurate Revision Forms.

(v) The Bidder can make this upward revision any number of times during the Bid/Issue Period. However, for any revision(s) in the Bid, the Bidders will have to use the services of the same Designated Intermediary through which such Bidder had placed the original Bid. Bidders are advised to retain copies of the blank Revision Form and the revised Bid must be made only in such Revision Form or copies thereof.

(vi) If revision of the Bids results in an incremental amount, the relevant SCSB will block the additional Bid Amount. The Registrar will reconcile the Bid data and consider the revised Bid data for preparing the Basis of Allotment.

(vii) When a Bidder revises his or her Bid, he or she will surrender the earlier Acknowledgement Slip and will, on demand, receive a revised Acknowledgement Slip from the Designated Intermediary. It is the responsibility of the Bidder to request for and obtain the revised Acknowledgement Slip, which will act as proof of his or her having revised the previous Bid.

**Price Discovery and Allocation**

(i) Based on the Bids received and demand generated at various price levels, the Investment Manager, in consultation with the Book Running Lead Managers, will finalize the Issue Price and the Anchor Investor Issue Price.

(ii) Allocation to Anchor Investors will be at the discretion of the Investment Manager in consultation with the Book Running Lead Managers, subject to compliance with the InvIT Regulations, and other applicable laws. In the event of under-subscription in the Anchor Investor Portion, the balance Units will be added to the Institutional Investor Portion. The number of Units allocated to Anchor Investors and the Anchor Investor Allocation Price, will be made available in public domain by the Book Running Lead Managers before the Bid/Issue Opening Date.

(iii) In case of under-subscription in any category, the unsubscribed portion in either the Institutional Investor category or the Non-Institutional Investor Portion may be allotted to applicants in the other categories.

(iv) Allocation to Non-Residents, including Eligible NRIs and FPIs will be subject to applicable law.

(v) The Investment Manager in consultation with the Book Running Lead Managers reserves the right to withdraw the Issue any time after the Bid/Issue Opening Date but before the Allotment, without assigning any reasons whatsoever.

(vi) No Bidders can withdraw or lower their Bids at any time.

**Advertisement regarding Issue Price**

The Investment Manager will offer an advertisement after the filing of the Final Offer Document with SEBI and the Stock Exchanges. This advertisement will indicate the Issue Price.

**Issuance of Allotment Advice**

(i) Upon approval of the Basis of Allotment by the Designated Stock Exchange, the Registrar shall send to the Syndicate a list of the Bidders who have been Allotted Units in the Issue.

(ii) The Registrar will then dispatch an Allotment Advice to the Bidders who have been Allotted Units in the Issue. The dispatch of an Allotment Advice shall be deemed a valid, binding and irrevocable contract for the Bidder.

(iii) The issuance of Allotment Advice is subject to "Notice to Anchor Investors: Allotment Reconciliation and Confirmation of Allocation Note" below.

**Notice to Anchor Investors: Allotment Reconciliation and Confirmation of Allocation Note ("CAN")**

(i) A physical book will be prepared by the Registrar on the basis of the Bid cum Application Forms received from Anchor Investors. Based on the physical book and at the discretion of the Investment Manager in consultation with the Book Running Lead Managers, selected Anchor Investors will be sent a CAN or, if required, the revised CAN.

(ii) ***In the event that the Issue Price is higher than the Anchor Investor Allocation Price:*** Anchor Investors will be sent a revised CAN within one day of the Pricing Date indicating the number of Units allocated to such Anchor Investor and the pay-in date for payment of the balance amount. Anchor Investors are then required to pay any additional amounts, being the difference between the Issue Price and the Anchor Investor Allocation Price, as indicated in the revised CAN within the pay-in date referred to in the revised CAN. Thereafter, the Allotment Advice will be issued to such Anchor Investors.

(iii) ***In the event the Issue Price is lower than the Anchor Investor Allocation Price*****:** Anchor Investors who have been Allotted Units will directly receive Allotment Advice and will not receive a refund for the difference between the Issue Price and the Anchor Investor Allocation Price.

**Designated Date and Allotment**

On the Designated Date, the Registrar to the Issue shall instruct the SCSBs to transfer funds represented by allocation of Units from ASBA Accounts into Public Issue Account. The balance amount after transfer to the Public Issue Account shall be unblocked by the relevant SCSB. Whilst the Investment Manager shall ensure all steps for the completion of the necessary formalities for the listing and the commencement of trading of the Units on the Stock Exchanges are completed within 6 Working Days of the Bid/Issue Closing Date, the timetable may be extended due to various factors, such as extension of the Bid/Issue Period by the Investment Manager, revision of the Price Band or any delay in receiving the final listing and trading approval from the Stock Exchanges. The commencement of trading of the Units will be entirely at the discretion of the Stock Exchanges and in accordance with the applicable laws.

Bidders are advised to instruct their Depository Participant to accept the Units that may be Allotted to them in this Issue.

**Basis of Allotment**

**For other than Anchor Investors**

(i) The Allotment to Bidders other than Anchor Investors shall be on proportionate basis within the specified investor categories and the number of Units Allotted shall be rounded off to the nearest integer, subject to minimum Allotment per successful Bidder in case of oversubscription as per the InvIT Regulations.

(ii) In case of under-subscription in any investor category, the unsubscribed portion in either the Institutional Investor category or the Non-Institutional Investor category may be allotted to applicants in the other category.

(iii) The aggregate allocation to Institutional Investors will not be more than 75.00% of the Net Issue.

(iv) The aggregate allocation to Non-Institutional Investors shall not be less than 25.00% of the Net Issue.

(v) The identity of Institutional Investors shall not be made public.

(vi) In relation to UPI Bidders, the RTA shall prepare the basis of Allotment based on information of Bidding and blocking received from the Stock Exchange and after undertaking reconciliation of the Bid data and block confirmations corresponding to the Bids by all Investor category applications (with and without the use if UPI). Upon approval of the basis of Allotment, the RTA shall share the 'debit' file with the Sponsor Bank and SCSBs, as applicable, for credit of funds in the Public Issue Account and unblocking of excess funds in the UPI Bidder's account. The Sponsor Bank, based on the mandate approved by the Bidder at the time of blocking of funds, shall raise the debit / collect request from the Bidder's bank account, whereupon funds will be transferred from investor's account to the public offer account and remaining funds, if any, will be unblocked without any manual intervention by investor or their bank.

**For Anchor Investor Portion**

Allocation to Anchor Investors at the Anchor Investor Allocation Price will be at the discretion of the Investment Manager, in consultation with the Book Running Lead Managers, subject to compliance with the following requirements:

- not more than 60% of the Institutional Investor Portion will be available for allocation to Anchor Investors;

- allocation to Anchor Investors will be on a discretionary basis and subject to a minimum number of two Anchor Investors for allocation up to ₹ 2,500 million and minimum number of five Anchor Investors for allocation more than ₹ 2,500 million. The identity of the Anchor Investors shall be made public.

The number of Units Allocated to Anchor Investors and the Anchor Investor Allocation Price will be made available on the websites of the Stock Exchanges, the Sponsor, the Investment Manager and the Book Running Lead Managers, prior to the Bid/Issue Opening Date.

**Method of Proportionate Basis of Allotment in the Issue**

Except in relation to Anchor Investors, in the event of the Issue being over-subscribed, the Investment Manager and the Book Running Lead Managers will finalize the Basis of Allotment in consultation with the Designated Stock Exchange. The Designated Stock Exchange along with the Book Running Lead Managers and the Registrar will be responsible for ensuring that the Basis of Allotment is finalized in a fair and proper manner.

Except in relation to Anchor Investors, the Allotment will be made on a proportionate basis as explained below, subject to minimum Allotment per successful Bidder in case of oversubscription in accordance with the InvIT Regulations:

(i) Bidders will be categorized according to the number of Units applied for.

(ii) The total number of Units to be allotted to each category as a whole will be arrived at on a proportionate basis, which is the total number of Units applied for in that category (number of Investors in the category multiplied by the number of Units applied for) multiplied by the inverse of the over-subscription ratio.

Number of Units to be allotted to the successful Bidders will be arrived at on a proportionate basis, which is total number of Units applied for by each Bidder in that category multiplied by the inverse of the over-subscription ratio.

**Units in Dematerialized Form with NSDL or CDSL**

As per the InvIT Regulations, the Allotment will be only in dematerialized form.

In this context, two agreements have been signed amongst the Trustee (on behalf of the Trust), the respective Depositories and the Registrar:

(i) Agreement dated January 2, 2026, between NSDL, the Trust (acting through Investment Manager) and the Registrar.

(ii) Agreement dated January 6, 2026, between CDSL, the Trust (acting through Investment Manager) and the Registrar.

(iii) Bids from any Bidder without relevant details of his or her depository account are liable to be rejected.

(iv) A Bidder applying for Units must have at least one valid beneficiary account with either of the Depository Participants of either NSDL or CDSL prior to making the Bid.

(v) Allotment to a successful Bidder will be credited in electronic form directly to the beneficiary account (with the Depository Participant) of the Bidder.

(vi) Bid cum Application Forms or Revision Forms containing incomplete or incorrect details under the heading “Bidder’s Depository Account Details” are liable to be rejected.

(vii) Units in electronic form can be traded only on the stock exchanges having electronic connectivity with NSDL and CDSL. The Stock Exchanges where the Units are proposed to be listed have electronic connectivity with CDSL and NSDL.

**Communications**

All future communications in connection with Bids made in this Issue should be addressed to the Registrar quoting the full name of the sole or First Bidder, Bid cum Application Form number, PAN, Bidders depository account details, number of Units applied for, date of Bid cum Application Form, name and address of the member of the Syndicate where the Bid was submitted and cheque or draft number and issuing bank thereof or with respect to ASBA Bids, the bank account number in which an amount equivalent to the Bid Amount was blocked.

Bidders can contact the Compliance Officer or the Registrar in case of any pre-Issue or post-Issue related problems such as non-receipt of letters of allotment, credit of allotted Units in the respective beneficiary accounts, refund orders etc. In case of ASBA Bids submitted with the Designated Intermediaries, Bidders can contact the relevant Designated Intermediary. We estimate that the average time required by the Registrar to the Issue, the SCSBs or us for redressal of routine investor grievances shall be 10 Working Days from the date of receipt of the complaint. In case of non-routine complaints and complaints where external agencies are involved, we will seek to redress complaints as expeditiously as possible. The Trust shall be registered on SCORES and shall comply with the SEBI circular (CIR/OIAE/1/2014) dated December 18, 2014, (SEBI/HO/OIAE/IGRD/P/CIR/202) dated November 7, 2022, (SEBI/HO/OIAE/IGRD/CIR/P/2023/156) dated September 20, 2023 and (SEBI/HO/OIAE/IGRD/CIR/P/2023/183) dated December 1, 2023 in relation to redressal of investor grievances through SCORES.

**Payment of Refunds**

Payment of refunds will be made in the manner described below.

**Mode of Refunds**

**For Anchor Investors**

For Anchor Investors, any payment of refund will be made electronically through NACH, Direct Credit, RTGS or NEFT. For all other Anchor Investors, including those who have not updated their bank particulars with the MICR code, refund orders through speed or registered post for refund orders of ₹ 1,500 and above. Such refunds will be made by cheques, pay orders or demand drafts drawn on the Refund Bank and payable at par at places where Bids are received. Any bank charges for cashing such cheques, pay orders or demand drafts at other centres will be payable by the respective Investors. Please note that refunds through the abovementioned modes shall be credited only to the bank account from which the Bid Amount was remitted.

**Refunds for ASBA Bidders**

In the case of ASBA Bidders, the Registrar will instruct the relevant SCSBs to unblock the funds in the relevant ASBA Accounts to the extent of the Bid Amounts specified in the Bid cum Application Forms for withdrawn, rejected or unsuccessful or partially successful ASBA Bids, within 6 Working Days of the Bid/Issue Closing Date.

**Refunds for UPI Bidders**

For UPI Bidders, Units would be credited to the Bidder's account after confirmation of receipt of funds in the Public Issue Account. The Bidder will be notified for full / partial Allotment. For partial Allotment, the remaining funds shall be unblocked. For no Allotment, the UPI mandate would be revoked and application amount would be unblocked for the Bidder. The Registrar shall ensure refund of application amount or excess application amount in the bank account of the Bidder as stated in its demat account.

**Disposal of Applications and Application Moneys**

With respect to Bidders other than ASBA Bidders, the Investment Manager will ensure dispatch of Allotment Advice, refund orders (except for Anchor Investors who receive refunds through electronic transfer of funds) and give benefit to the beneficiary account with Depository Participants and submit the documents pertaining to the Allotment to the Stock Exchanges after the Allotment.

In case of Anchor Investors who receive refunds through NACH, NEFT, direct credit or RTGS, the refund instructions will be given to the clearing system within 6 Working Days from the Bid/Issue Closing Date. A

suitable communication will be sent to the Anchor Investors receiving refunds through this mode within 6 Working Days from the Bid/Issue Closing Date, giving details of the bank where refunds will be credited along with amount and expected date of electronic credit of refund.

**Refund Orders or instructions to the SCSBs**

With respect to Anchor Investors, the Investment Manager will ensure dispatch of Allotment Advice and refund orders (except for Anchor Investors who receive refunds through electronic transfer of funds), give benefit to the beneficiary account with the Depository Participants and submit documents pertaining to the Allotment to the Stock Exchanges after the Allotment.

In the case of ASBA Bidders, the Registrar will instruct the relevant SCSBs to unblock the funds in the relevant ASBA Accounts to the extent of the Bid Amounts specified in the Bid cum Application Forms for withdrawn, rejected or unsuccessful or partially successful ASBA Bids, within 6 Working Days of the Bid Closing Date.

**Interest in case of delay in dispatch of Allotment Letters or Refund Orders/instruction to SCSB by the Registrar**

Allotment, including the credit of Allotted Units to the beneficiary accounts of the Depository Participants, will be made not later than 6 Working Days of the Bid/Issue Closing Date. If Allotment letters/refund orders have not been dispatched to the Bidders or if, in a case where the refund or portion thereof is made in electronic manner through direct credit, NEFT, RTGS or NACH, or unblocking of ASBA Accounts or the refund instructions have not been issued to the clearing system in the disclosed manner and/or demat credits are not made to Bidders within 6 Working Days from the Bid/ Issue Closing Date, the Investment Manager will be liable to pay interest at 15% per annum, as prescribed under the InvIT Regulations and other applicable law.

The Trust, and the Investment Manager shall not have recourse to the Issue Proceeds until the final approval for listing and trading of the Units from all the Stock Exchanges where listing is sought has been received.

**Withdrawal of the Issue**

The Investment Manager in consultation with the Trustee and the Book Running Lead Managers, reserves the right not to proceed with the Issue at any time after the Bid/Issue Opening Date but before Allotment. If the Investment Manager, in consultation with the Book Running Lead Managers, withdraw the Issue, they will offer a public notice within two days or such other time as may be prescribed by SEBI in this regard, providing reasons for not proceeding with the Issue. The Book Running Lead Managers, through the Registrar, will notify the SCSBs to unblock the ASBA Accounts within one Working Day or such other time as may be prescribed by SEBI, from the day of receipt of such notification. The notice of withdrawal will be made available on the websites of the Stock Exchanges, the Trust, the Sponsor, the Investment Manager and will also be issued in the same newspapers where the Pre-Issue advertisements have appeared.

If the Investment Manager withdraws the Issue after the Bid/Issue Closing Date and thereafter determine that they will proceed with a further public offering of Units, they will file a fresh draft offer document with SEBI or the Stock Exchanges, as the case may be.

Notwithstanding the foregoing, the Issue is also subject to obtaining (i) the final listing and trading approvals of the Stock Exchanges, which the Investment Manager will apply for only after Allotment; and (ii) the final approval of the Final Offer Document after it is filed with SEBI and the Stock Exchanges.

In the event the Trust does not receive listing permission from the Stock Exchanges or in the event of withdrawal of the observation letter issued by SEBI, the Units shall not be eligible for listing and the Trust shall be liable to refund the subscription monies, if any, to the respective Bidders immediately, along with interest at the rate of 15.00% per annum, from the date of Allotment.

**Minimum Subscription and Minimum Allotment**

In case the Trust does not receive (i) the minimum subscription of at least 90% of the Issue; or (ii) subscription for at least 10% of the total outstanding Units by public Unitholders, on a post-Issue basis or in accordance with InvIT Regulation; or (iii) if the number of prospective Allottees (other than the Sponsor, its related parties and Associates) is less than 20, the entire subscription money shall be refunded.

**Undertakings of Investment Manager**

The Investment Manager hereby undertakes on behalf of the Trust that at any given time, there shall be only one denomination for the Units and that it shall comply with such disclosure and accounting norms specified by the SEBI from time to time.

The Investment Manager further undertakes that no person connected with this Issue, including a person connected with the distribution of this Issue, shall offer any incentive, whether direct or indirect, in any manner, whether in cash or kind or services or otherwise to any person for making an application for allotment of Units, except for any fees or commission for services rendered in relation to this Issue.

## TAXATION

## STATEMENT OF POSSIBLE TAX BENEFITS AVAILABLE TO THE RAAJMARG INFRA INVESTMENT TRUST AND ITS UNITHOLDERS UNDER THE APPLICABLE LAWS IN INDIA

January 14, 2026

To
**Raajmarg Infra Investment Trust**
G-5 & 6, Sector – 10,
Dwarka,
New Delhi 110 075

**Raajmarg Infra Investment Managers Private Limited**
G-5 & 6, Sector – 10 Dwarka
New Delhi 110 075

**IDBI Trusteeship Services Limited**
1009, 10th Floor,
Ansal Bhawan, KG Marg, New Delhi – 110 001

**Sub: Statement of possible tax benefits available to Raajmarg Infra Investment Trust and its Unitholders**

Dear Sirs,

We refer to the proposed initial offer public offer of units of Raajmarg Infra Investment Trust ("**Trust**"). With reference to the captioned subject, given below is a statement and the Annexure herewith, of the applicable sections of the Income-tax Act, 1961, as amended ("**Income Tax Act**") relating to possible tax benefits available to the Trust and its Unitholders. These benefits are typically dependent on Trust or its unitholders fulfilling the conditions prescribed under the relevant provisions of the Income Tax Act.

The benefits discussed in the enclosed Annexure are not exhaustive but illustrative. The information contained in the Annexure is only intended to provide general information to the investors and hence is neither designed nor intended to be a substitute for professional tax advice. In view of the individual tax consequences and the changing tax laws, it is advisable to consult a tax consultant with respect to the specific tax implications arising out of the participation in the issue.

Our confirmation is based on the information, explanations and representations obtained from the Investment Manager and on the basis of our understanding of the business activities and operations of the Trust.

We do not express an opinion or provide any assurance as to whether:
- Trust or its Unitholders will continue to obtain these benefits in future.
- The conditions prescribed for availing the benefits, where applicable have been/would be met
- with. The revenue authorities/courts will concur with the views expressed herein.

**Limitations**

Our views expressed in the statement and as enclosed in the Annexure are based on the facts and assumptions indicated above. No assurance is given that the revenue authorities/ courts will concur with the views expressed herein. Our views are based on the existing provisions of law and its interpretation, which are subject to change from time to time. We do not assume responsibility to update the views consequent to such changes.

We have considered the provisions of the Income-tax Act, 1961 as amended by the Finance Act, 2025, to the extent notified and applicable as on the date of this statement. Any amendments proposed but not yet notified, or effective for future assessment years, have not been considered. We have not considered the impact of the proposed Direct Tax Code 2025; as the said law is still under legislative process.

We hereby give our consent to include this statement and the Annexure attached herewith, regarding possible tax benefits available to the Trust and to its Unitholders in the draft offer document, offer document and final offer document in connection with the initial public offer of units of the Trust which is proposed to be filed with

Securities and Exchange Board of India, relevant stock exchanges and any regulatory authority, as may be required under applicable law.

The Annexure has been prepared solely in connection with the initial public offer of units of the Trust under the prescribed regulations.

Reliance on the Annexure is on the express understanding that we do not assume responsibility towards the investors who may or may not invest in the initial public offer of units of the Trust relying on the Annexure.

For A.R. & Co.,
Chartered
Accountants
FRN – 002744C

CA. Mohd. Azam Ansari
Partner
MRN – 511623
UDIN: 26511623TJBWUY3953
Date: January 14, 2026
Place: New Delhi

**ANNEXURE TO STATEMENT OF POSSIBLE TAX BENEFITS AVAILABLE TO RAAJMARG INFRA INVESTMENT TRUST AND ITS UNITHOLDERS UNDER THE APPLICABLE LAWS IN INDIA**

*The information provided below sets out the possible tax benefits available to the Unitholders in a summary manner only and is not a complete analysis or listing of all potential tax consequences of purchase, ownership and disposal of equity shares or units, under the tax laws presently in force in India. It is not exhaustive or comprehensive analysis and is not intended to be a substitute for professional tax advice.*

The Income-tax Act, 1961 as amended ("**Act**") has set-out a special regime for taxation of income arising to the Trust and its unitholders under Chapter XII FA of the Act.

We have summarised below relevant income-tax provisions as applicable to the Trust and its unitholders, under the Act. The income tax provisions listed below are available to the Trust and its unitholders subject to compliance with the applicable provisions and/or the conditions laid out in the Act and the regulations as prescribed under the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, made under the Securities and Exchange Board of India Act, 1992 (15 of 1992) ('InvIT Regulations').

**Tax provisions applicable to the Trust**

1. Definition of business trust under the Act

A 'business trust' is defined under section 2(13A) of the Act to mean a trust registered as an infrastructure investment trust (InvIT) under the SEBI InvIT Regulations or a real estate investment trust (REIT) under the SEBI REIT Regulations.

2. Taxability of the Trust

2.1.1. Income received from the Special Purpose Vehicle(s) ('SPVs')

***a. Interest***

Interest received or receivable by the Trust from the Project SPV (being domestic companies) shall be exempt from tax, subject to satisfaction of conditions given in section 10(23FC) of the Act.

In this regard, please note that as per the explanation to section 10(23FC) of the Act, the expression "special purpose vehicle" means an Indian company in which the business trust holds controlling interest and any specific percentage of shareholding or interest, as may be required by the regulations under which such trust is granted registration.

As per provisions of section 14A of the Act, any expenditure incurred in relation to earning the exempt income as provided above, whether accrued, arisen or received or not, should not be tax deductible. In case the tax authorities are not satisfied by the disallowance considered by the Trust, the quantum of disallowance shall be computed in accordance with the provisions of section 14A read with Rule 8D of the Rules.

As per section 193(ix) and section 194A(3)(xi) of the Act, any income by way of interest received/receivable by the Trust from SPV is not subject to withholding of taxes.

***b. Dividend (other than dividend in the nature of the buy-back proceeds from Project SPV)***

Dividend received or receivable by the Trust from the Project SPV (being domestic companies) shall be exempt from tax, subject to satisfaction of conditions given in section 10(23FC) of the Act.

In this regard, please note that as per the explanation to section 10(23FC) of the Act, the expression "special purpose vehicle" means an Indian company in which the business trust holds controlling interest and any specific percentage of shareholding or interest, as may be required by the regulations under which such trust is granted registration.

As per provisions of section 14A of the Act, any expenditure incurred in relation to earning the exempt income as provided above, whether accrued, arisen or received or not, should not be tax deductible. In case the tax authorities are not satisfied by the disallowance considered by the Trust, the quantum of disallowance shall be computed in accordance with the provisions of section 14A read with Rule 8D of the Rules.

Further, second proviso to section 194 of the Act provides that no TDS is required to be deducted by a SPV in respect of dividend paid to the Trust.

***c. Dividend in the nature of the buy-back proceeds from Project SPV***

As per amendments made *vide* Finance (No. 2) Act, 2024, proceeds from buy-back of shares shall be taxable as deemed dividend in the hands of shareholders as per provisions of newly inserted clause (f) under section 2(22) of the Act.

Further, with respect to shares bought back which are deemed as dividend under section 2(22)(f) of the Act, no deduction should be allowed while computing the dividend income as per second proviso to section 57 of the Act.

Additionally, as per proviso to section 46A of the Act, sales consideration in respect of shares bought back shall be considered as Nil for the purposes of computation of capital gains. Accordingly, cost of acquisition of such shares should be regarded as capital loss in the hands of shareholders in the year of such buy back.

It must be noted that such loss shall be considered as short-term capital loss where shares are held for a period of 24 months or less, and where shares are held for a period of more than 24 months, such losses shall be classified as long-term capital loss.

Section 70 read with section 74 of the Act allows short-term capital loss arising during a financial year to be set off against income, if any, from capital gains (short-term or long-term), arising in the same financial year. However, long-term capital loss arising during a financial year is allowed to be set-off only against long-term capital gains. Balance loss, if any, is allowed to be carried forward and set-off against income from capital gains, arising during subsequent eight assessment years, as follows: (i) balance short-term capital loss can be carried forward and set-off against capital gains (short-term or long-term); and (ii) balance long-term capital loss can be carried forward and set-off only against long-term capital gains.

Further, as per Section 71 of the Act, short term/ long term capital loss for the year cannot be set-off against income under any other head other than capital gains for the same year.

In absence of any clarity by the CBDT with respect to treatment of such deemed dividend in case of Trust, taxability of such deemed dividend in the hands of Trust should be in a similar manner, as in the case of normal dividend as discussed in Point 'b' above. Trust will incur a capital loss (to the extent of cost of acquisition of shares) in the year of buy back which will be eligible for carry forward and set off against future capital gains in accordance with provisions of section 70 read with section 74 of the Act, as discussed above.

2.1.2. Income other than the income distributed by the SPVs

***a. Income by way of dividend/ interest/ any other income (such as treasury income)***

Dividend/interest income received by the Trust from listed securities, liquid funds, etc. or treasury income etc. shall be subject to tax at the maximum marginal rate in force ('MMR') as per section 115UA of the Act. MMR is defined under the provisions of the Act to mean the rate of income-tax (including surcharge on income-tax, if any) applicable in relation to the highest slab of income as per the relevant Finance Act as increased by cess.

As per first proviso to section 57 of the Act, no deduction shall be allowable against dividend income other than deduction on account of interest expense and such interest expense shall not exceed 20% of

the gross dividend income included in the total income for that year, without deduction under section 57 of the Act.

***b. Income by way of capital gains***

In terms of section 115UA(2) of the Act, the total taxable income of the Trust shall be chargeable to tax at Maximum Marginal Rate (MMR) except for income arising on transfer of short-term capital assets[1] taxable under Section 111A and long-term capital assets taxable under Section 112 and Section 112A of the Act.

As per the provisions of section 111A of the Act, any income arising from transfer of short-term capital asset being an equity share in a company or a unit of an equity-oriented fund or a unit of a business trust, transacted through a recognized stock exchange and subject to STT, should be taxable at a rate of 20%[++2]. However, the condition of subject to STT is not applicable if the transaction is undertaken on a recognized stock exchange located in any International Financial Services Centre ('IFSC') and where the consideration for such transaction is received or receivable in foreign currency.

Short-term capital gains arising from transfer of short-term capital asset other than the shares and securities covered under section 111A of the Act, will be taxed at MMR.

As per the provisions of section 112 of the Act, gains arising on the transfer of long-term capital assets shall be chargeable to tax in the hands of the Trust at the rate of 12.5%[++].

Section 48 of the Act prescribes the mode of computation of capital gains and provides for deduction of cost of acquisition/ improvement and expenses incurred in connection with the transfer of a capital asset, from the sale consideration to arrive at the amount of capital gains. In respect of long-term capital gains taxable under section 112 of the Act, section 48 of the Act provided for substitution of cost of acquisition/improvement with indexed cost of acquisition/improvement, which adjusts the cost of acquisition/improvement by a cost inflation index as prescribed from time to time. However, such adjustment of cost of acquisition/improvement by a cost inflation index has been removed *vide* Finance (No. 2) Act, 2024 and this position continues under the Finance Act, 2025.

Further, as per provisions of section 112A of the Act, capital gains exceeding one lakh and twenty five thousand rupees arising on the transfer of long term capital asset, being an equity share in a company or a unit of an equity oriented fund or a unit of a business trust, transacted through a recognized stock exchange and subject to STT, shall be chargeable to tax in the hands of the business trust at the rate of 12.50% (plus applicable surcharge and cess) without applying the benefit under the first proviso to section 48 of the Act. Pursuant to the amendment introduced by the Finance Act, 2025, Section 112A has been expressly included within the scope of Section 115UA(2) of the Act, and accordingly, such long-term capital gains shall not be taxable at the maximum marginal rate in the hands of the business trust.

As per section 50CA of the Act, where the consideration on transfer of unquoted shares of a company, is less than the fair market value of such share determined in such manner as may be prescribed, the value so determined shall for the purpose of section 48 of the Act, be deemed to the full value of consideration.

Section 70 read with section 74 of the Act allows short-term capital loss arising during a financial year to be set off against income, if any, from capital gains (short-term or long-term), arising in the same financial year. However, long-term capital loss arising during a financial year is allowed to be set-off only against long-term capital gains. Balance loss, if any, is allowed to be carried forward and set-off against income from capital gains, arising during subsequent eight assessment years, as follows: (i) balance short-term capital loss can be carried forward and set-off against capital gains (short-term or

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[1] *As per section 2(42A), a short-term capital asset means: (i) for unlisted shares – period of holding is less than or equal to 24 months; (ii) for unlisted bonds/debentures - always deemed to be short-term capital asset; (iii) Immovable property being land and/or building - period of holding is less than or equal to 24 months; (iv) listed equity shares or debentures or units of an equity-oriented fund or units of business trust– period of holding less than or equal to 12 months. As per section 2(29A), a capital asset which is not a short-term capital asset is regarded as a long-term capital asset.*

[2] *excluding applicable surcharge and cess*

long-term); and (ii) balance long-term capital loss can be carried forward and set-off only against long-term capital gains.

Further, as per Section 71 of the Act, short term/ long term capital loss for the year cannot be set-off against income under any other head other than capital gains for the same year.

**3. Taxability of unitholders**

3.3 Income by way of interest and dividend (including upstreaming of dividend in the nature of the buy-back proceeds from Project SPV)

a. As per the provisions of section 115UA(1) of the Act, the income distributed by the Trust is taxable in the hands of the unitholders in the same manner and in the same proportion as the underlying income received by or accrued to the Trust.
b. As per the provisions of section 10(23FD), any income referred to in section 115UA(1) of the Act and distributed by the Trust shall not be included in the total income of the unitholders, except for the following income:
   - Interest income from SPV (referred to in section 10(23FC)(a));
   - Dividend Income from SPV [referred to in section 10(23FC)(b)], i.e., if the SPV has opted for concessional tax regime under section 115BAA;

   The above income would be taxable in the hands of the unitholders under section 115UA(3) of the Act at the rates applicable to the respective unitholders.
c. As per section 115A(1)(iiac) of the Act read with section 194LBA of the Act, income in the nature of interest referred to in section 10(23FC)(a) shall be taxable at the rate of 5%++ in the hands of a non-resident unitholders. Such interest would be taxable in the hands of resident unitholders at the applicable tax rates.
d. Taxability of dividend income distributed by the Trust to unitholders is dependent on the taxation regime adopted by the SPV(s), which distributes the dividend to the Trust. If the SPV(s) has not opted for a concessional corporate tax rate under section 115BAA of the Act ('Qualifying SPV'), dividend distributed by such Qualifying SPV ('Qualified Dividend') and distributed by the Trust is exempt in the hands of the unitholders. Any dividend other than Qualified Dividend distributed by the Trust ('Unqualified Dividend') is taxable in the hands of the unitholders. Such Unqualified Dividend shall be taxable in the hands of non-resident unitholders at the rate of 20%++ as per section 115A of the Act and shall be taxable in the hands of resident unitholders at the applicable tax rates.
e. Further, where the dividend, interest, or any other income received by the Trust is chargeable to tax in the hands of the Trust, such income shall be exempt in the hands of the unitholders on distribution by the Trust under section 10(23FD) of the Act. Further, any expenditure incurred for earning such exempt income shall not be deductible in the hands of the unitholders under the provisions of section 14A of the Act.
f. <u>Deductions from income in the hands of unitholders</u>

   A domestic company is allowed deduction of dividend income received by it from another domestic company or the Trust subject to certain conditions. Therefore, if the unitholder is a domestic company, it should be able to claim the deduction under section 80M where the prescribed conditions mentioned under section 80M have been complied with.

   Further, as per proviso to section 57 of the Act, no deduction shall be allowable against the dividend income other than deduction on account of interest expense and such interest expense shall not exceed 20% of the gross dividend income for that year, without deduction under section 57 of the Act. Furthermore, where dividend income is in the nature of the shares bought back, no expense shall be allowed as deduction against such dividend income.

3.2 <u>Distribution of specified sum</u>

a. The Finance Act, 2023 has amended section 56(2) of the Act to add a new clause (xii) which provides the taxability of any specified sum received by unitholders from the Trust in respect of units held by him at any time during the year.

b. Computation of "specified sum" shall be the result of 'A-B-C' where:

   'A' = Cumulative distribution made by trust till date excluding the amount distributed in the nature of dividend, interest or rental income or any amount taxed/taxable in the hands of InvIT
   'B' = Issue price of such units
   'C' = Amount charged to tax under this provision in earlier years

Specified sum shall be deemed to be zero if 'A-B-C' results in negative value.

3.3 Other income (income other than interest or dividend income or income chargeable to tax under section 56(2)(xii) of the Act) received from Trust

a. Other income (income other than interest or dividend income or income chargeable to tax under section 56(2)(xii) of the Act) such as treasury income earned by Trust and distributed to unitholder shall be exempt in hands of unitholders as the same shall be taxable in the hands of Trust. Further, there shall be no withholding on distribution of such other income by the Trust to the unitholders.

3.4 Income by way of capital gains

3.1.1. For resident unitholder

a. For the purpose of computation of capital gains on sale of units of Trust, consideration received on sale of units of Trust shall be reduced by cost of acquisition of such units and expenditure incurred wholly and exclusively in connection with such sale.

b. As per the amendments made by Finance Act, 2023, the amount of distribution to the extent not chargeable to tax u/s 56(2)(xii) of the Act and not covered u/s 10(23FC), 10(23FCA) or 115UA(2) of the Act, shall be reduced from the cost of units, for the purpose of computation of capital gains.

c. Investors are advised to consult their tax advisor for computation of capital gains including cost of acquisition of units as per Indian tax laws in each case.

d. Where the gains arising on the transfer of units of the Trust by the unitholder are included in the business income of an assessee assessable under the head 'Profits and Gains from Business or Profession' and on which STT has been charged, such STT shall be a deductible expense from business income as per the provisions of section 36(1)(xv) of the Act. The characterization of gains/ losses, arising from sale of units, as capital gains or business income would depend on the nature of holding in the hands of the unitholder and various other factors.

e. Where the gains on transfer of the units of the Trust are characterized as capital gains, and if such units are long-term capital assets and such transaction is chargeable to STT, income arising on transfer of units of the Trust (over and above INR 0.125 million) will be taxable at a tax rate of 12.50%$^{++}$ subject to conditions as per section 112A. However, the condition of transaction being chargeable to STT is not required if the transaction is undertaken on a recognised stock exchange located in IFSC and where the consideration for such transaction is received or receivable in foreign currency. Further, in case of long-term capital gain on transfer of units of the Trust, which are not subject to STT, shall be taxable in the hands of the unitholders at the tax rate of 12.50%$^{++}$ under section 112 of the Act.

f. Short-term capital gains arising on transfer of the units of the Trust will be chargeable to tax at the rate of 20%$^{++}$ as per the provisions of section 111A of the Act, provided such transaction is subject to STT. The condition of STT is not required to be followed if the transaction is undertaken on a recognised stock exchange located in IFSC and where the consideration for such transaction is received or receivable in foreign currency.

g. In case of a unitholder being an individual or HUF, where the total taxable income as reduced by short-term capital gains is below the basic exemption limit, the short-term capital gains will be reduced to the extent of the shortfall and only the balance short-term capital gains will be subjected to such tax in accordance with the proviso to sub-section (1) of section 111A of the Act. Short-term capital gains on transfer of units of the business trust, not transacted through a recognized stock exchange and not subject to STT shall be taxable at the applicable rate of tax for respective unitholders.

h. In case of a unitholder being a resident individual or HUF, where the total taxable income as reduced by long-term capital gains taxable is below the basic exemption limit, such long-term capital gains will be reduced to the extent of the shortfall and only the balance long-term capital gains will be subjected to such tax in accordance with the proviso to sub-section (1) of section 112 and proviso to sub-section (2) of section 112A of the Act.

i. In case of determining the period of holding for units allotted pursuant to exchange of shares of special purpose vehicle, as per clause (hc) of explanation 1 to section 2(42A), the period of holding for the units shall include the period for which the shares were held by the promoter in the SPV

j. In case of unitholder, being a domestic company that are liable to pay MAT under provisions of section 115JB of the Act, the gains arising, if any, on sale of units of the Trust are to be included as part of book profits for the purposes of computing MAT lability. MAT paid by such companies should be available as credit for set off against future tax liability, provided such companies do not opt to be governed by the concessional tax rate under section 115BAA of the Act.

k. In case of unitholders, other than companies, that are liable to Alternate Minimum Tax (AMT) under provisions of Section 115JC of the Act, the gains arising, if any, on sale of units of Trust are to be included as part of adjusted total income for the purpose of computing AMT liability. AMT paid by such unitholders should be available as credit for set-off against future tax liability, provided they do not opt to be governed by the concessional tax rates u/s 115BAC or 115BAD of the Act.

*3.1.2.* <u>For non-resident unitholder (other than Foreign Portfolio Investors ('FPIs'):</u>

a. For the purpose of computation of capital gains on sale of units of Trust, consideration received on sale of units of Trust shall be reduced by cost of acquisition of such units and expenditure incurred wholly and exclusively in connection with such sale.

b. As per the amendments made by Finance Act, 2023, the amount of distribution to the extent not chargeable to tax u/s 56(2)(xii) of the Act and not covered u/s 10(23FC), 10(23FCA) or 115UA(2) of the Act, shall be reduced from the cost of units, for the purpose of computation of capital gains.

c. Investors are advised to consult their tax advisor for computation of capital gains including cost of acquisition of units as per Indian tax laws in each case.

d. Where the gains arising on the transfer of shares of the unitholder are included in the business income of an assessee assessable under the head 'Profits and Gains from Business or Profession' and on which STT has been charged, such STT shall be a deductible expense from business income as per the provisions of section 36(1)(xv) of the Act. Such business income should not be taxable in India unless the non-resident has a taxable presence in India.

e. Where the gains on transfer of the units are characterized as capital gains, if such units are long-term capital assets and such transaction is chargeable to STT, income arising on transfer of units of the Trust (over and above INR 0.125 million) will be taxable at a tax rate of 12.50%++ subject to conditions as per Section 112A. However, the condition of STT is not required to be followed if the transaction is undertaken on a recognised stock exchange located in IFSC and where the consideration for such transaction is received or receivable in foreign currency. Further, in case of long-term capital gain on transfer of units of the Trust, which are not subject to STT, shall be taxable in the hands of the unitholders at the tax rate of 12.50%++ under section 112 of the Act.

f. Short-term capital gains arising on transfer of the units of the Trust will be chargeable to tax at the rate of 20%++ as per the provisions of section 111A of the Act if such transaction is chargeable to STT. However, the condition of STT is not required to be followed if the transaction is undertaken on a recognised stock exchange located in IFSC and where the consideration for such transaction is received or receivable in foreign currency.

g. Short-term capital gains on transfer of units of the business trust, not transacted through a recognized stock exchange and not subject to STT shall be taxable at the applicable rate of tax for respective unitholders.

h. As per section 47 of the Act read with Notification no. 16/2020, any capital gain arising on transfer of capital asset being unit of a business trust listed on a recognised stock exchange located in any IFSC where the consideration is received or receivable in foreign currency, would not be regarded as a transfer and therefore, would not be subject to any capital gain tax implications.

i. In case of unitholders, other than companies, that are liable to AMT under provisions of Section 115JC of the Act, the gains arising, if any, on sale of units of Trust are to be included as part of adjusted total income for the purpose of computing AMT liability. AMT paid by such unitholders should be available as credit for set-off against future tax liability, provided they do not opt to be governed by the concessional tax rates u/s 115BAC or 115BAD of the Act.

j. As per explanation 4 to section 115JB(2), the provisions of section 115JB shall not be applicable to a foreign company if the foreign company is a resident of a country having DTAA with India and such foreign company does not have a permanent establishment within the definition of the term in the relevant DTAA, or the foreign company is a resident of a country which does not have a DTAA with India and such foreign company is not required to seek registration under the legislation covering companies in India.

3.1.3. <u>For non-resident unitholders who are FPIs:</u>

a. As per section 2(14) of the Act, any securities held by an FPI, which were invested in accordance with the regulations made under the Securities and Exchange Board of India Act, 1992 shall be deemed to be capital assets. Hence the income from the transfer of such securities shall be deemed to be treated as capital gains.

b. If units of the Trust are long-term capital assets and such transaction is chargeable to STT, income arising on their transfer (over and above INR 0.125 million) will be taxable at a tax rate of 12.50%$^{++}$ subject to conditions as per section 112A read with section 115AD. Further, in case of long-term capital gain on transfer of units of the Trust, which are not subject to STT, shall be taxable in the hands of the unitholders at the tax rate of 10%$^{++}$, as per section 115AD.

c. Short-term capital gains arising on transfer of the units of the Trust will be chargeable to tax at the rate of 20%$^{++}$ as per the provisions of section 111A of the Act read with section 115AD, if such transaction is chargeable to STT. Short-term capital gains on transfer of units of the Trust, not transacted through a recognized stock exchange and not subject to STT shall be taxable at 30%$^{++}$ under section 115AD of the Act. The condition of payment of STT is not required to be followed if the transaction is undertaken on a recognised stock exchange located in IFSC and where the consideration for such transaction is received or receivable in foreign currency.

d. Investors are advised to consult their tax advisor for computation of capital gains including cost of acquisition of units as per Indian tax laws in each case.

e. As per the Explanation 4 to section 115JB, provisions of Minimum Alternate Tax shall not be applicable to any foreign company if:

- Such foreign company is a resident of country with which India has a DTAA and such foreign company does not have a permanent establishment in India; or

- Such foreign company is a resident of country with which India does not have a DTAA and such foreign company is not required to seek registration under any law for the time being in force relating to companies.

Accordingly, provisions of MAT shall not apply to FPIs/ FIIs in case the above conditions hold true.

3.1.4. <u>For unitholders who are notified Sovereign Wealth Fund and notified Pension Funds:</u>

a. As per section 10(23FE) of the Act, any income by way of dividend, interest, any sum referred to in section 56(2)(xii), or long-term capital gain arising from investment made in units of the Trust on or after 1 April 2020 and before 31 March 2030 and held for at least three years shall be exempt for notified Sovereign Wealth Fund, wholly owned subsidiary of Abu Dhabi Investment Authority (ADIA) and notified Pension Funds, subject to satisfaction of stipulated conditions.

b. Investors are advised to consult their tax advisor for computation of capital gains including cost of acquisition of units as per Indian tax laws in each case.

c. In this regard, please note that there as per provisions of the Act, no exemption is being provided from withholding of taxes on above mentioned income accruing to the specified persons as defined under section 10(23FE) of the Act.

3.1.5. Special tax benefits/ provisions applicable to Alternative Investment Fund (Category I and II)

a. Under section 10(23FBA) of the Act, any income of an investment fund other than the income chargeable under the head "Profits and gains of business or profession" is exempt from income tax.

b. Further, income of the investment fund chargeable under the head 'Profits and gains of business or profession' is taxable as follows (section 115UB(4) of the Act)

- at the rate or rates as specified in the Finance Act of the relevant year, where such fund is a company or a firm; or
- at maximum marginal rate in any other case

c. The losses incurred by AIF shall be treated in accordance with the provisions of section 115UB(2) and 115UB(2A) of the Act.

3.1.6. For unitholders who are mutual funds:

a. Under section 10(23D) of the Act, any income earned by a Mutual Fund registered under the Securities and Exchange Board of India Act, 1992, or a Mutual Fund set up by a public sector bank or a public financial institution, or a Mutual Fund authorised by the Reserve Bank of India would be exempt from income-tax, subject to such conditions as the Central Government may by notification in the Official Gazette specify in this behalf.

b. In light with the provisions of section 196 of the Act, no deduction of tax shall be made on any sum payable to a Mutual Fund specified under clause (23D) of section 10. Accordingly, the Trust is not required to withhold tax on any sum payable to Mutual Fund set up under section 10(23D) of the Act.

3.1.7. For Venture Capital Companies/Funds:

For VCF/VCC registered prior to 21 May 2012:

a. Under Section 10(23FB) of the Act, any income of Venture Capital Company to whom the certificate of registration is granted before 21/05/2012 under SEBI (Venture Capital Funds) Regulations, 1996 or as a subcategory I Alternative Investment Fund as is regulated under SEBI (Alternative Investment Funds Regulations) under the SEBI Act, 1992, would be exempt from income tax, subject to conditions specified therein.

b. As per Section 115U of the Act, any income derived by a person from his investment in Venture Capital Company/Venture Capital Fund would be taxable in the hands of the person making an investment in the same manner as if it were the income accruing or arising to or received by such person had the investments been made directly in the venture capital undertaking.

For VCF/VCC registered post 21 May 2012:

c. VCF/VCC registered post 21 May 2012 shall be classified as a Category 1 Alternate Investment Fund which shall be governed by the SEBI (AIF) Regulations 2012 or as referred to in sub-regulation (2) of regulation 18of the International Financial Services Centres Authority (Fund Management) Regulations, 2022 made under the International Financial Services Centres Authority Act, 2019. For such funds benefit of section 10(23FB) and section 115U shall not be applicable and shall be governed by section 115UB read with section 10(23FBA) and 10(23FBB) which states that business income earned by such fund shall be taxable in the hands of the Fund and exempt in the hands of the unit holders, and other income earned viz. capital gains, income from other sources shall be exempt in the hands of the fund and taxable in the hands of unit holder.

3.1.8. Benefits under Double taxation avoidance agreement (DTAA)

a. As per section 2(30) of the Act, non-resident is defined to mean a person who is not a "resident". A non-resident unit holder should be subject to taxation in India only if:

- it is regarded a tax resident of India; or
- being a non-resident in India, it derives: (a) if any income is received / deemed to be received in India; or (b) if any income has accrued or arisen / deemed to have accrued or arisen in India in terms of the provisions of the Act.

b. Section 6 of the Act provides that a foreign company should be treated as a tax resident in India if its place of effective management (POEM) is in India in that year. POEM has been defined to mean a place where key managerial and commercial decisions that are necessary for the conduct of the business of an entity as a whole are, in substance made.

c. Under the provisions of section 90(2) of the Act, a non-resident will be governed by the provisions of the DTAA between India and the country of tax residence of the non-resident and the provisions of the Act apply to the extent they are more beneficial to the assessee.

d. However, the non-resident investor will have to furnish a certificate of his being a tax resident in a country outside India and a suitable declaration stating that such non-resident does not have a fixed base/ permanent establishment in India, to obtain the benefit of the applicable DTAA and such other document as may be prescribed as per the provision of section 90(4) of Act. Further, as per Notification No. 3/2022 dated 16th July 2022, Form 10F is required to be furnished electronically for submitting information as required under Rule 21AB, where tax residence certificate does not contain all the prescribed requisite information.

e. As per the provisions of section 90(2) of the Act, the provisions of the Act would prevail over the provisions of the DTAA to the extent they are more beneficial to the non-resident.

3.1.9. Treatment of loss:

a. Section 70 read with section 74 of the Act allows short-term capital loss arising during a financial year to be set off against income, if any, from capital gains (short-term or long-term), arising in the same financial year. However, long-term capital loss arising during a financial year is allowed to be set-off only against long-term capital gains. Balance loss, if any, is allowed to be carried forward and set-off against income from capital gains, arising during subsequent eight assessment years, as follows: (i) balance short-term capital loss can be carried forward and set-off against capital gains (short-term or long-term); and (ii) balance long-term capital loss can be carried forward and set-off only against long-term capital gains.

b. Further, as per Section 71 of the Act, short term/ long term capital loss for the year cannot be set-off against income under any other head other than capital gains for the same year.

3.3 Tax deduction at source by the Trust

a. Section 194LBA – Certain income from units of the Trust: As per section 194LBA of the Act, taxes shall be required to be deducted at source at the time of payment/ credit (whichever is earlier) from following income distributions by the Trust to its unitholders:

| Class of unitholders | Nature of income | Applicable tax rates |
|---|---|---|
| • Resident unitholders* | Interest income - Section 194LBA(1) | 10% |
| | Unqualified Dividend income - Section 194LBA(1) | 10% |
| | Qualified Dividend income - Section 194LBA(2A) | Not subject to withholding tax |
| | Specified sum – Section 56(2)(xii) | Not subject to withholding tax |

| | | |
|---|---|---|
| • Non-resident unitholders*#^ | Interest income – Section 194LBA(2)<br><br>Unqualified Dividend income^ - Section 194LBA(2)<br><br>Qualified Dividend income – Section 194LBA(2A)<br><br>Specified sum – Section 56(2)(xii) | 5%++<br><br>10%++<br><br>Not subject to withholding tax<br><br>Tax rates as may be applicable++ |
| • Category I & II Alternative Investment Funds<br>• Mutual Funds | Any distribution | Not subject to withholding tax |

**The unitholders may provide NIL/Lower withholding certificate issues under section 197 of the Act with respect to income as specified u/s 194LBA of the Act.*

*^ If the Act provides withholding tax rate for any specific category of non-resident unitholders, then the same needs to be considered.*

*# Non-resident unitholders may seek to avail any beneficial provisions under applicable DTAA that India may have entered into with its country of residence. Rate of TDS for FPI/FII may be governed in accordance with section 196D of the Act.*

b. Applicability of other provisions:

No income tax is deductible at source from income in the nature of capital gains arising to a resident unitholder under the provisions of the Act.

However, as per the provisions of Section 195 read with section 90 of the Act, any income on transfer of units of the Trust by non-residents may be subject to withholding of tax at the rate under the domestic tax laws or under the DTAA, whichever is more beneficial to the Assessee (other than FPIs/ FIIs who are subject to provisions of section 196D(2) of the Act)

Further, section 196D of the Act provide that in case of a payee, being FPIs/ FIIs of country with which India has entered into DTAA, tax shall be deducted at the rate of 20% or the DTAA rates (for the incomes referred in section 115AD(1), other than capital gains and interest income subject to TDS u/s 194LD of the Act), whichever is lower, subject to the FPI/ FII furnishing a Tax Residency Certificate (referred to in Section 90(4) of the Act) and a suitable declaration for not having a fixed base/ permanent establishment in India, to the payer.

Further, as per sub-section (2) of section 196D of the Act, no tax is to be deducted from any income, in the nature of capital gains arising to a FPI or FII from the transfer of units, subject to the FPI/ FII furnishing a Tax Residency Certificate (referred to in Section 90(4) of the Act) and a suitable declaration for not having a fixed base/ permanent establishment in India, to the payer.

Buyer and seller of unlisted shares/securities also need to check the applicability of TDS u/s 194Q of the Act read with provision of Tax Collection at Source (TCS) u/s 206C(1H) of the Act. As per the clarification issued by CBDT, the transaction in shares not taken place through recognized stock exchange/ recognised clearing corporations may also fall under the ambit of section 194Q/206C(1H) of the Act since CBDT has clarified that the said provisions of section 194Q/206C(1H) of the Act are not applicable to transactions in securities and commodities transacted through recognised stock exchanges/ recognised clearing corporations, including those located in International Financial Service Centre.

c. Provisions of section 206AA of the Act

As per section 206AA of the Act, where a tax payer does not possess a Permanent Account Number ('PAN'), taxes have to be withheld on payment of income to the tax payer (where chargeable to tax) at higher of the following:

- at the rate specified in the Act; or
- at the rate or rates in force; or
- at the rate of twenty per cent

The Finance Act, 2016 amended the aforementioned provision to provide an exemption to non-residents, subject to compliance of such conditions as may be prescribed by the CBDT. In furtherance

of the amended provision, the CBDT issued a notification prescribing the rules (Rule 37BC of the Rules) for relaxation from withholding of tax at higher rates in the absence of PAN in the case of non-resident deductee and laid down the information and alternative documents required to claim such relaxation.

d. Provisions of section 206AB of the Act

Finance Act 2021 has inserted section 206AB which *inter alia* stipulates that where tax is required to be withheld by a person on payment or credit to a *specified person*[3], the tax shall be deducted at the higher of the following rates:

- at twice the rate specified in the relevant provision of the Act; or
- at twice the rate or rates in force; or
- at the rate of five per cent.

If the provisions of section 206AA is applicable to a specified person, in addition to the provision of section 206AB, the tax shall be deducted at higher of the two rates provided in section 206AB and in section 206AA.

*e.* Applicability of other provisions:

*Section 94(7) of the Act (commonly known as dividend stripping)*

Vide Finance Act, 2022, applicability of section 94(7) of the Act (commonly known as dividend stripping) has been extended to the units of Trust as well (that with effect from Financial Year 2022-23) which provides that where:

a) any person buys or acquires any securities or unit within a period of three months prior to the record date[4];
b) such person sells or transfers such securities within three months after such record date or such units within a period of nine months after such record date;
c) the dividend or income on such securities or unit received or receivable by such person is exempt

then, the loss, if any, arising from the sale and purchase of securities and units, to the extent of dividend or income received or receivable on such securities or unit, shall be ignored for computing income chargeable to tax.

*Section 94(8) of the Act (commonly known as bonus stripping)*

Vide Finance Act, 2022, applicability of section 94(8) of the Act (commonly known as bonus stripping) has been extended to the units of Trust as well (that with effect from Financial Year 2022-23) which provides that where:

a) any person buys or acquires any units within a period of three months prior to the record date;
b) such person is allotted additional units without any payment on the basis of holding of such units on such record date;
c) such person sells or transfers all or any of the units within a period of nine months after the record date, while continuing to hold all or any of the additional units referred above

then, the loss, if any, arising from the sale and purchase of all or any of the units shall be ignored for computing income chargeable to tax and notwithstanding anything contained in any other provision of

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[3] *As per the provisions of section 206AB of the Act, 'Specified person' means a person who:*
*(i) has not furnished the return of income for the previous year immediately preceding the previous year in which the tax is required to be deducted, for which time-limit of furnishing the return of income u/s 139(1) has expired; and*
*(ii) the aggregate of tax deducted at source and tax collected at source is INR 50,000 or more in the said previous year*

[4] *Record date means a date fixed to entitles the holder of such securities or units to receive dividend, income, or additional securities or unit without consideration, as the case may be*

the Act, the amount of loss so ignored shall be deemed to be the cost of purchase or acquisition of such additional units referred above as are held on the date of such sale or transfer.

f. Transaction not regarded as transfer under section 47(xvii) of the Act:

According to section 47(xvii) of the Act, any transfer of a capital asset, being share of a special purpose vehicle to a business trust in exchange of units allotted by that trust to the transferor shall not be regarded as transfer and accordingly not be liable to capital gains tax.

Further, as per section 49(2AC) of the Act, the cost of units of Trust allotted to the transferor in exchange of shares in SPV shall be deemed to be the cost of acquisition of shares in SPV.

Furthermore, as per clause (hc) of Explanation 1 to section 2(42A) of the Act, for ascertaining the period of holding of such units, the period of holding of shares in SPV shall also be included.

Any notional gain or loss arising on transfer of shares of SPV to business trust in exchange of units allotted by the trust as referred under section 47(xvii) are to be excluded while calculating book profits for the purpose of MAT under section 115JB. Similarly, any notional gain or loss arising upon change in carrying amount of the units held by Unitholder are to be excluded in calculating book profits for the levy of MAT under section 115JB (clause (iie)/(fc) to explanation 1 to section 115JB).

Further, actual gain or loss on disposal of units held by the Unitholder as referred to in section 47 (xvii) are considered for the purpose of normal provisions of the Act and MAT under section 115JB by taking into account the cost of the shares exchanged with units referred to in the said clause or the carrying amount of the shares at the time of exchange where such shares are carried at a value other than the cost through statement of profit and loss, as the case may be (clause (iif)/(k) to explanation 1 to section 115JB).

However, if the Unitholder opts for concessional tax regime under section 115BAA / 115BAB then provisions of MAT under section 115JB shall not be applicable for the Unitholder and it shall forego its entire MAT credit available, if any, at the time of exercising concessional tax-regime.

## 3. General tax rates and provisions

3.1. The characterization of gains/ losses, arising from sale / transfer of units, as capital gains or business income would depend on the nature of holding in the hands of the unit holder and various other factors.

3.2. Where the gains arising on the transfer of the units of the Trust are included in the business income of an assessee assessable under the head "Profits and Gains from Business or Profession" and on which securities transaction tax has been charged, such securities transaction tax shall be a deductible expense from business income as per the provisions of section 36(1)(xv) of the Act. However, securities transaction tax is not eligible to be deducted as cost on transfer of the units of the Trust in case where the gains arising from such transfer is assessable under the head “Capital Gains”.

3.3. The income-tax rates specified in this note are as applicable for the financial year 2025-26 (relevant to assessment year 2026-27), and are exclusive of surcharge and cess, if any. Rate of surcharge and cess are provided below:

**Surcharge:**

**Domestic companies (other than companies who have opted for concessional tax regime under section 115BAA and 115BAB of the Act):**

a) If the total income does not exceed INR 10 million – Nil
b) If the total income exceeds INR 10 million but does not exceed INR 100 million - 7 %
c) If the total income exceeds INR 100 million - 12 %

**Domestic companies (for companies who have opted for concessional tax regime under section 115BAA and 115BAB of the Act):**

a) At the rate of 10% on total income

**Foreign companies:**

a) If the total income does not exceed INR 10 million - Nil
b) If the total income exceeds INR 10 million but does not exceed INR 100 million – 2%
c) If the total income exceeds INR 100 million – 5%

**Firms:**

a) If the total income does not exceed INR 10 million - Nil
b) If the total income exceeds INR 10 million – 12%

**For individuals, HUF, AOP and BOI (including non-resident) who have not opted for the New Regime:**

a) If the total income does not exceed INR 5 million – Nil
b) If the total income exceeds INR 5 million but does not exceed INR 10 million – 10%
c) If the total income exceeds INR 10 million but does not exceed INR 20 million – 15%
d) If the total income (excluding dividend income or income under the provision of section 111A, section 112 and section 112A of the Act) exceeds INR 20 million but does not exceed INR 50 million – 25%
e) If the total income (excluding dividend income or income under the provision of section 111A, section 112 and section 112A of the Act) exceeds INR 50 million – 37%
f) If total income is above 20 million (including dividend income or income under the provision of section 111A, section 112 and section 112A of the Act) but is not covered under (d) and (e) above – 15%.

However, the applicable surcharge does not exceed 15% in case of dividend income or income under the provision of section 111A and section 112A of the Act included in such total income. Also, in case of an association of persons consisting of only companies as its members, the rate of surcharge on the amount of Income-tax shall not exceed 15%. The above surcharge is subject to marginal tax benefit as per the Act. As per the Finance (No. 2) Act, 2024, in case of the Individual/HUF/AOP (other than co-operative)/ BOI/ Artificial Juridical Person ('AJP') taxable under the New Regime prescribed under the Act, the surcharge on the amount of income-tax shall not exceed 25% where taxable income exceeds INR 20 million. As per the Finance (No. 2) Act, 2024, in the case of an AOP being a non-resident, and consisting of only companies as its members, surcharge shall be calculated at the rate of 10%, where the aggregate income exceeds INR 5 million but does not exceed INR 10 million; at the rate of 15%, where the aggregate income exceeds INR 10 million.

**Health and education cess:**

In all cases, health and education cess will be levied at the rate of 4% of income-tax and surcharge.

## 4. Disclaimer

4.1. The stated benefits will be available only to the sole/ first named holder in case the units are held by joint holders.

4.2. Please note that the TDS rates mentioned in the given document may be subject to any concessions introduced/ allowed by the Government under any policy, press release, etc. Also, the same may also be subject to lower/ nil withholding tax certificates which may be furnished by the unit holders.

4.3. In respect of non-residents, the tax rates and the consequent taxation mentioned above shall be further subject to any benefits available under the applicable DTAA, if any, between India and the country in which the non-resident has fiscal domicile. Further, it is pertinent to meet the terms and condition viz. Principal purpose test, beneficial ownership test etc. as enacted in DTAAs entered into by India with various countries based on Multilateral Convention to implement tax treaty related measures to prevent Base Erosion and Profit Shifting ('MLI').

4.4. The tax implications/ benefits stated in this document are subject to General Anti Avoidance Rules (GAAR) provisions under the Act. GAAR may be invoked by the Indian income-tax authorities in case arrangements are found to be impermissible avoidance arrangements. Further, in case GAAR provisions are invoked, the onus to prove that the main purpose of an arrangement was not to obtain any tax benefit

is on the taxpayer. Also, any resident or non-resident may approach the Authority for Advance Rulings to determine whether an arrangement can be regarded as an impermissible avoidance arrangement.

4.5. This statement is intended only to provide general information to the investors and is neither designed nor intended to be substituted for professional tax advice. In view of the individual nature of tax consequences, each investor is advised to consult his/her own tax advisor with respect to specific tax consequences of his/her participation in the scheme.

4.6. No assurance is given that the revenue authorities/courts will concur with the views expressed herein. Our views are based on the existing provisions of law and its interpretation, which are subject to changes from time to time. We do not assume responsibility to update the views consequent to such changes. We shall not be liable to any claims, liabilities or expenses relating to this assignment, except to the extent of fees relating to this assignment, as finally judicially determined to have resulted primarily from bad faith or intentional misconduct. We will not be liable to any other person in respect of this statement.

4.7. This statement of possible direct tax benefits enumerated above is as per the Act as amended by the Finance Act, 2025 applicable for financial year ending 31 March 2026 relevant to the assessment year 2026-27. The above statement of possible Direct-tax Benefits sets out the possible tax benefits available to the Trust and its unitholders under the current tax laws presently in force in India. Several of these benefits available are dependent on the Trust or its unitholders fulfilling the conditions prescribed under the relevant tax laws.

4.8. Please note that the tax rates provided in this statement are exclusive of applicable surcharge and cess. The rates prescribed in sub-section (1A) of section 115BAC of the Act ("New Tax Regime") are the default rates applicable to all individuals, HUFs, AOPs (other than co-operative societies), BOIs and Artificial Juridical Persons ("AJPs"). Accordingly, tax rates and surcharge prevailing under the New Tax Regime will be considered for the purpose of withholding, unless the payee has exercised a valid option otherwise in accordance with the Act.

4.9. The information provided above sets out the possible tax benefits available to the unit holders in a summary manner only and is not a complete analysis or listing of all potential tax consequences of the purchase, ownership and disposal of equity shares and units, under the current tax laws presently in force in India. It is not exhaustive or comprehensive and is not intended to be a substitute for professional advice. Investors are advised to consult their own tax advisor with respect to the tax implications arising on account of any investment in equity shares or units (including tax implications on account of any distributions by/ receipts from the Trust), particularly in view of the fact that certain recently enacted legislation may not have a direct legal precedent or may have a different interpretation impacting the benefits, which an investor can avail.

4.10. This statement does not discuss any tax consequences in the country outside India of an investment in the units of trust. The unit holders / investors in the country outside India are advised to consult their own professional advisors regarding possible Income tax consequences that apply to them.

4.11. The statement is prepared on the basis of information available with the Trust and there is no assurance that:

- the Trust or its unitholders will continue to obtain these benefits in future;
- the conditions prescribed for availing the benefits have been/ would be met with; and
- the revenue authorities/courts will concur with the view expressed herein.

The above views are based on the provisions of law that exist on this day and its interpretation, which are subject to change from time to time.

## ASSET REVENUE INFORMATION

In relation to the Issue, we are proposing to transfer tolling rights of the InvIT Assets, to RPPL. Since NHAI is not required to prepare or maintain project-wise financials for the InvIT Assets, it would not be feasible to present the combined financial statements of the Trust in relation to the InvIT Assets proposed to be held by the Trust as required under the Chapter 3 of the SEBI InvIT Master Circular. Accordingly, we have filed an exemption letter dated January 14, 2026 ("**Exemption Letter**") with the SEBI for exemption from strict application of certain provisions of the InvIT Regulations and SEBI InvIT Master Circular in respect of disclosure of financial statements of the InvIT Assets proposed to be held by the Trust and related disclosure requirements including combined financial statements of the Trust.

In accordance with the Exemption Letter, the revenue data for each of the InvIT Assets for the period from April 1, 2022 till December 31, 2025 is disclosed below:

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | April 2022 | May 2022 | June 2022 | July 2022 | August 2022 | September 2022 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 41.78 | 44.12 | 41.87 | 46.81 | 46.53 | 44.94 |
| | | Chokkenahalli toll plaza | 36.74 | 37.88 | 35.58 | 38.95 | 38.58 | 37.08 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 103.48 | 112.70 | 102.93 | 96.68 | 99.63 | 100.29 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 146.96 | 154.98 | 153.37 | 153.58 | 157.97 | 162.35 |
| 04 | Chennai Tada | Nallur Toll Plaza | 109.67 | 110.93 | 112.07 | 115.53 | 116.42 | 118.37 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 54.16 | 55.57 | 57.28 | 55.50 | 56.47 | 56.14 |
| | | Surapattu Toll Plaza | 80.64 | 81.38 | 82.49 | 84.89 | 84.52 | 85.01 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 | March 2023 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 45.72 | 46.44 | 53.45 | 52.83 | 48.40 | 51.46 |
| | | Chokkenahalli toll plaza | 38.75 | 39.14 | 42.69 | 42.66 | 38.65 | 41.90 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 99.10 | 111.76 | 113.89 | 112.94 | 112.63 | 116.90 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 161.34 | 165.79 | 170.19 | 163.18 | 155.16 | 168.99 |
| 04 | Chennai Tada | Nallur Toll Plaza | 111.33 | 109.79 | 121.08 | 116.41 | 112.91 | 125.62 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 58.65 | 56.03 | 61.18 | 61.41 | 57.81 | 63.47 |
| | | Surapattu Toll Plaza | 78.23 | 78.85 | 82.80 | 78.93 | 77.60 | 84.36 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | April 2023 | May 2023 | June 2023 | July 2023 | August 2023 | September 2023 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 51.93 | 56.79 | 55.08 | 55.55 | 57.26 | 54.94 |
| | | Chokkenahalli toll plaza | 40.98 | 45.76 | 44.82 | 45.50 | 48.00 | 46.87 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 114.09 | 116.52 | 108.53 | 109.97 | 108.29 | 104.37 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 161.06 | 178.59 | 174.86 | 169.84 | 175.89 | 182.88 |
| 04 | Chennai Tada | Nallur Toll Plaza | 120.07 | 123.53 | 124.72 | 129.64 | 133.48 | 130.53 |
| 05 | Chennai | Vanagram Toll | 61.71 | 65.43 | 61.89 | 62.61 | 64.78 | 60.84 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bypass | Plaza | | | | | | |
| | | Surapattu Toll Plaza | 79.41 | 82.70 | 82.91 | 86.93 | 89.45 | 86.34 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | October 2023 | November 2023 | December 2023 | January 2024 | February 2024 | March 2024 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 57.61 | 53.68 | 58.34 | 55.81 | 54.82 | 56.04 |
| | | Chokkenahalli toll plaza | 49.05 | 46.54 | 49.61 | 50.16 | 47.82 | 49.00 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 109.64 | 114.42 | 121.41 | 112.55 | 116.88 | 124.34 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 191.98 | 179.92 | 190.30 | 185.86 | 180.34 | 192.67 |
| 04 | Chennai Tada | Nallur Toll Plaza | 134.34 | 119.34 | 119.80 | 129.42 | 135.91 | 142.67 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 60.33 | 54.90 | 54.59 | 59.69 | 61.66 | 65.03 |
| | | Surapattu Toll Plaza | 87.20 | 79.58 | 79.45 | 83.31 | 90.07 | 92.22 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | April 2024 | May 2024 | June 2024 | July 2024 | August 2024 | September 2024 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 51.06 | 53.97 | 51.94 | 51.60 | 53.35 | 51.71 |
| | | Chokkenahalli toll plaza | 46.45 | 50.83 | 47.62 | 48.09 | 49.77 | 48.73 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 114.44 | 116.74 | 114.40 | 116.88 | 110.10 | 115.22 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 176.88 | 185.53 | 176.98 | 181.82 | 189.86 | 144.35 |
| 04 | Chennai Tada | Nallur Toll Plaza | 130.46 | 137.11 | 136.78 | 143.27 | 146.41 | 136.70 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 63.11 | 70.56 | 72.24 | 71.82 | 76.17 | 73.59 |
| | | Surapattu Toll Plaza | 85.64 | 91.22 | 93.13 | 95.02 | 98.10 | 92.38 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | October 2024 | November 2024 | December 2024 | January 2025 | February 2025 | March 2025 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 54.42 | 51.87 | 55.74 | 52.76 | 50.21 | 56.17 |
| | | Chokkenahalli toll plaza | 51.40 | 49.98 | 53.18 | 50.53 | 46.93 | 51.26 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 122.50 | 126.74 | 137.80 | 134.07 | 143.57 | 140.23 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 195.37 | 232.75 | 247.62 | 248.43 | 232.48 | 256.58 |
| 04 | Chennai Tada | Nallur Toll Plaza | 131.70 | 124.21 | 135.09 | 138.40 | 137.63 | 154.08 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 71.72 | 69.63 | 68.83 | 64.70 | 67.29 | 76.85 |
| | | Surapattu Toll Plaza | 89.57 | 83.28 | 80.67 | 79.69 | 82.77 | 94.20 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | April 2025 | May 2025 | June 2025 | July 2025 | August 2025 | September 2025 |
|---|---|---|---|---|---|---|---|---|
| 01 | Neelmangla- | Kulumapalya | 54.53 | 58.24 | 55.37 | 58.46 | 58.12 | 55.26 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tumkur | toll plaza | | | | | | |
| | | Chokkenahalli toll plaza | 50.38 | 53.68 | 52.05 | 54.78 | 53.26 | 43.92 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 136.01 | 139.02 | 124.66 | 124.09 | 125.78 | 123.98 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 262.06 | 281.46 | 273.49 | 275.87 | 243.42 | 249.80 |
| 04 | Chennai Tada | Nallur Toll Plaza | 148.75 | 149.63 | 151.78 | 165.52 | 159.04 | 157.16 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 76.48 | 82.45 | 79.33 | 85.15 | 83.65 | 79.81 |
| | | Surapattu Toll Plaza | 91.68 | 97.92 | 97.37 | 103.24 | 100.95 | 96.18 |

*(in ₹ million)*

| S. No. | Asset Name | Plaza Name | October 2025 | November 2025 | December 2025 |
|---|---|---|---|---|---|
| 01 | Neelmangla-Tumkur | Kulumapalya toll plaza | 55.02 | 54.68 | 62.07 |
| | | Chokkenahalli toll plaza | 43.28 | 42.86 | 49.78 |
| 02 | Gorhar-Barwa adda | Ghanghri Toll Plaza | 117.38 | 139.27 | 141.65 |
| 03 | Vijayawada | Kaza Toll Plaza Mangaliri | 239.61 | 246.20 | 250.13 |
| 04 | Chennai Tada | Nallur Toll Plaza | 140.16 | 146.17 | 155.05 |
| 05 | Chennai Bypass | Vanagram Toll Plaza | 73.13 | 71.84 | 76.77 |
| | | Surapattu Toll Plaza | 86.12 | 89.71 | 93.07 |

**AUDITED FINANCIAL INFORMATION**

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**A. R. & Co.**
Chartered Accountants

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Plot No-27, Sector-10, Dwarka,
New Delhi-110075
Cell No.9810195084, 9810444051
E-mail: ar_co1981@yahoo.co.in
pawankgoel1@gmail.com

**INDEPENDENT AUDITORS' REPORT**

To,
The Board of Directors
Raajmarg Infra Investment Managers Private Limited
(Investment Manager of Raajmarg Infra Investment Trust)
G-5 & 6, Sector-10,
Dwarka, Delhi-110075

**Opinion**

We have audited the special purpose standalone financial statements of Raajmarg Infra Investment Trust ("the Trust"), which comprise the special purpose standalone balance sheet as at 31st December, 2025, the special purpose standalone statement of profit and loss (including other comprehensive income) for the period from 24th November 2025 to 31st December 2025, and the special purpose standalone statement of cash flows for the period from 24th November, 2025 to 31st December, 2025, the special purpose Statement of Net Assets at fair value for the period from 24th November, 2025 to 31st December, 2025, the special purpose Statement of Total Returns at fair value and the special purpose Statement of Net Distributable Cash Flows ("NDCFs") for the period from 24th November, 2025 to 31st December, 2025 and notes to the special purpose standalone financial statements, including a summary of the material accounting policies ("the special purpose standalone financial statements") and other explanatory information, as required by Indian Accounting Standard 34, "Interim Financial Reporting" ("Ind AS 34") and other accounting principles generally accepted in India.

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid special purpose standalone financial statements give the information required by the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended from time to time including any guidelines and circulars issued thereunder (together referred to as the "SEBI InvIT Regulations") in the manner so required and give a true and fair view in conformity with Ind AS 34 and other accounting principles generally accepted in India, to the extent not inconsistent with SEBI InvIT Regulations, of the state of affairs of the Trust, as at 31st December, 2025, Profit and other comprehensive income for the period from 24th November, 2025 to 31st December, 2025, its cash flows for the period from 24th November, 2025 to 31st December, 2025, its statement of changes in Unitholder's equity for the period from 24th November, 2025 to 31st December, 2025, its net assets at fair value as at 31st December, 2025, its total returns at fair value and the net distributable cash flows of the Trust for the period from 24th November, 2025 to 31st December, 2025.

**A. R. & Co.**
Chartered Accountants

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pawankgoel1@gmail.com

**Basis for Opinion**

We conducted our audit in accordance with the Standards on Auditing ("SAs") issued by the Institute of Chartered Accountants of India. Our responsibilities under those SAs are further described in the Auditor's Responsibilities for the Audit of the Special purpose standalone financial statements section of our report. We are independent of the Trust in accordance with the Code of Ethics issued by the Institute of Chartered Accountants of India together with the ethical requirements that are relevant to our audit of the special purpose standalone financial statements under the provisions of the SEBI InvIT Regulations, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the Code of Ethics. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

**RESPONSIBILITIES OF THE BOARD OF DIRECTORS OF INVESTMENT MANAGER FOR THE SPECIAL PURPOSE STANDALONE FINANCIAL STATEMENTS**

The Board of Directors of Raajmarg Infra Investment Managers Private Limited (Investment Manager) is/are responsible for the preparation of these special purpose standalone financial statements that give a true and fair view of the state of affairs, profit and other comprehensive income , cash flows and the movement of the Unitholder's equity for the period from 24th November, 2025 to 31st December, 2025, the net assets at fair value as at 31st December, 2025, the total returns at fair value and the net distributable cash flows of the Trust in accordance with the requirements of the SEBI InvIT Regulations, Indian Accounting Standards as defined in Rule 2(1)(a) of Companies (Indian Accounting Standards) Rules, 2015, as amended and other accounting principles generally accepted in India, to the extent not inconsistent with SEBI InvIT Regulations.
This responsibility also includes maintenance of adequate accounting records in accordance with the provisions of the SEBI Invit Regulations for safeguarding of the assets of the Trust and for preventing and detecting frauds and other irregularities; selection and application of appropriate accounting policies; making judgments and estimates that are reasonable and prudent; and design, implementation and maintenance of adequate internal financial controls that were operating effectively for ensuring accuracy and completeness of the accounting records, relevant to the preparation and presentation of the special purpose standalone financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

In preparing the special purpose standalone financial statements, the Board of Directors of Investment Manager are responsible for assessing the Trust's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the management either intends to liquidate the Trust or to cease operations, or has no realistic alternative but to do so.

**A. R. & Co.**
Chartered Accountants

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pawankgoel1@gmail.com

The Board of Directors of Investment Manager are also responsible for overseeing the Trust's financial reporting process.

**Auditor's Responsibilities for the Audit of the Special purpose standalone financial statements**

Our objectives are to obtain reasonable assurance about whether the special purpose standalone financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these special purpose standalone financial statements.

As part of an audit in accordance with SAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the special purpose standalone financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Trust's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Trust's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the special purpose standalone financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence

**A. R. & Co.**
Chartered Accountants

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obtained up to the date of our auditors' report. However, future events or conditions may cause the Trust to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the special purpose standalone financial statements, including the disclosures, and whether the special purpose standalone financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

**For A. R. & Co.**
**Chartered Accountants**
**FRN. 002744C**

**CA Mohd. Azam Ansari**
**Partner**
**Membership No: 511623**
**UDIN: 26511623UACYIH3626**
**Place: New Delhi**
**Date: 12.01.2026**

**RAAJMARG INFRA INVESTMENT TRUST**

**SEBI Registration Number :- IN/InvIT/25-26/0034**

**SPECIAL PURPOSE STANDALONE BALANCE SHEET AS AT 31 DECEMBER, 2025**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Notes | As at 31 December, 2025 |
|---|---|---|
| **Assets** | | |
| **1) Non - Current Assets** | | |
| (a) Financial Assets | | |
| (i) Investments | | - |
| (ii) Loans | | - |
| (iii) Other Financial Assets | | - |
| (b) Other Non-Current Assets | | - |
| **Total non current assets** | | **-** |
| **2) Current Assets** | | |
| (a) Financial Assets | | |
| (i) Cash and Cash Equivalents | | - |
| (ii) Other Financial Assets | | - |
| (b) Current Tax Assets (Net) | | - |
| (c) Other Current Assets | 4 | 0.01 |
| **Total current assets** | | **0.01** |
| **Total Assets** | | **0.01** |
| **Equity and Liabilities** | | |
| **Equity** | | |
| 1) Unit Capital | 5 | - |
| 2) Initial Settlement Amount | | 0.01 |
| 3) Other Equity | | - |
| **Total Equity** | | **0.01** |
| **Liabilities** | | |
| **1) Non-Current Liabilities** | | |
| (a) Financial Liabilities | | |
| (i) Borrowings | | - |
| **Total Non-Current Liabilities** | | **-** |
| **2) Current Liabilities** | | |
| (a) Financial Liabilities | | |
| (i) Borrowings | | - |
| (ii) Trade Payables | | |
| (a) Total Outstanding, dues of micro and small enterprises | | - |
| (b) Total outstanding, dues of creditors other than micro and small enterprises | | - |
| (iii) Other Financial Liabilities | | - |
| (b) Current Tax Liabilities (Net) | | - |
| (c) Other Current Liabilities | | - |
| **Total Current Liabilities** | | **-** |
| **Total Equity and Liabilities** | | **0.01** |

**The accompanying notes form an integral part of these financial statements**
This is the Balance Sheet referred to in our report of even date.

**For A.R. & Co.**
**Chartered Accountants**
**FRN - 002744C**

**For and on behalf of Board of Directors of the**
**Raajmarg Infra Investment Managers Private Ltd.**
**(acting as Investment Manager of Raajmarg Infra Investment Trust)**

**CA Mohd. Azam Ansari**
**Partner**
**MRN - 511623**

**NRVVMK Rajendra Kumar**
**Director**
**DIN: 09494456**

**Ashish Kumar Singh**
**Director**
**DIN: 09841587**

**Date : 12.01.2026**
**Place : New Delhi**

**Mridul Dubey**
**CFO**

**Gunjan Rajpal**
**Compliance Officer**

**RAAJMARG INFRA INVESTMENT TRUST**

**SEBI Registration Number :- IN/InvIT/25-26/0034**

**SPECIAL PURPOSE STANDALONE STATEMENT OF PROFIT AND LOSS**

**FOR THE PERIOD ENDED 31 DECEMBER, 2025**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Notes | For the Period ended 31 December, 2025 |
|---|---|---|
| **Income and Gains** | | |
| Interest income on loan given to subsidiaries | | - |
| Interest Income on fixed deposits | | - |
| Profit on sale of investments | | - |
| Other income | | - |
| **Total Income** | | **-** |
| **Expenses** | | |
| Investment Manager Fees | | - |
| Trustee Fees | | - |
| Valuation expenses | | - |
| Annual listing fees | | - |
| Rating fees | | - |
| Audit Fees | | |
| - Statutory audit fees | | - |
| - Other audit services (including certification) | | - |
| Custodian Fees | | - |
| Finance Cost | | - |
| Other Expenses | | - |
| **Total Expenses** | | **-** |
| | | |
| **Profit before Tax** | | **-** |
| **Tax Expenses** | | |
| Current Tax | | - |
| Current tax - earlier years | | |
| Deferred Tax expense/(credit) | | |
| **Total Tax** | | - |
| | | |
| **Profit after Tax** | | - |
| **Other Comprehensive Income** | | |
| A (i) Items that will not be reclassified to Profit or Loss | | - |
| (ii) Income tax relating to items that will not be reclassified to profit or loss | | - |
| B (i) Items that will be reclassified to Profit or Loss | | - |
| (ii) Income tax relating to items that will not be reclassified to profit or loss | | - |
| | | - |
| **Total Comprehensive Income for the period/year** | | **-** |
| **Earnings per Unit** | | |
| Basic | | - |
| Diluted | | - |

**The accompanying notes form an integral part of these financial statements.**
This is the Statement of Profit and Loss referred to in our report of even date.

**For A.R. & Co.**

**Chartered Accountants**
**FRN - 002744C**

**For and on behalf of Board of Directors of the Raajmarg Infra Investment Managers Private Ltd. (acting as Investment Manager of Raajmarg Infra Investment Trust)**

**CA Mohd. Azam Ansari**
**Partner**
**MRN - 511623**

**NRVVMK Rajendra Kumar**
**Director**
**DIN: 09494456**

**Ashish Kumar Singh**
**Director**
**DIN: 09841587**

**Date : 12.01.2026**
**Place : New Delhi**

**Mridul Dubey**
**CFO**

**Gunjan Rajpal**
**Compliance Officer**

**RAAJMARG INFRA INVESTMENT TRUST**
**SEBI Registration Number :- IN/InvIT/25-26/0034**
**SPECIAL PURPOSE STANDALONE STATEMENT OF CASH FLOWS**
**FOR THE PERIOD ENDED 31 DECEMBER, 2025**

*(All amounts are in ₹ millions unless otherwise stated)*

| | Particulars | For the Period ended 31 December, 2025 |
|---|---|---|
| **A.** | **Cash flows from operating activities** | |
| | Net Profit/(Loss) Before Tax | - |
| | **Adjustments:** | |
| | Finance Cost (net) | - |
| | Interest Income on Bank FDR | - |
| | Interest Income on Long Term Loan given to SPVs' | - |
| | Profit on redemption of Mutual Funds | - |
| | **Operating cash flows before Working Capital Changes** | - |
| | **Movements in Working Capital** | |
| | Decrease / (Increase) in Other Financial Assets | - |
| | Decrease / (Increase) in Other Current/ Non-Current Assets | - |
| | Increase / (Decrease) in Trade & Other Payables | - |
| | Increase / (Decrease) in Other Financial Liabilities | - |
| | Increase / (Decrease) in Other Current Liabilities | - |
| | Increase / (Decrease) in Current Tax Liabilities | - |
| | **Cash used in operating activities** | **-** |
| | Income Tax paid | - |
| | **Net Cash Flows from/(used in) operating activities -A** | **-** |
| **B.** | **Cash flows from investing activities** | |
| | Long Term Loans given | - |
| | Purchase of Non Current Investments | - |
| | Investment in FDR | - |
| | Profit on redemption of Mutual Funds | - |
| | Interest received on Long Term Loan given | - |
| | Interest Received from Bank | - |
| | **Net Cash Flows used in investing activities - B** | - |
| **C.** | **Cash flows from financing activities** | |
| | Proceeds from Issue of unit capital | - |
| | Expense incurred towards initial public debt offering | - |
| | Expense incurred towards institutional unit allotment | - |
| | Processing Fee paid | - |
| | Proceeds from Long Term Borrowings | - |
| | Distribution paid to unit holders | - |
| | Repayment of Long Term Borrowings | - |
| | Finance Costs Paid | - |
| | **Net Cash Flows from/(Used in) financing activities -C** | - |
| | Net Increase/Decrease in Cash and Cash equivalents (A+B+C) | - |
| | Cash and Cash Equivalents at the Beginning of the Period/Year | - |
| | **Cash and Cash Equivalents at the end of the Period/Year (Refer Note 8)** | **-** |

**Reconciliation of liabilities arising from Financing Activities pursuant to Ind AS 7- Statement of Cash Flows.**
Net Debt Recognition

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | For the Period ended 31 December, 2025 |
|---|---|
| **a)** Carrying amount of debt at the beginning of the period/year | - |
| **b)** Additional borrowings during the period/year | - |
| **c)** Repayments during the period/year | - |
| **d)** Other adjustments/settlements during the period/year | - |
| e) Transaction Cost adjustment | - |
| **f)** Carrying amount of debt at the end of the period/year | **-** |

**Note:**
(i) The above Statement of Cash Flows has been prepared under the indirect method as set out in "Ind AS 7 Statement of Cash Flows".
(ii) Amount in bracket represent outflows.
This is the Cash Flow Statement referred to in our report of even date.

**For A.R. & Co.**
**Chartered Accountants**
**FRN - 002744C**

**CA Mohd. Azam Ansari**
**Partner**
**MRN - 511623**

**Date : 12.01.2026**
**Place : New Delhi**

**For and on behalf of Board of Directors of the**
**Raajmarg Infra Investment Managers Private Ltd.**
**(acting as Investment Manager of Raajmarg Infra Investment Trust)**

**NRVVMK Rajendra Kumar**
**Director**
**DIN: 09494456**

**Ashish Kumar Singh**
**Director**
**DIN: 09841587**

**Mridul Dubey**
**CFO**

**Gunjan Rajpal**
**Compliance Officer**

**RAAJMARG INFRA INVESTMENT TRUST**
**SEBI Registration Number :- IN/InvIT/25-26/0034**
**SPECIAL PURPOSE STANDALONE STATEMENT OF CHANGES IN UNIT HOLDERS EQUITY**
**FOR THE PERIOD ENDED 31 DECEMBER, 2025**

**A. Initial Settlement Amount**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Amount |
|---|---|
| **Opening Balance** | **-** |
| Changes during the period | 0.01 |
| **Balance as at 31 December, 2025** | **0.01** |

**B. Unit Capital**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Number of unit | Amount |
|---|---|---|
| **Opening Balance** | **-** | **-** |
| Changes in unit capital | **-** | **-** |
| One time issue expenses | **-** | **-** |
| **Balance as at 31 December, 2025** | **-** | **-** |

**C. Other Equity**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Reserves and Surplus | Items of Other Comprehensive Income | Total |
|---|---|---|---|
| | | Items that will not be reclassified to profit or loss | |
| | Retained Earnings | Remeasurement of Defined Benefit Obligation/ Plan | |
| **Opening Balance** | **-** | **-** | **-** |
| Profit for the period | **-** | **-** | **-** |
| **Less:** | | | |
| Distribution to unit holders | | | |
| Interest | **-** | **-** | **-** |
| Other Income | **-** | **-** | **-** |
| **Balance as at 31 December, 2025** | **-** | **-** | **-** |

**For A.R. & Co.**
**Chartered Accountants**
**FRN - 002744C**

**CA Mohd. Azam Ansari**
**Partner**
**MRN - 511623**

**Date : 12.01.2026**
**Place : New Delhi**

**For and on behalf of Board of Directors of the**
**Raajmarg Infra Investment Managers Private Ltd.**
**(acting as Investment Manager of Raajmarg Infra Investment Trust)**

**NRVVMK Rajendra Kumar**
**Director**
**DIN: 09494456**

**Ashish Kumar Singh**
**Director**
**DIN: 09841587**

**Mridul Dubey**
**CFO**

**Gunjan Rajpal**
**Compliance Officer**

**RAAJMARG INFRA INVESTMENT TRUST**
**SEBI Registration Number :- IN/InvIT/25-26/0034**
**Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025**
**Disclosures pursuant to SEBI circulars (as required by paragraph 6 of chapter 4 to the SEBI Master Circular No.SEBI/HO/DDHS-PoD-2/P/CIR/2024/44 dated May 15, 2024)**

**Standalone Statement of Net Assets at Fair Value**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | As at 31 December, 2025 | |
|---|---|---|
| | Book value | Fair value^ |
| A. Assets | - | - |
| B. Liabilities (at book value) | - | - |
| **C. Net assets (A-B)** | **-** | **-** |
| D. No of units | - | - |
| **E. NAV (C/D)** | **-** | **-** |

**Standalone Statement of Total Return at Fair Value:**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | As at 31 December, 2025 |
|---|---|
| Total comprehensive income for the period/year (As per the Special Purpose Standalone Statement of Profit and Loss) | - |
| Add: Other changes in fair value for the | - |
| **Total return** | **-** |

**The accompanying notes form an integral part of the Special Purpose Standalone Financial Statements.**

This is the Standalone Statement of Net Assets at Fair Value and Standalone Statement of Total Return at Fair Value referred to in our report of even date.

**For A.R. & Co.**
**Chartered Accountants**
**FRN - 002744C**

**CA Mohd. Azam Ansari**
**Partner**
**MRN - 511623**

**Date : 12.01.2026**
**Place : New Delhi**

**For and on behalf of Board of Directors of the Raajmarg Infra Investment Managers Private Ltd. (acting as Investment Manager of Raajmarg Infra Investment Trust)**

**NRVVMK Rajendra Kumar**
**Director**
**DIN: 09494456**

**Ashish Kumar Singh**
**Director**
**DIN: 09841587**

**Mridul Dubey**
**CFO**

**Gunjan Rajpal**
**Compliance Officer**

**RAAJMARG INFRA INVESTMENT TRUST**

**SEBI Registration Number :- IN/InvIT/25-26/0034**

**Special Purpose Statement of Net Distributable Cash Flow for the Period ended 31 December, 2025**

**Additional disclosures as required by paragraph 6 of chapter 4 to the SEBI Master Circular No.SEBI/HO/DDHS-PoD-2/P/CIR/2024/44 dated May 15, 2024**

*(All amounts are in ₹ lakh unless otherwise stated)*

| S. No. | Particulars | Amount |
|---|---|---|
| 1 | **Cashflows from operating activities of the Trust** | 0.00 |
| 2 | (+) Cash flows received from SPV's / Investment entities which represent distributions of NDCF computed as per relevant framework (Refer Notes Below) | 0.00 |
| 3 | (+) Treasury income / income from investing activities of the Trust (interest income received from FD, any investment entities as defined in Regulation 18(5), tax refund, any other income in the nature of interest, profit on sale of Mutual funds, investments, assets etc., dividend income etc., excluding any Ind AS adjustments) | 0.00 |
| 4 | (+) Proceeds from sale of infrastructure / real estate investments, infrastructure / real estate assets or shares of SPVs/Holdcos or Investment Entity adjusted for the following | 0.00 |
| | • Applicable capital gains and other taxes | 0.00 |
| | • Related debts settled or due to be settled from sale proceeds | 0.00 |
| | • Directly attributable transaction costs | 0.00 |
| | • Proceeds reinvested or planned to be reinvested as per Regulation 18(16)(d) of REIT Regulations or Regulation 18(7) of InvIT Regulations or any other relevant provisions of the REIT/InvIT Regulations | 0.00 |
| 5 | (+) Proceeds from sale of infrastructure / real estate investments, infrastructure / real estate assets or sale of shares of SPVs/ Hold cos or Investment Entity not distributed pursuant to an earlier plan to re-invest as per Regulation 18(16)(d) of REIT Regulations or Regulation 18(7) of InvIT Regulations or any other relevant provisions of the REIT/InvIT Regulations, if such proceeds are not intended to be invested subsequently | 0.00 |
| 6 | (-) Finance cost on Borrowings, excluding amortisation of any transaction costs, recognized in Profit and Loss account of the Trust | 0.00 |
| 7 | (-) Debt repayment at Trust level (to include principal repayments as per scheduled EMI's except if refinanced through new debt including overdraft facilities and to exclude any debt repayments / debt refinanced through new debt in any form or equity raise) | 0.00 |
| 8 | (-) any reserve required to be created under the terms of, or pursuant to the obligations arising in accordance with, any: (i). loan agreement entered with lenders, or (ii). agreement pursuant to which the Trust operates or owns the infrastructure or real estate asset, or generates revenue or cashflows from such asset (such as, concession agreement, transmission services agreement, power purchase agreement, lease agreement, and any other agreement of a like nature, by whatever name called); or (iii). statutory, judicial, regulatory, or governmental stipulations; or (iv). such mandatory terms or conditions, which if breached (or not complied with) would result in the Trust losing the right to own or operate the relevant infrastructure asset or real estate asset | 0.00 |
| 9 | (-) any capital expenditure to the extent not funded by debt / equity or from reserves created in the earlier years | 0.00 |
| 10 | **NDCF at Trust level as at the beginning** | **0.00** |
| | **NDCF Distributed during the period** | **0.00** |
| | **Balance NDCF for December 2025** | **0.00** |

**Notes:**

1 In accordance with the SEBI circular no. SEBI/HO/DDHS-PoD-2/P/CIR/2024/44 dated May 15, 2024, the framework for computation of Net Distributable cash flows ("NDCF") is revised with effect from April 01, 2024. Accordingly, NDCF for the period ended 31 December, 2025, has been calculated and presented in accordance with the revised framework.

# RAAJMARG INFRA INVESTMENT TRUST
## SEBI Registration Number :- IN/InvIT/25-26/0034
## Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025

**1 TRUST INFORMATION AND NATURE OF OPERATIONS**

Raajmarg Infra Investment Trust ("Trust" or "InvIT") is an irrevocable Trust with Trust Deed executed on 24 November 2025 and registered with Sub Registrar IX Distt. South West Delhi having registration number 2025/16/IV/4177, in Book No : IV, Volume No. 3262, under the provisions of the Indian Trusts Act, 1882 on 01 December 2025.

It is registered under the Securities and Exchange Board of India (Infrastructure Investment Trust) Regulations, 2014 on 22 December 2025 having registration number IN/InvIT/25-26/0034.

The Trust was setup by National Highways Authority of India ("NHAI" or the "Sponsor"). The Trustee to the Trust is IDBI Trusteeship Services Limited (the "Trustee") and Investment Manager for the Trust is Raajmarg Infra Investment Managers Private Limited ("Investment Manager").

The Trust has been formed to invest in infrastructure assets primarily being in the road sector in India. The Trust's road projects will be implemented and held through special purpose vehicles ("Project SPVs"/ "Subsidiaries").

The registered office of Investment Manager is G-5 & 6, Sector-10, Dwarka, New Delhi - 110075.

**2 Basis of Preparation**

The financials comprises of the Balance Sheet, Statement of Profit and Loss, Cash Flow Statement, Statement of Changes in Equity and explanatory notes thereon of Raajmarg Infra Investment Trust, for the period ended 31st December 2025. The Special Purpose financial Information has been prepared in accordance with recognition and measurement principles laid down in Indian Accounting Standard 34- Interim Financial Reporting (Ind AS 34), as presribed in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015 (as amended) and other accounting principles generally accepted in India, to the extent not inconsistent with the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, as amended, the additional disclosures as required in Chapter 4 of SEBI Master Circular No. SEBI/HO/DDHS-PoD 2/P/CIR/2023/115 dated 06th July 2023 as amended including any guidelines and circulars issued thereunder ("SEBI Circulars/InvIT Regulations")

The financial statements were authorised for issue in accordance with resolution passed by the board of directors of the Investment Manager on 12.01.2026.

The audit of these Special Purpose Standalone Financial statements for the period ended 31 December, 2025 of RIIT has been carried out by the Statutory Auditors of RIIT.

**3 Material accounting policies and key sources of estimation uncertainities and critical judgements**

**A Material accounting policies**

The accounting policies adopted in preparation of these financial statements are consistent with those followed in preparation of the Trust's latest Annual Financial Statements.

**B Key sources of estimation uncertainities and critical judgements**

The preparation of the financial statements requires use of certain critical accounting estimates and judgements. It also requires the management to exercise judgement in the process of applying the Trust's accounting policies. The areas where judgements and estimates are significant to the financial statements or areas involving a higher degree of judgement or complexity are the same as those applied to the Trust's latest Annual Standalone Financial Statements.

## 4 Other Current Assets

*(All amounts are in ₹ millions unless otherwise stated)*

| **Particulars** | **As at 31 December, 2025** |
|---|---|
| Balance with Trustee (IDBI Trusteeship Services Ltd.) | 0.01 |
| **Total** | **0.01** |

As per the executed Trust Deed on 24.11.2025, the Trustee i.e. IDBI Trusteeship Services Limited holds an amount of Rs. 10,000/- towards the initial settlement of the InvIT Trust on behalf of the Trust. The said amount of Rs. 10,000/- were transferred to Trustee by the Sponsor i.e. NHAI on 31.10.2025 i.e. before the execution of the Trust Deed. This initial corpus shall be applied and governed by the Terms and Conditions of the Trust Deed.

**RAAJMARG INFRA INVESTMENT TRUST**
**SEBI Registration Number :- IN/InvIT/25-26/0034**
**Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025**

**5 Unit Capital**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | As at 31 December, 2025 | |
|---|---|---|
| | No of Units | Amount |
| **Unit Capital** | | |
| **Opening balance** | - | - |
| Add: Units issued during the year | - | - |
| Less: Issue expenses (refer note below) | - | - |
| **Balance as at year end** | - | - |

**Rights/ preferences and restrictions attached to Unit Capital**

Subject to the provisions of the InvIT Regulations, the indenture of funds, and applicable rules, regulations and guidelines, the rights of the unit holders include:

a) The beneficial interest of each unitholder shall be equal and limited to the proportion of the number of the units held by that unitholder to the total number of units.

b) Right to receive income or distributions with respect to the units held.
c) Right to attend the annual general meeting and other meetings of unit holders of the Trust.
d) Right to vote upon any matters/resolutions proposed in relation to the Trust.
e) Right to receive periodic information having a bearing on the operation or performance of the Trust in accordance with the InvIT Regulations.
f) Right to apply to the Trust to take up certain issues at meetings for unit holders approval.
g) Right to receive additional information, if any, in accordance with InvIT documents filed with Placement Memorandum.

In accordance with the InvIT Regulations, no unit holders shall enjoy superior voting or any other rights over any other unit holders, and there shall not be multiple classes of units. There shall be only one denomination of units. Not withstanding the above, subordinate units may be issued only to the Sponsor and its Associates, where such subordinate units shall carry only inferior voting or any other rights compare to the other units.

Under the provisions of the InvIT Regulations, not less than 90% of the net distributable cash flows of the Trust is required to be distributed to the unitholders, and in accordance with such statutory obligation the Trust has formulated a distribution policy to declare and distribute the distributable cash flows to its unitholders atleast once every financial year as approved by the Board of Directors of the Investment Manager. The distributions made by Trust to its unitholders are based on the Net Distributable Cash Flows (NDCF) of the Trust under the InvIT Regulations. The distribution in proportion to the number of units held by the unitholders. The Trust declares and pays in distributions in Indian rupees.

**Limitation to the Liability of the unit holders**
The liability of each unit holders towards the payment of any amount (that may arise in relation to the Trust including any taxes, duties, fines, levies, liabilities, costs or expenses) shall be limited only to the extent of the capital contribution of such unit holders and after such capital contribution shall have been paid in full by the unit holders, the unit holders shall not be obligated to make any further payments.
The unit holders shall not have any personal liability or obligation with respect to the Trust.

**RAAJMARG INFRA INVESTMENT TRUST**
**SEBI Registration Number :- IN/InvIT/25-26/0034**
**Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025**

**Classification of Unit Holders' Funds**

Under the provisions of the InvIT Regulations, RIIT is required to distribute to Unitholders not less than ninety percent of the net distributable cash flows of RIITfor each financial year. Accordingly, a portion of the unitholders' funds contains a contractual obligation of the Trust to pay to its Unitholders cash distributions. The Unitholders' funds could therefore have been classified as compound financial instrument which contain both equity and liability components in accordance with Ind AS 32 - Financial Instruments: Presentation. However, in accordance with SEBI Circulars (No. CIR/IMD/DF/114/2016 dated 20-Oct-2016 and No. CIR/IMD/DF/127/2016 dated 29-Nov-2016) issued under the InvIT Regulations, the unitholders' funds have been classified as equity in order to comply with the mandatory requirements of Section H of Annexure A to the SEBI Circular dated 20-Oct-2016 dealing with the minimum disclosures for key financial statements. In line with the above, the distribution payable to unit holders is recognised as liability when the same is approved by the Investment Manager.

**Details Of Unitholders Holding More Than 5% Units In The Trust**

| Name Of Unitholders | As at 31 December, 2025 | |
|---|---|---|
| | No. of Units | % |
| | | |
| | | |
| | | |
| | | |

As per records of the Trust, including its register of unitholders and other declaration received from unitholders regarding beneficial interest, the above unitholding represent both legal and beneficial ownership of units.

The Trust has not allotted any fully paid-up units by way of bonus units nor has it bought back any class of units from the date of incorporation till the balance sheet date. Further the Trust has not issued any units for consideration other than cash during the period/year.

**Reconciliation of Number of Units Outstanding is set out below*:**

| Particulars | As at 31 December, 2025 | |
|---|---|---|
| | No of Units | Amount (amounts in ₹ millions) * |
| Number of Units at the beginning of the period/year | | |
| Units issued during the period/year | | |
| Number of Units at the end of the period/year | | |

* Amount related to issue expenses are not deducted in the reconciliation of number of unit capital outstanding.

**RAAJMARG INFRA INVESTMENT TRUST**
**SEBI Registration Number :- IN/InvIT/25-26/0034**
**Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025**

**6 Statement of Related Parties**

**A. List of Related Parties as per requirement of IND AS 24 – "Related Party Disclosures"**

| | |
|---|---|
| **Enterprises where Control / significant influence exists** | |

**B. List of additional related parties as per Regulation 2(1)(zv) of the SEBI InvIT Regulations**

**Parties to the Trust**

Raajmarg Infra Investment Managers Private Limited (RIIMPL) - Investment Manager (IM) of the Trust
IDBI Trusteeship Services Limited (ITSL) - Trustee of the Trust
National Highways Authority of India (NHAI)- Sponsor
National Highways InvIT Project Managers Private Limited (NHIPMPL)- Project Manager

**Promoters of the Parties to the Trust specified above**

Government of India (acting through Ministry of Road, Transport & Highways (MORTH)) - Promoter of RIIMPL
IDBI Bank Limited (IDBI Bank) - Promoter of ITSL
Government of India (acting through Ministry of Road, Transport & Highways (MORTH)) - Promoter of NHAI
National Highways Authority of India (NHAI)- Promoter of NHIPMPL

**Directors of the parties to the Trust specified above**

**Directors of RIIMPL**

Mr. NRVVMK Rajendra Kumar
Mr. Ashish Kumar Singh
Ms. Annie George Mathew
Mr. Giridhar Aramane
Mr. Himanshu Gulliani
Mr. DIP Kishore

**Directors of ITSL**

Ms. Jayakumar Subramonia Pillai
Mr. Pradeep Kumar Malhotra
Mr. Balkrishna Variar
Mr. Arun Kumar Agarwal
Mr. Hare Krushna Dandapani Panda
Mr. Soma Nandan Satpathy
Mr. Kumar Neel Lohit

**Directors of NHIPMPL**

Mr. Akhil Khare
Mr. Ashish Kumar Singh

**C. Transactions with Related Parties**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Period ended 31 December, 2025 |
|---|---|
| **Raajmarg 1 Projects (P) Ltd.** | |
| **National Highways Infra Investment Managers Private Limited (NHIIMPL)** | |
| **National Highways Authority of India (NHAI)** | |
| Initial Settlement Amount | 0.01 |
| **IDBI Trusteeship Services Limited (ITSL)** | |
| **IDBI Bank Limited** | |

**D. Closing Balances with Related Parties**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | As at 31 December, 2025 |
|---|---|
| **Raajmarg 1 Projects (P) Ltd.** | |
| **National Highways Infra Investment Managers Private Limited (NHIIMPL)** | |
| **National Highways Authority of India (NHAI)** | |
| Initial Settlement Amount | 0.01 |
| **IDBI Trusteeship Services Limited (ITSL)** | |
| **IDBI Bank Limited** | |

**RAAJMARG INFRA INVESTMENT TRUST**

**SEBI Registration Number :- IN/InvIT/25-26/0034**

**Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025**

**7 Statement of Contingent Liabilities/Contingent Assets**

There are no contingent liabilities as at 31 December, 2025

**8 Distribution made**

*(All amounts are in ₹ millions unless otherwise stated)*

| Particulars | Period ended 31 December, 2025 |
|---|---|
| Interest | - |
| Return of capital | |
| Dividend | |
| Other income of the Trust | - |
| **Total** | **-** |

**9 Disclosure of segment information pursuant to IND AS 108 "Operating Segments"**

The activities of the Trust mainly include investing in infrastructure assets primarily in the SPVs operating in the road sector to generate cash flows for distribution to unit holders. Based on the guiding principles given in Ind AS - 108 “Operating Segments”, this activity falls within a single operating segment. Further, the entire operations of the Trust are only in India and hence, disclosure of secondary / geographical segment information does not arise. Accordingly, requirement of providing disclosures under Ind AS 108 does not arise.

**10 Investment Management Fees**

i) The Investment Manager's Management Fee has been agreed at Rs.11.0 Crores from the Financial Year 2026-27 onwards.

ii) The management fee set out in paragraph (i) above shall be subject to escalation on an annual basis at the rate of 10% of the management fee for each previous year.

iii) Any applicable taxes, cess or charges, as the case may be, shall be in addition to the management fee and shall be payable by Raajmarg Infra Investment Trust (RIIT) to the Investment Manager (RIIMPL).

iv) Management fee payment frequency: Payment of management fee shall be made by Raajmarg Infra Investment Trust (RIIT) to the Investment Manager (RIIMPL) in advance on a quarterly basis at the beginning of each quarter of the financial year.

**11 Key sources of estimation**

The preparation of financial statements in conformity with Ind AS requires the Trust makes estimates and assumptions that affect the reported amounts of income and expenses of the period, the reported balances of assets and liabilities and the disclosures relating to contingent liabilities as of the date of the financial statements. The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates include allowance for doubtful loans /other receivables, fair value measurement etc. Difference, if any, between the actual results and estimates is recognised in the period in which the results are known.

**RAAJMARG INFRA INVESTMENT TRUST**

**SEBI Registration Number :- IN/InvIT/25-26/0034**

**Notes to Special Purpose Standalone Financial Statements for the period ended 31 December, 2025**

**12 Disclosure pursuant to Ind AS 23 "Borrowing Costs"**

Borrowing cost capitalised during the period ended 31 December, 2025 Rs. Nil

**13 Default and breaches**

There are no defaults during the year with respect to repayment of principal and payment of interest and no breaches of the terms and conditions of the borrowings. There are no breaches during the year which permitted lender to demand accelerated payment.

**14** The financial statements of the Trust are the first financial statements prepared under Ind AS, comparative information for the previous period has not been presented. Accordingly, the figures for the current period are not comparable with those of any prior period.

**For A.R. & Co.**
**Chartered Accountants**
**FRN - 002744C**

**CA Mohd. Azam Ansari**
**Partner**
**MRN - 511623**

**Date : 12.01.2026**
**Place : New Delhi**

**For and on behalf of Board of Directors of the Raajmarg Infra Investment Managers Private Ltd. (acting as Investment Manager of Raajmarg Infra Investment Trust)**

**NRVVMK Rajendra Kumar**
**Director**
**DIN: 09494456**

**Ashish Kumar Singh**
**Director**
**DIN: 09841587**

**Mridul Dubey**
**CFO**

**Gunjan Rajpal**
**Compliance Officer**

**PROJECTIONS OF REVENUE FROM OPERATIONS AND CASH FLOW FROM OPERATING ACTIVITIES**

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**A. R. & Co.**
Chartered Accountants

A-403, Gayatri Apartments
Plot No-27, Sector-10, Dwarka,
New Delhi-110075
Cell No.9810195084, 9810444051
E-mail: ar_co1981@yahoo.co.in
pawankgoel1@gmail.com

**Independent Auditor's Report on financial projections of revenue from operations and cash flow from operating activities and underlying assumptions**

To,
The Board of Directors of
Raajmarg Infra Investment Managers Private Limited
**("RIIMPL" or "Investment Manager")**
in its capacity as the **Investment Manager** of
Raajmarg Infra Investment Trust
**("InvIT" or "RIIT" or "Trust")**

G – 5 & 6, Sector - 10, Dwarka,
New Delhi – 110 075

1. We have examined the accompanying Statement of financial projections of revenue from operations and cash flow from operating activities and the underlying assumptions of the Raajmarg Infra Investment Trust **(the "Trust")**, Raajmarg 1 Projects Private Limited (referred to as the **"Project SPV"**) (the Trust and Project SPVs together referred to as 'Trust Group'), for the years ending March 31, 2026, March 31, 2027, March 31, 2028 and March 31, 2029 along with basis of preparation and the significant assumptions (Statement of financial projections along with the related assumptions for the Trust Group are hereinafter referred to as the "Financial Projection Information") , annexed to this report for the purpose of inclusion in the Offer Document and Final Offer Document (collectively, the "Offer Documents") prepared by Raajmarg Infra Investment Managers Private Limited (the **"Investment Manager")** in connection with the proposed Initial Public Offering of Units of the Trust (the **"Offering").** The Project SPV is owned by the Trust and the Project Assets are proposed to be transferred from the Sponsor to the Project SPV.

2. The preparation and presentation of the Financial Projection Information, including the underlying assumptions, as set out in Note 3 to Financial Projection Information, is the responsibility of the Investment Manager and has been approved by Board of Directors of the Investment Manager in its meeting held on 12.01.2026. Our report on the financial projection information is based on the Final Valuation Report obtained by the management from Registered Valuers i.e. RBSA Valuation Advisors LLP who have submitted their final signed valuation report to the management on 12.01.2026. Our responsibility is to examine the evidence supporting the assumptions (excluding hypothetical assumptions) and other information to the Projection Information. Our responsibility does not include verification of projections. Therefore, we do not vouch for the accuracy of the same.

3. The Projection Information has been prepared by the Investment Manager in accordance with the requirements of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 issued by the Securities and Exchange Board of India

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("SEBI"), as amended from time to time and any circulars issued thereunder (the "lnvlT Regulations") for inclusion in the Offer Documents using a set of assumptions that include hypothetical assumptions about future events and management's actions that are not necessarily expected to occur, as set out in Note 3 to the Projection Information and has been approved by the Board of Directors of the Investment Manager. Consequently, users are cautioned that the Projection Information may not be appropriate for purposes other than that described above.

4. We have examined the evidence supporting the assumptions and other information in the Projection Information on a test basis taking into consideration:
   (a) the terms of our engagement agreed with you vide our engagement letter dated 19.12.2025 requesting us to carry out work on the Projection Information, proposed to be included in the Offer Documents; and
   (b) Standard on Assurance Engagement 3400, "The Examination of Prospective Financial Information", issued by the Institute of Chartered Accountants of India.

5. Based on our examination of the evidence supporting the assumptions (excluding the hypothetical assumptions mentioned in Note 3 to the Projection Information), read with para 7 below, nothing has come to our attention which causes us to believe that such assumptions do not provide a reasonable basis for the Projection Information.

6. Further, nothing has come to our attention that causes us to believe, that the Projection Information, read with the Basis of Preparation and notes therein, has not been properly prepared on the basis of the assumptions as set out in Note 3 to the Projection Information and on a consistent basis, to the extent applicable, with the accounting policies and the basis of preparation of the historical Special Purpose Combined Financial Statements of the Trust Group as required by the lnvlT Regulations, prepared in accordance with Indian Accounting Standards as defined in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015 prescribed under Section 133 of the Companies Act, 2013. Our report on such historical Special Purpose Combined Financial Statements expressed unmodified opinion.

7. We draw attention to Note 3 to the Projection Information, the management of Investment Manager has assumed hypothetical assumptions in preparation of Projection Information. Our conclusion is not modified in respect of this matter.

8. Events and circumstances frequently do not occur as expected. Even if the events anticipated under the hypothetical assumptions described above occur, actual results are still likely to be different from the Projection Information since other anticipated events frequently do not occur as expected and the variation may be material. The actual results may therefore differ materially from those forecasted and projected. For the reasons set out above, we do not express any opinion as to the possibility of achievement of the Projection Information.

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9. lnvlT Regulations require the independent auditor to issue a report on the Projection Information and this report is issued for the sole purpose of the Offering in accordance with Indian lnvlT Regulations. Our work has not been carried out in accordance with auditing or other standards and practices generally accepted in jurisdictions outside India, including in the United States of America, and accordingly should not be relied upon as if it had been carried out in accordance with those standards and practices. US securities regulations do not require profit forecasts to be reported on by a third party. This report should not be relied upon by prospective investors in the United States of America, including persons who are Qualified Institutional Buyers as defined under Rule 144A under the United States Securities Act of 1933 participating in the Offering. We accept no responsibility and deny any liability to any person who seeks to rely on this report and who may seek to make a claim in connection with any offering of securities on the basis that they had acted in reliance on such information under the protections afforded by United States of America law and regulation.

10. We have no responsibility to update our report for events and circumstances occurring after the date of the report.

11. This report is intended solely for inclusion in the Offer Documents in connection with the Offering. It should not be used by any other person or for any other purpose. Accordingly, we do not accept or assume any liability or any duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come.

For A.R. & Co.
Chartered Accountants
FRN: 002744C

CA. Mohd. Azam Ansari
Partner
MRN: 511623
UDIN: 26511623TYJEYN8172
Place: Delhi
Date: January 12, 2026

**RAAJMARG INFRA INVESTMENT TRUST**
Statement of Projections of Revenue from Operations
And
Cash Flow from Operating Activities

***₹ Millions***

| **Year Start** | **1-Jan-26** | **1-Apr-26** | **1-Apr-27** | **1-Apr-28** |
|---|---|---|---|---|
| **Year End** | **31-Mar-26** | **31-Mar-27** | **31-Mar-28** | **31-Mar-29** |
| | | | | |
| **Trust** | | | | |
| Revenue from Operations | 0.00 | 10,463.83 | 10,709.19 | 10,701.73 |
| Cash Flow from Operating Activities | 0.00 | 8,572.75 | 10,607.70 | 10,958.03 |
| | | | | |
| **Project SPV** | | | | |
| Revenue from Operations | 0.00 | 9,258.00 | 11,280.35 | 11,806.52 |
| Cash Flow from Operating Activities | 0.00 | 8,766.30 | 10,764.10 | 11,129.92 |
| | | | | |
| **Combined (Trust & Project SPV)** | | | | |
| Revenue from Operations | 0.00 | 9,258.00 | 11,280.35 | 11,806.52 |
| Cash Flow from Operating Activities | 0.00 | 8,621.50 | 10,605.20 | 10,955.53 |
| | | | | |

** Cashflow from operating activities are reported before taxes (Refer note 3 of Significant assumptions for the Projections).*

For and on behalf of the Board of Directors of
Raajmarg Infra Investment Managers Private Limited
(as Investment Manager of Raajmarg Infra Investment Trust)

Ashish Kumar Singh
Director
DIN: 09841587
Place: Delhi
Date: January 12, 2026

**Raajmarg Infra Investment Trust**
**Notes to the Statement of projections of**
**Revenue from Operations**
**And**
**Cash Flow from Operating Activities**

## 1. General Information:

Raajmarg Infra Investment Trust **("RIIT" or the "Trust")** was setup as an irrevocable trust under the Indian Trust Act, 1882 registered as an Infrastructure Investment Trust ("InvlT") with Securities Exchange Board of India ("SEBI") under the SEBI (Infrastructure Investment Trust) Regulations, 2014 vide Certificate of Registration (IN/lnvlT/25-26/0034) dated December 22, 2025

National Highways Authority of India **("NHAI" or the "Sponsor")** is the sponsor of the Trust. The Trustee to the Trust is IDBI Trusteeship Services Limited **(the "Trustee")**. Investment Manager for the Trust is Raajmarg Infra Investment Managers Limited **("RIIMPL" or the "Investment Manager")** and the Project Manager for the Trust is National Highways Infra Project Managers Private Limited **("NHIPMPL" the "Project Manager")**.

The object and purpose of the Trust, as described in the Trust Deed, is to carry on the activity of an infrastructure investment trust as permissible under SEBI (Infrastructure Investment Trusts) Regulations, 2014 as amended from time to time including circulars, notifications, clarifications and guidelines issued thereunder (the "InvIT Regulations") to raise funds through the Trust, to make investments in accordance with the InvIT Regulations and the investment strategy and to carry on the activities as may be required for operating the Trust, including incidental and ancillary matters thereto.

Raajmarg 1 Projects (P) Ltd. is the Project SPV which is owned by Trust **(the "Project SPV")**. While preparing financial projections of the Project SPV, following assets have been considered which are proposed to be transferred to the Project SPV:

| S. No. | Corridor Code | Corridor Name | Asset Code | Toll plaza Name | State | Number of Plazas |
|---|---|---|---|---|---|---|
| 1 | GBA | Gorhar Barwa Adda | Ku | Kulgo | Jharkhand | 1 |
| 2 | VC | Vijayawada Chilakaluripet | Ka | Kaza | Andhra Pradesh | 1 |
| 3 | CB | Chennai Bypass | Va | Vanagram* | Tamil Nadu | 2 |
| | | | Su | Surapattu | Tamil Nadu | |
| 4 | CT | Chennai Tada | Na | Nallur* | Tamil Nadu | 1 |
| 5 | NT | Nelamangala Tumakuru | Kul | Kulumepalya | Karnataka | 2 |
| | | | Ch | Chokkenahalli | Karnataka | |

** As per Traffic Due Diligence report of December 2025, toll plaza at Vanagaram is proposed to be relocated to Tiruneermalai and toll plaza at Nallur Is proposed to be relocated to Durainallur*

## 2. Basis of preparation of projections of revenue from operations and cash flow from operating activities

The projection of revenue from operations and cash flows from operating activities ("Projections") of Project SPV and the Trust (collectively referred to as "Trust Group") for the financials years ending March 31, 2026, March 31, 2027, March 31, 2028 and March 31 2029 ("Projections period") along with the basis of preparation and other explanatory information and the significant assumptions (the "Statement of Projections") have been compiled by Investment Manager to the Trust and has been approved by the Board of Directors of the Investment Manager to the Trust solely for inclusion in the draft offer document/ offer document/ final offer document in connection with the listing. Therefore, the use of these Statement of Projections is not appropriate and should not be used or relied upon for any purpose other than described above.

The Statement of Projections have been prepared based on the accounting policies for recognition and measurement used for preparation of the Special Purpose Combined Financial Statements of the Trust Group in accordance with Indian Accounting Standards ("Ind AS") as defined in Rule 2(l)(a) of the Companies (Indian Accounting Standards) Rules, 2015, prescribed under Section 133 of the Companies Act, 2013 read with InvIT Regulations and the Guidance Note on Combined and Carved Out Financial Statements issued by the Institute of Chartered Accountants of India.

Though the aforesaid Projections are prepared using the principles of the Ind AS framework, they do not provide for all the detailed disclosures as required under Ind AS. Projected Operational cash flows of the SPVs and Trust have been calculated using the direct method under Ind AS 7- Statement of Cash Flows and is computed by deducting the projected operating expenses from the projected revenue from operations and non-cash expenses (if any). Projected cash flow from operations does not include any items pertaining to financing or investing nature. Cash flows from operating activities are reported before taxes.

The Statement of Projections are presented in Indian Rupees (INR/ ₹) which is also the functional currency of the Trust Group. All values are rounded to the nearest millions, unless otherwise indicated.

The Projections include the following information:

1. Projections of revenue from operations and operating cash flows for each of the SPV for the financial years ending March 31, 2026, March 31, 2027, March 31, 2028 and March 31, 2029.

2. Projections of revenue from operations and operating cash flows for the Trust Group for the financial years ending March 31, 2026, March 31, 2027, March 31, 2028 and March 31, 2029.

3. Summary of significant assumptions and other explanatory information. The Trust Group follows March 31 as its accounting year end.

It is clarified that the Statement of Projections have been prepared on the basis of a mixture of best-estimates (i.e., assumptions as to future events which are expected to take place and the actions expected to take place as of the date the information is prepared) and hypothetical assumptions (about future events and actions which may or may not necessarily take place).

**3. Significant assumptions:**

The Statement of Projections has been prepared based on the significant assumptions including hypothetical assumptions summarized below.

The Investment Manager has obtained the Traffic reports from the third-party traffic consultants ("Traffic Consultants") for its Project SPV and the Technical reports from third-party technical consultants ("Technical Consultants") in assessment of the assumptions, market fundamentals, industry drivers and outlook amongst other things for the preparations of the Statement of Projections. The names of the appointed consultants are as below:

| S. No. | Name of Consulatant | Job | Stretch |
|---|---|---|---|
| 1 | Chaitanya Projects Consultancy (P) Ltd. & Shree Bhawani Consultancy Services (P) Ltd. | Technical Due Diligence | Vijayawada-Chilakaluripet, Andhra Pradesh<br>Chennai Bypass, Tamil Nadu<br>Chennai - Tada, Tamil Nadi<br>Bangalore - Neelmangla - Tumkur, Karnataka |
| 2 | URS Scott Wilson India (P) Ltd. & Marc Technocrats (P) Ltd. | Technical Due Diligence | Barachatti - Gorhar, Jharkhand<br>Gorhar - Barwa Adda, Bihar/Jharkhand |
| 3 | Translink Infrastructure Consultant (P) Ltd. & Infra Brainiacs (P) Ltd. | Traffic Due Diligence | Barachatti - Gorhar, Jharkhand<br>Gorhar - Barwa Adda, Bihar/Jharkhand<br>Vijayawada-Chilakaluripet, Andhra Pradesh<br>Chennai Bypass, Tamil Nadu<br>Chennai - Tada, Tamil Nadi<br>Bangalor - Neelmangla - Tumkur, Karnataka |

The proposed assets to be acquired by Project SPVs are exclusively toll based projects as far as income of the Project SPV and Trust is considered. However, it is given to understand by the management that NHAI i.e. the Sponsor of the Trust has entered into certain contracts inter-alia for EPC, HAM, and Maintenance in respect of certain sections of the Proposed Specified Projects.

In respect of these projects management has represented expenses which are detailed hereinafter.

Revenue of the toll-based projects is based on and subject to various estimates, forecast and assumptions that are subjective in nature. The Traffic Reports and Statement of Projections consider current expectations and views on future influencing events and contain forecasts, projections and other forward-looking statements that relate to future events. The future traffic growth considered in the Statement of Projections are taking into consideration the factors like country's GDP growth, economic survey inputs, current and future growth of traffic in

the specific corridor of the project, traffic mix in the relevant geographical section of the project, development of alternative traffic options, both as competitive roads or as an alternative transport mode availability, demographic/industrial development in the vicinity of the project, fuel prices, local government policies on natural resources extraction, etc., as per the Report of the Traffic Consultant.

The Technical Reports and Statement of Projections consider current status of the maintenance requirement of the projects and future period expectation depending on the pattern of the traffic. It also considers the forecasted major maintenance need of the project based on the life expectancy of the structure of the road and its effectiveness in meeting the requisite quality expectations as per the Report of the Technical Consultant.

The Statement of Projections contains forecasts and projections that relate to future events including hypothetical assumptions, which by nature, are subject to significant risks and uncertainties. Events and circumstances may not occur as expected. Even if the events anticipated under the hypothetical assumptions that are considered in the Statement of Projects occur, actual outcomes could be different from those stated in the Statement of Projections.

However, the Investment Manager does not expect that actual traffic volumes to differ materially from the future traffic volumes expressed or implied in the Traffic Reports and reflected in these Statements of Projections. The Investment Manager considers these projections to be fair and reasonable as of the report date.

The assumptions used in the Projections by the Investment Manager are in line with the information and assumptions as per analysis of the industry experts.

The projections of the Trust Group have been prepared by combining the projections of revenue from operations and cash flows from operating activities of the Trust and Project SPV, eliminating transactions (vis., interest on loan) between the Trust and Project SPV and after considering following assumptions:

## A. Revenue from Operations: For Project SPV

Revenue from operations of the Project SPV consists of revenue from toll collection, and interest income. Revenue projections do not include any other income (operating or otherwise) as these have material in the Projections period.

### i. Revenue from Toll Collection

Revenue from toll collection is projected based on Traffic report obtained from the Traffic Consultant (the "Traffic Report"). The projections of revenue from operations is based on base case scenario who has based its report considering the actual traffic data for the period upto December 2025 and toll tariff rates for the financial year ending March 31, 2026. The key variables for toll income growth, tollable traffic growth, future traffic mix and the Wholesale Price Index ("WPI") are based on the Traffic Report.

NHAI has entered into toll collection arrangement with certain third parties for the specified projects which is expected to be extended by the Trust up to 31.03.2027.

The summary of the existing toll collections agreements is as under:

| S. No. | Corridor Name | Toll plaza Name | Toll Collection Contract Period | |
|---|---|---|---|---|
| | | | From | To |
| 1 | Gorhar Barwa Adda | Kulgo | 30.01.2025 | 30.01.2026 |
| 2 | Vijayawada Chilakaluripet | Kaza | 23.01.2025 | 23.01.2026 |
| 3 | Chennai Bypass | Vanagram | 15.04.2025 | 15.04.2026 |
| | | Surapattu | 13.09.2025 | 13.09.2026 |
| 4 | Chennai Tada | Nallur | 09.05.2025 | 09.05.2026 |
| 5 | Nelamangala Tumakuru | Kulumepalya | 14.11.2025 | 14.11.2026 |
| | | Chokkenahalli | 14.11.2025 | 14.11.2026 |

**Toll revenue for FY2027 comprises:**

a) Assured remittance from NHAI as per existing toll collection arrangement with third parties; and
b) Estimated revenue from the extension of Toll collection arrangement till 31.03.2027 is summarized below:

| S. No. | Corridor Name | FY 2027 ₹ in Millions |
|---|---|---|
| 1 | Gorhar Barwa Adda | 1,551 |
| 2 | Vijayawada Chilakaluripet | 2,257 |
| 3 | Chennai Bypass | 2,055 |
| 4 | Chennai Tada | 1,475 |
| 5 | Nelamangala Tumakuru | 1,920 |
| | **Total:** | **9,258** |

**Tollable Traffic Growth Projected**

| S. No. | Corridor Name | Tollable Traffic Growth (FY2027 to FY2041) |
|---|---|---|
| 1 | Gorhar Barwa Adda | 2.6% |
| 2 | Vijayawada Chilakaluripet | 2.0% |
| 3 | Chennai Bypass | 6.1% |
| 4 | Chennai Tada | 3.7% |
| 5 | Nelamangala Tumakuru | 1.7% |

The management has considered long-term forecast of WPI annual growth rate of 3.24% based on circular related macro-economic assumptions considered by NHAI while deciding an initial estimated concession value (IECV) i.e. average of past WPI growth trend for last 10 calendar years for – for 2024, available on the web portal of NHAI

| S. No. | Corridor Name | WPI Inflation Factor FY26-27 | Estimated WPI Inflation Factor for FY27-28 and subsequent years |
|---|---|---|---|
| 1 | Gorhar Barwa Adda | 0.25% | 3.24% |
| 2 | Vijayawada Chilakaluripet | 0.25% | 3.24% |
| 3 | Chennai Bypass | 0.25% | 3.24% |
| 4 | Chennai Tada | 0.25% | 3.24% |
| 5 | Nelamangala Tumakuru | 0.25% | 3.24% |

**Projected Toll Revenue**

Toll revenue growth for FY2027 and FY 2041 (inter-alia based on tollable traffic projected by the traffic consultants and toll rates based on WPI inflation estimate) is summarized below:

| S. No. | Corridor Name | Tollable Revenue Growth (base year FY2027) |
|---|---|---|
| 1 | Gorhar Barwa Adda | 6.7% |
| 2 | Vijayawada Chilakaluripet | 5.9% |
| 3 | Chennai Bypass | 10.4% |
| 4 | Chennai Tada | 8.7% |
| 5 | Nelamangala Tumakuru | 7.9% |

Further, the assumptions for the Traffic mix for the toll-based Project SPV considered by the Traffic Consultant as on the date of the report and by Board of Directors of the Investment Manager are tabulated in Annexure I to these notes.

**B. Operating Expenses: (For Project SPV)**

i. **Operation and maintenance expenses (Major Maintenance Expenses – MMR)**

Management has informed that NHAI has entered into certain contracts inter-alia for EPC, HAM, Maintenance in respect of certain sections of the specified projects. As per the aforementioned, management has represented that:

a) O&M expenses and MMR expenses during the tenor of the aforementioned contracts shall be borne by NHAI/ respective contractor.
b) EPC expenses/ Capital expenditure for six laning as per the aforementioned contracts shall be borne by NHAI;
c) Subsequent to the completion of the tenor of the aforementioned contracts, SPV shall be responsible for maintenance (O&M/MMR) for the Specified Projects and the same has been considered in Technical Study Reports accordingly.

ii. **Operation and Maintenance Expenses (Routine Maintenance):**

O&M Expenses for the Specified Projects for the Projected Period have been estimated

by the Management basis the Technical Study conducted by the Technical Consultants appointed by Trust. Further, SPV proposes to enter into a transitional support agreement with NHAI and National Highways Invit Project Managers Private Limited wherein NHAI will provide the Concessionaire and the Project Manager a transitional support in respect of its O&M obligations and Tolling Obligations and obligations under the Project Implementation and Management Agreement for a period of 30 months commencing from the Appointed Date. In consideration of the services to be rendered by NHAI, the Project SPV and the Project Manager will pay fees to NHAL, as per the transitional support agreement.

iii. **Major Maintenance & Repair Expenses (MMR/ Periodic maintenance):**

Periodic maintenance expenses are costs that are incurred to bring the road assets back to an earlier condition or to keep the road asset operating at its present condition. MMR Expenses have been estimated by the Management for the Projected Period basis the Technical Due Diligence Reports of the Technical Consultants.

iv. **Project Management (PM) Expenses:**

PM expenses shall be paid to the Project Manager for management of all the toll road projects. These expenses have been estimated by the Management considering the draft terms of the Project management agreement proposed to be entered into with the Project Manager.

v. **Insurance and Other Office Expenses:**

Like O&M Expenses, Insurance and Other Expenses have been estimated by the Management for the Projected Period basis the Technical Due Diligence Reports of the Technical Consultants.

As further understood from the Management that during the transition period of 30 months commencing from 1st April 2026, ATMS expenses, in relation to toll management systems and software, to the extent of 40% will be borne by the SPV and remaining 60% related to manpower and other costs will be borne by NHAI. As represented by the Management, the ATMS costs 40% of the overall toll collection costs are related to toll management systems and software. The same has been considered to arrive cash flows during the transition period for the valuation exercise.

Post transition period, these expenses for the Projected Period have been estimated by the Management basis the Technical Study conducted by the Technical Consultants appointed by Trust.

vi. **IM Expenses and Trust Expenses**

IM Expenses and Trust Expenses shall be paid by RIIT to the Investment Manager and Trust, respectively. These expenses have been estimated by the Management considering the draft terms of the proposed agreements to be entered into with the Investment Manager and the Trust.

vii. **Depreciation and Amortization**

One time lumpsum consideration for Service Concession to be paid to NHAI and future capital expenditure have been amortized over the period of concession (15 years) on the basis of projected revenues.

viii. **Taxes**

Income Taxes have been estimated considering, as appropriate, tax depreciation/ amortization policy to be followed by the SPV and the corporate income tax rate of 25.17%.

ix. **Capital Expenditure**

The Management has projected that major capital expenditure aggregating ₹ 669 millions shall be incurred by the SPV during FY2027 (₹ 528 millions) and FY2028 (₹ 141 millions) for the Specified Projects, basis the Technical Study conducted by the Technical Consultants appointed by Trust.

| S. No. | Corridor Name | Capital Expenditure ₹ in Millions |
|---|---|---|
| 1 | Gorhar Barwa Adda | 231 |
| 2 | Vijayawada Chilakaluripet | 156 |
| 3 | Chennai Bypass | 118 |
| 4 | Chennai Tada | 164 |
| 5 | Nelamangala Tumakuru | - |
| | **Total:** | **669** |

x. **Working Capital**

Considering the nature of the business of operating toll road projects, the working capital requirement for the Projected Period has been estimated as NIL/ Not Material.

## Annexure I
## Average Annual Daily Traffic ("AADT")

| Gorhar to Barwa Adda, Bihar/Jharkhand – Kulgo Toll Plaza | | | | |
|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28** | **FY29** |
| Cars + Mini LCV | 4,617 | 5,012 | 5,384 | 5,750 |
| Buses | 342 | 351 | 361 | 369 |
| Mini LCV | 909 | 954 | 997 | 1,047 |
| LGV/LCV | 391 | 428 | 457 | 480 |
| 2 Axle Truck | 1,228 | 1,303 | 1,368 | 1,431 |
| 3 Axle Trucks | 876 | 884 | 881 | 874 |
| MAV/ OSV | 4,138 | 4,258 | 4,379 | 4,536 |
| **AADT** | **12,500** | **13,190** | **13,826** | **14,487** |
| **PCU** | **32,069** | **33,383** | **34,599** | **35,951** |

| Vijayawada-Chilakaluripet, Andhra Pradesh – Kaza Toll Plaza | | | | |
|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28** | **FY29** |
| Cars + Mini LCV | 25,073 | 26,314 | 27,714 | 29,555 |
| Buses | 2,525 | 2,583 | 2,643 | 2,702 |
| Mini LCV | 2,482 | 2,590 | 2,709 | 2,826 |
| LGV/LCV | 1,089 | 1,141 | 1,198 | 1,258 |
| 2 Axle Truck | 2,000 | 2,081 | 2,166 | 2,294 |
| 3 Axle Trucks | 1,388 | 1,372 | 1,344 | 1,358 |
| MAV/ OSV | 3,167 | 3,034 | 2,790 | 2,948 |
| **AADT** | **37,725** | **39,115** | **40,564** | **42,941** |
| **PCU** | **61,180** | **62,377** | **63,234** | **66,596** |

| Chennai-Bypass, Tamil Nadu – Vanagram Toll Plaza | | | | |
|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28** | **FY29** |
| Cars + Mini LCV | 29,235 | 33,399 | 38,005 | 43,297 |
| Buses | 2,945 | 3,030 | 3,118 | 3,210 |
| Mini LCV | 4,546 | 5,142 | 5,871 | 6,653 |
| LGV/LCV | 2,049 | 2,101 | 2,159 | 2,215 |
| 2 Axle Truck | 1,060 | 1,110 | 1,185 | 1,215 |
| 3 Axle Trucks | 551 | 555 | 573 | 577 |
| MAV/ OSV | 2,015 | 2,070 | 2,183 | 2,231 |
| **AADT** | **42,400** | **47,407** | **53,094** | **59,398** |
| **PCU** | **59,587** | **65,092** | **71,566** | **78,317** |

| Chennai-Bypass, Tamil Nadu – Surapattu Toll Plaza | | | | |
|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28** | **FY29** |
| Cars + Mini LCV | 14,081 | 16,058 | 18,235 | 20,723 |
| Buses | 265 | 273 | 281 | 289 |
| Mini LCV | 3,579 | 4,036 | 4,608 | 5,207 |
| LGV/LCV | 2,791 | 2,922 | 3,066 | 2,725 |
| 2 Axle Truck | 1,332 | 1,376 | 1,432 | 1,214 |
| 3 Axle Trucks | 1,007 | 1,015 | 1,031 | 875 |
| MAV/ OSV | 3,778 | 3,883 | 4,053 | 3,454 |
| **AADT** | **26,833** | **29,564** | **32,705** | **34,487** |
| **PCU** | **46,659** | **49,943** | **53,908** | **52,696** |

| Chennai-Tada, Tamil Nadu – Nallur Toll Plaza | | | | | |
|---|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **H1 FY28** | **H2 FY28** | **FY29** |
| Cars + Mini LCV | 17,704 | 19,130 | 20,618 | 11,870 | 12,778 |
| Buses | 1,850 | 1,905 | 1,961 | 1,111 | 1,145 |

| | | | | | |
|---|---|---|---|---|---|
| Mini LCV | 4,216 | 4,433 | 4,661 | 2,758 | 2,884 |
| LGV/LCV | 3,648 | 3,819 | 3,991 | 3,675 | 3,845 |
| 2 Axle Truck | 2,809 | 2,985 | 3,172 | 2,979 | 3,171 |
| 3 Axle Trucks | 1,545 | 1,577 | 1,607 | 1,450 | 1,477 |
| MAV/ OSV | 6,220 | 6,667 | 7,150 | 7,033 | 7,585 |
| **AADT** | **37,992** | **40,514** | **43,161** | **30,876** | **32,886** |
| **PCU** | **73,994** | **78,689** | **83,664** | **68,410** | **72,944** |

| **Nelamangla-Tumakuru, Karnataka – Kulumepalya Toll Plaza** | | | | |
|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28** | **FY29** |
| Cars + Mini LCV | 26217 | 28100 | - | - |
| Buses | 3850 | 3986 | - | - |
| Mini LCV | 3990 | 4237 | - | - |
| LGV/LCV | 4752 | 4935 | - | - |
| 2 Axle Truck | 3664 | 3898 | - | - |
| 3 Axle Trucks | 1874 | 1887 | - | - |
| MAV/ OSV | 4,964 | 5,308 | - | - |
| **AADT** | **49312** | **52351** | **-** | **-** |
| **PCU** | **87839** | **92939** | **-** | **-** |

| **Nelamangla-Tumakuru, Karnataka – Chokkenahalli Toll Plaza** | | | | |
|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28** | **FY29** |
| Cars + Mini LCV | 20078 | 21449 | 22947 | 24706 |
| Buses | 3610 | 3737 | 3868 | 3989 |
| Mini LCV | 2966 | 3123 | 3286 | 3458 |
| LGV/LCV | 3811 | 4023 | 4246 | 4482 |
| 2 Axle Truck | 3642 | 3879 | 4126 | 4389 |
| 3 Axle Trucks | 1859 | 1874 | 1908 | 1943 |
| MAV/ OSV | 5,412 | 5,768 | 6,145 | 6,547 |
| **AADT** | **41378** | **43853** | **46526** | **49515** |
| **PCU** | **80,448** | **85,035** | **89,960** | **95,316** |

| **Nelamangla-Tumakuru, Karnataka – Halenijagal Toll Plaza** | | | | | | |
|---|---|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28 H1** | **FY28 H2** | **FY29 H1** | **FY29 H2** |
| Cars + Mini LCV | - | - | 28,060 | 28,060 | 29,513 | 22,264 |
| Buses | - | - | 3,973 | 3,973 | 4,098 | 3,825 |
| Mini LCV | - | - | 5,157 | 5,157 | 5,309 | 4,080 |
| LGV/LCV | - | - | 4,701 | 4,701 | 4,548 | 3,236 |
| 2 Axle Truck | - | - | 4,777 | 4,777 | 4,601 | 3,098 |
| 3 Axle Trucks | - | - | 1,962 | 1,962 | 1,680 | 1,201 |
| MAV/ OSV | - | - | 6,018 | 6,018 | 5,180 | 3,452 |
| **AADT** | - | - | **54,648** | **54,648** | **54,929** | **41,155** |
| **PCU** | - | - | **99,485** | **99,485** | **96,090** | **71,101** |

| **Nelamangla-Tumakuru, Karnataka – Bhartipura & Honnenahalli Toll Plaza** | | | | | | |
|---|---|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28 H1** | **FY28 H2** | **FY29 H1** | **FY29 H2** |
| Cars + Mini LCV | - | - | 8,731 | 8,731 | 8,799 | 8,799 |
| Buses | - | - | 643 | 643 | 650 | 650 |
| Mini LCV | - | - | 2,095 | 2,095 | 2,168 | 2,168 |
| LGV/LCV | - | - | 1,631 | 1,631 | 1,671 | 1,671 |
| 2 Axle Truck | - | - | 1,219 | 1,219 | 1,194 | 1,194 |
| 3 Axle Trucks | - | - | 792 | 792 | 769 | 769 |
| MAV/ OSV | - | - | 1,167 | 1,167 | 1,096 | 1,096 |
| **AADT** | - | - | **16,278** | **16,278** | **16,346** | **16,346** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **PCU** | - | - | **26,485** | **26,485** | **26,241** | **26,241** |

| **Nelamangla-Tumakuru, Karnataka – Dobbaspet & Halenijagal Toll Plaza** | | | | | | |
|---|---|---|---|---|---|---|
| **Total Traffic (AADT)** | **FY26** | **FY27** | **FY28 H1** | **FY28 H2** | **FY29 H1** | **FY29 H2** |
| Cars + Mini LCV | - | - | - | - | 6,287 | 6,287 |
| Buses | - | - | - | - | 221 | 221 |
| Mini LCV | - | - | - | - | 911 | 911 |
| LGV/LCV | - | - | - | - | 1,172 | 1,172 |
| 2 Axle Truck | - | - | - | - | 1,863 | 1,863 |
| 3 Axle Trucks | - | - | - | - | 760 | 760 |
| MAV/ OSV | - | - | - | - | 2,785 | 2,785 |
| **AADT** | - | - | - | - | **13,998** | **13,998** |
| **PCU** | - | - | - | - | **30,019** | **30,019** |

## MATERIAL CONTRACTS AND DOCUMENTS FOR INSPECTION

The following contracts, which are or may be deemed material have been entered or are to be entered into in due course. These contracts and also the documents for inspection referred to hereunder, may be inspected at the principal place of business of the Trust, from 10:00 A.M. to 5:00 P.M., on all Working Days from the date of filing the Offer Document until the date of listing of the Units pursuant to this Issue. Any of the contracts or documents mentioned in this Draft Offer Document may be amended or modified at any time if so required in the interest of the Trust or if required by the other parties, without reference to the Unitholder, subject to compliance with applicable law and InvIT Documents.

1. Trust deed dated November 24, 2025, entered between the Sponsor and the Trustee.
2. SEBI registration certificate for the Trust bearing number IN/InvIT/25-26/0034 dated December 22, 2025, to act as an infrastructure investment trust.
3. Investment management agreement dated December 2, 2025, entered between the Trustee and the Investment Manager.
4. Project implementation and management agreement dated January 6, 2026, entered amongst the Trustee, the Investment Manager, the Project Manager and Project SPV.
5. The Board resolution of the Investment Manager dated January 12, 2026, authorizing this Issue.
6. Issue agreement dated January 14, 2026, entered into amongst the Trust (acting through the Trustee), the Investment Manager, the Sponsor, the Project Manager and the Book Running Lead Managers.
7. Cash escrow and sponsor bank agreement dated [●] entered into amongst the Trust (acting through the Trustee), the Investment Manager, the Sponsor, the Escrow Collection Banks, the Refund Banks, the Registrar to the Issue and the Book Running Lead Managers.
8. Syndicate agreement dated [●] entered into among the Book Running Lead Managers, the Syndicate Member(s), the Trustee (on behalf of the InvIT), the Investment Manager, and the Registrar to the Issue.
9. The concession agreements, each dated [●], entered into by the Project SPV with NHAI.
10. Agreement dated January 2, 2026, between NSDL, the Trust (acting through the Investment Manager and its constituted attorneys) and the Registrar to the Issue.
11. Agreement dated January 6, 2026, between CDSL, the Trust (acting through the Investment Manager and its constituted attorneys) and the Registrar to the Issue.
12. Registrar agreement dated January 14, 2026, entered into among the Trustee (on behalf of the Trust), Investment Manager, and the Registrar to the Issue.
13. Facility agreement dated [●], entered into amongst the Trust (acting through the Trustee), the Investment Manager and the Project SPV.
14. Transitional support agreement dated [●], entered into amongst the Sponsor, Project SPV and the Project Manager.
15. Approval of NHAI dated January 12, 2026, in relation to the Issue.
16. Commitment letter dated January 12, 2026, from the Sponsor.
17. Letter from NHAI dated December 1, 2025, bearing reference number FINDIV-16012(16)/13/2025-O/o DGM (Fin-I). to the Investment Manager.
18. Certified copies of the updated Memorandum and Articles of Association of the Investment Manager as amended from time to time.
19. The consents from the (i) Book Running Lead Managers to the Issue; (ii) Legal counsel to the InvIT, the Investment Manager and the Sponsor as to Indian law; (iii) Legal counsel as to the Book Running Lead Managers as to Indian law; (v) Valuer; (vi) Registrar to the Issue; (vii) Escrow Collection Banks; (viii) Refund Banks; (ix) the Compliance Officer; (x) Traffic Consultant; and (xi) Technical Consultants, as referred to in their respective capacities.
20. Audited standalone financial statements of the Trust, for the period from the date of its settlement, that is November 24, 2025, till December 31, 2025.
21. The Projections of Revenue from Operations and Cash Flow from Operating Activities and the report dated January 12, 2026, thereon.
22. Audited financial statements of the Sponsor for financial years ended March 31, 2022, March 31, 2023, and March 31, 2024.
23. The report on statement of possible tax benefits dated January 14, 2026, from the Auditors.

24. In principle listing approval dated [●] and [●] issued by the Stock Exchanges.
25. Corporate governance policies adopted by the Investment Manager.
26. Letter dated [●], bearing reference number [●] from SEBI granting us an exemption in terms of the InvIT Regulations and the SEBI InvIT Master Circular.
27. Due diligence certificate dated [●], addressed to SEBI from the Book Running Lead Managers.
28. SEBI observation letter bearing number [●] dated [●].

## DECLARATION

The Investment Manager hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Investment Manager further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**For Raajmarg Infra Investment Managers Private Limited**

**NRVVMK Rajendra Kumar**
***Non-independent Director***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Investment Manager hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Investment Manager further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**For Raajmarg Infra Investment Managers Private Limited**

**Ashish Kumar Singh**
***Non-independent Director***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**For Raajmarg Infra Investment Managers Private Limited**

**Giridhar Aramane**
***Independent Director***

Place: Hyderabad
Date: January 14, 2026

## DECLARATION

The Investment Manager hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Investment Manager further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**For Raajmarg Infra Investment Managers Private Limited**

**Annie George Mathew**
***Independent Director***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**For Raajmarg Infra Investment Managers Private Limited**

**Dip Kishore Sen**
***Independent Director***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Investment Manager hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Investment Manager further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**For Raajmarg Infra Investment Managers Private Limited**

**Himanshu Gulliani**
***Non- Independent Director***

Place: Mumbai
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Santosh Kumar Yadav, IAS**
***Chairman***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Vishal Chauhan, IAS**
***Member (Admin)***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Anil Choudhary**
***Member (Projects)***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**NRVVMK Rajendra Kumar**
***Member (Finance)***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**K Venkata Ramana**
***Member (PPP)***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Alok Deepankar,**
***Member (Technical)***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Vipnesh Sharma**
***Member (Projects)***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**B.V.R. Subrahmanyam**
***Chief Executive Officer, Niti Aayog***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**V Umashankar**
***Secretary, Ministry of Road Transport and Highways***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**V. K. Rajawat**
***DG (Road Development) & Special Secretary, Ministry of Road Transport and Highways***

Place: Delhi
Date: January 14, 2026

## DECLARATION

The Sponsor hereby declares and certifies that all relevant provisions of the InvIT Regulations, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be) have been complied with and no statement made in this Draft Offer Document is contrary to the applicable provisions of the InvIT Regulations, the SCRA, SEBI Act and all rules, regulations and guidelines issued by the GoI or SEBI (as the case may be). The Sponsor further certifies that all the statements and disclosures in this Draft Offer Document are material, true, correct, not misleading and adequate in order to enable the Bidders to make an informed decision.

**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Vumlunmang Vualnam**
***Secretary, Department of Expenditure***

Place: Delhi
Date: January 14, 2026

## DECLARATION

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**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Prof. Manoj Kumar Tiwari**
***Director, IIM, Mumbai***

Place: Mumbai
Date: January 14, 2026

## DECLARATION

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**FOR NATIONAL HIGHWAYS AUTHORITY OF INDIA**

**Rajnish Kumar**
***Former Chairman, State Bank of India***

Place: Gurugram
Date: January 14, 2026

**ANNEXURE A**

**VALUATION REPORT**

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# Report on the Enterprise Valuation of the Specified Road Projects proposed to be acquired by Raajmarg 1 Projects Private Limited ("R1PPL") as of 31 December 2025

**Private and Confidential**

Report Reference No.: RVA2526AMDRRN064 12/01/2026

Raajmarg Infra Investment Managers Private Limited
G5 & 6, Sector-10, Dwarka,
New Delhi - 110075

**Sub: Enterprise Valuation of the Specified Projects (as defined below), pursuant to the SEBI (Infrastructure Investment Trusts) Regulations, 2014, in connection with the Proposed Transaction**

Dear Sir,

We refer to your letter of award dated 14 November 2025 wherein RBSA Valuation Advisors LLP ("RBSA"), a registered valuer entity under the Section 247 of the Companies Act, 2013, was appointed by Raajmarg Infra Investment Managers Private Limited ("RIIMPL"/ the "Investment Manager"), as an independent valuer, as per Regulation 2(zzf) of the SEBI (Infrastructure Investment Trust) Regulations, 2014 ("SEBI InvIT Regulations").

Raajmarg Infra Investment Trust ("RIIT" or the "Trust" or "InvIT") is registered with the Securities and Exchange Board of India ("SEBI") as an infrastructure investment trust under the SEBI InvIT Regulations. Raajmarg 1 Projects Private Limited ("R1PPL" or the "SPV") is a wholly owned subsidiary of RIIT and is incorporated as a special purpose vehicle to operate and maintain the road projects. RIIMPL is acting as the Investment Manager to the Trust, National Highways Authority of India ("NHAI") is acting as the Sponsor to the Trust and IDBI Trusteeship Services Limited ("Trustee") is acting as Trustee to the Trust, within the meaning of the SEBI InvIT Regulations.

NHAI aims to monetize the following five road projects (together referred to as the Specified Projects through the InvIT (Infrastructure Investment Trust) route:

| Section No. | Name of Section | NH | Total Length (Kms) | Toll Plaza | Start Kms | End Kms |
|---|---|---|---|---|---|---|
| 1 | Chilakaluripet-Vijayawada | NH-16 | 69.408 Km | Kaza | 355+000 | 357+342 |
| | Chilakaluripet Bypass | | | | 0+000 | 16+499 |
| | Chilakaluripet-Vijayawada | | | | 372+038 | 422+605 |
| 2 | Chennai Bypass | NH-32 and NH-48 | 32.600 Km | Vanagaram /Tiruneermalai* and Surapattu | 000+000 | 32+600 |
| 3 | Chennai- Tada | NH-16 | 33.000 Km | Nallur* | 21+400 | 54+400 |
| 4 | Neelmangala- Tumakuru | NH-48 | 44.668 Km | Kulumepalya and Chokkenahalli | 29+500 | 61+520 |
| | Tumakuru Bypass | | | | 61+520 | 74+168 |
| 5 | Gorhar-Barwa Adda | NH-19 (old NH-2) | 80.522 Km | Kulgo | 320+810 | 401+332 |

** As per Traffic Due Diligence report of December 2025, toll plaza at Vanagaram is proposed to be relocated to Tiruneermalai and toll plaza at Nallur Is proposed to be relocated to Durainallur*

*Source: Information provided by the Management*

We understand from you that:

- R1PPL is evaluating acquisition of the Specified Projects and enter into concession agreements with NHAI to operate, maintain and transfer the Specified Projects under the Toll, Operate and Transfer ("TOT") model ("Proposed Transaction");
- The Proposed Transaction is expected to be effective from 1 April 2026.

In this context, RIIMPL has requested RBSA for carrying out fair enterprise valuation ("Enterprise Valuation") of the Specified Projects as at 31 December 2025 ("Valuation Date"), pursuant to the SEBI InvIT Regulations, in connection with the Proposed Transaction. While the valuation date for the purpose of this Report has been considered as 31 December 2025, the economic benefits in the form of cash flows are expected to accrue to the Trust only from the Appointed Date, i.e., 1 April 2026. Considering this, the discounting of projected cash flows has been undertaken from the Appointed Date.

In the event of any material change in the proposed key terms of the Concession agreement and Transitional Support agreement for the Specified Projects and the actual terms or Management's estimate of interest rate and actual interest rate, the valuation will need to be updated. Our valuation of the SPV is subject to this premise.

We have analyzed the information provided by/ on behalf of the Investment Manager through broad inquiry, analysis and review but have not carried out due diligence or audit of such information. We have relied on the explanations and information provided by/ on behalf of the Investment Manager. We have no present or planned future interest in the Sponsors, R1PPL or the Investment Manager except to the extent of our appointment as an independent valuer. Our professional fees for the valuation are not contingent upon the values reported herein. Our valuation analysis should not be construed as investment advice specifically, we do not express any opinion on the suitability or otherwise of entering into any financial or other transaction with R1PPL or the Trust.

Our valuation analysis must be considered as a whole. Selecting portions of our analysis or the factors we considered, without considering all factors and analysis together could create a misleading view of the process underlying the valuation conclusions. Valuation is a complex process and is not necessarily susceptible to partial analysis or summary description. Any attempt to do so could lead to undue emphasis on any particular factor or analysis.

We enclose our valuation report (the "Report") providing our opinion on the Enterprise Valuation of the Specified Projects as of 31 December 2025, on a 'going concern value' premise. The attached Report details the valuation approach and methodologies, calculations, and conclusions with respect to this valuation and complies with the SEBI InvIT Regulations and guidelines, circulars or notifications issued by SEBI there under.

Please note that the Report must be read in conjunction with the Assumptions and Limiting Conditions, which are contained in Section 5 of this Report. This letter, the Report and the summary of valuation included herein may be provided to the Trust's advisors, the Securities and Exchange Board of India and other regulatory and supervisory authority, as may be required under the applicable regulations in connection with the Proposed Transaction and can be reproduced and included in the draft offer document/ offer document/ final offer document proposed to be filed in connection with offering of the units of the Trust.

This letter should be read in conjunction with the attached Report.

For **RBSA Valuation Advisors LLP,**
(RVE No.: IBBI/RV-E/05/2019/110)




**Name: Ravishu Vinod Shah**
Designation: Partner
Asset Class: Securities or Financial Assets (RV No.: IBBI/RV/06/2020/12728)

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# 1. Executive Summary

National Highways Authority of India ("NHAI") was set up by an act of the Indian Parliament, NHAI Act, 1988. NHAI was set up with the primary objective of facilitating development, maintenance and Management of national highways in India. NHAI has been entrusted with National Highways Development Project, along with other minor projects.

Raajmarg Infra Investment Trust ("RIIT" or the "Trust" or "InvIT") is registered with the Securities and Exchange Board of India ("SEBI") as an infrastructure investment trust under the SEBI InvIT Regulations. Raajmarg 1 Projects Private Limited ("R1PPL" or the "SPV") is a wholly owned subsidiary of RIIT and is incorporated as a special purpose vehicle to operate and maintain the road projects. Raajmarg Infra Investment Managers Private Limited ("RIIMPL" or the "Investment Manager") is acting as Investment Manager to the Trust, National Highways Authority of India ("NHAI" or "Sponsor") is acting as Sponsor to the Trust and IDBI Trusteeship Services Limited ("Trustee") is acting as the Trustee to the Trust, within the meaning of the SEBI (Infrastructure Investment Trust) Regulations, 2014 ("SEBI InvIT Regulations").

NHAI aims to monetize the following five road projects (together referred to as the Specified Projects through the InvIT (Infrastructure Investment Trust) route:

| Section No. | Name of Section | NH | Total Length (Kms) | Toll Plaza | Start Kms | End Kms |
|---|---|---|---|---|---|---|
| 1 | Chilakaluripet-Vijayawada | NH-16 | 69.408 Km | Kaza | 355+000 | 357+342 |
| | Chilakaluripet Bypass | | | | 0+000 | 16+499 |
| | Chilakaluripet-Vijayawada | | | | 372+038 | 422+605 |
| 2 | Chennai Bypass | NH-32 and NH-48 | 32.600 Km | Vanagaram /Tiruneermalai* and Surapattu | 000+000 | 32+600 |
| 3 | Chennai- Tada | NH-16 | 33.000 Km | Nallur* | 21+400 | 54+400 |
| 4 | Neelmangala- Tumakuru | NH-48 | 44.668 Km | Kulumepalya and Chokkenahalli | 29+500 | 61+520 |
| | Tumakuru Bypass | | | | 61+520 | 74+168 |
| 5 | Gorhar-Barwa Adda | NH-19 (old NH-2) | 80.522 Km | Kulgo | 320+810 | 401+332 |

** As per Traffic Due Diligence report of December 2025, toll plaza at Vanagaram is proposed to be relocated to Tiruneermalai and toll plaza at Nallur Is proposed to be relocated to Durainallur*
*Source: Information provided by the Management*

We understand from you that:

- R1PPL is evaluating acquisition of the Specified Projects and enter into concession agreements with NHAI to operate, maintain and transfer the Specified Projects under the Toll, Operate and Transfer ("TOT") model ("Proposed Transaction")
- The Proposed Transaction is expected to be effective from 1 April 2026,

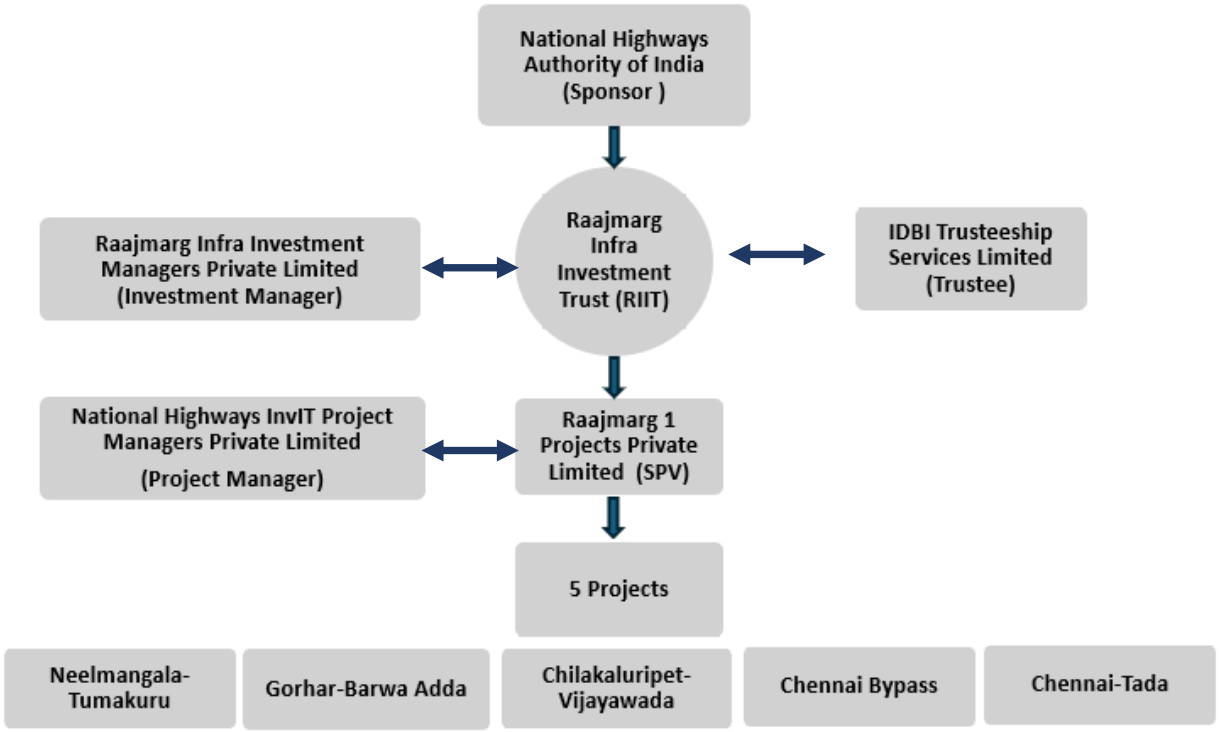


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Corporate Office: 1081 and 1081, Solitaire Corporate Park, Chakala, Andheri Kurla Road, Andheri (E) - 400 093 Tel: +91 22 6130 6000
Website: www.rbsa.in Email: contact@rbsa.in LLP IN: AAA-0842

RBSA Valuation Advisors LLP, a registered valuer entity under the Section 247 of the Companies Act, 2013, has been appointed by Raajmarg Infra Investment Managers Private Limited ("RIIMPL"/ the "Investment Manager"), as an independent valuer, as per Regulation 2(zzf) of the SEBI InvIT Regulations.

In this context, RIIMPL has requested RBSA for carrying out fair enterprise valuation ("Enterprise Valuation") of the Specified Projects as at 31 December 2025 ("Valuation Date") pursuant to the SEBI InvIT Regulations in connection with the Proposed Transaction. Although the valuation date is 31 December 2025, the projected cash flows have been discounted from the Appointed Date of 1 April 2026, being the date from which the Trust is expected to start receiving economic benefits.

**Raajmarg Infra Investment Trust Structure**






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Website: www.rbsa.in Email: contact@rbsa.in LLP IN: AAA-0842

# 2. Disclosure about the Valuer

- RBSA Valuation Advisors LLP ("RBSA") is a registered valuer entity under the Section 247 of the Companies Act, 2013 registered with the Insolvency and Bankruptcy Board of India having Registered Valuer Entity No. IBBI/RV-E/05/2019/110.

- RBSA Group operates across 9 offices in India, Middle East and Singapore, offering a comprehensive suite of services, including Valuation services, Investment Banking, Restructuring services, Transaction Services, Risk Consulting, Dispute & Litigation Support, etc.

- Ravishu Vinod Shah, the signatory to this Report, is a partner with RBSA Valuation Advisors LLP. He is a registered valuer for the Securities or Financial Assets asset class, with IBBI, holding RV No. IBBI/RV/06/2020/12728. He has been associated with RBSA for over 6 years. With over 28 years of experience, he carries extensive expertise in valuation and financial advisory services.
  Contact details: +91 22 6130 6093
  Email ID: ravishu@rbsa.in

- RBSA, Ravishu Vinod Shah and the team working on the valuation of Specified Projects do not have any financial interest in the Trust, the SPV, Investment Manager or the Sponsor, except to the extent of our appointment as independent valuer. We do not have any conflict of interest in carrying out this valuation. Sufficient time and information was provided to us to carry out the valuation. Further, the information provided by the Management have been appropriately reviewed in carrying out the valuation.

- We declare that:
  i. We are competent to undertake the financial valuation in terms of the SEBI InvIT Regulations;
  ii. We are an independent registered valuer entity and have prepared the Report on a fair and unbiased basis;
  iii. We have at least two partners/ directors having experience of 5 years each in the valuation of infrastructure assets; and

- We have carried out additional scope of work as per Schedule V of SEBI InvIT Regulations (Refer para 9.2 for further details).

- This Report covers all the disclosures required as per the SEBI InvIT Regulations and the Valuation of the Specified Projects is impartial, true and fair and in compliance with the SEBI InvIT Regulations.

# 3. Valuation Analysis

- The Discounted Cash Flow ("DCF") method under the Income Approach has been adopted for carrying out the Enterprise Valuation of the Specified Projects. Free Cash Flow to Firm ("FCFF") method under DCF has been applied based on the projected financial statements of the Specified Projects provided by the management of RIIMPL (the "Management").

- The Enterprise Value of the Specified Projects has been estimated, on a 'going concern value' premise. The Proposed Transaction is expected to be effective from 1 April 2026. We understand from the Management that the consideration for the acquisition of concession rights for the Specified Projects is expected to be paid prior to the commencement of their concession period. Accordingly, the Enterprise Value has been computed by discounting the projected FCFF of the Specified Projects beginning from 1 April 2026 until the end of the concession period of 15 years, using an appropriate Weighted Average Cost of Capital ("WACC"). The Enterprise Value of the Specified Projects has been computed by discounting the projected Free Cash Flows to Firm from the Appointed Date, i.e., 1 April 2026, with reference to the valuation date of 31 December 2025.

- It may be noted that in the event of any material change in the proposed key terms of the Concession agreement and Transitional Support agreement for the Specified Projects and the actual terms or Management's estimate of interest rate and actual interest rate, the valuation will need to be updated. Our valuation of the SPV is subject to this premise.

- The Investment Manager had appointed Traffic and Technical Consultants to carry out Traffic study for estimation of toll revenue and Technical study for estimation of operating and maintenance expenses and major maintenance expenses respectively, for each of the Specified Road Projects over the respective concession period of 15 years ending 31 March 2041. We have relied upon the Traffic Due Diligence Reports provided by the Traffic Consultant and Technical Due Diligence Reports provided by the Technical Consultants, on the Specified Projects for the Enterprise Valuation.

- Valuation of a company/ business is not a precise science and the conclusions arrived at in many cases will be subjective and dependent on the exercise of individual judgment. There is, therefore, no indisputable single value and we normally express our opinion on the value as falling within a likely range. However, considering the nature of the engagement, we have provided a single point value estimate. While we have provided our opinion on the enterprise value of the Specified Projects based on the information made available to us and within the scope and constraints of our engagement, others may have a different opinion. Accordingly, we expressly disclaim all liability for any loss or damage of whatever kind which may arise from any person acting on any information and estimates contained in this Report which are contrary to the stated purpose.



- While our work has involved an analysis of financial and other information provided by/ on behalf of the Management, our engagement does not include an audit in accordance with generally accepted auditing standards of Specified Projects' existing business records. We have not carried out any independent technical evaluation or appraisal or due diligence of the assets or liabilities of Specified Projects. Accordingly, we assume no responsibility and make no representations with respect to the accuracy or completeness of any information provided by/ on behalf of the Management. Our Report is subject to the scope, assumptions and limitations detailed hereinafter. As such the Report is to be read in totality, and not in parts, in conjunction with the relevant documents referred to herein and in the context of the purpose for which it is made.

- Enterprise Valuation of the Specified Projects as of 31 December 2025 has been carried out considering inter-alia Traffic Due Diligence Reports of Traffic Consultants and Technical Due Diligence Reports of Technical Consultants, Business plan/ Projected financial statements of the Specified Projects and other information provided by/ on behalf of the Management, industry analysis and other relevant factors.

- The Valuation Date considered for the Enterprise Valuation of the Specified Projects is 31 December 2025. For details relating to the valuation date and the commencement of discounting of projected cash flows, reference may be made to the Valuation Analysis section of this Report.

- Valuation analysis and results are specific to the Valuation Date. A valuation of this nature involves consideration of various factors including the financial position of the Specified Projects as at the Valuation Date, trends in the equity stock market and fixed income security market, macro-economic and industry trends, etc.

- The Valuation summary of the Specified Projects as of 31 December 2025 is as follows:

| Particulars | WACC | Enterprise Value (INR Cr) |
|---|---|---|
| Enterprise Value of Specified Projects | 10.1% | 9,298.7 |

- This Report covers the disclosures required as per the SEBI InvIT Regulations and the valuation of the Specified Projects is impartial, true and fair and in compliance with the SEBI InvIT Regulations.

# 4. Assumptions and Limiting Conditions

4.1. This Report, its contents and the results herein are specific to (i) the purpose of valuation agreed as per the terms of our engagement; (ii) the date of this Report; (iii) Traffic Due Diligence Reports and Technical Due Diligence Reports for the Specified Road Projects by the Traffic and Technical Consultants respectively, (iv) Business plan/ Projected financial statements of the Specified Projects, and (v) other information provided by/ on behalf of the Management and information obtained from public domain/ subscribed databases till 31 December 2025.

4.2. While our work has involved an analysis of financial and other information provided by/ on behalf of the Management, our engagement does not include an audit of the existing business records of the Specified Projects, in accordance with generally accepted auditing standards. We have not carried out any independent technical evaluation or appraisal or due diligence of the assets or liabilities of the Specified Projects. Accordingly, we assume no responsibility and make no representations with respect to the accuracy or completeness of any information provided by/ on behalf of the Management. Our Report is subject to the Scope, Assumptions and Limitations detailed hereinafter. As such the Report is to be read in totality, and not in parts, in conjunction with the relevant documents referred to herein and in the context of the purpose for which it is made.

4.3. The valuation of companies and businesses is not a precise science and the conclusions arrived at in many cases will be subjective and dependent on the exercise of individual judgment. There is, therefore, no indisputable single value and we normally express our opinion on the value as falling within a likely range. However, considering the purpose and requirement of this engagement, we have provided a single point value estimate. While we have provided our opinion on the fair enterprise value of the Specified Projects based on the information made available to us and within the scope and constraints of our engagement, others may have a different opinion.

4.4. A valuation of this nature is necessarily based on stock market, financial, economic and other conditions in general and industry trends in particular prevailing as on the Valuation date and the information made available to us as of the date hereof. Events occurring after the Valuation date may affect this Report and the assumptions used in preparing it, and we do not assume any obligation to update, revise or reaffirm this Report.

4.5. In the course of valuation, we were provided with both written and verbal information as mentioned in Section 5. We have analysed the information provided to us by/ on behalf of the Management through broad inquiry, analysis and review but have not carried out a due diligence or audit of the information provided for the purpose of this engagement. We have assumed that no information has been withheld that could have influenced the purpose of our Report.

4.6. Valuation may be based on estimates of future financial performance or opinions that represent reasonable expectations at a particular point in time. However, we do not provide assurance on the achievability of the results projected by the Management as events and circumstances do not occur as expected and differences between actual and expected results may be material. We express no opinion as to how closely the actual results will correspond to those projected as the achievement of

the projected results is inter-alia dependent on actions, plans and assumptions of the Management and macro-economic and other external factors which are beyond the control of the Management.

4.7. Our valuation is primarily from a business perspective and does not consider various legal and other corporate structures beyond the limited information provided to us by the Management. The value conclusion is not intended to represent the value at any time other than the Valuation Date that is specifically stated in the Report.

4.8. We have also relied on the data from external sources to conclude the valuation. These sources are believed to be reliable and therefore, we assume no liability for the truth or accuracy of any data, opinions or estimates furnished by others that have been used in this analysis. Where we have relied on data, opinions or estimates from external sources, reasonable care has been taken to ensure that such data has been correctly extracted from those sources and/ or reproduced in its proper form and context.

4.9. The actual price achieved in case of a transaction may be higher or lower than our estimate of value depending upon the circumstances and timing of the transaction, the nature of the business and other relevant factors. The knowledge, negotiating ability and motivation of the buyers and sellers and the applicability of a discount or premium for control will also affect actual market price achieved. Accordingly, our valuation conclusion will not necessarily be the price at which any agreement proceeds. The final transaction price is something on which the parties themselves have to agree considering *inter-alia* their own assessment of the transaction and inputs from other advisors.

4.10. This Report has been prepared for sole use by the Investment Manager/ Trust/ Sponsor in connection with the purpose stated herein. It is inappropriate to use this Report for any purpose other than the purpose mentioned herein. This restriction does not preclude the Investment Manager from providing a copy of the Report to its third-party advisors whose review would be consistent with the intended use. Our Report may be disclosed in connection with any statutory and regulatory filing in accordance with the provision of SEBI InvIT Regulations. We shall not assume any responsibility to any third party to whom the Report is disclosed or otherwise made available.

4.11. The Report assumes that the Specified Projects comply fully with relevant laws and regulations applicable in their area of operations and usage unless otherwise stated, and that they will be managed in a competent and responsible manner. Further, unless specifically stated to the contrary, this Report has given no consideration to matters of a legal nature, including issues of legal title and compliance with local laws, and litigations and other contingent liabilities that are not recorded/ reflected in the financial statements provided to us.

4.12. It is clarified that this Report is not a fairness opinion under any of the stock exchange/ listing regulations. In case of any third-party having access to this Report, it should be noted that the Report is not a substitute for the third party's own due diligence/ appraisal/ enquiries/ independent advice that the third party should undertake for his purpose.

4.13. In the particular circumstances of this case, our liability (in contract or under statute or otherwise) for any economic loss or damage arising out of or in connection with this engagement, irrespective of the quantum of loss or damage caused, shall be limited to the amount of fees actually received by us from the Trust, as laid out in the engagement letter, for such valuation work.

4.14. In rendering this Report, we have not provided any legal, regulatory, tax, accounting or actuarial advice and accordingly we do not assume any responsibility or liability in respect thereof.

4.15. This Report does not look into the business/ commercial reasons behind the acquisition of the Specified Projects by the Trust nor the likely benefits arising out of the same. Similarly, it does not address the relative merits of investing in an infrastructure trust as compared with any other alternative business transaction, or other alternatives, or whether or not such alternatives could be achieved or are available.

4.16. We are not advisors with respect to legal, tax and regulatory matters for the Specified Projects or the Trust. No investigation of the Specified Projects' claim to title of assets has been made for the purpose of this Report and the Specified SPVs' claim to such rights have been assumed to be valid. No consideration has been given to liens or encumbrances against the assets, beyond the loans disclosed in the accounts. Therefore, no responsibility is assumed for matters of a legal nature.

4.17. The scope of work has been limited both in terms of the areas of the business and operations which have been reviewed. There may be matters, other than those noted in this report, which might be relevant in the context of the transaction and whose wider scope might uncover.

4.18. RBSA is not aware of any contingent, commitment or material issue, besides the information disclosed in the audited/ provisional financial statements and additionally provided by the Investment Manager / Management which has been presented in this Report, which could materially affect the Specified Projects economic environment and future performance and therefore, the fair value of their businesses.

4.19. We have no present or planned future interest in the Trustee, Investment Manager, the Sponsor, the Trust or the SPV except to the extent of our appointment as an independent valuer. The fee for this Report is not contingent upon the values reported herein. Our valuation analysis should not be construed as investment advice; specifically, we do not express any opinion on the suitability or otherwise of entering into any financial or other transaction.

4.20. We have relied upon the representations of the Management in respect of the information provided by them. We shall not be liable for any loss, damages, cost or expenses arising from fraudulent acts, misrepresentations, or willful default on part of the Investment Manager, the SPV, their directors, employees or agents.

- **Limitation of Liabilities**
  - It is agreed that, having regard to RBSA's interest in limiting the personal liability and exposure to litigation of its personnel, the Investment Manager, the Sponsor, the SPV, the Trust or the Trustee will not bring any claim in respect of any damage against any of RBSA's personnel.
  - In no circumstances, RBSA shall be responsible for any consequential, special, direct, indirect, punitive or incidental loss, damages or expenses (including loss of profits, data, business, opportunity cost, goodwill or indemnification) in connection with the performance of the Services whether such damages are based on breach of contract, tort, strict liability, breach of warranty, negligence, or otherwise) even if the Trust had contemplated and communicated to RBSA the likelihood of such damages. Any decision to act upon the Report is to be made by the Trust and no communication by RBSA should be treated as an invitation or inducement to engage the Trust to act upon the Report.
  - In the particular circumstances of this case, our liability (in contract or under statute or otherwise) for any loss or damage caused, shall be limited to the amount of fees actually received by us, as laid out in the engagement letter, for this valuation report.
  - It is clarified that the Sponsor and the Trust will be solely responsible for any delays, additional costs, or other liabilities caused by or associated with any deficiencies in their responsibilities, misrepresentations, incorrect and incomplete information including information provided to determine the assumptions.
  - RBSA will not be liable if any loss arises due to the provision of false, misleading or incomplete information or documentation by the Investment Manager, the Sponsor, the SPV, the Trust or the Trustee.



# 5. Sources of Information

For the purpose of undertaking this valuation exercise, we have relied on the following sources of information provided by/ on behalf of the Management:

- Discussions with the Management to *inter-alia* understand expected future performance of the Specified Projects, key value drivers and other key factors affecting the business of the Specified Projects;
- Projected financial statements of the Specified Projects for the concession period from 1st April 2026 to 31 March 2041 (FY2026 – FY2041) which the Management expects to be their best estimate of the expected performance of the Specified Projects ("Management Projections");
- Reports of Translink Infrastructure Consultants Pvt. Ltd. in association with Infra Brainiacs Private Limited ("Traffic Consultants") appointed by the Investment Manager for Traffic Study and estimation of toll revenue for the duration of the concession period for each of the Specified Projects ("Traffic Due Diligence Reports");
- Reports of URS Scott Wilson India Private Limited in joint venture with MARC Technocrats Private Limited and Chaitanya Project Consultancy Limited ("Technical Consultants") appointed by the Investment Manager for Technical Study for estimation of operating and maintenance expenses and major maintenance expenses for the duration of the concession period for Gorhar - Barwa Adda (December 2025) and each of the remaining Specified Projects (January 2026) ("Technical Due Diligence Reports");
- Draft Concession Agreements and Draft Transitional Support Agreement for the Specified Projects between the SPV and NHAI for the Specified Projects;
- Information provided by the Management for mandatory disclosures required by SEBI; and
- S&P Capital IQ's database of publicly traded companies.

We have also obtained the explanations, information and representations, which we believed were reasonably necessary and relevant for our exercise from the Management. Besides above, there may be other information provided by the Management which we may not have perused in detail, if not considered relevant for the defined scope.

# 6. Procedures

We have carried out the Enterprise Valuation of the Specified Projects, to the extent applicable, in accordance with ICAI Valuation Standards, 2018 ("ICAI VS") issued by the Institute of Chartered Accountants of India.

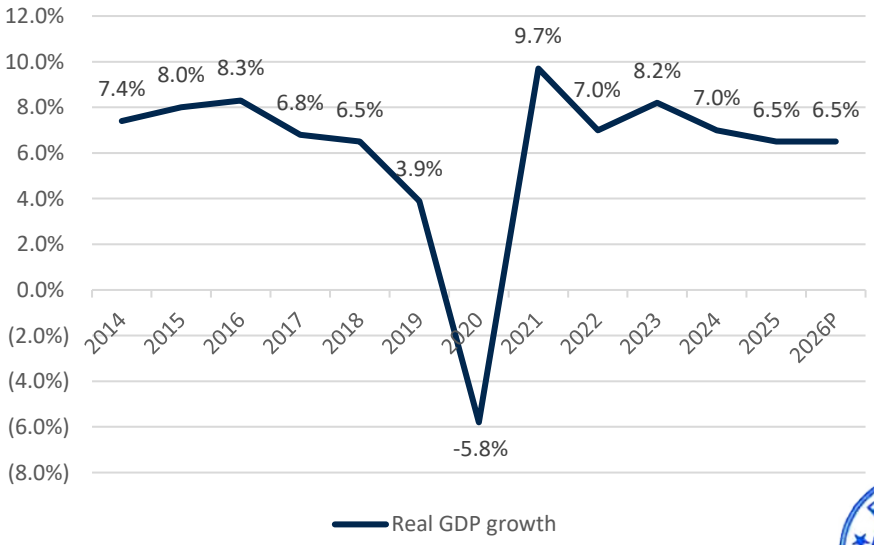
We have adopted the following procedures for carrying out the valuation analysis:

- Discussions with the Management to *inter-alia* understand expected future performance of the Specified Projects, key value drivers and other factors affecting the business of the Specified Projects;
- Analysis of the Management Projections;
- Considered the Traffic Due Diligence Reports and Technical Due Diligence Reports;
- Considered the key terms of Draft Concession Agreements and Draft Transitional Support Agreement;
- Analysis of the information available in public domain/ subscribed databases in respect of the comparable companies/ comparable transactions, as considered relevant by us;
- Selection of valuation approach and valuation methodology/(ies), in accordance with ICAI VS, as considered appropriate and relevant by us;
- Analysis of other publicly available information, as considered relevant by us; and
- Determination of Enterprise Value of the Specified Projects as on Valuation Date.

# 7. Industry Overview

**Indian Economy**

- India is one of the fastest-growing major economies in the world, underpinned by strong domestic demand, young population and structural economic reforms. As of FY 2024–25, the Indian economy has demonstrated resilience amid global headwinds, with GDP growth of ~6.5% according to the Reserve Bank of India and international financial institutions. The services and manufacturing sectors continue to be primary growth drivers, supported by government initiatives like 'Make in India', 'Digital India', and the Production-Linked Incentive (PLI) scheme. Additionally, public infrastructure investment and a rebound in private consumption have further bolstered growth momentum. While external uncertainties persist, India's stable macroeconomic fundamentals, expanding middle class, and digital transformation position it well for sustained medium to long-term growth.
- India, ranked as the fourth largest economy, has been amongst the fastest growing economies in the world over the past few years.For FY2026, GDP is projected at ~INR 197 trillion, a growth of around 6.5%, consistent with consensus estimates from MOSPI, the Reserve Bank of India, and global institutions. This trajectory is supported by ongoing capex expansion, infrastructure development, stronger formalization of the economy, and improving macroeconomic stability. Reforms such as GST 2.0, focused on rate rationalization and simplification are also expected to boost infrastructure and construction activity, further supporting medium-term growth.



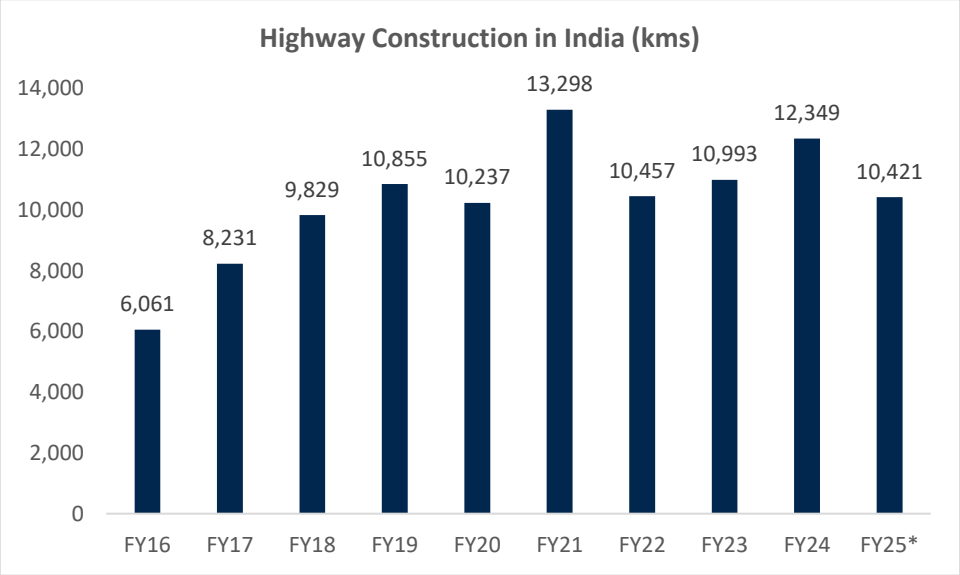
**Road Infrastructure in India**

- The road sector in India plays a pivotal role in the nation's infrastructure development and economic growth, contributing significantly to GDP and employment. India has the second-largest road network in the world, spanning over ~6.7 million kilometers, which includes national highways, state highways, and rural roads. The government, through agencies like the National Highways Authority of India, continues to prioritize road development under flagship programs such as Bharatmala Pariyojana and PM Gati Shakti. The sector has witnessed robust investment from both public and private players, with increasing emphasis on hybrid annuity and BOT (Build-Operate-Transfer) models to enhance efficiency and risk-sharing. Despite challenges such as land acquisition delays, regulatory hurdles, and funding constraints, the road sector remains a key focus area for infrastructure-led economic transformation in India. The road network transports ~64.5% of all goods in the country and ~90% of India's total passenger traffic uses road network to commute.

| Particulars | In Km | % Share |
|---|---|---|
| National Highways | 1,46,195 | 2% |
| State Highways | 1,79,535 | 3% |
| Other Roads | 6,345,403 | 95% |
| **Total** | **6,671,133** | |

*Source: IBEF Roads Industry Report August 2025*

**Highway Construction in India (Kms)**




**Provisional Target*
*Source: IBEF Roads Industry Report August 2025*

**Strong momentum in expansion of roadways**

- The government has established a provisional target of constructing 10,421 km of national highways in FY25, reflecting a 15% decrease from last year's achievement due to delays in project clearances. In FY24, ~12,349 km of national highways were constructed.
- National Highways increased from 91,287 km in 2013-14 to 1,46,195 km in 2024-25, and the pace of construction has improved from 12.1 km a day in 2014-15 to 33.8 km in 2023-24.
- From 2014 to 2024, the length of four-lane and above national highways in India has expanded significantly, increasing by approximately 2.5 times. The total length of these highways grew from 18,371 kilometers in 2014 to 45,947 kilometers in 2024. This expansion reflects the government's sustained focus on improving highway capacity, enhancing road safety, and boosting connectivity for freight and passenger movement under initiatives such as Bharatmala Pariyojana. The development of high-capacity corridors has also been instrumental in reducing travel time and logistics costs, thereby contributing to the overall economic efficiency and competitiveness of the country
- The length of operational High-Speed Corridors of NHs network has increased from 93 km in 2014 to about 2,474 km in 2024.
- As of December 2025, the Pradhan Mantri Gram Sadak Yojana (PMGSY) has constructed over 7.88 lakh kilometers of rural roads since its inception, aiming to provide all-weather road connectivity to unconnected villages across India.
- Bharatmala Pariyojana, a flagship government program, aims to develop about 34,800 kilometers of highways for improving connectivity across India. As on 31.08.2025, projects covering a total length of ~26,425 km have been awarded and out of this, ~20,378 km have already been constructed
- Summary of Phase 1 Components and approved outlay of for the same are as follows: -

| Sr. No. | Components | Length (Km) | Outlay (INR Crore) |
|---|---|---|---|
| 1 | Economic corridors development | 9,000 | 120,000 |
| 2 | Inter- corridors & feeder roads | 6,000 | 80,000 |
| 3 | National Corridors Efficiency Improvement | 5,000 | 100,000 |
| 4 | Border and International Connectivity Roads | 2,000 | 25,000 |
| 5 | Coastal and port connectivity roads | 2,000 | 20,000 |
| 6 | Expressways | 800 | 40,000 |
| 7 | Balance Road works under NHDP | 10,000 | 1,50,000 |
| | **Total** | **34,800** | **5,35,000** |

*Source: MoRTH Website*

- Highway construction in India increased at a CAGR of 9.3% between FY16-FY24 and the Indian road infrastructure market is projected to witness a CAGR of 9.5% during the forecast period FY2025–FY2032, growing from ~USD 270.50 trillion in FY2024 to ~USD 559.09 trillion in FY2032.
- In March 2025, The National Highways Authority of India (NHAI) has achieved a significant milestone by raising INR 18,380 crore through its Infrastructure Investment Trust (InvIT), marking the largest monetization transaction in the history of India's road sector. The fourth round of fund raising adds up the total amount raised via InvIT to over INR 46,000 crore since its inception in 2020.

**Growth Drivers**

- Government Initiatives: In the Union Budget 2025-26, ~INR 287,333 Crore has been allocated to MorTH reflecting a increase of 2.4% compared to FY25. Of this, allocation to NHAI is ~ INR 170,266 crore earmarked for the development and maintenance of national highways, including projects under the Bharatmala Pariyojana, Roads and Bridges – INR 116,292 crore, for the construction and maintenance of roads and bridges and Other Expenditures – INR 775 crore, covering administrative costs and road safety initiatives.
- Policy Changes: The following are the recent policy changes that the MoRTH and NHAI have undertaken to improve private participation in the sector and increase competition. (i) Technical and financial bidder eligibility criteria reduced for HAM and EPC projects, which would promote the entry of smaller players (ii) Changes in the hybrid-annuity model (HAM) concession agreement aimed at protecting developers' returns and easing their cash flows during the construction period (iii) Changes in the Build-Operate-Toll (BOT) concession agreement to reinstate developer interest in the model.
- Rising Vehicular Demand: The expansion of domestic trade has driven an increase in commercial vehicle production and freight movement across the country. This upward trend in commercial and freight transport is expected to enhance inter-state trade and tourism, resulting in higher traffic volumes and improved toll revenues.
- FÀSTag: To streamline toll collection and enhance transparency, the Ministry of Road Transport and Highways launched the National Electronic Toll Collection (NETC) program—implemented nationwide—as a key initiative to modernize tolling systems. Under this system, vehicles are fitted with FASTags, RFID-enabled prepaid tags linked to vehicle registration and user accounts. As of March 2025, the FASTag program in India has continued its robust growth. The total FASTags issued were ~10.72 crore reflecting a significant increase from the 8.81 crore tags issued by 39 banks as of March 2024. The monthly toll collection in March 2025 was ~INR 6,800 crore in toll collections through 379.1 million electronic toll transactions.

**Future Prospects:**

The Indian roads sector is experiencing steady growth, propelled by rapid urbanization, a rising population, and the growing need for reliable and efficient transport infrastructure. Increasing domestic trade activity has also contributed to a rise in commercial vehicle usage and freight movement, further strengthening the outlook for the sector.

- A surge in private investments is projected in the highway sector from INR 20,000 Cr to almost INR 1 trillion in 6-7 years.
- Cumulative FDI Inflows in construction development stood at US$ 35.24 billion between April 2000-September 2024.
- Under “Parvatmala Pariyojana”, the Government of India plans to develop 250+ projects with a Ropeway length of 1,200+ km over five years.

- As of March 2025, the National Highways Authority of India (NHAI) has significantly advanced its Wayside Amenities (WSAs) initiative. A total of 501 sites have been awarded for development along national highways and expressways. Out of these, 94 WSAs are currently operational, providing facilities such as fuel stations, electric vehicle charging points, food courts, restrooms, and medical clinics. The Ministry of Road Transport and Highways aims to develop approximately 1,000 WSAs over the next five years, positioning one every 50 kilometers along national highways.
- The Government of India is actively advancing the integration of innovative toll collection technologies, including the Global Navigation Satellite System (GNSS), to facilitate barrier-less tolling. This system will utilize On-Board Units (OBUs) installed in vehicles to track distance travelled, enabling precise, distance-based toll charges without the need for physical toll booths.

**Road InvITs**

The road sector has been one of the most prominent segments for InvITs in India and emerged as the largest contributor to the InvIT landscape, with approximately 39% share of AUM as of March 2025.

As of fiscal 2025, there are 26 InvITs registered with SEBI, of which 15 are road InvITs. The AUM for road InvITs increased to Rs 2.46 lakh crore in March 2025, clocking a CAGR of ~42% from Rs 0.60 lakh crore in fiscal 2021.The number of road InvITs have grown 3 times from fiscal 2021 to fiscal 2025 and more than doubled in the past three fiscal years.

With numerous infrastructure initiatives underway, the outlook for India's road sector remains strong, well-positioned to support the country's expanding economy and growing population.

# 8. Valuation Approach and Methodology

| VALUATION APPROACHES | | |
|---|---|---|
| **INCOME APPROACH** | **MARKET APPROACH** | **ASSET APPROACH** |
| Estimates value based on the present value of future earnings of cash | Estimates value based on the multiples of comparable companies and precedent comparable transactions | Estimates value based on the fair value of the business' assets less the fair value of its liabilities |
| Applied | Not applied | Not Applied |

**Basis and Methodology of Valuation**

- **Basis of Valuation**

  It means the indication of the type of value being used in an engagement. Fair Value as per ICAI VS is defined as under:

  *"Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the valuation date."*

  Fair value basis has been adopted for enterprise valuation of the Specified SPVs.

- **Valuation Date**

  Valuation Date is the specific date at which the value of the assets to be valued gets estimated or measured. Valuation is time specific and can change with the passage of time *inter-alia* due to changes in the condition of the asset to be valued and market parameters. Accordingly, valuation of an asset as at a particular date can be different from other date(s).

  The Valuation Date considered for the fair enterprise valuation of the Specified Projects is 31 December 2025.

  It may be noted that in the event of any material change in the proposed key terms of the Concession agreement and Transitional Support agreement for the Specified Projects and the actual terms or Management's estimate of interest rate and actual interest rate, the valuation will need to be updated. Our valuation of the SPV is subject to this premise.

- **Premise of Value**

  Premise of Value refers to the conditions and circumstances how an asset is deployed. In the present case, we have determined the fair enterprise value of the Specified Projects on a Going Concern Value defined as, *"Going concern value is the value of a business enterprise that is expected to continue to operate in the future. The intangible elements of going concern value result from factors such as having a trained work force, an operational plant, the necessary licenses, systems, and procedures in place, etc."*

| Approach & Method | Applied/Not Applied | Description | Rationale |
|---|---|---|---|
| **Income Approach** Discounted Cash Flow Method (DCF) | Applied | ▪ In the DCF method under the Income approach, forecast cash flows are discounted back to the Valuation date, estimating a net present value of the cash flow stream of the business. A terminal value at the end of the explicit forecast period is then determined and that value is also discounted back to the Valuation date to give an overall value for the business.<br>▪ A discounted cash flow methodology typically requires the forecast period to be of such a length to enable the business to achieve a stabilized level of earnings, or to be reflective of an entire operation cycle for more cyclical industries.<br>▪ The rate at which the future cash flows are discounted (the "discount rate") should reflect not only the time value of money, but also the risk associated with the business' future operations. The discount rate most generally employed is Weighted Average Cost of Capital ("WACC") or Cost of Equity (Ke), reflecting an optimal as opposed to actual financing structure. | • Management has provided financial projections of the Specified Projects, which represents their best estimate of the expected performance of the Specified Projects for the balance tenor of their respective Concession period. Considering the aforementioned, the DCF method has been adopted to estimate the enterprise value of the Specified Projects. |
| **Market Approach**<br>• Market Price Method | Not Applied | ▪ Under this method, the value of a company is arrived at considering its market price over an appropriate period. | ▪ As the Specified Projects are not listed, this method is not applied |
| **Market Approach**<br>• Comparable Companies Multiples ("CCM") Method | Not Applied | ▪ Under Comparable Companies Method, the value of shares / business of a company is determined based on market multiples of publicly traded comparable companies. Although no two companies are entirely alike, the companies selected as comparable companies should be engaged in the same or a similar line | ▪ The Specified Projects are operational and does not have project implementation risk. Further, the projected income and cash flows of the Specified Projects primarily depend on the key terms of the respective concession agreements, residual tenor project-specific |

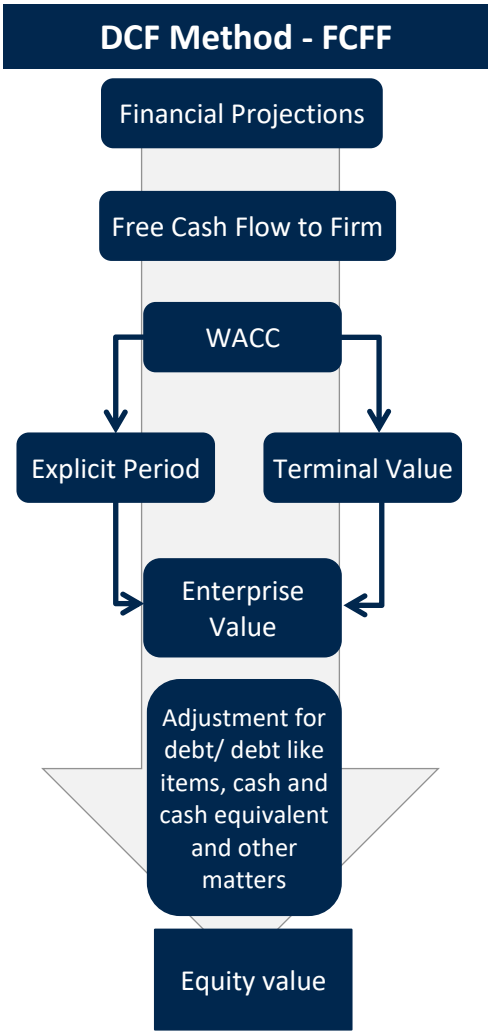
| Approach & Method | Applied/Not Applied | Description | Rationale |
|---|---|---|---|
| | | of business as the subject company.<br>▪ The appropriate multiple is generally based on the performance of listed companies with similar business models and size. | characteristics/ factors, etc. which may differ from the other projects. Accordingly, this method is not adopted. |
| **Market Approach**<br>• Comparable Transaction Multiples ("CTM") Method | Not Applied | ▪ Under Comparable Transaction Multiples Method, the value of shares /business of a company is determined based on market multiples of publicly disclosed transactions in the similar space as that of the subject company.<br>▪ Multiples are generally based on data from recent transactions in a comparable sector, but with appropriate adjustment after consideration is given to the specific characteristics of the business being valued. | ▪ The projected income and cash flows of the Specified Projects primarily depend on the key terms of the respective concession agreements, residual tenor, project-specific characteristics/ factors, etc. which may differ from the other projects. We have not adopted this methodology due to unavailability of information in public domain involving recent transactions in similar projects |
| **Asset based Approach.**<br>• Adjusted Net Asset Value Method | Not Applied | ▪ Under the Adjusted Net Asset Value Method, a Valuation of a 'going concern' business is computed by adjusting the assets and liabilities to the fair market value as of the date of the Valuation.<br>▪ A net asset value methodology is typically most appropriate when:<br>  ▪ Valuing a holding company or a capital-intensive company.<br>  ▪ Losses are continually generated by the business; or<br>  ▪ Valuation methodologies based on a company's net income or cash flow levels indicate a value lower than its adjusted net asset value. | ▪ The Specified Projects has entered into concession agreements and are expected to make the operating profits. The valuation of the Specified Projects is carried out on a 'going concern value' premise. In such a scenario, the fair worth of the business is reflected in its future earning capacity rather than the historical cost of the project. Since the Net Asset value does not capture the future earning potential of the businesses, we have not adopted the Asset approach for the valuation of the Specified Projects. |

**Income Approach**

The Income Approach is widely used for valuation under "Going Concern Value" premise. It focuses on the income generated by a company in the past as well as its future earning capability.

## Discounted Cash Flow ("DCF") Method

- Under the DCF method, the business is valued by discounting its free cash flows for the explicit forecast period and the perpetuity value thereafter.
- Free Cash Flows to Firm ("FCFF") under the DCF method has been applied for estimating the enterprise value of the Specified Projects.
- FCFF represent the cash available for distribution to both, the owners and creditors of the business. FCFF for the explicit period and perpetuity value is discounted by the Weighted Average Cost of Capital ("WACC") to derive the net present value. The WACC is an appropriate rate of discount to calculate the present value of the future cash flows as it considers equity–debt risk by incorporating debt–equity ratio of the firm.
- Enterprise Value ("EV") is derived by aggregating the present value of FCFF for the balance tenor of the Concession Agreement ("Explicit period") and Terminal value at the end of the Explicit period.
- Terminal value is estimated based on the business' potential for further growth beyond the Explicit period. Considering *inter-alia* estimated economic life of the projects and terms of the Concession Agreement, Terminal value has been estimated considering release of net working capital, at the end of the Explicit period.
- The Enterprise Value of the Specified Companies have been determined as an aggregate of the present value of FCFF for the Explicit period and Terminal value.



**Weighted Average Cost of Capital (WACC)**

WACC has been estimated as under:

| Particulars | Definition/Formula |
|---|---|
| WACC | Ke * (E/ (D + E)) + Kd * (1-T) * (D/(D + E)) |
| Where: | |
| Ke | cost of equity |
| E | market value of equity |
| Kd | cost of debt |
| D | market value of debt |
| T | effective tax rate |

The cost of equity is derived using the Capital Asset Pricing Model ("CAPM") as follows:

| Particulars | Definition/Formula |
|---|---|
| Ke | Rf + ß * (Rm – Rf) + $\alpha$ |
| Where: | |
| Rf | the return on risk-free assets |
| Rm | the expected average return of the market |
| (Rm – Rf) | the average risk premium above the risk – free rate that a "market" portfolio of assets is earning |
| ß | the beta factor, being the measure of the systematic risk of a particular asset relative to the risk of a portfolio of all risky assets |
| $\alpha$ | Company specific risk factor (alpha) if any |

A summary of WACC for the Specified Road Projects is appended as per **Appendix 1**.

# 9. Valuation of the Specified Projects

## 9.1. Key assumptions underlying Management Projections:

We have carried out the Enterprise Valuation of the Specified Projects as of 31 December 2025, considering *inter-alia* the Traffic Due Diligence Reports and Technical Due Diligence Reports of the Traffic and Technical Consultants respectively dated December 2025, Business plan/ Projected financial statements of the Specified Projects and other information provided by/ on behalf of the Management, industry analysis and other relevant factors.

**Operating Revenue:**

Operating revenue for the Specified Road Projects for the forecast period from 1st April 2026 to 31 March 2041 (the "Projected Period") have been estimated by the Management considering *inter-alia* projected Tollable traffic for the Specified Projects as per the Traffic Due Diligence Reports dated December 2025 of the Traffic Consultants appointed by the Trust.

We understand from the Management that, as on the Valuation Date, toll collection for the Specified Projects are currently being carried out by NHAI through certain third-party arrangements, the details of which are set out in the table below:

| Particulars | Toll Plaza | Toll Collection Contract Period | |
|---|---|---|---|
| | | From | To |
| Chilakaluripet - Vijayawada | Kaza Toll | 23 January 2025 | 23 January 2026 |
| Chennai Bypass | Vanagram | 15 April 2025 | 15 April 2026 |
| | Surapattu | 13 September 2025 | 13 September 2026 |
| Chennai- Tada | Nallur | 9 May 2025 | 9 May 2026 |
| Neelmangala- Tumakuru | Kulumepalya | 14 November 2025 | 14 November 2026 |
| | Chokkenahalli | 14 November 2025 | 14 November 2026 |
| Gorhar-Barwa Adda | Kulgo | 30 January 2025 | 30 January 2026 |

*Source: Information provided by the Management*

Toll revenue for FY2027 comprising a) assured remittance from NHAI as per existing toll collection arrangement with third parties and b) estimated revenue from the extension of toll collection arrangement till 31 March 2027 is summarised below:

| Particulars | FY2027 (INR Cr) |
|---|---|
| Chilakaluripet- Vijayawada | 225.7 |
| Chennai Bypass | 205.5 |
| Chennai- Tada | 147.5 |
| Neelmangala- Tumakuru | 192.0 |
| Gorhar-Barwa Adda | 155.1 |
| **Total** | **925.8** |

*Source: Information provided by the Management*

**Tollable Traffic Growth Projected**

Tollable Traffic has been projected by the Traffic Consultants considering *inter-alia* the analysis of historical traffic data, GDP growth, road network development in the region, potential traffic drivers and other relevant factors.

Tollable Traffic Growth projected by the Traffic Consultants is summarised below in terms of the Compound Annual Growth Rate (CAGR) for the period from FY2027 to the last full financial year before the concession end date. For further details, refer Traffic Due Diligence Reports.

| Particulars | Tollable Traffic Growth (FY2027- FY2041) |
|---|---|
| Chilakaluripet - Vijayawada | 2.0% |
| Chennai Bypass | 6.1% |
| Chennai- Tada | 3.7% |
| Neelmangala- Tumakuru | 1.7% |
| Gorhar-Barwa Adda | 2.6% |

*Source: Traffic Due Diligence Report; RBSA Analysis*

**Toll Rates**

Toll rates have been estimated for the forecast years as per the National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto and the following Wholesale Price Index (WPI) Inflation factor mentioned in the below table. The WPI inflation factors for FY26-27 have been considered based on the Management estimate.

The Management has considered a long- term forecast of WPI annual growth rate of 3.24% based on circular related macro-economic assumptions considered by NHAI while deciding an Initial Estimated Concession Value (IECV) i.e. average of past WPI growth trend for last 10 calendar years – for 2024, available on the web portal of NHAI

| Particulars | WPI Inflation Factor for FY26-27 | Estimated WPI Inflation Factor for FY27-28 and subsequent years |
|---|---|---|
| Chilakaluripet - Vijayawada | 0.25% | 3.24% |
| Chennai Bypass | 0.25% | 3.24% |
| Chennai- Tada | 0.25% | 3.24% |
| Neelmangala- Tumakuru | 0.25% | 3.24% |
| Gorhar-Barwa Adda | 0.25% | 3.24% |

*Source: Information provided by the Management*

**Projected Toll Revenue**

Toll Revenue growth for FY2027 and FY2041 (inter-alia based on Tollable Traffic projected by the Traffic Consultants and Toll rates based on WPI inflation estimate) is summarised below.

| Particulars | Toll Revenue Growth (base year FY2027) |
|---|---|
| Chilakaluripet - Vijayawada | 5.9% |
| Chennai Bypass | 10.4% |
| Chennai- Tada | 8.7% |
| Neelmangala- Tumakuru | 7.9% |
| Gorhar-Barwa Adda | 6.7% |

*Source: Management Projection; Traffic Due Diligence Report and RBSA Analysis*

For Project-wise, year-wise details of toll revenue for FY2027 to FY2041, refer Appendix 2

**Capacity Augmentation**

The draft concession agreement provides that during capacity augmentation, any monetary loss to the Concessionaire due to lane closures or traffic diversion will be assessed by the Authority using prescribed traffic measurement methods. The Authority shall only be obliged to pay compensation, in case it is determined by the Authority that the monetary loss suffered by the Concessionaire in the event of such lane closure/ traffic diversion on account of Capacity Augmentation is greater the threshold specified in the concession agreement. However, during or after capacity augmentation, any revenue impact arising from changes in the Equivalent Tollable Length shall be settled quarterly. Any increase in revenue due to an increase in Equivalent Tollable Length shall be remitted by the Concessionaire to the Authority, while any revenue loss resulting solely from a decrease in Equivalent Tollable Length shall be compensated by the Authority to the Concessionaire.

**Effect of Variation of Toll Collection**

In the event, the actual fee shall have fallen short/ exceeded of the target fee by more than 5% thereof, then for every 1% shortfall/ excess as compared to the target fee, the remaining Concession Period shall be increased/ decreased by 1% thereof, subject to fulfilment of terms of the Draft Concession Agreement; provided that the Concession Period shall not be reduced by more than 5 years, or shall not be increased by more than 10 years. It is further clarified that the subsequent target fee shall also be changed by the same percentage. Target fees shall not be revised in the event the Authority undertakes capacity augmentation.

**Existing arrangement for Operation and Maintenance ("O&M") Expenses, Major Maintenance & Repair Expenses ("MMR"), Hybrid Annuity Model ("HAM") and capacity augmentation**

We understand from the Management that NHAI has entered into certain contracts inter-alia for EPC, HAM, maintenance in respect of certain section of the Specified Projects, which are summarised below:

**Chilakaluripet-Vijayawada**

| Particulars | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/s Shiva Build Tech Private Limited | PBMC # | 355+000 | 357+342 | 2.342 | - | 24 March 2032 |
| M/s Chilakaluripet Bypass Private Limited | HAM | 0+000 | 16+499 | 16.499 | 29 October 2024 | 28 October 2039 |
| M/s Shiva Build Tech Private Limited | PBMC | 372+038 | 422+605 | 50.567 | - | 24 March 2032 |

# Performance Based Maintenance Contract

**Chennai Bypass**

| Particulars | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/s Arjunvaishanvi Infrastructure & Developers Pvt. Ltd | O&M (Annual Maintenance) | 0+000 | 32+600 | 32.6 | - | 30 March 2026 |
| M/s Babuji Civil Construction | EPC (Major Maintenance) | | | | - | 30 May 2028 |

**Chennai- Tada**

| Particulars | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/s SPL Infrastructure Private Limited | EPC (Six laning) | 21+400 | 54+400 | 33 | 9 February 2022 | 9 February 2026 |

**Neelmangala Tumakuru**

| Particulars | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/s HG Infra Engineering Limited | EPC (Six laning) | 29+500 | 49+900 | 20.4 | 31 March 2027 | 31 March 2032 |
| | EPC | 61+520 | 74+168 | 12.648 | 31 March 2027 | 31 March 2032 |
| Sri Chowdeshwari Concrete India Private Limited | O&M | 49+900 | 61+520 | 11.62 | - | 5 June 2029 |
| DPR invited (Six laning) | | 49+900 | 61+520 | 11.62 | 30 September 2028 | 30 September 2033 |

**Gorhar- Barwa Adda**

| Particulars | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| Progressive Construction Ltd & Sunway Construction Berhad, Malaysia | Item Rate | 320+810 | 326+000 | 5.19 | Not Applicable | |
| DBL Gorhar Khairatunda Highway Private Limited | HAM | 326+000 | 360+300 (Design 361+000) | 35 | 16 October 2021/ 31 March 2022 | 15 October 2036 |
| M/s Ashoka Khairatunda Barwa Adda Road Limited | HAM | 360+300 (Design 361+000) | 400+632 (Design 401+332) | 40.332 | 09 October 2021/ 21 April 2022 | 08 October 2036 |

*Source: Information provided by the Management; Technical Due Diligence Reports*

Management represented that:

- O&M expenses and MMR expenses during the tenor of the aforementioned contracts shall be borne by NHAI/ respective contractor;
- EPC expenses/ Capital expenditure for six laning as per the aforementioned contracts shall be borne by NHAI;
- Subsequent to the completion of the tenor of the aforementioned contracts, SPV shall be responsible for maintenance (O&M/ MMR) for the Specified Projects and the same has been considered in Technical Study Reports accordingly.

- **Operation and Maintenance Expenses (Routine Maintenance):** O&M Expenses for the Specified Projects for the Projected Period have been estimated by the Management basis the Technical Study conducted by the Technical Consultants appointed by Trust. Further, R1PPL proposes to enter into a transitional support agreement with NHAI and National Highways Invit Project Managers Private Limited wherein NHAI will provide the Concessionaire and the Project Manager a transitional support in respect of its O&M obligations and Tolling Obligations and obligations under the Project Implementation and Management Agreement for a period of 30 months commencing from the Appointed Date. In consideration of the services to be rendered by NHAI, the Project SPV and the Project Manager will pay fees to NHAI, as per the transitional support agreement.

- **Major Maintenance & Repair Expenses (MMR / Periodic maintenance)**: Periodic maintenance expenses are costs that are incurred to bring the road asset back to an earlier condition or to keep the road asset operating at its present condition. MMR Expenses have been estimated by the Management for the Projected Period basis the Technical Due Diligence Reports of the Technical Consultants.
- **Project Management (PM) Expenses**: PM expenses shall be paid to the Project Manager for management of all the toll road projects. These expenses have been estimated by the Management

considering the draft terms of the Project management agreement proposed to be entered into with the Project Manager.

- **Insurance and Other Office Expenses**: Like O&M Expenses, Insurance and Other Expenses have been estimated by the Management for the Projected Period basis the Technical Due Diligence Reports of the Technical Consultants.

  As further understood from the Management that during the transition period of 30 months commencing from 1st April 2026, ATMS expenses, in relation to toll management systems and software, to the extent of 40% will be borne by the SPV and remaining 60% related to manpower and other costs will be borne by NHAI. As represented by the Management, the ATMS costs ~ 40% of the overall toll collection costs are related to toll management systems and software. The same has been considered to arrive cash flows during the transition period for this valuation exercise.

  Post transition period, these expenses for the Projected Period have been estimated by the Management basis the Technical Study conducted by the Technical Consultants appointed by Trust.

- **IM Expenses and Trust Expenses:** IM Expenses and Trust Expenses shall be borne by RIIT. These expenses have been estimated by the Management considering the draft terms of the proposed agreements to be entered into with the Investment Manager and the Trust.

- **Depreciation and Amortization**: One-time lumpsum consideration for Service Concession to be paid to NHAI and future capital expenditure have been amortized over the period of concession (15 years) on the basis of projected revenues.

- **Taxes:** Income taxes have been estimated considering, as appropriate, tax depreciation/ amortisation policy to be followed by the SPV and the corporate income tax rate of 25.17%.

- **Capital Expenditure**: The Management has projected that major capital expenditure aggregating ~INR 66.9 crores shall be incurred by the SPV during FY2027 (~INR 52.8 crores) and FY2028 (~INR 14.1 crores) for the Specified Projects, basis the Technical Due Diligence Reports.

| Particulars | Capex (INR Cr) |
|---|---|
| Chilakaluripet- Vijayawada | 15.6 |
| Chennai Bypass | 11.8 |
| Chennai- Tada | 16.4 |
| Neelmangala- Tumakuru | - |
| Gorhar-Barwa Adda | 23.1 |
| **Total Capex** | **66.9** |

*Source Management Projection*

- **Working Capital**: Considering the nature of the business of operating toll road projects, the working capital requirement for the Projected Period has been estimated as NIL/ not material.

## 9.2. Specified Road Projects of R1PPL

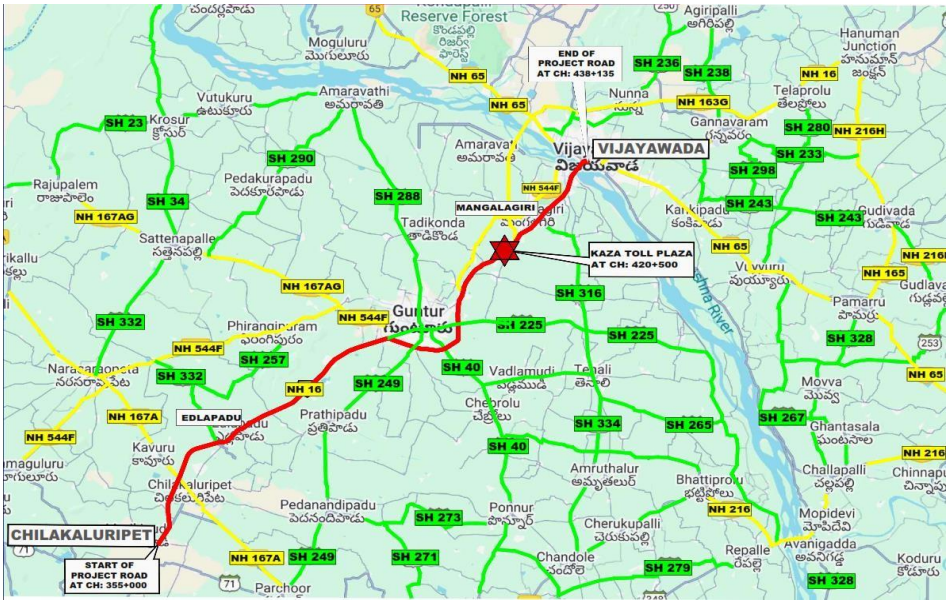
### 9.2.1. Chilakaluripet-Vijayawada Project

#### 9.2.1.1. Project Overview

| Parameters | Details |
|---|---|
| Project Name | Chilakaluripet- Vijayawada (NH-16) |
| Length of the project | 69+408 Km (post de-scope due to development of Vijayawada Bypass)<br>2.342 Km from Chilakaluripet (355+000) to Vijayawada (357+342)<br>16.499 Km Chilakaluripet Bypass (0+000 - (16+499)<br>50.567 Km from Chilakaluripet (372+038) to Vijayawada (422+065) |
| Toll Plaza Location | Kaza at Km 420+500 |

*Source: Information provided by the Management*

#### 9.2.1.2. Project Location




*Source: Information provided by the Management*

The project highway forms a vital part of Golder Quadrilateral (GQ) / East Coast Corridor which connects Kolkata and Chennai. The project highway strategically located at central region of Andhra Pradesh and hence as acts as spinal cord for the state by extending the connectivity to different parts of the country i.e., West Bengal/Odisha in north and Karnataka/Tamil Nadu in south. Additionally, the corridor plays a vital role in supporting port-led industrial development, logistics parks, and regional economic hubs along the eastern coast, strengthening Andhra Pradesh's integration with national and international supply chains.

#### 9.2.1.3. Key proposed infrastructure developments which may affect Traffic

We understand from the Traffic Study Report that traffic has been projected after considering inter-alia the impact of following proposed infrastructure developments:

- **Amaravati Outer Ring Road**

  Amaravati Outer Ring Road (ORR) is a major proposed infrastructure project designed to circle the new capital city of Amaravati in Andhra Pradesh. Proposed outer ring road will be around 189 km long, six-lane, access-controlled greenfield road being developed by National Highways Authority of India. Alignment is finialled and DPR work is in advance stage. Proposed ring road is planned to connect Guntur, Tenali, Vuyyuru and Amaravati to support the region's growth as outlined in Master Plan 2050 by Andhra Pradesh Capital Region Development Authority.

  A part of the project highway including the existing Kaza TP will be within the boundary to be established by proposed ring road which will encircle Vijayawada, Amaravati and Guntur. Consequently, a significant portion of traffic is expected to divert to the ring road, as vehicles will prefer to bypass the city to avoid congestion, leading to a significant reduction in through traffic.

- **Ramayapatnam Port**

  Ramayapatnam port is a greenfield development by the state government in Prakasam district and implemented by Andhra Pradesh Maritime Board through Ramayapatnam Port Development Corporation Limited. Construction of Phase-1 commenced in July 2022 and expected to be operational by end of FY27. Phase-1 development includes four multipurpose berths, breakwaters and dredging works with cargo handling capacity of 30 MTPA extended to 19 berths with 138 MTPA capacity in future.

  This port-led economic development will strengthen trade and growth of the region. This development is likely to attract additional traffic to the project road, leading to a developmental traffic.

- **Amaravati Capital City**

  Development related to Amaravati Capital City and nearby region is expected to generate significant developmental and induced traffic at the project highway.

  As major phases of the capital city's infrastructure such as government administrative complexes, educational institutions, housing townships and commercial centers become operational, travel demand within the region is expected to rise. This growth will lead to increased daily commuting between Amaravati/Vijayawada and Guntur, as well as heightened movement of goods and services supporting the expanding urban ecosystem.

In the long term, the enhanced connectivity and economic opportunities offered by the Amaravati Capital City and nearby region will act as strong promoter for traffic growth through the project highway. The induced traffic will primarily consist of passenger vehicles, public transport and logistics movement associated with residential and business development.

- **Chennai Hyderabad high-speed rail**

  Chennai–Hyderabad High Speed Rail Corridor is a proposed 778 km high-speed rail link connecting Chennai Central, Minjur (on Chennai Ring Road), Tirupati, Amaravati/ Vijayawada, and Hyderabad across Tamil Nadu, Andhra Pradesh and Telangana. Upon completion, it is expected to reduce the current Chennai–Hyderabad travel time from approximately 12 hours to about ~3 hours. Consequently, a portion of traffic is expected to reduce, as people will prefer to take rail to avoid congestion. This will reduce traffic movement of Car/Jeep/Van and bus from/ to Hyderabad, Vijayawada and Chennai.

#### 9.2.1.4. Additional Procedures to be complied with in accordance with InvIT regulations:

A. List of one-time sanctions/approvals which are obtained or pending:

As represented by the Management, the list of sanctions/ approvals obtained till 31 December 2025 is provided in Appendix 3(a).

B. List of up to date/ overdue periodic clearances:

As represented by the Management, all other material permits, registrations, licenses, approvals, consents and other authorizations (collectively referred as "Governmental Licenses") shall be obtained by R1PPL as per individual project requirements once the rights and obligations are assumed by the SPV. The Project SPV (R1PPL) would be in due course and as required under applicable law procure all the Governmental Licenses issued by, and shall make all material declarations and filings with, the applicable Government Authority to own, lease, license, operate and use its properties and assets and to conduct the business by the Project SPV, as will be described in the placement documents. No notice of proceedings has been received relating to the revocation or modification of any Governmental Licenses, except as would not result in a Material Adverse Change. The general list of relevant Governmental Licenses as provided by the Management is enclosed in Appendix 3(b).

C. Estimates of already carried out as well as proposed major repairs and improvements along with estimated time of completion:

Historical Major Maintenance Expenses: We understand from the Management that the details of historical major maintenance expenses are not available with the Investment Manager.

Projected Major Maintenance Expenses as per the Technical Due Diligence Report by Technical Consultants is provided in Appendix 3(c).

D. On-going material litigations including tax disputes and claims in relation to the assets, if any;
As represented by the Management, the list of on-going material litigations including tax disputes and claims till 31 December 2025 is provided in Appendix 3(d).

The Management represented that impact, if any, of the litigation in respect of the Specified Projects pertaining to the period prior to the Effective date shall be borne by NHAI (the Sponsor).

E. Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:
As represented by the Management, there are no revenue pendencies including local authority taxes associated with the Chilakaluripet-Vijayawada Project and compounding charges as at 31 December 2025.

F. Vulnerability to natural or induced hazards that may not have been covered in town planning building control:
As represented by the Management, there are no vulnerability to natural or induced hazards that may not have been covered in town planning/ building control.

G. Physical inspection
We carried out the physical inspection on 5 January 2026. We observed during the physical inspection that the Toll was being collected at Kaza toll plaza. Please refer to Appendix 3(e) for the latest pictures of the project.

H. Statement of Assets:
As represented by the Management, RIIMPL is envisaging to acquire the Specified Projects. Hence, there is no asset of the Project as at the Valuation Date.

### 9.2.2. Chennai Bypass Project

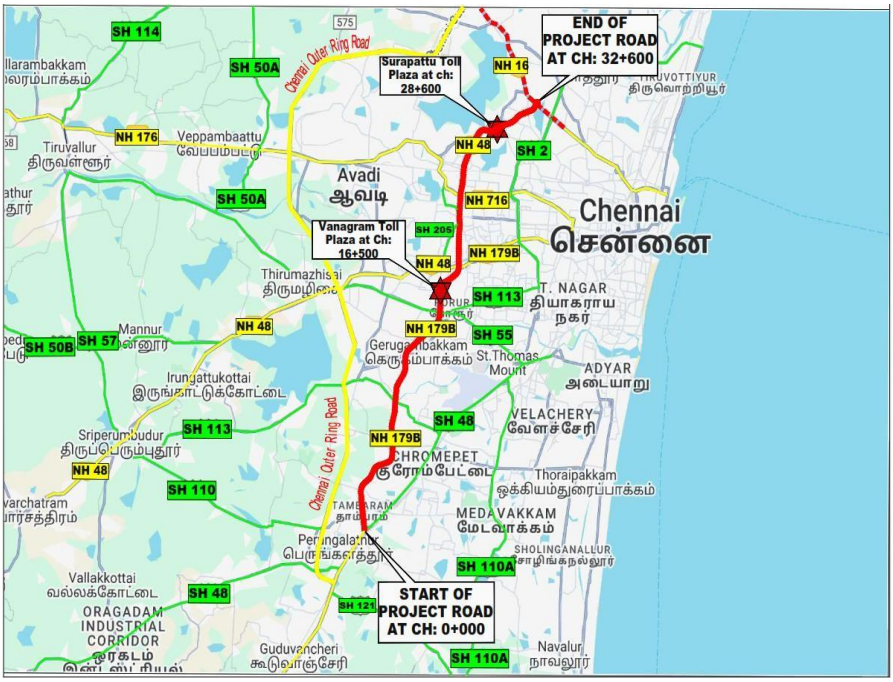
#### 9.2.2.1. Project Overview

| Parameters | Details |
|---|---|
| Project Name | Chennai Bypass (NH-32 & NH-48) |
| Length of the project | 32.600 kms from Tambaram (0+000) to Madhavaram (32+600) |
| Toll Plaza Location | Vanagaram at Km 16+500 / Tiruneermalai* at Km 6+500 and Surapattu at Km 28+600 |

*Present toll plaza at Vanagaram location is to be shifted to Tiruneermalai due to identified black spot near toll plaza and proposed construction of Vehicular Underpass (VUP) at Km 016+890

*Source: Information provided by the Management*

#### 9.2.2.2. Project Location




*Source: Information provided by the Management*

The project highway is a 32 km bypass section of Chennai city, part of two national highways i.e., Golden Quadrilateral (Mumbai – Bengaluru – Chennai corridor NH48) and NH179B (old NH32/NH45) connecting Chennai to south Tamil Nadu. It starts Irumbuliyur junction near Tambaram in southern Chennai) and extends to Madhavaram junction on NH16 on east of the city. It caters to substantial intra-city and port-related traffic, including movements between Bengaluru/western and Chennai maritime cluster covering ports of Chennai, Ennore and Kattupalli.

#### 9.2.2.3. Key proposed infrastructure developments which may affect Traffic

We understand from the Traffic Study Report that traffic has been projected after considering inter-alia the impact of following proposed infrastructure developments:

- **Bengaluru – Chittor – Thatchoor corridor and CPRR link**
  Chennai – Bengaluru Industrial Corridor (CBIC) proposes high impact / market driven nodes at Ponneri in Tamil Nadu (NH48), Tumakuru in Karnataka (NH48) and Krishnapatnam/ Nellore in Andhra Pradesh (NH16).

  Bengaluru – Chittor – Thatchoor corridor in association with northern end of Chennai Peripheral Ring Road (CPRR) will be backbone to this mega industrial corridor. Bengaluru Chennai Expressway (NE7) and Chittoor Thatchur section of NH716B will link both states to Chennai Maritime Cluster covering ports of Chennai, Ennore and Kattupalli. Both will be access-controlled development. As a result, a portion of traffic is expected to reduce for Surapattu toll plaza.

- **Chennai Port Maduravoyal elevated corridor**
  NHAI is developing elevated corridor exclusively for Chennai Port (Maduravoyal to Chennai Port Gate No. 10) to strengthen external evacuation infrastructure. Further, Chennai Port is implementing strengthening program of internal roads for ease on movement between Gate No. 1 to 10 followed by internal elevated corridor as long-term solution to ease out internal congestion. This project is under implementation with expected completion by mid FY29.

  Integrated logistics facility at Chennai (Mappedu) Multimodal Logistics Park ("MMLP") – This acts as dry port for Chennai Maritime Cluster. Traffic which is associated to Chennai Port without using logistics facility (CFS/Yard) at Manali area, elevated corridor will act as natural choice for such traffic i.e., factory stuffing/sealed container to/ from manufacturing facility. Traffic which is associated to Chennai Port using logistics facility (CFS/ Yard) at Manali area partly will use Mappedu MMLP as dry port followed by elevated corridor as seamless connectivity.

  Sriperumbudur to Maduravoyal Elevated Corridor (long-term)- DPR of 'Construction of 6 lane Elevated Corridor from Sriperumbudur to Maduravoyal' for future connectivity is under process by Chennai Metro Rail Limited in close coordination with NHAI as plan is to integrate metro connectivity with the elevated corridor. This will further enhance seamless connectivity for Chennai port bound traffic.

  Considering the above developments, it could have a significant negative impact on traffic associated with Surapattu toll plaza.

- **Additional entry/exit at Ch km 5.200**
  As Chennai Bypass is access-controlled with limited entry-exit, the present route via ORR require a long detour, causing delays in the movement of export and import goods. Therefore, MEPZ has requested NHAI to develop a dedicated entry and exit ramp at Ch km 5.200 on Chennai Bypass. Also industrial area at Thirumudivakkam and Tambaram originated/destined traffic could use the proposed Facility hence will be positive impact for the both the toll plazas.

### 9.2.2.4. Additional Procedures to be complied with in accordance with InvIT regulations:

A. List of one-time sanctions/approvals which are obtained or pending

As represented by the Management, the list of sanctions/ approvals obtained till 31 December 2025 is provided in Appendix 3(a).

B. List of up to date/ overdue periodic clearances:

As represented by the Management, all other material permits, registrations, licenses, approvals, consents and other authorizations (collectively referred as "Governmental Licenses") shall be obtained by R1PPL as per individual project requirements once the rights and obligations are assumed by the SPV. The Project SPV (R1PPL) would be in due course and as required under applicable law procure all the Governmental Licenses issued by, and shall make all material declarations and filings with, the applicable Government Authority to own, lease, license, operate and use its properties and assets and to conduct the business by the Project SPV, as will be described in the placement documents. No notice of proceedings has been received relating to the revocation or modification of any Governmental Licenses, except as would not result in a Material Adverse Change. The general list of relevant Governmental Licenses as provided by the Management is enclosed in Appendix 3(b)**.**

C. Estimates of already carried out as well as proposed major repairs and improvements along with estimated time of completion:

Historical Major Maintenance Expenses: We understand from the Management that the details of historical major maintenance expenses are not available with the Investment Manager.

As further represented by the Management, forecasted Major Maintenance Expenses (INR in Crs) is provided in Appendix 3(c).

D. <u>On-going material litigations including tax disputes and claims in relation to the assets, if any;</u>

As represented by the Management, the list of on-going material litigations including tax disputes and claims till 31 December 2025 is provided in Appendix 3(d).

The Management represented that impact, if any, of the litigation in respect of the Specified Projects pertaining to the period prior to the Effective date shall be borne by NHAI (the Sponsor).

E. <u>Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:</u>

As represented by the Management, there are no revenue pendencies including local authority taxes associated with InvIT Asset and compounding charges as at 31 December 2025.

F. <u>Vulnerability to natural or induced hazards that may not have been covered in town planning building control:</u>

As represented by the Management, there are no vulnerability to natural or induced hazards that may not have been covered in town planning/ building control.

G. <u>Physical inspection</u>

We carried out the physical inspection of Chennai Bypass Project on 5 January 2026. We observed during the physical inspection that the Toll was being collected at Vanagaram and Surapattu toll plazas. Please refer to Appendix 3(e) for the latest pictures of the project.

H. <u>Statement of Assets:</u>

As represented by the Management, RIIT is envisaging to acquire stake in the SPV. Hence, there is no asset of the Project as at the Valuation Date.

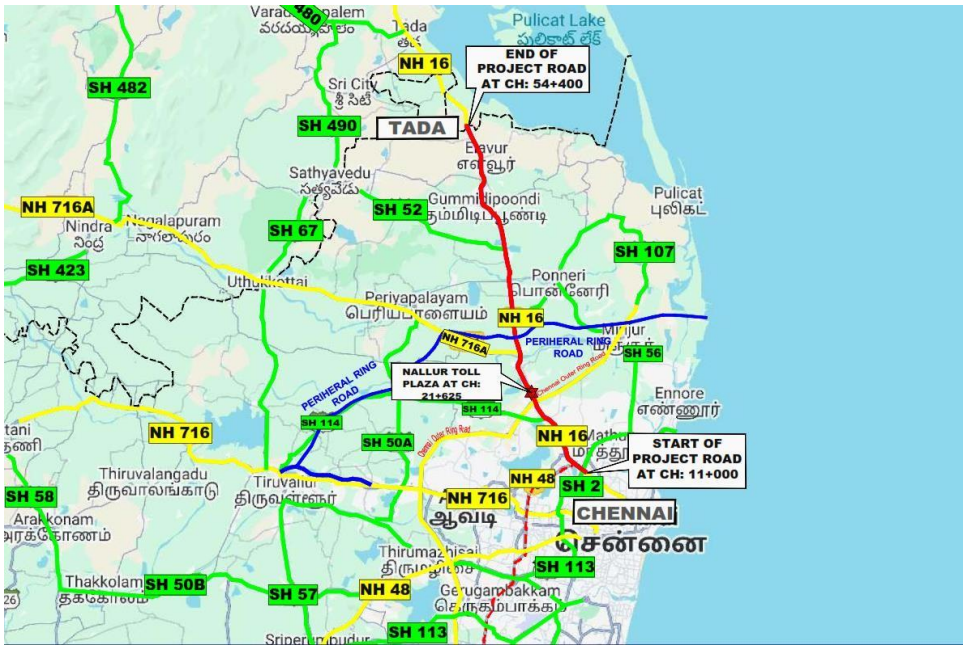
### 9.2.3. Chennai Tada Project

#### 9.2.3.1. Project Overview

| Parameters | Details |
|---|---|
| Project Name | Chennai Tada (NH-16) |
| Length of the project | Revised Length: 33.000 Kms for asset monetization proposal* From NH16 interaction with Chennai Outer Ring Road (21+400 Km) to TN/AP Border (54+400) |
| Toll Plaza Location | Nallur at Km 21+625<br>Nallur toll plaza will be shifted to Durainallur at Km 34+180 from 1st October 2027 in context of development of Chennai Peripheral Ring Road |

**Initial section of Km 11+000 to Km 21+400 (10.400 Km length) is to be de-notified and handed over to the state government in near future considering 4 lane configuration and urbanization along the section. Hence, this 10.400 Km length to be excluded for asset monetization proposal.*
*Source: Information provided by the Management*

#### 9.2.3.2. Project Location



*Source: Information provided by the Management*

Located at the southern end of the country's ~1,500 km east–coast corridor (NH16), this point serves as gateway to Chennai maritime and industrial clusters and observes traffic from states on eastern coast, northern and western part of the country. Chennai maritime cluster includes Chennai, Ennore (Kamarajar) and Kattupalli ports which contributes ~20% in container traffic of India, being second largest container traffic cluster western India.

#### 9.2.3.3. Key proposed infrastructure developments which may affect Traffic

We understand from the Traffic Study Report that traffic has been projected after considering inter-alia the impact of following proposed infrastructure developments:

- **Surat – Nasik – Chennai Expressway**

  Surat Nasik Chennai Expressway is ~1,200 km long 6-lane, partially access-controlled highway being developed by NHAI through HAM. The project is part of two major economic corridors i.e., ~513 km Surat – Nashik – Ahmednagar – Solapur corridor and ~707 km. Solapur– Kurnool – Chennai corridor integrating both greenfield and brownfield stretches.

  Recently, MoRTH cancelled Surat – Nasik section of proposed development due to persistent challenges in securing environmental clearances. To address the intended connectivity objective, Maharashtra State Road Development Corporation ("MSRDC") will develop greenfield expressway connecting Bharvir Khurd on Smruddhi Marg to Tawa village on NH48. This development will negatively impact traffic movement between Solapur/ west and Chennai/ south and between Hyderabad/ north and Chennai/ south

- **Chennai Hyderabad high-speed rail**

  Chennai–Hyderabad High Speed Rail Corridor is a proposed 778 km high-speed rail link connecting Chennai Central, Minjur (on Chennai Ring Road), Tirupati, Amaravati/ Vijayawada and Hyderabad across Tamil Nadu, Andhra Pradesh and Telangana. it is expected to reduce the current Chennai–Hyderabad travel time from approximately 12 hours to about ~3 hours. As a result, there will be a negative movement in Traffic from/ to Hyderabad, Vijayawada and Chennai.

- **National Waterway 4**

  National Waterway 4 (NW4) is a major plan to use rivers and canals as a large transportation route in South India. It connects the states of Andhra Pradesh, Tamil Nadu, Telangana, and the territory of Puducherry. Alignment follows several important waterways, including parts of the Godavari and Krishna rivers, as well as several man-made canals. In total, the planned route is nearly 2,900 kilometers long. Inland Waterways Authority of India (IWAI), is currently working on the first sections, making rivers deeper and building docks for loading and unloading goods. The aim is to create a cheaper and more environmentally friendly way to move heavy cargo like coal, cement, and food, reducing traffic from roads and railways. This will reduce the traffic of 3A trucks and MAV.

### 9.2.3.4. Additional Procedures to be complied with in accordance with InvIT regulations:

A. List of one-time sanctions/approvals which are obtained or pending:
As represented by the Management, the list of sanctions/ approvals obtained till 31 December 2025 is provided in Appendix 3(a).

B. List of up to date/ overdue periodic clearances:

As represented by the Management, all other material permits, registrations, licenses, approvals, consents and other authorizations (collectively referred as "Governmental Licenses") shall be obtained by R1PPL as per individual project requirements once the rights and obligations are assumed by the SPV. The Project SPV (R1PPL) would be in due course and as required under applicable law procure all the Governmental Licenses issued by, and shall make all material declarations and filings with, the applicable Government Authority to own, lease, license, operate and use its properties and assets and to conduct the business by the Project SPV, as will be described in the placement documents. No notice of proceedings has been received relating to the revocation or modification of any Governmental Licenses, except as would not result in a Material Adverse Change. The general list of relevant Governmental Licenses as provided by the Management is enclosed in Appendix 3(b).

C. Estimates of already carried out as well as proposed major repairs and improvements along with estimated time of completion:

Historical Major Maintenance Expenses: We understand from the Management that the details of historical major maintenance expenses are not available with the Investment Manager.

As further represented by the Management, forecasted Major Maintenance Expenses (INR in Crs) is provided in Appendix 3(c).

D. On-going material litigations including tax disputes and claims in relation to the assets, if any;
As represented by the Management, the list of on-going material litigations including tax disputes and claims till 31 December 2025 is provided in Appendix 3(d).

The Management represented that impact, if any, of the litigation in respect of the Specified Projects pertaining to the period prior to the Effective date shall be borne by NHAI (the Sponsor).

E. Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:
As represented by the Management, there are no revenue pendencies including local authority taxes associated with InvIT Asset and compounding charges as at 31 December 2025.

F. Vulnerability to natural or induced hazards that may not have been covered in town planning building control:

As represented by the Management, there are no vulnerability to natural or induced hazards that may not have been covered in town planning/ building control.

G. Physical inspection

We carried out the physical inspection of Chennai Tada Project on 5 January 2026. We observed during the physical inspection that the Toll was being collected at Nallur toll plaza. Please refer to Appendix 3(e) for the latest pictures of the project.

H. Statement of Assets:

As represented by the Management, RIIT is envisaging to acquire stake in the SPV. Hence, there is no asset of the Project as at the Valuation Date.

### 9.2.4. Neelmangla- Tumakuur Project

#### 9.2.4.1. Project Overview

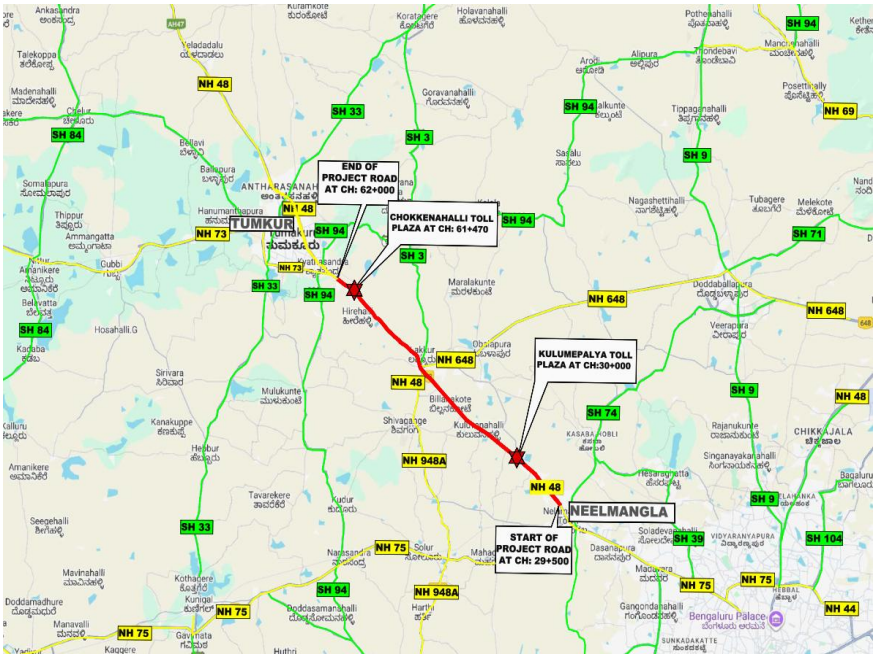
| Parameters | Details |
|---|---|
| Project Name | Neelmangla-Tumakuru (NH-48) |
| Length of the project | 44.668 kms for asset monetization proposal*<br>32.02 Kms from Neelmangla (29+500) to Tumakuru (61+520)<br>12.648 Kms for Tumakuru Bypass from 61+520 to 74+168 |
| Toll Plaza Location | Kulumepalya at Km 30+000, Chokkenahalli at Km 61+500 |

** Tolling of Tumakuru Bypass (km 62.000 to km 74.168, length 12.168 km) is currently being exercised at adjacent Karjeevanahalli toll plaza (under BOT concession) and reimbursed to NHAI by BOT concessionaire. This section will be added for this monetization bundle. Hence, this 12.168 km length to be added for asset monetization proposal.*

Timeline of commencement/ closure of mentioned toll plazas/ check plazas are as follows:

| Toll/Check Plaza | Details |
|---|---|
| Kulumepalya (km 30.000) | will be terminated on 31 March 2027 (FY27) on completion of 4 to 6 laning of Nelmangala toDobbaspet section |
| Halenijagal (km 53.100) | will be operational from 1 April 2027 (FY28) |
| Bharathipura Entry CP (km 46.375) and Honnenahalli Exit CP (km 47.425) | will be operational from 1 April 2027 (FY28) along with Halenijagal TP for Nelamangala to Dobbaspet section |
| Chokkenahalli (km 61.500) | will be terminated on 30 September 2028 (H1 FY29) on completion of 4 to 6 laning of Dobbaspet to Tumakuru and entire project highway length will be charged at Halenijagal TP |
| Dobbaspet Entry CP (km 49.900) and Halenijagal Exit CP (km 53.100) | will be operational from 1 October 2028 (H2 FY29) |

#### 9.2.4.2. Project Location




*Source: Information provided by the Management*

Located at the southern end of golden quadrilateral's ~1,000 km Mumbai – Bengaluru corridor (NH48), this point serves as gateway to Bengaluru and handles high volume of freight traffic moving towards western and northern India and neighbouring state of Tamil Nadu, supporting inter-state trade movement.

#### 9.2.4.3. Key proposed infrastructure developments which may affect Traffic

We understand from the Traffic Study Report that traffic has been projected after considering inter-alia the impact of following proposed infrastructure developments:

**Upgradation of NH66**

NH66 upgradation aims to decongest the corridor, enhance inter-state connectivity, and support economic growth, logistics, and tourism along the western coast. The project has faced prolonged construction challenges and is targeted for completion by March 2027, with phased openings continuing into early 2028, particularly in Kerala. The Mumbai–Goa section is nearing completion and is expected to significantly reduce travel time, while diverted hazardous cargo traffic is likely to return to NH66 once all sections become operational. This will be expected to have a negative diversion on traffic movement between Kagal/north and Kochi / south for hazardous cargo traffic and other chemical and petroleum products traffic using NH48 as safety precautions.

**Satellite Town Ring Road (STRR)**

STRR officially designated as NH948A and partly as NH648, is a greenfield expressway project being developed by NHAI. Planned as a 4–6 lane, access-controlled corridor, the STRR is envisioned as an orbital road around Bengaluru, to ease the pressure on the city's congested road network. Its primary objective is to create a regional transportation framework by connecting 12 satellite towns surrounding Bengaluru, while allowing through traffic to bypass the congested core city area. It is also expected to stimulate economic development, encourage industrial growth in peripheral areas, and support more balanced urban expansion.

It is being implemented in multiple phases with the northeastern arc from Dobbaspet to Hoskote via Doddaballapur and Devanahalli is completed. The partially operational northern ring is also known as the Bengaluru Ring Road. Southwestern arc of the STRR is also being built in phases, with the overall project expected to be completed by the end of 2030. Once this section becomes operational, it will provide a smoother bypass around Bengaluru for vehicles coming from Mysuru and the northern districts of Kerala, reducing travel time and congestion on existing highways.

Development of North Ring of STRR / Bengaluru Ring Road will have a negative impact on traffic movement between Dobbaspet/north-west and Hosur/south-east. However, South Ring of STRR will be expected to have positive impact on traffic movement between Dobbaspet/north-west and Hosur/south-east and Dobbaspet/north and Mysuru/north Kerala and negative impact on Traffic movement between Dobbaspet/north and Mysuru/north Kerala.

**Surat – Nasik – Chennai Expressway**

Surat Nasik Chennai Expressway is ~1200 km long 6-lane, partially access-controlled highway being developed by NHAI through HAM. The project is part of two major economic corridors i.e

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513 km Surat – Nashik – Ahmednagar – Solapur corridor and 707 km. Solapur– Kurnool – Chennai corridor integrating both greenfield and brownfield stretches. Recently, MoRTH cancelled Surat – Nasik section of proposed development due to persistent challenges in securing environmental clearances. To address the intended connectivity objective, Maharashtra State Road Development Corporation (MSRDC) will develop greenfield expressway connecting Bharvir Khurd on Smruddhi Marg to Tawa village on NH48. This development will negatively impact Traffic movement between Solapur/west and Chennai/south and between Hyderabad/north and Chennai/south

**Bengaluru Tumakuru Metro line**

The proposed extension of the Namma Metro along the north-western corridor aims to connect Bengaluru with Tumakuru marking Karnataka's first inter-city metro corridor and a major step towards Bengaluru – Tumakuru twin city planning. Corridor is planned to span approximately 59.6 km, extending from Madavara (terminal station of the Green Line) to Tumakuru, thereby linking the Bengaluru metropolitan area with an important industrial and educational hub of the state via Dobbaspet. The plan also includes two metro depots, one proposed near Nelamangala to serve the suburban and industrial belt, and another near Tumakuru to support terminal operations and maintenance requirements. This will have a negative diversion on the traffic movement of bus and Car/ Jeep/ Van between Bengaluru and Tumakuru.

**Service Road on implementation of access-controlled**

Proposed access-controlled modality will be implemented on completion of 4 to 6 lane widening of entire stretch i.e. start of H2 FY29. This will have a negative diversion of local traffic movement between Dobbaspet and Tumakuru.

**Dobbaspet and Halenijagal (Check Plaza) traffic**

Dobbaspet and Halenijagal (Check Plaza) will be implemented in mid FY29 and because of which traffic movement between Tumakuru/north and Dobbaspet/further towards north-east ring and south-west ring of Bengaluru / Satellite Town Ring Road will use proposed check plazas as Entry/Exit. Hence, the same will be eliminated from the main carriage way.

### 9.2.4.4. Additional Procedures to be complied with in accordance with InvIT regulations:

A. <u>List of one-time sanctions/approvals which are obtained or pending:</u>

As represented by the Management, the list of sanctions/ approvals obtained till 31 December 2025 is provided in Appendix 3(a).

B. <u>List of up to date/ overdue periodic clearances:</u>

As represented by the Management, all other material permits, registrations, licenses, approvals, consents and other authorizations (collectively referred as "Governmental Licenses") shall be obtained by R1PPL as per individual project requirements once the rights and obligations are assumed by the SPV. The Project SPV (R1PPL) would be in due course and as required under applicable law procure all the Governmental Licenses issued by, and shall make all material declarations and filings with, the applicable Government Authority to own, lease, license, operate

and use its properties and assets and to conduct the business by the Project SPV, as will be described in the placement documents. No notice of proceedings has been received relating to the revocation or modification of any Governmental Licenses, except as would not result in a Material Adverse Change. The general list of relevant Governmental Licenses as provided by the Management is enclosed in Appendix 3(b)**.**

C. Estimates of already carried out as well as proposed major repairs and improvements along with estimated time of completion:

Historical Major Maintenance Expenses: We understand from the Management that the details of historical major maintenance expenses are not available with the Investment Manager.

As further represented by the Management, forecasted Major Maintenance Expenses (INR in Crs) is provided in Appendix 3(c).

D. On-going material litigations including tax disputes and claims in relation to the assets, if any;
As represented by the Management, the list of on-going material litigations including tax disputes and claims till 31 December 2025 is provided in Appendix 3(d).

The Management represented that impact, if any, of the litigation in respect of the Specified Projects pertaining to the period prior to the Effective date shall be borne by NHAI (the Sponsor).

E. Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:
As represented by the Management, there are no revenue pendencies including local authority taxes associated with InvIT Asset and compounding charges as at 31 December 2025.

F. Vulnerability to natural or induced hazards that may not have been covered in town planning building control:
As represented by the Management, there are no vulnerability to natural or induced hazards that may not have been covered in town planning/ building control.

G. Physical inspection
We carried out the physical inspection of Neelmangla Tumakuru Project on 5 January 2026. We observed during the physical inspection that the Toll was being collected at Kulumepalya and Chokkenahalli toll plaza. Please refer to Appendix 3(e) for the latest pictures of the project.

H. Statement of Assets:
As represented by the Management, RIIT is envisaging to acquire stake in the SPV. Hence, there is no asset of the Project as at the Valuation Date.

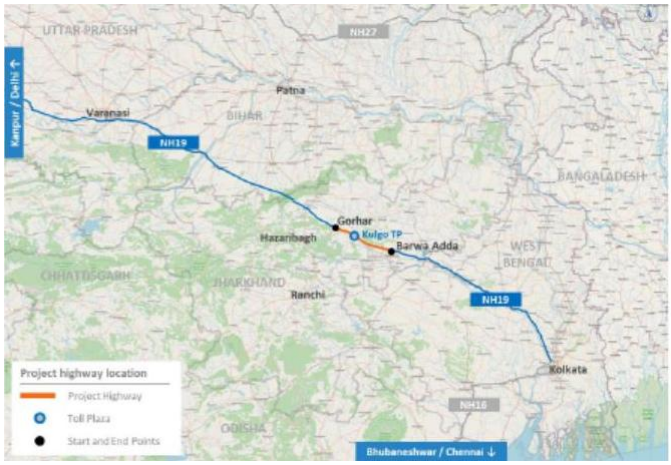
### 9.2.5. Gorhar-Barwa Adda Project

#### 9.2.5.1. Project Overview

| Parameters | Details |
|---|---|
| Project Name | Gorhar-Barwa Adda (NH-19) |
| Length of the project | 80.522 kms from Gorhar (320+810) to Barwa Adda (401+332) |
| Toll Plaza Location | Kulgo at Km 352+100 (known as Ghanghri toll plaza in local region) |

*Source: Information provided by the Management*

#### 9.2.5.2. Project Location




*Source: Information provided by the Management*

The project highway is an integral part of golden quadrilateral along NH19, a strategic long-distance transport corridor linking Delhi/Agra and Kolkata. It serves as a critical inter-state traffic, ensuring all-weather connectivity among Uttar Pradesh, Bihar, Jharkhand and West Bengal and supporting efficient regional freight and passenger movement.

#### 9.2.5.3. Key proposed infrastructure developments which may affect Traffic

We understand from the Traffic Study Report that traffic has been projected after considering inter-alia the impact of following proposed infrastructure developments:

**Varanasi Ranchi Kolkata highspeed corridor**

Greenfield 6 lane access controlled highspeed corridor under Bharatmala Pariyojana to be developed as National Highway passing through Uttar Pradesh, Bihar, Jharkhand, West Bengal and will be part of Vision 2047. This will expect to reduce current travel time from 12-14 hours to 7-9 hours. Consequently, this will have a negative movement in traffic between Varanasi/west and Hazaribagh/Bokaro/south from FY31 onwards; between Varanasi/west and Kolkata/Kharagpur/Haldia from Q4 FY33 onwards and between Dobhi/north and Hazaribagh/south from Q4 FY33 onwards.

### Raxual Haldia Economic Corridor

This project is a planned 695 km, 6 lane, access-controlled greenfield highway development that will connect Raxaul on the India-Nepal border in Bihar to Haldia Port in West Bengal. Passing through parts of Bihar, Jharkhand, and West Bengal, the expressway is aimed at improving regional connectivity, reducing travel time, and facilitating smoother movement of goods and passengers across eastern India. By offering a faster and more efficient link between Nepal and an important maritime hub, it will play a key role in boosting cross-border trade and regional development. Development of this expressway will attract traffic between Nepal, Bihar, Jharkhand and southern West Bengal impacting negatively to project highway.

### Eastern Dedicated Freight Corridor

Sonnagar - Dankuni section is the eastern extension of the Eastern Dedicated Freight Corridor (EDFC), designed to connect the existing freight corridor from Sonnagar in Bihar to Dankuni near Kolkata in West Bengal. Project is being implemented by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL), with the objective of enhancing freight capacity, reducing congestion on existing railway lines, and improving transport efficiency for industries located in Bihar, Jharkhand, and West Bengal. Sonnagar - Dankuni link is expected to significantly decongest the existing Howrah - Delhi main line, improve supply chain efficiency and will negatively impact the traffic movement of Gorhar-Barwa Adda project.

### Kandla Gorakhpur LPG Pipeline

Kandla - Gorakhpur LPG Pipeline is a 2,805 km long project world's longest LPG pipeline being developed by IHB Limited, a joint venture of Indian Oil, BPCL, and HPCL. Authorized by the Petroleum & Natural Gas Regulatory Board (PNGRB) under the Common Carrier category, the pipeline traverses Gujarat, Madhya Pradesh, and Uttar Pradesh. The pipeline will transport LPG sourced from import terminals at Kandla, Dahej, and Pipavav, and refineries at Koyali and Bina. It will directly supply 22 LPG bottling plants 3 in Gujarat, 6 in Madhya Pradesh, and 13 in Uttar Pradesh ensuring reliable and efficient LPG distribution across western and northern India. Development of this pipeline is expected to impact LPG transportation from Haldia Port (via Durgapur Bottling Plant to Purvanchal region, Bihar, Jharkhand), as Kandla serves as a major hub for handling petroleum, oil, and lubricants (POL) and will cater to a significant share of LPG movement through the new network.

### Varanasi Howrah Vande Bharat Express

Varanasi - Howrah Vande Bharat Express is a semi-high-speed train covering about 760 km between Varanasi and Howrah in around 7.5 to 8 hours, offering faster and more comfortable travel. It enhances connectivity across major cities like Patna, Gaya, and Asansol, boosting regional mobility and tourism in eastern India. Consequently, a portion of traffic is expected to shift to the rail transport leading to a reduction in traffic.

**National Waterway 1**

National Waterway 1 (NW1), also known as the Allahabad–Haldia Inland Waterway, is one of India's longest and most significant inland navigation corridors, spanning 1,620 km along the Ganga River. It connects Haldia in West Bengal to Prayagraj (Allahabad) in Uttar Pradesh, passing through the states of West Bengal, Jharkhand, Bihar, and Uttar Pradesh. It is expected to reduce trucks and MAV traffic movement between Varanasi and Kolkata

### 9.2.5.4. Additional Procedures to be complied with in accordance with InvIT regulations:

A. List of one-time sanctions/approvals which are obtained or pending:

As represented by the Management, the list of sanctions/ approvals obtained till 31 December 2025 is provided in Appendix 3(a).

B. List of up to date/ overdue periodic clearances:

As represented by the Management, all other material permits, registrations, licenses, approvals, consents and other authorizations (collectively referred as "Governmental Licenses") shall be obtained by R1PPL as per individual project requirements once the rights and obligations are assumed by the SPV. The Project SPV (R1PPL) would be in due course and as required under applicable law procure all the Governmental Licenses issued by, and shall make all material declarations and filings with, the applicable Government Authority to own, lease, license, operate and use its properties and assets and to conduct the business by the Project SPV, as will be described in the placement documents. No notice of proceedings has been received relating to the revocation or modification of any Governmental Licenses, except as would not result in a Material Adverse Change. The general list of relevant Governmental Licenses as provided by the Management is enclosed in Appendix 3(b).

C. Estimates of already carried out as well as proposed major repairs and improvements along with estimated time of completion:

Historical Major Maintenance Expenses: We understand from the Management that the details of historical major maintenance expenses are not available with the Investment Manager.

As further represented by the Management, forecasted Major Maintenance Expenses is provided in Appendix 3(c).

D. On-going material litigations including tax disputes and claims in relation to the assets, if any;

As represented by the Management, the list of on-going material litigations including tax disputes and claims 31 December 2025 is provided in Appendix 3(d).

The Management represented that impact, if any, of the litigation in respect of the Specified Projects pertaining to the period prior to the Effective date shall be borne by NHAI (the Sponsor).

E. Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:

As represented by the Management, there are no revenue pendencies including local authority taxes associated with InvIT Asset and compounding charges as at 31 December 2025.

F. Vulnerability to natural or induced hazards that may not have been covered in town planning building control:

As represented by the Management, there are no vulnerability to natural or induced hazards that may not have been covered in town planning/ building control.

G. Physical inspection

We carried out the physical inspection of Gorwa Barwa Adda Project on 5 January 2026. We observed during the physical inspection that the Toll was being collected at Kulgo toll plaza. Please refer to Appendix 3(e) for the latest pictures of the project.

H. Statement of Assets:

As represented by the Management, RIIT is envisaging to acquire stake in the SPV. Hence, there is no asset of the Project as at the Valuation Date.

# 10. Valuation Conclusion

We have carried out the Enterprise Valuation of the Specified Projects as of 31 December 2025, considering *inter-alia* Traffic Due Diligence Reports and Technical Due Diligence Reports of Traffic and Technical Consultants respectively, Business plan/ Projected financial statements of the Specified SPVs and other information provided by/ on behalf of Management, industry analysis and other relevant factors.

The Valuation summary of Specified Projects as of 31 December 2025[1] is as follows:

| Particulars | WACC | Enterprise Value (INR Cr) |
|---|---|---|
| Enterprise Value of Specified Projects | 10.1% | 9,298.7 |




[1] While the valuation date for the purpose of this Report is 31 December 2025, the cash flows are expected to accrue to the Trust only from the Appointed Date, i.e., 1 April 2026. Considering this, the discounting of projected cash flows has been undertaken from the Appointed Date.

# Appendices

## Appendix 1 - WACC:

| Toll Projects | SPV | Remarks |
|---|---|---|
| Debt-to-equity Ratio | ~ 1.00 | Specified Projects are yet to be acquired by the SPV. Considering *inter-alia* the typical funding pattern and long-term debt-equity ratio for road infrastructure projects, permissible leverage under the SEBI InvIT Regulations, discussions with the Management regarding planned long-term debt-equity ratio and other relevant factors, debt to equity ratio has been considered as 1:1. |
| Unlevered Beta – Industry | ~ 0.51 | Beta is a measure of the risk of the shares of a company. ß is the co-variance between the return on sample stock and the return on the market. In order to determine the appropriate beta factor for the Company, consideration must be given either to the market beta of the Company or betas of comparable quoted companies.<br>Following comparable companies have been selected considering inter-alia the nature of the business operations, segmental analysis, size, historical performance, trading frequency and trading volume and other relevant factors.<br>• Ashoka Buildcon Limited<br>• IRB Infrastructure Developers Limited<br>• PNC Infratech Limited<br>Further, two additional comparable companies, namely, Bharat Road Network Limited and IRB InvIT Fund were also analysed for computation of industry beta. However, their unlevered beta was significantly lower (less than 0.10) and they were considered as outliers.<br><br>Unlevered beta of the selected comparable companies have been estimated based on their 5-year monthly levered beta, using: Unlevered beta = Relevered beta/ [1 + (D/E)] For further details, refer note 1 below (Calculation of Beta on page no. 52).<br><br>(Source: Capital IQ and RBSA analysis) |
| **Cost of Equity (Ke)** | | |
| Risk Free Rate (Rfr) | ~6.80% | Based on 10-year zero coupon yield curve ("ZCYC") for GoI securities as at 31 December 2025 (Source: The Clearing Corporation of India Limited). |
| Equity Market Risk Premium | ~7.00% | Equity Market equity risk premium is the additional return that investors expect over a risk-free asset and is estimated considering inter-alia historical equity market returns over a risk-free rate and forward-looking equity market risk premium estimates. Data sources reviewed[2] generated a range of equity risk premium indications. However, a 7% equity market risk premium was considered reasonable representative of the equity risk premium for India. |
| Relevered Beta | ~ 1.03 | Considering inter-alia the unlevered beta of the selected comparable companies and the debt-to-equity ratio of 1.00 (as mentioned above).<br>The relevered beta has been computed using:<br>Relevered beta = Unlevered beta * [1 + (D/E)] |
| **Cost of Equity (Ke)** | **~13.98%** | |

[2] RBSA internal study for long term historical equity market returns of BSE Sensex over 1990 – 2024 (on a 'systematic investment plan' basis), Risk-free rate for the long term GoI securities (Source: CCIL), etc.

| Toll Projects | SPV | Remarks |
|---|---|---|
| | | |
| **Cost of Debt (Kd)** | | |
| Pre-Tax Cost of Debt (Kd) | ~7.60% | Management estimate considering *inter-alia* ongoing discussions/ negotiations with the potential lenders |
| Effective tax rate | ~19.23% | Estimated considering *inter-alia* tax depreciation/ amortization policy followed by the SPV and corporate income tax rate |
| Post-Tax Cost of Debt (Kd) | **~ 6.14%** | |
| **WACC (Rounded off)** | **10.10%** | |

**Note 1: Calculation of Beta**

| Name of Comparable Company | 5-year monthly levered beta | 6-month VWAP Market Capitalization (INR in Cr) | Total Debt as of the latest available financials for Valuation date (INR in Cr) | Debt-equity ratio based on 5 years average | Unlevered Beta based on 5-year debt-equity# |
|---|---|---|---|---|---|
| Ashoka Buildcon Limited | 1.55 | 5,228.6 | 1,988,9 | 1.55 | 0.47 |
| IRB Infrastructure Developers Limited | 1.63 | 26,662.2 | 20,851.6 | 1.63 | 0.49 |
| PNC Infratech Limited | 0.83 | 7,662.1 | 5,068.8 | 0.83 | 0.58 |
| **Mean** | | | | | **0.51** |

*# Unlevered Beta= [Levered Beta/(1+Debt-equity ratio)]*
*Source: Capital IQ and RBSA analysis*

Following comparable companies have been selected considering inter-alia the nature of the business operations, segmental analysis, size, historical performance, trading frequency and trading volume and other relevant factors:

A. Ashoka Buildcon Limited engages in the infrastructure development business in India. The company operates through Construction & Contract Related Activity; Built, Operate and Transfer (BOT); and Sale of Goods segments. It engages in the construction of infrastructure facilities on engineering, procurement, and construction basis, as well as BOT basis. In addition, the company undertakes various projects, such as highways, bridges, power projects, buildings, city gas distribution projects, water projects, and railways. Further, it sells ready mix concrete and real estate properties.

B. IRB Infrastructure Developers Limited engages in the infrastructure development business in India. It operates in two segments, Built, Operate and Transfer/Toll Operate and Transfer; and Construction. The company develops roads and operates and maintains roadways. It also provides real estate, hospitality, and airport development services, as well as operates as an investment manager. The company was incorporated in 1998 and is based in Mumbai, India.

C. PNC Infratech Limited, operates as an infrastructure investment, development, construction, operation, and management company in India. The company undertakes various infrastructure projects, including roads, highways, bridges, flyovers, power transmission lines, airport runways and pavements, rural drinking water supply, irrigation, industrial area development, rail freight corridors, and other infrastructure projects. It also provides end-to-end infrastructure implementation solutions, such as EPC services and executes and implements projects on a design-build-finance-operate-transfer, operate-maintain-transfer, hybrid annuity model, and other public-private partnership formats. PNC Infratech Limited was founded in 1989 and is headquartered in Agra, India.

## Appendix 2 – Discounted Cash Flow (DCF): Enterprise Valuation of the Specified Projects

Note: Discounting of projected cash flows commences from 1 April 2026, being the Appointed Date.

INR Cr

| Finanical Year | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY2039 | FY2040 | FY2041 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Revenue | 925.8 | 1,128.0 | 1,180.7 | 1,253.1 | 1,362.1 | 1,489.6 | 1,609.1 | 1,652.0 | 1,710.4 | 1,884.1 | 2,046.4 | 2,198.2 | 2,361.8 | 2,544.3 | 2,738.7 |
| EBITDA before MMR Provisions and CSR Expense | 876.6 | 1,076.4 | 1,113.0 | 1,158.8 | 1,263.0 | 1,385.6 | 1,461.8 | 1,496.2 | 1,535.4 | 1,704.7 | 1,806.9 | 1,972.8 | 2,149.3 | 2,271.1 | 2,442.1 |
| Add: Interest income on MM Reserve | - | - | - | - | - | - | - | - | - | - | - | - | 2.3 | 3.2 | 0.9 |
| Add/(Less): (Increase)/Decrease in MM Reserve | - | - | - | - | - | - | - | - | - | - | - | - | (93.4) | 58.4 | 35.0 |
| Less: CSR Expense | - | - | - | - | - | - | - | - | - | - | - | (1.5) | (5.8) | (10.8) | (17.1) |
| Less: IM Expenses | (13.0) | (14.3) | (15.7) | (17.3) | (19.0) | (20.9) | (23.0) | (25.3) | (27.8) | (30.6) | (33.7) | (37.0) | (40.7) | (44.8) | (49.3) |
| Less: Trust Expenses | (1.5) | (1.6) | (1.7) | (1.9) | (2.0) | (2.2) | (2.3) | (2.5) | (2.7) | (2.9) | (3.1) | (3.3) | (3.6) | (3.8) | (4.1) |
| Less: Income Tax | - | - | - | - | - | - | (33.0) | (262.6) | (327.2) | (370.7) | (421.3) | (426.7) | (375.1) | (510.4) | (586.3) |
| Less: MM Expenses | - | - | - | - | - | - | (102.6) | (139.4) | - | (54.8) | - | (177.4) | (583.9) | (186.8) | (70.0) |
| Less: Capital Expenditure | (52.8) | (14.1) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Add/(Less): (Increase)/ Decrease in Working Capital | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Free Cashflows to Firm ("FCFF")** | **809.3** | **1,046.4** | **1,095.6** | **1,139.7** | **1,242.0** | **1,362.5** | **1,300.9** | **1,066.5** | **1,177.8** | **1,245.7** | **1,348.9** | **1,326.9** | **1,049.1** | **1,576.1** | **1,751.1** |
| Time to Midpoint | 0.5 | 1.5 | 2.5 | 3.5 | 4.5 | 5.5 | 6.5 | 7.5 | 8.5 | 9.5 | 10.5 | 11.5 | 12.5 | 13.5 | 14.5 |
| Discount Rate | 0.953 | 0.865 | 0.786 | 0.714 | 0.648 | 0.589 | 0.535 | 0.486 | 0.441 | 0.401 | 0.364 | 0.330 | 0.300 | 0.273 | 0.248 |
| **PV of FCFF** | **771.3** | **905.7** | **861.1** | **813.6** | **805.3** | **802.3** | **695.7** | **518.0** | **519.6** | **499.1** | **490.7** | **438.5** | **314.9** | **429.6** | **433.4** |
| **Enterprise Value** | **9,298.7** | | | | | | | | | | | | | | |



## Projected Cash EBITDA for Specified Projects:

INR Cr

| Financial Year | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY2039 | FY2040 | FY2041 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Vijayawada- Chilakaluripet | 225.7 | 248.0 | 269.7 | 299.5 | 327.5 | 360.5 | 395.4 | 353.8 | 299.9 | 335.1 | 364.4 | 390.6 | 420.8 | 458.4 | 505.4 |
| Chennai Bypass | 205.5 | 253.1 | 269.4 | 284.2 | 316.4 | 359.7 | 400.3 | 447.1 | 508.1 | 564.2 | 618.4 | 662.0 | 712.9 | 761.8 | 819.6 |
| Chennai- Tada | 147.5 | 163.3 | 169.4 | 186.6 | 200.8 | 218.5 | 237.0 | 258.5 | 284.1 | 311.1 | 339.1 | 370.0 | 399.4 | 437.1 | 474.5 |
| Neelmangala- Tumakuru | 192.0 | 286.3 | 282.1 | 277.3 | 295.4 | 310.3 | 327.0 | 355.7 | 384.0 | 417.6 | 447.2 | 473.5 | 501.2 | 530.0 | 553.5 |
| Gorhar-Barwa Adda | 155.1 | 177.3 | 190.1 | 205.6 | 222.0 | 240.4 | 249.3 | 237.0 | 234.3 | 256.2 | 277.2 | 302.0 | 327.5 | 357.1 | 385.6 |
| **Revenue** | **925.8** | **1,128.0** | **1,180.7** | **1,253.1** | **1,362.1** | **1,489.6** | **1,609.1** | **1,652.0** | **1,710.4** | **1,884.1** | **2,046.4** | **2,198.2** | **2,361.8** | **2,544.3** | **2,738.7** |
| Other Office expenses | 13.9 | 14.6 | 15.4 | 23.2 | 24.3 | 25.6 | 35.0 | 36.7 | 38.6 | 40.5 | 52.4 | 55.1 | 57.8 | 60.7 | 63.7 |
| Routine Maintenance | 14.2 | 14.9 | 15.9 | 18.1 | 19.0 | 20.0 | 38.6 | 41.2 | 54.7 | 53.1 | 84.1 | 62.2 | 41.2 | 89.1 | 103.3 |
| Electricity | 2.3 | 2.4 | 2.5 | 3.1 | 3.2 | 3.4 | 7.4 | 7.7 | 8.1 | 8.5 | 14.9 | 15.6 | 16.4 | 18.2 | 19.2 |
| Toll Plaza & ATMS O & M | 16.0 | 16.8 | 30.8 | 46.2 | 48.6 | 51.0 | 54.7 | 57.9 | 60.8 | 63.8 | 67.0 | 70.4 | 73.9 | 78.4 | 82.3 |
| PM Expenses | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 |
| Insurance Expenses | 2.5 | 2.6 | 2.7 | 3.3 | 3.5 | 3.7 | 11.2 | 11.7 | 12.3 | 12.9 | 20.5 | 21.6 | 22.6 | 26.2 | 27.5 |
| Performance BG | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| **Total Expenses** | **49.2** | **51.6** | **67.7** | **94.3** | **99.1** | **104.0** | **147.3** | **155.8** | **175.0** | **179.4** | **239.5** | **225.4** | **212.6** | **273.2** | **296.6** |
| **EBITDA before MMR Provisions and CSR Expense** | **876.6** | **1,076.4** | **1,113.0** | **1,158.8** | **1,263.0** | **1,385.6** | **1,461.8** | **1,496.2** | **1,535.4** | **1,704.7** | **1,806.9** | **1,972.8** | **2,149.3** | **2,271.1** | **2,442.1** |



### Sensitivity Analysis: Enterprise Value

INR Cr

| WACC | 9.60% | 9.85% | 10.10% | 10.35% | 10.60% |
|---|---|---|---|---|---|
| Enterprise Value | 9,571.0 | 9,433.3 | 9,298.7 | 9,167.1 | 9,038.5 |



## Appendix 3 – Additional Disclosure for the Specified Projects

**Appendix 3(a) - List of one-time sanctions / approvals as of 31 December 2025, as provided by the Management**

**Gorhar- Barwa Adda (Jharkhand)**

*Gorhar to Khairatunda*

- Environmental Clearance Approval dated June 23, 2014 issued by Ministry of Environment and Forests for widening and rehabilitation of the existing 4 lane to 6 lane of Aurangabad to Barwa Adda (km 180.000 to km 400.057) Section of NH-2 in the state of Bihar and Jharkhand.

*Khairatunda to Barwa Adda*

- Environmental Clearance Approval from Forest Division Officer, Girdih East Forest Division, Forest Department, Jharkhand for six laning of Khairatunda- Barwa Adda of NH-2 from 360.000 km to 400.132 section.

**Chilakaluripet-Vijayawada (Andhra Pradesh)**

- Environmental Clearance Exemption Certificate dated March 8, 2013 issued by Louis Berger Group Inc., acting as Independent Engineer, confirming that obtaining environmental clearance for the project was not required.

**Appendix 3(b) – List of up to date / overdue periodic clearances**

**Gorhar- Barwa Adda (Jharkhand)**

*Gorhar to Khairatunda*

- Licence obtained pursuant to CLRA Act issued by Office of the Licensing Officer, Assistant Labour Commissioner, Dhanbad, GoI dated November 2, 2023.

*Khairatunda to Barwa Adda*

- Licence obtained pursuant to CLRA Act issued by Office of the Licensing Officer, Assistant Labour Commissioner, Dhanbad, GoI dated February 24, 2023.
- Registration under the Employees' Provident Fund and Miscellaneous Provisions Act, 1952, issued by the Employees' Provident Fund Organisation.

**Chilakaluripet-Vijayawada (Andhra Pradesh)**

- Licence obtained pursuant to CLRA Act issued by Office of the Licensing Officer, Assistant Labour Commissioner, Vijayawada, GoI dated August 5, 2025;
- Registration under the Employees' Provident Fund and Miscellaneous Provisions Act, 1952, issued by the Employees' Provident Fund Organisation.
- Certificate of registration under the Employees' State Insurance Act, 1948, issued by the Employees' State Insurance Corporation.

**Chennai- Tada (Tamil Nadu)**

- Renewal of CTO obtained pursuant to Water Act and Air Act issued by Tamil Nadu Pollution Board in relation to, amongst others, for operating the facility for manufacture of products/ byproducts, discharge of sewage/trade effluent for hot bituminous mix dated October 1, 2020.
- Licence obtained pursuant to CLRA Act issued by Office of the Licensing Officer, Assistant Labour Commissioner, Chennai, GoI dated October 29, 2025.
- Registration under the Employees' Provident Fund and Miscellaneous Provisions Act, 1952, issued by the Employees' Provident Fund Organisation.
- Certificate of registration under the Employees' State Insurance Act, 1948, issued by the Employees' State Insurance Corporation.



**Chennai Bypass (Tamil Nadu)**

- Licence obtained pursuant to CLRA Act issued by Office of the Licensing Officer, Assistant Labour Commissioner, Chennai, GoI
- Registration under the Employees' Provident Fund and Miscellaneous Provisions Act, 1952, issued by the Employees' Provident Fund
- Certificate of registration under the Employees' State Insurance Act, 1948, issued by the Employees' State Insurance Corporation

**Neelmangla Tumakuru (Karnataka)**

- CTE obtained pursuant to Water Act and Air Act issued by Karnataka State Pollution Control Board in relation to, amongst others, for setting up of manufacturing unit for ready mix concrete, wet mix dated October 19, 2022.
- CTO obtained pursuant to Water Act and Air Act issued by Karnataka State Pollution Control Board in relation to, amongst others, for discharge of sewage/trade effluents and emission for ready mix concrete, wet mix dated January 13, 2023.
- CTO obtained pursuant to Water Act and Air Act issued by Karnataka State Pollution Control Board in relation to, amongst others, for discharge of sewage/trade effluents and emission for ready mix concrete, hot mix dated February 9, 2023.
- Licence obtained pursuant to CLRA Act issued by Office of the Licensing Officer, Assistant Labour Commissioner, Bangalore, GoI dated August 16, 2022.
- Registration under the Employees' Provident Fund and Miscellaneous Provisions Act, 1952, issued by the Employees' Provident Fund Organisation.
- Registration Certificate of Establishment pursuant to Karnataka Shops and Commercial Establishments Act, 1961, issued by Department of Labour, Government of Karnataka for road construction dated May 4, 2022.
- Certificate of registration for principal employer obtained pursuant to BOCW Act issued by Office of the registering officer, assistant labour commissioner, Bangalore, GoI dated November 4, 2025



## Appendix 3(c) - Estimates of proposed major repairs and improvements #

INR Cr

| Financial Year | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY2039 | FY2040 | FY2041 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Gorhar-Barwa Adda | - | - | - | - | - | - | - | - | - | - | - | 177.4 | - | - | - |
| Chilakaluripet-Vijayawada | - | - | - | - | - | - | - | - | - | - | - | - | 270.7 | - | - |
| Chennai Bypass | - | - | - | - | - | - | 102.6 | - | - | - | - | - | 137.5 | - | - |
| Chennai-Tada | - | - | - | - | - | - | - | 139.4 | - | - | - | - | - | 186.8 | - |
| Neelmangala- Tumakuru | - | - | - | - | - | - | - | - | - | 54.8 | - | - | 175.8 | - | 70.0 |
| **Major Repair and improvements** | **-** | **-** | **-** | **-** | **-** | **-** | **102.6** | **139.4** | **-** | **54.8** | **-** | **177.4** | **583.9** | **186.8** | **70.0** |

*Source : Information provided by the Management*

# Excludes expenses which are to be borne by NHAI/ contractors based on existing contracts between NHAI and respective contractors (for details, refer Section 9)

**Appendix 3(d) - On-going material litigation including tax disputes and claims in relation to the assets as of 31 December 2025**

**Chennai Bypass**

1. NHAI, in its capacity as the concessioning authority, has filed a petition before the High Court of Delhi (challenging the award of the arbitral tribunal passed on March 21, 2012) against M/s. Hindustan Construction Company in relation to the construction of Chennai Bypass Phase-II connecting NH-4 & NH-5 and widening of Chennai Bypass Phase-I connecting NH-45 & NH-4 in the State of Tamil Nadu. The claims challenged are determination of additional costs incurred for piling works due to change in the sequence of piling, and reimbursement of additional costs incurred on account of change in norms for bonus payment to workers and introduction/increase of service tax due to subsequent legislation. The amount challenged before the High Court of Delhi is INR 21.70 crore. The matter is currently pending.

2. NHAI, in its capacity as the concessioning authority has filed a petition before the High Court of Delhi (challenging the award of the arbitral tribunal passed on June 05, 2013) against M/s. Hindustan Construction Company in relation to the Contract Agreement dated February 26, 2005 for construction of Chennai Bypass Phase-II connecting NH-4 & NH-5 and widening of Chennai Bypass Phase-I connecting NH-45 & NH-4 in the State of Tamil Nadu. The claims challenged include determination of rates for a new item of 40 mm thick bituminous concrete (treated as variation) and reimbursement of additional costs incurred during the extended contract period due to delays not attributable to the contractor, covering overheads, equipment charges, labour costs, financing charges, loss of profit, and uncovered escalation on materials and fuel. The amount challenged before the High Court of Delhi is INR 150.5 crore. The matter is currently pending.

3. NHAI, in its capacity as the concessioning authority has filed a petition before the High Court of Delhi (challenging the award of the arbitral tribunal passed on August 12, 2024) against M/s. MEP Chennai Bypass Toll Road Private Limited in relation to the concession agreement for operation and maintenance of Chennai Bypass (Km 0.00 to Km 32.600) on operate, maintain and transfer basis in the State of Tamil Nadu. The claims challenged relate to non-remittance of concession fee, non-completion of project facilities, non-compliance with maintenance obligations, interest amount, and costs. The amount challenged before the High Court of Delhi is INR 277.6 crore. The matter is currently pending.

4. M/s. MEP Chennai Bypass Toll Road Private Limited has filed a petition before the High Court of Delhi (challenging the arbitral award passed on August 14, 2024) against NHAI in relation to the concession agreement for operation and maintenance of Chennai Bypass (Km 0.00 to Km 32.600) on operate, maintain and transfer basis in the State of Tamil Nadu. The claims relate to compensation for losses due to failure to





notify correct user fee and exclusion of Maduravoyal Junction Structure in fee notification, losses due to toll evasion through illegal/unplanned entry and exit points, loss of future business, reimbursement of costs for maintaining collaterals in the form of bank guarantees, interest for pre-award and post-award periods, and costs incurred in the proceedings. The amount involved is INR 30.2 crore. The matter is currently pending.

**Gorhar-Barwa Adda**

1. M/s DBL Gorhar Khairatunda Highways Private Limited. has initiated arbitration proceedings against NHAI under Society for Affordable Redressal of Disputes ("SAROD") in relation to six-laning of Gorhar to Khairatunda section of NH-2 (Km 320.810 to Km 360.300) in the State of Jharkhand. The claims relate to compensation for delayed and withheld payments including milestone and change of scope works, reimbursement of expenses for extension of performance bank guarantee, compensation for additional costs due to change in law (royalty rates and fuel taxes), release of withheld annuity and O&M payments due to incorrect CPI index application, and interest on delayed payments. The amount involved is INR 155.8 crore. The matter is currently pending.

**Neelmangla-Tumakuru**

1. Mushtafa Khan, Jinesh Kumar Jain, K. Anjan Kumar, Doddahanumaiah, Sri Siddalingaswamigalu and 147 other landowners have initiated arbitration proceedings against NHAI in relation to Neelmangla to Tumakuru section of NH – 48 (Km 30.00 to Km 75.00) in the state of Karnataka. NHAI had acquired land and fixed compensation as per the right to fair compensation and transparency in Land Acquisition and Rehabilitation and Resettlement Act, 2013. The claims in the arbitration proceedings relate to enhancement of compensation for the acquired land. The amount involved in all such case is not quantifiable. The matters are currently pending.

**Note:** The Management has represented that impact, if any, of the litigation in respect of the Specified Projects pertaining to the period prior to the effective date shall be borne by NHAI (the Sponsor).

*Source: Information Provided by the Management*

## Appendix 3(e)- Site Visit Photographs

### Chilakaluripet- Vijayawada

Site Visit Photos- OHHPL












**Chennai Bypass**












**Chennai Tada**












**Neelmangala Tumakru**












**Gorhar- Barwa Adda**











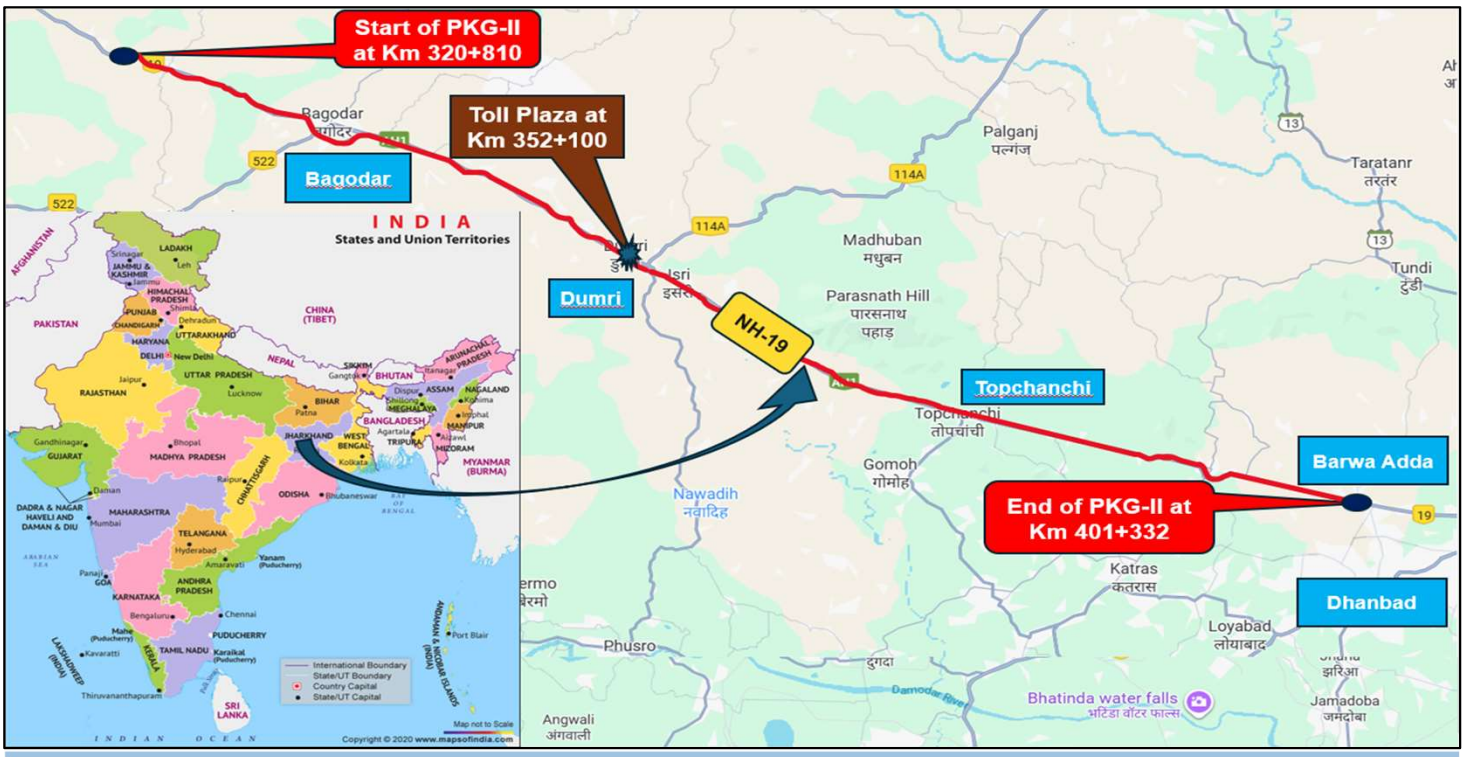

**ANNEXURE B**

**TECHNICAL CONSULTANT REPORTS**

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URS MARC Technocrats Pvt. Ltd.

# Preparation of Technical Due Diligence Report of the National Highway Stretches under Consideration for award on Asset Monetization




# Technical Due Diligence Report

## *Gorhar to Barwa Adda*

**(Km 320+810 to Km 401+332)**

**January 26**

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
National Highways Authority of India

**Prepare For:**

**National Highways Authority of India**

## Quality Information

| Prepared by | Checked by | Verified by | Approved by |
|---|---|---|---|
| YR | AD | SG | SRL |

## Revision History

| Revision | Revision date | Details | Authorized | Name | Position |
|---|---|---|---|---|---|
| R0 | | | | | |
| | | | | | |
| | | | | | |
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# LIST OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| AMC | Annual Maintenance Contract | DGPS | Differential Global Positioning System |
| ATCC | Automatic Traffic Counter and Classifier | DCA | Draft Concession Agreement |
| ATMS | Advanced Traffic Management System | DIS | Digital Imaging system |
| AADT | Annual Average Daily Traffic | DG | Diesel Generator |
| AVCC | Automatic Vehicle Count and classifier | DLC | Dry Lean Concrete |
| ARRB | Australian Road Research Board | DLP | Digital Laser Profiler |
| BC | Bituminous Concrete | DPR | Detailed Project Report |
| BHS | Both Hand Side | ECB | Emergency Call Box |
| BI | Bump Integrator | EPC | Engineering, Procurement, and Construction |
| BOQ | Bill of Quantity | ESAL | Equivalent Standard Axle Load |
| BT | Bituminous Top | ETC | Electronic Toll Collection |
| CA | Concession Agreement | EW | East West |
| CBR | California Bearing Ratio | FY | Financial Year |
| CAL | Client Access License | FOB | Foot Over Bridge |
| CAPEX | Capital Expenditures | FWD | Falling Weight Deflectometer |
| CC | Control Centre | GAD | General Arrangement Drawing |
| CMO | Chief Medical Officer | GOI | Government of India |
| CCEA | Cabinet Committee on Economic Affairs | GPRS | General Packet Radio Service |
| CCTV | Closed Circuit Television Systems | GSB | Granular Sub-base |
| CUP | Cattle Underpass | GNSS | Global Navigation Satellite System |
| DBM | Dense Bituminous Macadam | GPS | Global Positioning System |

| | |
|---|---|
| GSM | Global System for Mobile |
| GST | Goods and Services Tax |
| HAM | Hybrid Annuity Model |
| HSYD | High Yielding Strength Deformed |
| IMU | Inertial Measurement Unit |
| INR | Indian Rupees |
| INViT | Infrastructure Investment Trust |
| IRC | Indian Road Congress |
| IE | Independent Engineer |
| ITM | Integrated Traffic Management |
| ITS | Intelligent Transport System |
| KVA | Kilo-Volt-Ampere |
| LCV | Light Commercial Vehicle |
| LiDAR | Light Detecting and Ranging |
| LED | Light Emitting Diode |
| LHS | Left Hand Side |
| LIU | Light Interface Units |
| LOA | Level of Service |
| LVUP | Light Vehicular Underpass |
| LL | Liquid Limit |
| MAV | Multi Axle Vehicle |
| MBIU | Mobile Bridge Inspection Unit |
| MCA | Model Concession Agreement |
| MCW | Main Carriageway |
| MDS | Metrological Data System |
| MDD | Maximum Dry Density |
| MET | Metrological |
| MIS | Management Information System |
| MJB | Major Bridge |
| MNB | Minor Bridge |
| MOP | Management of Means of Payment |
| MoRTH | Ministry of Road Transport and Highways |
| MSA | Million Standard Axles |
| MSWIM | Medium Setting Weighing Motion |
| MT | Metric Ton |
| NH | National Highway |
| NHAI | National Highways Authority of India |
| NMS | Network Management System |
| NSV | Network survey Vehicle |
| NVR | Network Video Recorder |
| O&M | Operation & Maintenance |
| OMC | Optimum Moisture content |
| OFC | Optical Fiber Cable |
| OPEX | Operational Expenditure |

| | |
|---|---|
| OSV | Other Sized Vehicle |
| PCC | Plain Cement Concrete |
| PCOD | Provisional Commercial Operation Date |
| PCI | Pavement Condition Index |
| PCR | Pavement Condition Rating |
| PCU | Passenger Car Unit |
| PQC | Pavement Quality Concrete |
| PR | Project Road |
| PSC | Pre-Stressed Concrete |
| PTZ | Pan–Tilt–Zoom |
| PUP | Pedestrian Underpass |
| PWIM | Portable Weigh in Motion |
| RCC | Reinforced Cement Concrete |
| RFID | Radio Frequency Identification |
| RFP | Reference for Proposal |
| RHS | Right Hand Side |
| RMS | Radio Mobile System |
| ROB | Rail/Road Over Bridge |
| ROW | Right of Way |
| RUB | Rail/Road Under Bridge |
| SAN | Storage Area Network |
| SOR | Schedule of Rates |
| SPV | Special Purpose Vehicle |
| SWB | Static Weigh Bridge |
| SR | Service Road |
| SC | Scheduled Caste |
| ST | Scheduled Tribe |
| TMS | Toll Management System |
| TOT | Toll, Operate and Transfer |
| TTES | Travel Time Estimation System |
| UI | Unevenness Index |
| UPS | Uninterruptible Power Supply |
| VASD | Vehicle Actuated Speed Display |
| VDF | Vehicle Damage Factor |
| VIDS | Video Incident Detection System |
| VMS | Variable Message Signs |
| VUP | Vehicular Underpass |
| WIM | Weigh in Motion |
| WMM | Wet Mix Macadam |

# Content


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| **Chapter: 2** | Project Description with Highway Inventory | **2-1 to 2-57** |
| **Chapter: 3** | Structure Inventory & Condition | **3-1 to 3-82** |
| **Chapter: 4** | Methodology | **4-1 to 4-50** |
| **Chapter: 5** | Design Standards | **5-1 to 5-14** |
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# Executive Summary

# EXECUTIVE SUMMARY

## 1. INTRODUCTION

The National Highways Authority of India (NHAI), constituted by an act of Parliament, is engaged in development, maintenance and management of National Highways networks in India entrusted to it by Ministry of Road Transport and Highways (MoRT&H), Government of India (GoI).

To fulfill the requirement of the growing industrialization and development of the country, Government has made ambitious plans to expand network of national highways across the length and width of the country at a rapid pace. The various programs which have been taken by Govt. through NHAI are

The various programs which have been taken by Govt. through NHAI are:

1. **Phase I**: Golden Quadrilateral (GQ): connecting four metro cities (Delhi, Mumbai, Chennai and Kolkata) by upgrading existing road with four / six lanning having length of 5846 km
2. **Phase II**: North-South and East-West Corridors (NSEW) comprising 4/6-laning of National Highways connecting Srinagar to Kanyakumari and Silchar to Porbandar. The total length of NSEW corridor is 7300 km.
3. **Phase III**: Four-laning of 12,109 km of high-density national highways connecting state capitals and places of economic, commercial and tourist importance.
4. **Phase IV**: Upgradation of 20,000 km of single-lane roads to two-lane standards with paved shoulders.
5. **Phase V**: Six-laning of 6,500 km of four-laned highways.
6. **Phase VI**: Construction of 1,000 km of expressways connecting major commercial and industrial townships.
7. **Phase VII**: Construction of ring roads, bypasses, underpasses, flyovers, etc. comprising 700 km of road network.

Bharatmala Pariyojana is a new umbrella program launched by GOI for the highways sector that focuses on optimizing efficiency of freight and passenger movement across the country by bridging critical infrastructure gaps through effective interventions like development of Economic Corridors, Inter Corridors and Feeder Routes, National Corridor Efficiency Improvement, Border and International connectivity roads, Coastal and Port connectivity roads and Green-field expressways.

To achieve this accelerated pace of development, high funding is required in the short term. For this purpose, MoRTH has proposed to leverage Asset Recycling in the highway sector and is expected to generate additional resources for construction of future highways. Accordingly, the Model for monetization of public funded operational NH projects has been developed, which is called Toll, Operate and Transfer (TOT). Under the TOT model, right of collection of user fee of selected operational NH projects is proposed to be assigned for a specific time period, to developers or investors (Concessionaire) against upfront payment of a lump-sum amount to NHAI. Further, during the tenure of the contract, the O&M responsibility would also remain with the assigned Concessionaire.

In August 2016, the Cabinet Committee on Economic Affairs (CCEA) authorized the NHAI to monetize public funded NH projects which are operational and generating toll revenues

for at least two years after the Commercial Operations Date (COD) through the TOT model.

The National Highways Authority of India (NHAI) has initiated the process of setting up an infrastructure investment trust (InvIT) to monetize its road assets. In order to implement this model, NHAI requires the preparation of a detailed report on inventory & physical condition of the road to be conducted through selected consultant.

**M/s. URS Scott Wilson India Pvt. Ltd. in JV with MARC Technocrats (P) Ltd** submitted proposal and selected as empaneled consultant for carrying out Technical Due Diligence. LOA issued by NHAI vide ref No: NHAI / AM/2023-24/ Empanelment-2/ Tech. RFP/e-203713/254 dated 10.09.2024 for carrying out Tech Due Diligence of following road stretches.

**List of Allotted Stretches**

| S.No. | Name of Stretch | Name of Toll Plaza | State | Length of Project | No. of Lanes |
|---|---|---|---|---|---|
| 1 | Gorhar to Barwa Adda | Kulgo | Jharkhand | 80.522 | 4L/ 6L |
| **Total Length** | | | | **80.522 Km** | |

Accordingly, detailed reports on inventory & physical condition have been carried out for all stretches including a study of improvement proposals. This executive summary presents details of Project **Gorhar to Barwa Adda** Section from Km 320+810 to Km 401+332 having length of 80.522 km.

## 2. STUDY OBJETIVE

The main objective of this assignment is to assess the physical condition of all existing features of the **Gorhar to Barwa Adda** stretch and preparation of Technical Due Diligence Report (TDDR), technical and maintenance schedules. Physical condition survey of Project Stretch includes data collection and analysis of highway geometric design parameters, pavement condition, condition of structures, road safety features, condition of existing facilities like toll plazas, truck lay byes etc.

Based on physical condition of stretches, options are worked out for improvements of safety aspects of existing highway features, repair and rehabilitation of pavement and structures. Cost associated with all improvement proposals are also estimated as part of this study.

NHAI has appointed **M/s Translink Infrastructure Consultants (P) Ltd.** for carrying out Traffic Due Diligence and data provided by Traffic Consultant through NHAI is adopted for analysis of pavement design and periodic overlay.

## 3. PROJECT STRETCH

The project stretch start from Gorhar Km 320+810 to Barwa Adda Km 401+332 (Existing 400+632) of NH 19 in the State of Jharkhand. The total length of the project road is 80.522 km.

The project road passes through the Gorhar, Atka, Bagodar, Kulgo, Dumri, Jamtara, Ishri, Topchanchi, Rajganj, and Barwa Adda the State of Jharkhand.

The existing Four/six Lane project road was constructed under Item Rate by the HAM Concessionaire package wise from as shown details below in table:

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | PCOD / COD | O&M Handover Date* |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| Progressive Construction Limited & Sunway Construction Berhad, Malaysia | Item Rate | 320+810 | 326+000 | 5.19 | Not Applicable | |
| M/s DBL Gorhar Khairatunda Highways Pvt. Ltd. | HAM | 326+000 | 360+300 (Design 361+000) | 35.000 | 16.10.2021/ 31.03.2022 | 15.10.2036 |
| M/s Ashoka Khairatunda Barwa Adda Road Limited (AKBARL) | HAM | 360+300 (Design 361+000) | 400+632 (Design 401+332) | 40.332 | 09.10.2021/ 21.04.2022 | 08.10.2036 |
| **Total Length** | | | | **80.522** | | |

The project road was known as NH-2 which starts from Km 320+810 at Gorhar and ends at Km 401+332 at Barwa Adda. The project road is renumbered as New NH-19. Available project documents are as per NH-19 therefore this report is also prepared based on changing system of New NH 19.

**Ongoing Status of Project Section**

**From Km 320+810 to Km 326+000 (Gorhar to Atka)**

The stretch from Km 320+810 to Km 326+000, between Gorhar and Atka, is a 4-lane retained portion with a length of 5.190 kilometers.

**From Km 320+810 to Km 360+300 (Design 361+000) (Atka to Khairatunda)**

The stretch from Km 320+810 to Km 360+300 (Design Km 361+000), from Gorhar was awarded to M/s DBL Gorhar Khairatunda Highways Pvt. Ltd (HAM Concessionaire) under the Hybrid Annuity Model (HAM) for six lanning works, with the Concession Agreement signed on 27th April 2018. The section from Km 320+810 to Km 326+000 was descope from M/s DBL Gorhar Khairatunda Highways Pvt. Ltd therefore revised scope of M/s DBL is from Km 326+000 to Km 360+300 (Design 361+000) having length of 35 km. Six lanning is now completed with PCOD on 16.10.2021 and COD achieved on 31.03.2022. As per the HAM Concession Agreement, this stretch shall be under Operation and Maintenance for 15 years from PCOD i.e. till 15.10.2036.

**From Km 360+300 to 400+632 (Design 401+332) (Khairatunda to Barwa Adda)**

The stretch from Km 360+300 to Km 400+632, spanning a length of 40.332 km between Khairatunda to Barwa Adda is awarded to M/s Ashoka Khairat under Barwa Adda Road Limited (AKBARL) under the Hybrid Annuity Model (HAM) for six lanning works. The Concession Agreement for this section was signed on 17th April 2018. Six lanning is now completed with PCOD on 09.10.2021 and COD achieved on 21.04.2022. As per the HAM Concession Agreement, this stretch shall be under Operation and Maintenance for 15 years from PCOD i.e. till 08.10.2036.

The index map depicting the project road is presented in **Fig.0.1.**

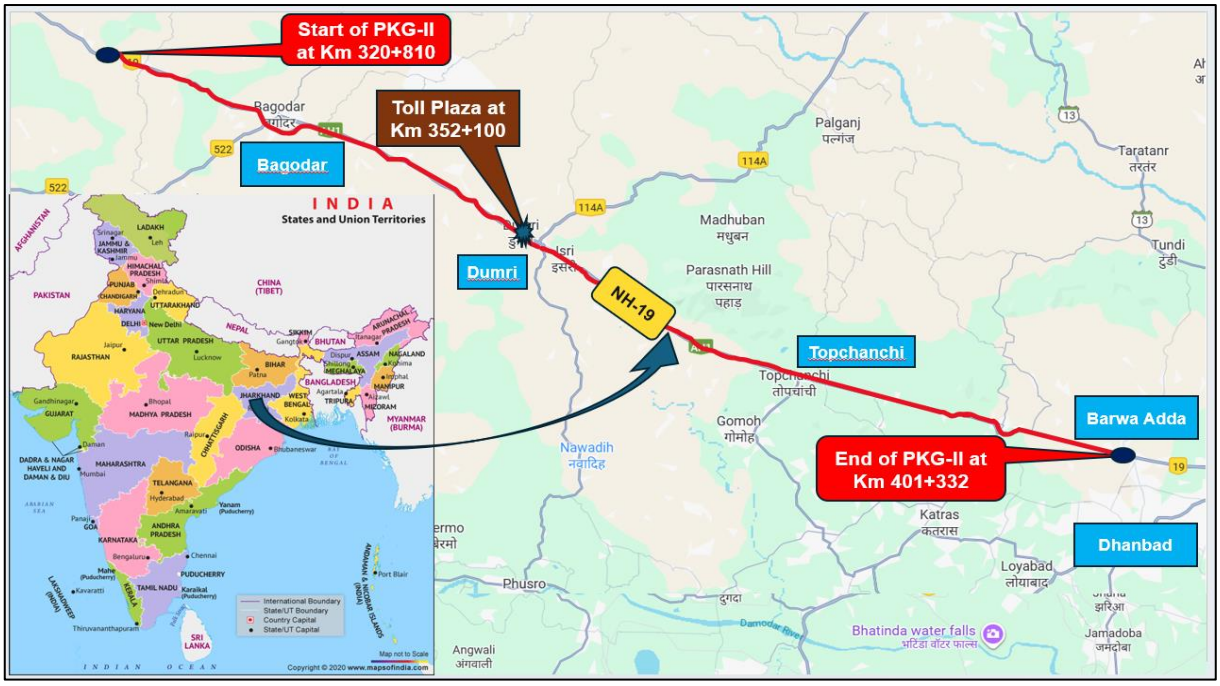



**Fig 0.1: Project Location Map**

## 4. Survey and Investigation

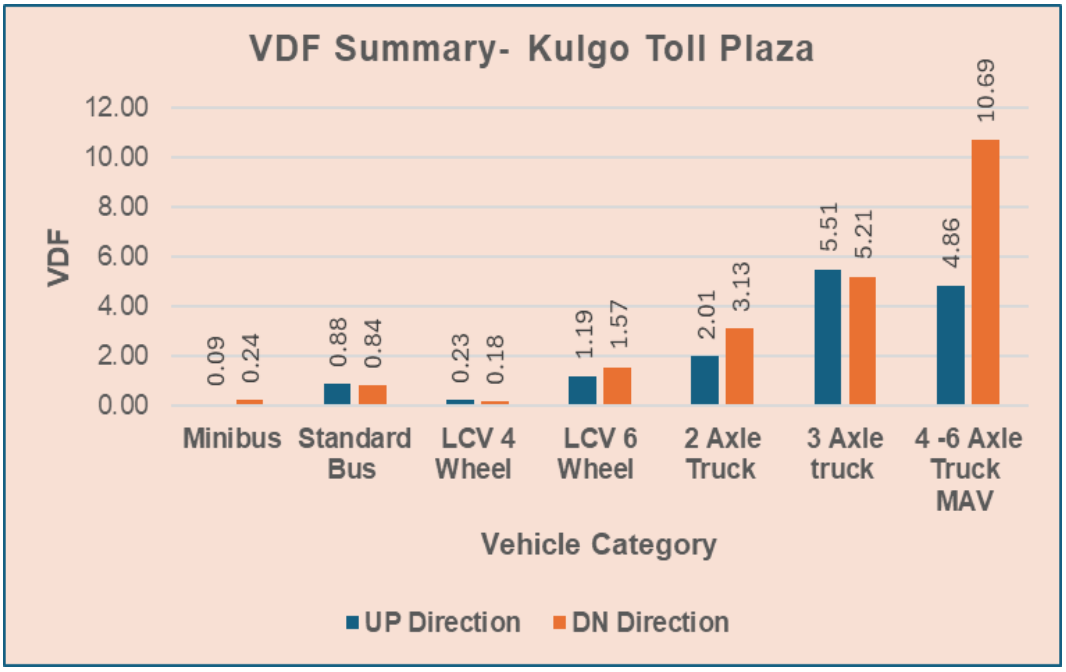
Existing KM stone of NH-19 is being referred to in this report. Various investigations were carried out to assess the physical condition of the Project Stretch. List of all investigations and its schedule is presented in table below:

| Sl. No | Type of Survey | Location | Survey Schedule |
|---|---|---|---|
| **Survey & Investigation Schedule** | | | |
| 1 | Traffic Surveys | **Carried out by M/s TransLink Infra** | |
| 2 | Topographical Survey through LiDAR | Entire Stretch | Aug / Sep 2025 |
| 3 | Aerial Videography by Drone | Entire Stretch | Aug / Sep 2025 |
| 4 | Network Survey Vehicle | Entire Stretch | Aug / Sep 2025 |
| 5 | (a) FWD | Entire Stretch | Aug / Sep 2025 |
| | (b)Test Pits | | Aug / Sep 2025 |
| | © Core Cutting | | Aug / Sep 2025 |
| 6 | Material Testing | Entire Stretch | Aug / Sep 2025 |
| 7 | Structural Investigation | Entire Stretch | Aug / Sep 2025 |
| | i. Inventory | | Aug / Sep 2025 |
| | Ii MBIU | Entire Stretch | Aug / Sep 2025 |
| 8 | Road Safety Audit | Entire Stretch | Aug / Sep 2025 |
| 9 | Toll Plaza Audit | Main Plaza 1 nos | Aug / Sep 2025 |
| 10 | Road Inventory (Manual) | Entire Stretch | Aug / Sep 2025 |
| 11 | Retroreflection of Road Signs | Entire Stretch | Aug / Sep 2025 |

## 5. TRAFFIC SURVEY, ANALYSIS & TRAVEL DEMAND ESTIMATION

Traffic Survey has been carried out by the traffic consultant appointed by M/s **Translink Infrastructure Consultants Pvt. Ltd.**

a) **Axle Load Survey**: Vehicle Damage Factor (VDF) has calculated based on Axle Load Survey is presented as below:

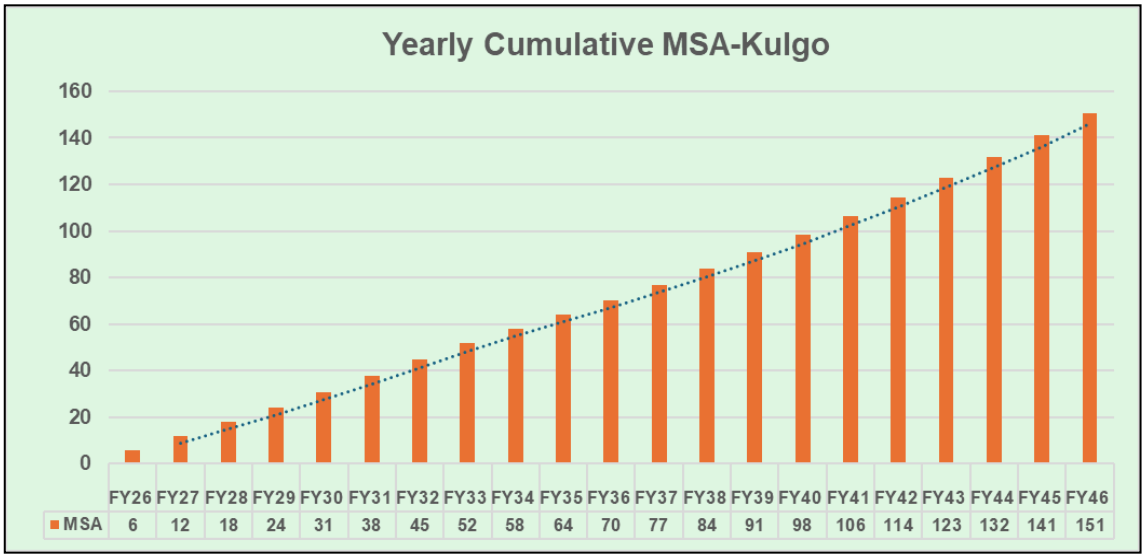



### b) Yearly Design Traffic in terms of MSA

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | 4 -6 Axle Truck MAV | OSV | Yearly Design ESA | MSA | Design Period |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VDF** | ***0.24*** | ***0.88*** | ***0.23*** | ***1.57*** | ***3.13*** | ***5.51*** | ***10.69*** | ***0.00*** | | | |
| FY26 | 26 | 342 | 364 | 684 | 544 | 876 | 4135 | 3 | 5,779,734 | **6** | ***0*** |
| FY27 | 29 | 351 | 399 | 726 | 577 | 884 | 4255 | 3 | 5,947,335 | **12** | ***1*** |
| FY28 | 31 | 361 | 426 | 762 | 606 | 881 | 4376 | 3 | 6,122,831 | **18** | ***2*** |
| FY29 | 32 | 369 | 448 | 797 | 633 | 874 | 4533 | 3 | 6,305,056 | **24** | ***3*** |
| FY30 | 34 | 374 | 466 | 837 | 665 | 873 | 4728 | 3 | 6,554,336 | **31** | ***4*** |
| FY31 | 35 | 384 | 483 | 877 | 697 | 872 | 4914 | 4 | 6,793,580 | **38** | ***5*** |
| FY32 | 36 | 393 | 501 | 920 | 731 | 871 | 5113 | 4 | 7,068,386 | **45** | ***6*** |
| FY33 | 36 | 404 | 503 | 907 | 720 | 812 | 5132 | 4 | 7,029,897 | **52** | ***7*** |
| FY34 | 35 | 414 | 479 | 788 | 626 | 653 | 4682 | 4 | 6,348,046 | **58** | ***8*** |
| FY35 | 34 | 424 | 469 | 722 | 574 | 557 | 4450 | 4 | 5,985,698 | **64** | ***9*** |
| FY36 | 36 | 432 | 491 | 758 | 602 | 559 | 4665 | 5 | 6,276,878 | **70** | ***10*** |
| FY37 | 37 | 437 | 508 | 796 | 633 | 562 | 4897 | 5 | 6,553,916 | **77** | ***11*** |
| FY38 | 38 | 447 | 525 | 837 | 664 | 566 | 5136 | 5 | 6,858,330 | **84** | ***12*** |
| FY39 | 39 | 456 | 546 | 877 | 696 | 569 | 5383 | 5 | 7,172,498 | **91** | ***13*** |
| FY40 | 41 | 467 | 564 | 919 | 730 | 573 | 5649 | 6 | 7,530,802 | **98** | ***14*** |
| FY41 | 42 | 477 | 584 | 962 | 764 | 576 | 5906 | 6 | 7,837,468 | **106** | ***15*** |
| FY42 | 44 | 487 | 607 | 1008 | 800 | 580 | 6182 | 6 | 8,188,159 | **114** | ***16*** |
| FY43 | 45 | 495 | 625 | 1052 | 836 | 583 | 6456 | 6 | 8,535,741 | **123** | ***17*** |
| FY44 | 47 | 500 | 644 | 1100 | 874 | 587 | 6749 | 7 | 8,931,511 | **132** | ***18*** |
| FY45 | 48 | 510 | 663 | 1149 | 913 | 590 | 7052 | 7 | 9,292,363 | **141** | ***19*** |
| FY46 | 49 | 520 | 683 | 1202 | 955 | 595 | 7374 | 7 | 9,700,619 | **151** | ***20*** |

**End of HAM Concessionaire (Km 326 to Km 3 Operation and Maintenance in Year 2036.**

**Graphical Presentation of Yearly MSA**




## 6. Detailed Road Inventory

Detailed inventory of Project Stretch is captured through NSV, LiDAR and field reconnaissance. Salient features like built-up settlements, carriageway dimensions, surface type, junctions, service roads, road furniture etc. are recorded for entire Project Stretch. Overview of summarized road inventory is presented in table below.

| S. No. | Description | | Details |
|---|---|---|---|
| 1 | Project Stretch | | Project Road Start from Gorhar Km 320+810 to Barwa Adda Km 401+332 (Existing 400+632) NH 19 (Old NH 2) Gorhar – Barwa Adda section in the state of Jharkhand. |
| 2 | Length of Project Stretch (km) | | 80.522 Km |
| 3 | Road Type (km) | Flexible & Rigid | Km 320+810 to Km 401+332 (Existing 400+632) (excluding Toll Plaza) |
| 4 | Length of Urban Section (km) | | 33.900 Km |
| 5 | Length of Slip/Service Road (km) | LHS | 41.640 Km |
| | | RHS | 41.191 Km |
| 6 | No. of Bypasses | | 02 Nos. (Bagodar, Rajgunj) |
| 7 | No. of Major Junctions | | 11 Nos. (2 At grade, 9 Grade Separated) |
| 8 | No. of Minor Junctions | | 154 Nos. (146 At grade, 8 Grade Separated) |
| 9 | No. of Median Openings | | 30 Nos. |
| 10 | No. of Toll Plazas | | 1 Nos. |
| 11 | No. of Bus Bays / Shelter | | 25 Nos. |
| 12 | No. of Truck Lay Byes | | 05 Nos. |
| 14 | No. of Rest Area | | Nil. |
| 15 | Drain (km) | RCC Cover Drain | 52.087 Km (at MCW) |
| | | RCC Open Drain | 0.115 Km (at MCW), |
| | | Line Drain | 0.055 Km (at MCW), 1.78 Km (at Median) |
| | | Open V Drain | 0.705 Km (at MCW), 3.355 Km (at Median) |
| 16 | Streetlight (Nos.) | | 2811 Nos. |
| 17 | High Mast Lights (Nos.) | | 08 Nos. |
| 18 | Solar Blinkers (Nos.) | | 44 Nos. |
| 19 | Length of Safety Barrier (Km) | | |

| S. No. | Description | Details |
|---|---|---|
| | W-Beam Safety Barrier (Km) | 28.280 Km |
| | RCC Crash Barrier (Km) | 25.781 Km |
| | New Jersey crash barriers (Km) | 0.460 Km |
| | Wire rope | 38.670 Km |
| 20 | Length of Pedestrian Guard Rails (in km) | 15.980 Km |

## 7. INVENTORY, REPAIR AND REHABILITATION FOR STRUCTURES

One of the objectives of this assignment was to carry out inventory of all the existing structures, condition surveys for all the highway structures and to analyze their condition and to propose defects repairs or rehabilitation if required. There are a total 212 nos of structures along the project stretch, number of structure based on type of structures is summarized below:

| S. No. | Type of Structure | Unit | Structures |
|---|---|---|---|
| 1. | Major bridges (Length > 60m) | No | 03 |
| 2. | Minor bridges (Length < 60m & > 6m) | No | 33 |
| 3. | Fly over | No | 0 |
| 4. | ROB | No | 01 |
| 5. | VUP | No | 16 |
| 6. | VUP Grade II | No | 01 |
| 7. | PUP / CUP | No | 04 |
| 8. | FOB | No | 10 |
| 9. | VOP | No | 0 |
| 10. | Culvert (Pipe and Box) | No | 144 |
| **Total** | | **No** | **212** |

Visual inspections and condition surveys were carried out as per provisions of IRC: SP: 35 on all bridges and structures in the Project Stretch. For all non-accessible structures, Mobile Bridge Inspection Unit (MBIU) was used during inventory and condition surveys.

As per Condition Survey findings it is evident that structures are generally in good to fair condition. Protection works and expansion joints, etc. are minimally distressed. It is noted that some minor defects like vegetation growth, damaged or filled expansion joints, missing drainage spouts, settlement in approach slab, minor distresses in substructures and superstructures. These defects are to be rectified by the existing HAM Concessionaire in case of structure falling between Km 326.000 to 401.332 and structures coming in between Km 320.810 to Km 326 shall be rectified during six lanning of work.

## 8. PAVEMENT CONDITION ASSESSMENT

The project road has Flexible Pavement along entire Main Carriageway and Rigid Pavement at toll plaza location and Rigid Pavement along existing Service Road. The construction of project completed as shown in the table below:

The Consultant has carried out various surveys and investigations along the project and findings of test report is summarized as below:

## A. Pavement Material Investigation

Pavement material investigations were carried out to know the properties of the existing sub-grade, Granular Subbase (GSB) Wet Mix Macadam (WMM) / Dry Lean Concrete (DLC) and Bituminous / Concrete layers. Field investigations such field dry density and field moisture content were also carried out on existing subgrade by excavating test pit to evaluate the in-situ characteristics of exiting subgrade. Visual inspection of the existing pavement conditions as well as surrounding area along project road was carried out prior to commencement of material investigation work.

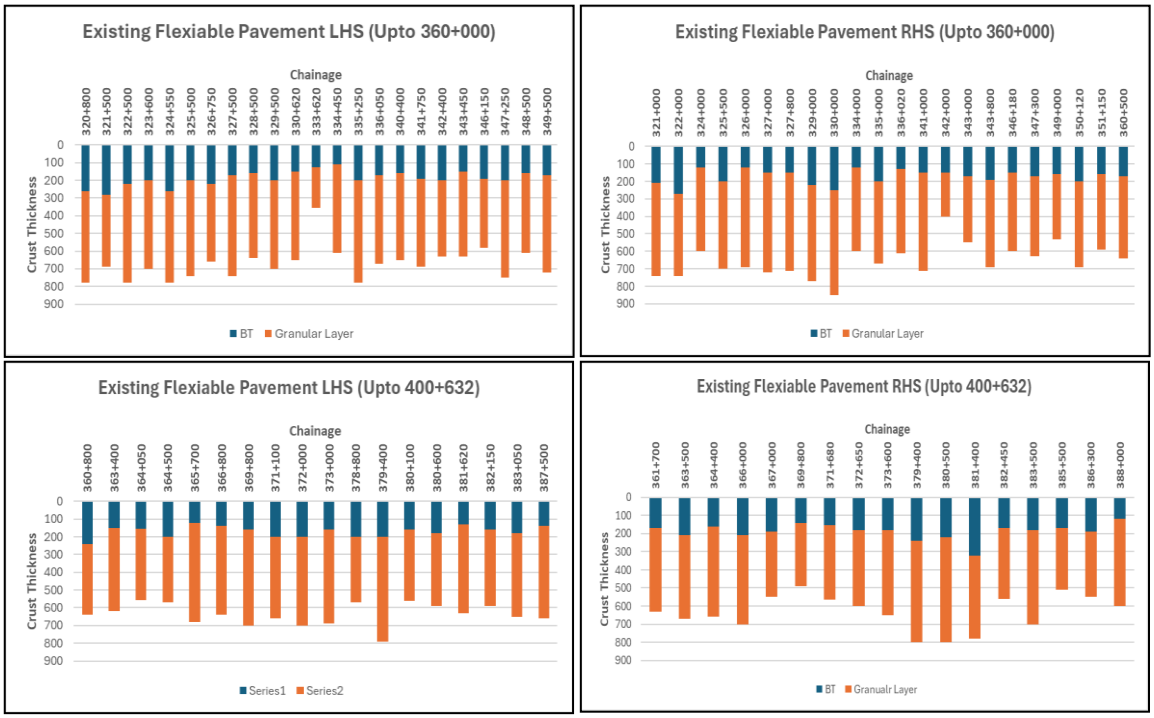
### a. Existing Subgrade Soil

The existing subgrade soil is Along the project road section, the existing subgrade soil is predominately comprising of Sand 45.88 %, Silt & Clay 28.06 % and 26.07 % Gravel along the project road.

4-days Soaked CBR (at 97% Compaction) vary in the range of 12.5 % and 17.5%.

### b. Crust Composition

Pavements are layered structures comprising various types of materials. These materials, their associated properties, and their interactions determine properties of the resultant pavement. Therefore, a good understanding of the underlayer will help to understand how they are characterized, and how they perform for better understanding of pavement behavior and deterioration. The existing crust thickness of Flexible and Rigid is present below:




**Crust Composition of Existing Pavement**

## B. Analysis of Pavement Condition by using FWD Survey

The Structural Condition of the Pavement has evaluated using Falling Weight

Deflectometer (FWD). The FWD is a non-destructive pavement testing device which provides accurate data on the response of the pavement to dynamic loads by simulating actual wheel loads in both response and duration. Structural evaluation was carried out by using data obtained from test and further analysis is carried out based on IRC 115- 2014 for Flexible Pavement and IRC 117-2015 for Rigid Pavement. The direction wise Project Stretch lengths are summarized in the table below.

**Homogeneous Section wise Remaining Life**

| Sl No | Chainage | | Length (Km) | IIT Pave Result | | Rutting Life | Fatigue Life | Remaining life |
|---|---|---|---|---|---|---|---|---|
| | From | To | | Tensile Strain at Bottom BT | Vertical Strain at top of Subgrade | | | |
| **LHS** | | | | | | | | |
| **Section-1 (4 Lane)** | | | | | | | | |
| 1 | 320+000 | 321+000 | 1.00 | 2.36E-04 | 2.31E-04 | 434.58 | 15.88 | 15.88 |
| 2 | 321+000 | 322+000 | 1.00 | 2.33E-04 | 2.38E-04 | 374.48 | 16.07 | 16.07 |
| 3 | 322+000 | 324+000 | 2.00 | 2.14E-04 | 2.08E-04 | 696.57 | 23.67 | 23.67 |
| 4 | 324+000 | 325+000 | 1.00 | 2.46E-04 | 2.20E-04 | 536.77 | 13.83 | 13.83 |
| 5 | 325+000 | 326+000 | 1.00 | 2.24E-04 | 2.16E-04 | 591.93 | 16.76 | 16.76 |
| **Section-2 (Six Lane)** | | | | | | | | |
| 1 | 326+000 | 328+000 | 2.00 | 3.56E-04 | 2.89E-04 | 156.72 | 5.09 | 5.09 |
| 2 | 328+000 | 330+000 | 2.00 | 2.90E-04 | 2.50E-04 | 303.01 | 9.14 | 9.14 |
| 3 | 330+000 | 333+000 | 3.00 | 3.29E-04 | 2.78E-04 | 186.57 | 5.94 | 5.94 |
| 4 | 333+000 | 336+000 | 3.00 | 3.47E-04 | 2.70E-04 | 212.98 | 6.03 | 6.03 |
| 5 | 336+000 | 338+000 | 2.00 | 2.67E-04 | 2.53E-04 | 287.04 | 11.96 | 11.96 |
| 6 | 338+000 | 342+000 | 4.00 | 3.01E-04 | 2.49E-04 | 307.45 | 8.23 | 8.23 |
| 7 | 342+000 | 346+000 | 4.00 | 2.80E-04 | 2.44E-04 | 339.58 | 9.91 | 9.91 |
| 8 | 346+000 | 348+000 | 2.00 | 3.36E-04 | 2.68E-04 | 220.66 | 5.56 | 5.56 |
| 9 | 348+000 | 351+000 | 3.00 | 2.57E-04 | 2.33E-04 | 417.90 | 12.97 | 12.97 |
| 10 | 351+000 | 353+000 | 2.00 | 2.87E-04 | 2.44E-04 | 340.21 | 11.00 | 11.00 |
| 11 | 353+000 | 355+000 | 2.00 | 2.71E-04 | 2.46E-04 | 325.41 | 12.14 | 12.14 |
| 12 | 355+000 | 356+000 | 1.00 | 3.04E-04 | 2.70E-04 | 214.78 | 7.95 | 7.95 |
| 13 | 356+000 | 360+000 | 4.00 | 2.71E-04 | 2.41E-04 | 357.85 | 11.33 | 11.33 |
| **Section-3 (Six Lane)** | | | | | | | | |
| 1 | 360+000 | 367+000 | 7.00 | 2.90E-04 | 2.63E-04 | 241.16 | 8.87 | 8.87 |
| 2 | 367+000 | 370+000 | 3.00 | 2.87E-04 | 2.67E-04 | 222.53 | 10.94 | 10.94 |
| 3 | 370+000 | 375+000 | 5.00 | 2.46E-04 | 2.44E-04 | 337.06 | 15.63 | 15.63 |
| 4 | 375+000 | 379+000 | 4.00 | 2.96E-04 | 2.61E-04 | 248.37 | 9.69 | 9.69 |
| 5 | 379+000 | 382+000 | 3.00 | 2.75E-04 | 2.50E-04 | 301.91 | 11.46 | 11.46 |
| 6 | 382+000 | 387+000 | 5.00 | 3.12E-04 | 2.64E-04 | 234.62 | 7.46 | 7.46 |
| 7 | 387+000 | 395+000 | 8.00 | 2.70E-04 | 2.44E-04 | 336.44 | 11.36 | 11.36 |
| 8 | 395+000 | 396+000 | 1.00 | 2.96E-04 | 2.72E-04 | 207.35 | 8.55 | 8.55 |
| 9 | 396+000 | 398+000 | 2.00 | 2.31E-04 | 2.16E-04 | 586.97 | 18.65 | 18.65 |
| 10 | 398+000 | 401+000 | 3.00 | 2.42E-04 | 2.41E-04 | 359.88 | 14.49 | 14.49 |

| Sl No | Chainage | | Length (Km) | IIT Pave Result | | Rutting Life | Fatigue Life | Remaining life |
|---|---|---|---|---|---|---|---|---|
| | From | To | | Tensile Strain at Bottom BT | Vertical Strain at top of Subgrade | | | |
| **RHS** | | | | | | | | |
| **Section-1** | | | | | | | | |
| 1 | 320+000 | 321+000 | 1 | 2.53E-04 | 2.33E-04 | 417.09 | 15.16 | 15.16 |
| 2 | 321+000 | 324+000 | 3 | 3.94E-04 | 2.97E-04 | 137.41 | 3.76 | 3.76 |
| 3 | 324+000 | 326+000 | 2 | 2.79E-04 | 2.48E-04 | 310.83 | 9.85 | 9.85 |
| **Section-2** | | | | | | | | |
| 1 | 326+000 | 328+000 | 2 | 3.18E-04 | 2.71E-04 | 208.4 | 7.37 | 7.37 |
| 2 | 328+000 | 330+000 | 2 | 3.60E-04 | 2.78E-04 | 188.1 | 4.78 | 4.78 |
| 3 | 330+000 | 336+000 | 6 | 2.48E-04 | 2.29E-04 | 452.98 | 13.64 | 13.64 |
| 4 | 336+000 | 339+000 | 3 | 3.15E-04 | 2.66E-04 | 227.12 | 6.59 | 6.59 |
| 5 | 339+000 | 343+000 | 4 | 2.56E-04 | 2.35E-04 | 398.14 | 13.45 | 13.45 |
| 6 | 343+000 | 345+000 | 2 | 3.05E-04 | 2.52E-04 | 292.78 | 9.04 | 9.04 |
| 7 | 345+000 | 348+000 | 3 | 2.34E-04 | 2.17E-04 | 579.63 | 17.59 | 17.59 |
| 8 | 348+000 | 354+000 | 6 | 2.76E-04 | 2.53E-04 | 284.99 | 10.35 | 10.35 |
| 9 | 354+000 | 358+000 | 4 | 2.70E-04 | 2.54E-04 | 278.95 | 11.09 | 11.09 |
| 10 | 358+000 | 360+000 | 2 | 2.44E-04 | 2.24E-04 | 493.7 | 17.11 | 17.11 |
| **Section-3** | | | | | | | | |
| 1 | 360+000 | 364+000 | 4 | 2.71E-04 | 2.43E-04 | 344.68 | 12.38 | 12.38 |
| 2 | 364+000 | 370+000 | 6 | 3.44E-04 | 2.68E-04 | 220.28 | 5.57 | 5.57 |
| 3 | 370+000 | 375+000 | 5 | 2.66E-04 | 2.46E-04 | 322.43 | 11.34 | 11.34 |
| 4 | 375+000 | 378+000 | 3 | 3.07E-04 | 2.66E-04 | 229.06 | 7.35 | 7.35 |
| 5 | 378+000 | 383+000 | 5 | 2.93E-04 | 2.66E-04 | 227.12 | 9.89 | 9.89 |
| 6 | 383+000 | 388+000 | 5 | 3.25E-04 | 2.79E-04 | 182.67 | 6.57 | 6.57 |
| 7 | 388+000 | 393+000 | 5 | 2.89E-04 | 2.58E-04 | 263.58 | 9.23 | 9.23 |
| 8 | 393+000 | 394+000 | 1 | 2.64E-04 | 2.52E-04 | 292.78 | 12.15 | 12.15 |
| 9 | 394+000 | 401+000 | 7 | 2.84E-04 | 2.44E-04 | 335.81 | 10.06 | 10.06 |

Overlay required to increase life of pavement is up to Year 2036 is the responsibility of HAM Concessionaire.

### C. Analysis of Pavement Condition Data

Field Survey for Surface Distress and Riding Quality was carried out using Network Survey Vehicle (NSV). NSV is a highly specialized survey Vehicle designed and developed by Australian Road Research Board (ARRB) Group. NSV is equipped with a fully integrated Hawkeye 2000 data collection system. The NSV consists of a Multi-Laser Profiler, Digital Imaging System whose outputs are all linked via a highly accurate distance measuring instrument.

#### i) Evaluation of Roughness and Rutting

Roughness and rutting of pavement are being measured using a Digital Laser Profiler (DLP), Integrated into the NSV. DLP has eleven lasers to enhance the accuracy of measurements. The profiler is capable of measuring:

- Pavement Roughness (one laser in each wheel path and center)
- Rutting (full transverse pavement measurement) in case of Flexible Pavement

Roughness and Rutting are two most important quality parameters of pavement describing its riding quality and durability and are very significant in gaining negative or positive feedback from road users. The summary of result is summarized as below:

**Pavement condition based on Roughness**

| Sl. No. | Pavement | Section | Chainage | | Length* (Km) | Range | Condition | |
|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | LHS | RHS |
| 1 | Flexible Pavement | Section-1 | 320+810 | 326+000 | 5.19 | <1800 | 0 | 0 |
| | | | | | | 1800 - 2400 | 3.19 | 4.94 |
| | | | | | | >2400 | 2 | 0.25 |
| 2 | Flexible Pavement | Section-2 | 326+000 | 360+300 (Design 361+000) | 34.3 | <1800 | 15 | 16.3 |
| | | | | | | 1800 - 2400 | 19 | 17 |
| | | | | | | >2400 | 0.3 | 1 |
| 3 | Flexible Pavement | Section-3 | 360+300 (Design 361+000) | 400+632 (Design 401+332) | 40.33 | <1800 | 27 | 27 |
| | | | | | | 1800 - 2400 | 13.33 | 13.33 |
| | | | | | | >2400 | 0 | 0 |

**Pavement Condition based on Rutting**

| Sl. No. | Pavement | Section | Chainage | | Length* (Km) | Range | Condition | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | L-1 | L-2 | L-3 | R-1 | R-2 | R-3 |
| 1 | Flexible Pavement | Section-1 | 320+810 | 326+000 | 5.19 | <5 | 3.35 | 4.82 | 0.00 | 2.41 | 4.68 | 0.00 |
| | | | | | | 5 to 10 | 1.61 | 0.36 | 0.00 | 2.52 | 0.49 | 0.00 |
| | | | | | | >10 | 0.23 | 0.01 | 0.00 | 0.26 | 0.02 | 0.00 |
| 2 | Flexible Pavement | Section-2 | 326+000 | 360+300 (Design 361+000) | 34.30 | <5 | 2.30 | 11.30 | 0.10 | 3.50 | 12.80 | 22.75 |
| | | | | | | 5 to 10 | 21.90 | 17.70 | 0.00 | 19.85 | 18.20 | 0.00 |
| | | | | | | >10 | 10.10 | 5.30 | 0.00 | 10.95 | 3.30 | 0.70 |
| 3 | Flexible Pavement | Section-3 | 360+300 (Design 361+000) | 400+632 (Design 401+332) | 40.33 | <5 | 5.90 | 19.40 | 0.10 | 5.70 | 22.45 | 36.05 |
| | | | | | | 5 to 10 | 28.33 | 18.43 | 0.00 | 25.63 | 15.88 | 0.00 |
| | | | | | | >10 | 6.10 | 2.50 | 0.00 | 9.00 | 2.00 | 0.00 |

- Length excluding Toll Plaza and Structure.

The section under HAM Concession shall be maintained by existing HAM Concessionaire up to O & M Handover Date.

### ii) Evaluation of Pavement Condition Index (PCI)

The Hawkeye 2000 Series Asset View Digital Imaging System (DIS) is a video acquisition system for visually assessment of pavement conditions. Analysis of condition measurement (cracks, potholes, patching, etc.) is undertaken to determine Pavement Condition Index (PCI) of the Project Stretches.

PCI provides a numerical rating for the condition of road segments within the road network, where 0 is the poor possible condition and 100 is the best possible condition.

The Roughness condition summary is presented in table below:

**Pavement condition Summary based on PCI Values (Flexible)**

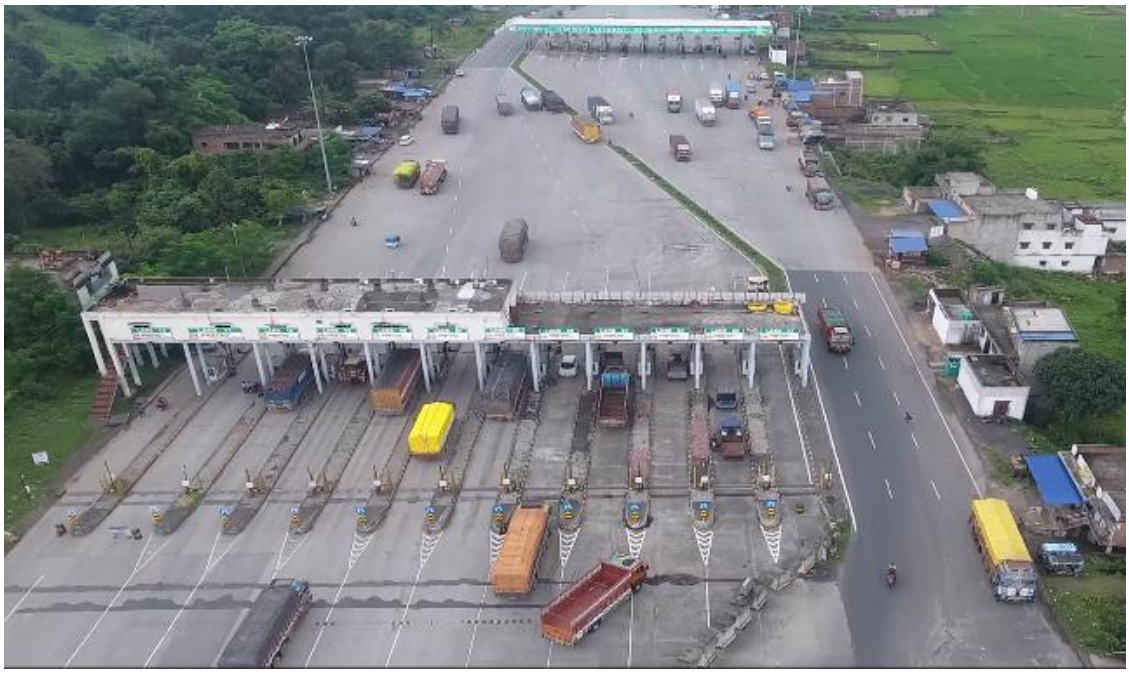
| Condition | PCI Rating | LHS | | RHS | |
|---|---|---|---|---|---|
| | | Length | Percentage | Length | Percentage |
| **Excellent** | **100-90** | 22.19 | 27.67% | 25.00 | 31.18% |
| **Good** | **90-80** | 14.00 | 17.46% | 16.00 | 19.95% |
| **Satisfactory** | **80-60** | 43.00 | 53.62% | 37.19 | 46.38% |
| **Fair** | **60-40** | 1.00 | 1.25% | 2.00 | 2.49% |
| **Poor** | **40-20** | 0.00 | 0.00% | 0.00 | 0.00% |
| **Fail** | **20-0** | 0.00 | 0.00% | 0.00 | 0.00% |

## 9. TOLL PLAZAS

Toll on this Project stretch is currently being collected through open tolling system at following toll plazas:

- Toll Plaza at Km 352+100 (Kulgo)

The photograph showing existing Toll Plazas is appended as below:



**Toll Plaza at Km 352+100 (Kulgo)**

It is proposed to retain the existing toll plaza as the numbers of lanes are sufficient for the 20-year Concession period. The existing toll plaza is having following facilities:

- Rigid Pavement is provided on both plazas.
- Existing Administrative building is required to be furnished e.g., Furniture, AC, and Fitting of Windows etc. as per the requirements.
- Parking area, paving, lighting, plantation etc.as per IRC: SP:84-2019/IRC:87-2019 in the existing Administrative Building premise.

- Traffic Aid Post and Medical Aid Post within the Area/ boundary of Toll Complex.
- Toilet Blocks on both sides of Toll Plaza.
- High Mast has provided both Toll Plaza Lighting and Approach Lighting on both sides of Toll Plaza.

## 10. MATERIAL INVESTIGATION

The construction material survey and investigations include Identification of borrow area locations and laboratory testing on borrow soil samples, Identification and laboratory testing of Quarry materials and identification and laboratory testing of locally available industrial waste.

### Borrow Area Investigation and Testing

A total of Ten (5) borrow soil sources, have been identified, visited, inspected, and sampled. From the inspection of borrow area locations and test results of borrow area soil, it has been observed that the lead of the borrow area location is within 5 Km. The liquid limit of the borrowed soil varies in the range of 24.6 to 35.9 and the soil PI found in the range of 3.1 to 30.2. The MDD of the soil is found to be in the range of 1.93 gm/cc to 9.80 gm/cc with OMC varying from 7.2% to 11.6%. The soaked CBR (97% compaction) of the borrow soil sample is found to be in the range of 14.0% to 19.2% with 80% of soil samples have CBR at 97% compaction greater than 10%.

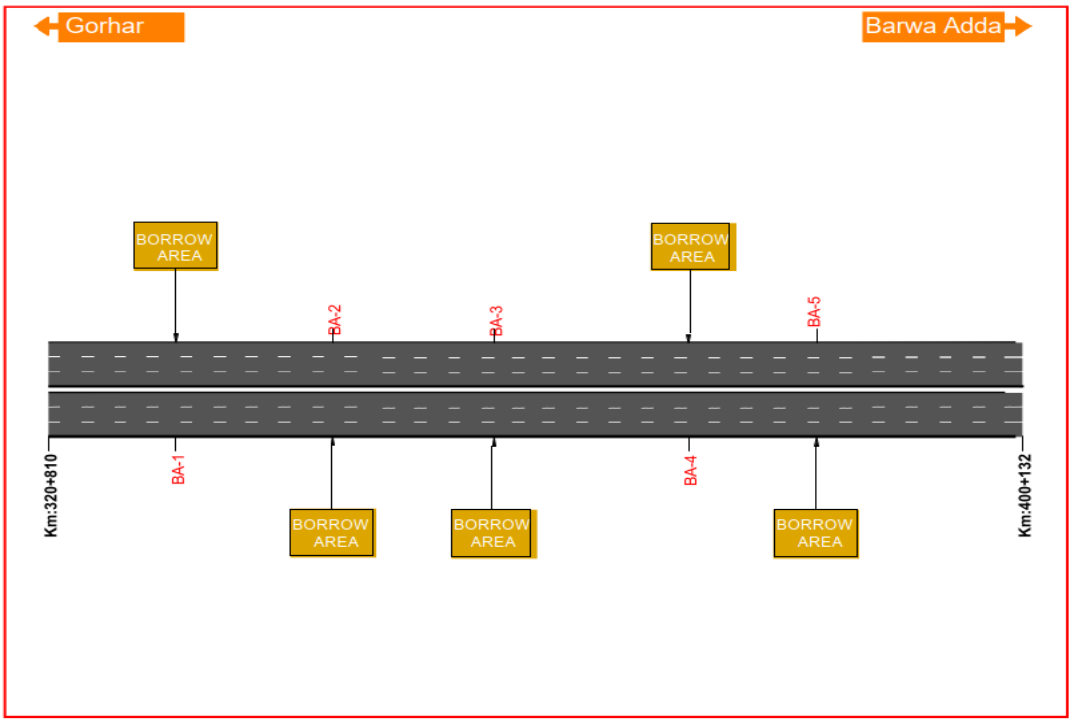


**Borrow Locations**

The locations of most of the currently known sources of quarry materials and natural sand in the vicinity of the project have been thoroughly examined. Samples collected from these sources were tested and found to be suitable for road construction. The Barakar River serves as a natural source of sand, while two aggregate sources near the project highway have been identified as Ekta Engineering Works and Vikas Crusher.



**Photographs of Aggregate source at Km 400+132**




**Description of Aggregate Source and Stone Dust**

| Source ID | Existing Chainage/ Side | Location | Lead from nearest point of project Road (Km) | Quantity |
|---|---|---|---|---|
| AQ1 | 400+132 L/S | Vikash Crusher | 39.2 | Plenty |

**Description of Natural Sand Source**

| Source ID | Location | Lead from the nearest point of project Road (Km) | Approx. Quantity (m3) | River |
|---|---|---|---|---|
| SQ1 | Chirkunda | 62.80 | Huge | Barakar River |

### Source of Construction Water

The primary source of water for concrete works could be natural streams, springs and ground water. The latter can be obtained from deep bore wells. Potable water is generally

acceptable for concrete works

## 11. Pond Ash & Fly Ash

One number of coals fired thermal power plants has been identified within 57 km of project road vicinity as source of pond ash. Representative samples of pond ash had been collected from this source. The location and the approximate distance from power plant to the nearest point on the project road are given in the table mentioned below.

| S. No | Plant | Details | Lead (km) |
|---|---|---|---|
| 1 | Koderma Thermal Power station | Chandwara, Jharkhand | 72.4 |

## 12. ROAD SEFTY ASSESSMENT AND IDENTIFICATION OF IMPROVEMENT PROPOSALS

Road Safety Audit (RSA) of the Project Stretch was carried out to:

- Identify issues related to Road Safety along Project Stretch.
- Propose Improvement Proposals for the identified issues/locations along the Project Stretch.

Based on the Road Safety Audit conducted at site the following is recommended:

| S. No | Safety Issue | Description of Safety Issue | Proposed Safety Improvements |
|---|---|---|---|
| 1 | Non-standard Entry & Exit | Entry & Exit from MCW to Service Road and vice-versa are not having proper acceleration and deceleration lane. | Provide properly designed acceleration & deceleration lanes, ensuring smooth speed transitions between service roads and highways |
| 2 | Improper junction design | Improperly designed junctions without central islands | All junctions are to be developed with left-in/left-out as per Fig 3.7 of IRC: SP:87-2019 |
| 3 | Junctions are directly connected to MCW | Junctions are connected to MCW with direct access without acceleration and deceleration lane without proper radius for turning | All junctions are to be developed with left-in/left-out as per Fig 3.7 of IRC: SP:87-2019 |
| 4 | Unauthorized Median Opening | There are unauthorized median openings along the project. | All median openings are to be closed immediately. |
| 5 | Existing Median Opening | Median openings have been provided without shelters lanes. These median openings are being used for U Turn Provision only. Road furniture is found to be inadequate. | All median openings are to be provided with sign boards, road markings, road studs and blinkers. |

| S. No | Safety Issue | Description of Safety Issue | Proposed Safety Improvements |
|---|---|---|---|
| 6 | Sign Boards | Missing place name in Informatory sign Informatory sign with Blue background for National Highway, incorrect placement/positioning of signs on the service road which are intended for traffic traveling on MCW, Non-uniform spacing of Chevron signs, etc. | Provide all road signs as per IRC:67-2022 & latest circular ensuring correct placement. |
| 7 | Road Markings | Incorrect/missing road markings observed at many locations | Provide road markings as per IRC:35-2015 & ensure periodic maintenance. |
| 8 | Traffic Calming | Absence of active traffic calming measures on side road & MCW at junction locations | Active traffic calming measures like Transverse Bar Markers are proposed to be provided as per IRC:99-2018 |
| 9 | VUP | Unsafe crossing of vehicles due to absence of VUP at few locations. | VUP are proposed at major junctions for ensuring safety of all road users |
| 10 | ATMS | ATMS as provided are not in accordance with NHAI / Policy Guidelines / Standard Documents 2023, Policy Circular No. 11.53/2023 dated 10th October 2023. | It is recommended to provide ATMS as per NHAI latest Circular. |

The existing HAM Concessionaire is responsible for providing deficiencies in terms of road safety and same being provided. ATMS is proposed to be under Public InvIT Scope.

## 13. COST ESTIMATE

The summary of cost estimate proposed to be provided under Public InvIT is as follows:

### A. CAPEX

| Sl. No. | Item Description | Quantity | | Amount (Rs in Cr.) |
|---|---|---|---|---|
| | | Unit | Qty. | |
| 1 | Advanced Traffic Management System (ATMS) | Km | 80.522 | 14.570 |
| 2 | Providing Multi Lane Free Flow (MLFF) at Toll Plaza | Nos | 1 | 5.00 |
| **Total Amount (excl GST)** | | | | **19.570** |

### B. Operation & Maintenance Cost (OPEX) as of 2025/26

| Year | Routine Maintenance | Toll Plaza & ATMS Operation and Maintenance | Electricity & Patrolling expenses | Other office expenses | Insurance | Total Maintenance Amount incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount incl GST |
|---|---|---|---|---|---|---|---|
| 2026-2027 | - | 2.13 | 0.14 | 0.30 | 0.19 | 3.25 | - |
| 2027-2028 | - | 2.13 | 0.14 | 0.30 | 0.19 | 3.25 | - |
| 2028-2029 | 0.19 | 3.72 | 0.14 | 0.30 | 0.19 | 5.35 | - |
| 2029-2030 | 0.38 | 5.32 | 0.14 | 0.30 | 0.19 | 7.46 | - |

| Year | Routine Maintenance | Toll Plaza & ATMS Operation and Maintenance | Electricity & Patrolling expenses | Other office expenses | Insurance | Total Maintenance Amount incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount incl GST |
|---|---|---|---|---|---|---|---|
| 2030-2031 | 0.38 | 5.32 | 0.14 | 0.30 | 0.19 | 7.46 | - |
| 2031-2032 | 0.38 | 5.32 | 0.14 | 0.30 | 0.19 | 7.46 | - |
| 2032-2033 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2033-2034 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2034-2035 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2035-2036 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2036-2037 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2037-2038 | - | 5.32 | 3.30 | 5.46 | 3.90 | 21.21 | 103.70 |
| 2038-2039 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2039-2040 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2040-2041 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2041-2042 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2042-2043 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2043-2044 | - | 5.32 | 3.30 | 5.46 | 3.90 | 21.21 | 103.70 |
| 2044-2045 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2045-2046 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2046-2047 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2047-2048 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2048-2049 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2049-2050 | - | 5.32 | 3.30 | 5.46 | 3.90 | 21.21 | 103.70 |
| **Total** | **145.73** | **119.67** | **47.83** | **79.40** | **56.84** | **530.36** | **311.11** |

# Chapter 1. Introduction

# CHAPTER 1. INTRODUCTION

## 1.1 INTRODUCTION

The National Highways Authority of India (NHAI) constituted by an act of Parliament, "the National Highways Authority of India Act, 1988". It is responsible for the development, maintenance and management of National Highways entrusted to it and for matters connected or incidental thereto. The Authority is in operation since February 1995 with the appointment of full time Chairman and other Members. Additional information about NHAI activities and other details can be found on www.nhai.org. The source of information provided in this report is taken from NHAI website.
National Highways Authority of India (NHAI) is mandated to implement National Highways Development Project (NHDP) which is

- India 's Largest ever highways project
- World class roads with uninterrupted traffic flow

The National Highways have a total length of 140,000 + km to serve as the arterial network of the country. The Government of India has launched major initiatives to upgrade and strengthen National Highways through various phases of National Highways Development project (NHDP), which are briefly as under:

- NHDP Phase I: NHDP Phase I was approved by Cabinet Committee on Economic Affairs (CCEA) in December 2000 at an estimated cost of Rs.30,000 crore comprises mostly of GQ (5,846 km) and NS-EW Corridor (981km), port connectivity (356 km) and others (315 km).
- NHDP Phase II: NHDP Phase II was approved by CCEA in December 2003 at an estimated cost of Rs.34,339 crores (2002 prices) comprise mostly NS-EW Corridor (6,161 km) and other National Highways of 486 km length, the total length being 6,647 km. The total length of Phase II is 6,647 km.
- NHDP Phase-III: Government approved on 5.3.2005 up gradation and 4 laning of 4,035 km of National Highways on BOT basis at an estimated cost of Rs. 22,207 crores (2004 prices). Government approved in April 2007 up gradation and 4 laning at 8074 km at an estimated cost of Rs. 54,339 crores.
- NHDP Phase V: CCEA has approved on 5.10.2006 six laning of 6,500 km of existing 4 lane highways under NHDP Phase V (on DBFO basis). Six laning of 6,500 km includes 5,700 km of GQ and other stretches.
- NHDP Phase VI: CCEA has approved on November 2006 for 1000 km of expressways at an estimated cost of Rs. 16680 crores.
- NHDP Phase VII: CCEA has approved on December 2007 for 700 km of Ring Roads, Bypasses and flyovers and selected stretches at an estimated cost of Rs. 16680 crores.

To accelerate development of National Highways, MoRTH proposed to leverage asset monetization of existing operational roads and it is expected to generate additional resources. Accordingly, NHAI has awarded / being awarded under Toll Operate Transfer and through InVIT.

For implementation of ToT / InVIT, NHAI requires the preparation of a detailed report on inventory & physical condition of the road along with estimation of immediate requirement in order to improve safety of project road, Operation & Maintenance cost (OPEX) and periodic overlay requirement for proposed concession period.

**M/s. URS Scott Wilson India Pvt. Ltd. in JV with MARC Technocrats (P) Ltd** submitted proposal and selected as empaneled consultant for carrying out Technical Due Diligence. LOA issued by NHAI vide ref No: NHAI / AM/2023-24/ Empanelment-2/ Tech. RFP/e-203713/254 dated 10.09.2024 for carrying out Tech Due Diligence of following road stretches.

| S.No. | Name of Stretch | Name of Toll Plaza | State | Length of Project | No. of Lanes |
|---|---|---|---|---|---|
| 1 | Gorhar to Barwa Adda | Kulgo | Jharkhand | 80.522 | 4L/ 6L |
| **Total Length** | | | | **80.522 Km** | |

The consultant has carried out detailed investigations and prepared detail reports on inventory and physical conditions for the above roads.

This report presents details for section of **Gorhar to Barwa Adda Section from** Km 320+810 to Km 401+332 having length of 80.522 km.

## 1.2 OBJECTIVE OF STUDY AND SCOPE OF WORKS

The main objective of this assignment is to assess the physical condition of all existing features of the **Gorhar to Barwa Adda** stretch and preparation of Detailed Project Report (DPR), technical and maintenance schedules for bidding process. Physical condition survey of Project Stretch includes data collection and analysis of highway geometric design parameters, pavement condition, condition of structures, road safety features, condition of existing facilities like toll plazas, truck lay byes etc.

Based on physical condition of stretches, options are worked out for improvements of safety aspects of existing highway features, repair and rehabilitation of pavement and structures. Cost associated with all improvement proposals are also estimated as part of this study.

NHAI has appointed **M/s Translink Infrastructure Consultants (P) Ltd.** for carrying out Traffic Due Diligence and data provided by Traffic Consultant through NHAI is adopted for analysis of pavement design and periodic overlay.

The general scope of services of the Consultant are as follows:

- Undertake topographic surveys using LiDAR along existing Right of Way (ROW) covering sufficient width beyond main carriageway and extraction of existing physical features from the captured data
- Investigation for accessing condition of pavement including shoulder, embankment, drainage etc. using visual means, advanced laser profilometer and image processing software and Falling Weight Deflectometer.
- Investigation for perception of existing pavement composition
- Conducting road safety audit for evaluating geometry of road, adequacy and condition of existing of safety features etc.
- Inventory of all structures along Project Stretches like bridges, culverts, ROBs, underpasses, flyovers etc. covering physical and hydraulic parameters. Investigations shall be carried out for accessing structural conditions using Mobile Bridge Inspection Unit (MBIU) as per IRC: SP:35. For the bridges identified to be in a distressed condition based upon the visual condition survey, supplementary testing shall be carried out as per IRC:

SP:35 and IRC: SP:40. Selection of tests may be made based on the specific requirement of the structure.

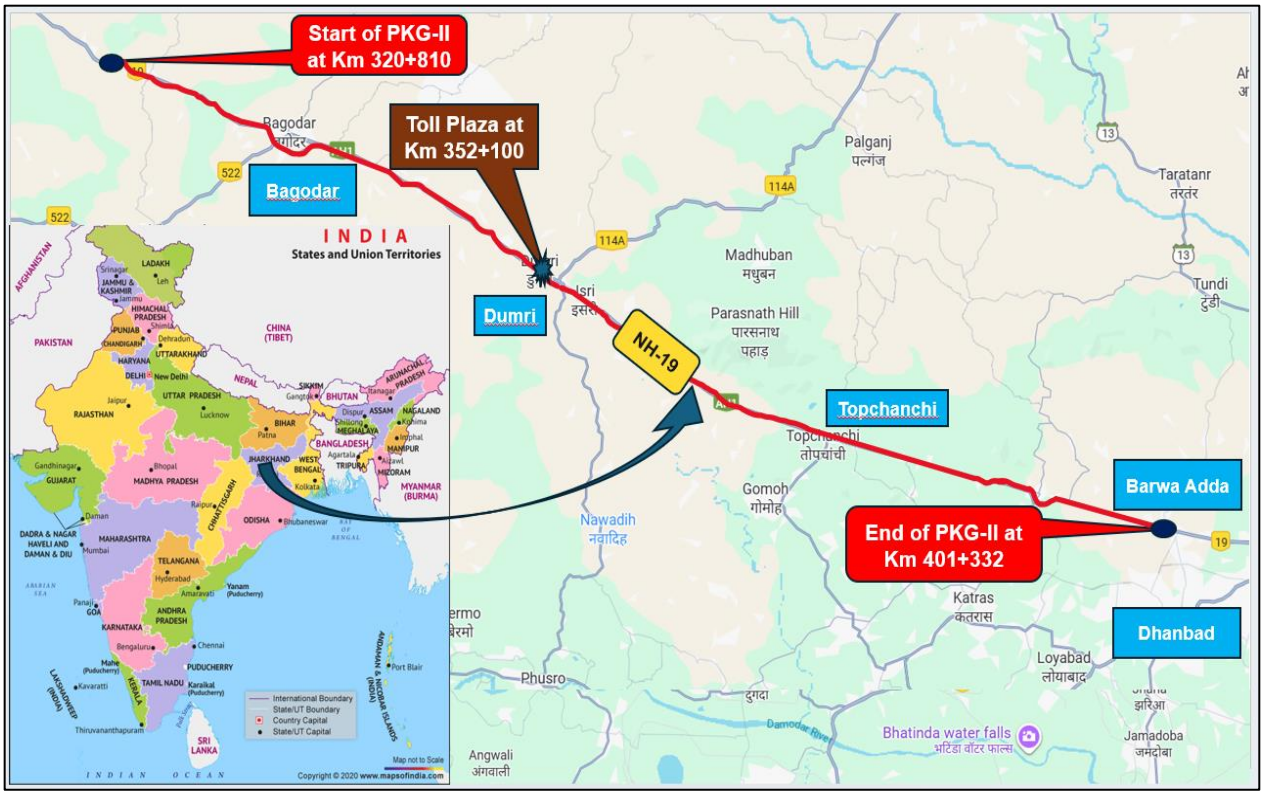
- Identification of source of construction materials quarry sites, sand source and borrow areas and assessment of quality of various construction materials
- Preparation of improvement strategy for strengthening of pavement and structures, rehabilitation and design for road safety features, road furniture etc.
- Condition and Inventory of Toll Plaza
- Preparation of suitable proposals for improvement of the existing road and strengthening of pavement, as required at the appropriate time to maintain the level of service over the design period.
- Estimation of detailed cost based on improvement proposal
- Preparation and submission of following items:
    a) Strip Plan
    b) Drawing for Improvement Proposal
    c) Topographic Survey Plan and Profile
    d) Signage Plan (existing and additional signs)

## 1.3 PROJECT STRETCH

The project stretch start from Gorhar Km 320+810 to Barwa Adda Km 401+332 (Existing 400+632) of NH 19 in the State of Jharkhand. The total length of the project road is 80.522 km.

The are one toll plaza and toll being collected at following locations:

- Toll Plaza at Km 352+100 (Kulgo)




**Project Location Map**

The salient features of the project are as below:

## A) Project Salient Features - Highway

| S. No. | Description | | Details |
|---|---|---|---|
| 1 | Project Stretch | | Project Road Start from Gorhar Km 320+810 to Barwa Adda Km 401+332 (Existing 400+632) NH 19 (Old NH 2) Gorhar – Barwa Adda section in the state of Jharkhand. |
| 2 | Length of Project Stretch (km) | | 80.522 Km |
| 3 | Road Type (km) | Flexible & Rigid | Km 320+810 to Km 400+632 (Design 401+332) (excluding Toll Plaza) |
| 4 | Length of Urban Section (km) | | 33.900 Km |
| 5 | Length of Slip/Service Road (km) | LHS | 41.640 Km |
| | | RHS | 41.191 Km |
| 6 | No. of Bypasses | | 02 Nos. (Bagodar, Rajgunj) |
| 7 | No. of Major Junctions | | 11 Nos. (2 At grade, 9 Grade Separated) |
| 8 | No. of Minor Junctions | | 154 Nos. (146 At grade, 8 Grade Separated) |
| 9 | No. of Median Openings | | 30 Nos. |
| 10 | No. of Toll Plazas | | 1 Nos. |
| 11 | No. of Bus Bays / Shelter | | 25 Nos. |
| 12 | No. of Truck Lay Byes | | 05 Nos. |
| 14 | No. of Rest Area | | Nil. |
| 15 | Drain (km) | RCC Cover Drain | 52.087 Km (at MCW) |
| | | RCC Open Drain | 0.115 Km (at MCW), |
| | | Line Drain | 0.055 Km (at MCW), 1.78 Km (at Median) |
| | | Open V Drain | 0.705 Km (at MCW), 3.355 Km (at Median) |
| 16 | Streetlight (Nos.) | | 2811 Nos. |
| 17 | High Mast Lights (Nos.) | | 08 Nos. |
| 18 | Solar Blinkers (Nos.) | | 44 Nos. |
| 19 | Length of Safety Barrier (Km) | | |
| | W-Beam Safety Barrier (Km) | | 28.280 Km |
| | RCC Crash Barrier (Km) | | 25.781 Km |
| | New Jersey crash barriers (Km) | | 0.460 Km |
| | Wire rope | | 38.670 Km |
| 20 | Length of Pedestrian Guard Rails (in km) | | 15.980 Km |

## B) Project Salient Features – Structure

| S. No | Type of Structures | Unit | Quantity |
|---|---|---|---|
| 1 | Major Bridges | No | 03 |
| 2 | Minor Bridges | No | 33 |
| 3 | Flyover | No | - |
| 4 | ROB | No | 01 |
| 5 | RUB | No | - |
| 6 | VOP | No | - |
| 7 | VUP | No | 16 |
| 8 | VUP Grade II | No | 01 |
| 8 | PUP | No | 04 |
| 9 | EUP/CUP/AOP | No | - |
| 12 | FOB | No | 10 |
| 13 | Culverts (Pipe and Box) | No | 144 |

# Chapter 2. Project Description with Highway Inventory

# 2. PROJECT ROAD DESCRIPTION

## 2.1 GENERAL

The project stretch start from Gorhar at Km 320+810 to Barwa Adda at Km 401+332 (Existing Km 400+632) of NH 19 in the State of Jharkhand. The total length of the project road is 80.522 Km.

The project road stretch passes through Gorhar, Atka, Bagodar, Kulgo, Dumri, Jamtara, Ishri, Topchanchi, Rajganj and Barwa Adda (Dhanbad) in the State of Jharkhand.

Project Highway has been divided in Three (3) sections and the details of the section as given in **Table 2.1.**

**Table 2.1: Project Site Details**

| Section No. | Section Name | | Chainage (Km) | | Length (Km) | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | From | | To | |
| | From | To | From | To | | Easting | Northing | Easting | Northing |
| Sec-1 | Gorhar | Atka | 320+810 | 326+000 | 5.190 | 369385.18 | 2667956.34 | 374188.59 | 2666059.24 |
| Sec-2 | Atka | Khairatunda | 326+000 | 360+300 (Design 361+000) | 35.000 | 374188.59 | 2666059.25 | 404117.48 | 2650761.09 |
| Sec-3 | Khairatunda | Barwa Adda | 360+300 | 400+632 (Design 401+332) | 40.332 | 404117.48 | 2650761.09 | 441794.72 | 2637925.95 |
| **Total Length** | | | | | **80.522** | | | | |

All above Three (3) sections of Project Highway are under HAM as per provisions of the existing Concession. Existing Concessionaire shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing HAM Concession Agreement. The details of agency, section and COD/PCOD date as given in **Table 2.2.**

**Table 2.2: Project Details**

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | PCOD /COD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/s DBL Gorhar Khairatunda Highways Pvt. Ltd. | HAM | 326+000 | 360+300 (Design 361+000) | 35.000 | 16.10.2021/ 31.03.2022 | 15.10.2036 |
| M/s Ashoka Khairatunda Barwa Adda Road Limited (AKBARL) | HAM | 360+300 (Design 361+000) | 400+632 (Design 401+332) | 40.332 | 09.10.2021/ 21.04.2022 | 08.10.2036 |

These works pertain to the de-scoped 6-lane sections, which have been retained as 4-lane configurations. Details for these projects section are provided in the table below:

**Table 2.3: Project Details of DPR Under Progress**

| Sl. No | Chainage (Km) | | Length (Km) | Remarks |
|---|---|---|---|---|
| | From | To | | |
| 1 | 320+810 | 326+000 | 5.190 | 6-Lane DPR Under Progress |

The O&M Handover Date is tentative and may vary based on the actual completion date of the project. There will be no financial implication for the same.

The project stretches will be handed over to the TOT/InvIT Concessionaire for Toll Collection and Operation of TMS and works mentioned in Schedule-B

After completion of the concession period of existing HAM concessionaire, subject section from Km 320+810 to Km 401+332 (Existing 400+632) of NH-19 shall be handed over the InvIT Concessionaire to operate and maintain the Project Highway i.e., the date of end of concession period of existing concessionaire shall be O&M Handover date

Fee is being collected at 1 (One) number of Toll Plazas, at Km. 352+100 near at Kulgo, for the Project length of 80.522 Km.

Location Maps of Project Highway is Presented Below

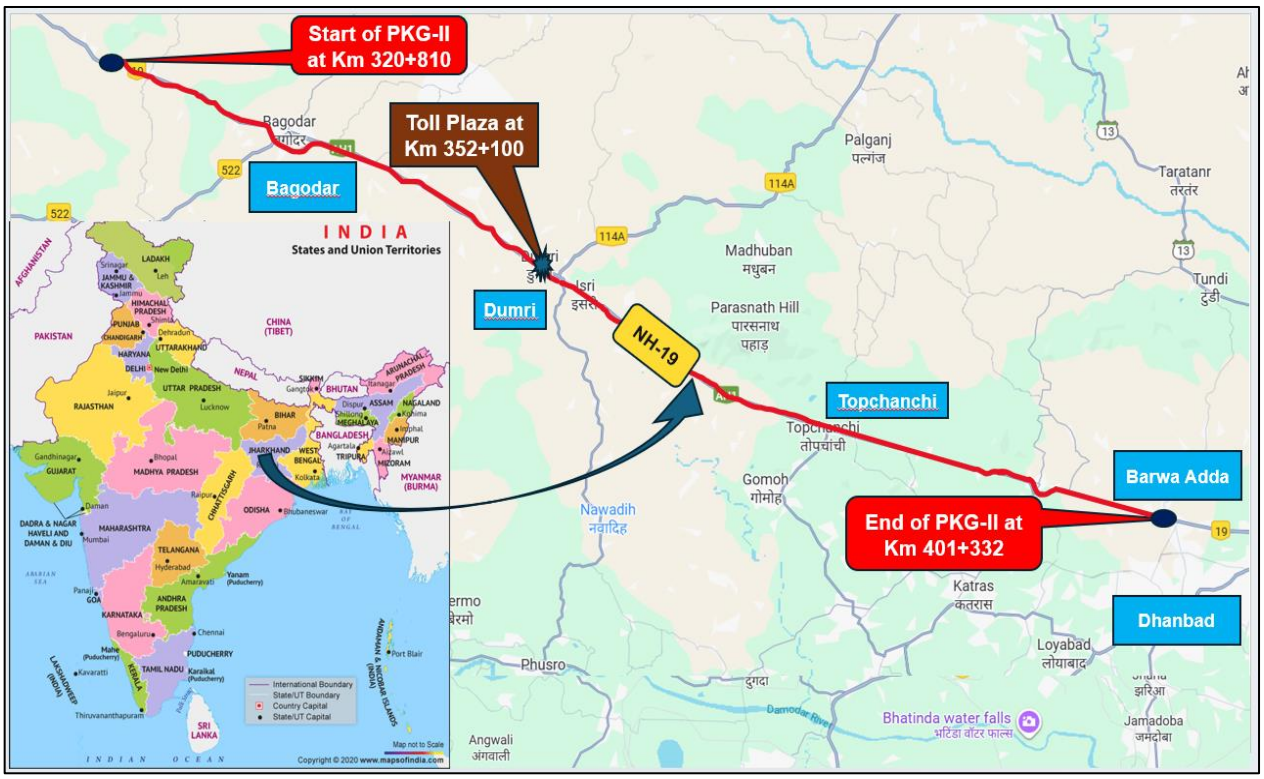



**Fig 2.1: Index Map showing Project Road**

## 2.2 START AND END POINT

The project road starts at Km 320+810 (Gorhar) and end at Km 400+632 (Design 401+332) (Barwa Adda) as given below table.

**Table 2.4: New NH 19 (Old NH 02) Start & End Points LHS & RHS**

| Kilometer (Km) as per NH-19 LHS | | Kilometer (Km) as per NH-19 RHS | | Length (Km) | Description of Road |
|---|---|---|---|---|---|
| From | To | From | To | | |
| 320+810 | 400+632 (Design 401+332) | 400+632 (Design 401+332) | 320+810 | 80.522 | Gorhar – Barwa Adda |



**Project Road Start at Km 320+810**



**Project Road End at Km 400+632**

## 2.3 SUMMARY OF INVENTORY

While inventory is captured chainage-wise with their existing physical condition, an overview of all inventories is presented in **Table 2.5**.

**Table 2.5: Summary of Inventory on Project Stretch**

| S. No. | Description | | Details |
|---|---|---|---|
| 1 | Project Stretch | | Project Road Start from Gorhar Km 320+810 to Barwa Adda Km 401+332 (Existing Km 400+632) NH 19 (Old NH 2) Gorhar –Barwa Adda section in the state of Jharkhand. * |
| 2 | Length of Project Stretch (km) | | 80.522 Km |
| 3 | Road Type (km) | Flexible & Rigid | Km 320+810 to Km 401+332 (Existing Km 400+632) (excluding Toll Plaza) |
| 4 | Length of Urban Section (km) | | 33.900 Km |
| 5 | Length of Service /SlipRoad (km) | LHS | 41.640 Km |
| | | RHS | 41.191 Km |
| 6 | No. of Bypasses | | 02 Nos. (Bagodar, Rajgunj) |
| 7 | No. of Major Junctions | | 11 Nos. (2 At grade, 9 Grade Separated) |
| 8 | No. of Minor Junctions | | 154 Nos. (146 At grade, 8 Grade Separated) |
| 9 | No. of Median Openings | | 30 Nos. |
| 10 | No. of Toll Plazas | | 1 Nos. |
| 11 | No. of Bus Bays / Shelter | | 25 Nos. |
| 12 | No. of Truck Lay Byes | | 05 Nos. |
| 14 | No. of Rest Area | | Nil. |
| 15 | Drain (km) | RCC Cover Drain | 52.087 Km (at MCW) |
| | | RCC Open Drain | 0.115 Km (at MCW), |
| | | Line Drain | 0.055 Km (at MCW), 1.78 Km (at Median) |
| | | Open V Drain | 0.705 Km (at MCW), 3.355 Km (at Median) |
| 16 | Streetlight (Nos.) | | 2811 Nos. |
| 17 | High Mast Lights (Nos.) | | 08 Nos. |

| S. No. | Description | Details |
|---|---|---|
| 18 | Solar Blinkers (Nos.) | 44 Nos. |
| 19 | Length of Safety Barrier (Km) | |
| | W-Beam Safety Barrier (Km) | 28.280 Km |
| | RCC Crash Barrier (Km) | 25.781 Km |
| | New Jersey crash barriers (Km) | 0.460 Km |
| | Wire rope | 38.670 Km |
| 20 | Length of Pedestrian Guard Rails (in km) | 15.980 Km |

* Note: that there is overlap between Section 2 which ends at Km 361+000 and Sec 3 starts from 360+300 thus there is chainage overlap of 700 m. Therefore, end of Chainage of the project becomes Km 401+332. For this chainage variation also has been observed between M/s DBL and M/s ABL Section. End point of DBL Section is Km 361+000 and same location is referred to as Km 360+300 while design by M/ ABL. Therefore, there is two KM Stone of Km 361 at spacing of 700 m length.

## 2.4 HIGHWAY INVENTORY

Details of Highway Inventory with respect to existing Kilometer as per NH-19 are presented in below sections.

### 2.4.1 Built-up Settlements

The following are the details of the built-up section:

| S. No. | Chainage Km | | Length (m) | Side | Name of Settlement |
|---|---|---|---|---|---|
| | From | To | | (LHS/RHS) | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | |
| 1 | 322+300 | 325+750 | 3450 | BHS | Atka Village |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 2 | 330+200 | 330+900 | 700 | BHS | Sonturpi Village |
| 3 | 336+600 | 337+250 | 650 | BHS | Banpura |
| 4 | 337+900 | 338+250 | 350 | LHS | Ghaghra |
| 5 | 338+850 | 339+220 | 370 | LHS | Hesla |
| 6 | 339+220 | 340+350 | 1130 | BHS | Hesla |
| 7 | 343+150 | 343+700 | 550 | BHS | Aura |
| 8 | 343+900 | 344+400 | 500 | BHS | Aura |
| 9 | 344+550 | 344+900 | 350 | BHS | Aura |
| 10 | 346+050 | 346+600 | 550 | LHS | Beko |
| 11 | 346+900 | 347+200 | 300 | BHS | Beko |
| 12 | 347+500 | 347+900 | 400 | BHS | Beko |
| 13 | 349+800 | 350+150 | 350 | LHS | Beko |
| 14 | 350+300 | 351+200 | 900 | BHS | Kulgo |
| 15 | 352+650 | 353+700 | 1050 | BHS | Kulgo |
| 16 | 354+150 | 355+900 | 1750 | LHS | Jamtara |
| 17 | 355+200 | 355+900 | 700 | RHS | Jamtara |
| 18 | 356+500 | 357+800 | 1300 | LHS | Ishri |
| 19 | 357+250 | 357+900 | 650 | RHS | Ishri |
| 20 | 359+100 | 359+950 | 850 | BHS | Dumri |
| **Section-6 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 21 | 360+700 | 361+300 | 600 | BHS | Nimiyaghat |

| S. No. | Chainage Km | | Length (m) | Side (LHS/RHS) | Name of Settlement |
|---|---|---|---|---|---|
| | From | To | | | |
| 22 | 361+400 | 362+100 | 700 | BHS | Nimiyaghat |
| 23 | 362+350 | 362+900 | 550 | BHS | Nimiyaghat |
| 24 | 364+000 | 364+450 | 450 | BHS | Uparnagar Village |
| 25 | 366+900 | 367+300 | 400 | RHS | Sankardih Village |
| 26 | 368+800 | 370+000 | 1200 | BHS | Sankardih Village |
| 27 | 370+700 | 371+100 | 400 | LHS | Satkira Village |
| 28 | 371+950 | 372+450 | 500 | LHS | Pabapur Village |
| 29 | 372+100 | 372+600 | 500 | RHS | Pabapur Village |
| 30 | 375+300 | 377+000 | 1700 | BHS | Topchanchi |
| 31 | 377+500 | 377+800 | 300 | LHS | Topchanchi |
| 32 | 380+200 | 380+500 | 300 | LHS | Madaidih Village |
| 33 | 380+700 | 381+600 | 900 | BHS | Ledatanr Village |
| 34 | 382+200 | 382+600 | 400 | BHS | Kabirdih |
| 35 | 382+850 | 383+200 | 350 | BHS | Kamata |
| 36 | 384+300 | 384+800 | 500 | BHS | Kotaldih |
| 37 | 385+900 | 387+000 | 1100 | BHS | Dayabanspahar |
| 38 | 387+800 | 389+700 | 1900 | BHS | Maheshpur |
| 39 | 389+900 | 390+600 | 700 | LHS | Dalludih |
| 40 | 392+650 | 393+000 | 350 | BHS | Rajabhita |
| 41 | 393+300 | 394+200 | 900 | LHS | Domanpur |
| 42 | 397+100 | 397+500 | 400 | RHS | Udaypur |
| 43 | 397+500 | 398+150 | 650 | BHS | Udaypur |
| 44 | 398+400 | 399+100 | 700 | RHS | Udaypur |
| 45 | 399+800 | 400+400 | 600 | BHS | Barwaadda |
| **Total** | | | **33900** | | |

### 2.4.2 Kilometer & Hectometer Stone

The number of existing kilometer and hectometer stone along the Project Stretch are obtained from NSV and LiDAR survey and presented in **Table 2.6**.

**Table 2.6: Availability of Kilometer Stones**

| S. No. | Existing Km | Topo / Design KM |
|---|---|---|
| 1 | 321+000 | 321+000 |
| 2 | 322+000 | 322+000 |
| 3 | 323+000 | 323+000 |
| 4 | 324+000 | 324+000 |
| 5 | 325+000 | 325+000 |
| 6 | 326+000 | 325+992 |
| 7 | 327+000 | 326+990 |
| 8 | 328+000 | 327+990 |
| 9 | 329+000 | 328+995 |
| 10 | 330+000 | 329+982 |
| 11 | 331+000 | 330+983 |
| 12 | 332+000 | 331+983 |
| 13 | 333+000 | 332+983 |
| 14 | 334+000 | 333+988 |
| 15 | 335+000 | 334+982 |

| S. No. | Existing Km | Topo / Design KM |
|---|---|---|
| 16 | 336+000 | 335+982 |
| 17 | 337+000 | 336+980 |
| 18 | 338+000 | 337+981 |
| 19 | 339+000 | 338+980 |
| 20 | 340+000 | 339+981 |
| 21 | 341+000 | 340+980 |
| 22 | 342+000 | 341+981 |
| 23 | 343+000 | 342+982 |
| 24 | 344+000 | 343+981 |
| 25 | 345+000 | 344+980 |
| 26 | 346+000 | 345+981 |
| 27 | 347+000 | 346+982 |
| 28 | 348+000 | 347+979 |
| 29 | 349+000 | 348+964 |
| 30 | 350+000 | 349+965 |

| S. No. | Existing Km | Topo / Design KM |
|---|---|---|
| 31 | 351+000 | 350+976 |
| 32 | 352+000 | 351+978 |
| 33 | 353+000 | 352+977 |
| 34 | 354+000 | 353+978 |
| 35 | 355+000 | 354+978 |
| 36 | 356+000 | 355+976 |
| 37 | 357+000 | 356+981 |
| 38 | 358+000 | 357+980 |
| 39 | 359+000 | 358+990 |
| 40 | 360+000 | 359+976 |
| 41 | 361+000 A | 361+000 |
| 42 | 361+000 B | 361+700 |
| 43 | 362+000 | 362+718 |
| 44 | 363+000 | 363+718 |
| 45 | 364+000 | 364+717 |
| 46 | 365+000 | 365+722 |
| 47 | 366+000 | 366+716 |
| 48 | 367+000 | 367+716 |
| 49 | 368+000 | 368+716 |
| 50 | 369+000 | 369+716 |
| 51 | 370+000 | 370+726 |
| 52 | 371+000 | 371+716 |
| 53 | 372+000 | 372+715 |
| 54 | 373+000 | 373+714 |
| 55 | 374+000 | 374+713 |
| 56 | 375+000 | 375+714 |

| S. No. | Existing Km | Topo / Design KM |
|---|---|---|
| 57 | 376+000 | 376+722 |
| 58 | 377+000 | 377+714 |
| 59 | 378+000 | 378+713 |
| 60 | 379+000 | 379+713 |
| 61 | 380+000 | 380+712 |
| 62 | 381+000 | 381+712 |
| 63 | 382+000 | 382+713 |
| 64 | 383+000 | 383+713 |
| 65 | 384+000 | 384+712 |
| 66 | 385+000 | 385+712 |
| 67 | 386+000 | 386+712 |
| 68 | 387+000 | 387+703 |
| 69 | 388+000 | 388+711 |
| 70 | 389+000 | 389+711 |
| 71 | 390+000 | 390+714 |
| 72 | 391+000 | 391+712 |
| 73 | 392+000 | 392+710 |
| 74 | 393+000 | 393+710 |
| 75 | 394+000 | 394+707 |
| 76 | 395+000 | 395+722 |
| 77 | 396+000 | 396+708 |
| 78 | 397+000 | 397+708 |
| 79 | 398+000 | 398+707 |
| 80 | 399+000 | 399+707 |
| 81 | 400+000 | 400+707 |
| 82 | 400+632 | 401+332 |












**Existing Kilometer Stone at Site**

### 2.4.3 Right of Way

Existing Right of Way (Row) on Project Stretch is given in this section. There is no Row demarcation at site in most of the sections of Project Stretch. Consultant has obtained the Row from PIU and presented it in **Table 2.7**.

**Table 2.7: Existing Row**

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane) 6 lane DPR in under process** | | | | | | |
| 1 | 320+810 | 321+140 | 330 | 40.00 | 16.00 | 24.00 |
| 2 | 321+140 | 321+351 | 211 | 40.00 | 16.00 | 24.00 |
| 3 | 321+351 | 321+641 | 290 | 40.00 | 16.00 | 24.00 |
| 4 | 321+641 | 321+875 | 234 | 40.00 | 16.00 | 24.00 |
| 5 | 321+875 | 321+951 | 76 | 39.00 | 20.00 | 19.00 |
| 6 | 321+951 | 322+391 | 440 | 39.00 | 21.00 | 18.00 |
| 7 | 322+391 | 322+741 | 350 | 33.00 | 22.00 | 11.00 |
| 8 | 322+741 | 323+126 | 385 | 36.00 | 19.00 | 17.00 |
| 9 | 323+126 | 323+419 | 293 | 36.00 | 15.00 | 21.00 |
| 10 | 323+419 | 323+495 | 76 | 36.00 | 15.00 | 21.00 |
| 11 | 323+495 | 323+960 | 465 | 38.00 | 17.00 | 21.00 |
| 12 | 323+960 | 324+185 | 225 | 38.00 | 18.00 | 20.00 |
| 13 | 324+185 | 324+204 | 19 | 33.00 | 17.00 | 16.00 |
| 14 | 324+204 | 324+298 | 94 | 33.00 | 17.00 | 16.00 |
| 15 | 324+298 | 325+356 | 1058 | 36.00 | 19.00 | 17.00 |
| 16 | 325+356 | 325+556 | 200 | 36.00 | 19.00 | 17.00 |
| 17 | 325+556 | 325+798 | 242 | 36.00 | 19.00 | 17.00 |
| 18 | 325+798 | 326+000 | 202 | 43.00 | 27.00 | 16.00 |
| **Section-2 from Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | |
| 19 | 326+000 | 326+060 | 60 | 67.90 | 37.80 | 30.10 |
| 20 | 326+060 | 326+110 | 50 | 67.90 | 38.30 | 29.60 |
| 21 | 326+110 | 326+160 | 50 | 67.90 | 38.80 | 29.10 |
| 22 | 326+160 | 326+210 | 50 | 59.90 | 28.90 | 31.00 |
| 23 | 326+210 | 326+260 | 50 | 59.90 | 29.00 | 30.90 |
| 24 | 326+260 | 326+310 | 50 | 59.90 | 30.00 | 29.90 |
| 25 | 326+310 | 326+360 | 50 | 59.90 | 30.70 | 29.20 |
| 26 | 326+360 | 326+410 | 50 | 59.90 | 31.10 | 28.80 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 27 | 326+410 | 326+460 | 50 | 59.90 | 30.90 | 29.00 |
| 28 | 326+460 | 326+510 | 50 | 59.90 | 30.00 | 29.90 |
| 29 | 326+510 | 326+560 | 50 | 59.90 | 29.00 | 30.90 |
| 30 | 326+560 | 326+610 | 50 | 59.90 | 28.90 | 31.00 |
| 31 | 326+610 | 326+660 | 50 | 59.90 | 28.90 | 31.00 |
| 32 | 326+660 | 326+710 | 50 | 59.90 | 28.90 | 31.00 |
| 33 | 326+710 | 326+760 | 50 | 59.90 | 28.90 | 31.00 |
| 34 | 326+760 | 326+810 | 50 | 59.90 | 28.90 | 31.00 |
| 35 | 326+810 | 326+860 | 50 | 59.90 | 29.00 | 30.90 |
| 36 | 326+860 | 326+910 | 50 | 59.90 | 29.00 | 30.90 |
| 37 | 326+910 | 326+960 | 50 | 59.90 | 28.90 | 31.00 |
| 38 | 326+960 | 327+010 | 50 | 59.90 | 28.30 | 31.60 |
| 39 | 327+010 | 327+060 | 50 | 60.00 | 28.20 | 31.80 |
| 40 | 327+060 | 327+110 | 50 | 59.90 | 26.70 | 33.20 |
| 41 | 327+110 | 327+160 | 50 | 59.90 | 27.00 | 32.90 |
| 42 | 327+160 | 327+210 | 50 | 60.00 | 26.60 | 33.40 |
| 43 | 327+210 | 327+260 | 50 | 59.90 | 27.80 | 32.10 |
| 44 | 327+260 | 327+310 | 50 | 59.90 | 26.20 | 33.70 |
| 45 | 327+310 | 327+360 | 50 | 59.90 | 25.40 | 34.50 |
| 46 | 327+360 | 327+410 | 50 | 59.90 | 25.30 | 34.60 |
| 47 | 327+410 | 327+460 | 50 | 59.90 | 23.80 | 36.10 |
| 48 | 327+460 | 327+510 | 50 | 60.10 | 22.80 | 37.30 |
| 49 | 327+510 | 327+560 | 50 | 59.90 | 24.80 | 35.10 |
| 50 | 327+560 | 327+610 | 50 | 60.40 | 24.70 | 35.70 |
| 51 | 327+610 | 327+660 | 50 | 60.00 | 29.30 | 30.70 |
| 52 | 327+660 | 327+710 | 50 | 59.90 | 30.30 | 29.60 |
| 53 | 327+710 | 327+810 | 100 | 60.00 | 30.70 | 29.30 |
| 54 | 327+810 | 327+860 | 50 | 59.80 | 28.90 | 30.90 |
| 55 | 327+860 | 327+910 | 50 | 59.90 | 29.00 | 30.90 |
| 56 | 327+910 | 327+960 | 50 | 59.90 | 28.90 | 31.00 |
| 57 | 327+960 | 328+010 | 50 | 59.90 | 28.00 | 31.90 |
| 58 | 328+010 | 328+060 | 50 | 60.00 | 28.60 | 31.40 |
| 59 | 328+060 | 328+110 | 50 | 60.00 | 27.60 | 32.40 |
| 60 | 328+110 | 328+160 | 50 | 60.10 | 30.20 | 29.90 |
| 61 | 328+160 | 328+210 | 50 | 59.90 | 28.30 | 31.60 |
| 62 | 328+210 | 328+260 | 50 | 60.00 | 29.80 | 30.20 |
| 63 | 328+260 | 328+310 | 50 | 59.90 | 28.50 | 31.40 |
| 64 | 328+310 | 328+360 | 50 | 59.90 | 30.10 | 29.80 |
| 65 | 328+360 | 328+410 | 50 | 59.90 | 29.70 | 30.20 |
| 66 | 328+410 | 328+460 | 50 | 59.90 | 29.80 | 30.10 |
| 67 | 328+460 | 328+510 | 50 | 59.90 | 29.90 | 30.00 |
| 68 | 328+510 | 328+560 | 50 | 59.90 | 29.90 | 30.00 |
| 69 | 328+560 | 328+610 | 50 | 59.90 | 29.70 | 30.20 |
| 70 | 328+610 | 328+660 | 50 | 59.90 | 29.50 | 30.40 |
| 71 | 328+660 | 328+710 | 50 | 59.90 | 29.90 | 30.00 |
| 72 | 328+710 | 328+760 | 50 | 59.90 | 30.30 | 29.60 |
| 73 | 328+760 | 328+810 | 50 | 59.90 | 30.30 | 29.60 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 74 | 328+810 | 328+860 | 50 | 59.90 | 30.60 | 29.30 |
| 75 | 328+860 | 328+910 | 50 | 59.90 | 30.90 | 29.00 |
| 76 | 328+910 | 328+960 | 50 | 59.90 | 30.50 | 29.40 |
| 77 | 328+960 | 329+010 | 50 | 60.00 | 31.20 | 28.80 |
| 78 | 329+010 | 329+060 | 50 | 60.00 | 30.10 | 29.90 |
| 79 | 329+060 | 329+110 | 50 | 59.90 | 30.80 | 29.10 |
| 80 | 329+110 | 329+160 | 50 | 59.90 | 29.90 | 30.00 |
| 81 | 329+160 | 329+210 | 50 | 59.90 | 30.00 | 29.90 |
| 82 | 329+210 | 329+260 | 50 | 59.90 | 30.00 | 29.90 |
| 83 | 329+260 | 329+310 | 50 | 59.90 | 30.00 | 29.90 |
| 84 | 329+310 | 329+360 | 50 | 59.90 | 29.90 | 30.00 |
| 85 | 329+360 | 329+410 | 50 | 59.90 | 29.90 | 30.00 |
| 86 | 329+410 | 329+460 | 50 | 59.90 | 29.90 | 30.00 |
| 87 | 329+460 | 329+510 | 50 | 59.90 | 30.10 | 29.80 |
| 88 | 329+510 | 329+560 | 50 | 59.90 | 30.10 | 29.80 |
| 89 | 329+560 | 329+610 | 50 | 59.90 | 29.90 | 30.00 |
| 90 | 329+610 | 329+660 | 50 | 59.90 | 29.80 | 30.10 |
| 91 | 329+660 | 329+710 | 50 | 59.90 | 29.80 | 30.10 |
| 92 | 329+710 | 329+760 | 50 | 59.90 | 29.80 | 30.10 |
| 93 | 329+760 | 329+810 | 50 | 59.90 | 29.70 | 30.20 |
| 94 | 329+810 | 329+860 | 50 | 59.90 | 29.50 | 30.40 |
| 95 | 329+860 | 329+910 | 50 | 59.90 | 29.40 | 30.50 |
| 96 | 329+910 | 329+960 | 50 | 59.90 | 29.70 | 30.20 |
| 97 | 329+960 | 330+010 | 50 | 59.90 | 29.30 | 30.60 |
| 98 | 330+010 | 330+060 | 50 | 60.00 | 30.40 | 29.60 |
| 99 | 330+060 | 330+110 | 50 | 60.00 | 32.80 | 27.20 |
| 100 | 330+110 | 330+160 | 50 | 61.60 | 37.10 | 24.50 |
| 101 | 330+160 | 330+210 | 50 | 59.90 | 43.20 | 16.70 |
| 102 | 330+210 | 330+260 | 50 | 60.40 | 41.20 | 19.20 |
| 103 | 330+260 | 330+310 | 50 | 59.90 | 43.40 | 16.50 |
| 104 | 330+310 | 330+360 | 50 | 59.90 | 43.00 | 16.90 |
| 105 | 330+360 | 330+410 | 50 | 60.20 | 40.10 | 20.10 |
| 106 | 330+410 | 330+460 | 50 | 60.10 | 35.90 | 24.20 |
| 107 | 330+460 | 330+510 | 50 | 59.90 | 33.60 | 26.30 |
| 108 | 330+510 | 330+560 | 50 | 59.90 | 33.60 | 26.30 |
| 109 | 330+560 | 330+610 | 50 | 59.90 | 33.50 | 26.40 |
| 110 | 330+610 | 330+660 | 50 | 59.90 | 33.40 | 26.50 |
| 111 | 330+660 | 330+710 | 50 | 59.90 | 33.30 | 26.60 |
| 112 | 330+710 | 330+760 | 50 | 59.90 | 33.10 | 26.80 |
| 113 | 330+760 | 330+810 | 50 | 59.90 | 33.20 | 26.70 |
| 114 | 330+810 | 330+860 | 50 | 59.90 | 33.40 | 26.50 |
| 115 | 330+860 | 330+910 | 50 | 59.90 | 33.20 | 26.70 |
| 116 | 330+910 | 330+960 | 50 | 59.90 | 32.60 | 27.30 |
| 117 | 330+960 | 331+010 | 50 | 59.90 | 31.50 | 28.40 |
| 118 | 331+010 | 331+060 | 50 | 59.90 | 30.50 | 29.40 |
| 119 | 331+060 | 331+110 | 50 | 59.90 | 30.00 | 29.90 |
| 120 | 331+110 | 331+160 | 50 | 59.90 | 30.00 | 29.90 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 121 | 331+160 | 331+210 | 50 | 59.90 | 30.20 | 29.70 |
| 122 | 331+210 | 331+260 | 50 | 59.90 | 30.60 | 29.30 |
| 123 | 331+260 | 331+310 | 50 | 59.90 | 30.50 | 29.40 |
| 124 | 331+310 | 331+360 | 50 | 59.90 | 30.20 | 29.70 |
| 125 | 331+360 | 331+410 | 50 | 59.90 | 30.10 | 29.80 |
| 126 | 331+410 | 331+460 | 50 | 59.90 | 30.30 | 29.60 |
| 127 | 331+460 | 331+510 | 50 | 59.90 | 30.20 | 29.70 |
| 128 | 331+510 | 331+560 | 50 | 59.90 | 30.00 | 29.90 |
| 129 | 331+560 | 331+610 | 50 | 59.90 | 30.30 | 29.60 |
| 130 | 331+610 | 331+660 | 50 | 59.90 | 30.40 | 29.50 |
| 131 | 331+660 | 331+710 | 50 | 59.90 | 30.60 | 29.30 |
| 132 | 331+710 | 331+760 | 50 | 59.90 | 30.70 | 29.20 |
| 133 | 331+760 | 331+810 | 50 | 59.90 | 30.50 | 29.40 |
| 134 | 331+810 | 331+860 | 50 | 59.90 | 29.90 | 30.00 |
| 135 | 331+860 | 331+910 | 50 | 60.00 | 28.80 | 31.20 |
| 136 | 331+910 | 331+960 | 50 | 59.90 | 27.10 | 32.80 |
| 137 | 331+960 | 332+010 | 50 | 59.90 | 27.60 | 32.30 |
| 138 | 332+010 | 332+060 | 50 | 60.20 | 27.70 | 32.50 |
| 139 | 332+060 | 332+110 | 50 | 59.90 | 25.60 | 34.30 |
| 140 | 332+110 | 332+160 | 50 | 60.20 | 26.60 | 33.60 |
| 141 | 332+160 | 332+210 | 50 | 60.70 | 30.40 | 30.30 |
| 142 | 332+210 | 332+260 | 50 | 60.10 | 33.10 | 27.00 |
| 143 | 332+260 | 332+310 | 50 | 60.40 | 29.80 | 30.60 |
| 144 | 332+310 | 332+360 | 50 | 59.90 | 25.60 | 34.30 |
| 145 | 332+360 | 332+410 | 50 | 59.90 | 25.70 | 34.20 |
| 146 | 332+410 | 332+460 | 50 | 60.00 | 26.90 | 33.10 |
| 147 | 332+460 | 332+510 | 50 | 59.90 | 28.10 | 31.80 |
| 148 | 332+510 | 332+560 | 50 | 59.90 | 27.50 | 32.40 |
| 149 | 332+560 | 332+610 | 50 | 60.10 | 26.00 | 34.10 |
| 150 | 332+610 | 332+660 | 50 | 60.00 | 29.70 | 30.30 |
| 151 | 332+660 | 332+710 | 50 | 60.00 | 30.60 | 29.40 |
| 152 | 332+710 | 332+760 | 50 | 59.90 | 30.10 | 29.80 |
| 153 | 332+760 | 332+810 | 50 | 59.80 | 28.70 | 31.10 |
| 154 | 332+810 | 332+860 | 50 | 59.50 | 26.00 | 33.50 |
| 155 | 332+860 | 332+910 | 50 | 59.75 | 25.85 | 33.90 |
| 156 | 332+910 | 332+960 | 50 | 59.70 | 26.50 | 33.20 |
| 157 | 332+960 | 333+010 | 50 | 60.00 | 31.40 | 28.60 |
| 158 | 333+010 | 333+060 | 50 | 59.90 | 32.30 | 27.60 |
| 159 | 333+060 | 333+110 | 50 | 59.90 | 32.60 | 27.30 |
| 160 | 333+110 | 333+160 | 50 | 60.00 | 31.30 | 28.70 |
| 161 | 333+160 | 333+210 | 50 | 60.00 | 29.20 | 30.80 |
| 162 | 333+210 | 333+260 | 50 | 59.90 | 27.10 | 32.80 |
| 163 | 333+260 | 333+310 | 50 | 59.90 | 27.00 | 32.90 |
| 164 | 333+310 | 333+360 | 50 | 59.90 | 27.10 | 32.80 |
| 165 | 333+360 | 333+410 | 50 | 59.90 | 27.20 | 32.70 |
| 166 | 333+410 | 333+460 | 50 | 59.90 | 27.50 | 32.40 |
| 167 | 333+460 | 333+510 | 50 | 59.90 | 27.80 | 32.10 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 168 | 333+510 | 333+560 | 50 | 59.90 | 26.70 | 33.20 |
| 169 | 333+560 | 333+610 | 50 | 60.10 | 26.80 | 33.30 |
| 170 | 333+610 | 333+660 | 50 | 59.90 | 29.60 | 30.30 |
| 171 | 333+660 | 333+710 | 50 | 60.00 | 31.60 | 28.40 |
| 172 | 333+710 | 333+760 | 50 | 59.90 | 34.00 | 25.90 |
| 173 | 333+760 | 333+810 | 50 | 59.90 | 35.90 | 24.00 |
| 174 | 333+810 | 333+860 | 50 | 60.00 | 35.60 | 24.40 |
| 175 | 333+860 | 333+910 | 50 | 60.00 | 32.80 | 27.20 |
| 176 | 333+910 | 333+960 | 50 | 60.00 | 31.30 | 28.70 |
| 177 | 333+960 | 334+010 | 50 | 59.90 | 30.10 | 29.80 |
| 178 | 334+010 | 334+060 | 50 | 59.90 | 29.30 | 30.60 |
| 179 | 334+060 | 334+110 | 50 | 59.90 | 28.90 | 31.00 |
| 180 | 334+110 | 334+160 | 50 | 60.00 | 29.50 | 30.50 |
| 181 | 334+160 | 334+210 | 50 | 59.90 | 29.90 | 30.00 |
| 182 | 334+210 | 334+260 | 50 | 59.90 | 29.40 | 30.50 |
| 183 | 334+260 | 334+310 | 50 | 59.90 | 29.60 | 30.30 |
| 184 | 334+310 | 334+360 | 50 | 59.90 | 30.60 | 29.30 |
| 185 | 334+360 | 334+410 | 50 | 59.90 | 32.90 | 27.00 |
| 186 | 334+410 | 334+460 | 50 | 59.90 | 32.90 | 27.00 |
| 187 | 334+460 | 334+510 | 50 | 59.90 | 32.60 | 27.30 |
| 188 | 334+510 | 334+560 | 50 | 59.90 | 31.80 | 28.10 |
| 189 | 334+560 | 334+610 | 50 | 60.00 | 30.30 | 29.70 |
| 190 | 334+610 | 334+660 | 50 | 59.90 | 27.90 | 32.00 |
| 191 | 334+660 | 334+710 | 50 | 59.90 | 28.00 | 31.90 |
| 192 | 334+710 | 334+760 | 50 | 59.90 | 28.90 | 31.00 |
| 193 | 334+760 | 334+810 | 50 | 59.90 | 29.60 | 30.30 |
| 194 | 334+810 | 334+860 | 50 | 59.90 | 29.90 | 30.00 |
| 195 | 334+860 | 334+910 | 50 | 59.90 | 29.90 | 30.00 |
| 196 | 334+910 | 334+960 | 50 | 59.90 | 29.50 | 30.40 |
| 197 | 334+960 | 335+010 | 50 | 59.90 | 29.10 | 30.80 |
| 198 | 335+010 | 335+060 | 50 | 59.90 | 28.50 | 31.40 |
| 199 | 335+060 | 335+110 | 50 | 59.90 | 30.10 | 29.80 |
| 200 | 335+110 | 335+160 | 50 | 59.80 | 31.00 | 28.80 |
| 201 | 335+160 | 335+210 | 50 | 59.90 | 31.20 | 28.70 |
| 202 | 335+210 | 335+260 | 50 | 60.00 | 30.30 | 29.70 |
| 203 | 335+260 | 335+310 | 50 | 59.90 | 29.80 | 30.10 |
| 204 | 335+310 | 335+360 | 50 | 59.90 | 30.00 | 29.90 |
| 205 | 335+360 | 335+410 | 50 | 59.90 | 30.30 | 29.60 |
| 206 | 335+410 | 335+460 | 50 | 59.90 | 30.50 | 29.40 |
| 207 | 335+460 | 335+510 | 50 | 59.90 | 30.80 | 29.10 |
| 208 | 335+510 | 335+560 | 50 | 59.90 | 31.00 | 28.90 |
| 209 | 335+560 | 335+610 | 50 | 59.90 | 31.20 | 28.70 |
| 210 | 335+610 | 335+660 | 50 | 59.90 | 31.50 | 28.40 |
| 211 | 335+660 | 335+710 | 50 | 59.90 | 31.70 | 28.20 |
| 212 | 335+710 | 335+760 | 50 | 59.90 | 32.00 | 27.90 |
| 213 | 335+760 | 335+810 | 50 | 59.90 | 32.20 | 27.70 |
| 214 | 335+810 | 335+860 | 50 | 60.00 | 32.50 | 27.50 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 215 | 335+860 | 335+910 | 50 | 59.90 | 32.70 | 27.20 |
| 216 | 335+910 | 335+960 | 50 | 59.90 | 32.90 | 27.00 |
| 217 | 335+960 | 336+010 | 50 | 59.90 | 33.20 | 26.70 |
| 218 | 336+010 | 336+060 | 50 | 59.90 | 33.20 | 26.70 |
| 219 | 336+060 | 336+110 | 50 | 60.10 | 30.90 | 29.20 |
| 220 | 336+110 | 336+160 | 50 | 60.00 | 26.50 | 33.50 |
| 221 | 336+160 | 336+210 | 50 | 60.00 | 25.20 | 34.80 |
| 222 | 336+210 | 336+260 | 50 | 60.00 | 25.60 | 34.40 |
| 223 | 336+260 | 336+310 | 50 | 60.00 | 28.60 | 31.40 |
| 224 | 336+310 | 336+360 | 50 | 59.90 | 28.50 | 31.40 |
| 225 | 336+360 | 336+410 | 50 | 59.90 | 28.70 | 31.20 |
| 226 | 336+410 | 336+460 | 50 | 60.00 | 31.80 | 28.20 |
| 227 | 336+460 | 336+510 | 50 | 60.00 | 34.50 | 25.50 |
| 228 | 336+510 | 336+560 | 50 | 59.90 | 33.50 | 26.40 |
| 229 | 336+560 | 336+610 | 50 | 59.90 | 32.90 | 27.00 |
| 230 | 336+610 | 336+660 | 50 | 60.00 | 30.20 | 29.80 |
| 231 | 336+660 | 336+710 | 50 | 59.90 | 28.60 | 31.30 |
| 232 | 336+710 | 336+760 | 50 | 59.90 | 28.90 | 31.00 |
| 233 | 336+760 | 336+810 | 50 | 59.90 | 29.70 | 30.20 |
| 234 | 336+810 | 336+860 | 50 | 59.90 | 30.00 | 29.90 |
| 235 | 336+860 | 336+910 | 50 | 59.90 | 30.10 | 29.80 |
| 236 | 336+910 | 336+960 | 50 | 59.90 | 30.10 | 29.80 |
| 237 | 336+960 | 337+010 | 50 | 59.90 | 30.10 | 29.80 |
| 238 | 337+010 | 337+060 | 50 | 59.90 | 30.40 | 29.50 |
| 239 | 337+060 | 337+110 | 50 | 59.90 | 31.00 | 28.90 |
| 240 | 337+110 | 337+160 | 50 | 59.90 | 30.80 | 29.10 |
| 241 | 337+160 | 337+210 | 50 | 59.90 | 30.10 | 29.80 |
| 242 | 337+210 | 337+260 | 50 | 59.90 | 29.40 | 30.50 |
| 243 | 337+260 | 337+310 | 50 | 59.90 | 28.70 | 31.20 |
| 244 | 337+310 | 337+360 | 50 | 59.90 | 28.50 | 31.40 |
| 245 | 337+360 | 337+410 | 50 | 59.90 | 30.30 | 29.60 |
| 246 | 337+410 | 337+460 | 50 | 59.90 | 31.80 | 28.10 |
| 247 | 337+460 | 337+510 | 50 | 59.90 | 31.60 | 28.30 |
| 248 | 337+510 | 337+560 | 50 | 59.90 | 31.30 | 28.60 |
| 249 | 337+560 | 337+610 | 50 | 59.90 | 30.90 | 29.00 |
| 250 | 337+610 | 337+660 | 50 | 59.90 | 30.50 | 29.40 |
| 251 | 337+660 | 337+710 | 50 | 59.90 | 30.50 | 29.40 |
| 252 | 337+710 | 337+760 | 50 | 59.90 | 30.40 | 29.50 |
| 253 | 337+760 | 337+810 | 50 | 59.90 | 30.30 | 29.60 |
| 254 | 337+810 | 337+860 | 50 | 59.90 | 30.60 | 29.30 |
| 255 | 337+860 | 337+910 | 50 | 59.90 | 30.00 | 29.90 |
| 256 | 337+910 | 337+960 | 50 | 59.90 | 30.00 | 29.90 |
| 257 | 337+960 | 338+010 | 50 | 59.90 | 30.20 | 29.70 |
| 258 | 338+010 | 338+060 | 50 | 59.90 | 29.70 | 30.20 |
| 259 | 338+060 | 338+110 | 50 | 59.90 | 30.20 | 29.70 |
| 260 | 338+110 | 338+160 | 50 | 59.90 | 29.80 | 30.10 |
| 261 | 338+160 | 338+210 | 50 | 59.90 | 29.30 | 30.60 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 262 | 338+210 | 338+260 | 50 | 60.00 | 28.80 | 31.20 |
| 263 | 338+260 | 338+310 | 50 | 59.90 | 28.30 | 31.60 |
| 264 | 338+310 | 338+360 | 50 | 59.90 | 29.30 | 30.60 |
| 265 | 338+360 | 338+410 | 50 | 59.90 | 29.30 | 30.60 |
| 266 | 338+410 | 338+460 | 50 | 59.90 | 29.60 | 30.30 |
| 267 | 338+460 | 338+510 | 50 | 60.00 | 29.10 | 30.90 |
| 268 | 338+510 | 338+560 | 50 | 59.90 | 29.90 | 30.00 |
| 269 | 338+560 | 338+610 | 50 | 59.90 | 29.20 | 30.70 |
| 270 | 338+610 | 338+660 | 50 | 59.90 | 30.00 | 29.90 |
| 271 | 338+660 | 338+710 | 50 | 59.90 | 29.80 | 30.10 |
| 272 | 338+710 | 338+760 | 50 | 59.90 | 30.10 | 29.80 |
| 273 | 338+760 | 338+810 | 50 | 59.90 | 30.00 | 29.90 |
| 274 | 338+810 | 338+860 | 50 | 59.90 | 29.80 | 30.10 |
| 275 | 338+860 | 338+910 | 50 | 59.90 | 29.40 | 30.50 |
| 276 | 338+910 | 338+960 | 50 | 59.90 | 29.20 | 30.70 |
| 277 | 338+960 | 339+010 | 50 | 59.90 | 29.50 | 30.40 |
| 278 | 339+010 | 339+060 | 50 | 59.90 | 29.90 | 30.00 |
| 279 | 339+060 | 339+110 | 50 | 59.90 | 30.30 | 29.60 |
| 280 | 339+110 | 339+160 | 50 | 59.90 | 30.70 | 29.20 |
| 281 | 339+160 | 339+210 | 50 | 59.90 | 31.00 | 28.90 |
| 282 | 339+210 | 339+260 | 50 | 60.43 | 31.18 | 29.25 |
| 283 | 339+260 | 339+310 | 50 | 56.33 | 29.40 | 26.93 |
| 284 | 339+310 | 339+360 | 50 | 55.15 | 29.50 | 25.65 |
| 285 | 339+360 | 339+410 | 50 | 54.35 | 28.72 | 25.63 |
| 286 | 339+410 | 339+460 | 50 | 54.57 | 27.75 | 26.82 |
| 287 | 339+460 | 339+510 | 50 | 54.33 | 29.50 | 24.83 |
| 288 | 339+510 | 339+560 | 50 | 54.12 | 29.90 | 24.22 |
| 289 | 339+560 | 339+610 | 50 | 52.95 | 29.05 | 23.90 |
| 290 | 339+610 | 339+660 | 50 | 53.99 | 29.95 | 24.04 |
| 291 | 339+660 | 339+710 | 50 | 51.97 | 27.57 | 24.40 |
| 292 | 339+710 | 339+760 | 50 | 52.02 | 27.22 | 24.80 |
| 293 | 339+760 | 339+810 | 50 | 52.22 | 26.40 | 25.82 |
| 294 | 339+810 | 339+860 | 50 | 53.21 | 25.55 | 27.66 |
| 295 | 339+860 | 339+910 | 50 | 53.51 | 24.70 | 28.81 |
| 296 | 339+910 | 339+960 | 50 | 52.70 | 23.70 | 29.00 |
| 297 | 339+960 | 340+010 | 50 | 60.00 | 25.20 | 34.80 |
| 298 | 340+010 | 340+060 | 50 | 59.90 | 26.60 | 33.30 |
| 299 | 340+060 | 340+110 | 50 | 59.90 | 27.60 | 32.30 |
| 300 | 340+110 | 340+160 | 50 | 59.90 | 28.40 | 31.50 |
| 301 | 340+160 | 340+210 | 50 | 59.90 | 28.40 | 31.50 |
| 302 | 340+210 | 340+260 | 50 | 59.90 | 28.70 | 31.20 |
| 303 | 340+260 | 340+310 | 50 | 59.90 | 29.50 | 30.40 |
| 304 | 340+310 | 340+360 | 50 | 60.10 | 29.80 | 30.30 |
| 305 | 340+360 | 340+410 | 50 | 59.90 | 32.30 | 27.60 |
| 306 | 340+410 | 340+460 | 50 | 60.00 | 32.90 | 27.10 |
| 307 | 340+460 | 340+510 | 50 | 59.90 | 33.90 | 26.00 |
| 308 | 340+510 | 340+560 | 50 | 59.90 | 33.20 | 26.70 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 309 | 340+560 | 340+610 | 50 | 59.90 | 32.10 | 27.80 |
| 310 | 340+610 | 340+660 | 50 | 59.90 | 31.40 | 28.50 |
| 311 | 340+660 | 340+710 | 50 | 60.00 | 31.80 | 28.20 |
| 312 | 340+710 | 340+760 | 50 | 60.00 | 31.40 | 28.60 |
| 313 | 340+760 | 340+810 | 50 | 59.90 | 29.70 | 30.20 |
| 314 | 340+810 | 340+860 | 50 | 59.90 | 30.20 | 29.70 |
| 315 | 340+860 | 340+910 | 50 | 59.90 | 30.70 | 29.20 |
| 316 | 340+910 | 340+960 | 50 | 59.90 | 31.00 | 28.90 |
| 317 | 340+960 | 341+010 | 50 | 59.90 | 31.10 | 28.80 |
| 318 | 341+010 | 341+060 | 50 | 59.90 | 31.10 | 28.80 |
| 319 | 341+060 | 341+110 | 50 | 59.90 | 31.00 | 28.90 |
| 320 | 341+110 | 341+160 | 50 | 59.90 | 30.80 | 29.10 |
| 321 | 341+160 | 341+210 | 50 | 59.90 | 30.50 | 29.40 |
| 322 | 341+210 | 341+310 | 100 | 59.90 | 30.30 | 29.60 |
| 323 | 341+310 | 341+360 | 50 | 59.90 | 30.20 | 29.70 |
| 324 | 341+360 | 341+410 | 50 | 59.90 | 30.00 | 29.90 |
| 325 | 341+410 | 341+460 | 50 | 59.90 | 29.80 | 30.10 |
| 326 | 341+460 | 341+510 | 50 | 59.90 | 29.90 | 30.00 |
| 327 | 341+510 | 341+560 | 50 | 59.90 | 29.90 | 30.00 |
| 328 | 341+560 | 341+610 | 50 | 59.90 | 29.90 | 30.00 |
| 329 | 341+610 | 341+660 | 50 | 59.90 | 29.80 | 30.10 |
| 330 | 341+660 | 341+710 | 50 | 59.90 | 29.80 | 30.10 |
| 331 | 341+710 | 341+760 | 50 | 59.90 | 29.80 | 30.10 |
| 332 | 341+760 | 341+810 | 50 | 59.90 | 29.80 | 30.10 |
| 333 | 341+810 | 341+860 | 50 | 59.90 | 29.70 | 30.20 |
| 334 | 341+860 | 341+910 | 50 | 59.90 | 29.80 | 30.10 |
| 335 | 341+910 | 341+960 | 50 | 60.00 | 29.70 | 30.30 |
| 336 | 341+960 | 342+010 | 50 | 59.90 | 28.70 | 31.20 |
| 337 | 342+010 | 342+060 | 50 | 59.90 | 30.20 | 29.70 |
| 338 | 342+060 | 342+110 | 50 | 59.90 | 30.00 | 29.90 |
| 339 | 342+110 | 342+160 | 50 | 59.90 | 30.90 | 29.00 |
| 340 | 342+160 | 342+210 | 50 | 59.90 | 30.30 | 29.60 |
| 341 | 342+210 | 342+260 | 50 | 59.90 | 29.90 | 30.00 |
| 342 | 342+260 | 342+310 | 50 | 59.90 | 29.90 | 30.00 |
| 343 | 342+310 | 342+360 | 50 | 59.90 | 29.90 | 30.00 |
| 344 | 342+360 | 342+410 | 50 | 59.90 | 29.80 | 30.10 |
| 345 | 342+410 | 342+460 | 50 | 59.90 | 30.80 | 29.10 |
| 346 | 342+460 | 342+510 | 50 | 59.90 | 30.00 | 29.90 |
| 347 | 342+510 | 342+560 | 50 | 59.90 | 30.00 | 29.90 |
| 348 | 342+560 | 342+610 | 50 | 59.90 | 30.90 | 29.00 |
| 349 | 342+610 | 342+660 | 50 | 60.00 | 30.70 | 29.30 |
| 350 | 342+660 | 342+710 | 50 | 60.00 | 29.10 | 30.90 |
| 351 | 342+710 | 342+760 | 50 | 60.00 | 29.70 | 30.30 |
| 352 | 342+760 | 342+810 | 50 | 51.50 | 28.50 | 23.00 |
| 353 | 342+810 | 342+860 | 50 | 59.90 | 29.70 | 30.20 |
| 354 | 342+860 | 342+910 | 50 | 59.90 | 30.50 | 29.40 |
| 355 | 342+910 | 342+960 | 50 | 60.20 | 31.40 | 28.80 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 356 | 342+960 | 343+010 | 50 | 59.90 | 33.90 | 26.00 |
| 357 | 343+010 | 343+060 | 50 | 59.90 | 32.50 | 27.40 |
| 358 | 343+060 | 343+110 | 50 | 59.90 | 33.20 | 26.70 |
| 359 | 343+110 | 343+160 | 50 | 59.90 | 32.10 | 27.80 |
| 360 | 343+160 | 343+210 | 50 | 59.90 | 32.20 | 27.70 |
| 361 | 343+210 | 343+260 | 50 | 59.90 | 32.00 | 27.90 |
| 362 | 343+260 | 343+310 | 50 | 59.90 | 31.00 | 28.90 |
| 363 | 343+310 | 343+360 | 50 | 59.90 | 30.40 | 29.50 |
| 364 | 343+360 | 343+410 | 50 | 59.90 | 30.50 | 29.40 |
| 365 | 343+410 | 343+460 | 50 | 59.90 | 30.50 | 29.40 |
| 366 | 343+460 | 343+510 | 50 | 59.90 | 30.50 | 29.40 |
| 367 | 343+510 | 343+560 | 50 | 59.90 | 30.50 | 29.40 |
| 368 | 343+560 | 343+610 | 50 | 59.90 | 30.50 | 29.40 |
| 369 | 343+610 | 343+660 | 50 | 59.90 | 30.60 | 29.30 |
| 370 | 343+660 | 343+710 | 50 | 59.90 | 30.60 | 29.30 |
| 371 | 343+710 | 343+760 | 50 | 59.90 | 30.40 | 29.50 |
| 372 | 343+760 | 343+810 | 50 | 59.90 | 29.60 | 30.30 |
| 373 | 343+810 | 343+860 | 50 | 59.90 | 28.60 | 31.30 |
| 374 | 343+860 | 343+910 | 50 | 59.90 | 27.20 | 32.70 |
| 375 | 343+910 | 343+960 | 50 | 60.00 | 26.90 | 33.10 |
| 376 | 343+960 | 344+010 | 50 | 60.00 | 28.60 | 31.40 |
| 377 | 344+010 | 344+060 | 50 | 59.90 | 30.90 | 29.00 |
| 378 | 344+060 | 344+110 | 50 | 59.90 | 30.20 | 29.70 |
| 379 | 344+110 | 344+160 | 50 | 59.90 | 29.80 | 30.10 |
| 380 | 344+160 | 344+210 | 50 | 59.90 | 29.70 | 30.20 |
| 381 | 344+210 | 344+260 | 50 | 59.90 | 29.70 | 30.20 |
| 382 | 344+260 | 344+310 | 50 | 59.90 | 29.60 | 30.30 |
| 383 | 344+310 | 344+360 | 50 | 59.90 | 30.00 | 29.90 |
| 384 | 344+360 | 344+410 | 50 | 59.90 | 29.00 | 30.90 |
| 385 | 344+410 | 344+460 | 50 | 59.90 | 29.70 | 30.20 |
| 386 | 344+460 | 344+510 | 50 | 60.00 | 32.20 | 27.80 |
| 387 | 344+510 | 344+560 | 50 | 59.90 | 34.30 | 25.60 |
| 388 | 344+560 | 344+610 | 50 | 59.90 | 34.00 | 25.90 |
| 389 | 344+610 | 344+660 | 50 | 59.90 | 34.60 | 25.30 |
| 390 | 344+660 | 344+710 | 50 | 59.90 | 34.80 | 25.10 |
| 391 | 344+710 | 344+760 | 50 | 59.90 | 34.80 | 25.10 |
| 392 | 344+760 | 344+810 | 50 | 59.90 | 34.30 | 25.60 |
| 393 | 344+810 | 344+860 | 50 | 59.90 | 34.30 | 25.60 |
| 394 | 344+860 | 344+910 | 50 | 59.90 | 34.00 | 25.90 |
| 395 | 344+910 | 344+960 | 50 | 59.90 | 34.00 | 25.90 |
| 396 | 344+960 | 345+010 | 50 | 59.90 | 34.10 | 25.80 |
| 397 | 345+010 | 345+060 | 50 | 59.80 | 33.90 | 25.90 |
| 398 | 345+060 | 345+110 | 50 | 59.90 | 34.30 | 25.60 |
| 399 | 345+110 | 345+160 | 50 | 59.90 | 33.80 | 26.10 |
| 400 | 345+160 | 345+210 | 50 | 59.90 | 33.20 | 26.70 |
| 401 | 345+210 | 345+260 | 50 | 59.90 | 32.90 | 27.00 |
| 402 | 345+260 | 345+310 | 50 | 59.90 | 32.80 | 27.10 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 403 | 345+310 | 345+360 | 50 | 59.90 | 31.90 | 28.00 |
| 404 | 345+360 | 345+410 | 50 | 60.00 | 31.50 | 28.50 |
| 405 | 345+410 | 345+460 | 50 | 59.90 | 30.50 | 29.40 |
| 406 | 345+460 | 345+510 | 50 | 59.90 | 30.90 | 29.00 |
| 407 | 345+510 | 345+560 | 50 | 59.90 | 30.30 | 29.60 |
| 408 | 345+560 | 345+610 | 50 | 59.90 | 30.50 | 29.40 |
| 409 | 345+610 | 345+660 | 50 | 58.90 | 29.70 | 29.20 |
| 410 | 345+660 | 345+710 | 50 | 55.60 | 29.70 | 25.90 |
| 411 | 345+710 | 345+760 | 50 | 54.70 | 29.70 | 25.00 |
| 412 | 345+760 | 345+810 | 50 | 57.60 | 28.80 | 28.80 |
| 413 | 345+810 | 345+860 | 50 | 59.60 | 30.00 | 29.60 |
| 414 | 345+860 | 345+910 | 50 | 59.70 | 29.60 | 30.10 |
| 415 | 345+910 | 345+960 | 50 | 59.20 | 29.70 | 29.50 |
| 416 | 345+960 | 346+010 | 50 | 57.30 | 29.20 | 28.10 |
| 417 | 346+010 | 346+060 | 50 | 56.40 | 28.80 | 27.60 |
| 418 | 346+060 | 346+110 | 50 | 58.50 | 28.70 | 29.80 |
| 419 | 346+110 | 346+160 | 50 | 59.70 | 27.50 | 32.20 |
| 420 | 346+160 | 346+210 | 50 | 58.50 | 24.00 | 34.50 |
| 421 | 346+210 | 346+260 | 50 | 57.50 | 23.70 | 33.80 |
| 422 | 346+260 | 346+310 | 50 | 56.70 | 26.50 | 30.20 |
| 423 | 346+310 | 346+360 | 50 | 55.10 | 29.50 | 25.60 |
| 424 | 346+360 | 346+410 | 50 | 53.10 | 30.40 | 22.70 |
| 425 | 346+410 | 346+460 | 50 | 51.90 | 31.30 | 20.60 |
| 426 | 346+460 | 346+510 | 50 | 51.90 | 31.70 | 20.20 |
| 427 | 346+510 | 346+560 | 50 | 52.00 | 31.00 | 21.00 |
| 428 | 346+560 | 346+610 | 50 | 52.00 | 31.50 | 20.50 |
| 429 | 346+610 | 346+660 | 50 | 51.60 | 30.70 | 20.90 |
| 430 | 346+660 | 346+710 | 50 | 50.60 | 30.40 | 20.20 |
| 431 | 346+710 | 346+760 | 50 | 51.70 | 30.20 | 21.50 |
| 432 | 346+760 | 346+810 | 50 | 56.70 | 30.40 | 26.30 |
| 433 | 346+810 | 346+860 | 50 | 58.30 | 30.00 | 28.30 |
| 434 | 346+860 | 346+910 | 50 | 53.30 | 28.10 | 25.20 |
| 435 | 346+910 | 346+960 | 50 | 49.70 | 26.90 | 22.80 |
| 436 | 346+960 | 347+010 | 50 | 49.70 | 25.90 | 23.80 |
| 437 | 347+010 | 347+060 | 50 | 49.80 | 25.00 | 24.80 |
| 438 | 347+060 | 347+110 | 50 | 49.90 | 25.30 | 24.60 |
| 439 | 347+110 | 347+160 | 50 | 51.50 | 24.90 | 26.60 |
| 440 | 347+160 | 347+210 | 50 | 56.60 | 24.90 | 31.70 |
| 441 | 347+210 | 347+260 | 50 | 59.90 | 24.80 | 35.10 |
| 442 | 347+260 | 347+310 | 50 | 59.80 | 24.70 | 35.10 |
| 443 | 347+310 | 347+360 | 50 | 59.80 | 25.20 | 34.60 |
| 444 | 347+360 | 347+410 | 50 | 59.80 | 26.00 | 33.80 |
| 445 | 347+410 | 347+460 | 50 | 59.80 | 26.10 | 33.70 |
| 446 | 347+460 | 347+510 | 50 | 59.80 | 25.90 | 33.90 |
| 447 | 347+510 | 347+560 | 50 | 59.80 | 25.80 | 34.00 |
| 448 | 347+560 | 347+610 | 50 | 59.80 | 27.80 | 32.00 |
| 449 | 347+610 | 347+660 | 50 | 59.90 | 29.70 | 30.20 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 450 | 347+660 | 347+710 | 50 | 59.90 | 31.60 | 28.30 |
| 451 | 347+710 | 347+760 | 50 | 59.80 | 32.80 | 27.00 |
| 452 | 347+760 | 347+810 | 50 | 59.90 | 32.30 | 27.60 |
| 453 | 347+810 | 347+860 | 50 | 60.20 | 30.70 | 29.50 |
| 454 | 347+860 | 347+910 | 50 | 61.20 | 30.60 | 30.60 |
| 455 | 347+910 | 347+960 | 50 | 62.30 | 29.80 | 32.50 |
| 456 | 347+960 | 348+010 | 50 | 63.00 | 29.40 | 33.60 |
| 457 | 348+010 | 348+060 | 50 | 63.20 | 29.40 | 33.80 |
| 458 | 348+060 | 348+110 | 50 | 61.20 | 27.00 | 34.20 |
| 459 | 348+110 | 348+160 | 50 | 60.00 | 27.00 | 33.00 |
| 460 | 348+160 | 348+210 | 50 | 62.40 | 26.90 | 35.50 |
| 461 | 348+210 | 348+260 | 50 | 64.30 | 28.40 | 35.90 |
| 462 | 348+260 | 348+310 | 50 | 65.30 | 28.00 | 37.30 |
| 463 | 348+310 | 348+360 | 50 | 66.40 | 28.90 | 37.50 |
| 464 | 348+360 | 348+410 | 50 | 67.30 | 30.70 | 36.60 |
| 465 | 348+410 | 348+460 | 50 | 66.30 | 31.80 | 34.50 |
| 466 | 348+460 | 348+510 | 50 | 62.40 | 31.90 | 30.50 |
| 467 | 348+510 | 348+560 | 50 | 59.80 | 32.30 | 27.50 |
| 468 | 348+560 | 348+610 | 50 | 59.70 | 31.60 | 28.10 |
| 469 | 348+610 | 348+660 | 50 | 58.60 | 30.60 | 28.00 |
| 470 | 348+660 | 348+710 | 50 | 54.60 | 32.00 | 22.60 |
| 471 | 348+710 | 348+760 | 50 | 52.50 | 30.70 | 21.80 |
| 472 | 348+760 | 348+810 | 50 | 53.30 | 30.40 | 22.90 |
| 473 | 348+810 | 348+860 | 50 | 54.60 | 29.60 | 25.00 |
| 474 | 348+860 | 348+910 | 50 | 56.20 | 28.40 | 27.80 |
| 475 | 348+910 | 348+960 | 50 | 59.30 | 28.00 | 31.30 |
| 476 | 348+960 | 349+010 | 50 | 64.60 | 29.00 | 35.60 |
| 477 | 349+010 | 349+060 | 50 | 66.70 | 29.50 | 37.20 |
| 478 | 349+060 | 349+110 | 50 | 63.70 | 29.30 | 34.40 |
| 479 | 349+110 | 349+160 | 50 | 61.70 | 29.60 | 32.10 |
| 480 | 349+160 | 349+210 | 50 | 60.80 | 29.60 | 31.20 |
| 481 | 349+210 | 349+260 | 50 | 60.40 | 30.30 | 30.10 |
| 482 | 349+260 | 349+310 | 50 | 60.40 | 30.60 | 29.80 |
| 483 | 349+310 | 349+360 | 50 | 60.30 | 30.50 | 29.80 |
| 484 | 349+360 | 349+410 | 50 | 60.00 | 30.40 | 29.60 |
| 485 | 349+410 | 349+460 | 50 | 60.00 | 30.20 | 29.80 |
| 486 | 349+460 | 349+510 | 50 | 59.90 | 30.40 | 29.50 |
| 487 | 349+510 | 349+560 | 50 | 60.00 | 30.30 | 29.70 |
| 488 | 349+560 | 349+610 | 50 | 60.00 | 30.40 | 29.60 |
| 489 | 349+610 | 349+660 | 50 | 61.50 | 29.80 | 31.70 |
| 490 | 349+660 | 349+710 | 50 | 65.40 | 29.40 | 36.00 |
| 491 | 349+710 | 349+760 | 50 | 67.20 | 28.70 | 38.50 |
| 492 | 349+760 | 349+810 | 50 | 65.00 | 28.50 | 36.50 |
| 493 | 349+810 | 349+860 | 50 | 65.30 | 29.40 | 35.90 |
| 494 | 349+860 | 349+910 | 50 | 69.30 | 30.90 | 38.40 |
| 495 | 349+910 | 349+960 | 50 | 71.70 | 32.60 | 39.10 |
| 496 | 349+960 | 350+010 | 50 | 74.20 | 31.30 | 42.90 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 497 | 350+010 | 350+060 | 50 | 77.40 | 32.50 | 44.90 |
| 498 | 350+060 | 350+110 | 50 | 81.70 | 34.10 | 47.60 |
| 499 | 350+110 | 350+160 | 50 | 80.80 | 35.70 | 45.10 |
| 500 | 350+160 | 350+210 | 50 | 75.00 | 37.50 | 37.50 |
| 501 | 350+210 | 350+260 | 50 | 71.00 | 37.40 | 33.60 |
| 502 | 350+260 | 350+310 | 50 | 68.90 | 35.10 | 33.80 |
| 503 | 350+310 | 350+360 | 50 | 66.10 | 33.80 | 32.30 |
| 504 | 350+360 | 350+410 | 50 | 62.20 | 33.60 | 28.60 |
| 505 | 350+410 | 350+460 | 50 | 58.20 | 32.70 | 25.50 |
| 506 | 350+460 | 350+510 | 50 | 54.40 | 30.20 | 24.20 |
| 507 | 350+510 | 350+560 | 50 | 51.90 | 26.90 | 25.00 |
| 508 | 350+560 | 350+610 | 50 | 51.90 | 25.50 | 26.40 |
| 509 | 350+610 | 350+660 | 50 | 52.40 | 23.80 | 28.60 |
| 510 | 350+660 | 350+710 | 50 | 54.00 | 23.80 | 30.20 |
| 511 | 350+710 | 350+760 | 50 | 55.00 | 24.00 | 31.00 |
| 512 | 350+760 | 350+810 | 50 | 54.90 | 24.50 | 30.40 |
| 513 | 350+810 | 350+860 | 50 | 54.30 | 25.30 | 29.00 |
| 514 | 350+860 | 350+910 | 50 | 52.70 | 26.10 | 26.60 |
| 515 | 350+910 | 350+960 | 50 | 52.30 | 26.90 | 25.40 |
| 516 | 350+960 | 351+010 | 50 | 53.30 | 27.40 | 25.90 |
| 517 | 351+010 | 351+060 | 50 | 55.20 | 28.10 | 27.10 |
| 518 | 351+060 | 351+110 | 50 | 58.20 | 28.60 | 29.60 |
| 519 | 351+110 | 351+160 | 50 | 59.90 | 29.10 | 30.80 |
| 520 | 351+160 | 351+210 | 50 | 60.00 | 29.40 | 30.60 |
| 521 | 351+210 | 351+260 | 50 | 59.90 | 29.60 | 30.30 |
| 522 | 351+260 | 351+310 | 50 | 59.80 | 30.10 | 29.70 |
| 523 | 351+310 | 351+360 | 50 | 59.90 | 30.30 | 29.60 |
| 524 | 351+360 | 351+410 | 50 | 59.80 | 30.10 | 29.70 |
| 525 | 351+410 | 351+460 | 50 | 59.80 | 29.90 | 29.90 |
| 526 | 351+460 | 351+510 | 50 | 59.70 | 29.90 | 29.80 |
| 527 | 351+510 | 351+560 | 50 | 59.80 | 30.40 | 29.40 |
| 528 | 351+560 | 351+610 | 50 | 60.00 | 31.95 | 28.05 |
| 529 | 351+610 | 351+660 | 50 | 68.08 | 34.57 | 33.51 |
| 530 | 351+660 | 351+710 | 50 | 60.15 | 38.14 | 22.01 |
| 531 | 351+710 | 351+760 | 50 | 60.09 | 41.27 | 18.82 |
| 532 | 351+760 | 351+810 | 50 | 60.00 | 43.53 | 16.47 |
| 533 | 351+810 | 351+860 | 50 | 79.80 | 47.84 | 31.96 |
| 534 | 351+860 | 351+910 | 50 | 96.43 | 52.93 | 43.50 |
| 535 | 351+910 | 351+960 | 50 | 89.99 | 60.82 | 29.17 |
| 536 | 351+960 | 352+010 | 50 | 96.34 | 61.18 | 35.16 |
| 537 | 352+010 | 352+060 | 50 | 89.97 | 61.48 | 28.49 |
| 538 | 352+060 | 352+110 | 50 | 90.00 | 61.85 | 28.15 |
| 539 | 352+110 | 352+160 | 50 | 103.43 | 62.22 | 41.21 |
| 540 | 352+160 | 352+210 | 50 | 89.98 | 62.53 | 27.45 |
| 541 | 352+210 | 352+260 | 50 | 90.01 | 62.57 | 27.44 |
| 542 | 352+260 | 352+310 | 50 | 90.01 | 62.16 | 27.85 |
| 543 | 352+310 | 352+360 | 50 | 90.01 | 61.22 | 28.79 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 544 | 352+360 | 352+410 | 50 | 83.93 | 62.42 | 21.51 |
| 545 | 352+410 | 352+460 | 50 | 84.62 | 63.10 | 21.52 |
| 546 | 352+460 | 352+510 | 50 | 59.67 | 38.14 | 21.53 |
| 547 | 352+510 | 352+560 | 50 | 58.03 | 36.50 | 21.53 |
| 548 | 352+560 | 352+610 | 50 | 56.12 | 34.59 | 21.53 |
| 549 | 352+610 | 352+660 | 50 | 54.01 | 31.71 | 22.30 |
| 550 | 352+660 | 352+710 | 50 | 60.84 | 35.55 | 25.29 |
| 551 | 352+710 | 352+760 | 50 | 54.00 | 27.02 | 26.98 |
| 552 | 352+760 | 352+810 | 50 | 54.00 | 26.77 | 27.23 |
| 553 | 352+810 | 352+860 | 50 | 55.90 | 28.10 | 27.80 |
| 554 | 352+860 | 352+910 | 50 | 55.90 | 28.90 | 27.00 |
| 555 | 352+910 | 352+960 | 50 | 55.90 | 28.90 | 27.00 |
| 556 | 352+960 | 353+010 | 50 | 55.90 | 29.00 | 26.90 |
| 557 | 353+010 | 353+060 | 50 | 55.90 | 29.20 | 26.70 |
| 558 | 353+060 | 353+110 | 50 | 55.90 | 29.30 | 26.60 |
| 559 | 353+110 | 353+160 | 50 | 55.90 | 29.50 | 26.40 |
| 560 | 353+160 | 353+210 | 50 | 55.80 | 29.40 | 26.40 |
| 561 | 353+210 | 353+260 | 50 | 55.80 | 29.30 | 26.50 |
| 562 | 353+260 | 353+310 | 50 | 55.90 | 29.00 | 26.90 |
| 563 | 353+310 | 353+360 | 50 | 55.90 | 28.80 | 27.10 |
| 564 | 353+360 | 353+410 | 50 | 55.90 | 28.80 | 27.10 |
| 565 | 353+410 | 353+460 | 50 | 55.90 | 28.90 | 27.00 |
| 566 | 353+460 | 353+510 | 50 | 55.80 | 29.20 | 26.60 |
| 567 | 353+510 | 353+560 | 50 | 55.90 | 29.00 | 26.90 |
| 568 | 353+560 | 353+610 | 50 | 55.90 | 28.90 | 27.00 |
| 569 | 353+610 | 353+660 | 50 | 57.50 | 28.10 | 29.40 |
| 570 | 353+660 | 353+710 | 50 | 61.40 | 26.10 | 35.30 |
| 571 | 353+710 | 353+760 | 50 | 68.00 | 24.70 | 43.30 |
| 572 | 353+760 | 353+810 | 50 | 78.40 | 24.40 | 54.00 |
| 573 | 353+810 | 353+860 | 50 | 87.80 | 24.60 | 63.20 |
| 574 | 353+860 | 353+910 | 50 | 96.50 | 27.00 | 69.50 |
| 575 | 353+910 | 353+960 | 50 | 99.80 | 30.90 | 68.90 |
| 576 | 353+960 | 354+010 | 50 | 94.50 | 35.80 | 58.70 |
| 577 | 354+010 | 354+060 | 50 | 91.50 | 39.80 | 51.70 |
| 578 | 354+060 | 354+110 | 50 | 97.10 | 39.70 | 57.40 |
| 579 | 354+110 | 354+160 | 50 | 99.90 | 39.80 | 60.10 |
| 580 | 354+160 | 354+210 | 50 | 99.80 | 39.80 | 60.00 |
| 581 | 354+210 | 354+260 | 50 | 97.90 | 41.00 | 56.90 |
| 582 | 354+260 | 354+310 | 50 | 93.70 | 43.50 | 50.20 |
| 583 | 354+310 | 354+360 | 50 | 84.20 | 41.80 | 42.40 |
| 584 | 354+360 | 354+410 | 50 | 68.20 | 34.60 | 33.60 |
| 585 | 354+410 | 354+460 | 50 | 60.80 | 31.80 | 29.00 |
| 586 | 354+460 | 354+510 | 50 | 63.10 | 32.30 | 30.80 |
| 587 | 354+510 | 354+560 | 50 | 65.50 | 33.30 | 32.20 |
| 588 | 354+560 | 354+610 | 50 | 66.80 | 35.40 | 31.40 |
| 589 | 354+610 | 354+660 | 50 | 66.00 | 36.20 | 29.80 |
| 590 | 354+660 | 354+710 | 50 | 62.10 | 36.40 | 25.70 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 591 | 354+710 | 354+760 | 50 | 59.90 | 34.10 | 25.80 |
| 592 | 354+760 | 354+810 | 50 | 59.80 | 31.60 | 28.20 |
| 593 | 354+810 | 354+860 | 50 | 59.80 | 29.70 | 30.10 |
| 594 | 354+860 | 354+910 | 50 | 59.50 | 29.70 | 29.80 |
| 595 | 354+910 | 354+960 | 50 | 59.30 | 29.70 | 29.60 |
| 596 | 354+960 | 355+010 | 50 | 59.30 | 29.90 | 29.40 |
| 597 | 355+010 | 355+060 | 50 | 58.70 | 29.60 | 29.10 |
| 598 | 355+060 | 355+110 | 50 | 56.90 | 28.60 | 28.30 |
| 599 | 355+110 | 355+160 | 50 | 55.90 | 28.40 | 27.50 |
| 600 | 355+160 | 355+210 | 50 | 55.90 | 29.30 | 26.60 |
| 601 | 355+210 | 355+260 | 50 | 55.80 | 29.80 | 26.00 |
| 602 | 355+260 | 355+310 | 50 | 55.70 | 29.80 | 25.90 |
| 603 | 355+310 | 355+360 | 50 | 55.60 | 29.80 | 25.80 |
| 604 | 355+360 | 355+410 | 50 | 55.60 | 29.80 | 25.80 |
| 605 | 355+410 | 355+460 | 50 | 59.50 | 29.90 | 29.60 |
| 606 | 355+460 | 355+510 | 50 | 69.30 | 29.90 | 39.40 |
| 607 | 355+510 | 355+560 | 50 | 76.00 | 31.10 | 44.90 |
| 608 | 355+560 | 355+610 | 50 | 76.00 | 34.10 | 41.90 |
| 609 | 355+610 | 355+660 | 50 | 75.80 | 35.90 | 39.90 |
| 610 | 355+660 | 355+710 | 50 | 75.90 | 36.00 | 39.90 |
| 611 | 355+710 | 355+760 | 50 | 75.80 | 36.00 | 39.80 |
| 612 | 355+760 | 355+810 | 50 | 75.90 | 36.00 | 39.90 |
| 613 | 355+810 | 355+860 | 50 | 75.90 | 35.90 | 40.00 |
| 614 | 355+860 | 355+910 | 50 | 75.80 | 35.80 | 40.00 |
| 615 | 355+910 | 355+960 | 50 | 75.80 | 35.80 | 40.00 |
| 616 | 355+960 | 356+010 | 50 | 75.80 | 36.00 | 39.80 |
| 617 | 356+010 | 356+060 | 50 | 75.90 | 36.20 | 39.70 |
| 618 | 356+060 | 356+110 | 50 | 75.80 | 36.20 | 39.60 |
| 619 | 356+110 | 356+160 | 50 | 75.80 | 36.20 | 39.60 |
| 620 | 356+160 | 356+210 | 50 | 75.90 | 36.30 | 39.60 |
| 621 | 356+210 | 356+260 | 50 | 72.10 | 34.90 | 37.20 |
| 622 | 356+260 | 356+310 | 50 | 62.30 | 32.20 | 30.10 |
| 623 | 356+310 | 356+360 | 50 | 56.40 | 30.50 | 25.90 |
| 624 | 356+360 | 356+410 | 50 | 58.50 | 30.00 | 28.50 |
| 625 | 356+410 | 356+460 | 50 | 59.90 | 30.40 | 29.50 |
| 626 | 356+460 | 356+510 | 50 | 59.80 | 30.50 | 29.30 |
| 627 | 356+510 | 356+560 | 50 | 59.90 | 30.40 | 29.50 |
| 628 | 356+560 | 356+610 | 50 | 59.80 | 30.50 | 29.30 |
| 629 | 356+610 | 356+660 | 50 | 59.90 | 30.30 | 29.60 |
| 630 | 356+660 | 356+710 | 50 | 59.90 | 30.50 | 29.40 |
| 631 | 356+710 | 356+760 | 50 | 59.90 | 30.20 | 29.70 |
| 632 | 356+760 | 356+810 | 50 | 59.90 | 30.30 | 29.60 |
| 633 | 356+810 | 356+860 | 50 | 59.90 | 29.70 | 30.20 |
| 634 | 356+860 | 356+910 | 50 | 59.80 | 28.90 | 30.90 |
| 635 | 356+910 | 356+960 | 50 | 59.80 | 28.80 | 31.00 |
| 636 | 356+960 | 357+010 | 50 | 59.90 | 28.90 | 31.00 |
| 637 | 357+010 | 357+060 | 50 | 59.60 | 29.40 | 30.20 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 638 | 357+060 | 357+110 | 50 | 59.70 | 29.50 | 30.20 |
| 639 | 357+110 | 357+160 | 50 | 59.70 | 29.80 | 29.90 |
| 640 | 357+160 | 357+210 | 50 | 59.80 | 29.60 | 30.20 |
| 641 | 357+210 | 357+260 | 50 | 59.80 | 30.30 | 29.50 |
| 642 | 357+260 | 357+310 | 50 | 59.80 | 30.30 | 29.50 |
| 643 | 357+310 | 357+360 | 50 | 58.90 | 30.20 | 28.70 |
| 644 | 357+360 | 357+410 | 50 | 57.00 | 30.20 | 26.80 |
| 645 | 357+410 | 357+460 | 50 | 56.60 | 30.30 | 26.30 |
| 646 | 357+460 | 357+510 | 50 | 58.50 | 30.30 | 28.20 |
| 647 | 357+510 | 357+560 | 50 | 59.00 | 30.30 | 28.70 |
| 648 | 357+560 | 357+610 | 50 | 56.90 | 30.40 | 26.50 |
| 649 | 357+610 | 357+660 | 50 | 56.50 | 30.40 | 26.10 |
| 650 | 357+660 | 357+710 | 50 | 59.20 | 30.80 | 28.40 |
| 651 | 357+710 | 357+760 | 50 | 63.10 | 31.90 | 31.20 |
| 652 | 357+760 | 357+810 | 50 | 68.60 | 34.70 | 33.90 |
| 653 | 357+810 | 357+860 | 50 | 71.90 | 36.30 | 35.60 |
| 654 | 357+860 | 357+910 | 50 | 71.90 | 36.20 | 35.70 |
| 655 | 357+910 | 357+960 | 50 | 72.70 | 36.10 | 36.60 |
| 656 | 357+960 | 358+010 | 50 | 74.70 | 36.10 | 38.60 |
| 657 | 358+010 | 358+060 | 50 | 75.90 | 36.10 | 39.80 |
| 658 | 358+060 | 358+110 | 50 | 75.90 | 36.10 | 39.80 |
| 659 | 358+110 | 358+160 | 50 | 80.10 | 37.90 | 42.20 |
| 660 | 358+160 | 358+210 | 50 | 90.20 | 42.10 | 48.10 |
| 661 | 358+210 | 358+260 | 50 | 92.40 | 43.30 | 49.10 |
| 662 | 358+260 | 358+310 | 50 | 84.50 | 40.60 | 43.90 |
| 663 | 358+310 | 358+360 | 50 | 79.80 | 38.40 | 41.40 |
| 664 | 358+360 | 358+410 | 50 | 79.80 | 36.80 | 43.00 |
| 665 | 358+410 | 358+460 | 50 | 79.90 | 36.80 | 43.10 |
| 666 | 358+460 | 358+510 | 50 | 79.70 | 38.70 | 41.00 |
| 667 | 358+510 | 358+560 | 50 | 80.50 | 41.70 | 38.80 |
| 668 | 358+560 | 358+610 | 50 | 82.60 | 43.20 | 39.40 |
| 669 | 358+610 | 358+660 | 50 | 81.50 | 41.90 | 39.60 |
| 670 | 358+660 | 358+710 | 50 | 78.00 | 40.20 | 37.80 |
| 671 | 358+710 | 358+760 | 50 | 75.10 | 37.50 | 37.60 |
| 672 | 358+760 | 358+810 | 50 | 75.60 | 37.90 | 37.70 |
| 673 | 358+810 | 358+860 | 50 | 75.20 | 35.90 | 39.30 |
| 674 | 358+860 | 358+910 | 50 | 73.30 | 35.90 | 37.40 |
| 675 | 358+910 | 358+960 | 50 | 73.20 | 36.00 | 37.20 |
| 676 | 358+960 | 359+010 | 50 | 77.30 | 38.00 | 39.30 |
| 677 | 359+010 | 359+060 | 50 | 75.50 | 37.90 | 37.60 |
| 678 | 359+060 | 359+110 | 50 | 65.60 | 32.30 | 33.30 |
| 679 | 359+110 | 359+160 | 50 | 59.60 | 29.20 | 30.40 |
| 680 | 359+160 | 359+210 | 50 | 59.60 | 27.10 | 32.50 |
| 681 | 359+210 | 359+260 | 50 | 60.30 | 27.80 | 32.50 |
| 682 | 359+260 | 359+310 | 50 | 61.60 | 28.60 | 33.00 |
| 683 | 359+310 | 359+360 | 50 | 62.70 | 29.40 | 33.30 |
| 684 | 359+360 | 359+410 | 50 | 63.50 | 30.20 | 33.30 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 685 | 359+410 | 359+460 | 50 | 63.10 | 30.60 | 32.50 |
| 686 | 359+460 | 359+510 | 50 | 61.00 | 30.60 | 30.40 |
| 687 | 359+510 | 359+560 | 50 | 59.90 | 30.60 | 29.30 |
| 688 | 359+560 | 359+610 | 50 | 59.80 | 30.60 | 29.20 |
| 689 | 359+610 | 359+660 | 50 | 59.90 | 30.70 | 29.20 |
| 690 | 359+660 | 359+710 | 50 | 59.80 | 30.80 | 29.00 |
| 691 | 359+710 | 359+760 | 50 | 59.90 | 30.90 | 29.00 |
| 692 | 359+760 | 359+810 | 50 | 59.90 | 30.60 | 29.30 |
| 693 | 359+810 | 359+860 | 50 | 59.80 | 29.90 | 29.90 |
| 694 | 359+860 | 359+910 | 50 | 59.80 | 28.90 | 30.90 |
| 695 | 359+910 | 359+960 | 50 | 59.00 | 28.30 | 30.70 |
| 696 | 359+960 | 360+010 | 50 | 57.10 | 28.30 | 28.80 |
| 697 | 360+010 | 360+060 | 50 | 55.90 | 28.20 | 27.70 |
| 698 | 360+060 | 360+110 | 50 | 55.90 | 28.00 | 27.90 |
| 699 | 360+110 | 360+160 | 50 | 57.00 | 29.00 | 28.00 |
| 700 | 360+160 | 360+210 | 50 | 59.50 | 32.10 | 27.40 |
| 701 | 360+210 | 360+260 | 50 | 60.30 | 32.50 | 27.80 |
| 702 | 360+260 | 360+310 | 50 | 59.90 | 30.00 | 29.90 |
| 703 | 360+310 | 360+360 | 50 | 63.30 | 30.00 | 33.30 |
| 704 | 360+360 | 360+410 | 50 | 71.50 | 32.10 | 39.40 |
| 705 | 360+410 | 360+460 | 50 | 72.70 | 31.90 | 40.80 |
| 706 | 360+460 | 360+510 | 50 | 65.80 | 29.20 | 36.60 |
| 707 | 360+510 | 360+560 | 50 | 61.40 | 27.10 | 34.30 |
| 708 | 360+560 | 360+610 | 50 | 60.40 | 27.10 | 33.30 |
| 709 | 360+610 | 360+660 | 50 | 59.80 | 27.80 | 32.00 |
| 710 | 360+660 | 360+710 | 50 | 59.90 | 29.20 | 30.70 |
| 711 | 360+710 | 360+760 | 50 | 59.70 | 29.90 | 29.80 |
| 712 | 360+760 | 360+810 | 50 | 59.40 | 29.80 | 29.60 |
| 713 | 360+810 | 360+860 | 50 | 59.40 | 30.00 | 29.40 |
| 714 | 360+860 | 360+910 | 50 | 59.70 | 30.20 | 29.50 |
| 715 | 360+910 | 360+960 | 50 | 59.90 | 30.00 | 29.90 |
| 716 | 360+960 | 361+000 | 40 | 59.80 | 29.80 | 30.00 |
| **Section-3 – 360+300 to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | |
| 717 | 360+300 | 362+300 | 2000 | 59.50 | 30.00 | 29.50 |
| 718 | 362+300 | 363+100 | 800 | 59.00 | 29.50 | 29.50 |
| 719 | 363+100 | 364+000 | 900 | 58.50 | 29.00 | 29.50 |
| 720 | 364+000 | 364+200 | 200 | 58.50 | 29.50 | 29.00 |
| 721 | 364+200 | 365+800 | 1600 | 59.00 | 29.50 | 29.50 |
| 722 | 365+800 | 365+900 | 100 | 60.00 | 30.50 | 29.50 |
| 723 | 365+900 | 366+000 | 100 | 59.00 | 30.50 | 28.50 |
| 724 | 366+000 | 366+100 | 100 | 59.50 | 31.00 | 28.50 |
| 725 | 366+100 | 366+200 | 100 | 59.00 | 31.00 | 28.00 |
| 726 | 366+200 | 366+300 | 100 | 57.00 | 31.00 | 26.00 |
| 727 | 366+300 | 366+400 | 100 | 59.35 | 32.85 | 26.50 |
| 728 | 366+400 | 366+900 | 500 | 58.00 | 31.00 | 27.00 |
| 729 | 366+900 | 367+500 | 600 | 59.60 | 31.30 | 28.30 |
| 730 | 367+500 | 368+000 | 500 | 60.00 | 30.00 | 30.00 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 731 | 368+000 | 368+100 | 100 | 59.30 | 31.00 | 28.30 |
| 732 | 368+100 | 368+200 | 100 | 59.30 | 31.00 | 28.30 |
| 733 | 368+200 | 368+300 | 100 | 62.75 | 36.00 | 26.75 |
| 734 | 368+300 | 368+400 | 100 | 62.75 | 36.00 | 26.75 |
| 735 | 368+400 | 368+500 | 100 | 64.15 | 37.40 | 26.75 |
| 736 | 368+500 | 368+600 | 100 | 60.15 | 33.40 | 26.75 |
| 737 | 368+600 | 368+700 | 100 | 60.15 | 33.40 | 26.75 |
| 738 | 368+700 | 368+800 | 100 | 57.75 | 31.00 | 26.75 |
| 739 | 368+800 | 368+900 | 100 | 57.75 | 31.00 | 26.75 |
| 740 | 368+900 | 369+000 | 100 | 58.00 | 35.00 | 23.00 |
| 741 | 369+000 | 369+100 | 100 | 57.00 | 33.00 | 24.00 |
| 742 | 369+100 | 369+200 | 100 | 60.00 | 30.00 | 30.00 |
| 743 | 369+200 | 369+300 | 100 | 63.00 | 29.00 | 34.00 |
| 744 | 369+300 | 369+400 | 100 | 60.00 | 29.00 | 31.00 |
| 745 | 369+400 | 369+500 | 100 | 60.50 | 29.50 | 31.00 |
| 746 | 369+500 | 369+600 | 100 | 60.50 | 26.50 | 34.00 |
| 747 | 369+600 | 369+700 | 100 | 60.00 | 30.50 | 29.50 |
| 748 | 369+700 | 369+800 | 100 | 56.50 | 26.50 | 30.00 |
| 749 | 369+800 | 369+900 | 100 | 61.00 | 30.00 | 31.00 |
| 750 | 369+900 | 370+000 | 100 | 60.00 | 26.00 | 34.00 |
| 751 | 370+000 | 370+100 | 100 | 60.00 | 25.00 | 35.00 |
| 752 | 370+100 | 370+200 | 100 | 61.00 | 26.50 | 34.50 |
| 753 | 370+200 | 370+300 | 100 | 60.60 | 25.00 | 35.60 |
| 754 | 370+300 | 370+400 | 100 | 61.20 | 25.60 | 35.60 |
| 755 | 370+400 | 370+500 | 100 | 60.50 | 26.50 | 34.00 |
| 756 | 370+500 | 370+600 | 100 | 60.50 | 26.50 | 34.00 |
| 757 | 370+600 | 370+700 | 100 | 60.00 | 26.00 | 34.00 |
| 758 | 370+700 | 370+800 | 100 | 61.50 | 26.50 | 35.00 |
| 759 | 370+800 | 370+900 | 100 | 68.00 | 33.00 | 35.00 |
| 760 | 370+900 | 371+000 | 100 | 65.50 | 30.50 | 35.00 |
| 761 | 371+000 | 371+100 | 100 | 65.50 | 30.50 | 35.00 |
| 762 | 371+100 | 371+200 | 100 | 58.50 | 30.00 | 28.50 |
| 763 | 371+200 | 371+300 | 100 | 58.50 | 30.00 | 28.50 |
| 764 | 371+300 | 371+400 | 100 | 58.50 | 30.00 | 28.50 |
| 765 | 371+400 | 371+500 | 100 | 58.50 | 30.00 | 28.50 |
| 766 | 371+500 | 371+600 | 100 | 58.50 | 30.00 | 28.50 |
| 767 | 371+600 | 371+700 | 100 | 56.00 | 27.50 | 28.50 |
| 768 | 371+700 | 371+800 | 100 | 58.50 | 30.00 | 28.50 |
| 769 | 371+800 | 371+900 | 100 | 58.50 | 30.00 | 28.50 |
| 770 | 371+900 | 372+000 | 100 | 51.50 | 24.50 | 27.00 |
| 771 | 372+000 | 372+100 | 100 | 49.00 | 24.00 | 25.00 |
| 772 | 372+100 | 372+200 | 100 | 52.00 | 25.00 | 27.00 |
| 773 | 372+200 | 372+300 | 100 | 52.00 | 25.00 | 27.00 |
| 774 | 372+300 | 372+400 | 100 | 52.00 | 25.00 | 27.00 |
| 775 | 372+400 | 372+500 | 100 | 53.00 | 26.00 | 27.00 |
| 776 | 372+500 | 372+600 | 100 | 60.00 | 25.00 | 35.00 |
| 777 | 372+600 | 372+700 | 100 | 60.00 | 25.00 | 35.00 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 778 | 372+700 | 372+800 | 100 | 59.00 | 24.00 | 35.00 |
| 779 | 372+800 | 372+900 | 100 | 62.00 | 24.00 | 38.00 |
| 780 | 372+900 | 373+000 | 100 | 63.00 | 25.00 | 38.00 |
| 781 | 373+000 | 373+100 | 100 | 62.00 | 24.00 | 38.00 |
| 782 | 373+100 | 373+200 | 100 | 63.00 | 25.00 | 38.00 |
| 783 | 373+200 | 373+300 | 100 | 62.00 | 24.00 | 38.00 |
| 784 | 373+300 | 373+400 | 100 | 68.00 | 26.00 | 42.00 |
| 785 | 373+400 | 373+500 | 100 | 69.00 | 27.00 | 42.00 |
| 786 | 373+500 | 373+600 | 100 | 68.00 | 27.00 | 41.00 |
| 787 | 373+600 | 373+700 | 100 | 71.00 | 34.00 | 37.00 |
| 788 | 373+700 | 373+800 | 100 | 70.00 | 30.00 | 40.00 |
| 789 | 373+800 | 373+900 | 100 | 70.00 | 36.00 | 34.00 |
| 790 | 373+900 | 374+000 | 100 | 64.00 | 28.00 | 36.00 |
| 791 | 374+000 | 374+100 | 100 | 63.00 | 27.00 | 36.00 |
| 792 | 374+100 | 374+200 | 100 | 60.00 | 27.00 | 33.00 |
| 793 | 374+200 | 374+300 | 100 | 52.00 | 25.00 | 27.00 |
| 794 | 374+300 | 374+400 | 100 | 52.00 | 24.00 | 28.00 |
| 795 | 374+400 | 374+500 | 100 | 53.00 | 25.00 | 28.00 |
| 796 | 374+500 | 374+600 | 100 | 52.00 | 24.00 | 28.00 |
| 797 | 374+600 | 374+700 | 100 | 53.00 | 25.00 | 28.00 |
| 798 | 374+700 | 374+800 | 100 | 62.00 | 24.00 | 38.00 |
| 799 | 374+800 | 374+900 | 100 | 61.00 | 24.00 | 37.00 |
| 800 | 374+900 | 375+000 | 100 | 52.50 | 25.50 | 27.00 |
| 801 | 375+000 | 375+100 | 100 | 52.75 | 25.50 | 27.25 |
| 802 | 375+100 | 375+200 | 100 | 52.75 | 25.50 | 27.25 |
| 803 | 375+200 | 375+300 | 100 | 52.75 | 25.50 | 27.25 |
| 804 | 375+300 | 375+400 | 100 | 52.75 | 25.50 | 27.25 |
| 805 | 375+400 | 375+500 | 100 | 55.75 | 28.50 | 27.25 |
| 806 | 375+500 | 375+600 | 100 | 54.25 | 27.00 | 27.25 |
| 807 | 375+600 | 375+700 | 100 | 52.50 | 25.50 | 27.00 |
| 808 | 375+700 | 375+800 | 100 | 51.00 | 24.00 | 27.00 |
| 809 | 375+800 | 375+900 | 100 | 50.50 | 24.00 | 26.50 |
| 810 | 375+900 | 376+000 | 100 | 45.50 | 23.50 | 22.00 |
| 811 | 376+000 | 376+100 | 100 | 52.00 | 30.00 | 22.00 |
| 812 | 376+100 | 376+200 | 100 | 51.70 | 30.00 | 21.70 |
| 813 | 376+200 | 376+300 | 100 | 56.95 | 29.25 | 27.70 |
| 814 | 376+300 | 376+400 | 100 | 51.20 | 29.20 | 22.00 |
| 815 | 376+400 | 376+500 | 100 | 52.10 | 29.60 | 22.50 |
| 816 | 376+500 | 376+600 | 100 | 52.70 | 29.20 | 23.50 |
| 817 | 376+600 | 376+700 | 100 | 47.80 | 24.30 | 23.50 |
| 818 | 376+700 | 376+800 | 100 | 50.90 | 27.40 | 23.50 |
| 819 | 376+800 | 376+900 | 100 | 55.90 | 27.40 | 28.50 |
| 820 | 376+900 | 377+000 | 100 | 55.90 | 27.40 | 28.50 |
| 821 | 377+000 | 377+100 | 100 | 83.00 | 28.50 | 54.50 |
| 822 | 377+100 | 377+200 | 100 | 81.00 | 27.00 | 54.00 |
| 823 | 377+200 | 377+300 | 100 | 54.50 | 27.00 | 27.50 |
| 824 | 377+300 | 377+400 | 100 | 54.00 | 27.00 | 27.00 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 825 | 377+400 | 377+500 | 100 | 54.25 | 27.00 | 27.25 |
| 826 | 377+500 | 377+600 | 100 | 54.25 | 27.00 | 27.25 |
| 827 | 377+600 | 377+700 | 100 | 54.25 | 27.00 | 27.25 |
| 828 | 377+700 | 377+800 | 100 | 54.25 | 27.00 | 27.25 |
| 829 | 377+800 | 377+900 | 100 | 61.00 | 27.00 | 34.00 |
| 830 | 377+900 | 378+000 | 100 | 61.00 | 27.00 | 34.00 |
| 831 | 378+000 | 378+100 | 100 | 61.00 | 27.00 | 34.00 |
| 832 | 378+100 | 378+200 | 100 | 61.00 | 27.00 | 34.00 |
| 833 | 378+200 | 378+300 | 100 | 55.50 | 27.00 | 28.50 |
| 834 | 378+300 | 378+400 | 100 | 55.00 | 27.00 | 28.00 |
| 835 | 378+400 | 378+500 | 100 | 56.50 | 28.50 | 28.00 |
| 836 | 378+500 | 378+600 | 100 | 56.50 | 28.50 | 28.00 |
| 837 | 378+600 | 378+700 | 100 | 57.50 | 29.50 | 28.00 |
| 838 | 378+700 | 378+800 | 100 | 55.00 | 27.00 | 28.00 |
| 839 | 378+800 | 378+900 | 100 | 62.50 | 28.50 | 34.00 |
| 840 | 378+900 | 379+000 | 100 | 64.00 | 30.00 | 34.00 |
| 841 | 379+000 | 379+100 | 100 | 53.10 | 27.50 | 25.60 |
| 842 | 379+100 | 379+200 | 100 | 60.75 | 26.75 | 34.00 |
| 843 | 379+200 | 379+300 | 100 | 66.10 | 27.60 | 38.50 |
| 844 | 379+300 | 379+400 | 100 | 63.20 | 24.60 | 38.60 |
| 845 | 379+400 | 379+500 | 100 | 63.20 | 24.60 | 38.60 |
| 846 | 379+500 | 379+600 | 100 | 60.20 | 24.60 | 35.60 |
| 847 | 379+600 | 379+700 | 100 | 63.20 | 27.60 | 35.60 |
| 848 | 379+700 | 379+800 | 100 | 61.60 | 26.00 | 35.60 |
| 849 | 379+800 | 379+900 | 100 | 61.60 | 26.00 | 35.60 |
| 850 | 379+900 | 380+000 | 100 | 60.60 | 26.60 | 34.00 |
| 851 | 380+000 | 380+100 | 100 | 61.60 | 27.60 | 34.00 |
| 852 | 380+100 | 380+200 | 100 | 61.60 | 27.60 | 34.00 |
| 853 | 380+200 | 380+300 | 100 | 61.60 | 27.60 | 34.00 |
| 854 | 380+300 | 380+400 | 100 | 60.00 | 26.00 | 34.00 |
| 855 | 380+400 | 380+500 | 100 | 60.00 | 26.00 | 34.00 |
| 856 | 380+500 | 380+600 | 100 | 60.00 | 26.00 | 34.00 |
| 857 | 380+600 | 380+700 | 100 | 58.60 | 24.60 | 34.00 |
| 858 | 380+700 | 380+800 | 100 | 61.60 | 26.00 | 35.60 |
| 859 | 380+800 | 380+900 | 100 | 60.00 | 26.00 | 34.00 |
| 860 | 380+900 | 381+000 | 100 | 60.00 | 26.00 | 34.00 |
| 861 | 381+000 | 381+100 | 100 | 60.00 | 26.00 | 34.00 |
| 862 | 381+100 | 381+200 | 100 | 60.00 | 26.00 | 34.00 |
| 863 | 381+200 | 381+300 | 100 | 60.00 | 26.00 | 34.00 |
| 864 | 381+300 | 381+400 | 100 | 60.00 | 26.00 | 34.00 |
| 865 | 381+400 | 381+500 | 100 | 60.00 | 26.00 | 34.00 |
| 866 | 381+500 | 381+600 | 100 | 60.00 | 26.00 | 34.00 |
| 867 | 381+600 | 381+700 | 100 | 60.00 | 26.00 | 34.00 |
| 868 | 381+700 | 381+800 | 100 | 60.00 | 26.00 | 34.00 |
| 869 | 381+800 | 381+900 | 100 | 60.00 | 26.00 | 34.00 |
| 870 | 381+900 | 382+000 | 100 | 60.00 | 26.00 | 34.00 |
| 871 | 382+000 | 382+100 | 100 | 63.00 | 26.00 | 37.00 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 872 | 382+100 | 382+200 | 100 | 60.00 | 23.00 | 37.00 |
| 873 | 382+200 | 382+300 | 100 | 60.00 | 23.00 | 37.00 |
| 874 | 382+300 | 382+400 | 100 | 60.00 | 23.00 | 37.00 |
| 875 | 382+400 | 382+500 | 100 | 57.00 | 23.00 | 34.00 |
| 876 | 382+500 | 382+600 | 100 | 54.50 | 23.00 | 31.50 |
| 877 | 382+600 | 382+700 | 100 | 79.60 | 24.60 | 55.00 |
| 878 | 382+700 | 382+800 | 100 | 79.60 | 24.60 | 55.00 |
| 879 | 382+800 | 382+900 | 100 | 81.00 | 26.00 | 55.00 |
| 880 | 382+900 | 383+000 | 100 | 80.00 | 26.00 | 54.00 |
| 881 | 383+000 | 383+100 | 100 | 90.00 | 36.00 | 54.00 |
| 882 | 383+100 | 383+200 | 100 | 70.80 | 36.80 | 34.00 |
| 883 | 383+200 | 383+300 | 100 | 70.80 | 36.80 | 34.00 |
| 884 | 383+300 | 383+400 | 100 | 70.80 | 36.80 | 34.00 |
| 885 | 383+400 | 383+500 | 100 | 64.70 | 30.70 | 34.00 |
| 886 | 383+500 | 383+600 | 100 | 63.25 | 29.25 | 34.00 |
| 887 | 383+600 | 383+700 | 100 | 60.00 | 26.00 | 34.00 |
| 888 | 383+700 | 383+800 | 100 | 60.00 | 26.00 | 34.00 |
| 889 | 383+800 | 383+900 | 100 | 61.60 | 26.00 | 35.60 |
| 890 | 383+900 | 384+000 | 100 | 61.00 | 26.00 | 35.00 |
| 891 | 384+000 | 384+100 | 100 | 86.10 | 38.30 | 47.80 |
| 892 | 384+100 | 384+200 | 100 | 86.10 | 38.30 | 47.80 |
| 893 | 384+200 | 384+300 | 100 | 72.43 | 24.63 | 47.80 |
| 894 | 384+300 | 384+400 | 100 | 72.40 | 24.60 | 47.80 |
| 895 | 384+400 | 384+500 | 100 | 59.60 | 24.60 | 35.00 |
| 896 | 384+500 | 384+600 | 100 | 60.20 | 24.60 | 35.60 |
| 897 | 384+600 | 384+700 | 100 | 59.60 | 24.00 | 35.60 |
| 898 | 384+700 | 384+800 | 100 | 59.60 | 24.00 | 35.60 |
| 899 | 384+800 | 384+900 | 100 | 59.60 | 24.00 | 35.60 |
| 900 | 384+900 | 385+000 | 100 | 59.60 | 24.00 | 35.60 |
| 901 | 385+000 | 385+100 | 100 | 61.60 | 24.60 | 37.00 |
| 902 | 385+100 | 385+200 | 100 | 61.60 | 24.60 | 37.00 |
| 903 | 385+200 | 385+300 | 100 | 61.60 | 24.60 | 37.00 |
| 904 | 385+300 | 385+400 | 100 | 61.60 | 24.60 | 37.00 |
| 905 | 385+400 | 385+500 | 100 | 60.20 | 24.60 | 35.60 |
| 906 | 385+500 | 385+600 | 100 | 60.20 | 24.60 | 35.60 |
| 907 | 385+600 | 385+700 | 100 | 60.20 | 24.60 | 35.60 |
| 908 | 385+700 | 385+800 | 100 | 63.20 | 24.60 | 38.60 |
| 909 | 385+800 | 385+900 | 100 | 63.20 | 24.60 | 38.60 |
| 910 | 385+900 | 386+000 | 100 | 63.20 | 24.60 | 38.60 |
| 911 | 386+000 | 386+100 | 100 | 63.20 | 24.60 | 38.60 |
| 912 | 386+100 | 386+200 | 100 | 61.60 | 23.00 | 38.60 |
| 913 | 386+200 | 386+300 | 100 | 62.60 | 24.00 | 38.60 |
| 914 | 386+300 | 386+400 | 100 | 63.20 | 24.60 | 38.60 |
| 915 | 386+400 | 386+500 | 100 | 63.20 | 24.60 | 38.60 |
| 916 | 386+500 | 386+600 | 100 | 61.60 | 24.60 | 37.00 |
| 917 | 386+600 | 386+700 | 100 | 60.20 | 24.60 | 35.60 |
| 918 | 386+700 | 386+800 | 100 | 60.20 | 24.60 | 35.60 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 919 | 386+800 | 386+900 | 100 | 60.20 | 24.60 | 35.60 |
| 920 | 386+900 | 387+000 | 100 | 60.20 | 24.60 | 35.60 |
| 921 | 387+000 | 387+100 | 100 | 57.00 | 23.00 | 34.00 |
| 922 | 387+100 | 387+200 | 100 | 61.00 | 26.00 | 35.00 |
| 923 | 387+200 | 387+300 | 100 | 61.00 | 26.00 | 35.00 |
| 924 | 387+300 | 387+400 | 100 | 57.00 | 23.00 | 34.00 |
| 925 | 387+400 | 387+500 | 100 | 61.00 | 26.00 | 35.00 |
| 926 | 387+500 | 387+600 | 100 | 63.00 | 26.00 | 37.00 |
| 927 | 387+600 | 387+700 | 100 | 63.00 | 26.00 | 37.00 |
| 928 | 387+700 | 387+800 | 100 | 58.60 | 24.60 | 34.00 |
| 929 | 387+800 | 387+900 | 100 | 58.60 | 24.60 | 34.00 |
| 930 | 387+900 | 388+000 | 100 | 58.60 | 24.60 | 34.00 |
| 931 | 388+000 | 388+100 | 100 | 54.00 | 26.00 | 28.00 |
| 932 | 388+100 | 388+200 | 100 | 55.00 | 27.00 | 28.00 |
| 933 | 388+200 | 388+300 | 100 | 56.00 | 28.00 | 28.00 |
| 934 | 388+300 | 388+400 | 100 | 56.00 | 28.00 | 28.00 |
| 935 | 388+400 | 388+500 | 100 | 56.00 | 28.00 | 28.00 |
| 936 | 388+500 | 388+600 | 100 | 56.00 | 28.00 | 28.00 |
| 937 | 388+600 | 388+700 | 100 | 56.00 | 28.00 | 28.00 |
| 938 | 388+700 | 388+800 | 100 | 54.00 | 26.00 | 28.00 |
| 939 | 388+800 | 388+900 | 100 | 54.00 | 26.00 | 28.00 |
| 940 | 388+900 | 389+000 | 100 | 53.50 | 26.00 | 27.50 |
| 941 | 389+000 | 389+100 | 100 | 53.50 | 26.00 | 27.50 |
| 942 | 389+100 | 389+200 | 100 | 55.00 | 27.00 | 28.00 |
| 943 | 389+200 | 389+300 | 100 | 56.00 | 28.00 | 28.00 |
| 944 | 389+300 | 389+400 | 100 | 64.00 | 28.00 | 36.00 |
| 945 | 389+400 | 389+500 | 100 | 63.00 | 28.00 | 35.00 |
| 946 | 389+500 | 389+600 | 100 | 60.00 | 28.00 | 32.00 |
| 947 | 389+600 | 389+700 | 100 | 60.50 | 28.00 | 32.50 |
| 948 | 389+700 | 389+800 | 100 | 60.50 | 28.00 | 32.50 |
| 949 | 389+800 | 389+900 | 100 | 60.00 | 30.00 | 30.00 |
| 950 | 389+900 | 390+000 | 100 | 60.00 | 30.00 | 30.00 |
| 951 | 390+000 | 390+500 | 500 | 60.00 | 30.00 | 30.00 |
| 952 | 390+500 | 391+000 | 500 | 60.00 | 30.00 | 30.00 |
| 953 | 391+000 | 391+500 | 500 | 60.00 | 30.00 | 30.00 |
| 954 | 391+500 | 392+000 | 500 | 60.00 | 30.00 | 30.00 |
| 955 | 392+000 | 392+500 | 500 | 60.00 | 30.00 | 30.00 |
| 956 | 392+500 | 392+800 | 300 | 60.00 | 30.00 | 30.00 |
| 957 | 392+800 | 392+900 | 100 | 59.00 | 27.00 | 32.00 |
| 958 | 392+900 | 393+000 | 100 | 59.00 | 27.00 | 32.00 |
| 959 | 393+000 | 393+100 | 100 | 53.00 | 27.00 | 26.00 |
| 960 | 393+100 | 393+200 | 100 | 54.00 | 28.00 | 26.00 |
| 961 | 393+200 | 393+300 | 100 | 54.00 | 28.00 | 26.00 |
| 962 | 393+300 | 393+400 | 100 | 57.00 | 31.00 | 26.00 |
| 963 | 393+400 | 393+500 | 100 | 57.00 | 31.00 | 26.00 |
| 964 | 393+500 | 393+600 | 100 | 57.00 | 31.00 | 26.00 |
| 965 | 393+600 | 393+700 | 100 | 57.00 | 31.00 | 26.00 |

| S. No. | Chainage Km | | Length (m) | Total width of RoW | ROW width from median centerline (m) | |
|---|---|---|---|---|---|---|
| | From | To | | | LHS | RHS |
| 966 | 393+700 | 393+800 | 100 | 57.00 | 31.00 | 26.00 |
| 967 | 393+800 | 393+900 | 100 | 57.00 | 31.00 | 26.00 |
| 968 | 393+900 | 394+000 | 100 | 57.00 | 31.00 | 26.00 |
| 969 | 394+000 | 394+100 | 100 | 57.00 | 31.00 | 26.00 |
| 970 | 394+100 | 394+200 | 100 | 57.00 | 31.00 | 26.00 |
| 971 | 394+200 | 394+300 | 100 | 57.20 | 31.20 | 26.00 |
| 972 | 394+300 | 394+400 | 100 | 58.00 | 32.00 | 26.00 |
| 973 | 394+400 | 394+500 | 100 | 58.00 | 32.00 | 26.00 |
| 974 | 394+500 | 394+600 | 100 | 57.00 | 31.00 | 26.00 |
| 975 | 394+600 | 394+700 | 100 | 57.00 | 31.00 | 26.00 |
| 976 | 394+700 | 394+800 | 100 | 56.00 | 30.00 | 26.00 |
| 977 | 394+800 | 394+900 | 100 | 57.00 | 30.00 | 27.00 |
| 978 | 394+900 | 395+000 | 100 | 59.50 | 33.00 | 26.50 |
| 979 | 395+000 | 395+100 | 100 | 58.50 | 32.00 | 26.50 |
| 980 | 395+100 | 395+200 | 100 | 58.00 | 32.00 | 26.00 |
| 981 | 395+200 | 395+300 | 100 | 58.00 | 32.00 | 26.00 |
| 982 | 395+300 | 395+400 | 100 | 67.00 | 31.00 | 36.00 |
| 983 | 395+400 | 395+500 | 100 | 67.00 | 31.00 | 36.00 |
| 984 | 395+500 | 395+600 | 100 | 67.00 | 31.00 | 36.00 |
| 985 | 395+600 | 395+700 | 100 | 57.00 | 31.00 | 26.00 |
| 986 | 395+700 | 395+800 | 100 | 56.00 | 30.00 | 26.00 |
| 987 | 395+800 | 395+900 | 100 | 56.00 | 30.00 | 26.00 |
| 988 | 395+900 | 396+000 | 100 | 56.00 | 30.00 | 26.00 |
| 989 | 396+000 | 396+100 | 100 | 55.00 | 29.00 | 26.00 |
| 990 | 396+100 | 396+200 | 100 | 56.00 | 30.00 | 26.00 |
| 991 | 396+200 | 396+300 | 100 | 56.00 | 30.00 | 26.00 |
| 992 | 396+300 | 396+400 | 100 | 53.00 | 27.00 | 26.00 |
| 993 | 396+400 | 396+500 | 100 | 52.00 | 26.00 | 26.00 |
| 994 | 396+500 | 396+600 | 100 | 52.00 | 26.00 | 26.00 |
| 995 | 396+600 | 396+700 | 100 | 54.00 | 28.00 | 26.00 |
| 996 | 396+700 | 396+800 | 100 | 53.00 | 26.00 | 27.00 |
| 997 | 396+800 | 396+900 | 100 | 56.00 | 29.00 | 27.00 |
| 998 | 396+900 | 397+000 | 100 | 53.00 | 26.00 | 27.00 |
| 999 | 397+000 | 397+100 | 100 | 55.00 | 27.00 | 28.00 |
| 1000 | 397+100 | 397+200 | 100 | 53.00 | 27.00 | 26.00 |
| 1001 | 397+200 | 397+300 | 100 | 55.00 | 27.00 | 28.00 |
| 1002 | 397+300 | 397+400 | 100 | 57.00 | 29.00 | 28.00 |
| 1003 | 397+400 | 397+500 | 100 | 55.00 | 28.00 | 27.00 |
| 1004 | 397+500 | 397+700 | 200 | 54.00 | 26.00 | 28.00 |
| 1005 | 397+700 | 397+900 | 200 | 62.00 | 30.00 | 32.00 |
| 1006 | 397+900 | 398+700 | 800 | 84.00 | 40.00 | 44.00 |
| 1007 | 398+700 | 400+632 | 1932 | 56.50 | 29.50 | 27.00 |
| **Total** | | | **80522** | | | |

### 2.4.4 Carriageway

Generally, the existing carriageway is of four lane divided standards. The carriageway width slightly varies at merging and diverging at junctions, median openings, at approaches to

structures and on structures. It may be noted that details of carriageway on structures shall be referred from Structures Inventory section of this chapter. Details of carriageway along the Project Stretch as given in **Table 2.8.**

**Table 2.8: Details of Existing Carriageway**

| Chainage | | Length | LHS | | Median | RHS | |
|---|---|---|---|---|---|---|---|
| From | To | | Earthen shoulder (m) | Full Carriageway width | | Full Carriageway width | Earthen shoulder (m) |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | |
| 320+810 | 321+000 | 190 | 2.00 | 8.75 | 4.00 | 8.75 | 2.00 |
| 321+000 | 321+500 | 500 | 2.00 | 8.50 | 4.00 to 3.50 | 8.50 | 2.00 |
| 321+500 | 322+000 | 500 | 2.00 | 8.50 | 3.50 to 1.80 | 8.25 | 2.00 |
| 322+000 | 322+500 | 500 | - | 8.50 | 1.80 | 8.25 | - |
| 322+500 | 323+000 | 500 | - | 8.50 | 1.80 to 1.50 | 8.25 | - |
| 323+000 | 323+500 | 500 | - | 8.50 | 1.50 | 8.25 | - |
| 323+500 | 324+000 | 500 | - | 8.75 | 1.50 | 8.25 | - |
| 324+000 | 324+500 | 500 | 2.00 | 8.75 | 1.50 to 1.80 | 8.25 | 2.00 |
| 324+500 | 325+000 | 500 | 2.00 | 8.50 | 1.80 | 8.50 | 2.00 |
| 325+000 | 325+700 | 700 | 2.00 | 8.25 | 1.80 to 1.50 | 8.25 | 2.00 |
| 325+700 | 326+000 | 300 | 2.00 | 8.50 | 1.50 to 4.00 | 8.50 | 2.00 |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | |
| 326+000 | 326+260 | 260 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 326+260 | 326+415 | 155 | 2.00 | 12.50 | 4.00 | 12.50 to 19.30 | 2.00 |
| 326+415 | 326+575 | 160 | 2.00 | 12.50 | 4.00 to 1.80 | 8.50+7.00 | 2.00 |
| 326+575 | 326+703 | 128 | 2.00 | 12.50 | 1.80 to 4.00 | 20.50 to 12.50 | 2.00 |
| 326+703 | 327+000 | 297 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 327+000 | 327+500 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 327+500 | 328+000 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 328+000 | 328+288 | 288 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 328+288 | 328+430 | 142 | 2.00 | 12.50 | 4.00 to 2.10 | 12.25 to 20.00 | 2.00 |
| 328+430 | 328+700 | 270 | 2.00 | 12.50 | 2.10 to 3.30 | 8.50+9.00 | 2.00 |
| 328+700 | 328+950 | 250 | - | 12.50 | 3.30 to 1.80 | 8.50+9.00 | - |
| 328+950 | 329+500 | 550 | 2.00 | 12.50 | 1.80 to 2.50 | 8.50+9.00 | 2.00 |
| 329+500 | 330+000 | 500 | 2.00 | 12.50 | 2.50 to 2.00 | 8.50+9.00 | 2.00 |
| 330+000 | 330+305 | 305 | 2.00 | 12.50 | 2.00 to 4.20 | 8.50+8.50 | 2.00 |
| 330+305 | 330+425 | 120 | 2.00 | 12.50 | 4.20 to 4.50 | 18.00 to 12.50 | 2.00 |
| 330+425 | 330+500 | 75 | 2.00 | 12.50 | 4.50 | 12.50 | 2.00 |
| 330+500 | 331+000 | 500 | 2.00 | 12.50 | 4.50 | 12.50 | 2.00 |
| 331+000 | 331+500 | 500 | - | 13.00 | 4.50 | 13.00 | - |
| 331+500 | 332+000 | 500 | - | 13.00 | 4.50 | 13.00 | - |
| 332+000 | 332+500 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 332+500 | 333+000 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 333+000 | 333+500 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 333+500 | 334+000 | 500 | 2.00 | 12.50 | 4.50 | 12.50 | 2.00 |
| 334+000 | 334+500 | 500 | 2.00 | 12.50 | 4.50 | 12.50 | 2.00 |
| 334+500 | 335+000 | 500 | 2.00 | 12.50 | 4.50 | 12.50 | 2.00 |
| 335+000 | 335+300 | 300 | 2.00 | 12.50 | 4.50 to 5.30 | 12.50 | 2.00 |
| 335+300 | 336+000 | 700 | 2.00 | 12.50 | 5.30 to 4.70 | 12.50 | 2.00 |
| 336+000 | 336+500 | 500 | - | 12.50 | 4.70 to 4.50 | 12.50 | - |
| 336+500 | 337+000 | 500 | - | 12.75 | 4.50 | 12.75 | - |
| 337+000 | 337+500 | 500 | - | 12.75 | 4.50 | 12.75 | - |
| 337+500 | 338+000 | 500 | - | 12.75 | 4.50 | 12.75 | - |

| Chainage | | Length | LHS | | Median | RHS | |
|---|---|---|---|---|---|---|---|
| From | To | | Earthen shoulder (m) | Full Carriageway width | | Full Carriageway width | Earthen shoulder (m) |
| 338+000 | 338+500 | 500 | - | 12.75 | 4.50 to 4.00 | 12.75 | - |
| 338+500 | 339+000 | 500 | - | 12.50 | 4.00 | 12.50 | - |
| 339+000 | 339+500 | 500 | - | 12.50 | 4.00 to 2.50 | 12.50 | - |
| 339+500 | 340+000 | 500 | - | 12.75 | 2.50 to 2.00 | 12.75 | - |
| 340+000 | 340+500 | 500 | - | 12.75 | 2.00 to 4.00 | 12.75 | - |
| 340+500 | 341+000 | 500 | - | 12.50 | 4.00 | 12.50 | - |
| 341+000 | 341+500 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 341+500 | 342+000 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 342+000 | 342+500 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 342+500 | 343+000 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 343+000 | 343+460 | 460 | 2.00 | 13.50 | 4.00 | 13.50 | 2.00 |
| 343+460 | 343+530 | 70 | 2.00 | 13.50 to 19.00 | 4.00 | 13.50 to 19.00 | 2.00 |
| 343+530 | 343+962 | 432 | 2.00 | 8.75+8.75 | 4.00 | 8.75+9.0 | 2.00 |
| 343+962 | 344+033 | 71 | 2.00 | 19.00 to 13.50 | 4.00 | 19.00 to 13.50 | 2.00 |
| 344+033 | 344+500 | 467 | - | 12.75 | 4.00 to 2.00 | 12.75 | - |
| 344+500 | 345+000 | 500 | - | 12.75 | 2.00 to 3.50 | 12.75 | - |
| 345+000 | 345+500 | 500 | - | 12.75 | 3.50 to 4.00 | 12.75 | - |
| 345+500 | 346+000 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 346+000 | 346+460 | 460 | 2.00 | 12.50 | 4.00 to 0.90 | 12.50 | 2.00 |
| 346+460 | 346+930 | 470 | - | 12.50 | 0.90 NJB | 12.50 | - |
| 346+930 | 347+500 | 570 | 2.00 | 12.50 | 0.90 to 4.00 | 12.50 | 2.00 |
| 347+500 | 348+000 | 500 | - | 12.50 | 4.00 | 12.50 | - |
| 348+000 | 348+130 | 130 | 2.00 | 12.50 | 4.00 | 14.00 | 2.00 |
| 348+130 | 348+290 | 160 | 2.00 | 12.50 | 4.00 to 2.10 | 14.00 to 21.00 | 2.00 |
| 348+290 | 348+500 | 210 | 2.00 | 12.50 | 2.10 to 1.80 | 8.50+8.50 | 2.00 |
| 348+500 | 348+900 | 400 | 2.00 | 12.50 | 1.80 | 7.00+8.50 | 2.00 |
| 348+900 | 349+000 | 100 | 2.00 | 12.50 | 1.80 to 2.10 | 20.00 to 16.00 | 2.00 |
| 349+000 | 349+255 | 255 | 2.00 | 12.50 | 2.10 to 4.00 | 16.00 to 12.50 | 2.00 |
| 349+255 | 349+500 | 245 | - | 12.50 | 4.00 | 12.50 | - |
| 349+500 | 349+950 | 450 | 2.00 | 12.50 | 4.00 | 12.00 to 14.50 | 2.00 |
| 349+950 | 350+070 | 120 | 2.00 | 12.50 | 4.00 to 2.60 | 14.50 to 20.50 | 2.00 |
| 350+070 | 350+155 | 85 | 2.00 | 12.50 | 2.60 to 5.90 | 7.00+7.00 | 2.00 |
| 350+155 | 350+220 | 65 | - | 12.50 | 5.90 | 7.00+7.00 | - |
| 350+220 | 350+500 | 280 | 2.00 | 12.75 | 5.90 to 2.00 | 20.50 to 12.75 | 2.00 |
| 350+500 | 351+000 | 500 | - | 12.75 | 2.00 to 4.00 | 12.75 | - |
| 351+000 | 351+510 | 510 | - | 12.50 | 4.00 to 4.50 | 12.50 | - |
| 351+510 | 352+665 | 1155 | TOLL Plaza | | | | |
| 352+665 | 353+000 | 335 | - | 12.50 | 4.00 | 12.50 | - |
| 353+000 | 353+500 | 500 | - | 12.50 | 4.00 | 12.50 | - |
| 353+500 | 353+775 | 275 | - | 12.50 | 4.00 | 12.50 | - |
| 353+775 | 353+815 | 40 | - | 12.50 | 4.00 to 1.30 | 12.50 | - |
| 353+815 | 353+930 | 115 | | 12.50 | 1.30 | 12.50 | |
| 353+930 | 354+100 | 170 | - | 12.50 | 1.30 to 4.00 | 12.50 | - |
| 354+100 | 354+500 | 400 | - | 12.50 | 4.00 to 4.50 | 12.50 | - |
| 354+500 | 354+900 | 400 | - | 13.00 | 4.50 to 4.00 | 13.00 | - |
| 354+900 | 355+500 | 600 | - | 13.00 | 4.00 | 13.00 | - |
| 355+500 | 355+800 | 300 | - | 13.00 | 4.00 to 3.75 | 13.00 | - |
| 355+800 | 356+500 | 700 | - | 14.00 | 3.75 | 13.00 | - |
| 356+500 | 357+000 | 500 | - | 14.50 | 3.75 | 13.50 | - |

| Chainage | | Length | LHS | | Median | RHS | |
|---|---|---|---|---|---|---|---|
| From | To | | Earthen shoulder (m) | Full Carriageway width | | Full Carriageway width | Earthen shoulder (m) |
| 357+000 | 357+100 | 100 | - | 14.50 | 3.75 to 4.00 | 13.50 | - |
| 357+100 | 357+380 | 280 | - | 14.50 | 4.00 | 13.50 | - |
| 357+380 | 357+600 | 220 | - | 12.50 | 4.00 to 1.10 | 12.50 | - |
| 357+600 | 357+675 | 75 | - | 12.50 | 1.10 | 12.50 | - |
| 357+675 | 357+800 | 125 | - | 12.50 | 1.10 to 4.00 | 12.50 | - |
| 357+800 | 358+025 | 225 | 2.00 | 16.0 to 19.5 | 4.00 | 16.0 to 19.5 | 2.00 |
| 358+025 | 358+075 | 50 | 2.00 | 9.00+9.00 | 4.00 | 9.0+8.5 | 2.00 |
| 358+075 | 358+190 | 115 | Major Bridge | | | | |
| 358+190 | 358+760 | 570 | - | 8.50+9.00 | 4.00 to 3.20 | 8.5+9.0 | - |
| 358+760 | 358+880 | 120 | ROB | | | | |
| 358+880 | 358+980 | 100 | - | 8.50+9.00 | 3.20 | 8.5+9.0 | - |
| 358+980 | 359+080 | 100 | - | 20.50 to 12.50 | 3.20 to 2.00 | 20.50 to 12.50 | - |
| 359+080 | 359+500 | 420 | - | 12.50 | 2.00 | 12.50 | - |
| 359+500 | 360+000 | 500 | - | 12.50 | 2.00 | 12.50 | - |
| 360+000 | 360+280 | 280 | - | 12.50 | 2.00 | 12.50 | - |
| 360+280 | 360+340 | 60 | 2.00 | 12.50 | 2.00 to 4.00 | 12.50 | 2.00 |
| 360+340 | 360+420 | 80 | 2.00 | 12.50 to 20.50 | 4.00 | 12.50 to 18.80 | 2.00 |
| 360+420 | 360+860 | 440 | 2.00 | 9.00+7.00 | 4.00 | 8.50+8.50 | 2.00 |
| 360+860 | 360+950 | 90 | 2.00 | 18.50 to 12.50 | 4.00 | 18.50 to 12.50 | 2.00 |
| 360+950 | 361+000 | 50 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | |
| 360+300 | 360+500 | 200 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 360+500 | 361+000 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 361+000 | 361+500 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 361+500 | 362+000 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 362+000 | 362+500 | 500 | - | 12.50 | 4.00 to 4.20 | 12.50 | - |
| 362+500 | 363+000 | 500 | - | 12.50 | 4.20 | 12.50 | - |
| 363+000 | 363+580 | 580 | - | 12.50 | 4.20 to 4.00 | 12.50 | - |
| 363+580 | 363+700 | 120 | 2.00 | 12.50 to 17.75 | 4.00 | 12.50 to 17.75 | 2.00 |
| 363+700 | 364+080 | 380 | 2.00 | 8.50+8.50 | 4.00 | 8.50+8.50 | 2.00 |
| 364+080 | 364+220 | 140 | 2.00 | 19.00 to 12.50 | 4.00 | 17.00 to 13.00 | 2.00 |
| 364+220 | 364+500 | 280 | 2.00 | 13.00 | 4.00 | 13.00 | 2.00 |
| 364+500 | 365+000 | 500 | - | 12.75 | 4.00 | 12.75 | - |
| 365+000 | 365+500 | 500 | - | 12.50 | 4.00 | 12.50 | - |
| 365+500 | 366+000 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 366+000 | 366+270 | 270 | 2.00 | 12.50 | 4.00 | 13.00 | 2.00 |
| 366+270 | 366+385 | 115 | 2.00 | 12.50 to 18.00 | 4.00 | 13.00 to 18.00 | 2.00 |
| 366+385 | 366+750 | 365 | 2.00 | 8.50+8.50 | 4.00 | 8.50+7.00 | 2.00 |
| 366+750 | 366+900 | 150 | 2.00 | 19.50 to 12.50 | 4.00 | 19.50 to 12.50 | 2.00 |
| 366+900 | 367+000 | 100 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 367+000 | 367+500 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 367+500 | 368+000 | 500 | - | 12.75 | 4.00 | 12.75 | - |
| 368+000 | 368+500 | 500 | - | 12.50 | 4.00 to 4.20 | 12.50 | - |
| 368+500 | 369+000 | 500 | - | 12.75 | 4.20 | 12.75 | - |
| 369+000 | 369+230 | 230 | - | 12.50 | 4.20 to 3.80 | 12.50 | 2.00 |
| 369+230 | 369+380 | 150 | - | 12.50 to 18.00 | 3.80 | 13.00 to 18.75 | 2.00 |
| 369+380 | 369+735 | 355 | - | 8.00+8.50 | 3.80 | 8.50+8.00 | 2.00 |
| 369+735 | 369+860 | 125 | 2.00 | 18.50 to 13.00 | 3.80 | 18.50 to 14.00 | 2.00 |
| 369+860 | 370+100 | 240 | - | 12.50 | 3.80 to 4.50 | 12.50 | - |

| Chainage | | Length | LHS | | Median | RHS | |
|---|---|---|---|---|---|---|---|
| From | To | | Earthen shoulder (m) | Full Carriageway width | | Full Carriageway width | Earthen shoulder (m) |
| 370+100 | 370+600 | 500 | - | 12.50 | 4.50 to 4.00 | 12.50 | - |
| 370+600 | 371+000 | 400 | - | 12.50 | 4.00 to 3.80 | 12.50 | - |
| 371+000 | 371+350 | 350 | 2.00 | 12.50 | 3.80 | 12.50 | 2.00 |
| 371+350 | 371+450 | 100 | 2.00 | 12.50 to 18.00 | 3.80 | 13.00 to 19.00 | 2.00 |
| 371+450 | 371+780 | 330 | 2.00 | 8.00+8.50 | 3.80 to 4.00 | 8.00+8.50 | 2.00 |
| 371+780 | 371+900 | 120 | 2.00 | 19.00 to 12.50 | 4.00 | 19.00 to 12.50 | 2.00 |
| 371+900 | 372+010 | 110 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 372+010 | 372+500 | 490 | - | 13.00 | 4.00 | 13.00 | - |
| 372+500 | 373+000 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 373+000 | 373+190 | 190 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 373+190 | 373+450 | 260 | 2.00 | 12.50 | 4.00 to 3.00 | 12.50 to 20.50 | 2.00 |
| 373+450 | 373+680 | 230 | 2.00 | 12.50 | 3.00 to 7.00 | 8.50+8.50 | 2.00 |
| 373+680 | 373+900 | 220 | - | 13.00 | 7.00 to 4.50 | 23.00 to 13.75 | - |
| 373+900 | 374+000 | 100 | - | 12.75 | 4.50 | 12.75 | - |
| 374+000 | 374+500 | 500 | - | 12.50 | 4.50 | 12.75 | - |
| 374+500 | 375+000 | 500 | - | 12.50 | 4.50 to 4.00 | 12.75 | - |
| 375+000 | 375+500 | 500 | - | 12.75 | 4.00 | 12.75 | - |
| 375+500 | 375+800 | 300 | - | 12.50 | 4.00 to 1.30 | 12.50 | - |
| 375+800 | 376+000 | 200 | - | 12.50 | 1.30 to 2.50 | 12.50 | - |
| 376+000 | 376+100 | 100 | - | 12.75 | 2.50 to 1.80 | 13.00 | - |
| 376+100 | 376+700 | 600 | - | 12.75 | 1.80 | 13.00 | - |
| 376+700 | 377+000 | 300 | - | 13.00 | 1.80 to 4.00 | 12.75 | - |
| 377+000 | 377+590 | 590 | - | 13.00 | 4.00 | 12.75 | - |
| 377+590 | 377+800 | 210 | - | 12.75 | 4.00 to 1.30 | 12.75 | - |
| 377+800 | 378+500 | 700 | - | 13.00 | 1.30 to 4.00 | 13.00 | - |
| 378+500 | 379+000 | 500 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 379+000 | 379+420 | 420 | 2.00 | 12.50 | 4.00 | 12.50 | 2.00 |
| 379+420 | 379+600 | 180 | 2.00 | 12.50 | 4.00 to 4.50 | 12.50 to 21.00 | 2.00 |
| 379+600 | 380+100 | 500 | 2.00 | 12.50 | 4.50 to 5.50 | 8.75+8.75 | 2.00 |
| 380+100 | 380+500 | 400 | 2.00 | 12.50 | 5.50 to 6.00 | 8.75+8.75 | 2.00 |
| 380+500 | 381+000 | 500 | 2.00 | 12.50 | 6.00 to 5.00 | 8.50+8.75 | 2.00 |
| 381+000 | 381+500 | 500 | 2.00 | 12.50 | 5.50 | 8.50+8.75 | 2.00 |
| 381+500 | 381+840 | 340 | 2.00 | 12.50 | 5.50 to 5.00 | 8.50+8.75 | 2.00 |
| 381+840 | 382+040 | 200 | 2.00 | 12.50 | 5.00 to 4.50 | 19.00 to 12.50 | 2.00 |
| 382+040 | 382+400 | 360 | 2.00 | 12.50 | 4.50 to 4.00 | 12.50 | 2.00 |
| 382+400 | 383+000 | 600 | - | 13.00 | 4.00 to 3.80 | 13.25 | - |
| 383+000 | 383+400 | 400 | 2.00 | 12.50 | 3.80 to 4.50 | 12.50 | 2.00 |
| 383+400 | 384+000 | 600 | - | 12.50 | 4.50 | 12.50 | - |
| 384+000 | 384+500 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 384+500 | 385+000 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 385+000 | 385+500 | 500 | 2.00 | 12.50 | 4.50 to 4.00 | 12.50 | 2.00 |
| 385+500 | 385+700 | 200 | 2.00 | 12.50 | 4.00 to 3.80 | 12.50 | 2.00 |
| 385+700 | 386+000 | 300 | 2.00 | 12.50 | 3.80 | 12.50 | 2.00 |
| 386+000 | 386+500 | 500 | - | 13.00 | 3.80 | 13.25 | - |
| 386+500 | 387+000 | 500 | - | 13.00 | 3.80 | 13.25 | - |
| 387+000 | 387+500 | 500 | 2.00 | 12.50 | 3.80 to 1.50 | 13.00 | 2.00 |
| 387+500 | 388+000 | 500 | 2.00 | 12.50 | 1.50 to 3.80 | 13.00 | 2.00 |
| 388+000 | 388+500 | 500 | - | 13.00 | 3.80 | 13.25 | - |
| 388+500 | 389+000 | 500 | - | 13.25 | 3.80 | 13.25 | - |

| Chainage | | Length | LHS | | Median | RHS | |
|---|---|---|---|---|---|---|---|
| From | To | | Earthen shoulder (m) | Full Carriageway width | | Full Carriageway width | Earthen shoulder (m) |
| 389+000 | 389+500 | 500 | - | 13.25 | 3.80 to 4.00 | 13.25 | - |
| 389+500 | 390+000 | 500 | - | 12.50 | 4.00 to 2.50 | 12.50 | - |
| 390+000 | 390+500 | 500 | - | 12.50 | 2.50 | 12.50 | - |
| 390+500 | 391+000 | 500 | - | 13.00 | 2.50 | 13.00 | - |
| 391+000 | 391+500 | 500 | - | 12.50 | 2.50 | 12.50 | - |
| 391+500 | 392+000 | 500 | - | 12.50 | 2.50 | 12.50 | - |
| 392+000 | 392+500 | 500 | - | 13.00 | 2.50 | 13.00 | - |
| 392+500 | 393+000 | 500 | - | 13.00 | 2.50 to 4.00 | 13.00 | - |
| 393+000 | 393+500 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 393+500 | 394+000 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 394+000 | 394+500 | 500 | - | 13.25 | 4.00 | 13.25 | - |
| 394+500 | 395+000 | 500 | - | 13.00 | 4.00 to 4.50 | 13.00 | - |
| 395+000 | 395+500 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 395+500 | 396+000 | 500 | - | 12.50 | 4.50 | 12.50 | - |
| 396+000 | 396+500 | 500 | - | 12.50 | 4.50 to 4.00 | 12.50 | - |
| 396+500 | 397+000 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 397+000 | 397+500 | 500 | - | 13.00 | 4.00 | 13.00 | - |
| 397+500 | 397+990 | 490 | - | 13.00 | 4.00 | 13.00 | - |
| 397+990 | 398+140 | 150 | - | 13.00 to 20.25 | 4.00 | 13.00 to 19.00 | - |
| 398+140 | 398+480 | 340 | - | 8.50+8.75 | 4.00 | 8.75+8.75 | - |
| 398+480 | 398+640 | 160 | - | 19.75 to 13.25 | 4.00 | 19.50 to 13.00 | - |
| 398+640 | 399+000 | 360 | - | 13.25 | 4.00 | 13.00 | - |
| 399+000 | 399+500 | 500 | - | 12.75 | 4.00 to 4.50 | 13.00 | - |
| 399+500 | 400+000 | 500 | - | 13.00 | 4.50 to 2.00 | 13.00 | - |
| 400+000 | 400+632 | 632 | - | 13.00 | 2.00 to 4.50 | 13.50 | - |

**Note:** Carriageway widths and median widths varies at approaches of structure, toll plaza, median opening, junctions etc. locations.

### 2.4.5 Service /Slip Road

It may be noted that, there are Service Road as well as Slip Roads along the project stretch. The details of Service/Slip Roads as given in **Table 2.9.**

**Table 2.9: Service / Slip Road**

| S. No. | New Chainage (km) | | Length (m) | Side | Width (m) | Pavement Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Section-1 From Km 320+810 to Km 326+000 (4 Lane Retained)** | | | | | | |
| NIL | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | |
| 1 | 331+070 | 331+920 | 850 | LHS | 7.00 | Rigid |
| 2 | 331+070 | 331+920 | 850 | RHS | 7.00 | Rigid |
| 3 | 331+920 | 333+215 | 1295 | LHS | 5.50 | Rigid |
| 4 | 331+920 | 333+190 | 1270 | RHS | 5.50 | Rigid |
| 5 | 336+160 | 336+880 | 720 | LHS | 5.50 | Rigid |
| 6 | 336+400 | 336+880 | 480 | RHS | 5.50 | Rigid |
| 7 | 336+880 | 340+730 | 3850 | LHS | 7.00 | Rigid |
| 8 | 336+880 | 340+730 | 3850 | RHS | 7.00 | Rigid |

| S. No. | New Chainage (km) | | Length (m) | Side | Width (m) | Pavement Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 9 | 344+215 | 345+880 | 1665 | LHS | 7.00 | Rigid |
| 10 | 344+215 | 344+487 | 272 | RHS | 7.00 | Rigid |
| 11 | 344+487 | 344+807 | 320 | RHS | 5.50 | Rigid |
| 12 | 344+807 | 345+880 | 1073 | RHS | 7.00 | Rigid |
| 13 | 346+460 | 346+930 | 470 | LHS | 5.50 | Rigid |
| 14 | 346+460 | 346+930 | 470 | RHS | 5.50 | Rigid |
| 15 | 347+550 | 347+880 | 330 | LHS | 7.00 | Rigid |
| 16 | 347+550 | 347+880 | 330 | RHS | 7.00 | Rigid |
| 17 | 349+260 | 349+380 | 120 | LHS | 7.00 | Rigid |
| 18 | 349+260 | 349+380 | 120 | RHS | 7.00 | Rigid |
| 19 | 350+855 | 351+275 | 420 | LHS | 7.00 | Rigid |
| 20 | 350+855 | 351+275 | 420 | RHS | 7.00 | Rigid |
| 21 | 352+960 | 357+790 | 4830 | LHS | 7.00 | Rigid |
| 22 | 352+960 | 357+790 | 4830 | RHS | 7.00 | Rigid |
| 23 | 359+255 | 360+130 | 875 | LHS | 9.00 | Rigid |
| 24 | 359+255 | 360+130 | 875 | RHS | 9.00 | Rigid |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | |
| 25 | 360+620 | 360+785 | 165 | LHS | 9.00 | Rigid |
| 26 | 360+825 | 362+540 | 1715 | LHS | 9.00 | Rigid |
| 27 | 362+540 | 362+690 | 150 | LHS | 5.50 | Rigid |
| 28 | 362+690 | 363+350 | 660 | LHS | 9.00 | Rigid |
| 29 | 360+620 | 361+655 | 1035 | RHS | 9.00 | Rigid |
| 30 | 361+730 | 363+350 | 1620 | RHS | 9.00 | Rigid |
| 31 | 364+495 | 365+255 | 760 | LHS | 7.00 | Rigid |
| 32 | 364+495 | 365+255 | 760 | RHS | 7.00 | Rigid |
| 33 | 367+330 | 368+795 | 1465 | LHS | 7.00 | Rigid |
| 34 | 368+795 | 368+930 | 135 | LHS | 5.50 | Rigid |
| 35 | 367+330 | 368+950 | 1620 | RHS | 7.00 | Rigid |
| 36 | 369+975 | 370+860 | 885 | LHS | 7.00 | Rigid |
| 37 | 369+975 | 370+860 | 885 | RHS | 7.00 | Rigid |
| 38 | 372+250 | 372+400 | 150 | LHS | 5.50 | Rigid |
| 39 | 372+250 | 372+400 | 150 | RHS | 7.00 | Rigid |
| 40 | 373+745 | 375+890 | 2145 | LHS | 7.00 | Rigid |
| 41 | 375+890 | 376+895 | 1005 | LHS | 5.50 | Rigid |
| 42 | 376+895 | 378+705 | 1810 | LHS | 7.00 | Rigid |
| 43 | 373+745 | 375+800 | 2055 | RHS | 7.00 | Rigid |
| 44 | 375+800 | 375+925 | 125 | RHS | 5.50 | Rigid |
| 45 | 375+950 | 376+250 | 300 | RHS | 5.50 | Rigid |
| 46 | 376+250 | 377+563 | 1313 | RHS | 7.00 | Rigid |
| 47 | 377+570 | 378+705 | 1135 | RHS | 7.00 | Rigid |
| 48 | 382+400 | 383+000 | 600 | LHS | 7.00 | Rigid |
| 49 | 382+400 | 383+000 | 600 | RHS | 7.00 | Rigid |
| 50 | 383+610 | 385+130 | 1520 | LHS | 7.00 | Rigid |
| 51 | 383+610 | 385+110 | 1500 | RHS | 7.00 | Rigid |
| 52 | 386+210 | 386+950 | 740 | LHS | 7.00 | Rigid |
| 53 | 386+210 | 386+950 | 740 | RHS | 7.00 | Rigid |
| 54 | 388+060 | 389+770 | 1710 | LHS | 7.00 | Rigid |
| 55 | 389+770 | 392+780 | 3010 | LHS | 5.50 | Rigid |

| S. No. | New Chainage (km) | | Length (m) | Side | Width (m) | Pavement Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 56 | 392+780 | 400+370 | 7590 | LHS | 7.00 | Rigid |
| 57 | 388+060 | 389+770 | 1710 | RHS | 7.00 | Rigid |
| 58 | 389+770 | 392+780 | 3010 | RHS | 5.50 | Rigid |
| 59 | 392+780 | 398+977 | 6197 | RHS | 7.00 | Rigid |
| 60 | 399+097 | 400+380 | 1283 | RHS | 7.00 | Rigid |
| **Total** | | | **82838** | | | |

### 2.4.6 Junctions

There is total 11 major junctions and 154 minor junctions exist along the project stretch. Details of all junctions are provided below.

**Table 2.10: At Grade Major Junction Along the Project Highway**

| S. No. | Chainage Km | Type of Junction | Side | Access Road Leads to | |
|---|---|---|---|---|---|
| | | | | LHS | RHS |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | |
| NIL | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 353+950 | Y | LHS | Jamtara | - |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 2 | 375+850 | T | RHS | - | Bokaro City |



At Grade Junction at Ch. 353+950 LHS



At Grade Junction at Ch. 375+850 RHS

**Table 2.10 (A): Grade Separated Major Junction Along the Project Highway**

| S.No. | Chainage Km | Type of Junction | Side | Access Road Leads to | |
|---|---|---|---|---|---|
| | | | | LHS | RHS |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | |
| NIL | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 332+150 | Y | LHS | Bagodar | - |
| 2 | 333+250 | + | BHS | Bagodar | Hazaribagh |
| 3 | 336+420 | Y | LHS | Bagodar | - |
| 4 | 353+950 | Y | LHS | Jamtara | - |
| 5 | 355+900 | + | BHS | Giridih | Bermo |

| S.No. | Chainage Km | Type of Junction | Side | Access Road Leads to | |
|---|---|---|---|---|---|
| | | | | LHS | RHS |
| 6 | 359+050 | Y | LHS | Jamtara | - |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 7 | 390+180 | Y | LHS | Rajganj | - |
| 8 | 390+970 | + | BHS | Rajganj | Jamshedpur |
| 9 | 392+520 | Y | LHS | Rajganj | - |



At Grade Separated Junction at Ch. 355+900 BHS



At Grade Separated Junction at Ch. 390+970 BHS

**Table 2.11: At Grade Minor Junction Along the Project Highway**

| S. No. | Chainage Km | Type of Junction | Side | Access Road Leads to | | Remarks |
|---|---|---|---|---|---|---|
| | | | | LHS | RHS | Junction at MCW/ Service Road / Slip Road |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | |
| 1 | 323+190 | T | LHS | Mundro | - | MCW |
| 2 | 323+210 | T | RHS | - | Atka | MCW |
| 3 | 323+530 | T | RHS | - | Atka | MCW |
| 4 | 324+050 | T | LHS | School | - | MCW |
| 5 | 324+140 | T | RHS | - | Atka | MCW |
| 6 | 324+450 | T | LHS | Gram Panchayat | - | MCW |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | |
| 7 | 328+210 | Y | LHS | Forest Department | - | MCW |
| 8 | 329+010 | T | RHS | - | Gainra | MCW |
| 9 | 329+775 | Y | LHS | Forest Department | - | MCW |
| 10 | 330+030 | T | LHS | Village Road | - | MCW |
| 11 | 330+120 | + | Both | Mahuri | Gaira | MCW |
| 12 | 330+160 | T | RHS | - | Dongo | MCW |
| 13 | 331+300 | T | LHS | Jarmune | - | Service Road |
| 14 | 331+900 | T | RHS | - | School | Service Road |
| 15 | 331+910 | T | LHS | Jarmune | - | Service Road |
| 16 | 336+960 | T | RHS | - | Village Road | Service Road |
| 17 | 337+530 | T | LHS | College | - | Service Road |
| 18 | 337+780 | T | LHS | Ghaghra | - | Service Road |
| 19 | 338+240 | X | BHS | Hesla | Village Road | Under VUP |

| S. No. | Chainage Km | Type of Junction | Side | Access Road Leads to | | Remarks |
|---|---|---|---|---|---|---|
| | | | | LHS | RHS | Junction at MCW/ Service Road / Slip Road |
| 20 | 339+800 | T | LHS | School | - | Service Road |
| 21 | 340+120 | T | LHS | Village Road | - | Service Road |
| 22 | 340+200 | T | LHS | Jamuniya | - | Service Road |
| 23 | 340+670 | T | LHS | Pathaldiha | - | Service Road |
| 24 | 340+750 | T | RHS | - | Tirla | Service Road |
| 25 | 341+370 | T | RHS | - | School | MCW |
| 26 | 342+280 | T | LHS | Pathaldiha | - | MCW |
| 27 | 343+170 | T | LHS | Pathaldiha | - | MCW |
| 28 | 343+430 | T | RHS | - | Tirla | MCW |
| 29 | 343+650 | T | LHS | Pathaldiha | - | MCW |
| 30 | 344+080 | Y | RHS | - | Kharkharo | MCW |
| 31 | 344+280 | T | LHS | Dama | - | Service Road |
| 32 | 345+350 | T | LHS | Ghuttibari | - | Service Road |
| 33 | 346+120 | + | BHS | Ghuttibari | Pochri | MCW |
| 34 | 347+730 | T | LHS | Ghuttibari | - | Service Road |
| 35 | 348+520 | T | RHS | - | Pokharia | MCW |
| 36 | 349+030 | T | LHS | Ghuttibari | - | MCW |
| 37 | 349+540 | T | RHS | - | Kenduatan | MCW |
| 38 | 350+430 | T | LHS | Chino | - | MCW |
| 39 | 350+690 | T | RHS | - | Kulgo | MCW |
| 40 | 350+840 | T | LHS | Chino | - | MCW |
| 41 | 351+200 | T | LHS | Chino | - | Service Road |
| 42 | 351+820 | Y | LHS | Village Road | - | MCW |
| 43 | 353+250 | T | RHS | - | Tambagurio | Service Road |
| 44 | 353+330 | T | LHS | Dumri | - | Service Road |
| 45 | 353+890 | + | BHS | Dumri | Village Road | Service Road |
| 46 | 354+360 | Y | RHS | - | Village Road | Service Road |
| 47 | 359+190 | T | RHS | - | Rangamati | MCW |
| 48 | 359+210 | Y | LHS | Baramasia | - | MCW |
| 49 | 359+310 | T | LHS | Baramasia | - | Service Road |
| 50 | 360+010 | T | LHS | Village Road | - | Service Road |
| 51 | 360+510 | T | LHS | Teliatura | - | MCW |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | |
| 52 | 360+340 | T | LHS | Rangamati | - | MCW |
| 53 | 360+370 | T | RHS | - | Village Road | MCW |
| 54 | 360+970 | T | RHS | - | Village Road | Service Road |
| 55 | 361+040 | T | RHS | - | Village Road | Service Road |
| 56 | 361+120 | T | RHS | - | Police Station | Service Road |
| 57 | 361+410 | T | RHS | - | Village Road | Service Road |
| 58 | 361+550 | T | RHS | - | Village Road | Service Road |
| 59 | 361+590 | T | LHS | Village Road | - | Service Road |
| 60 | 362+470 | T | RHS | - | Balutunda road | Service Road |
| 61 | 362+900 | T | RHS | - | Village Road | Service Road |
| 62 | 363+480 | T | RHS | - | Village Road | MCW |
| 63 | 363+500 | T | LHS | Village Road | - | MCW |
| 64 | 364+380 | T | RHS | - | Village Road | MCW |

| S. No. | Chainage Km | Type of Junction | Side | Access Road Leads to | | Remarks |
|---|---|---|---|---|---|---|
| | | | | LHS | RHS | Junction at MCW/ Service Road / Slip Road |
| 65 | 364+600 | T | LHS | Village Road | - | Service Road |
| 66 | 365+140 | T | RHS | - | Village Road | Service Road |
| 67 | 365+680 | T | RHS | - | Village Road | MCW |
| 68 | 365+860 | T | RHS | - | Village Road | MCW |
| 69 | 366+730 | T | RHS | - | Village Road | MCW |
| 70 | 366+910 | T | RHS | - | Village Road | MCW |
| 71 | 367+050 | T | RHS | - | Village Road | MCW |
| 72 | 367+620 | T | RHS | - | Barwadih | Service Road |
| 73 | 368+100 | T | RHS | - | Thakurchak | Service Road |
| 74 | 368+930 | T | LHS | Village Road | - | Service Road |
| 75 | 369+180 | T | RHS | - | Thakurchak | MCW |
| 76 | 369+500 | T | LHS | Karmatanr | - | MCW |
| 77 | 369+910 | T | RHS | - | Singhdih | MCW |
| 78 | 370+620 | T | RHS | - | Korkota | Service Road |
| 79 | 370+750 | + | Both | Kalyanpur | Lakshmipur | Service Road |
| 80 | 370+860 | T | LHS | Village Road | - | Service Road |
| 81 | 371+920 | T | LHS | Chinpur | - | MCW |
| 82 | 372+150 | T | RHS | - | Village Road | MCW |
| 83 | 372+550 | T | RHS | - | Village Road | MCW |
| 84 | 372+580 | T | LHS | Village Road | - | MCW |
| 85 | 373+250 | T | LHS | Village Road | - | MCW |
| 86 | 373+720 | T | LHS | Village Road | - | MCW |
| 87 | 374+770 | T | RHS | - | Narkopi | Service Road |
| 88 | 375+660 | T | RHS | - | Village Road | Service Road |
| 89 | 376+510 | T | LHS | Village Road | - | Service Road |
| 90 | 376+925 | T | RHS | - | - | Service Road |
| 91 | 377+220 | T | LHS | Madhukata | - | Service Road |
| 92 | 377+465 | T | LHS | Village Road | - | Service Road |
| 93 | 377+720 | Y | RHS | - | Gopalpur | Service Road |
| 94 | 377+760 | T | LHS | Madhukata | - | Service Road |
| 95 | 378+240 | T | LHS | Village Road | - | Service Road |
| 96 | 378+370 | T | LHS | Village Road | - | Service Road |
| 97 | 379+060 | T | RHS | - | Village Road | MCW |
| 98 | 379+160 | T | LHS | Khamardih | - | MCW |
| 99 | 380+290 | T | LHS | Madaidih | - | MCW |
| 100 | 380+360 | T | LHS | Madaidih | - | MCW |
| 101 | 381+450 | X | Both | Kamta | Sirampur | MCW |
| 102 | 382+330 | T | RHS | - | Kabirdih | MCW |
| 103 | 382+390 | T | RHS | - | Village Road | MCW |
| 104 | 382+520 | T | RHS | - | Village Road | Service Road |
| 105 | 382+940 | + | Both | Lokbad road | Kandedih | Service Road |
| 106 | 383+180 | T | RHS | - | Kandedih | Service Road |
| 107 | 383+480 | T | LHS | Lokbad road | - | Service Road |
| 108 | 384+620 | T | RHS | - | Village Road | Service Road |
| 109 | 385+520 | T | LHS | Village Road | - | MCW |
| 110 | 385+590 | T | LHS | Lachhmanpur | - | MCW |

| S. No. | Chainage Km | Type of Junction | Side | Access Road Leads to | | Remarks |
|---|---|---|---|---|---|---|
| | | | | LHS | RHS | Junction at MCW/ Service Road / Slip Road |
| 111 | 385+610 | T | RHS | - | Sidhabad | MCW |
| 112 | 386+280 | Y | LHS | Lachhmanpur | - | MCW |
| 113 | 386+830 | T | RHS | - | Dayabanspahar | MCW |
| 114 | 387+110 | T | LHS | - | - | MCW |
| 115 | 387+580 | T | LHS | Village Road | - | MCW |
| 116 | 387+700 | Y | RHS | - | Village Road | MCW |
| 117 | 387+930 | + | Both | Jarmunai | Bardar | MCW |
| 118 | 388+090 | T | LHS | Jarmunai | - | Service Road |
| 119 | 388+110 | T | RHS | - | Village Road | Service Road |
| 120 | 388+530 | X | Both | Village Road | Maheshpur | Service Road |
| 121 | 388+770 | Y | LHS | Village Road | - | Service Road |
| 122 | 389+310 | Y | RHS | - | Village Road | Service Road |
| 123 | 389+520 | T | LHS | Village Road | - | Service Road |
| 124 | 389+730 | T | LHS | School | - | Service Road |
| 125 | 389+910 | T | LHS | Village Road | - | Service Road |
| 126 | 390+050 | T | RHS | - | Village Road | Service Road |
| 127 | 391+710 | T | RHS | - | Village Road | Service Road |
| 128 | 392+140 | T | RHS | - | Village Road | Service Road |
| 129 | 392+160 | T | LHS | Rajganj | - | Service Road |
| 130 | 392+790 | T | Both | Village Road | Village Road | Service Road |
| 131 | 393+460 | T | LHS | Giridih | - | Service Road |
| 132 | 394+460 | T | LHS | Village Road | - | Service Road |
| 133 | 395+230 | T | RHS | - | Village Road | Service Road |
| 134 | 395+800 | T | LHS | Village Road | - | Service Road |
| 135 | 396+000 | T | LHS | Village Road | - | Service Road |
| 136 | 396+380 | T | RHS | - | Village Road | Service Road |
| 137 | 396+650 | T | LHS | Village Road | - | Service Road |
| 138 | 397+060 | T | RHS | - | Village Road | Service Road |
| 139 | 397+650 | T | RHS | - | Udaypur | Service Road |
| 140 | 398+225 | T | RHS | - | Village Road | Service Road |
| 141 | 398+725 | T | RHS | - | Village Road | Service Road |
| 142 | 398+780 | T | LHS | Village Road | - | Service Road |
| 143 | 399+210 | T | LHS | Village Road | - | Service Road |
| 144 | 399+490 | T | RHS | - | Village Road | Service Road |
| 145 | 399+950 | T | LHS | Street road | - | Service Road |
| 146 | 400+010 | T | LHS | Street road | - | Service Road |



At Grade Junction at Ch. 349+030 LHS



At Grade Junction at Ch. 379+160 LHS

**Table 2.11 (A): Grade Separated Minor Junction Along the Project Highway**

| S. No. | Chainage Km | Type of Junction | Side | Access Road Leads to | |
|---|---|---|---|---|---|
| | | | | LHS | RHS |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | |
| **NIL** | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 346+810 | T | LHS | Ghuttibari | - |
| 2 | 354+420 | Y | LHS | Jamtara | - |
| 3 | 359+590 | T | RHS | - | Rangamati |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 4 | 362+710 | + | Both | Sammed Shikharji | Nimiyaghat Sation |
| 5 | 368+550 | T | RHS | - | Village Road |
| 6 | 374+300 | + | Both | Topchanchi | Narkopi |
| 7 | 384+430 | + | Both | Kotaldih | Katrasgarh |
| 8 | 395+750 | X | Both | Sadhubad | Village Road |



At Grade Separated Junction at Ch. 374+300 RHS



At Grade Separated Junction at Ch. 395+750 RHS

### 2.4.7 Median Openings

Details of median openings observed along the Project Stretch are given in **Table 2.12**.

**Table 2.12: List of Median Openings**

| S. No. | Chainage Km | | Length (m) | Storage Lane |
|---|---|---|---|---|
| | From | To | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | |
| 1 | 321+219 | 321+244 | 25 | No |
| 2 | 323+185 | 323+210 | 25 | No |
| 3 | 324+171 | 324+193 | 22 | No |
| 4 | 325+801 | 325+817 | 16 | No |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | |
| 5 | 340+628 | 340+653 | 25 | No |
| 6 | 344+088 | 344+113 | 25 | No |
| 7 | 345+378 | 345+403 | 25 | No |
| 8 | 347+728 | 347+753 | 25 | No |
| 9 | 349+028 | 349+053 | 25 | No |
| 10 | 350+688 | 350+713 | 25 | No |
| 11 | 352+318 | 352+343 | 25 | No |
| 12 | 353+908 | 353+933 | 25 | Yes |
| 13 | 355+508 | 355+533 | 25 | No |
| 14 | 359+080 | 359+120 | 40 | No |
| 15 | 360+488 | 360+513 | 25 | No |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | |
| 16 | 361+038 | 361+063 | 25 | No |
| 17 | 364+338 | 364+363 | 25 | No |
| 18 | 365+638 | 365+663 | 25 | No |
| 19 | 367+608 | 367+633 | 25 | No |
| 20 | 371+888 | 371+913 | 25 | No |
| 21 | 375+825 | 375+875 | 50 | Yes |
| 22 | 377+688 | 377+713 | 25 | Yes |
| 23 | 379+088 | 379+113 | 25 | No |
| 24 | 381+438 | 381+463 | 25 | No |
| 25 | 382+938 | 382+963 | 25 | No |
| 26 | 386+798 | 386+823 | 25 | No |
| 27 | 388+438 | 388+463 | 25 | No |
| 28 | 393+438 | 393+463 | 25 | No |
| 29 | 397+638 | 397+663 | 25 | No |
| 30 | 399+198 | 399+223 | 25 | No |



Median Openings at Ch. 323+198



Median Openings at Ch. 371+901

### 2.4.8 Drains

Details of existing Drains on Project Stretch as given in **Table 2.13.**

**Table 2.13: Drains along the Project Stretch**

| S. No. | Chainage Km | | Length (m) | Side | Location | Drain Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | |
| NIL | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | |
| 1 | 331+070 | 331+830 | 760 | BHS | S/R & MCW | RCC Cover Drain |
| 2 | 331+840 | 333+210 | 1370 | LHS | SR Shoulder | RCC Cover Drain |
| 3 | 331+840 | 332+925 | 1085 | RHS | SR Shoulder | RCC Cover Drain |
| 4 | 333+000 | 333+200 | 200 | RHS | SR Shoulder | RCC Cover Drain |
| 5 | 336+210 | 336+470 | 260 | LHS | SR Shoulder | RCC Cover Drain |
| 6 | 336+400 | 336+880 | 480 | RHS | SR Shoulder | RCC Cover Drain |
| 7 | 336+800 | 336+875 | 75 | LHS | SR Shoulder | RCC Cover Drain |
| 8 | 336+875 | 338+875 | 2000 | BHS | S/R & MCW | RCC Cover Drain |
| 9 | 338+875 | 339+775 | 900 | BHS | SR Shoulder | RCC Cover Drain |
| 10 | 339+775 | 340+780 | 1005 | BHS | S/R & MCW | RCC Cover Drain |
| 11 | 344+210 | 345+880 | 1670 | BHS | S/R & MCW | RCC Cover Drain |
| 12 | 346+460 | 346+860 | 400 | BHS | SR Shoulder | RCC Cover Drain |
| 13 | 346+875 | 346+930 | 55 | RHS | SR Shoulder | RCC Cover Drain |
| 14 | 347+550 | 347+880 | 330 | BHS | S/R & MCW | RCC Cover Drain |
| 15 | 349+250 | 349+375 | 125 | BHS | S/R & MCW | RCC Cover Drain |
| 16 | 350+285 | 350+400 | 115 | LHS | Shoulder | RCC Open Drain |
| 17 | 350+850 | 351+280 | 430 | BHS | S/R & MCW | RCC Cover Drain |
| 18 | 351+975 | 352+130 | 155 | LHS | Shoulder (Toll Plaza) | RCC Cover Drain |
| 19 | 352+960 | 354+070 | 1110 | BHS | S/R & MCW | RCC Cover Drain |
| 20 | 354+070 | 354+850 | 780 | BHS | SR Shoulder | RCC Cover Drain |
| 21 | 354+860 | 355+810 | 950 | LHS | S/R & MCW | RCC Cover Drain |
| 22 | 355+000 | 355+840 | 840 | RHS | S/R & MCW | RCC Cover Drain |
| 23 | 355+875 | 356+840 | 965 | LHS | SR Shoulder | RCC Cover Drain |
| 24 | 355+890 | 356+170 | 280 | RHS | SR Shoulder | RCC Cover Drain |
| 25 | 356+170 | 357+220 | 1050 | RHS | S/R & MCW | RCC Cover Drain |
| 26 | 356+910 | 357+570 | 660 | LHS | SR Shoulder | RCC Cover Drain |
| 27 | 357+220 | 357+780 | 560 | RHS | SR Shoulder | RCC Cover Drain |
| 28 | 359+260 | 359+550 | 290 | BHS | SR Shoulder | RCC Cover Drain |
| 29 | 359+570 | 360+120 | 550 | RHS | SR Shoulder | RCC Cover Drain |
| 30 | 359+650 | 360+110 | 460 | LHS | SR Shoulder | RCC Cover Drain |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | |
| 31 | 362+240 | 362+430 | 190 | LHS | SR Shoulder | RCC Cover Drain |
| 32 | 362+240 | 362+380 | 140 | RHS | SR Shoulder | RCC Cover Drain |
| 33 | 362+400 | 363+355 | 955 | RHS | SR Shoulder | RCC Cover Drain |
| 34 | 362+560 | 362+610 | 50 | LHS | SR Shoulder | RCC Cover Drain |
| 35 | 362+700 | 363+350 | 650 | LHS | SR Shoulder | RCC Cover Drain |
| 36 | 364+480 | 365+640 | 1160 | LHS | Shoulder | RCC Cover Drain |
| 37 | 367+240 | 367+740 | 500 | LHS | SR Shoulder | RCC Cover Drain |
| 38 | 367+820 | 368+790 | 970 | LHS | SR Shoulder | RCC Cover Drain |
| 39 | 368+180 | 368+970 | 790 | RHS | SR Shoulder | RCC Cover Drain |

| S. No. | Chainage Km | | Length (m) | Side | Location | Drain Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 40 | 369+160 | 369+535 | 375 | LHS | SR Shoulder | RCC Cover Drain |
| 41 | 369+985 | 370+180 | 195 | LHS | SR Shoulder | RCC Cover Drain |
| 42 | 370+310 | 371+010 | 700 | LHS | SR Shoulder | RCC Cover Drain |
| 43 | 370+410 | 370+700 | 290 | RHS | SR Shoulder | RCC Cover Drain |
| 44 | 372+240 | 372+400 | 160 | RHS | S/R & MCW | RCC Cover Drain |
| 45 | 372+400 | 372+550 | 150 | LHS | SR Shoulder | RCC Cover Drain |
| 46 | 373+850 | 375+880 | 2030 | LHS | SR Shoulder | RCC Cover Drain |
| 47 | 373+950 | 374+190 | 240 | RHS | SR Shoulder | RCC Cover Drain |
| 48 | 373+950 | 374+190 | 240 | RHS | SR Shoulder | RCC Cover Drain |
| 49 | 374+360 | 375+385 | 1025 | RHS | SR Shoulder | RCC Cover Drain |
| 50 | 375+410 | 375+910 | 500 | RHS | SR Shoulder | RCC Cover Drain |
| 51 | 375+965 | 376+040 | 75 | RHS | SR Shoulder | RCC Cover Drain |
| 52 | 376+120 | 376+300 | 180 | RHS | SR Shoulder | RCC Cover Drain |
| 53 | 376+285 | 376+310 | 25 | LHS | SR Shoulder | RCC Cover Drain |
| 54 | 383+635 | 385+190 | 1555 | LHS | SR Shoulder | RCC Cover Drain |
| 55 | 383+635 | 385+220 | 1585 | RHS | SR Shoulder | RCC Cover Drain |
| 56 | 389+610 | 389+940 | 330 | LHS | SR Shoulder | RCC Cover Drain |
| 57 | 389+620 | 390+285 | 665 | RHS | SR Shoulder | RCC Cover Drain |
| 58 | 390+180 | 390+280 | 100 | LHS | SR Shoulder | RCC Cover Drain |
| 59 | 390+345 | 390+915 | 570 | BHS | SR Shoulder | RCC Cover Drain |
| 60 | 390+945 | 391+060 | 115 | BHS | SR Shoulder | RCC Cover Drain |
| 61 | 391+110 | 391+120 | 10 | LHS | SR Shoulder | RCC Cover Drain |
| 62 | 391+100 | 391+285 | 185 | RHS | SR Shoulder | RCC Cover Drain |
| 63 | 391+455 | 391+825 | 370 | LHS | S/R & MCW | Open V Drain |
| 64 | 391+510 | 391+845 | 335 | RHS | S/R & MCW | Open V Drain |
| 65 | 392+125 | 392+890 | 765 | RHS | SR Shoulder | RCC Cover Drain |
| 66 | 392+135 | 392+490 | 355 | LHS | SR Shoulder | RCC Cover Drain |
| 67 | 392+570 | 392+742 | 172 | LHS | SR Shoulder | RCC Cover Drain |
| 68 | 392+755 | 392+900 | 145 | LHS | SR Shoulder | RCC Cover Drain |
| 69 | 394+285 | 394+320 | 35 | LHS | S/R & MCW | Line drain |
| 70 | 394+300 | 394+320 | 20 | RHS | S/R & MCW | Line drain |
| 71 | 394+945 | 395+700 | 755 | LHS | SR Shoulder | RCC Cover Drain |
| 72 | 394+945 | 396+735 | 1790 | RHS | SR Shoulder | RCC Cover Drain |
| 73 | 395+715 | 395+760 | 45 | LHS | SR Shoulder | RCC Cover Drain |
| 74 | 395+795 | 396+355 | 560 | LHS | SR Shoulder | RCC Cover Drain |
| 75 | 396+365 | 396+815 | 450 | LHS | SR Shoulder | RCC Cover Drain |
| 76 | 396+765 | 396+830 | 65 | RHS | SR Shoulder | RCC Cover Drain |

### 2.4.9 Retaining Wall/RE wall/Wing Wall/Toe Wall/Stone Pitching

The details of RE wall provided in the project is given in **Table 2.14.**

**Table 2.14: Retaining Wall Panels**

| S. No | LHS | | | RHS | | |
|---|---|---|---|---|---|---|
| | Chainage | | Length | Chainage | | Length |
| | From | To | | From | To | |
| **Section-1 from Km 320+810 to 326+000 (Retained 4 Lane)** | | | | | | |
| NIL | | | | | | |

| S. No | LHS | | | RHS | | |
|---|---|---|---|---|---|---|
| | Chainage | | Length | Chainage | | Length |
| | From | To | | From | To | |
| **Section-2 from Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | |
| 1 | 331+850 | 333+310 | 1460 | 331+850 | 333+310 | 1460 |
| 2 | 336+180 | 336+900 | 720 | 336+430 | 336+900 | 470 |
| 3 | 338+890 | 339+800 | 910 | 338+890 | 339+800 | 910 |
| 4 | 346+480 | 346+950 | 470 | 346+480 | 346+950 | 470 |
| 5 | 354+090 | 354+890 | 800 | 354+090 | 354+890 | 800 |
| 6 | 355+900 | 357+800 | 1900 | 355+900 | 356+190 | 290 |
| 7 | - | - | - | 357+240 | 357+800 | 560 |
| 8 | 359+280 | 360+140 | 860 | 359+280 | 360+140 | 860 |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | |
| 9 | 362+300 | 363+370 | 1070 | 362+300 | 363+370 | 1070 |
| 10 | 368+200 | 368+970 | 770 | 368+200 | 368+970 | 770 |
| 11 | 370+050 | 370+650 | 600 | 370+050 | 370+650 | 600 |
| 12 | 373+800 | 374+800 | 1000 | 373+800 | 374+800 | 1000 |
| 13 | 383+820 | 385+010 | 1190 | 383+820 | 385+010 | 1190 |
| 14 | 389+800 | 391+350 | 1550 | 389+800 | 391+350 | 1550 |
| 15 | 391+900 | 392+800 | 900 | 391+900 | 392+800 | 900 |
| 16 | 395+120 | 396+750 | 1630 | 395+120 | 396+750 | 1630 |
| **Total** | | | **15830** | **Total** | | **14530** |

### 2.4.10 Type of Pavement

There is Flexible Pavement along the entire length of the Project Road while, Toll Plaza area having Rigid Pavement.

**Table 2.15: Pavement Type**

| S. No. | Existing Kilometer (Km) | | Pavement Type | | Remarks |
|---|---|---|---|---|---|
| | From | To | LHS | RHS | |
| 1 | 320+810 | 400+632 | Flexible | Flexible | Excluding Toll Plaza at (Kulgo 352+100 km) |

## 2.5 PROJECT FACILITIES

### 2.5.1 ATMS/HTMS

The details of ATMS along the project road is given below:

**Table 2.16: Details of ATMS on the Project Highway**

| S. No. | Equipment Description | Unit | Total Quantity | | |
|---|---|---|---|---|---|
| | | | Km 320+810 to Km 326+000 | Km 326+000 to Km 360+300 | Km 360+300 to Km 400+632 |
| 1 | CCTV PTZ Cameras | No | DPR in Progress | 11 | 9 |
| 2 | VIDS/VIDES | No | | 2 | 8 |
| 3 | ATCC | No | | 2 | 2 |
| 4 | VMS | No | | 3 | 2 |
| 5 | MET | No | | 1 | - |
| 6 | Portable VMS | No | | - | 1 |
| 7 | ECB | No | | 12 | 17 |

### 2.5.2 Details of Bus Bays/ Bus Stops

The following are the details of Bus Bays/Bus Shelters along the project road as given in **Table 2.17.**

**Table 2.17: Bus Bays/Bus Shelter**

| S. No. | Chainage Km | Side | Location | Name of Habitation | Type |
|---|---|---|---|---|---|
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | |
| NIL | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 326+550 | LHS | MCW | - | Bus Shelter |
| 2 | 331+800 | LHS | SR | Jarmune | Bus Shelter |
| 3 | 331+800 | RHS | SR | Jarmune | Bus Shelter |
| 4 | 339+100 | RHS | SR | Hesla | Bus Shelter |
| 5 | 340+750 | LHS | SR | Hesla | Bus Shelter |
| 6 | 354+120 | LHS | SR | Simradih | Bus Shelter |
| 7 | 354+120 | RHS | SR | Simradih | Bus Shelter |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 8 | 364+650 | LHS | SR | Haithnagar | Bus Shelter |
| 9 | 364+650 | RHS | SR | Haithnagar | Bus Shelter |
| 10 | 370+120 | LHS | SR | Singhdih | Bus Shelter |
| 11 | 370+850 | LHS | SR | Satkira | Bus Shelter |
| 12 | 370+851 | RHS | SR | Satkira | Bus Shelter |
| 13 | 376+650 | LHS | SR | Topchanchi | Bus Shelter |
| 14 | 376+390 | RHS | SR | Topchanchi | Bus Shelter |
| 15 | 384+200 | LHS | SR | Kotal Adda | Bus Shelter |
| 16 | 386+330 | LHS | MCW | Charkipahadi | Bus Bays with Shelter |
| 17 | 386+330 | RHS | SR | Charkipahadi | Bus Shelter |
| 18 | 387+960 | RHS | SR | Jarmunai | Bus Shelter |
| 19 | 388+220 | LHS | SR | Jarmunai | Bus Shelter |
| 20 | 395+550 | LHS | SR | Kharni | Bus Shelter |
| 21 | 395+800 | RHS | SR | Kharni | Bus Shelter |
| 22 | 397+520 | LHS | SR | Jodapipal | Bus Shelter |
| 23 | 397+420 | RHS | SR | Jodapipal | Bus Shelter |
| 24 | 399+660 | LHS | SR | Kalyanpur | Bus Shelter |
| 25 | 399+700 | RHS | SR | Kalyanpur | Bus Shelter |

### 2.5.3 Details of Truck Lay Byes

The following are the details of Truck Lay Byes along the project road as given in **Table 2.18.**

**Table 2.18: Locations of Truck Lay Byes**

| S. No. | Chainage Km | Side | Name of Habitation | Remarks |
|---|---|---|---|---|
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | |
| NIL | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | |
| 1 | 341+770 | LHS | Hesla | |
| 2 | 342+780 | RHS | Hesla | |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | |
| 3 | 371+210 | RHS | Satkira | |

| S. No. | Chainage Km | Side | Name of Habitation | Remarks |
|---|---|---|---|---|
| 4 | 385+700 | LHS | Charkipahadi | |
| 5 | 387+400 | LHS | Jarmunai | |

## 2.6 ROAD FURNITURES

### 2.6.1 Lighting

The details of existing sections having street lightings and High masts as given in **Table 2.19A & 2.19B.**

**Table 2.19A: Locations of Street Lighting**

| S. No. | Chainage | | No. of Poles | Side | Type of Pole (Single Arm / Double Arm) |
|---|---|---|---|---|---|
| | From | To | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | |
| NIL | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 330+990 | 331+120 | 10 | Both | Single Arm |
| 2 | 331+150 | 333+380 | 202 | Both | Double Arm |
| 3 | 333+400 | 334+740 | 62 | Median | Double Arm |
| 4 | 334+770 | 334+830 | 6 | Both | Single Arm |
| 5 | 334+860 | 336+150 | 66 | Median | Double Arm |
| 6 | 336+180 | 336+410 | 12 | LHS + Median | Double Arm |
| 7 | 336+430 | 338+400 | 120 | Both | Double Arm |
| 8 | 338+990 | 340+600 | 98 | Both | Double Arm |
| 9 | 340+750 | 340+920 | 14 | Both | Single Arm |
| 10 | 341+750 | 341+940 | 9 | LHS | Single Arm |
| 11 | 342+660 | 342+900 | 9 | RHS | Single Arm |
| 12 | 344+120 | 344+220 | 10 | Both | Single Arm |
| 13 | 344+300 | 344+860 | 40 | Both | Double Arm |
| 14 | 350+620 | 350+860 | 18 | Both | Single Arm |
| 15 | 350+910 | 351+190 | 20 | Both | Double Arm |
| 16 | 351+210 | 351+370 | 12 | Both | Single Arm |
| 17 | 351+570 | 351+750 | 13 | Median | Double Arm |
| 18 | 351+640 | 351+750 | 7 | LHS | Single Arm |
| 19 | 352+450 | 352+770 | 15 | RHS | Single Arm |
| 20 | 352+460 | 352+750 | 20 | Median | Double Arm |
| 21 | 352+990 | 355+580 | 174 | Both | Double Arm |
| 22 | 355+600 | 355+870 | 15 | Median | Double Arm |
| 23 | 355+600 | 356+040 | 34 | Both (SR) | Single Arm |
| 24 | 355+915 | 356+040 | 12 | Both (MCW) | Single Arm |
| 25 | 356+060 | 356+190 | 9 | Both | Double Arm |
| 26 | 356+540 | 357+220 | 24 | LHS | Double Arm |
| 27 | 357+250 | 357+610 | 26 | Both | Double Arm |
| 28 | 357+640 | 357+800 | 5 | LHS | Double Arm |
| 29 | 357+640 | 357+800 | 5 | RHS | Single Arm |
| 30 | 357+820 | 357+940 | 11 | Both | Single Arm |
| 31 | 358+800 | 358+900 | 8 | Both | Double Arm |

| S. No. | Chainage | | No. of Poles | Side | Type of Pole (Single Arm / Double Arm) |
|---|---|---|---|---|---|
| | From | To | | | |
| 32 | 359+130 | 359+270 | 14 | Both | Single Arm |
| 33 | 359+300 | 360+130 | 70 | Both | Double Arm |
| 34 | 360+150 | 360+300 | 14 | Both | Single Arm |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 35 | 361+050 | 361+370 | 11 | Median | Double Arm |
| 36 | 361+400 | 363+370 | 134 | Both | Double Arm |
| 37 | 363+400 | 363+600 | 8 | Median | Double Arm |
| 38 | 364+320 | 364+530 | 7 | Median | Double Arm |
| 39 | 364+550 | 365+260 | 40 | Both | Double Arm |
| 40 | 365+290 | 365+490 | 8 | Median | Double Arm |
| 41 | 367+110 | 367+310 | 8 | Median | Double Arm |
| 42 | 367+340 | 368+970 | 98 | Both | Double Arm |
| 43 | 369+000 | 369+140 | 6 | Median | Double Arm |
| 44 | 369+890 | 369+990 | 4 | Median | Double Arm |
| 45 | 370+030 | 370+870 | 56 | Both | Double Arm |
| 46 | 371+100 | 371+400 | 11 | RHS | Single Arm |
| 47 | 372+030 | 372+650 | 21 | Median | Double Arm |
| 48 | 373+780 | 376+360 | 170 | Both | Double Arm |
| 49 | 376+820 | 378+730 | 114 | Both | Double Arm |
| 50 | 378+750 | 379+400 | 20 | Median | Double Arm |
| 51 | 382+200 | 382+400 | 8 | Median | Double Arm |
| 52 | 382+440 | 383+030 | 36 | Both | Double Arm |
| 53 | 383+430 | 383+640 | 8 | Median | Double Arm |
| 54 | 383+670 | 385+100 | 88 | Both | Double Arm |
| 55 | 385+030 | 385+090 | 3 | Median | Double Arm |
| 56 | 385+580 | 385+900 | 11 | LHS | Single Arm |
| 57 | 386+040 | 386+220 | 7 | Median | Double Arm |
| 58 | 386+250 | 386+970 | 44 | Both | Double Arm |
| 59 | 387+000 | 387+200 | 8 | Median | Double Arm |
| 60 | 387+340 | 387+400 | 3 | LHS | Single Arm |
| 61 | 387+540 | 387+680 | 5 | LHS | Single Arm |
| 62 | 387+880 | 388+080 | 8 | Median | Double Arm |
| 63 | 388+100 | 391+460 | 204 | Both | Double Arm |
| 64 | 391+490 | 391+880 | 14 | Median | Double Arm |
| 65 | 391+910 | 398+010 | 370 | Both | Double Arm |
| 66 | 398+580 | 400+130 | 94 | Both | Double Arm |
| **Total** | | | **2811** | | |

**Table 2.19B: Locations of High Mast Light**

| S.No. | Chainage | Nos. | Remarks |
|---|---|---|---|
| 1 | 352+100 | 6 | Toll Plaza (Kulgo) |
| 2 | 353+950 | 1 | Major Junction (Start of Dumri Bypass) |
| 3 | 359+050 | 1 | Major Junction (End of Dumri Bypass) |
| **Total** | | **8** | |



High Mast Light at 353+950



High Mast Light at Toll Plaza 352+100

### 2.6.2 Traffic Blinkers

The project stretch has 44 Nos. of Traffic Blinkers.



Traffic Blinkers Light at 361+038



Traffic Blinkers Light at 375+875

### 2.6.3 Safety Barriers

Details of existing Metallic Beam Crash Barrier as given in **Table 2.20.**

**Table 2.20: W-beam Safety Barrier**

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Section-1 from Km 320+810 to 326+000 (Retained 4 Lane)** | | | | | | |
| 1 | 320+850 | 320+880 | W-Beam | 30 | LHS | MCW |
| 2 | 321+250 | 321+300 | W-Beam | 50 | RHS | MCW |
| 3 | 325+990 | 326+000 | W-Beam | 10 | LHS | MCW |
| **Section-2 from Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | |
| 4 | 326+000 | 326+040 | W-Beam | 40 | LHS | MCW |
| 5 | 326+190 | 326+220 | W-Beam | 30 | LHS | MCW |
| 6 | 326+550 | 326+750 | W-Beam | 200 | LHS | MCW |
| 7 | 328+500 | 328+530 | W-Beam | 30 | LHS | MCW |
| 8 | 328+580 | 328+660 | W-Beam | 80 | LHS | MCW |

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 9 | 328+580 | 328+800 | W-Beam | 220 | RHS | MCW |
| 10 | 328+650 | 328+950 | W-Beam | 600 | Median | Median |
| 11 | 329+300 | 329+700 | W-Beam | 400 | RHS | MCW |
| 12 | 329+330 | 329+360 | W-Beam | 30 | LHS | MCW |
| 13 | 329+430 | 329+480 | W-Beam | 50 | LHS | MCW |
| 14 | 329+510 | 330+050 | W-Beam | 1080 | Median | Median |
| 15 | 329+530 | 329+580 | W-Beam | 50 | LHS | MCW |
| 16 | 331+100 | 331+850 | PGR | 750 | RHS | MCW |
| 17 | 331+150 | 331+850 | PGR | 700 | LHS | MCW |
| 18 | 331+850 | 331+910 | W-Beam | 60 | LHS | MCW |
| 19 | 331+850 | 331+950 | W-Beam | 100 | RHS | MCW |
| 20 | 331+910 | 332+530 | RCC | 620 | LHS | MCW |
| 21 | 331+950 | 333+400 | RCC | 1450 | RHS | MCW |
| 22 | 332+530 | 332+940 | W-Beam | 410 | LHS | MCW |
| 23 | 332+940 | 333+280 | RCC | 340 | LHS | MCW |
| 24 | 333+380 | 333+400 | RCC | 20 | LHS | MCW |
| 25 | 333+400 | 333+580 | W-Beam | 180 | LHS | MCW |
| 26 | 333+400 | 333+600 | W-Beam | 200 | RHS | MCW |
| 27 | 334+010 | 334+070 | W-Beam | 60 | RHS | MCW |
| 28 | 334+020 | 334+080 | W-Beam | 60 | LHS | MCW |
| 29 | 334+330 | 334+350 | W-Beam | 20 | LHS | MCW |
| 30 | 334+890 | 334+910 | W-Beam | 20 | RHS | MCW |
| 31 | 334+900 | 335+020 | W-Beam | 120 | RHS | MCW |
| 32 | 335+225 | 335+400 | W-Beam | 175 | LHS | MCW |
| 33 | 335+380 | 335+400 | W-Beam | 20 | RHS | MCW |
| 34 | 336+180 | 336+215 | W-Beam | 35 | LHS | MCW |
| 35 | 336+215 | 336+730 | RCC | 515 | LHS | MCW |
| 36 | 336+220 | 336+390 | W-Beam | 170 | RHS | MCW |
| 37 | 336+390 | 336+650 | RCC | 260 | RHS | MCW |
| 38 | 336+650 | 336+900 | W-Beam | 250 | RHS | MCW |
| 39 | 336+730 | 336+790 | W-Beam | 60 | LHS | MCW |
| 40 | 336+900 | 338+890 | PGR | 1990 | RHS | MCW |
| 41 | 336+920 | 338+910 | PGR | 1990 | LHS | MCW |
| 42 | 338+890 | 338+960 | W-Beam | 70 | RHS | MCW |
| 43 | 338+910 | 338+980 | W-Beam | 70 | LHS | MCW |
| 44 | 338+960 | 339+690 | RCC | 730 | RHS | MCW |
| 45 | 338+980 | 339+650 | RCC | 670 | LHS | MCW |
| 46 | 339+650 | 339+750 | W-Beam | 100 | LHS | MCW |
| 47 | 339+690 | 339+780 | W-Beam | 90 | RHS | MCW |
| 48 | 339+750 | 340+750 | PGR | 1000 | LHS | MCW |
| 49 | 339+780 | 340+750 | PGR | 970 | RHS | MCW |
| 50 | 339+850 | 340+250 | W-Beam | 800 | Median | Median |
| 51 | 339+950 | 340+000 | W-Beam | 50 | RHS | Service Road |
| 52 | 340+400 | 340+550 | W-Beam | 150 | RHS | Service Road |
| 53 | 342+020 | 342+050 | W-Beam | 30 | LHS | MCW |
| 54 | 342+080 | 342+110 | W-Beam | 30 | LHS | MCW |
| 55 | 342+450 | 342+480 | W-Beam | 30 | LHS | MCW |

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 56 | 342+480 | 342+500 | RCC | 20 | LHS | MCW |
| 57 | 342+500 | 342+850 | W-Beam | 350 | LHS | MCW |
| 58 | 342+750 | 343+100 | W-Beam | 350 | RHS | MCW |
| 59 | 343+600 | 343+670 | W-Beam | 70 | LHS | MCW |
| 60 | 343+720 | 343+750 | W-Beam | 30 | LHS | MCW |
| 61 | 344+220 | 345+850 | PGR | 1630 | LHS | MCW |
| 62 | 344+500 | 344+600 | W-Beam | 100 | LHS | Service Road |
| 63 | 344+980 | 345+240 | W-Beam | 260 | LHS | Service Road |
| 64 | 345+050 | 345+150 | W-Beam | 100 | RHS | Service Road |
| 65 | 345+220 | 345+900 | PGR | 680 | RHS | MCW |
| 66 | 345+400 | 345+900 | W-Beam | 500 | LHS | Service Road |
| 67 | 346+470 | 346+490 | W-Beam | 40 | BHS | Median |
| 68 | 346+490 | 346+560 | PGR | 70 | LHS | MCW |
| 69 | 346+490 | 346+560 | W-Beam | 70 | RHS | MCW |
| 70 | 346+490 | 346+950 | NJB | 460 | Median | Median |
| 71 | 346+560 | 346+880 | RCC | 320 | LHS | MCW |
| 72 | 346+560 | 346+880 | RCC | 320 | RHS | MCW |
| 73 | 346+880 | 346+950 | PGR | 70 | LHS | MCW |
| 74 | 346+880 | 346+950 | W-Beam | 70 | RHS | MCW |
| 75 | 346+900 | 346+970 | W-Beam | 70 | LHS | Service Road |
| 76 | 346+950 | 346+970 | W-Beam | 40 | Median | Median |
| 77 | 346+950 | 347+050 | W-Beam | 100 | LHS | MCW |
| 78 | 347+200 | 347+240 | W-Beam | 40 | LHS | MCW |
| 79 | 347+530 | 347+800 | W-Beam | 270 | RHS | Service Road |
| 80 | 347+580 | 347+920 | PGR | 340 | RHS | MCW |
| 81 | 347+600 | 347+920 | PGR | 320 | LHS | MCW |
| 82 | 348+420 | 348+420 | W-Beam | 0 | LHS | MCW |
| 83 | 348+480 | 348+500 | W-Beam | 20 | LHS | MCW |
| 84 | 348+540 | 348+570 | W-Beam | 30 | RHS | MCW |
| 85 | 349+280 | 349+400 | PGR | 120 | LHS | MCW |
| 86 | 349+280 | 349+400 | PGR | 120 | RHS | MCW |
| 87 | 349+550 | 349+650 | W-Beam | 100 | RHS | MCW |
| 88 | 350+155 | 350+170 | W-Beam | 15 | RHS | MCW |
| 89 | 350+350 | 350+980 | W-Beam | 1260 | Median | Median |
| 90 | 350+750 | 350+900 | W-Beam | 150 | RHS | Service Road |
| 91 | 350+870 | 351+330 | PGR | 460 | LHS | MCW |
| 92 | 350+880 | 351+300 | PGR | 420 | RHS | MCW |
| 93 | 351+100 | 351+200 | W-Beam | 100 | RHS | Service Road |
| 94 | 352+800 | 352+900 | W-Beam | 200 | Median | Median |
| 95 | 352+930 | 352+980 | W-Beam | 100 | Median | Median |
| 96 | 352+980 | 354+080 | PGR | 1100 | LHS | MCW |
| 97 | 352+980 | 353+560 | PGR | 580 | RHS | MCW |
| 98 | 353+100 | 353+250 | W-Beam | 150 | LHS | Service Road |
| 99 | 353+740 | 354+090 | PGR | 350 | RHS | MCW |
| 100 | 354+080 | 354+200 | W-Beam | 120 | LHS | MCW |
| 101 | 354+090 | 354+190 | W-Beam | 100 | RHS | MCW |
| 102 | 354+190 | 354+870 | RCC | 680 | RHS | MCW |

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 103 | 354+200 | 354+750 | RCC | 550 | LHS | MCW |
| 104 | 354+750 | 354+880 | W-Beam | 130 | LHS | MCW |
| 105 | 354+850 | 354+870 | W-Beam | 20 | LHS | Service Road |
| 106 | 354+870 | 355+000 | W-Beam | 130 | RHS | MCW |
| 107 | 354+880 | 355+570 | PGR | 690 | LHS | MCW |
| 108 | 355+000 | 355+580 | PGR | 580 | RHS | MCW |
| 109 | 355+570 | 355+880 | W-Beam | 310 | LHS | MCW |
| 110 | 355+580 | 355+880 | W-Beam | 300 | RHS | MCW |
| 111 | 355+880 | 356+200 | RCC | 320 | LHS | MCW |
| 112 | 355+880 | 356+170 | RCC | 290 | RHS | MCW |
| 113 | 356+170 | 356+190 | W-Beam | 20 | RHS | MCW |
| 114 | 356+190 | 357+240 | PGR | 1050 | RHS | MCW |
| 115 | 356+200 | 356+545 | W-Beam | 345 | LHS | MCW |
| 116 | 356+454 | 357+770 | RCC | 1316 | LHS | MCW |
| 117 | 357+240 | 357+620 | W-Beam | 380 | RHS | MCW |
| 118 | 357+660 | 357+800 | W-Beam | 140 | RHS | MCW |
| 119 | 357+770 | 357+800 | W-Beam | 30 | LHS | MCW |
| 120 | 358+040 | 358+080 | W-Beam | 40 | LHS | MCW |
| 121 | 358+040 | 358+080 | W-Beam | 40 | RHS | MCW |
| 122 | 358+200 | 358+800 | W-Beam | 1200 | BHS | 2+2 Lane median |
| 123 | 358+200 | 358+800 | W-Beam | 1200 | BHS | 2+2 Lane median |
| 124 | 358+900 | 358+990 | W-Beam | 180 | BHS | 2+2 Lane median |
| 125 | 358+900 | 358+990 | W-Beam | 180 | BHS | 2+2 Lane median |
| 126 | 358+990 | 359+060 | W-Beam | 70 | RHS | MCW |
| 127 | 359+170 | 360+310 | W-Beam | 2280 | Median | Median |
| 128 | 359+270 | 359+390 | W-Beam | 120 | LHS | MCW |
| 129 | 359+280 | 359+400 | W-Beam | 120 | RHS | MCW |
| 130 | 359+390 | 360+100 | RCC | 710 | LHS | MCW |
| 131 | 359+400 | 360+090 | RCC | 690 | RHS | MCW |
| 132 | 359+800 | 359+900 | W-Beam | 100 | RHS | MCW |
| 133 | 360+090 | 360+140 | W-Beam | 50 | RHS | MCW |
| 134 | 360+100 | 360+150 | W-Beam | 50 | LHS | MCW |
| **Section-3 – 360+300 to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | |
| 135 | 360+680 | 362+250 | Wire rope | 1570 | RHS | MCW |
| 136 | 360+800 | 361+050 | Wire rope | 250 | LHS | Service Road |
| 137 | 361+550 | 361+800 | Wire rope | 250 | LHS | MCW |
| 138 | 361+850 | 361+950 | W-Beam | 100 | LHS | Service Road |
| 139 | 361+900 | 362+250 | Wire rope | 350 | LHS | MCW |
| 140 | 362+380 | 362+430 | W-Beam | 50 | RHS | MCW |
| 141 | 362+400 | 363+190 | RCC | 790 | LHS | MCW |
| 142 | 362+430 | 363+180 | RCC | 750 | RHS | MCW |
| 143 | 363+180 | 363+230 | W-Beam | 50 | RHS | MCW |
| 144 | 363+190 | 363+220 | W-Beam | 30 | LHS | MCW |
| 145 | 363+200 | 363+380 | Wire rope | 180 | LHS | MCW |
| 146 | 363+550 | 363+660 | W-Beam | 110 | RHS | MCW |
| 147 | 363+710 | 364+500 | Wire rope | 790 | LHS | MCW |
| 148 | 364+150 | 364+480 | Wire rope | 330 | RHS | Service Road |

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 149 | 364+420 | 365+280 | Wire rope | 860 | RHS | MCW |
| 150 | 365+440 | 365+450 | W-Beam | 10 | RHS | MCW |
| 151 | 365+850 | 365+870 | W-Beam | 20 | RHS | MCW |
| 152 | 365+880 | 365+980 | W-Beam | 100 | RHS | MCW |
| 153 | 366+080 | 366+240 | W-Beam | 160 | LHS | MCW |
| 154 | 366+150 | 366+250 | W-Beam | 100 | RHS | MCW |
| 155 | 366+360 | 366+500 | W-Beam | 140 | RHS | 2+2 Lane median |
| 156 | 366+650 | 366+750 | Wire rope | 100 | LHS | 2+2 Lane median |
| 157 | 366+800 | 368+200 | Wire rope | 1400 | RHS | MCW |
| 158 | 367+250 | 368+200 | Wire rope | 950 | LHS | MCW |
| 159 | 368+230 | 368+260 | W-Beam | 30 | LHS | MCW |
| 160 | 368+260 | 368+930 | RCC | 670 | LHS | MCW |
| 161 | 368+280 | 368+880 | RCC | 600 | RHS | MCW |
| 162 | 368+300 | 368+430 | Wire rope | 130 | RHS | Service Road |
| 163 | 368+880 | 368+910 | W-Beam | 30 | RHS | MCW |
| 164 | 368+930 | 368+950 | W-Beam | 20 | LHS | MCW |
| 165 | 369+370 | 369+430 | W-Beam | 60 | RHS | 2+2 Lane median |
| 166 | 369+400 | 369+730 | Wire rope | 330 | LHS | MCW |
| 167 | 369+460 | 369+750 | Wire rope | 290 | RHS | 2+2 Lane median |
| 168 | 370+030 | 370+050 | W-Beam | 20 | LHS | MCW |
| 169 | 370+050 | 370+650 | RCC | 600 | LHS | MCW |
| 170 | 370+080 | 370+120 | W-Beam | 40 | RHS | MCW |
| 171 | 370+120 | 370+660 | RCC | 540 | RHS | MCW |
| 172 | 370+650 | 370+680 | W-Beam | 30 | LHS | MCW |
| 173 | 370+660 | 370+730 | W-Beam | 70 | RHS | MCW |
| 174 | 371+030 | 371+350 | W-Beam | 320 | RHS | MCW |
| 175 | 371+200 | 371+250 | W-Beam | 50 | LHS | MCW |
| 176 | 371+450 | 371+850 | W-Beam | 400 | RHS | MCW |
| 177 | 371+490 | 371+780 | Wire rope | 290 | LHS | 2+2 Lane median |
| 178 | 371+500 | 371+850 | W-Beam | 350 | RHS | 2+2 Lane median |
| 179 | 372+280 | 372+450 | Wire rope | 170 | LHS | MCW |
| 180 | 372+450 | 372+660 | W-Beam | 210 | LHS | Service Road |
| 181 | 373+120 | 373+180 | W-Beam | 60 | RHS | MCW |
| 182 | 373+450 | 373+700 | Wire rope | 250 | LHS | MCW |
| 183 | 373+580 | 373+600 | W-Beam | 20 | RHS | MCW |
| 184 | 373+800 | 374+800 | RCC | 1000 | LHS | MCW |
| 185 | 373+820 | 373+870 | W-Beam | 50 | RHS | MCW |
| 186 | 373+870 | 374+820 | RCC | 950 | RHS | MCW |
| 187 | 374+800 | 374+850 | W-Beam | 50 | LHS | MCW |
| 188 | 374+820 | 374+870 | W-Beam | 50 | RHS | MCW |
| 189 | 374+900 | 378+750 | Wire rope | 3850 | LHS | MCW B/w SR |
| 190 | 374+950 | 378+750 | Wire rope | 3800 | RHS | MCW |
| 191 | 375+820 | 376+800 | W-Beam | 1960 | Median | Median |
| 192 | 377+000 | 377+150 | Wire rope | 150 | RHS | Service Road |
| 193 | 377+400 | 377+500 | W-Beam | 100 | RHS | Service Road |
| 194 | 377+900 | 378+050 | Wire rope | 150 | RHS | Service Road |
| 195 | 378+150 | 378+220 | W-Beam | 70 | LHS | Service Road |

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 196 | 379+020 | 379+040 | W-Beam | 20 | LHS | MCW |
| 197 | 379+100 | 379+180 | W-Beam | 80 | RHS | MCW |
| 198 | 379+380 | 379+430 | W-Beam | 50 | LHS | MCW |
| 199 | 379+400 | 379+550 | W-Beam | 150 | RHS | MCW |
| 200 | 379+700 | 379+900 | W-Beam | 200 | RHS | MCW |
| 201 | 379+750 | 379+780 | Wire rope | 30 | LHS | MCW |
| 202 | 380+050 | 380+200 | W-Beam | 150 | RHS | MCW |
| 203 | 381+600 | 381+800 | W-Beam | 200 | LHS | MCW |
| 204 | 382+430 | 383+050 | Wire rope | 620 | LHS | MCW |
| 205 | 382+500 | 382+980 | Wire rope | 480 | RHS | MCW |
| 206 | 382+580 | 382+850 | Wire rope | 270 | LHS | Service Road |
| 207 | 382+600 | 382+870 | Wire rope | 270 | RHS | Service Road |
| 208 | 383+200 | 383+480 | W-Beam | 280 | LHS | MCW |
| 209 | 383+770 | 383+820 | W-Beam | 50 | RHS | MCW |
| 210 | 383+780 | 383+820 | W-Beam | 40 | LHS | MCW |
| 211 | 383+820 | 385+010 | RCC | 1190 | LHS | MCW |
| 212 | 383+820 | 385+010 | RCC | 1190 | RHS | MCW |
| 213 | 385+010 | 385+030 | W-Beam | 20 | LHS | MCW |
| 214 | 385+010 | 385+030 | W-Beam | 20 | RHS | MCW |
| 215 | 385+450 | 385+600 | W-Beam | 150 | RHS | MCW |
| 216 | 385+620 | 385+700 | W-Beam | 80 | RHS | MCW |
| 217 | 386+000 | 386+030 | W-Beam | 30 | LHS | MCW |
| 218 | 386+050 | 386+100 | W-Beam | 50 | RHS | MCW |
| 219 | 386+250 | 386+980 | Wire rope | 730 | LHS | MCW |
| 220 | 386+250 | 386+980 | Wire rope | 730 | RHS | MCW |
| 221 | 386+350 | 386+450 | Wire rope | 100 | LHS | Service Road |
| 222 | 386+670 | 386+720 | Wire rope | 50 | LHS | Service Road |
| 223 | 387+070 | 387+120 | W-Beam | 50 | RHS | MCW |
| 224 | 387+270 | 387+620 | W-Beam | 700 | Median | Median |
| 225 | 387+740 | 387+850 | W-Beam | 110 | LHS | MCW |
| 226 | 388+090 | 389+800 | Wire rope | 1710 | RHS | MCW |
| 227 | 388+100 | 389+800 | Wire rope | 1700 | LHS | MCW |
| 228 | 388+500 | 388+750 | Wire rope | 250 | LHS | Service Road |
| 229 | 388+600 | 388+750 | W-Beam | 150 | RHS | Service Road |
| 230 | 389+000 | 389+250 | W-Beam | 250 | RHS | Service Road |
| 231 | 389+400 | 389+450 | W-Beam | 50 | RHS | Service Road |
| 232 | 389+500 | 389+680 | W-Beam | 180 | RHS | Service Road |
| 233 | 389+860 | 389+920 | W-Beam | 60 | RHS | MCW |
| 234 | 389+920 | 391+350 | RCC | 1430 | LHS | MCW |
| 235 | 389+920 | 391+350 | RCC | 1430 | RHS | MCW |
| 236 | 391+350 | 391+390 | W-Beam | 40 | LHS | MCW |
| 237 | 391+350 | 391+400 | W-Beam | 50 | RHS | MCW |
| 238 | 391+480 | 391+830 | W-Beam | 350 | LHS | MCW |
| 239 | 391+480 | 391+900 | W-Beam | 420 | RHS | MCW |
| 240 | 391+900 | 392+100 | W-Beam | 200 | LHS | MCW |
| 241 | 391+970 | 392+000 | W-Beam | 30 | RHS | MCW |
| 242 | 392+000 | 392+780 | RCC | 780 | LHS | MCW |

| S. No. | Chainage Km | | Type of Crash Barrier / PGR | Total Length (m) | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 243 | 392+000 | 392+780 | RCC | 780 | RHS | MCW |
| 244 | 392+780 | 392+810 | W-Beam | 30 | RHS | MCW |
| 245 | 392+810 | 392+910 | W-Beam | 100 | LHS | MCW |
| 246 | 392+900 | 394+520 | Wire rope | 1620 | RHS | MCW |
| 247 | 392+980 | 395+030 | Wire rope | 2050 | LHS | MCW B/w SR |
| 248 | 393+600 | 393+700 | W-Beam | 100 | RHS | Service Road |
| 249 | 394+150 | 394+200 | W-Beam | 50 | LHS | Service Road |
| 250 | 394+230 | 394+320 | W-Beam | 90 | LHS | Service Road |
| 251 | 394+580 | 394+950 | Wire rope | 370 | RHS | MCW |
| 252 | 394+580 | 394+680 | Wire rope | 100 | LHS | Service Road |
| 253 | 395+090 | 395+120 | W-Beam | 30 | RHS | MCW |
| 254 | 395+120 | 396+750 | RCC | 1630 | LHS | MCW |
| 255 | 395+120 | 396+750 | RCC | 1630 | RHS | MCW |
| 256 | 396+750 | 396+780 | W-Beam | 30 | RHS | MCW |
| 257 | 396+900 | 400+400 | Wire rope | 3500 | LHS | MCW B/w SR |
| 258 | 396+950 | 398+970 | Wire rope | 2020 | RHS | MCW B/w SR |
| 259 | 396+950 | 398+950 | Wire rope | 2000 | RHS | MCW |
| 260 | 397+180 | 397+430 | Wire rope | 250 | LHS | Service Road |
| 261 | 397+880 | 397+980 | W-Beam | 100 | LHS | Service Road |
| 262 | 398+180 | 398+500 | Wire rope | 320 | LHS | 2+2 Lane median |
| 263 | 398+180 | 398+500 | Wire rope | 320 | RHS | 2+2 Lane median |
| 264 | 398+250 | 398+340 | W-Beam | 90 | LHS | Service Road |
| 265 | 398+580 | 398+780 | Wire rope | 200 | LHS | Service Road |
| 266 | 398+870 | 398+930 | W-Beam | 60 | RHS | Service Road |
| 267 | 398+900 | 398+930 | W-Beam | 30 | LHS | Service Road |
| 268 | 399+130 | 400+400 | Wire rope | 1270 | LHS | MCW |
| 269 | 399+130 | 400+400 | Wire rope | 1270 | RHS | MCW |
| **Total** | | | | **109171** | | |

### 2.6.4 Sign Boards

Exhibits of Gantry is appended as given in **Table 2.21.**

**Table 2.21 Details of existing Gantries**

| S. No. | Chainage (km) | Signboard/ gantry details | Side (LHS/ RHS) | Locations details (at median, beside MCW, b/w MCW & SR etc) |
|---|---|---|---|---|
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | |
| NIL | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | |
| 1 | 330+700 | Cantilever | LHS | MCW |
| 2 | 331+200 | Cantilever | LHS | MCW |
| 3 | 336+250 | Cantilever | RHS | MCW |
| 4 | 336+400 | Cantilever | RHS | MCW |
| 5 | 337+650 | Cantilever | LHS | MCW |
| 6 | 339+350 | Cantilever | RHS | MCW |
| 7 | 349+500 | Cantilever | LHS | MCW |

| S. No. | Chainage (km) | Signboard/ gantry details | Side | Locations details |
|---|---|---|---|---|
| | | | (LHS/ RHS) | (at median, beside MCW, b/w MCW & SR etc) |
| 8 | 352+400 | Cantilever | RHS | MCW |
| 9 | 350+100 | Cantilever | LHS | MCW |
| 10 | 352+900 | Cantilever | RHS | MCW |
| 11 | 353+700 | Cantilever | LHS | MCW |
| 12 | 354+100 | Cantilever | RHS | MCW |
| 13 | 354+100 | Cantilever | LHS | MCW |
| 14 | 356+700 | Cantilever | RHS | MCW |
| 15 | 359+100 | Cantilever | LHS | MCW |
| 16 | 359+800 | Cantilever | RHS | MCW |
| 17 | 360+950 | Overhead Gantry | BHS | MCW |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | |
| 18 | 360+420 | Overhead Gantry | LHS | MCW |
| 19 | 362+290 | Cantilever (Screen) | LHS | MCW |
| 20 | 363+590 | Cantilever | RHS | MCW |
| 21 | 370+000 | Cantilever | LHS | MCW |
| 22 | 371+100 | Cantilever | RHS | MCW |
| 23 | 373+650 | Cantilever | LHS | MCW |
| 24 | 379+100 | Cantilever | RHS | MCW |
| 25 | 383+500 | Cantilever | LHS | MCW |
| 26 | 385+300 | Cantilever | RHS | MCW |
| 27 | 387+950 | Cantilever | LHS | MCW |
| 28 | 392+950 | Cantilever | RHS | SR |
| 29 | 394+300 | Cantilever | LHS | SR |
| 30 | 396+700 | Cantilever | RHS | MCW |
| 31 | 400+620 | Overhead Gantry | LHS | MCW |







**Sign Boards along the Project Road**

**Table 2.22 Details Summary of existing Road Furniture's**

| Sl. No. | Type of Sign | Section-1 from Km 320+810 to Km 326+000 | Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) | Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) |
|---|---|---|---|---|
| 1 | Speed Breaker | DPR under Progress | 0 | 45 |
| 2 | Stop | | 0 | 42 |
| 3 | Pedestrian Crossing | | 9 | 39 |
| 4 | Junction Ahead | | 27 | 111 |
| 5 | Hazard Markers | | 178 | 211 |
| 6 | Rute Marker | | 0 | 16 |
| 7 | Chevron Marking | | 354 | 99 |
| 8 | Place Identification | | 18 | 38 |
| 9 | Flag Type Direction | | 6 | 10 |
| 10 | Advance Direction | | 13 | 18 |
| 11 | U Turn Prohibited | | 18 | 26 |
| 12 | Right/Left Curve | | 11 | 10 |
| 13 | Gap in Median | | 2 | 14 |
| 14 | Merging Traffic | | 26 | 20 |
| 15 | Bus Stop | | 2 | 18 |
| 16 | Filling Station | | 8 | 18 |
| 17 | No Overtaking | | 0 | 9 |
| 18 | School Ahead | | 3 | 9 |
| 19 | Give Way | | 0 | 14 |
| 20 | Reassurance Sign | | 2 | 6 |
| 21 | Km Stone | | 70 | 80 |
| 22 | Truck Lay- By | | 6 | 4 |
| 23 | Hospital | | 0 | 3 |
| 24 | HT/LT | | 0 | 8 |
| 25 | Foot over bridge | | 6 | 14 |
| 26 | Cross road | | 0 | 6 |
| 27 | Police Station | | 0 | 1 |

Retroreflective Test caried out at all sign board and Road Marking.

### 2.6.5 Religious Structures

Religious structures are following Locations in table below:

**Table 2.23 Details of Religious Structures**

| S. No. | Chainage | Side | Locatin | Remarks |
|---|---|---|---|---|
| 1 | 339+120 | RHS | Service Road | Temple |
| 2 | 361+050 | LHS | Service Road | Temple |
| 3 | 368+935 | LHS | Service Road | Temple |
| 4 | 382+390 | RHS | Service Road | Temple |



Temple at Ch. 339+120 RHS Service Road



Temple at Ch. 361+050 LHS Service Road



Temple at Ch. 368+935 LHS Service Road



Temple at Ch. 382+390 RHS Service Road

### 2.6.6 Antiglare Treatment at Median

The project road has raised median.

**Table 2.24 Details of Antiglare Treatment at Median**

| Sl. No | Chainage | | Length (Km) | Remarks |
|---|---|---|---|---|
| | From | To | | |
| Nil. | | | | |

# Chapter 3. Structure Inventory & Condition

# 3. STRUCTURE INVENTORY & CONDIITON SURVEY

The present section refers to the inventory and condition survey of all the existing highway structures following the guidelines from IRC: SP-35.

The kilometric chainages that are shown in the following section correspond to the existing Kilometer stones present at site.

## 3.1 FIELD WORKS AND INVESTIGATIONS

Field works included the collection of data to produce an inventory of all the highway structures and the inspection to evaluate their condition for the remaining life.

The following field surveys were carried out in accordance with the provisions of IRC: SP: 35-1990.

- Inventory of existing highway bridges / structures
- Visual condition survey of existing highway bridges / structures

In addition to minor (< 60 m length) and major bridges (>60m length) other categories of structures have been considered depending on their function, such as Vehicle Underpass (VUP), Pedestrian/Cattle Underpass, Grade Separator, Elevated Structures.

All highway structures were inspected by a bridge expert and the methodology adopted for that inspection was as follows.

- Collection of data from concerned authorities regarding details of the structure and study of previous inspection reports (if any) so that condition of the defects which were noticed earlier could be checked.
- Visual inspection of foundations, abutments, wing-walls/returns, piers, columns and bearings, soffits of the deck including beams, details under the deck, condition of bridge deck surface, drainage, parapets, expansion joints, condition of approaches, condition of protective works etc.
- Inspection of bridges using MBIU and taking photographs.
- In general, and particularly in case of any important or major shortcoming structural distress is noticed leading to doubt about structural adequacy, a detailed investigation using Nondestructive Test is carried out.
- Preparation of report and proposals for repair/rehabilitation/ reconstruction of the structure as per site conditions.

### 3.1.1 COLLECTION OF INVENTORY DATA

Before undertaking field survey of existing structures on the project road, all concerned authorities were contacted to ascertain the availability of any past inventory and condition survey reports of existing bridges, sub-surface and geotechnical data, hydraulic data, as-built drawings, etc. Detailed field surveys, site investigation and collection of data were carried out by the Consultant's team of Engineers accordingly.

After doing a scrutiny of the afore-mentioned data regarding locations, structural details and condition of the structures, a team of Engineers visited the site in the month of August of 2025 and an inventory of all the structures and visual condition survey was carried out.

### 3.1.2 Inspections

Based on the visual condition survey, all the distresses were noted for each element of all structure and detailed investigations were carried out including NDT.

A Bridge Expert Inspected Minor and Major Bridges and VUP/LVUP when required, the inspection was supported by an MBIU. In this stretch total 31 nos. of structures have been inspected by MBIU. Photographs of all Major/Minor bridges, Flyovers, Elevated Structures, VUP/LVUP/PUP were taken, and present health condition of all the structures was recorded for all the elements of the bridges except foundations which are buried underground.

Some Photographs of Mobile Bridge Inspection Unit (MBIU) used for Inspection are as given below.

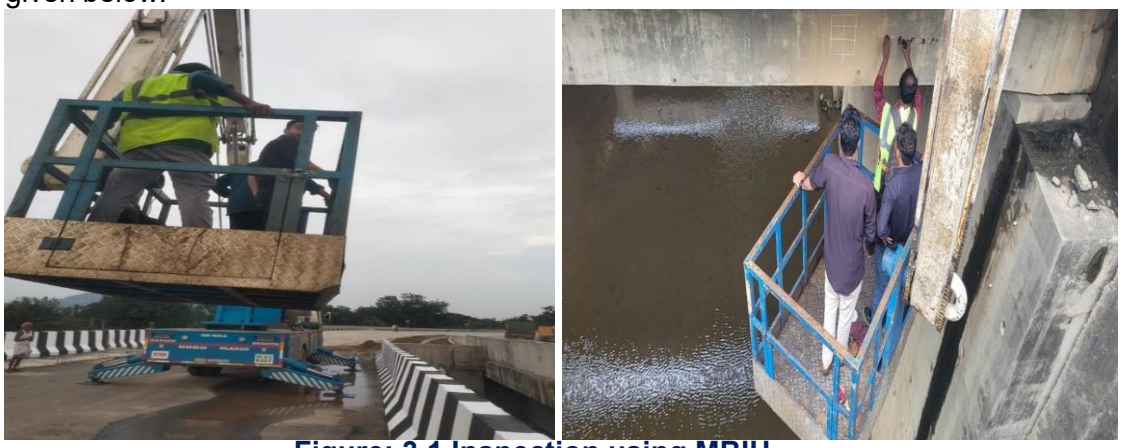


**Figure: 3.1 Inspection using MBIU**

### 3.1.3 Non-Destructive Test

On carrying out the Inventory and Condition Survey it was found that all the bridges and structures are newly built and in satisfactory condition except some minor defects like vegetation growth, missing drainage spouts, settlement in approach slab, minor stains on substructures and superstructures which can be set right by carrying out minor repairs and rehabilitations.

To evaluate the strength of the components of bridges/structures, the following Non-Destructive Tests (NDT) were conducted.

**a) Rebound Hammer**

The Rebound Hammer Method was used for:

- Assessing the likely compressive strength of concrete with the help of suitable co-rebound index and compressive strength.
- Assessing the uniformity of concrete.
- Assessing the quality of the concrete in relation to standard requirements.
- Assessing the quality of one element of concrete in relation to another.




**Figure: 3.2 Rebound Hammer Test**

### b) Ultrasonic Pulse Velocity

The ultrasonic pulse velocity method was used to establish:

- The homogeneity of the concrete.
- The presence of cracks voids and other imperfections.
- Changes in the structure of the concrete which may occur with time.
- The quality of the concrete in relation to standard requirement.
- The quality of one element of concrete in relation to another.
- The values of dynamic elastic modulus of the concrete.




**Figure: 3.3 Ultrasonic Pulse Velocity Test**

## 3.2 INVENTORY OF THE EXISTING STRUCTURES

The inventory of all structures was carried out and structure wise inventory details. These bridges / structures comprise the following: -

| S.N. | Type of Structure | Unit | Structures |
|---|---|---|---|
| 1. | Major bridges (Length > 60m) | No | 03 |
| 2. | Minor bridges (Length < 60m & > 6m) | No | 33 |
| 3. | Fly over | No | - |
| 4. | ROB | No | 01 |
| 5. | VUP | No | 16 |
| 6. | LVUP (VUP GRADE-II) | No | 01 |
| 7. | PUP / CUP | No | 04 |
| 8. | Elevated structure | No | - |
| 9. | FOB | No | 10 |
| 10. | VOP | No | - |
| 11. | Pipe Culvert | No | 52 |
| 12. | Box Culverts/ Slab Culverts | No | 92 |
| | **Total** | No | 212 |

### 3.2.1 Details of Culverts

As shown in the table above, there are 144 culverts on this project road from which 92 are Box/Slab culverts and 52 are pipe culverts.

A summary of the inventory of all culverts is provided in table below:-

**Box/Slab Culvert:**

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| **Box Culverts** | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | |
| 1 | 321+428 | Box Culvert | 1x1.5 |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | |
| 2 | 332+510 | Box Culvert | 1X3 |
| 3 | 334+160 | Box Culvert | 1X3 |
| 4 | 337+949 | Box Culvert | 1x2 |
| 5 | 339+061 | Box Culvert | 1x6 |
| 6 | 342+496 | Box Culvert | 1x3 |
| 7 | 344+377 | Box Culvert | 1x4.1 |
| 8 | 345+912 | Box Culvert | 1x5 |
| 9 | 346+805 | Box Culvert | 1X3 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 10 | 346+884 | Box Culvert | 1x4 |
| 11 | 351+210 | Box Culvert | 1x5 |
| 12 | 351+573 | Box Culvert | 1x2 |
| 13 | 352+060 | Box Culvert | 1x2 |
| 14 | 352+329 | Box Culvert | 1x1.2 |
| 15 | 352+971 | Box Culvert | 1x4 |
| 16 | 353+431 | Box Culvert | 1x2 |
| 17 | 353+858 | Box Culvert | 1x1.5 |
| 18 | 353+937 | Box Culvert | 1x2 |
| 19 | 354+327 | Box Culvert | 1x4 |
| 20 | 358+980 | Box Culvert | 1X3 |
| 21 | 359+945 | Box Culvert | 1x2 |
| 22 | 360+814 | Box Culvert | 1x5 |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | |
| 23 | 362+819 | Box Culvert | 1x3 |
| 24 | 362+864 | Box Culvert | 1x3 |
| 25 | 363+641 | Box Culvert | 1x2 |
| 26 | 364+181 | Box Culvert | 1x1 |
| 27 | 365+310 | Box Culvert | 1x1.7 |
| 28 | 365+754 | Box Culvert | 1x2 |
| 29 | 365+876 | Box Culvert | 1x2 |
| 30 | 366+941 | Box Culvert | 1x2 |
| 31 | 367+514 | Box Culvert | 1x2.4 |
| 32 | 367+676 | Box Culvert | 1x1.8 |
| 33 | 367+769 | Box Culvert | 1x2 |
| 34 | 368+356 | Box Culvert | 1x2 |
| 35 | 368+477 | Box Culvert | 1x2 |
| 36 | 368+715 | Box Culvert | 3x3 |
| 37 | 369+988 | Box Culvert | 1x1.5 |
| 38 | 370+206 | Box Culvert | 1x5 |
| 39 | 371+037 | Box Culvert | 1x2 |
| 40 | 373+107 | Box Culvert | 1x1.5 |
| 41 | 373+874 | Box Culvert | 1x3 |
| 42 | 373+974 | Box Culvert | 1x2 |
| 43 | 374+382 | Box Culvert | 1x3 |
| 44 | 375+438 | Box Culvert | 1x1.5 |
| 45 | 377+274 | Box Culvert | 1x2 |
| 46 | 377+438 | Box Culvert | 1x2.2 |
| 47 | 377+915 | Box Culvert | 1x2 |
| 48 | 378+223 | Box Culvert | 1x2 |
| 49 | 378+562 | Box Culvert | 1x2.2 |
| 50 | 378+953 | Box Culvert | 1x1.5 |
| 51 | 379+432 | Box Culvert | 1x2 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 52 | 379+536 | Box Culvert | 1x2.3 |
| 53 | 379+701 | Box Culvert | 1x1.5 |
| 54 | 380+150 | Box Culvert | 1x1.5 |
| 55 | 380+887 | Box Culvert | 1x1 |
| 56 | 381+057 | Box Culvert | 1x2 |
| 57 | 381+977 | Box Culvert | 1x2 |
| 58 | 382+037 | Box Culvert | 1x1.5 |
| 59 | 382+719 | Box Culvert | 1x4.2 |
| 60 | 383+328 | Box Culvert | 1x1.2 |
| 61 | 383+455 | Box Culvert | 1x2 |
| 62 | 383+911 | Box Culvert | 1x1.2 |
| 63 | 384+839 | Box Culvert | 1x1.5 |
| 64 | 385+456 | Box Culvert | 1x2 |
| 65 | 388+424 | Box Culvert | 1x1.6 |
| 66 | 388+506 | Box Culvert | 1x1.6 |
| 67 | 388+608 | Box Culvert | 1x 1.1 |
| 68 | 389+004 | Box Culvert | 1x1.1 |
| 69 | 389+342 | Box Culvert | 1x2 |
| 70 | 389+479 | Box Culvert | 1x3 |
| 71 | 389+971 | Box Culvert | 1x2 |
| 72 | 393+102 | Box Culvert | 1x1.5 |
| 73 | 393+681 | Box Culvert | 1x1.5 |
| 74 | 393+872 | Box Culvert | 1x1 |
| 75 | 394+247 | Box Culvert | 1x1.6 |
| 76 | 394+356 | Box Culvert | 1x2.1 |
| 77 | 395+318 | Box Culvert | 1x3 |
| 78 | 395+523 | Box Culvert | 1x1.5 |
| 79 | 396+229 | Box Culvert | 1x3 |
| 80 | 396+402 | Box Culvert | 1x3 |
| 81 | 396+693 | Box Culvert | 1x3 |
| 82 | 397+015 | Box Culvert | 1x1.8 |
| 83 | 399+350 | Box Culvert | 1x4.4 |
| 84 | 332+420 | Box Culvert | 1x3 |
| 85 | 333+040 | Box Culvert | 1x3 |
| 86 | 334+990 | Box Culvert | 1x3 |
| 87 | 334+030 | Box Culvert | 1x3 |
| 88 | 334+285 | Box Culvert | 1x3 |
| 89 | 335+770 | Box Culvert | 1x3 |
| 90 | 336+330 | Box Culvert | 1x3 |
| 91 | 391+700 | Box Culvert | 1x3 |
| 92 | 392+280 | Box Culvert | 1x3 |

## Pipe Culvert:

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| **Pipe Culverts** | | | |
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | |
| 1 | 320+924 | Pipe Culvert | 1x1.2 |
| 2 | 322+649 | Pipe Culvert | 1x1 |
| 3 | 323+599 | Pipe Culvert | 1x1 |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | |
| 4 | 326+610 | Pipe Culvert | 1x1.2 |
| 5 | 329+608 | Pipe Culvert | 1x1 |
| 6 | 331+029 | Pipe Culvert | 1x1 |
| 7 | 331+659 | Pipe Culvert | 1x1 |
| 8 | 337+373 | Pipe Culvert | 1x1.2 |
| 9 | 338+374 | Pipe Culvert | 3x0.9 |
| 10 | 339+883 | Pipe Culvert | 2x0.9 |
| 11 | 340+452 | Pipe Culvert | 2x1 |
| 12 | 340+619 | Pipe Culvert | 2x0.9 |
| 13 | 342+764 | Pipe Culvert | 2x1 |
| 14 | 344+537 | Pipe Culvert | 2x1 |
| 15 | 346+335 | Pipe Culvert | 2x1 |
| 16 | 349+779 | Pipe Culvert | 2x0.9 |
| 17 | 352+620 | Pipe Culvert | 1x1 |
| 18 | 353+087 | Pipe Culvert | 2x1 |
| 19 | 353+549 | Pipe Culvert | 1x1 |
| 20 | 355+002 | Pipe Culvert | 2x1 |
| 21 | 355+127 | Pipe Culvert | 2x1 |
| 22 | 355+207 | Pipe Culvert | 2x1 |
| 23 | 359+578 | Pipe Culvert | 1x1.2 |
| **Section- 3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | |
| 24 | 361+262 | Pipe Culvert | 4x1 |
| 25 | 362+625 | Pipe Culvert | 3x0.9 |
| 26 | 362+978 | Pipe Culvert | 2x0.9 |
| 27 | 363+128 | Pipe Culvert | 2x1 |
| 28 | 364+578 | Pipe Culvert | 3x1 |
| 29 | 364+855 | Pipe Culvert | 2x1 |
| 30 | 366+745 | Pipe Culvert | 2x0.9 |
| 31 | 367+845 | Pipe Culvert | 6x1 |
| 32 | 368+869 | Pipe Culvert | 1x1 |
| 33 | 369+009 | Pipe Culvert | 2x1 |
| 34 | 369+366 | Pipe Culvert | 2x1 |
| 35 | 370+354 | Pipe Culvert | 1x1 |
| 36 | 371+251 | Pipe Culvert | 4x1 |
| 37 | 374+702 | Pipe Culvert | 3x1.2 |
| 38 | 374+859 | Pipe Culvert | 3x1.2 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 39 | 375+234 | Pipe Culvert | 3x1.2 |
| 40 | 378+786 | Pipe Culvert | 1x0.9 |
| 41 | 379+091 | Pipe Culvert | 2x1.2 |
| 42 | 379+887 | Pipe Culvert | 2x1 |
| 43 | 384+963 | Pipe Culvert | 1x0.9 |
| 44 | 385+705 | Pipe Culvert | 2x1 |
| 45 | 386+064 | Pipe Culvert | 3x1.2 |
| 46 | 387+792 | Pipe Culvert | 1x1 |
| 47 | 388+685 | Pipe Culvert | 3x1 |
| 48 | 389+768 | Pipe Culvert | 2x1.2 |
| 49 | 393+250 | Pipe Culvert | 1x1 |
| 50 | 395+960 | Pipe Culvert | 2x1 |
| 51 | 399+925 | Pipe Culvert | 2x1 |
| 52 | 400+581 | Pipe Culvert | 1x0.9 |

**Some photographs of the above Culverts are given below: -**




***Box Culvert at Km 332+510***




***Box Culvert at Km 337+949***




***Box Culvert at Km 375+438***




***Box Culvert at Km 392+280***

| | |
|---|---|
|  |  |
| ***HPC at Km 362+625*** | ***HPC at Km 374+702*** |

### 3.2.2 Details of Major Bridge

A summary of Inventory of existing Major Bridges is provided in Table below

| S.No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total | Carriageway width | Footpath & Crash barrier/ railing | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | | | | | |
| Nil. | | | | | | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | | | |
| 1 | 333+289 | 333+391 | LHS (NEW) | 2x25 + 2x25.6 | 101.20 | 1x15.2 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment & Circular Pier | PSC Girder |
| | | | RHS (NEW) | 2x25 + 2x25.6 | 101.20 | 1x15.2 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment & Circular Pier | PSC Girder |
| 2 | 335+270 | 335+330 | LHS (NEW) | 3x20 | 60.00 | 1x15.2 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment & Circular Pier | RCC Solid Slab |
| | | | RHS (NEW) | 3x20 | 60.00 | 1x15.2 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment & Circular Pier | RCC Solid Slab |
| 3 | 358+106 | 358+209 | LHS (OUTER) (NEW) | 2x19.5 + 2x32 | 103.00 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment & RCC Circular Pier | PSC Girder/PSC Girder |
| | | | LHS (INNER) (OLD) | 2x18.8 + 2x32 | 101.60 | 1x11.1 | 1x7.5 | 1.8 | Open Foundation | Wall Type Spill through Abutment & RCC Circular Pier | PSC Girder/RCC Voided Salb |

| S.No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | RHS (INNER) (OLD) | 2x18.8 + 2x32 | 101.60 | 1x11.1 | 1x7.5 | 1.8 | Open Foundation | Wall Type Spill through Abutment & RCC Circular Pier | PSC Girder/RCC Voided Salb |
| | | | RHS (OUTER) (NEW) | 2x19.5 + 2x32 | 103.00 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment & RCC Circular Pier | PSC Girder/PSC Girder |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | | | |
| **Nil.** | | | | | | | | | | | |

**Note: 1. Total width is end to end incl. footpath, crash barrier etc.**

**Some photographs of above MJB's are given below: -**




*MAJOR BRIDGE AT Km 333+330*




*MAJOR BRIDGE AT Km 357+418*

### 3.2.3 Details of Flyover

A summary of Inventory of existing Flyover is provided in Table below.

| S. No. | Chainage Km | | Side | Span details (m) | Length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | | | | | |
| Nil. | | | | | | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | | | |
| Nil. | | | | | | | | | | | |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | | | |
| Nil. | | | | | | | | | | | |

### 3.2.4 Details of ROB

A summary of Inventory of existing ROB's are provided in Table below.

| S. No. | Chainage Km | | Side | Span details (m) | Length (m) | Deck Width m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | | | | | |
| Nil. | | | | | | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | | | |
| 1 | 358+780 | 358+876 | LHS (OUTER) (NEW) | 2x37.28 + 1x31.28 | 105.84 | 1x10.1 | 1x7.5 | 1.5 | Open Foundation | RCC Wall Type Abutment & RCC Circular Portal Pier | Composite Steel I Girder |

| S. No. | Chainage Km | | Side | Span details (m) | Length (m) | Deck Width m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | LHS (INNER) (OLD) | 1x16.73+1x16.57+1x31.72 +1x16.72 | 81.64 | 1x9.6 (excluding median) | 1x7.5 | 1.5 | Open Foundation | RCC Wall Type Abutment & RCC Rectangular Portal Pier | Composite Steel I Girder |
| | | | RHS (INNER) (OLD) | 1x16.73+1x16.57+1x31.72 +1x16.72 | 81.64 | 1x9.6 (excluding median) | 1x7.5 | 1.5 | Open Foundation | RCC Wall Type Abutment & RCC Rectangular Portal Pier | Composite Steel I Girder |
| | | | RHS (OUTER) (OLD) | 2x37.28 + 1x31.28 | 105.84 | 1x10.1 | 1x7.5 | 1.5 | Open Foundation | RCC Wall Type Abutment & RCC Circular Portal Pier | Composite Steel I Girder |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | | | |
| Nil. | | | | | | | | | | | |

**Some photographs of above ROB's are given below: -**




***ROB AT Km 358+118***

### 3.2.5 Details of Minor Bridges

A summary of Inventory of existing Minor Bridges is provided in Table below.

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | | | | | |
| 1 | 325+956 | 325+974 | LHS | 1x18 | | 1X10.8 | 1x8 | - | Not Visible | RCC Wall Type Abutment | RCC T-Girder |
| | | | (OLD) | | 18 | | | | | | |
| | | | RHS | 1x18 | | 1X9.5 | 1x7.5 | - | Not Visible | | RCC T-Girder |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | (OLD) | | 18 | | | | | RCC Wall Type Abutment | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | | | |
| 2 | 326+474 | 326+485 | LHS | 1x11 | 11 | 1X15.2 | 1x12 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 1x11 | 11 | 1x10.5 | 1x8.8 | - | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 1x11 | 11 | 1X8.5 | 1x7.5 | - | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | | (OLD) | | | | | | | | |
| 3 | 328+537 | 328+563 | LHS | 1X27.4 | 27.4 | 1X15.2 | 1x12 | 1.5 | Open Foundation | RCC Wall Type Abutment | RCC T-Girder |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 1X26.6 | 26.6 | 1X10.8 | 1x9 | - | Not Visible | RCC Wall Type Abutment | RCC T-Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 1X26.6 | 26.6 | 1X10.8 | 1x9 | - | Not Visible | RCC Wall Type Abutment | RCC T-Girder |
| | | | (OLD) | | | | | | | | |
| 4 | 329+048 | 329+059 | LHS | 1x11.72 | 11.72 | 1x15.2 | 1x12 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 1x11.72 | 11.72 | 1x10.5 | 1x8.8 | - | Not Visible | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | (OLD) | | | | | | | RCC Wall Type Abutment | RCC Solid Slab |
| | | | RHS OUTER | 1x11.72 | 11.72 | 1x10.6 | 1x8.8 | - | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | | (OLD) | | | | | | | | |
| 5 | 329+401 | 329+438 | LHS | 1x37.2 | 37.2 | 1x15.2 | 1x12 | 1.5 | Open Foundation | RCC Wall Type Abutment | PSC GIRDER |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 1x37.2 | 37.2 | 1x10.5 | 1x8 | - | Not Visible | RCC Wall Type Abutment | PSC GIRDER |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 1x37.2 | 37.2 | 1x10.5 | 1x8 | - | Not Visible | RCC Wall Type Abutment | PSC GIRDER |
| | | | (OLD) | | | | | | | | |
| 6 | 330+130 | 330+150 | LHS | 1X19.33 | 19.33 | 1x15.2 | 1x12 | 1.5 | Open Foundation | RCC Wall type Abutment | RCC T-Girder |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 1X19.33 | 19.33 | 1x10.5 | 1x8 | - | Not Visible | RCC Wall type Abutment | RCC T-Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 2x9.665 | 19.33 | 1x10.5 | 1x8 | - | Not Visible | RCC Wall type Abutment | RCC Solid slab |
| | | | (OLD) | | | | | | | | |
| 7 | 342+047 | 342+053 | LHS | 1X6.2 | 6.2 | 1x15.3 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | (NEW) | | | | | | | | |
| | | | RHS | 1X6.2 | 6.2 | 1x15.3 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| 8 | 343+735 | 343+759 | LHS OUTER | 1x24.2 | 24.2 | 1x11.8 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| | | | LHS INNER | 3x8.0 | 24 | 1x9.4 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | Arch Type with Deck slab |
| | | | (OLD) | | | | | | | | |
| | | | RHS INNER | 1X24.2 | 24.2 | 1x10.9 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | PSC Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 1X24.2 | 24.2 | 1x11.3 | 1x8.5 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| 9 | 348+400 | 348+420 | LHS | 1X19.20 | 19.2 | 1x15.2 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment | RCC Solid slab |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 1X19.20 | 19.2 | 1x10.9 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | RCC T-Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 2x9.6 | 19.2 | 1x10.9 | 1x9.0 | - | Not Visible | SM Wall type | Arch Type with Deck slab |
| | | | (OLD) | | | | | | | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | | | | | | | | Abutment & Pier | |
| 10 | 348+819 | 348+839 | LHS (NEW) | 2X20.20 | 40.4 | 1x15.2 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment & Pier | RCC T-Girder |
| | | | RHS INNER (OLD) | 4X10.1 | 40.4 | 1x9.4 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | Arch Type with Deck slab |
| | | | RHS OUTER (OLD) | 2X20.20 | 40.4 | 1x9.4 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC T-Girder |
| 11 | 350+154 | 350+209 | LHS (NEW) | 2X27.40 | 54.8 | 1x15.3 | 1x12.5 | 1.5 | Open Foundation | RCC Wall type Abutment & Pier | PSC Girder |
| | | | RHS INNER (OLD) | 2X27.40 | 54.8 | 1x9.4 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | PSC Girder |
| | | | RHS OUTER (OLD) | 2X27.40 | 54.8 | 1x9.4 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | PSC Girder |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| 12 | 360+436 | 360+444 | LHS OUTER (NEW) | 1X8.85 | 8.85 | 1x11.3 | 1x8.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | LHS INNER (OLD) | 1X8.85 | 8.85 | 1x9.4 | 1x9.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS INNER (OLD) | 1X8.85 | 8.85 | 1x9.4 | 1x9.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS OUTER (NEW) | 1X8.85 | 8.85 | 1x11.3 | 1x8.5 | 1.5 | Raft | RCC Box | RCC Box |
| 13 | 360+628 | 360+671 | LHS OUTER (NEW) | 2X22.0 | 44 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment & Pier | RCC Box Girder |
| | | | LHS INNER (OLD) | 2X21.4 | 42.8 | 1x10.9 | 1x9.0 | - | Not Visible | RCC Wall type Abutment & Pier | RCC T-Girder |
| | | | RHS INNER (OLD) | 2X21.4 | 42.8 | 1x10.9 | 1x9.0 | - | Not Visible | RCC Wall type Abutment & Pier | RCC T-Girder |
| | | | RHS OUTER (NEW) | 2X22.0 | 44 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment & Pier | RCC Box Girder |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| 14 | 361+883 | 361+889 | LHS (OUTER) | 1X6.0 | 6 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| | | | LHS (INNER) | 1X6.0 | 6 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS (INNER) | 1X6.0 | 6 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS (OUTER) | 1X6.0 | 6 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| 15 | 362+250 | 362+256 | LHS (OUTER) | 1X6.0 | 6 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| | | | LHS (INNER) | 1X6.0 | 6 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS (INNER) | 1X6.0 | 6 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS (OUTER) | 1X6.0 | 6 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| 16 | 363+897 | 363+927 | LHS (OUTER) | 1X29.540 | 29.54 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| | | | LHS (INNER) | 3X9.847 | 29.54 | 1x8.8 | 1x7.5 | - | Not Visible | RCC Wall type | RCC Solid slab |
| | | | (OLD) | | | | | | | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | | | | | | | | Abutment & Pier | |
| | | | RHS (INNER) | 1X29.540 | 29.54 | 1x10.7 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | PSC Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS (OUTER) | 1X29.540 | 29.54 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| 17 | 365+112 | 365+122 | LHS (OUTER) | 1X9.250 | 9.25 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| | | | LHS (INNER) | 1X9.250 | 9.25 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS (INNER) | 1X9.450 | 9.45 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS (OUTER) | 1X9.450 | 9.45 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |
| 18 | 366+225 | 366+233 | LHS | 1X8.5 | 8.5 | 1x15.8 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS | 1X8.5 | 8.5 | 1x15.8 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| 19 | 366+589 | 366+607 | LHS (OUTER) | 1X18.980 | 18.98 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | RCC Girder |
| | | | (NEW) | | | | | | | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | LHS (INNER) (OLD) | 2X9.445 | 18.89 | 1x8.8 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | RHS (INNER) (OLD) | 1X18.980 | 18.98 | 1x10.8 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | RCC Girder |
| | | | RHS (OUTER) (NEW) | 1X18.980 | 18.98 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | RCC Girder |
| 20 | 369+565 | 369+585 | LHS (OUTER) (NEW) | 1X20.73 | 20.73 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | RCC Girder |
| | | | LHS (INNER) (OLD) | 2X10.365 | 20.73 | 1x8.8 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | RHS (INNER) (OLD) | 1X20.79 | 20.79 | 1x10.8 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | RCC Girder |
| | | | RHS (OUTER) (NEW) | 1X20.79 | 20.79 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | RCC Girder |
| 21 | 371+631 | 371+657 | LHS (OUTER) (NEW) | 1X25.71 | 25.71 | 1x10.2 | 1x7.5 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | LHS (INNER) | 3X8.57 | 25.71 | 1x8.8 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | (OLD) | | | | | | | | |
| | | | RHS (INNER) | 1X25.70 | 25.7 | 1x10.8 | 1x8.5 | - | Not Visible | RCC Wall type Abutment | PSC Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS (OUTER) | 1X25.70 | 25.7 | 1x10.2 | 1x7.5 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| 22 | 372+673 | 372+679 | LHS | 1X6.0 | 6 | 1x15.2 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| | | | RHS | 1X6.0 | 6 | 1x15.2 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| 23 | 373+579 | 373+615 | LHS | 2X18.075 | 36.15 | 1x15.2 | 1x12.5 | - | Open Foundation | RCC Wall type Abutment & Pier | RCC Girder |
| | | | (NEW) | | | | | | | | |
| | | | RHS INNER | 5X7 | 35 | 1x8.5 | 1x7.5 | - | Not Visible | Stone masonry wall type Abutment & Pier | RCC Solid slab |
| | | | (OLD) | | | | | | | | |
| | | | RHS OUTER | 2X14.4 + 1x7.1 | 35.9 | 1x10.8 | 1x9.0 | - | Not Visible | | RCC Girder/ |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | (OLD) | | | | | | | RCC Wall type Abutment & Pier | |
| 24 | 377+001 | 377+010 | LHS (OUTER) (NEW) | 1X8.8 | 8.8 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | LHS (INNER) | 1X8.8 | 8.8 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS (INNER) | 1X8.8 | 8.8 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS (OUTER) (NEW) | 1X8.8 | 8.8 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| 25 | 379+757 | 379+773 | LHS (NEW) | 1X16.700 | 16.7 | 1x15.3 | 1x12.5 | - | Open Foundation | RCC Wall type Abutment | RCC T-Girder |
| | | | RHS INNER (OLD) | 2X8.350 | 16.7 | 1x8.5 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | RHS OUTER (OLD) | 1X16.700 | 16.7 | 1x10.5 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | RCC T-Girder |
| 26 | 380+637 | 380+655 | LHS (NEW) | 1X18.750 | 18.75 | 1x15.3 | 1x12.5 | - | Open Foundation | RCC Wall type Abutment | RCC T-Girder |
| | | | RHS INNER | 2X9.350 | 18.7 | 1x8.5 | 1x7.5 | - | Not Visible | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | (OLD) | | | | | | | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | RHS OUTER (OLD) | 1X18.750 | 18.75 | 1x10.5 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | RCC T-Girder |
| 27 | 381+697 | 381+715 | LHS (NEW) | 1X17.750 | 17.75 | 1x15.2 | 1x12.5 | - | Open Foundation | RCC Wall type Abutment | RCC T-Girder |
| | | | RHS INNER (OLD) | 2X8.875 | 17.75 | 1x8.5 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | RHS OUTER (OLD) | 1X17.750 | 17.75 | 1x10.5 | 1x9.0 | - | Not Visible | RCC Wall type Abutment | RCC T-Girder |
| 28 | 383+650 | 383+656 | LHS (OUTER) (NEW) | 1X6.0 | 6 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | LHS (INNER) | 1X6.0 | 6 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS (INNER) | 1X6.0 | 6 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS (OUTER) (NEW) | 1X6.0 | 6 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| 29 | 387+267 | 387+275 | LHS | 1X8.2 | 8.2 | 1x16 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | (OLD) | | | | | | | | |
| | | | RHS | 1X8.2 | 8.2 | 1x16 | 1x12.5 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (OLD) | | | | | | | | |
| 30 | 398+332 | 398+358 | LHS SR (OUTER) | 1X26.5 | 26.5 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| | | | LHS MCW (OUTER) | 1X26.5 | 26.5 | 1x11.7 | 1x10.8 | - | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| | | | LHS MCW (INNER) | 3X8.86 | 26.58 | 1x8.5 | 1x7.5 | - | Not Visible | RCC Wall type Abutment & Pier | RCC Solid slab |
| | | | (OLD) | | | | | | | | |
| | | | RHS MCW (INNER) | 1X26.5 | 26.5 | 1x10.7 | 1x8.8 | - | Not Visible | RCC Wall type Abutment | PSC Girder |
| | | | (OLD) | | | | | | | | |
| | | | RHS MCW (OUTER) | 1X26.5 | 26.5 | 1x11.7 | 1x10.8 | - | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| | | | RHS SR (OUTER) | 1X26.5 | 26.5 | 1x11.7 | 1x9.0 | 1.5 | Open Foundation | RCC Wall type Abutment | PSC Girder |
| | | | (NEW) | | | | | | | | |
| 31 | 399+744 | 399+753 | LHS (OUTER) | 1X8.9 | 8.9 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | (NEW) | | | | | | | | |

| S. No. | Chainage Km | | Side | Span details (m) | Bridge length (m) | Deck Width (m) | | | Foundation (raft/ pile/ well) | Sub Structure details | Super Structure details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | Total (end to end incl. footpath, crash barrier etc) | Carriageway width | Footpath & Crash barrier/ railing | | | |
| | | | LHS (INNER) | 1X8.9 | 8.9 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS (INNER) | 1X8.9 | 8.9 | 1x13.9 | 1x13.0 | - | Raft | RCC Box | RCC Box |
| | | | RHS (OUTER) (NEW) | 1X8.9 | 8.9 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| 32 | 390+317 | 390+370 | LHS (OUTER) | 4X12.5 | 50 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | LHS (INNER) | 4X12.5 | 50 | 1x13.4 | 1x12.5 | - | Raft | RCC Box | RCC Box |
| | | | RHS (INNER) | 4X12.5 | 50 | 1x13.4 | 1x12.5 | - | Raft | RCC Box | RCC Box |
| | | | RHS (OUTER) | 4X12.5 | 50 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| 33 | 391+096 | 391+130 | LHS (OUTER) (NEW) | 4X8.0 | 32 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |
| | | | LHS (INNER) (OLD) | 4X8.0 | 32 | 1x13.4 | 1x12.5 | - | Raft | RCC Box | RCC Box |
| | | | RHS (INNER) | 4X8.0 | 32 | 1x13.4 | 1x12.5 | - | Raft | RCC Box | RCC Box |
| | | | RHS (OUTER) (NEW) | 4X8.0 | 32 | 1x11.7 | 1x9.0 | 1.5 | Raft | RCC Box | RCC Box |

*Mentioned span for RCC BOX is Clear Span

## Some photographs of above Minor Bridges are given below: -






*Minor Bridge at Km 348+112*







*Minor Bridge at Km 360+440*







*Minor Bridge at Km 380+646*







*Minor Bridge at Km 391+113*

### 3.2.6 Details of Light Vehicular Underpasses (LVUP)/ Vehicular underpass Grade II

A summary of Inventory of existing Light Vehicular Underpasses is provided in Table below.

| S. No. | Chainage Km | Side | Span Arrangement (m) | Length(m) | Deck Width (m) | Vertical Clearance (m) | Foundation (raft/ pile/ well) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|---|
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | | | |
| Nil. | | | | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | |
| 1 | 339+223 | LHS (NEW) | 1x12.0 | 12.00 | 1x13.5 | 4.0 | Raft | RCC Box | RCC Box |
| | | RHS (NEW) | 1x12.0 | 12.00 | 1x13.5 | 4.0 | Raft | RCC Box | RCC Box |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | |
| Nil. | | | | | | | | | |

### 3.2.7 Details of Vehicular Underpasses VUP

A summary of Inventory of existing Vehicular Underpasses is provided in Table below.

| S. No. | Chainage Km | Side | Span Arrangement (m) | Length (m) | Deck Width (m) | Vertical Clearance (m) | Foundation (raft/ pile/ well) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|---|
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | | | | | | |
| Nil. | | | | | | | | | |
| **Section-2 from Km 326+000 to Km 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | |
| 1 | 332+100 | LHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | RHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| 2 | 333+225 | LHS (NEW) | 2x12.000 | 24.00 | 1x13.5 | 5.5 | Raft | RCC Box | RCC Box |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Length (m) | Deck Width (m) | Vertical Clearance (m) | Foundation (raft/ pile/ well) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|---|
| | | RHS (NEW) | 2x12.000 | 24.00 | 1x13.5 | 5.5 | Raft | RCC Box | RCC Box |
| 3 | 336+390 | LHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | RHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| 4 | 354+384 | LHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | RHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| 5 | 355+870 | LHS (NEW) | 1x15.7 | 15.70 | 1x18.0 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | RHS (NEW) | 1x15.7 | 15.70 | 1x18.0 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| 6 | 357+636 | LHS (NEW) | 1x12.31 | 12.31 | 1x13.5 | 5.5 | Raft | RCC Box | RCC Box |
| | | RHS (NEW) | 1x12.31 | 12.31 | 1x13.5 | 5.5 | Raft | RCC Box | RCC Box |
| 7 | 359+570 | LHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| | | RHS (NEW) | 1x21.0 | 21.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Solid Slab |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | |
| 8 | 362+680 | LHS (NEW) | 1x22.2 | 22.20 | 1x13.5 | 5.5 | Open Foundation | RCC Wall Type Abutment | RCC Girder |
| | | RHS (NEW) | 1x22.2 | 22.20 | 1x13.5 | 5.5 | Open Foundation | RCC Wall Type Abutment | RCC Girder |
| 9 | 368+522 | LHS (NEW) | 1x22.21 | 22.21 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Girder |
| | | RHS (NEW) | 1x22.21 | 22.21 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Girder |
| 10 | 370+425 | LHS | 1x22.27 | 22.27 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type | RCC Girder |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Length (m) | Deck Width (m) | Vertical Clearance (m) | Foundation (raft/ pile/ well) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|---|
| | | (NEW) | | | | | | Abutment | |
| | | RHS (NEW) | 1x22.27 | 22.27 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Girder |
| 11 | 374+295 | LHS (NEW) | 1x22.22 | 22.22 | 1x13.5 | 5.5 | Open Foundation | RCC Wall Type Abutment | RCC Girder |
| | | RHS (NEW) | 1x22.22 | 22.22 | 1x13.5 | 5.5 | Open Foundation | RCC Wall Type Abutment | RCC Girder |
| 12 | 384+400 | LHS (NEW) | 1x22.29 | 22.29 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Girder |
| | | RHS (NEW) | 1x22.29 | 22.29 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC Girder |
| 13 | 390+160 | LHS (NEW) | 1x25.00 | 25.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | PSC Girder |
| | | RHS (NEW) | 1x25.00 | 25.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | PSC Girder |
| 14 | 390+900 | LHS (NEW) | 2x12.00 | 24.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC BOX |
| | | RHS (NEW) | 2x12.00 | 24.00 | 1x13.5 | 5.5 | Not Visible | RCC Wall Type Abutment | RCC BOX |
| 15 | 392+532 | LHS (NEW) | 1x24.60 | 24.60 | 1x14.1 | 5.5 | Open Foundation | RCC Wall Type Abutment | PSC Girder |
| | | RHS (NEW) | 1x24.60 | 24.60 | 1x14.1 | 5.5 | Open Foundation | RCC Wall Type Abutment | PSC Girder |
| 16 | 395+750 | LHS (NEW) | 1x22.20 | 22.20 | 1x13.5 | 5.5 | Open Foundation | RCC Wall Type Abutment | RCC Girder |
| | | RHS (NEW) | 1x22.20 | 22.20 | 1x13.5 | 5.5 | Open Foundation | RCC Wall Type Abutment | RCC Girder |

**Some photographs of above VUP are given below: -**







*VUP at Km 332+050*







*VUP at Km 384+400*

### 3.2.8 Details of Pedestrian/Cattle Underpasses (PUP/CUP)

A summary of Inventory of existing Vehicle Underpasses is provided in Table below.

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | LENGTH OF BRIDGE FACE TO FACE OF DIRT WALL (m) | CARRIAGEWAY WIDTH BETWEEN KERBS (m) | TOTAL OUTER WIDTH OF BRIDGE (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | | | | |
| Nil. | | | | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | |
| 1 | 346+780 | LHS | 1x7.0 | 7.0 | 3.5 | 1x13.5 | RCC Box | RCC Box slab |
| | | RHS | 1x7.0 | 7.0 | 3.5 | 1x13.5 | RCC Box | RCC Box slab |







***PUP at Km 346+800***

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | LENGTH OF BRIDGE FACE TO FACE OF DIRT WALL (m) | CARRIAGEWAY WIDTH BETWEEN KERBS (m) | TOTAL OUTER WIDTH OF BRIDGE (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|
| **Section-3 From 361+040 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | |
| 2 | 384+590 | LHS | 1x5 | 5.0 | 3.0 | 1x13.5 | RCC Box | RCC Box slab |
| | | RHS | 1x5 | 5.0 | 3.0 | 1x13.5 | RCC Box | RCC Box slab |
| 3 | 392+160 | LHS | 1x10.5 | 10.5 | 4.0 | 1x13.5 | RCC Box | RCC Box slab |
| | | RHS | 1x10.5 | 10.5 | 4.0 | 1x13.5 | RCC Box | RCC Box slab |
| 4 | 400+870 | LHS | 1x7.0 | 7.0 | 3.0 | 1x13.5 | RCC Box | RCC Box slab |
| | | RHS | 1x7.0 | 7.0 | 3.0 | 1x13.5 | RCC Box | RCC Box slab |

**Some photographs of above PUP/CUP are given below: -**

### 3.2.9 Details of Foot Over Bridge (FOB)

A summary of Inventory of existing Foot Over Bridge is provided in Table below.

| S. NO. | BRIDGE NO. | EXISTING CHAINAGE | LHS/ RHS/ BHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | LENGTH OF BRIDGE FACE TO FACE OF DIRT WALL (m) | CARRIAGEWAY WIDTH BETWEEN KERBS (m) | TOTAL OUTER WIDTH OF BRIDGE (m) | SUPERSTRUCTURE TYPE | SUB - STRUCTURE TYPE |
|---|---|---|---|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | | | | | |
| Nil. | | | | | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | | |
| 1 | FOB BHS | 337+345 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 2 | FOB BHS | 340+250 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 3 | FOB BHS | 350+630 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | | |
| 4 | FOB BHS | 360+550 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 5 | FOB BHS | 366+955 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 6 | FOB BHS | 364+480 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 7 | FOB BHS | 372+440 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 8 | FOB BHS | 393+850 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |

| S. NO. | BRIDGE NO. | EXISTING CHAINAGE | LHS/ RHS/ BHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | LENGTH OF BRIDGE FACE TO FACE OF DIRT WALL (m) | CARRIAGEWAY WIDTH BETWEEN KERBS (m) | TOTAL OUTER WIDTH OF BRIDGE (m) | SUPERSTRUCTURE TYPE | SUB - STRUCTURE TYPE |
|---|---|---|---|---|---|---|---|---|---|
| 9 | FOB BHS | 399+380 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |
| 10 | FOB BHS | 400+450 | BHS | 2 X 20 | 40 | NA | 3.5 | Steel | Steel column |

**Some photographs of above Foot Over Bridge are given below: -**




***FOB at Km 364+480***

### 3.2.10 Details of Elevated Structure

A summary of Inventory of existing Elevated Structure is provided in Table below.

| S.NO. | EXISTING CHAINAGE | LHS/RHS/ BHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | LENGTH OF BRIDGE FACE TO FACE OF DIRT WALL (m) | CARRIAGEWAY WIDTH BETWEEN KERBS (m) | TOTAL OUTER WIDTH OF BRIDGE (m) | SUPERSTRUCTURE TYPE | SUB - STRUCTURE TYPE |
|---|---|---|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | | | | |
| Nil. | | | | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | | | | |
| Nil. | | | | | | | | |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | | | | |
| Nil. | | | | | | | | |

## 3.3 HYDRAULIC PERFORMANCE OF EXISTING BRIDGES

During inventory and condition surveys not much data about hydraulic performance of existing bridges could be obtained. However, as per local enquiry and water mark of the surrounding structures, it is found that all structures are hydraulically adequate. No overtopping was observed during the monsoon season of 2025.

## 3.4 CONDITION SURVEY OF EXISTING BRIDGES

The visual condition survey of all the existing structures was carried out as per provisions.

### 3.4.1 Culverts

A summary of Condition Survey of existing Culverts is provided in Table below.

**Pipe Culvert**

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Proposed Repair & Rehabilitation |
|---|---|---|---|---|
| **Pipe Culverts** | | | | |
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | |
| 1 | 320+924 | Pipe culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| 2 | 322+649 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 3 | 323+599 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | |
| 4 | 326+610 | Pipe culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| 5 | 329+608 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 6 | 331+029 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 7 | 331+659 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 8 | 337+373 | Pipe culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| 9 | 338+374 | Pipe culvert | 3x0.9 | Cleaning of Debris and Vegetation is Required |
| 10 | 339+883 | Pipe culvert | 2x0.9 | Cleaning of Debris and Vegetation is Required |
| 11 | 340+452 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 12 | 340+619 | Pipe culvert | 2x0.9 | Cleaning of Debris and Vegetation is Required |
| 13 | 342+764 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 14 | 344+537 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 15 | 346+335 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 16 | 349+779 | Pipe culvert | 2x0.9 | Cleaning of Debris and Vegetation is Required |
| 17 | 352+620 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 18 | 353+087 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 19 | 353+549 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 20 | 355+002 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 21 | 355+127 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 22 | 355+207 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 23 | 359+578 | Pipe culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | |
| 24 | 361+262 | Pipe culvert | 4x1 | Cleaning of Debris and Vegetation is Required |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Proposed Repair & Rehabilitation |
|---|---|---|---|---|
| 25 | 362+625 | Pipe culvert | 3x0.9 | Cleaning of Debris and Vegetation is Required |
| 26 | 362+978 | Pipe culvert | 2x0.9 | Cleaning of Debris and Vegetation is Required |
| 27 | 363+128 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 28 | 364+578 | Pipe culvert | 3x1 | Cleaning of Debris and Vegetation is Required |
| 29 | 364+855 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 30 | 366+745 | Pipe culvert | 2x0.9 | Cleaning of Debris and Vegetation is Required |
| 31 | 367+845 | Pipe culvert | 6x1 | Cleaning of Debris and Vegetation is Required |
| 32 | 368+869 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 33 | 369+009 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 34 | 369+366 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 35 | 370+354 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 36 | 371+251 | Pipe culvert | 4x1 | Cleaning of Debris and Vegetation is Required |
| 37 | 374+702 | Pipe culvert | 3x1.2 | Cleaning of Debris and Vegetation is Required |
| 38 | 374+859 | Pipe culvert | 3x1.2 | Cleaning of Debris and Vegetation is Required |
| 39 | 375+234 | Pipe culvert | 3x1.2 | Cleaning of Debris and Vegetation is Required |
| 40 | 378+786 | Pipe culvert | 1x0.9 | Cleaning of Debris and Vegetation is Required |
| 41 | 379+091 | Pipe culvert | 2x1.2 | Cleaning of Debris and Vegetation is Required |
| 42 | 379+887 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 43 | 384+963 | Pipe culvert | 1x0.9 | Cleaning of Debris and Vegetation is Required |
| 44 | 385+705 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 45 | 386+064 | Pipe culvert | 3x1.2 | Cleaning of Debris and Vegetation is Required |
| 46 | 387+792 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 47 | 388+685 | Pipe culvert | 3x1 | Cleaning of Debris and Vegetation is Required |
| 48 | 389+768 | Pipe culvert | 2x1.2 | Cleaning of Debris and Vegetation is Required |
| 49 | 393+250 | Pipe culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 50 | 395+960 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 51 | 399+925 | Pipe culvert | 2x1 | Cleaning of Debris and Vegetation is Required |
| 52 | 400+581 | Pipe culvert | 1x0.9 | Cleaning of Debris and Vegetation is Required |

### Box/Slab Culvert

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Proposed Repair & Rehabilitation |
|---|---|---|---|---|
| **Box Culverts** | | | | |
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | |
| 1 | 321+428 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | |
| 2 | 332+510 | Box Culvert | 1X3 | PUP |
| 3 | 334+160 | Box Culvert | 1X3 | PUP |
| 4 | 337+949 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 5 | 339+061 | Box Culvert | 1x6 | Cleaning of Debris and Vegetation is Required |
| 6 | 342+496 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 7 | 344+377 | Box Culvert | 1x4.1 | Cleaning of Debris and Vegetation is Required |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Proposed Repair & Rehabilitation |
|---|---|---|---|---|
| 8 | 345+912 | Box Culvert | 1x5 | Cleaning of Debris and Vegetation is Required |
| 9 | 346+805 | Box Culvert | 1X3 | PUP |
| 10 | 346+884 | Box Culvert | 1x4 | Cleaning of Debris and Vegetation is Required |
| 11 | 351+210 | Box Culvert | 1x5 | Cleaning of Debris and Vegetation is Required |
| 12 | 351+573 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 13 | 352+060 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 14 | 352+329 | Box Culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| 15 | 352+971 | Box Culvert | 1x4 | Cleaning of Debris and Vegetation is Required |
| 16 | 353+431 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 17 | 353+858 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 18 | 353+937 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 19 | 354+327 | Box Culvert | 1x4 | Cleaning of Debris and Vegetation is Required |
| 20 | 358+980 | Box Culvert | 1X3 | PUP |
| 21 | 359+945 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 22 | 360+814 | Box Culvert | 1x5 | Cleaning of Debris and Vegetation is Required |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | |
| 23 | 362+819 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 24 | 362+864 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 25 | 363+641 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 26 | 364+181 | Box Culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 27 | 365+310 | Box Culvert | 1x1.7 | Cleaning of Debris and Vegetation is Required |
| 28 | 365+754 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 29 | 365+876 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 30 | 366+941 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 31 | 367+514 | Box Culvert | 1x2.4 | Cleaning of Debris and Vegetation is Required |
| 32 | 367+676 | Box Culvert | 1x1.8 | Cleaning of Debris and Vegetation is Required |
| 33 | 367+769 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 34 | 368+356 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 35 | 368+477 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 36 | 368+715 | Box Culvert | 3x3 | Cleaning of Debris and Vegetation is Required |
| 37 | 369+988 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 38 | 370+206 | Box Culvert | 1x5 | Cleaning of Debris and Vegetation is Required |
| 39 | 371+037 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 40 | 373+107 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 41 | 373+874 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 42 | 373+974 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 43 | 374+382 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 44 | 375+438 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 45 | 377+274 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 46 | 377+438 | Box Culvert | 1x2.2 | Cleaning of Debris and Vegetation is Required |
| 47 | 377+915 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 48 | 378+223 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 49 | 378+562 | Box Culvert | 1x2.2 | Cleaning of Debris and Vegetation is Required |
| 50 | 378+953 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Proposed Repair & Rehabilitation |
|---|---|---|---|---|
| 51 | 379+432 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 52 | 379+536 | Box Culvert | 1x2.3 | Cleaning of Debris and Vegetation is Required |
| 53 | 379+701 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 54 | 380+150 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 55 | 380+887 | Box Culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 56 | 381+057 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 57 | 381+977 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 58 | 382+037 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 59 | 382+719 | Box Culvert | 1x4.2 | Cleaning of Debris and Vegetation is Required |
| 60 | 383+328 | Box Culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| 61 | 383+455 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 62 | 383+911 | Box Culvert | 1x1.2 | Cleaning of Debris and Vegetation is Required |
| 63 | 384+839 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 64 | 385+456 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 65 | 388+424 | Box Culvert | 1x1.6 | Cleaning of Debris and Vegetation is Required |
| 66 | 388+506 | Box Culvert | 1x1.6 | Cleaning of Debris and Vegetation is Required |
| 67 | 388+608 | Box Culvert | 1x 1.1 | Cleaning of Debris and Vegetation is Required |
| 68 | 389+004 | Box Culvert | 1x1.1 | Cleaning of Debris and Vegetation is Required |
| 69 | 389+342 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 70 | 389+479 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 71 | 389+971 | Box Culvert | 1x2 | Cleaning of Debris and Vegetation is Required |
| 72 | 393+102 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 73 | 393+681 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 74 | 393+872 | Box Culvert | 1x1 | Cleaning of Debris and Vegetation is Required |
| 75 | 394+247 | Box Culvert | 1x1.6 | Cleaning of Debris and Vegetation is Required |
| 76 | 394+356 | Box Culvert | 1x2.1 | Cleaning of Debris and Vegetation is Required |
| 77 | 395+318 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 78 | 395+523 | Box Culvert | 1x1.5 | Cleaning of Debris and Vegetation is Required |
| 79 | 396+229 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 80 | 396+402 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 81 | 396+693 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 82 | 397+015 | Box Culvert | 1x1.8 | Cleaning of Debris and Vegetation is Required |
| 83 | 399+350 | Box Culvert | 1x4.4 | Cleaning of Debris and Vegetation is Required |
| 84 | 332+420 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 85 | 333+040 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 86 | 334+990 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 87 | 334+030 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 88 | 334+285 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 89 | 335+770 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 90 | 336+330 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 91 | 391+700 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |
| 92 | 392+280 | Box Culvert | 1x3 | Cleaning of Debris and Vegetation is Required |

### 3.4.2 Major Bridge

A summary of Condition Survey of existing Major Bridges are provided in Table below.

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATION |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| **Nil.** | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 333+340 | LHS (NEW) | 2x25 + 2x25.6 | 1.Leaching observed on Abutments.<br>2. Neoprene sealing material damaged at expansion joints.<br>3. Honeycombing observed in Spans 1, 2, 3, 4 and Substructure (P1, P2, P3).<br>4. Growth of vegetation observed on side slopes.<br>5. Plywood sheets observed at bearing locations. | 1.Seal cracks and apply waterproof coating on abutments.<br>2. Replace damaged neoprene sealing material in expansion joints.<br>3. Repair honeycombed areas with polymer-modified mortar.<br>4. Remove vegetation and restore slope protection.<br>5. Remove plywood sheets and ensure proper bearing seating. |
| | | RHS(NEW) | 2x25 + 2x25.6 | 1. Leaching is observed on Abutments.<br>2. Neoprene Sealing material is Damaged in expansion joints.<br>3. Honey combing is observed on superstructure and Dirt wall.<br>4. Growth of vegetation is observed on side slope.<br>5. Plywood sheets are observed at bearings position. | 1.Seal cracks and apply waterproof coating on abutments.<br>2. Replace damaged neoprene sealing material in expansion joints.<br>3. Repair honeycombed areas with polymer-modified mortar.<br>4. Remove vegetation and restore slope protection.<br>5. Remove plywood sheets and ensure proper bearing seating. |
| 2 | 335+300 | LHS (NEW) | 3x20 | 1. Cracks are observed on approaches<br>2. Neoprene Sealing material is not visible covered with debris.<br>3. Leaching is observed on abutments. | 1.Repair cracks on approaches.<br>2. Clear debris and replace or expose neoprene sealing material in expansion joints.<br>3. Treat leaching on abutments by cleaning, repairing, and applying protective coating. |
| | | RHS(NEW) | 3x20 | 1. Cracks are observed on approaches<br>2. Neoprene Sealing material is damaged | 1.Repair cracks on approaches.<br>2.Replace damaged neoprene sea |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATION |
|---|---|---|---|---|---|
| | | | | 3. Minor honey combing, Leaching is observed on abutments.<br>4. Honey combing is observed on deck slab. | l2. Replace in expansion joints.<br>3. Remove loose concrete, repair minor honeycombing, and treat leaching on abutments.<br>4. Repair honeycombed areas on the deck slab with polymer-modified cement mortar. |
| 3 | 358+157 | LHS (OUTER) (NEW) | 2x19.5 + 2x32 | 1. Cracks are observed on Pavement surface.<br>2. Growth of vegetation is observed side slope.<br>3. Honey combing is observed on retaining wall.<br>4. Leaching is observed on Abutments and piers.<br>5. Minor honey combing is observed on deck slab.<br>6. Debris are observed around the bearings.<br>7. Neoprene sealing material is damaged in expansion joints and covered with debris. | 1.Repair cracks on the pavement surface.<br>2.Remove vegetation from pitched side slopes and apply preventive treatment.<br>3.Remove loose concrete and repair honeycombing on retaining walls.<br>4.Treat leaching on abutments and piers by cleaning, repairing, and applying protective coating.<br>5.Repair minor honeycombing on the deck slab with polymer-modified cement mortar.<br>6.Remove debris around bearings and ensure proper seating.<br>7.Clear debris and replace damaged neoprene sealing material in expansion joints. |
| | | LHS (INNER) (OLD) | 2x18.8 + 2x32 | 1. Growth of vegetation is observed side slope.<br>2. Minor honey combing is observed on deck slab.<br>3. Neoprene sealing material is damaged in expansion joints.<br>4. Drainage spouts are partially clogged. | 1.Remove vegetation from pitched side slopes and apply preventive treatment.<br>2. Repair minor honeycombing on the deck slab using polymer-modified cement mortar.<br>3. Replace damaged neoprene sealing material in expansion joints.<br>4. Clean partially clogged drainage spouts to ensure proper flow. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATION |
|---|---|---|---|---|---|
| | | RHS (INNER) (OLD) | 2x18.8 + 2x32 | 1. Growth of vegetation is observed side slope<br>.2. Minor honey combing is observed on deck slab.<br>3. Neoprene sealing material is damaged in expansion joints.<br>4. Drainage spouts are partially clogged. | 1.Remove vegetation from pitched side slopes and apply preventive treatment.<br>2.Repair minor honeycombing on the deck slab using polymer-modified cement mortar.<br>3.Replace damaged neoprene sealing material in expansion joints.<br>4.Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (OUTER) (NEW) | 2x19.5 + 2x32 | 1. Cracks are observed on Pavement surface.<br>2.Growth of vegetation is observed side slope.<br>3. Neoprene sealing material is not visible covered with debris.<br>4. Debris are observed around the bearings.<br>5. Reinforcement is exposed on deck slab.<br>6. Leaching is observed on Retaining wall. | 1.Repair cracks on the pavement surface.<br>2.Remove vegetation from pitched side slopes and apply preventive treatment.<br>3.Clear debris and expose/replace neoprene sealing material in expansion joints.<br>4.Remove debris around bearings and ensure proper seating.<br>5.Clean, treat, and patch exposed reinforcement on the deck slab.<br>6.Treat leaching on retaining wall by cleaning, repairing, and applying protective coating. |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| **Nil.** | | | | | |

### 3.4.3 Flyover

A summary of Condition Survey of existing Flyover's is provided in Table below.

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATION |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| Nil. | | | | | |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| Nil. | | | | | |

### 3.4.4 Rail Over Bridge (ROB)

A summary of Condition Survey of existing ROB's are provided in Table below.

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 358+828 | LHS (OUTER) (NEW) | 2x37.28 + 1x31.28 | 1.Growth of vegetation is observed side slope.<br>2. Growth of vegetation is observed Retaining wall.<br>3. Leaching is observed on Abutments and Piers.<br>4. E1 Sealing material is not provided. | 1.Remove vegetation from side slopes & apply preventive treatment.<br>2. Remove vegetation from retaining wall & apply preventive treatment.<br>3. Treat leaching on abutment & piers by cleaning & repairing and apply protective coating.<br>44. Provide sealing material in E1. |
| | | LHS (INNER) (OLD) | 1x16.73+1x16.57+1x31.72 +1x16.72 | 1. Cracks and Uneven surface observed on pavement surface.<br>2. Growth of vegetation is observed side slope.<br>3. Leaching and Growth of vegetation is observed Retaining wall.<br>4. Leaching and Growth of vegetation is observed on Abutments.<br>5. Cracks are observed on edge beam of the expansion joints.<br>6. Drainage spouts are partially clogged.<br>7. Growth of vegetation is observed on edge of the deck slab. | 1.Repair Cracks & level Unevenness on pavement surface.<br>2.Remove vegetation from side slopes & apply preventive treatment.<br>3.Treat leaching on retaining wall by cleaning & repairing, remove vegetation and apply protective coating.<br>4.Treat leaching on retaining wall by cleaning & repairing, remove vegetation and apply protective coating.<br>5.Repair cracks at edge beam of expansion joints.<br>6.Clean & flush clogged drainage spouts.<br>7.Remove vegetation from edge of deck slab & apply preventive treatment. |

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| | | RHS (INNER) (OLD) | 1x16.73+1x16.57+1x31.72 +1x16.72 | 1. Cracks and Uneven surface observed on pavement surface.<br>2. Growth of vegetation is observed side slope.<br>3. Leaching and Growth of vegetation is observed Retaining wall.<br>4. Leaching and Growth of vegetation is observed on Abutments.<br>5. Cracks are observed on edge beam of the expansion joints.<br>6. Drainage spouts are partially clogged.<br>7. Growth of vegetation is observed on edge of the deck slab. | 1.Repair Cracks & level Unevenness on pavement surface.<br>2.Remove vegetation from side slopes & apply preventive treatment.<br>3.Treat leaching on retaining wall by cleaning & repairing, remove vegetation and apply protective coating.<br>4.Treat leaching on retaining wall by cleaning & repairing, remove vegetation and apply protective coating.<br>5.Repair cracks at edge beam of expansion joints.<br>6.Clean & flush clogged drainage spouts.<br>7.Remove vegetation from edge of deck slab & apply preventive treatment. |
| | | RHS (OUTER) (OLD) | 2x37.28 + 1x31.28 | 1. Growth of vegetation is observed side slope.<br>2. Growth of vegetation is observed Retaining wall.<br>3. Leaching is observed on Abutments and Piers. | 1.Remove vegetation from side slopes & apply preventive treatment.<br>2. Remove vegetation from retaining wall & apply preventive treatment.<br>3. Treat leaching on abutment & piers by cleaning & repairing and apply protective coating. |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| Nil. | | | | | |

### 3.4.5 Minor Bridges

A summary of Condition Survey of existing Minor Bridges are provided in Table below.

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| 1 | 325+965 | LHS (OLD) | 1x18 | 1. Cracks, Potholes and Unevenness observed on pavement surface.<br>2. Growth of vegetation observed on side slopes.<br>3. Leaching observed on Abutments.<br>4. Honeycombing observed on I Girders.<br>5. Minor Damaged observed on I Girder.<br>6. Expansion Joints sealing material is damaged.<br>7. Debris observed on Expansion joints.<br>8. Drainage spouts are clogged. | 1.Repair cracks, potholes, and level uneven pavement surfaces.<br>2.Remove vegetation from side slopes and apply preventive treatment.<br>3.Treat leaching on abutments by cleaning, repairing, and applying protective coating.<br>4.Remove loose concrete and repair honeycombing on I-girders.<br>5.Repair minor damage on I-girders.<br>6.Replace damaged expansion joint sealing material.<br>7.Clear debris from expansion joints to ensure proper functioning.<br>8.Clean clogged drainage spouts to ensure proper flow. |
| | | RHS (OLD) | 1x18 | 1. Growth of vegetation observed on side slopes.<br>2. Leaching is observed on Abutments.<br>3. Honeycombing is observed on Girders.<br>4. Minor damaged edge of | 1.Remove vegetation from side slopes and apply preventive treatment.<br>2.Treat leaching on abutments by cleaning, repairing, and applying protective coating.<br>3.Remove loose concrete and repair honeycombing on girders. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | the deck slab.<br>5. Leaching is observed on superstructure.<br>6. Expansion joints sealing material is damaged.<br>7. Debris observed on Expansion joints.<br>8. Drainage spouts are clogged.<br>9. Projections pipes are not provided. | 4.Repair minor damaged edges of the deck slab.<br>5.Treat leaching on the superstructure by cleaning, repairing, and applying protective coating.<br>6.Replace damaged expansion joint sealing material.<br>7.Clear debris from expansion joints to ensure proper movement.<br>8.Clean clogged drainage spouts.<br>9.Provide projection pipes to ensure proper water discharge. |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 2 | 326+480 | LHS (NEW) | 1x11 | 1. Leaching observed on Abutments.<br>2. Growth of vegetation observed on side slopes.<br>3. Drainage Spouts clogged. | 1.Treat leaching on abutments by cleaning, repairing, and applying protective coating.<br>2. Remove vegetation from side slopes and apply preventive treatment.<br>3. Clean and flush clogged drainage spouts to ensure proper flow. |
| | | RHS INNER (OLD) | 1x11 | 1. Growth of vegetation observed on side slopes.<br>2. Leaching observed on Abutments and Deck slab.<br>3. Drainage Spouts clogged.<br>4. Expansion joints sealing material is damaged. | 1.Remove vegetation from side slopes and apply preventive treatment.<br>2. Treat leaching on abutments and deck slab by cleaning, repairing, and applying protective coating.<br>3. Clean and flush clogged drainage spouts.<br>4. Replace damaged expansion joint sealing |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | 5. Debris is observed on Expansion joints. | material.<br>5. Remove debris from expansion joints to ensure proper movement. |
| | | RHS OUTER (OLD) | 1x11 | 1. Growth of vegetation observed on side slopes.<br>2. Leaching observed on Abutments.<br>3. Drainage Spouts clogged. | 1.Remove vegetation from side slopes and apply preventive treatment.<br>2. Treat leaching on abutments by cleaning, repairing, and applying protective coating.<br>3.Clean and flush clogged drainage spouts to ensure proper flow. |
| 3 | 328+550 | LHS (NEW) | 1X27.4 | 1. Growth of vegetation observed on side slopes.<br>2. Leaching observed on Abutment.<br>3. Drainage Spouts are clogged.<br>4. Honeycombing is observed on Girders.<br>5. Cracks observed on Edge of the Expansion joint.<br>6. Debris is observed on Expansion joints. | 1.Remove vegetation from side slopes and apply preventive treatment.<br>2.Treat leaching on abutment by cleaning, repairing, and applying protective coating.<br>3.Clean and flush clogged drainage spouts.<br>4.Remove loose concrete and repair honeycombing on girders.<br>5.Repair cracks at the edges of expansion joints.<br>6.Remove debris from expansion joints to ensure proper movement. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS INNER (OLD) | 1X26.6 | 1. Minor Honey combing is observed on girders.<br>2. Leaching is observed on abutments.<br>3. Cracks are observed on sealing material.<br>4. Drainage spouts are clogged, and projection pipes are not provided.<br>5. Growth of vegetation is observed on median wall.<br>6. Cracks are observed on handrail. | 1.Repair minor honeycombing on girders with polymer-modified cement mortar.<br>2.Treat leaching on abutments by cleaning, repairing, and applying protective coating.<br>3.Replace or repair damaged sealing material in expansion joints.<br>4.Clean clogged drainage spouts and provide projection pipes for proper drainage.<br>5.Remove vegetation from the median wall and apply preventive treatment.<br>6.Repair cracks on the handrail. |
| | | RHS OUTER (OLD) | 1X26.6 | 1. Growth of vegetation is observed on side slope. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| 4 | 329+054 | LHS (NEW) | 1x11.72 | 1. Growth of vegetation is observed on retaining wall.<br>2. Drainage Spouts partially clogged. | 1.Remove vegetation from the retaining wall and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS INNER (OLD) | 1x11.72 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on retaining wall & median wall<br>3. Drainage Spouts partially clogged. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation from retaining and median walls and apply preventive treatment.<br>3. Clean partially clogged drainage |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | | spouts to restore proper flow. |
| | | RHS OUTER (OLD) | 1x11.72 | 1. Expansion joints are filled with debris.<br>2. Growth of vegetation on retaining wall.<br>3. Drainage Spouts partially clogged. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation from retaining and median walls and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to restore proper flow. |
| 5 | 329+420 | LHS (NEW) | 1x37 | 1. Expansion joints are damaged.<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS INNER (OLD) | 1x37 | 1. Expansion joints are damaged.<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged.<br>4. Bearings need to be replaced | 1.Replace damaged expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow.<br>4. Replace worn or damaged bearings. |
| | | RHS OUTER (OLD) | 1x37 | 1. Expansion joints are damaged.<br>2. Growth of vegetation around structure.<br>3. Drainage | 1.Replace damaged expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | Spouts partially clogged.<br>4. Bearings need to be replaced | clogged drainage spouts to ensure proper flow.<br>4. Replace worn or damaged bearings. |
| 6 | 330+140 | LHS (NEW) | 1X19.33 | 1. Expansion joints are filled with debris.<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS INNER (OLD) | 1X19.33 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged.<br>4. Wearing Coat Damage on approaches | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow.<br>4. Repair or replace damaged wearing coat on approaches. |
| | | RHS OUTER (OLD) | 2x9.665 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| 7 | 342+030 | LHS (NEW) | 1X6.2 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (NEW) | 1X6.2 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| 8 | 343+747 | LHS (OUTER) (NEW) | 1x24.0 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | LHS (INNER) (OLD) | 3x8.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (INNER) (OLD) | 1X24.0 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (OUTER) (OLD) | 1X24.0 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| 9 | 348+410 | LHS (NEW) | 1X19.200 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3.Clean partially clogged drainage |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | | spouts to ensure proper flow. |
| | | RHS INNER (OLD) | 1X19.200 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged.<br>4. Wearing Coat Damage on approaches | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow.<br>4.Repair or replace the damaged wearing coat on approaches. |
| | | RHS OUTER (OLD) | 2 X 9.6 | 1. Expansion joints elastomer damage<br>2. Growth of vegetation around structure.<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| 10 | 348+829 | LHS (NEW) | 2X20.200 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on retaining wall & median wall<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS INNER (OLD) | 4X10.1 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on retaining wall & median wall<br>3. Drainage Spouts partially clogged.<br>4. Wearing coat damage near expansion joint | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation from retaining and median walls and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to restore proper flow.<br>4. Repair wearing coat damage near expansion joints. |
| | | RHS OUTER (OLD) | 2X20.200 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on retaining wall & median wall<br>3. Drainage Spouts partially clogged. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| 11 | 350+182 | LHS (NEW) | 2X27.400 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on retaining wall & median wall<br>3. Drainage Spouts partially clogged.<br>4. Wearing coat damage near approaches | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation from retaining and median walls and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to restore proper flow.<br>4. Repair wearing coat damage near approaches. |
| | | RHS INNER (OLD) | 2X27.400 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | retaining wall & median wall<br>3. Drainage Spouts partially clogged. | and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS OUTER (OLD) | 2X27.400 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation on retaining wall & median wall<br>3. Drainage Spouts partially clogged. | 1.Replace damaged elastomer in expansion joints.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure3. Clean flow. |
| 12 | 360+440 | LHS (OUTER) (NEW) | 1X8.85 | 1. Growth of vegetation around structure.<br>2. Drainage Spouts partially clogged. | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | LHS (INNER) (OLD) | 1X8.85 | 1. Growth of vegetation around structure.<br>2. Drainage Spouts partially clogged. | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (INNER) (OLD) | 1X8.85 | 1. Growth of vegetation around structure.<br>2. Drainage Spouts partially clogged. | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (OUTER) (NEW) | 1X8.85 | 1. Growth of vegetation around structure.<br>2. Drainage Spouts partially clogged. | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | | spouts to ensure proper flow. |
| 13 | 360+650 | LHS (OUTER) (NEW) | 2X22.0 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts partially clogged. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3.Clean partially clogged drainage spouts to ensure proper flow. |
| | | LHS (INNER) (OLD) | 2X21.4 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts partially clogged. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (INNER) (OLD) | 2X21.4 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts partially clogged. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (OUTER) (NEW) | 2X22.0 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | Spouts partially clogged. | treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| **Section-3 From 361+000 (Ex. Km 360+300) to 401+332 (Ex. Km 400+632) (6 Lane)** | | | | | |
| 14 | 361+886 | LHS (OUTER) (NEW) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | LHS (INNER) (OLD) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (INNER) (OLD) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (OUTER) (NEW) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| 15 | 362+253 | LHS (OUTER) (NEW) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | LHS (INNER) (OLD) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (INNER) (OLD) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (OUTER) (NEW) | 1X6.0 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| 16 | 363+912 | LHS (OUTER) (NEW) | 1X29.540 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | 3. Drainage Spouts damage | treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | LHS (INNER) (OLD) | 3X9.847 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (INNER) (OLD) | 1X29.540 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts are clogged | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (OUTER) (NEW) | 1X29.540 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts are clogged | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean clogged drainage spouts to ensure proper flow. |
| 17 | 365+117 | LHS (OUTER) (NEW) | 1X9.250 | 1. Growth of vegetation around structure<br>2. Drainage Spouts damage | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | LHS (INNER) (OLD) | 1X9.250 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS (INNER) (OLD) | 1X9.450 | 1. Growth of vegetation around structure. | 1.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (OUTER) (NEW) | 1X9.450 | 1. Growth of vegetation around structure<br>2. Drainage Spouts damage | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| 18 | 366+229 | LHS(OLD) | 1X8.5 | 1. Growth of vegetation around structure<br>2. Drainage Spouts damage | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS(OLD) | 1X8.5 | 1. Growth of vegetation around structure<br>2. Drainage Spouts damage | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| 19 | 366+598 | LHS (OUTER) (NEW) | 1X18.980 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure3. Drainage Spouts are clogged | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3.Clean clogged drainage spouts to ensure proper flow. |
| | | LHS (INNER) (OLD) | 2X9.445 | 1. Wearing coat damage<br>2. Growth of vegetation around structure | 1.Repair or replace the damaged wearing coat.<br>2. Remove vegetation around the structure and apply preventive treatment. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS (INNER) (OLD) | 1X18.980 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment. |
| | | RHS (OUTER) (NEW) | 1X18.980 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment. |
| 20 | 369+575 | LHS (OUTER) (NEW) | 1X20.730 | 1. Honeycombing is observed on girder G2&G3 Girder.<br>2. Debris on expansion joints.<br>3. Cracks are observed on pavement surface.<br>4. Growth of vegetation on retaining wall. | 1.Remove loose concrete and repair honeycombing on G2 and G3 girders with polymer-modified cement mortar.<br>2. Clear debris from expansion joints to ensure proper movement.<br>3. Repair cracks on the pavement surface.<br>4. Remove vegetation from the retaining wall and apply preventive treatment. |
| | | LHS (INNER) (OLD) | 2X10.365 | 1. Grouting is observed.<br>2. Growth of vegetation on retaining wall.<br>3. Drainage Spouts partially clogged. | 1.Re-grout affected areas as required.<br>2. Remove vegetation from the retaining wall and apply preventive treatment.<br>3. Clean partially clogged drainage spouts3. Cleanure proper flow. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS (INNER) (OLD) | 1X20.790 | 1. Honeycombing is observed on girder G2&G3 Girder.<br>2. Debris on expansion joints.<br>3. Cracks are observed on pavement surface.<br>4. Growth of vegetation on retaining wall.<br>5. Patch work is observed on girders. | 1.Remove loose concrete and repair honeycombing on G2 and G3 girders with polymer-modified cement mortar.<br>2.Clear debris from expansion joints to ensure proper movement.<br>3.Repair cracks on the pavement surface.<br>4.Remove vegetation from the retaining wall and apply preventive treatment.<br>5.Inspect patched areas on girders and redo or reinforce patch work if necessary. |
| | | RHS (OUTER) (NEW) | 1X20.790 | 1. Honeycombing is observed on girder G2&G3 Girder.<br>2. Debris on expansion joints.<br>3. Cracks are observed on pavement surface.<br>4. Growth of vegetation on retaining wall. | 1.Remove loose concrete and repair honeycombing on G2 and G3 girders with polymer-modified cement mortar.<br>2. Clear debris from expansion joints to ensure proper movement.<br>3. Repair cracks on the pavement surface.<br>4. Remove vegetation from the retaining wall and apply preventive treatment. |
| 21 | 371+645 | LHS (OUTER) (NEW) | 1X25.710 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts are clogged | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean clogged drainage spouts to ensure proper flow. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | LHS (INNER) (OLD) | 3X8.570 | 1. Growth of vegetation around structure<br>2. Drainage Spouts are clogged | 1.Remove vegetation around the structure and apply preventive treatment.<br>2. Clean partially clogged drainage spouts to ensure proper flow. |
| | | RHS (INNER) (OLD) | 1X25.700 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts are clogged | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean clogged drainage spouts to ensure proper flow. |
| | | RHS (OUTER) (NEW) | 1X25.700 | 1. Expansion joints are filled with debris<br>2. Growth of vegetation around structure<br>3. Drainage Spouts are clogged | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Remove vegetation around the structure and apply preventive treatment.<br>3. Clean clogged drainage spouts to ensure proper flow. |
| 22 | 372+676 | LHS(OLD) | 1X6.0 | 1. Honey combing on slab is observed.<br>2. Cracks are observed on pavement surface.<br>3. Honey combing on abutment.<br>4. Growth of vegetation on retaining wall. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Repair cracks on the pavement surface.<br>3. Remove loose concrete and repair honeycombing on the abutment.<br>4. Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS (OLD) | 1X6.0 | | |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| 23 | 373+597 | LHS (NEW) | 2X18.075 | 1. Minor cracks on girder observed.<br>2. Debris are observed on expansion joint & E2 sealing damaged.<br>3. Drainage spouts are partially clogged.<br>4. Growth of vegetation retaining wall. | 1.Repair minor cracks on girders using suitable crack repair method.<br>2. Clear debris from expansion joints and replace damaged E2 sealing material.<br>3.Clean partially clogged drainage spouts to restore proper flow.<br>4.Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS INNER (OLD) | 5X7 | 1. Grouting is observed on slab & Spalling is observed on slab S-4.<br>2. Vegetation growth on retaining wall and pier.<br>3. Drainage spouts are clogged.<br>4. Cracks on pavement surface. | 1.Re-grout affected areas and remove loose concrete, then repair spalling on slab S-4 with suitable patch material.<br>2. Remove vegetation from retaining walls and piers and apply preventive treatment.<br>3. Clean clogged drainage spouts to ensure proper flow.<br>4. Repair cracks on the pavement surface. |
| | | RHS OUTER (OLD) | 2X14.4 + 1x7.1 | 1. Honey combing is observed on slab S1,S2& G1,G2 Girder.<br>2. Cracks are pavement surface.<br>3. Growth of vegetation on pavement surface. | 1.Remove loose concrete and repair honeycombing on slab S1, S2 and G1, G2 girders with polymer-modified cement mortar.<br>2. Repair cracks on the pavement surface.<br>3. Remove vegetation from the pavement surface and apply preventive treatment. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| 24 | 377+006 | LHS (OUTER) (NEW) | 1X8.8 | 1. Honey combing is observed on slab.<br>2. Leaching is observed on slab.<br>3. Debris on footpath.<br>4. Grouting is observed on LHS side. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Treat leaching on the slab by cleaning, repairing, and applying protective coating.<br>3. Remove debris from the footpath.<br>4. Inspect and redo grouting on the LHS side as required. |
| | | LHS (INNER) (OLD) | 1X8.8 | 1. Honey combing is observed on slab.<br>2. Leaching is observed on slab.<br>3. Debris on footpath.<br>4. Grouting is observed on LHS side. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Treat leaching on the slab by cleaning, repairing, and applying protective coating.<br>3. Remove debris from the footpath.<br>4. Inspect and redo grouting on the LHS side if required. |
| | | RHS (INNER) (OLD) | 1X8.8 | 1. Honey combing is observed on slab.<br>2. Leaching is observed on slab.<br>3. Debris on footpath.<br>4. Drainage spouts are clogged. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Treat leaching on the slab by cleaning, repairing, and applying protective coating.<br>3. Remove debris from the footpath.<br>4. Clean clogged drainage spouts to ensure proper flow. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS (OUTER) (NEW) | 1X8.8 | 1. Honey combing is observed on slab.<br>2. Leaching is observed on slab.<br>3. Debris on footpath.<br>4. Drainage spouts are clogged. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Treat leaching on the slab by cleaning, repairing, and applying protective coating.<br>3. Remove debris from the footpath.<br>4. Clean clogged drainage spouts to ensure proper flow. |
| 25 | 379+765 | LHS (NEW) | 1X16.700 | 1. Debris on expansion joints & Footpath.<br>2. Minor cracks on Girder G1,G2,G3&G4.<br>3. Growth of vegetation on Retaining wall.<br>4. Drainage spouts are partially clogged. | 1.Remove debris from expansion joints and footpath to ensure proper function.<br>2. Repair minor cracks on G1, G2, G3, and G4 girders.<br>3. Remove vegetation from retaining wall and apply preventive treatment.<br>4. Clean partially clogged drainage spouts to restore proper flow. |
| | | RHS INNER (OLD) | 2X8.350 | 1. Grouting is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks and potholes on pavement surface.<br>5. Growth of vegetation & Spalling is observed on pier. | 1.Inspect and redo grouting on the slab as required.<br>2.Remove vegetation from the retaining wall and apply preventive treatment.<br>3.Clean clogged drainage spouts to ensure proper flow.<br>4.Repair cracks and potholes on the pavement surface.<br>5.Remove vegetation from piers, and repair spalling by treating exposed reinforcement |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | | and patching with suitable mortar. |
| | | RHS OUTER (OLD) | 1X16.700 | 1. Debris on expansion joints.<br>2. Minor cracks on Girder G1,G2,G3&G4.<br>3. Growth of vegetation on Retaining wall.<br>4. Drainage spouts are partially clogged. | 1.Remove debris from expansion joints to ensure proper movement.<br>2. Repair minor cracks on G1, G2, G3, and G4 girders.<br>3. Remove vegetation from the retaining wall and apply preventive treatment.<br>4. Clean partially clogged drainage spouts to restore proper flow. |
| 26 | 380+646 | LHS (NEW) | 1X18.750 | 1. Honeycombing is observed on abutment.<br>2. Minor Cracks on G1 & G2 Observed Girder.<br>3. Debris on expansion joint.<br>4. Drainage spouts are partially clogged.<br>5. Growth of vegetation on retaining wall. | 1.Remove loose concrete and repair honeycombing on the abutment with polymer-modified cement mortar.<br>2. Repair minor cracks on G1 and G2 girders.<br>3. Clear debris from expansion joints to ensure proper movement.<br>4.Clean partially clogged drainage spouts to restore proper flow.<br>5.Remove vegetation from the retaining wall and apply preventive t5. Remove. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS INNER (OLD) | 2X9.350 | 1. Grouting is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks on pavement surface. | 1.Inspect and redo grouting on the slab as required.<br>2. Remove vegetation from the retaining wall and apply preventive treatment.<br>3. Clean clogged drainage spouts to ensure proper flow.<br>4. Repair cracks on the pavement surface. |
| | | RHS OUTER (OLD) | 1X18.750 | 1. Honeycombing is observed on abutment.<br>2. Minor Cracks on G1 & G2 Observed Girder.<br>3. Debris on expansion joint.<br>4. Drainage spouts are partially clogged.<br>5. Growth of vegetation on retaining wall. | 1.Remove loose concrete and repair honeycombing on the abutment with polymer-modified cement mortar.<br>2. Repair minor cracks on G1 and G2 girders.<br>3. Clear debris from expansion joints to ensure proper movement.<br>4. Clean partially clogged drainage spouts to restore proper flow.<br>5. Remove vegetation from the retaining wall and apply preventive treatment. |
| 27 | 381+706 | LHS (NEW) | 1X17.750 | 1. Drainage spouts are partially clogged.<br>2. Debris on footpath. | 1.Clean partially clogged drainage spouts to ensure proper flow.<br>2. Remove debris from the footpath. |
| | | RHS INNER (OLD) | 2X8.875 | 1. Grouting is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks on pavement surface. | 1.Inspect and redo grouting on the slab as required.<br>2. Remove vegetation from the retaining wall and apply preventive treatment.<br>3. Clean clogged drainage spouts to |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | | ensure proper flow.<br>4. Repair cracks on the pavement surface. |
| | | RHS OUTER (OLD) | 1X17.750 | 1. Drainage spouts are partially clogged.<br>2. Debris on footpath.<br>3. Cracks are observed on pavement surface.<br>4. Cracks are observed on girder. | 1.Clean partially clogged drainage spouts to restore proper flow.<br>2. Remove debris from the footpath.<br>3. Repair cracks on the pavement surface.<br>4. Repair cracks on the girder using suitable crack repair methods. |
| 28 | 383+653 | LHS (OUTER) (NEW) | 1X6.0 | 1. Drainage spouts are partially clogged.<br>2. Debris on footpath. | 1.Clean partially clogged drainage spouts to ensure proper flow.<br>2. Remove debris from the footpath. |
| | | LHS (INNER) (OLD) | 1X6.0 | | |
| | | RHS (INNER) (OLD) | 1X6.0 | | |
| | | RHS (OUTER) (NEW) | 1X6.0 | | |
| 29 | 387+271 | LHS(OLD) | 1X8.2 | 1. Grouting is observed on substructure.<br>2. Drainage spouts are not provided.<br>3. Vegetation on retaining wall. | 1.Inspect and redo grouting on the substructure as required.<br>2. Provide drainage spouts to ensure proper water discharge.<br>3. Remove vegetation from the retaining wall and apply preventive treatment. |
| | | RHS(OLD) | 1X8.2 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on retaining wall. | 1.Clean partially clogged drainage spouts to restore proper flow.<br>2. Remove vegetation from the retaining wall |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | | and apply preventive treatment. |
| 30 | 398+345 | LHS SR (OUTER) (NEW) | 1X26.5 | 1. Expansion joints are filled with debris.<br>2. Drainage spouts are partially clogged.<br>3. Growth of vegetation on retaining wall.<br>4. Cracks are observed on pavement surface. | 1.Clear debris from expansion joints to ensure proper movement.<br>2.Clean partially clogged drainage spouts to restore proper flow<br>3. Clean vegetation from the retaining wall and apply preventive treatment.<br>4. Repair cracks on the pavement surface. |
| | | LHS MCW (OUTER) (NEW) | 1X26.5 | 1. Grouting is observed.<br>2. Cracks are observed on pavement surface.<br>3. Growth of vegetation on retaining wall.<br>4. Drainage Spouts partially clogged. | 1.Inspect and redo grouting as required.<br>2. Repair cracks on the pavement surface.<br>3. Remove vegetation from the retaining wall and apply preventive treatment.<br>4. Clean partially clogged drainage spouts to restore proper flow. |
| | | LHS MCW (INNER) (OLD) | 3X8.86 | 1. Drainage spouts are clogged.<br>2. Patch work is observed.<br>3. Projection needs to be provided.<br>4. Growth of vegetation is observed on side slopes retaining wall<br>5. Damage is observed on edge of the deck slab. | 1.Clean clogged drainage spouts to restore proper flow.<br>2. Inspect and redo patch work if required.<br>3. Provide projection pipes for proper drainage.<br>4. Remove vegetation from side slopes and retaining wall and apply preventive treatment.<br>5. Repair damaged edges of the deck slab. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS MCW (INNER) (OLD) | 1X26.5 | 1. Drainage spouts are clogged.<br>2. Patch work is observed.<br>3. Projection needs to be provided.<br>4. Growth of vegetation is observed on side slopes retaining wall<br>5. Honey combing is observed on superstructure.<br>6. Expansion joints are filled with debris | 1.Clean clogged drainage spouts to restore proper flow.<br>2.Inspect and redo patch work on the structure if required.<br>3.Provide projection pipes for proper drainage.<br>4.Remove vegetation from side slopes and retaining wall and apply preventive treatment.<br>5.Remove loose concrete and repair honeycombing on the superstructure.<br>6.Clear debris from expansion joints to ensure proper movement. |
| | | RHS MCW (OUTER) (NEW) | 1X26.5 | 1. Expansion joints are filled with debris.<br>2. Drainage spouts are partially clogged.<br>3. Growth of vegetation on retaining wall.<br>4. Patch work is observed on slab.<br>5. Cracks are observed on pavement surface. | 1.Clear debris from expansion joints to ensure proper movement.<br>2. Clean partially clogged drainage spouts to restore proper flow.<br>3. Remove vegetation from the retaining wall and apply preventive treatment.<br>4. Inspect and redo patch work on the slab if required.<br>5. Repair cracks on the pavement surface. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS SR (OUTER) (NEW) | 1X26.5 | 1. Expansion joints are filled with debris.<br>2. Drainage spouts are partially clogged.<br>3. Growth of vegetation on retaining wall.<br>4. Cracks are observed on pavement surface.<br>5. B-3 Pedestal is minor damaged.<br>6. Honeycombing on Girder G1&G4. | 1.Clear debris from expansion joints to ensure proper movement.<br>2.Clean partially clogged drainage spouts to restore proper flow.<br>3.Remove vegetation from the retaining wall and apply preventive treatment.<br>4.Repair cracks on the pavement surface.<br>5.Repair minor damage on B-3 pedestal.<br>6.Remove loose concrete and repair honeycombing on G1 and G4 girders. |
| 31 | 399+749 | LHS (OUTER) (NEW) | 1X8.9 | 1. Honey combing is observed on superstructure.<br>2. Crash barrier is Damaged near Median.<br>3. Cracks are observed on Pavement surface.<br>4. Debris is observed on Footpath.<br>5. Leaching is observed on abutment.<br>6. Patch work is observed on abutment.<br>7. Vegetation on stone pitching & Retaining wall. | 1.Remove loose concrete and repair honeycombing on the superstructure.<br>2.Repair or replace the damaged crash barrier near the median.<br>3.Repair cracks on the pavement surface.<br>4.Remove debris from the footpath.<br>5.Treat leaching on the abutment by cleaning, repairing, and applying protective coating.<br>6.Inspect and redo patch work on the abutment if required.<br>7.Remove vegetation from stone pitching and retaining wall and apply preventive treatment. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | LHS (INNER) (OLD) | 1X8.9 | 1. Honey combing is observed on superstructure.<br>2. Crash barrier is Damaged near Median.<br>3. Cracks are observed on Pavement surface.<br>4. Debris is observed on Footpath.<br>5. Leaching is observed on abutment.<br>6. Patch work is observed on abutment.<br>7. Vegetation on stone pitching & Retaining wall. | 1.Remove loose concrete and repair honeycombing on the superstructure.<br>2.Repair or replace the damaged crash barrier near the median.<br>3.Repair cracks on the pavement surface.<br>4.Remove debris from the footpath.<br>5.Treat leaching on the abutment by cleaning, repairing, and applying protective coating.<br>6.Inspect and redo patch work on the abutment if required.<br>7.Remove vegetation from stone pitching and retaining wall, and apply preventive treatment. |
| | | RHS (INNER) (OLD) | 1X8.9 | 1. Honey combing is observed on superstructure.<br>2. Cracks are observed on Pavement surface.<br>3. Debris is observed on Footpath.<br>4. Leaching is observed on abutment.<br>5. Patch work is observed on abutment.<br>6. Vegetation on stone pitching & Retaining wall.<br>7. Drainage spouts are Not provided | 1.Remove loose concrete and repair honeycombing on the superstructure.<br>2.Repair cracks on the pavement surface.<br>3.Remove debris from the footpath.<br>4.Treat leaching on the abutment by cleaning, repairing, and applying protective coating.<br>5.Inspect and redo patch work on the abutment if required.<br>6.Remove vegetation from stone pitching and retaining wall, and apply preventive treatment.<br>7.Provide drainage spouts to ensure proper water discharge. |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS (OUTER) (NEW) | 1X8.9 | 1. Honey combing is observed on superstructure.<br>2. Cracks are observed on Pavement surface.<br>3. Debris is observed on Footpath.<br>4. Leaching is observed on abutment.<br>5. Patch work is observed on abutment.<br>6. Vegetation on stone pitching & Retaining wall.<br>7. Drainage spouts are Not provided | 1.Remove loose concrete and repair honeycombing on the superstructure.<br>2.Repair cracks on the pavement surface.<br>3.Remove debris from the footpath.<br>4.Treat leaching on the abutment by cleaning, repairing, and applying protective coating.<br>5.Inspect and redo patch work on the abutment if required.<br>6.Remove vegetation from stone pitching and retaining wall, and apply preventive treatment.<br>7.Provide drainage spouts to ensure proper water discharge. |
| 32 | 390+343 | LHS (OUTER) (NEW) | 4X12.5 | 1. Honeycombing is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks on pavement surface. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Remove vegetation from the retaining wall and apply preventive treatment.<br>3. Clean clogged drainage spouts to restore proper flow.<br>4. Repair cracks on the pavement surface. |
| | | LHS (INNER) (OLD) | 4X12.5 | 1. Honeycombing is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks on | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Remove vegetation from the retaining wall |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | | | pavement surface. | and apply preventive treatment.<br>3. Clean clogged drainage spouts to restore proper flow.<br>4. Repair cracks on the pavement surface. |
| | | RHS (INNER) (OLD) | 4X12.5 | 1. Honeycombing is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks on pavement surface. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Remove vegetation from the retaining wall and apply preventive treatment.<br>3. Clean clogged drainage spouts to restore proper flow.<br>4. Repair cracks on the pavement surface. |
| | | RHS (OUTER) (NEW) | 4X12.5 | 1. Honeycombing is observed on slab.<br>2. Vegetation on retaining wall.<br>3. Spouts are clogged.<br>4. Cracks on pavement surface. | 1.Remove loose concrete and repair honeycombing on the slab with polymer-modified cement mortar.<br>2. Remove vegetation from the retaining wall and apply preventive treatment.<br>3. Clean clogged drainage spouts to restore proper flow.<br>4. Repair cracks on the pavement surface. |
| 33 | 391+112 | LHS (OUTER) (NEW) | 4X8.0 | 1. Honey combing is observed on Slab S1,S3&S4.<br>2. Honey combing on Pier P1,P2&P3.<br>3. Honey combing & | 1.Remove loose concrete and repair honeycombing on slabs S1, S3, and S4 with polymer-modified cement mortar.<br>2.Remove loose concrete and repair honeycombing on piers |
| | | LHS (INNER) (OLD) | 4X8.0 | | |
| | | RHS (INNER) (OLD) | 4X8.0 | | |

| S. No. | Existing Chainage (Km) | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMMENDATIONS |
|---|---|---|---|---|---|
| | | RHS (OUTER) (NEW) | 4X8.0 | Vegetation on retaining wall.<br>4. Drainage spouts are partially clogged.<br>5. Missing footpath lane | P1, P2, and P3.<br>3.Remove honeycombing and vegetation from the retaining wall, and apply preventive treatment.<br>4.Clean partially clogged drainage spouts to restore proper flow.<br>5.Provide or reconstruct the missing footpath lane. |

### 3.4.6 Light Vehicular Underpasses (LVUP)/ Vehicular Underpass Grade-II

A summary of Condition Survey of existing Light Vehicular Underpasses is provided in Table below.

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 339+223 | LHS (NEW) | 1x12.0 | 1. Drainage spouts are not provided.<br>2. Vegetation on RE wall. | 1.Provide drainage spouts as per specification.<br>2. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x12.0 | | |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| Nil. | | | | | |

### 3.4.7 Vehicular Underpasses (VUP)

A summary of Condition Survey of existing Vehicular Underpasses are provided in Table below

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 332+100 | LHS (NEW) | 1x21.0 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall. | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x21.0 | | |
| 2 | 333+225 | LHS (NEW) | 2x12.000 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall.<br>3. Wearing coat on cross road damage | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment.<br>3. Repair damaged wearing coat on cross road. |
| | | RHS (NEW) | 2x12.000 | | |
| 3 | 336+390 | LHS (NEW) | 1x21.0 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall.<br>3. Expansion Sealing is damage. | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment.<br>3. Repair damaged sealing of expansion. |
| | | RHS (NEW) | 1x21.0 | | |
| 4 | 354+384 | LHS (NEW) | 1x21.0 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall.<br>3. Expansion Sealing is damage | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment.<br>3. Repair damaged sealing of expansion. |
| | | RHS (NEW) | 1x21.0 | | |
| 5 | 355+870 | LHS (NEW) | 1x15.7 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall. | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x15.7 | | |
| 6 | 357+636 | LHS (NEW) | 1x12.31 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall. | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x12.31 | | |
| 7 | 358+850 | LHS (NEW) | 1x21.0 | 1. Drainage spouts are partially clogged.<br>2. Vegetation on RE wall.<br>3. Expansion Joint is damage | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from RE wall and apply preventive treatment.<br>3. Repair damaged expansion joint. |
| | | RHS (NEW) | 1x21.0 | | |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 8 | 362+705 | LHS (NEW) | 1x22.2 | 1. Drainage spouts are partially clogged.<br>2. Vegetation growth on structure is observed.<br>3. Expansion joint Sealing elastomer is damaged. | 1.Clean & flush clogged drainage spouts.<br>2. Remove vegetation from structure and apply preventive treatment.<br>3. Repair damaged sealing of expansion. |
| | | RHS (NEW) | 1x22.2 | | |

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| 9 | 368+522 | LHS (NEW) | 1x22.21 | 1. Patch work is observed on slab.<br>2. Minor cracks on G2&G4 Girder.<br>3. Debris &E1 Sealing is damaged on expansion joints.<br>4. Drainage spouts are partially clogged.<br>5. Vegetation on RE wall.<br>6. Cracks are observed on pavement surface. | 1.Inspect patched areas on slab & reinforce patch work if necessary.<br>2. Repair minor cracks by using suitable repairing method.<br>3. Remove debris & repair damaged sealing in expansion joint.<br>4.Clean & flush clogged drainage spouts.<br>5. Remove vegetation from RE wall and apply preventive treatment.<br>6. Repair the observed cracks & level the pavement surface. |
| | | RHS (NEW) | 1x22.21 | 1. Patch work is observed on slab.<br>2. Minor cracks on G2&G4 Girder.<br>3. Debris on expansion joints.<br>4. Drainage spouts are partially clogged.<br>5. Vegetation on RE wall.<br>6. Cracks are observed on pavement surface. | 1.Inspect patched areas on slab & reinforce patch work if necessary.<br>2. Repair minor cracks on G2 & G4 girders by using suitable repairing method.<br>3. Remove debris & clean the expansion joint.<br>4.Clean & flush clogged drainage spouts.<br>5. Remove vegetation from RE wall and apply preventive treatment.<br>6. Repair the observed cracks & level the pavement surface. |
| 10 | 370+425 | LHS (NEW) | 1x22.270 | 1. Honey combing is on slab.<br>2. Minor cracks on G2&G4 Girder.<br>3. Debris &E2 Sealing is damaged on expansion joints.<br>4. Drainage spouts are partially clogged.<br>5. Vegetation on RE wall.<br>6. Cracks are observed on pavement surface. | 1.Remove loose concrete and repair honeycombing on slab with polymer-modified cement mortar.<br>2. Repair minor cracks on G2 & G4 girders by using suitable repairing method.<br>3. Remove debris & repair damaged sealing in expansion joint.<br>4.Clean & flush clogged drainage spouts.<br>5. Remove vegetation from RE wall and apply preventive treatment.<br>6. Repair the observed cracks & level the pavement surface. |

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| | | RHS (NEW) | 1x22.270 | 1. Honey combing is on slab.<br>2. Minor cracks on G2&G4 Girder.<br>3. Debris on expansion joints.<br>4. Drainage spouts are partially clogged.<br>5. Vegetation on RE wall.<br>6. Cracks are observed on pavement surface. | 1.Remove loose concrete and repair honeycombing on slab with polymer-modified cement mortar.<br>2. Repair minor cracks on G2 & G4 girders by using suitable repairing method.<br>3. Remove debris & repair damaged sealing in expansion joint.<br>4.Clean & flush clogged drainage spouts.<br>5. Remove vegetation from RE wall and apply preventive treatment.<br>6. Repair the observed cracks & level the pavement surface. |
| 11 | 374+295 | LHS (NEW) | 1x22.220 | 1. Honey combing is on b/w G3-G4 & G1-G2slab.<br>2. Debris is observed on expansion joints.<br>3. Drainage spouts are partially clogged.<br>4. Vegetation on RE wall. | 1.Remove loose concrete and repair honeycombing b/w G3-G4 & G1-G2 slab with polymer-modified cement mortar.<br>2. Remove debris & clean the expansion joint.<br>3. Clean & flush clogged drainage spouts.<br>4. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x22.220 | | |
| 12 | 384+400 | LHS (NEW) | 1x22.290 | 1. Cracks are observed on Girder G1, G2& G3.<br>2. E1 expansion joint damaged & E2 debris.<br>3. Cracks on pavement surface.<br>4. Drainage spouts are partially clogged.<br>5. Vegetation on RE wall. | 1.Repair observed cracks on girders G1, G2 & G3 by using suitable repairing method.<br>2. Remove debris & repair the damaged expansion joint.<br>3.Repair the observed cracks & level the pavement.<br>4.Repair, Clean & flush clogged drainage spouts.<br>.5. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x22.290 | | |
| 13 | 390+160 | LHS (NEW) | 1x25.0 | 1. Honey combing is observed on slab &C/S Gider.<br>2. Debris on expansion joints & E2 sealing and is damaged.<br>3. Drainage spouts are partially clogged.<br>4. Vegetation on RE wall. | 1.Remove loose concrete and repair honeycombing on slab & C/S girder with polymer-modified cement mortar.<br>2. Remove debris & repair the damaged sealing of expansion joint.<br>3. Clean & flush clogged drainage spouts.<br>4. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x25.0 | | |
| 14 | 390+900 | LHS (NEW) | 2x12.000 | 1. Honey combing is observed on Slab.<br>2. Drainage spouts are partially clogged. | 1.Remove loose concrete and repair honeycombing on slab with polymer-modified cement mortar. |

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| | | RHS (NEW) | 2x12.000 | 3. Vegetation on retaining wall. | 2. Clean & flush clogged drainage spouts.<br>3. Remove vegetation from RE wall and apply preventive treatment. |
| 15 | 392+532 | LHS (NEW) | 1x24.600 | 1. Honey combing is observed on slab, Gider &C/S Gider.<br>2. Debris on expansion joints& E2 sealing and edge beam is damaged.<br>3. Spouts are partially clogged.<br>4. Vegetation on RE wall. | 1.Remove loose concrete and repair honeycombing on slab & C/S girder with polymer-modified cement mortar.<br>2. Remove debris & repair the damaged sealing & edge beam of expansion joint (E2).<br>3. Clean & flush clogged drainage spouts.<br>4. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x24.600 | | |
| 16 | 395+750 | LHS (NEW) | 1x22.200 | 1. Minor cracks are observed on Girder G1, G2&G3.<br>2. Honey combing is observed on slab.<br>3. Cracks are observed on pavement surface.<br>4. E-2 sealing is partially damaged.<br>5. Spouts are partially clogged.<br>6. Vegetation on RE wall. | 1.Repair observed cracks on girders G1, G2 & G3 by using suitable repairing method.<br>2.Remove loose concrete and repair honeycombing on slab with polymer-modified cement mortar.<br>3.Repair the observed cracks & level the pavement surface.<br>4.Repair the damaged seal of expansion joint (E2).<br>5.Clean & flush clogged drainage spouts.<br>6. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x22.200 | | |

### 3.4.8 Pedestrian/Cattle Underpasses (PUP/CUP)

A summary of Condition Survey of existing Pedestrian/Cattle Underpasses are provided in Table below.

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | 346+780 | LHS (NEW) | 1x7.0 | 1. Drainage spouts are not provided.<br>2. Vegetation growth on structure is observed. | 1.Provide drainage spouts to ensure adequate water discharge.<br>2. Remove vegetation from structure and apply preventive treatment. |
| | | RHS (NEW) | 1x7.0 | | |

| S. No. | EXISTING CHAINAGE | LHS/RHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | OBSERVATION | RECOMENDATION |
|---|---|---|---|---|---|
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 2 | 384+590 | LHS (NEW) | 1x5 | 1. Drainage spout are not provided.<br>2. Honeycombing on top slab.<br>3. Vegetation on RE wall. | 1.Provide drainage spouts as per specification.<br>2. Remove loose concrete and repair honeycombing on top slab with polymer-modified cement mortar.<br>3. Remove vegetation from RE wall and apply preventive treatment. |
| | | RHS (NEW) | 1x5 | | |
| 3 | 392+160 | LHS (NEW) | 1x10.5 | 1. Honey combing is observed on top slab & Patch work is observed.<br>2. Drainage spouts are clogged.<br>3. Minor cracks are observed on Abutment.<br>4. Cracks and potholes are observed on pavement surface. | 1. Remove loose concrete and repair honeycombing on top slab with polymer-modified cement mortar and inspect the patched area & reinforce patch work if necessary.<br>2. Clean & flush clogged drainage spouts.<br>3. Repair observed cracks on abutment by using suitable repairing method.<br>4. Repair observed cracks & fill potholes with suitable material and level pavement surface. |
| | | RHS (NEW) | 1x10.5 | | |
| 4 | 400+870 | LHS (NEW) | 1x7.0 | 1. Honey Combing on top slab.<br>2. Honey combing on abutment.<br>3. Drainage spouts are not provided.<br>4. Vegetation on RE wall. | 1. Remove loose concrete and repair honeycombing on top slab with polymer-modified cement mortar.<br>2. Remove loose concrete and repair honeycombing on abutment with polymer-modified cement mortar.<br>3. Provide drainage spouts as per specification.<br>4. Remove vegetation from RE Wall and apply preventive treatment. |
| | | RHS (NEW) | 1x7.0 | 1. Honey combing is observed on superstructure & Abutment.<br>2. Drainage spouts are not provided.<br>3. Vegetation on RE wall. | 1. Remove loose concrete and repair honeycombing on super structure & abutment with polymer-modified cement mortar.<br>2. Provide drainage spouts as per specification.<br>3. Remove vegetation from RE Wall and apply preventive treatment. |

### 3.4.9 Foot Over Bridge (FOB)

A summary of Condition Survey of existing Foot Over Bridge are provided in Table below

| S.NO. | BRIDGE NO. | EXISTING CHAINAGE | LHS/RHS/BHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | CONDITION OF STRUCTURE |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| 1 | FOB BHS | 337+345 | BHS | 2 X 20 | Good |
| 2 | FOB BHS | 340+250 | BHS | 2 X 20 | Good |
| 3 | FOB BHS | 350+630 | BHS | 2 X 20 | Good |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| 4 | FOB BHS | 360+550 | BHS | 2 X 20 | Good |
| 5 | FOB BHS | 366+955 | BHS | 2 X 20 | Good |
| 6 | FOB BHS | 364+480 | BHS | 2 X 20 | Good |
| 7 | FOB BHS | 372+440 | BHS | 2 X 20 | Good |
| 8 | FOB BHS | 393+850 | BHS | 2 X 20 | Good |
| 9 | FOB BHS | 399+380 | BHS | 2 X 20 | Good |
| 10 | FOB BHS | 400+450 | BHS | 2 X 20 | Good |

### 3.4.10 Elevated Structure

A summary of Condition Survey of existing Elevated Structure is provided in Table below

| S.NO. | BRIDGE NO. | EXISTING CHAINAGE | LHS/RHS/BHS | SPAN ARRANGEMENT (EXPANSION JOINT TO EXPANSION JOINT) (m) | CONDITION OF STRUCTURE |
|---|---|---|---|---|---|
| **Section-1 From 320+810 to 326+000 (4 Lane Retained)** | | | | | |
| Nil. | | | | | |
| **Section-2 From Km 326+000 to 361+000 (Ex. Km 360+300) (6 Lane)** | | | | | |
| Nil. | | | | | |
| **Section-3 From 361+000 (Ex. Km 360+300) to 400+632 (Ex. Km 400+132) (6 Lane)** | | | | | |
| Nil. | | | | | |

### 3.4.11 General Condition of Existing Bridges

Following distresses have generally been noticed: -

- Clogged drainage spouts or of inadequate length or missing drainage pipe
- Poor maintenance and protection work of existing bridges
- Excessive vegetation growth around the bridges and in stream bed.
- Damaged / filled up expansion joints
- Settlement of Approach Slabs
- Damage to slope pitching and bed protection.
- Scaling of concrete or atmosphere distress
- Broken / missing railing / parapet.
- Debris on piers / abutments / deck

### 3.4.12 Repair / Improvement Works

As per Condition Survey findings, it is evident that most of the structures are in fair condition.

**Section-1 From 320+810 to 326+000**: The improvement works mentioned shall be carried out by NHAI.

**Section-2 From Km 326+000 to 361+000 (Ex. 360+300):** Since the section is under Operation and Maintenance of HAM Concessionaire, deficiency (minor repair works) pertaining to O & M shall be carried out the HAM Concessionaire till Year 2036.

**Section-3 From Km 361+000 (Ex. 360+300) to 401+332 (Ex 400+632) .** Since the section is under Operation and Maintenance of HAM Concessionaire, deficiency (minor repair works) pertaining to O & M shall be carried out the HAM Concessionaire till Year 2036.

# Chapter 4. Methodology

# 4. METHODOLOGY FOR FEASIBILITY STUDY

## 4.1 GENERAL

Broad methodology as outlined in the Inception Report, prepared on the basis of Scope of Work mentioned in Terms of Reference, has been generally followed, with certain modifications as felt necessary during the study. The methodology is described in detail in following sections.

## 4.2 SECONDARY DATA

Secondary data related to Project Stretch are collected from various authority, institution etc. and reviewed for understanding the Project Stretch. Following are the list of relevant documents collected, reviewed in this study.

- Past Detailed Project Reports
- Highway and structure inventory
- ROW details
- Past design reports
- Past traffic data
- Accident data
- Existing O&M contract agreements

## 4.3 SURVEYS AND INVESTIGATION

Physical condition of Project Stretch is assessed based on data captured through various surveys and investigations. Details of all these surveys and investigations are presented in next few sections.

### 4.3.1 Traffic Surveys

To appreciate the characteristics of traffic along the project road sections in terms of size, desire, speed, load and lead, number of surveys are carried out.

Traffic Surveys has been conducted by consultant appointed by NHAI. Data will be received from NHAI.

### 4.3.2 Drone Videography of Entire Stretch

Videography of entire Project Stretch is captured through Drone cameras flown at about 20 – 30 m above ground. This shall be useful for observing various features of Project Stretch from bird's eye level. Following are some of the snapshots of Drone videos.



***Snapshots of Drone Video***

### 4.3.3 Topographic Survey

Topographic survey through Light Detection and Ranging (LiDAR) technology is conducted on entire Project Stretch to identify and map existing features of highway. The purpose of this survey is to serve as base map for road. It also shows perimeter boundary lines and the lines of easements on or crossing the assets surveyed, in order for a designer to accurately show zoning and other agency required setbacks.

The following sections present brief introduction of LiDAR Technology.

#### 4.3.3.1 Brief Introduction of Mobile Lidar Technology

Mobile LiDAR is an advanced mapping solution that incorporates the most advanced LiDAR sensors, cameras and position/ navigation /GPS receivers to collect survey grade 3D point cloud data quickly and accurately.

With greater precision and flexibility than ever before, particularly in transportation applications, Mobile LiDAR has become an effective solution for rapid data collection in recent years given advances in scanning speed and accuracy, global navigation satellite system (GNSS) receivers and inertial measurement units (IMUs).

The system provides designers with a complete picture of project with survey accurate point measurements and ability to locate features that may be inaccessible with other methods.

Mobile mapping is the process of collecting geospatial data from a mobile vehicle. Typically fitted with a LiDAR remote sensing system, such systems are composed of an integrated array of time synchronized navigation sensors (survey grade DGPS) and imaging sensors mounted on a mobile platform. Primary output after pre-processing of data include geo-referenced 3D point cloud data, digital maps, images and videos. Further, after post-processing, output in desired format like AutoCAD*.dwg or Arc GIS*.shp files are obtained.

- Mobile LiDAR consists of following components.
- DGPS – Dual Antenna (Position and Heading)
- IMU (Inertial Measurement Unit) and DMI (Wheel Sensor)
- Scanner (Profiler Z+F 9012)
- 6 cameras and a sky Camera

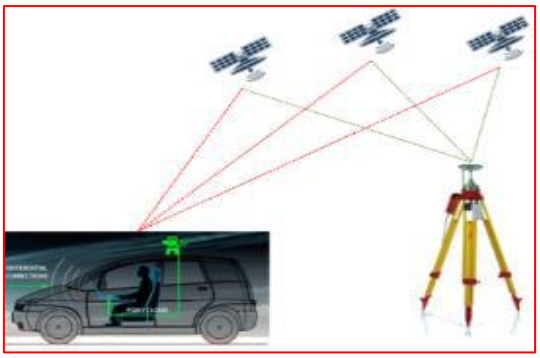



***Components of Mobile LiDAR***

## Methodology

Before Start of the data acquisition with Mobile LiDAR, following activities were completed at site:

- Well established network of DGPS control points at site.
- Ground control points at 250 m interval, connected with Total Station and Auto Level.





Once all the control points are marked at Ground, Mobile LiDAR are run -

- At least one DGPS - Base Station data is acquired at the time of survey.
- Single Run for each direction – i.e., two runs for each Project Stretch.
- The average length of data captured is about 80 km per day, with single run of vehicle, running at average speed of 40 km per hour.
- GPS base station observations are made using 3 numbers of survey grade DGPS receivers (Trimble R8) located about 30 km apart.
- More than 1,00,000 frames of high-resolution CCD pictures are collected with six set of Cameras covering 360 degrees of views per day.
- Generally Mobile LiDAR takes cross section at every 3 to 8 cm interval and levels at 5 mm interval. So, there are millions of data at every 10 m interval (approximately).
- During the post-processing, ground points are classified and verified. Cross-sections are extracted.




**Figure 4.1: Process of Data Capture Work in field using Mobile LiDAR**

Following data are generated from the system.

- Soft copy of pre-processed Raw data in Registered 3D point cloud*.hpc or LAS format.
- Soft copy showing plan of existing visible roadside features in AutoCAD*.dwg or *.shp format. L-sections & cross –sections shall as well be generated at required intervals.
- Soft copy of images captured by 6 sets of cameras in various directions, along the road, at interval of about 5 m apart.

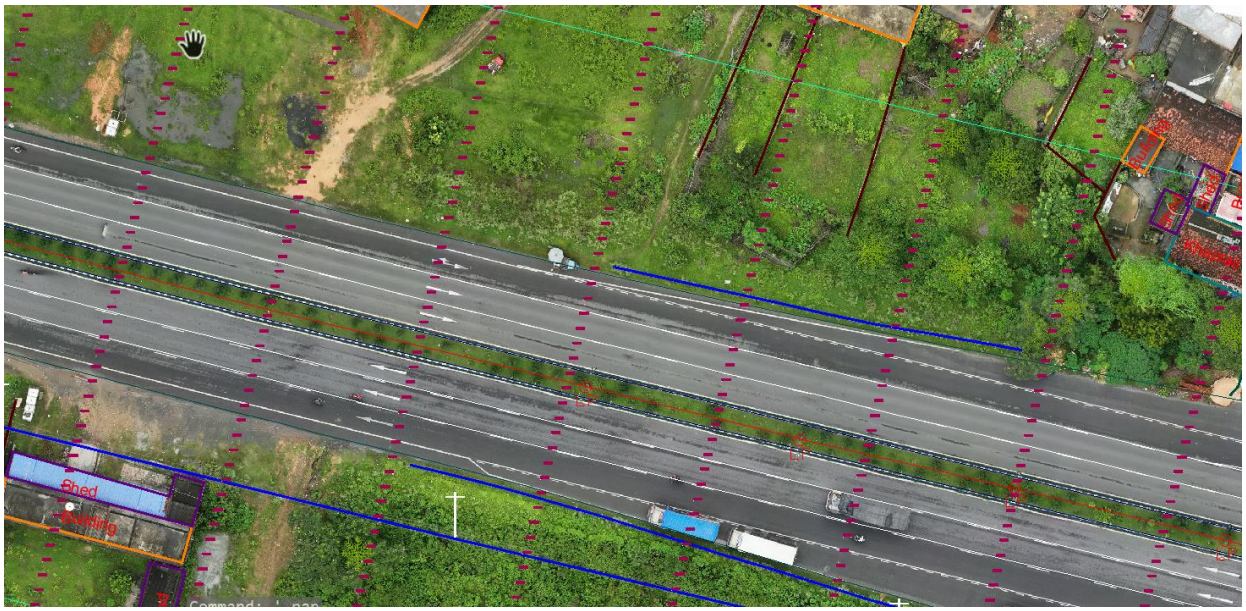


**Figure 4.2: Sample Output of Mobile Lidar**

### 4.3.3.2 Accuracy of the Point Cloud Data

Accuracy level is as per the data sheet of Leica Pegasus one mobile mapping system along with the scanner Z+F profiler 9012 having data acquisition rate up to 1 million pixel/second and as per actual site conditions and satellites available for DGPS. The relative accuracy of the data is about +/- 5 cm, for areas with good GPS signals, Generally, we have achieved relative accuracy of point cloud data as <5cm in previous similar works.

### 4.3.4 PAVEMENT INVESTIGATION AND ASSET INVENTORY

To access condition of existing pavement and assets, investigations are carried out using Network Survey Vehicle (NSV). Details of these investigations are presented in following sections.

#### 4.3.4.1 Network Survey Vehicle

Hawkeye 2000 Professional Network Survey Vehicle (NSV) is a highly specialized survey product designed and developed by Australian Road Research Board (ARRB) Group. ARRB Group was formed by state, territory and federal government road agencies in Australia, who established the organization as a means of cooperating to undertake research of national importance that they could not justify carrying out individually. ARRB has been operating for over 50 years and has built a reputation as premier automated pavement condition service and equipment providers in Australia and throughout the Asia region.

NSV is equipped with a fully integrated Hawkeye 2000 data collection system. NSV consists of a Multi-Laser Profiler, Digital Imaging System and a Gipsi-Trac unit whose outputs are all linked via a highly accurate distance measuring instrument.




**Figure 4.3: Layout of Network Survey Vehicle**

NSV allows all the data to be collected in a single pass, thus minimizing both the cost and the time needed to complete the survey. Since NSV is completely scalable system which suites to all different-different types of requirement of data collection and vehicle independent technology. Additionally, each data set is referenced to the road running distance, in accordance with the Council's current reference system, as well as its spatial position using GPS (WGS84). A team of trained and experienced field staff and a driver is utilized during the collection phases of projects. General methodology and modules of NSV for data collection and reporting is presented in the following section.

#### 4.3.4.2 NSV Component - Digital Laser Profiler

Integrated into the NSV is a Digital Laser Profiler (DLP) consisting of eleven lasers. This inertial profiler is capable of measuring:

- Pavement Roughness (one laser in each wheel path and centre)
- Rutting (full transverse pavement measurement)
- Macro texture (outer wheel path and between wheel paths).

The location at which each of these parameters is measured is as shown below:

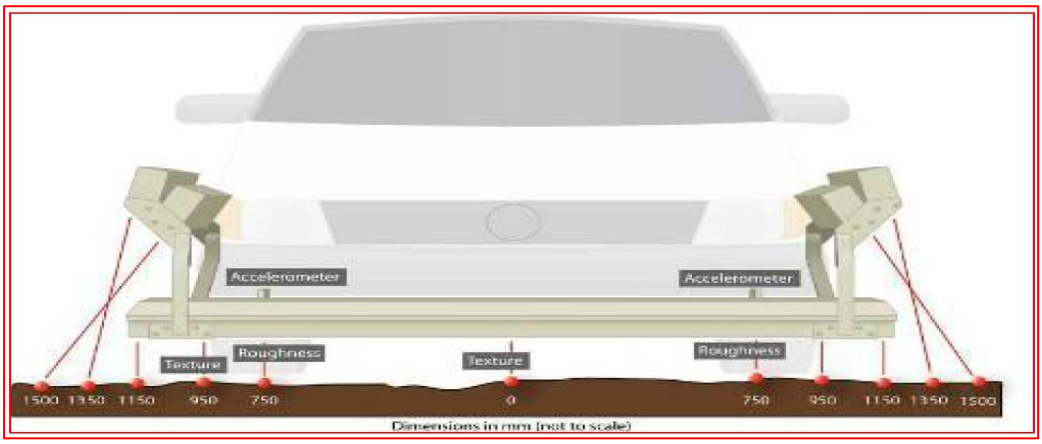



**Figure 4.4: Multi Laser Profiler Spacing**

## Determination of Roughness

The outputs of the lasers and accelerometers located in each wheel path (750 mm either side of the centre line of the vehicle) are sampled every 25 mm of longitudinal travel and used to calculate the longitudinal profile of the road.

The profile is then passed through the Quarter Car model to calculate the International Roughness Index (IRI) lane roughness as per the methodologies specified in the Austroads Guide to Asset Management, Part 5B - Roughness.

Post Survey any 'spikes' in the roughness outputs will be excluded that may arise from cattle grids, railway crossings, bridge abutments etc. Automated checks in the data processing software are already incorporated to exclude any contribution to roughness from data collected below the minimum survey speed which is typically set at 10 -30 km/hr (user definable).

- The above mentioned Roughness Digital Laser Profile System fall under the specification defined in Circular no 11041/218/2007 - admn issued by NHAI for use of Laser Profilometer in NHAI Works.

## Determination of Rutting

All data is measured and reported in accord with the recommendations contained within the Austroads Guide to Asset Management, Part 5C – Rutting.

The DLP measures a 3 metre transverse profile across the lane using a minimum of 11 lasers. A full transverse profile is measured every 50 mm of longitudinal travel and the processing software allows both lane and wheel path rutting to be measured using the string line and straight edge models.

**Determination of Texture**

The DLP (Digital Laser Profile) is capable of measuring both flushing and texture via Sensor Measured Texture Depth (SMTD). Texture is measured continuously along the pavement length using a non-contact laser transducer.

Macro texture can be recorded in many different ways. The most common is by using the Sensor Measured Texture Depth (SMTD). Internationally Mean Profile Depth (MPD) is more common. SMTD is more common as it can be easily correlated to a Sand Patch Texture Depth (SPTD). The DLP is able to record both types of texture to all international and national standards.

#### 4.3.4.3 NSV Component - Digital Imaging System

The Digital Imaging System of the NSV is the digital imaging component in which four roof mounted cameras are used to record digital images; typically, images are sampled every 10m. These cameras are oriented in a certain configuration to ensure that the information of interest, such as inventory or condition, is being recorded in the camera field of view. Typically, three cameras are forward facing and another onto the pavement which are capable of recording all the pavement defects and roadside assets at 10 m interval.




**Figure 4.5: Digital Image Camera**

**ATTRIBUTE LOCATION AND ASSESSMENT**

Since the Network Survey vehicle is an integrated system, the road side inventory information can be collected from the images in conjunction with the pavement distress types. Attributes such as bridges, land use, topography, hydrological characteristics, public transport arrangements, etc. are assessed in accordance with the relevant sections including the accurate assessment of the location and condition.

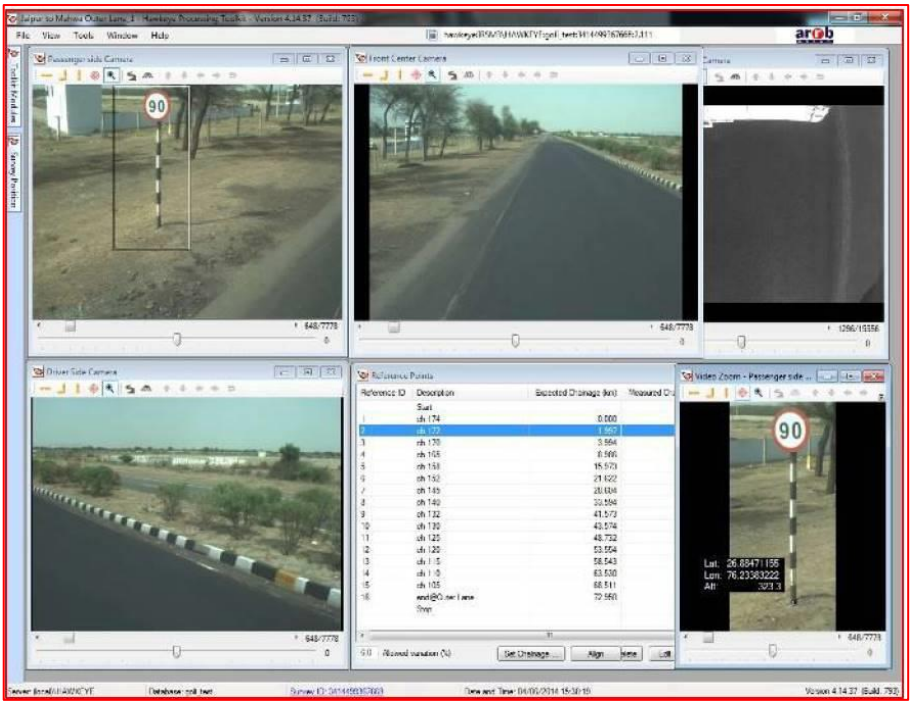


**Figure 4.6: Roadside Furniture Location and Assessment**

The Hawkeye 2000 Series Asset View Digital Imaging System (DIS) is a video acquisition system for visually identifying and locating roadside features accurately. The system utilizes the latest in digital camera technology and produces crisp high resolution video frames to ensure a continuous digital record of the roadway. The Hawkeye Processing Toolkit software ensures that the survey database can be reviewed, edited and processed quickly and efficiently. The data from each module can be compared against other results and exported to most common GIS and asset management systems.

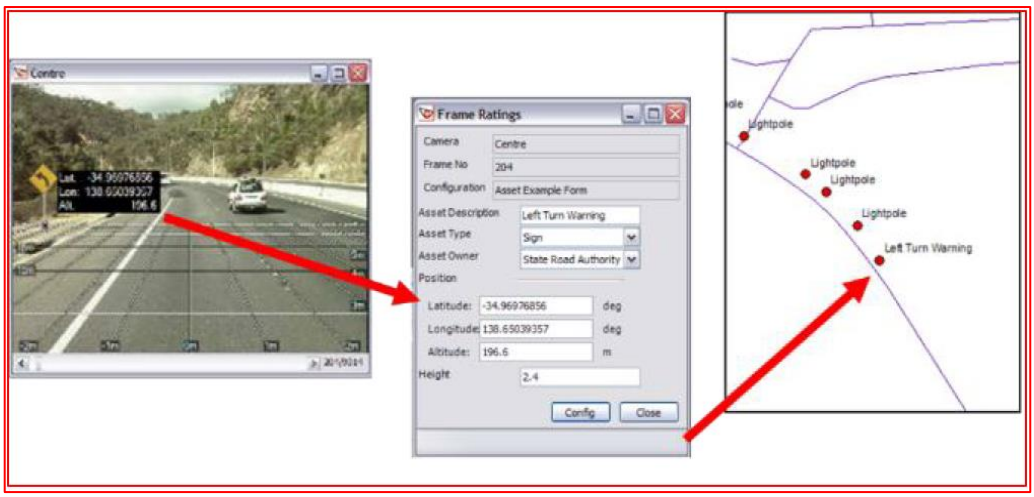



**Figure 4.7: Asset Location, Image Export and Shape file Outputs**

## Road Dimension Confirmation

All Hawkeye Digital Image System data is calibrated prior to the commencement of the survey. Utilising special tools within the Hawkeye Processing Toolkit, Rater measures the dimensions of the road off the video. This tool is used to confirm the width of all carriageways collected. The road length is automatically collected by the vehicles distance measuring instrument.

## Visual Assessment of Road Inventory Assets

From the digital images, a host of information are extracted. This information is linearly (chainage) and spatially (GPS) referenced. The information extracted is presented in the table below

**Table 4.1: Information extracted from NSV**

| Coding Parameters | Coding Type |
|---|---|
| **General Features and Utilities** | |
| Land use pattern | Agricultural, Urban, Commercial, Forest, Rural etc. |
| Roadside Arboriculture | Present/Not Present |
| Electric pole | Present/Not Present |
| Telephone | Present/Not Present |
| Wayside amenities, Bus bays, truck lay Bye, etc... | Present/Not Present |
| **Main Carriageway Features** | |
| Pavement type | Bituminous, Concrete |
| Junction (Major / Minor & X / T/ Y) & type of road crossing / merging | Type and Geolocation |
| Carriageway width (lane wise) | Width |
| Paved shoulder (width) | Width |
| Earthen shoulder (width and physical condition) | Width, Condition-Good, Fair,Poor |
| Footpath (physical condition) | Present/Not Present, Condition |
| Drain width (lined & Unlined, along with general condition) | Lined/Unlined, Condition |
| Median (width) | Width |
| Kerb Height | Height |
| Presence of Road Studs (Lane wise) - Yes / No | Yes/No |
| Coding Parameters | Coding Type |
| Sign boards identifications (both sides of carriageway) – Type and Physical Condition | Geo Location, Condition |
| Gantry boards identifications (type of gantry) – Physical Condition | Geo Location, Condition |
| Kilometre & hectometre stones | Present/Not present |
| Guard rails – Physical Condition | Geo Location, Condition |
| Safety barriers – Type and Physical Condition | Geolocation, Type and Condition |
| Delineators – Physical Condition | Present/Not present |
| Guard / guide posts – Physical Condition | Present/Not present, Condition |
| Street Light and High Mast Light | Geo Location and pole condition |
| Location of water bodies (lakes and reservoirs), at every occurrence | Type and Geo Location |
| Location of Structures | Type and Geo Location |
| **Service Road** | |
| Pavement type | Bituminous, Concrete |
| Carriageway width (lane wise) | Width |

| Coding Parameters | Coding Type |
|---|---|
| Drain width (lined & Unlined, along with general condition) | Lined/Unlined, Condition |
| Sign boards identifications (both sides of carriageway) – Type and Physical Condition | Geo Location , Condition |
| Location of water bodies (lakes and reservoirs), at every occurrence | Type and Geo Location |
| Street Lights | Geo Location and pole condition |

## Defect Assessment

The collected images / videos are rated using the Hawkeye Processing Toolkit. The processing toolkit is fully customizable and allows rating criteria to be set to produce project specific outputs linked to its spatial (GPS) and linear (chainage) position. The Hawkeye Processing Toolkit is an integrated graphical user interface (GUI) that compiles the collected survey data and allows the user to 'virtually drive down the road' and record rating information as needed. With each frame, a customized set of rating fields are attached, where the rater records set decisions about various parameters of the road at that point. These include areas, widths, heights, text fields, lists or numerical counts. Because Hawkeye is an integrated system, this means that all ratings are automatically linked to its GPS and road-chainage position.

The images are rated using standard guidelines, the extent of which are measured using the Hawkeye processing toolkit's area and width measurement facilities. The area calculations are stored against the relevant defect field in the toolkit's data file, which is stored in the required format and referenced to the road location.

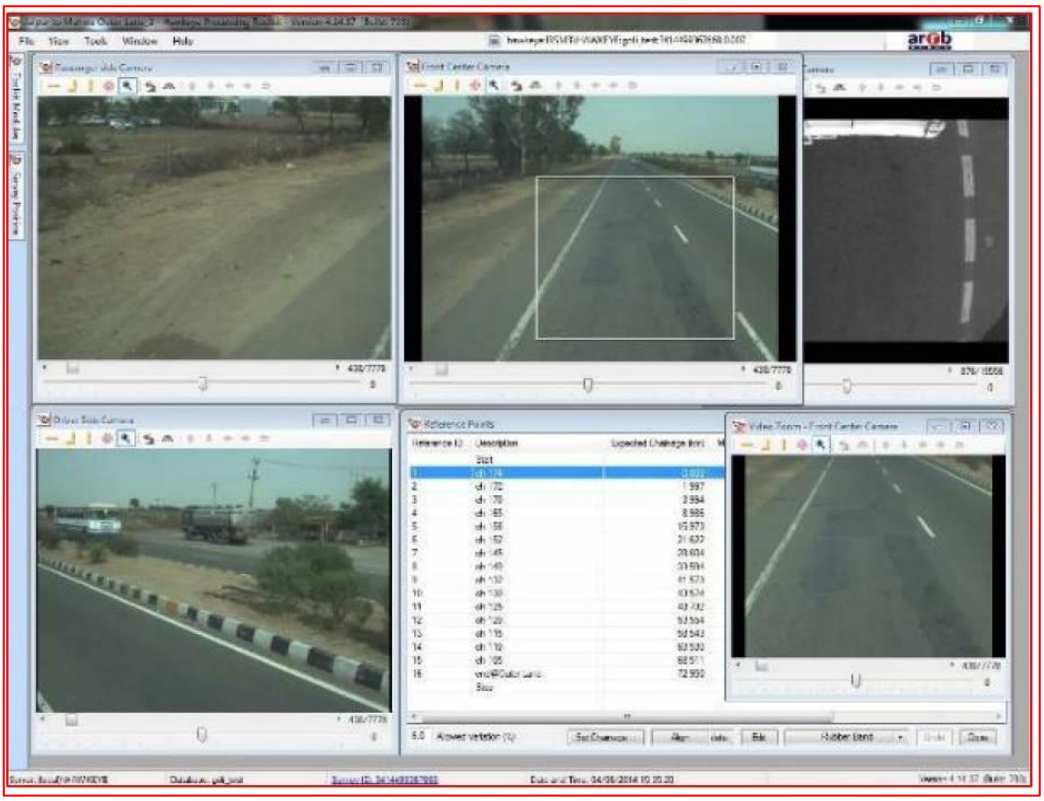


**Figure 4.8: Pavement Condition rating in Hawkeye Processing Tool kit**

The following pavement distress are recorded along with their severity and extent

| Type of Distress | Severity Levels | | Extent Levels | |
|---|---|---|---|---|
| Longitudinal Cracks | None | Low | | None |
| | <5mm wide | High | 1-5% | Few |
| | >5mm wide | | 6-15% | Intermittent |
| | | | 16-40% | Moderate |
| | | | 41-75% | Frequent |
| | | | > 75% | Extensive |
| Transverse Cracks | None | Low | | None |
| | <5mm wide | High | 1-5% | Few |
| | >5mm wide | | 6-15% | Intermittent |
| | | | 16-40% | Moderate |
| | | | 41-75% | Frequent |
| | | | > 75% | Extensive |
| Alligator Cracks | None | Low | | None |
| | <5mm wide | High | 1-5% | Few |
| | >5mm wide | | 6-15% | Intermittent |
| | | | 16-40% | Moderate |
| | | | 41-75% | Frequent |
| | | | > 75% | Extensive |
| Pothole | None | | | None |
| | <25mm | Low | 1 no. | Few |
| | 25-50mm | Medium | 2-3 no. | Intermittent |
| | >50mm | High | 4-6 no. | Frequent |
| | | | >6 no. | Extensive |
| Ravelling | None | | | None |
| | Significant Voids | Low | <3% | Few |
| | large patchy areas > 50% loss | Medium | 3-7% | Intermittent |
| | loss binder stone in depth | High | 8-20% | Frequent |
| | | | >20% | Extensive |
| Patching | None | | | None |
| | Minimal Distress | Low | <3% | Few |
| | Continuing Distress | Medium | 3-7% | Intermittent |
| | Local Failure | High | 8-20% | Frequent |
| | | | >20% | Extensive |
| Shoving | None | | | None |
| | <15mm | Low | <0.3% | Few |
| | 15-50mm | Medium | 0.3-5% | Intermittent |
| | >50mm | High | 5-14% | Frequent |
| | | | >14 | Extensive |
| Flushing/Bleeding | None | | | None |
| | 5-10 % Bitumen | Low | 1-5% | Few |
| | 11-25% Bitumen | Medium | 6-15% | Intermittent |
| | >25% Bitumen | High | 16-40% | Moderate |
| | | | 41-75% | Frequent |
| | | | >75% | Extensive |

| Type of Distress | Severity Levels | | Extent Levels | |
|---|---|---|---|---|
| Depression | None | | | None |
| | <15mm | Low | <1% | Few |
| | 15-50mm | Medium | 1-15% | Intermittent |
| | >50mm | High | 16-30% | Frequent |
| | | | >30 | Extensive |
| Edge Break | None | | | None |
| | 20-75mm | Low | <1% | Few |
| | 76-200mm | Medium | 1-15% | Intermittent |
| | >200mm | High | 16-30% | Frequent |
| | | | >30 | Extensive |
| Delamination | None | | | None |
| | <1m2 | Low | <0.5% | Few |
| | >1m2 | High | 0.6-2% | Intermittent |
| | | | 3-5% | Frequent |
| | | | >5% | Extensive |
| Corrugation | None | | | None |
| | <15mm | Low | <1% | Few |
| | 15-50mm | Medium | 1-15% | Intermittent |
| | >50mm | High | 16-30% | Frequent |

**Distance and Speed measurement**

Each road inventory and condition parameter are referenced to the road running distance via a highly accurate distance transducer attached to a rear wheel of the NSV as shown figure below. The transducer is in turn calibrated using a distance calibration site. The Distance and speed measurement performed by the distance measuring instrument which is a distance transducer and highly accurate and GPS distance and speed are also calculated.

#### 4.3.4.4 GIPSI-Trac Geometry Data

Hawkeye 2000 Professional Network Survey Vehicle provides the ability to use the Gipsi-Trac unit. The following data can be collected using Gipsi-Trac

- Horizontal Curvature
- Vertical Gradient
- Vertical curvature
- Cross Slope

However, geometrical data for the Project Stretch is referred from LiDAR surveys.

#### 4.3.4.5 Limitations of the Survey

As experienced operators of the survey equipment, IRSM and V R TECHNICHE are aware of the limitations of technology and the implications of the inappropriate use of technology to collect condition data, which are listed below with additional comments.

- Imaging technology requires appropriate lighting: Images are collected only when lighting conditions are conducive to recording images. Heavily wet pavements & stagnated water on pavements can mask defects and affect laser readings.
- Images do not capture extremely fine cracking: cracking less than 3mm can be difficult to observe even with high resolution images. Cracking of this severity can also be difficult to

observe from a manual footpath-based assessment and impossible from a windscreen-based assessment.

- Road conditions which affect the body roll of the vehicle such as excessive gradient, tight corners, traffic calming may affect the results of the laser profilometer.
- Inherent road attributes such as Joints on fly-over's & bridges, speed humps and service covers may represent high roughness and rutting readings on roads. These may or may not affect the accuracy of the equipment but recognizes that such issues will naturally increase the reported roughness reading.
- Due to the mechanism of data capture and rating, being from digital images instead of real environment conditions, limitations exist in the rating. Some of the possible rating limitations are:
  cannot identify cracking < 3 mm due to image resolution.

However, even taking these limitations into account, it remains possible to capture meaningful and useable data and information from the digital imaging survey, such that when applied in asset management procedures it can assist an asset manager to effectively maintain the network.

#### 4.3.4.6 Falling Weight Deflectometer (FWD)

Structural Condition of pavement is evaluated using Falling Weight Deflectometer (FWD) and subsequent analysis is carried out to ascertain the relative performance of the pavement for all Project Stretches, in the context of evaluating residual life, overlay and other maintenance requirements.

#### 4.3.4.7 Methodology of Falling Weight Deflectometer

Kaub Vehicle Mounted Falling Weight Deflectometer is used in this investigation. This unit is a non- destructive pavement testing device which provides accurate data on the response of the pavement (specifically the surface deflection bowl) to dynamic loads by simulating actual wheel loads in both response and duration. This allows more accurate and rapid measurement of pavement deflection under load than traditional methods.




**Figure 4.9: Vehicle Mounted FWD Machine**

A dynamic load is generated by the dropping of a mass from a pre-set height onto a 300 mm diameter plate. The magnitude of the load and the pavement response are measured by a load cell and six geophones. One geophone is located immediately under the load, whilst the others are located at variable offsets from the centre of the load.

The test load is varied between 7 and 80 KN to meet the requirements of the particular task and the pavement response for up to four different magnitudes of load are measured during any test sequence.

The offsets of the geophones can be set to any distance up to 1200 mm from the centre of the load and a typical sequence is completed in approximately one minute. Highly accurate deflection bowl measurements are therefore obtained, therefore it is very useful for carrying out large-scale pavement surveys.

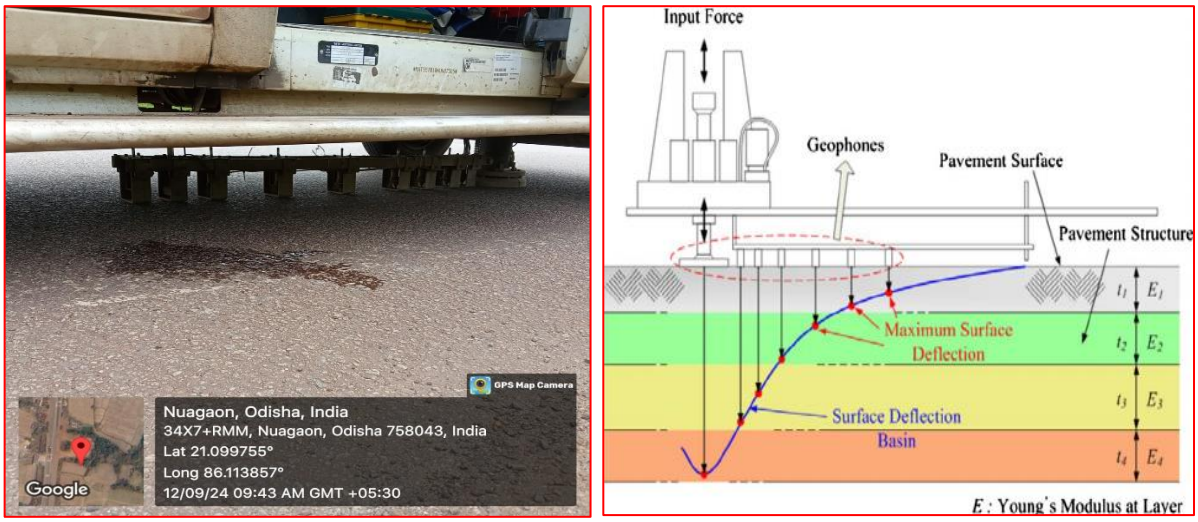



**Figure 4.10: Location of Geo-Phones**

This data assists in applications such as pavement overlay design, pavement condition surveys and in the development and operation of Pavement Management Systems (PMS). It is also used as input in back-calculation of Pavement Moduli packages.

The FWD is vehicle mounted. All testing is controlled by a personal computer which is located in the vehicle FWD. As a result, only one operator is required to conduct a survey on most occasions making it less labour/ equipment intensive than traditional methods.

**Working Principle**

- A set of weights is dropped onto a platform with springs (rubber buffers) and the impact load is transferred to the pavement through a loading plate.
- The load simulates the dynamic load from a truck.
- Normally, the load applied on road pavements is 40 kN.
- When subjected to a load, the pavement will bend and a deflection bowl is created. The deflections at various distances from the loading centre are recorded by the sensors (geophones) and stored in a data file.

**Confidence limits**

- Load cell accuracy 2% +/- 2 KPa (1kPa = 0.145 psi)
- Load resolution 0.03 - 0.12 KN (7 - 26 lbf), magnitude dependent
- Deflection range 2.0 mm (80 mil)
- Deflector accuracy 2% +/- 2 microns (1 micron = 0.04 mil)
- Deflector resolution 1 micron
- Deflection random error typically 1 - 2 microns (0.04 - 0.08 mil)
- Deflection systematic error +/- 2%

**Data Collection**

Methods of data collection using FWD is described in steps given below.

- Prepare the FWD unit for deflection testing
- Bring the FWD to a stopped position at the beginning of the test section, centred on the outside wheel path (or specific position), and take a measurement by applying load using following sequence:
- One settling drop to ensure proper contact.
- Three drops with an applied load of Specified Load
- Deflections are recorded from the sensors located at the centre of the loading plate for each drop Except the settling drop.
- Along with these deflection data, the parameter like Chainage, Temperature, Date and Time and Position of Sensors will also be recorded.
- After each measurement, drive the FWD forward to next measurement point.

#### 4.3.4.8 Analysis Stages

Analysis methodology includes back calculation of layer moduli and remaining life analysis, presented in the Chapter 8.

#### 4.3.4.9 Test Pits, Core Cutting and Material Investigations

As per the Scope of Work mentioned in the TOR, the following field observations are carried out

- Pavement Composition of the Project Stretches
- Subgrade Characteristics and Strength
- Material Properties of the Granular Layers
- Material Properties of the Bituminous Layers

Visual inspection of the existing pavement condition has been carried out prior to commencement of pavement investigation work to finalize the test pit and core cutting locations.

#### 4.3.4.10 Test Pits

Field studies are carried out to assess adequacy of the pavement layers and effectiveness of existing pavement layers. Efforts are made to examine condition of existing sub-grade, GSB and WMM by taking sample test pits of 0.6mx0.6m, at the interface of paved shoulder and earthen shoulders. Pavement composition details (pavement course, material type, and thickness) are

recorded at every test pit. The various in-situ tests conducted, and laboratory tests included in the testing program on soil, GSB and WMM samples along the alignment as per the requirements are summarized below:

Field Tests on Soil Subgrade

- Field Moisture Content & Field Dry Density Determination
- Field CBR using Dynamic Cone Penetrometer at each test pit
  Laboratory Tests on Subgrade Soil Sample

- Soil Classification, Sieve Analysis, Atterberg Limits
- Laboratory Proctor Compaction Test
- 4 day soaked CBR Test
- Free swell index
  Testing on Existing Granular Materials – Granular Sub Base (GSB)

- Gradation and cross variation of the same with MoRTH
- Laboratory Proctor Compaction Test

- 4 days soaked CBR Test
  Testing on Existing Granular Materials – WMM (Wet Mix Macadam)

- Gradation and cross variation of the same with MoRTH




**Figure 4.11: Test Pits**

**SIEVE ANALYSIS**

**Objective**

(a) Select sieves as per IS specifications and perform sieving.
(b) Obtain percentage of soil retained on each sieve.
(c) Draw graph between log grain size of soil and % finer.

**Need and Scope of Experiment**

The grain size analysis is widely used in classification of soils. The data obtained from grain size distribution curves is used in the design of filters for earth dams and to determine

suitability of soil for road construction, air field etc. Information obtained from grain size analysis can be used to predict soil water movement although permeability tests are more generally used.

## PLANNING AND ORGANISATION

### Apparatus

1. Balance
2. I.S Sieves
3. Rubber pestle and mortar
4. Mechanical Sieve Shaker

The grain size analysis is an attempt to determine the relative proportions of different grain sizes which make up a given soil mass.

### Knowledge of Equipment

1. The balance to be used must be sensitive to the extent of 0.1% of total weight of sample taken.
2. I.S 460-1962 are to used. The sieves for soil tests: 4.75 mm to 75 microns.

### Procedure

1. For soil samples of soil retained on 75 micron I.S sieve
   (a) The proportion of soil sample retained on 75 micron I.S sieve is weighed, and recorded weight of soil sample is as per I.S 2720.
   (b) I.S sieves are selected and arranged in the order as shown in the table.
   (c) The soil sample is separated into various fractions by sieving through above sieves placed in the above mentioned order.
   (d) The weight of soil retained on each sieve is recorded.
   (e) The moisture content of soil if above 5% it is to be measured and recorded.

   2 Nos. particle of soil sample shall be pushed through the sieves.



**Figure 4.12: Soil Grain Analysis**

***OBJECTIVE***

***To determine the California bearing ratio by conducting a load penetration test in the laboratory.***

**NEED AND SCOPE**

The california bearing ratio test is penetration test meant for the evaluation of subgrade strength of roads and pavements. The results obtained by these tests are used with the empirical curves to determine the thickness of pavement and its component layers. This is the most widely used method for the design of flexible pavement.

This instruction sheet covers the laboratory method for the determination of C.B.R. of undisturbed and remoulded /compacted soil specimens, both in soaked as well as unsoaked state.

**PLANNING AND ORGANIZATION**

Equipment's and tool required.

1. Cylindrical mould with inside dia 150 mm and height 175 mm, provided with a detachable extension collar 50 mm height and a detachable perforated base plate 10 mm thick.
2. Spacer disc 148 mm in dia and 47.7 mm in height along with handle.
3. Metal rammers. Weight 2.6 kg with a drop of 310 mm (or) weight 4.89 kg a drop 450 mm.
4. Weights. One annular metal weight and several slotted weights weighing 2.5 kg each, 147 mm in dia, with a central hole 53 mm in diameter.
5. Loading **machine.** With a capacity of atleast 5000 kg and equipped with a movable head or base that travels at an uniform rate of 1.25 mm/min. Complete with load indicating device.
6. Metal penetration piston 50 mm dia and minimum of 100 mm in length.
7. Two dial gauges reading to 0.01 mm.
8. **Sieves.** 4.75 mm and 20 mm I.S. Sieves.
9. Miscellaneous apparatus, such as a mixing bowl, straight edge, scales soaking tank or pan, drying oven, filter paper and containers.

**DEFINITION OF C.B.R.**

It is the ratio of force per unit area required to penetrate a soil mass with standard circular piston at the rate of 1.25 mm/min. to that required for the corresponding penetration of a standard material.

C.B.R. = Test Load/Standard load  100

The following table gives the standard loads adopted for different penetrations for the standard material with a C.B.R. value of 100%.

| Penetration of Plunger (mm) | Standard Load (kg) |
|---|---|
| 2.5 | 1370 |
| 5.0 | 2055 |
| 7.5 | 2630 |

| Penetration of Plunger (mm) | Standard Load (kg) |
|---|---|
| 10.0 | 3180 |
| 12.5 | 3600 |

The test may be performed on undisturbed specimens and on remolded specimens which may be compacted either statically or dynamically.

**PREPARATION OF TEST SPECIMEN**

**Undisturbed Specimen**

Attach the cutting edge to the mould and push it gently into the ground. Remove the soil from the outside of the mould which is pushed in . When the mould is full of soil, remove it from weighing the soil with the mould or by any field method near the spot.

**Determine the Density**

***Remoulded Specimen***

Prepare the remoulded specimen at Proctors maximum dry density or any other density at which C.B.R> is required. Maintain the specimen at optimum moisture content or the field moisture as required. The material used should pass 20 mm I.S. sieve but it should be retained on 4.75 mm I.S. sieve. Prepare the specimen either by dynamic compaction or by static compaction.

***Dynamic Compaction***

Take about 4.5 to 5.5 kg of soil and mix thoroughly with the required water.

Fix the extension collar and the base plate to the mould. Insert the spacer disc over the base. Place the filter paper on the top of the spacer disc.

Compact the mix soil in the mould using either light compaction or heavy compaction. For light compaction, compact the soil in 3 equal layers, each layer being given 55 blows by the 2.6 kg rammer. For heavy compaction compact the soil in 5 layers, 56 blows to each layer by the 4.89 kg rammer.

Remove the collar and trim off soil.

Turn the mould upside down and remove the base plate and the displacer disc.

Weigh the mould with compacted soil and determine the bulk density and dry density.

Put filter paper on the top of the compacted soil (collar side) and clamp the perforated base plate on to it.

***Static Compaction***

Calculate the weight of the wet soil at the required water content to give the desired density when occupying the standard specimen volume in the mould from the expression.

W =desired dry density * (1+w) V

Where W = Weight of the wet soil

w = desired water content

V = volume of the specimen in the mould = 2250 $cm^3$ (as per the mould available in laboratory)

Take the weight W (calculated as above) of the mix soil and place it in the mould.

Place a filter paper and the displacer disc on the top of soil.

Keep the mould assembly in static loading frame and compact by pressing the displacer disc till the level of disc reaches the top of the mould.

Keep the load for some time and then release the load. Remove the displacer disc.

The test may be conducted for both soaked as well as unsoaked conditions.

If the sample is to be soaked, in both cases of compaction, put a filter paper on the top of the soil and place the adjustable stem and perforated plate on the top of filter paper.

Put annular weights to produce a surcharge equal to weight of base material and pavement expected in actual construction. Each 2.5 kg weight is equivalent to 7 cm construction. A minimum of two weights should be put.

Immerse the mould assembly and weights in a tank of water and soak it for 96 hours. Remove the mould from tank.

Note the consolidation of the specimen.

***Procedure for Penetration Test***

Place the mould assembly with the surcharge weights on the penetration test machine. **(Fig.4.12).**

Seat the penetration piston at the center of the specimen with the smallest possible load, but in no case in excess of 4 kg so that full contact of the piston on the sample is established.

Set the stress and strain dial gauge to read zero. Apply the load on the piston so that the penetration rate is about 1.25 mm/min.

Record the load readings at penetrations of 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.5, 10 and 12.5 mm. Note the maximum load and corresponding penetration if it occurs for a penetration less than 12.5 mm.

Detach the mould from the loading equipment. Take about 20 to 50 g of soil from the top 3 cm layer and determine the moisture content.



**Figure 4.13: Days Soaked CBR Test**

**LIQUID LIMIT TEST**

**OBJECTIVE**

1. Prepare soil specimen as per specification.
2. Find the relationship between water content and number of blows.
3. Draw flow curve.
4. Find out liquid limit.

***NEED AND SCOPE***

Liquid limit is significant to know the stress history and general properties of the soil met with construction. From the results of liquid limit the compression index may be estimated. The compression index value will help us in settlement analysis. If the natural moisture content of soil is closer to liquid limit, the soil can be considered as soft if the moisture content is lesser than liquids limit, the soil can be considered as soft if the moisture content is lesser than liquid limit. The soil is brittle and stiffer.

**THEORY**

The liquid limit is the moisture content at which the groove, formed by a standard tool into the sample of soil taken in the standard cup, closes for 10 mm on being given 25 blows in a standard manner. At this limit the soil possess low shear strength.

**APPARATUS REQUIRED**

1. Balance 2. Liquid limit device (Casagrande's) 3. Grooving tool 4. Mixing dishes

5. Spatula 6. Electrical Oven

***PROCEDURE***

1. About 120 gm of air-dried soil from thoroughly mixed material passing 425 micron I.S sieve is to be obtained.

2. Distilled water is mixed to the soil thus obtained in a mixing disc to form uniform paste. The paste shall have a consistency that would require 30 to 35 drops of cup to cause closer of standard groove for sufficient length.
3. A portion of the paste is placed in the cup of LIQUID LIMIT device and spread into portion with few strokes of spatula.
4. Trim it to a depth of 1cm at the point of maximum thickness and return excess of soil to the dish.
5. The soil in the cup shall be divided by the firm strokes of the grooving tool along the diameter through the centre line of the follower so that clean sharp groove of proper dimension is formed.
6. Lift and drop the cup by turning crank at the rate of two revolutions per second until the two halves of soil cake come in contact with each other for a length of about 1 cm by flow only.
7. The number of blows required to cause the groove close for about 1 cm shall be recorded.
8. A representative portion of soil is taken from the cup for water content determination.
9. Repeat the test with different moisture contents at least three more times for blows between 15 and 35.

**NEED AND SCOPE**

Soil is used for making bricks , tiles , soil cement blocks in addition to its use as foundation for structures.

**APPARATUS REQUIRED**

1. Porcelain dish.
2. Glass plate for rolling the specimen.
3. Air tight containers to determine the moisture content.
4. Balance of capacity 200gm and sensitive to 0.01gm
5. Oven thermostatically controlled with interior of non-corroding material to maintain the temperature around 1050 and 1100C.

***PROCEDURE***

1. Take about 20gm of thoroughly mixed portion of the material passing through 425 micron I.S. sieve obtained in accordance with I.S. 2720 (part 1).

2. Mix it thoroughly with distilled water in the evaporating dish till the soil mass becomes plastic enough to be easily molded with fingers.

3. Allow it to season for sufficient time (for 24 hrs.) to allow water to permeate throughout the soil mass.

4. Take about 10gms of this plastic soil mass and roll it between fingers and glass plate with just sufficient pressure to roll the mass into a threaded of uniform diameter throughout its length. The rate of rolling shall be between 60 and 90 strokes per minute.

5. Continue rolling till you get a threaded of 3 mm diameter.

6. Kneed the soil together to a uniform mass and re-roll.

7. Continue the process until the thread crumbles when the diameter is 3 mm.

8. Collect the pieces of the crumbled thread in airtight container for moisture content determination.

9. Repeat the test to at least 3 times and take the average of the results calculated to the nearest whole number.



**Figure 4.14: Atterberg Limits Test**

**FREE SWELL INDEX OF SOIL**

**OBJECTIVE**
**For determination of free swell index of soils**

**REFERENCE STANDARD**

IS: 2720(Part 40)-1985- Methods of test for soils: Determination of free swell index of soil.

**EQUIPMENT / APPARATUS**

- Oven(105$^0$C to 110$^0$C, min)
- Balance (0.01g accuracy)
- Sieve [425 micron]
- Graduated glass cylinder [100ml capacity]

**PREPARATION SAMPLE**

The soil passing 425 micron sieve is used in this test.

***PROCEDURE***

1. Two no. of 10 g oven dried soil specimens passing through 425 micron IS sieve is taken.
2. Each soil specimen is poured in each of the two glass graduated cylinders of 100 ml. capacity.
3. Then one cylinder is filled with kerosene oil and the other with distilled water up to the 100 ml. mark.
4. It is to be stirred with a glass rod to remove entrapped air and allowed to settle for 24 hours.
5. After completion of 24 hours the final volume of soils in each of the cylinder is read out.

**CALCULATION**
**The free swell index of the soil is to be calculated as follows :**

**Free swell index, percent = $((V_d-V_k) / V_k)*100$**



**Figure 4.15: Free Swell Index**

### 4.3.4.11 Core Cutting

Detailed pavement condition survey is carried out for finalising locations of core cutting investigation based on the distresses/ pavement condition for needful further assessment.

The bituminous core samples are drilled with 100 mm standard size core cutting machine in the presence of pavement engineer, and the field observation reports of each core are prepared for needful assessment. The field observation report includes –

- Location and direction of the core cutting sample

- Off-set distance from median
- Depth of the core
- Distresses observations (crack width, depth) in each core

The following laboratory tests are carried out on the bituminous core samples –

- Density of the core
- Maximum Specific Gravity (Gmm)
- Bitumen Extraction
- Viscosity of the extracted bitumen (for 20% length)
- Gradation of Aggregates




**Figure 4.16: Core Cutting**

### 4.3.4.12 Material Investigations

The activities performed for material investigations include –

- Identification of potential sources near Project Stretch (including use of fly-ash/slag), quarry sites and borrow areas
- Collection of samples and conducting relevant laboratory tests
- Evaluation of test results and assessment of the suitability thereof for incorporation in various works and making recommendation on the use of the materials from different sources based on techno-economic principles
- Assess adequacy of quality and quantities of various construction materials available
- Preparation of mass haul diagram and quarry charts indicating the location of selected borrow areas, quarries and the respective estimated quantities

- Preparation and testing of bituminous mixes for various layers and concrete mixes of different grades using suitable materials (binders, aggregates, sand fillers etc.) as identified during material investigation to conform to latest specifications

The equipments used during investigations include hand tools like crow bars, spades, wedges etc. for collecting representative samples. The samples are packed in suitable bags, labelled and sent to laboratory for testing. Samples of stone aggregates are collected from existing crushers using the stone from the respective quarries.

### a) Sample Collection

Each quarry/material source is visited by an Assistant Engineer guided by the Material Expert, and the available materials are examined. The location of the source, the approachability, ownership, any environmental and social restrictions, approximate quantum of material available for extraction, any special installation/equipment required for extraction, visual assessment about suitability, and other relevant information are recorded.

Samples (30-40 kg) are collected from each source adopting standard sampling procedures. These are packed in suitable bags, labelled and sent to the laboratory for testing.





**Figure 4.17: Crusher Plant**

### b) Laboratory Testing of Borrow Soils and Granular Materials

The samples of materials for use in embankments, subgrade and granular sub-base are subjected to the following tests:

- Determination of water content
- Grain size analysis
- Liquid and plastic limit
- Compaction test (heavy compaction)
- Determination of CBR

### c) Laboratory Testing of Quarry Sample

- Gradation
- Specifications
- Flakiness & Elongation Index
- Aggregate Impact Value
- Soundness
- Bitumen Affinity Test

**TESTS ON AGGREGATES**

**DETERMINATION OF INDICES (FLAKINESS AND ELONGATION)**

**STANDARD**

- IS: 2386 (Part 1) 1963.

**DEFINITION**

- The Flakiness Index of aggregates is the percentage by weight of particles whose least dimension (thickness) is less than 0.6 times their mean dimension.
- The Elongation Index of aggregates is the percentage by weight of particles whose greatest dimension (length) is greater than 1.8 times their mean dimension.

**APPARTUS**

- Standard thickness gauge.
- Standard length gauge.
- IS sieves 63mm, 50mm, 40mm, 25mm, 20mm, 16mm, 12.50mm 10mm and 6.30mm.
- Balance of capacity 15kg and sensitivity 1gram.
- Thermostatically oven controlled with capacity up to 250 $^0$C.

***PROCEDURE***

- Take representative sample of aggregates from the stockpile.
- Dry the whole sample in the oven to a constant weight at a temperature of 105 to 110$^0$C and cool in room temperature.

- Sieve the whole sample through the sieves mentioned in the columns (1) and (2) of the Table 4.1.1.

**FLAKINESS INDEX**

- Take minimum of 200 pieces from each fraction and weigh (A).
- Separate flaky material from each fraction by gauging through the standard thickness gauge.
- Weigh the flaky material passing through the specified gauge from each fraction $c_1+c_2+c_3+c_4+c_5+\ldots\ldots\ldots= C$.

**CALCULATIONS**

- Flakiness index, % = (C / A) X 100

**ELONGATION INDEX**

- Take minimum of 200 pieces from each fraction and weigh (F).
- Separate the elongated material from each fraction by gauging through the standard length gauge.
- Weigh the elongated material passing through the specified gauge from each fraction $e_1+e_2+e_3+e_4+e_5+\ldots\ldots\ldots= E$



**Figure 4.18: Elongation and Flakiness Index Test**

**DETERMINATION OF AGGREGATE IMPACT VALUE**

STANDARD

- IS: 2386 (Part 4) 1963.

**DEFINITION**

- Aggregate Impact value is the ratio between the weights of the fines passing 2.36mm IS sieve and the total sample.

**APPARATUS**

- Standard Impact Testing machine.
- Cylindrical steel cup 6.3mm thick and having internal diameter of 102mm and depth of 50mm.
- A straight metal tamping rod of circular cross section 10mm diameter and 230mm long, rounded at one end.
- 12.5mm, 10mm and 2.36mm IS sieves.
- Balance of capacity 500gms and sensitivity 0.1gram.
- Thermostatically controlled oven with capacity up to 250 $^{o}$C.

**PROCEDURE**

- Take representative sample of aggregates passing 12.5mm IS sieve and retained on 10mm IS sieve.
- Keep the sample in the oven for a period of four hours till the time the weight becomes constant at a temperature of 105 to 110 $^{o}$C and cool to room temperature.
- Fill the cup in three equal layers, each layer being subjected to 25 strokes with the rounded end of the tamping rod.
- Struck off the surplus aggregates using tamping rod as a straight edge.
- Determine the net weight (A) of the aggregate in the cup.
- Now transfer the material into the cup of Impact machine, which is fixed firmly in position.
- Compact the material in the cup by a single tamping of 25 strokes with the tamping rod.
- Subject the test sample to a total of 15 blows by the hammer (weighing 13.50 Kg to 14Kg) of the Impact machine each being delivered at an interval of not less than one second and from a height of 380 $\pm$ 5 mm above the upper face of the aggregate as shown in Fig: 3.6.1.
- Remove the crushed aggregates from the cup and sieve the whole sample on the 2.36mm IS sieve till no further significant amount passes through the sieve in one minute and weigh (B) as shown in Fig: 3.6.2.
- Weigh the material that has passed through the sieve (C).
- If the total weight (B+C) is less than the original weight (A) by more than one gram, discard the result and conduct a fresh test.



**Figure 4.19: Aggregate Impact Value Test**

## DETERMINATION OF SOUNDNESS OF AGGREGATES

### STANDARD

- IS: 2386 (Part 5) 1963.

### OBJECTIVE

- To determine the soundness of aggregates.

### APPARATUS

- Sieves of size 80mm, 63mm, 50mm, 40mm, 31.50mm, 25mm, 20mm, 16mm, 12.50mm, 10mm, 8mm, 4.75mm, 4mm, 2.36mm, 1.18mm, 600microns, 300microns and 150microns with square openings conforming to IS: 460-1962.
- Containers for immersing the samples shall be perforated so as to permit free access of the solution from the sample and drainage of the solution from the sample without loss of aggregate.
- Arrangements shall also be available to ensure that the volume of the solution in which samples are to be immersed shall be at least five times the volume of the sample immersed at any one time.
- Balance of capacity 500gm sensitivity to 0.01gm
- Balance of capacity 10kg sensitivity to 1gm.
- Thermostatically controlled oven capable of being maintained at $105^0$ to $110^0$C.
- The rate of evaporation, at this range of temperature shall be at least 25gm/hour for four hours during which period the doors of the oven kept closed.

## REAGENTS

### SODIUM SULPHATE SOLUTION

- Prepare saturated solution of sodium sulphate technical grade, conforming to IS: 255 - 1950 or an equivalent grade of the salt of either the anhydrous ($Na_2 SO_4$) or the crystalline ($Na_2 SO_4 . 10 H_2O$) form in water at temperature of 25 to $30^0$C.
- For making of the solution, 420gms of anhydrous salt or 1300gms of decahydrate salt per liter of water are sufficient for saturation at $28^0$C.
- The mixer shall be thoroughly stirred during the addition of salt and the solution shall be stirred at frequent intervals until used.
- The solution shall be cooled to a temperature of 27 $\pm$ $2^0$C and maintained at that temperature for at least 48 hours before use.
- Salt cakes if any shall be broken and specific gravity of the solution shall be determined.
- When used, the solution shall have specific gravity of 1.151 to 1.174.
- Discoloured solution shall be discarded or filtered and checked again for specific gravity.

### Magnesium Sulphate Solution

- Prepare saturated solution of magnesium sulphate technical grade, conforming to IS: 257 - 1950 or an equivalent grade of the salt of either the anhydrous ($Mg SO_4$) or the crystalline ($Mg SO_4 . 7 H_2O$)(Epsom salt) form in water at a temperature of 25 to $30^0$C.
- For making of the solution, 400gms of anhydrous salt or 1400gms of heptahydrate salt per liter of water are sufficient for saturation at $28^0$C.
- The mixer shall be thoroughly stirred during the addition of salt and the solution shall be stirred at frequent intervals until used.
- The solution shall be cooled to a temperature of 27 $\pm$ $1^0$C and maintained at that temperature for at least 48 hours before use.
- Salt cakes if any shall be broken and specific gravity of the solution shall be determined.
- When used, the solution shall have specific gravity of 1.295 to 1.308.
- Discoloured solution shall be discarded or filtered and checked again for specific gravity.

## FINE AGGREGATES

- Aggregates passing 4.75mm IS Sieve shall be considered as fine aggregates.
- Sample shall be of such size that it will yield not less than 100gms of each of the sizes shown in Table.

| Passing IS Sieve | Retained on IS Sieve |
|---|---|
| 600microns | 300microns |
| 1.18mm | 600microns |
| 2.36mm | 1.18mm |
| 4.75mm | 2.36mm |

## COARSE AGGREGATES

- Aggregates of size more than 4.75mm shall be considered as coarse aggregates.
- Sample shall be of such size that it will yield not less than following amounts of different sizes, mentioned in Table: 3.7.2 which shall be available in amounts of 5% or more.

## ALL IN AGGREGATES

- Separate all in aggregates in to two major fractions such as smaller than 4.75 and coarser than 4.75.
- The former shall be dealt as fine aggregates and the latter as coarse aggregate

## PREPARATION OF TEST SAMPLE

### Fine Aggregates

- Thoroughly, wash fine aggregates on 300micron IS sieve and dry to constant weight at $105^0$ to $110^0$C and separate in to different sizes through the sieves mention in Table.

### Coarse Aggregates

- Thoroughly wash and dry aggregates to a constant weight in an oven at a temperature of $105^0$ to $110^0$ C.
- Separate into desired fraction by sieving through the sieves mention in Table.
- Weigh the required size of fraction and place in to separate containers.
- In the case of fraction coarser than 20mm the number of particles shall also be counted.

| | |
|---|---|
| 10mm to 4.75mm | 300gms |
| 20mm to 10mm<br>12.5 to 10mm<br>20 to 12.5mm | 1000gms<br>33%<br>67% |
| 40mm to 20mm<br>25mm to 20mm<br>40 to 25mm | 1500gms<br>33%<br>67% |
| 63mm to 40mm<br>50mm to 40mm<br>63 to 50 | 3000gms<br>50%<br>50% |
| 80mm and larger sizes by 20mm spread in sieve size, each fraction | 3000gms |

## PROCEDURE

## STORAGE OF SAMPLE IN SOLUTION

- Immerse the samples in the prepared solution of sodium sulphate for not less than 16hours nor more than 18hours in such a manner that the solution covers the sample to a depth of at least 15mm.
- Cover the containers to reduce the evaporation and to prevent accidental condition of extraneous substances.
- The temperature in the solution shall be maintained within 27 $\pm$ $1^0$C through out the immersion period.

- After the immersion period remove the aggregates from the solution and permit to drain for 15 ± 5 minutes and place in the oven at a temperature of 105 to 110$^0$C until it attains a constant weight.
- During this period remove the aggregates from the oven cool to room temperature and weigh at intervals not less than 4hours nor more than 18hours.
- Constant weight may considered to have been achieved when two successive weights for any one sample shall not differ by more than 0.1gram for fine aggregates and 1gram for coarse aggregates.
- After the constant weight has been achieved remove the aggregates from the oven and cool to room temperature.
- Again immerse the aggregates in solution for next cycle and repeat the same procedure as described above.
- The number of cycles to be conducted shall be as per specifications.
- After the completion of the final cycle cool the sample and wash the sample free from sulphate.
- This may be determined when there is no more reaction of the washed water with barium chloride. (When there is no white precipitation when barium chloride is added to washed water, it can be said that there is no sulphate with washed water)
- Dry each faction of sample in an oven at a temperature of 105 to 110$^0$C to constant weight and weigh.
- Sieve the fine aggregates over the same sieve on which it was retained before the test.

  Sieve the coarse aggregates over the sieves of sizes shown in Table: 3.7.3 for appropriate size of particle.

| Size of Aggregates | Sieve Size used to Determine Loss |
|---|---|
| 63 to 40mm | 31.50mm |
| 40 to 20mm | 16mm |
| 20 to 10mm | 8mm |
| 10 to 4.75mm | 4mm |

- Examine visually each size of aggregates to see if there is any evidence of excessive splitting, crumbling or disintegration of the grains.

  Conduct a combined sieve analysis of all the material subject to the above test to note the variation from the original grain size analysis of the sample.

**Laboratory Testing of Natural Sand**

- Gradation and Fineness modulus
- Deleterious Constituents

**Review and Verification of Test Results**

- The Material Expert has reviewed all the laboratory test results for consistency and compatibility. For example, for soils and other granular materials, the quality given by classification and maximum dry density results are compared against that given by CBR. For rock samples, the specific gravity, water absorption and the aggregate impact values are checked.

### 4.3.5 Road Safety Audit

Methodology for identification of road safety concerns and development of improvement proposals along the Project Stretches is listed in following steps.

- Review of past data and identification of accident blackspot locations along the Project Stretches
- Field investigations to understand the current safety concerns along the Project Stretches and specifically at the identified accident prone locations
- Identification and prioritization of improvement proposals based on requirements as immediate, medium term and long term to provide safer driving conditions

The detailed methodology followed the safety enhancement along the Project Stretches is described in further sections.

#### 4.3.5.1 Review of Past Data and Identification of Accident Blackspot Locations

Available past accident data on the Project Stretches has been collected from NHAI and analysed in detail. In addition to analysis of accident data, already identified blackspot locations by NHAI PIU are studied.

#### 4.3.5.2 Field Investigations to understand Safety Concerns

Safe Road Environment along the highway depends upon condition of various components of the highway such as alignment, provision and placement of street furniture, intersection geometry, availability of adequate sight distance, night vision along the highway, etc. It is essential to understand all these aspects on the highway from safety point of view. For this purpose, the team of Certified Road Safety Auditor/Engineer and Transport Planner has carried out detailed site reconnaissance. Following details are recorded during the field investigations.

- Current arrangement at intersections, pedestrian crossings, adequacy of the same all along the Project Stretch
- Condition of Service Roads and their intersection with main carriageway
- Identifying reasons for accidents at the identified accident prone locations such as – improper visibility,
- inadequacy of signage and information, inappropriate geometrical design, etc.
- Identification of locations for minor and major improvements

The above details are observed and recorded along the Project Stretches during the day as well as at night. Along with manual observations, entire Project Stretch is video graphed using Vehicle Video Recorder (VVR), which has capability of storing geographical coordinates of video. Snapshot of sample output from VVR is shown below.




**Figure 4.20: Snapshot-displaying Output from VVR**

As can be seen in above image, Vehicle Video Recorder records following details along with video:

- Video recording with 2-cameras – One Camera records the road section at driver's eye level and the other records view inside vehicle (which is not required for road safety inspection, therefore not used in this study)
- Location of Video on the Google Map (along with coordinates of the location)
- Speed of the Recording Vehicle, in km/hour

Videos will be useful to understand driver's view along the Project Stretches.

In addition to above, current conditions of road furniture are obtained from Network Survey Vehicle.

### 4.3.5.3 Retro-reflectivity Test of Road Markings and Road Signs

Retro Reflect Meter (Horizontal) - for measuring road markings Retro Reflectivity - Determination of night visibility (RL) and Determination of Day visibility (Qd).

### 4.3.5.4 The Equipment

Road markings must be clearly visible both in day and night. Road markings have become an important aid for drivers to follow the unlit roads at night where visual cues on roadsides are absent.



**Figure 4.21: Retro Reflectometer (Road Marking)**

This necessitates regular performance checking which markings can be done using a retro reflectometer. The night-time visibility (RL, coefficient of retro reflected luminance) and the daytime visibility (Qd, coefficient under diffuse illumination) can be quickly and accurately measured.

### 4.3.5.5 Procedure

Easy lux must be positioned directly over the Pavement Marking and parallel with the Marking as shown in fig.

Day time visibility (Qd) is expressed and measured in mcd•m-2•lx-1 observed at an angle of 2.29° at a distance of 30 m and represents the value of the diffuse scattered light received by the observer.

Night-time Visibility or value expressed by the coefficient of Retro-Reflection (RL) and measured in Mcd•m-2•lx-1.

For measurement night visibility device measures Retro-Reflection luminous rays from the study area at an angle of 2.29 °, the input light angle of 1.24 ° and at a distance of
30 m with a low beam.

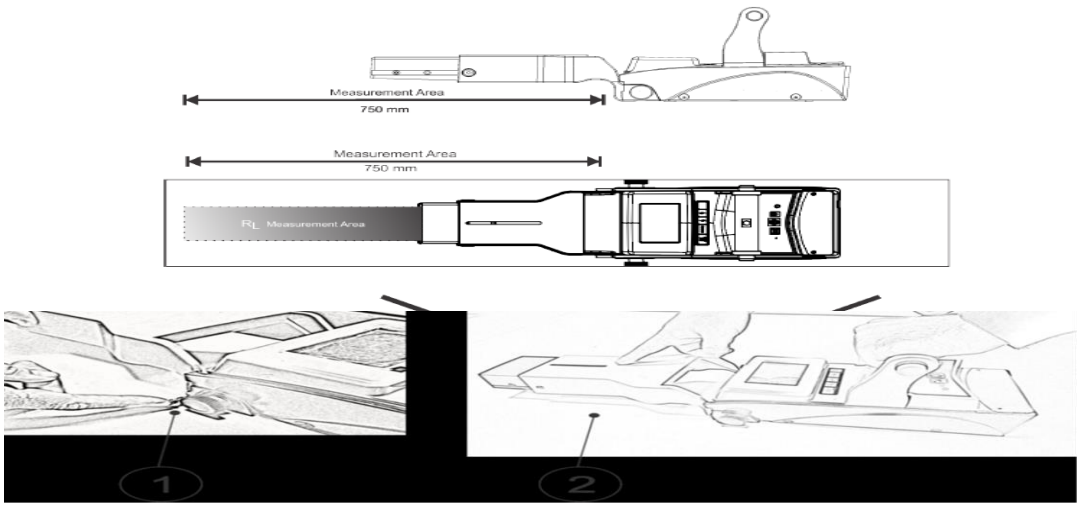



**Figure 4.22: Positioning of Equipment**




**Figure 4.23: Retro reflectivity of Road Markings on site**

### 4.3.5.6 Retro Reflectivity for Sign Board as per IRC 67-2012_Retro Reflectometer (vertical)

The Purpose of road sign is to promote road safety and efficiency by providing for the orderly movement of road users on all roads in both urban and non- urban are areas. Road signs notify road users of regulations and provide warning and guidance needed for safe, uniform and efficient operation.

#### 4.3.5.7 The Equipment

The **Mini Retro Reflector (Vertical)** is a different angle retro reflectometer designed to accurately measure the retro-reflection (*RA)* of road signs, safety clothing and other materials. The innovative optical system can measure different simultaneous observation angles. The entrance angle (*β*) can be fixed (−4° / +5°) or it can be continuously adjusted by the operator. The unique quadruple Geometry enables the Mini Reflector vertical to comply with all standards.




**Figure 4.24: Retro Reflectometer for Sign Board**

### 4.3.5.8 The Principle

The Mini Retro-Reflector (Vertical) is a handheld instrument to measure the coefficient of retro-reflection (RA) of road signs and other materials. It is capable of taking simultaneous measurements of up to 4 (four) observation angles in a single unit. The entrance angle (β) can be set to -4° or +5°, or it can be continuously adjusted by the operator. The unique quadruple Geometry enables the Mini Retro-Reflector (Vertical) to comply with all standards

### 4.3.5.9 Procedure

Retro-reflection" means the reflection of light which is returned in directions close to the direction from which it came, and this property being maintained even over wide variations of the direction of the incident radiation.

"Observation angle (symbol α)" is the angle between the illumination axis and the observation axis as shown in Fig.

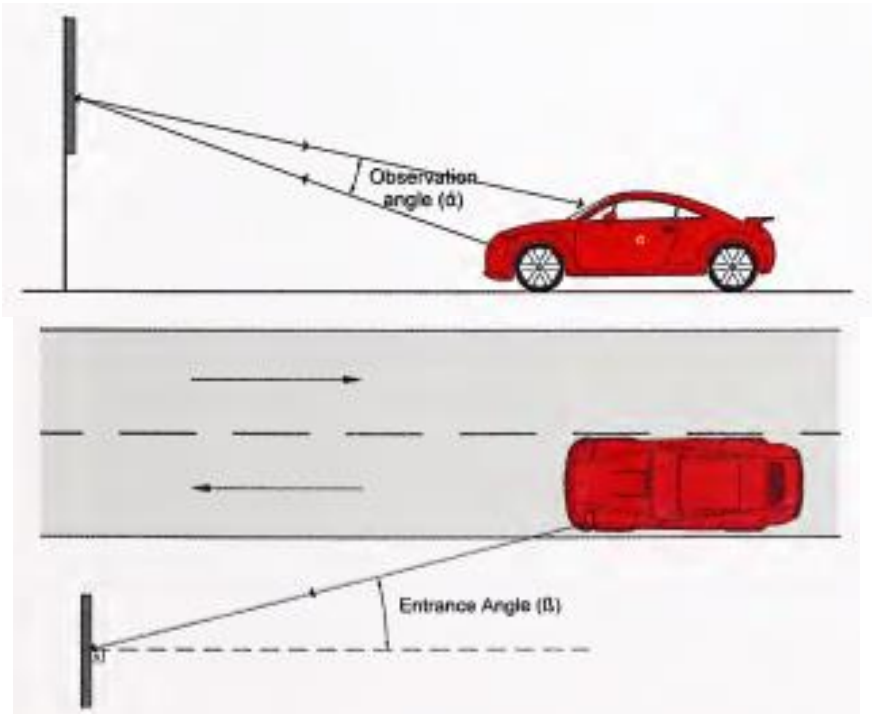



**Figure 4.25: Observation Angle**

*"Entrance angle (symbol β)" means the angle from the illumination axis to the reference axis. The reference axis is an axis perpendicular to the retro reflective surface as shown in Fig*.

### 4.3.5.10 Test Interpretations & Results

**"**Coefficient of retro-reflection R' " can be obtained from the luminous intensity (I) of the Retro-reflective area in the direction of observation and the illumination on the retro-reflective Plane at right angles to the direction of the incident light and the illuminated plane Sample surface A,

$$R' = I / E -1* A$$

The coefficient of retro-reflection R' is expressed in candle per square meter per lux (cd.m-2.lx-1).Though the sheeting as per ASTM classification are available from Type I To Type IX (as per IRC 67). a "higher" type of sheeting used in the ASTM need not necessarily imply that it is better thana "lower"-type sheeting, rather it meets different performance characteristics. Each type of

Sheeting has certain performance characteristics and the type of sheeting for a road should be selected which suits the situation encountered by road users in viewing the signs on the particular road. For example, sheeting with high coefficient of retro reflection at small observation angle will give better performance for driver's viewing the sign from long distances.

Similarly, signs with wide observation angle give good performance for drivers encountering situations to observe the signs involving wide observation angle.

**Specifications of Testing**

Measurement time after pressing trigger shall be less than or equal to 1 sec

- Observation angle adjustment from 0.2 degrees to 2.0 degrees
- Entrance angle adjustment from -45 degrees to +45 degrees
- Self-contained commercially available battery
- Inbuilt data storage of at least 2,000 measurements so that data transfer requirement is minimized while the survey is being conducted
- Interface for transferring data from device to Computer
- Built in GPS to capture GPS coordinates of road sign
- Range shall be at least 0-2000 cd/lx/m2




**Figure 4.26: Retroreflective Test on Sign Board**




**Figure 4.27: Retro-Reflectivity of Road Signs**

#### 4.3.5.11 Identification and Prioritization of Improvement Proposals along the Project Stretches

As described above, details related to current situation of various road furniture and geometrical aspects are recorded during the field investigations. Along with current situations, the improvements required at various locations are also identified. Project Stretches were developed almost before a decade or more as a part of Golden Quadrilateral or East West Corridor. While suggesting the improvement measures, Provisions of latest standards and best practices are taken into consideration. IRC: SP:84-2014, Manual of Specifications and Standards for 4-laning of Highways through Public Private Partnership (First Revision) and latest specifications are followed for improvement proposals.

Identification of safety improvement proposals are classified as immediate and long-term Improvement Proposals. Some of the proposals listed as below:

- Immediate Proposals – New Service Roads, Improvements in road furniture such as Sign Boards, Pavement Markings, Safety Barriers, Pedestrian Guard Rails, Street Lights, blinkers etc.
- Long-term Proposals – Major improvement proposals such as provision of underpasses, flyovers, corridor improvements etc.

Requirement for capacity augmentation along with its timeline for all Project Stretches are worked out which is mentioned in Chapter for Travel Demand Estimation.

Above safety improvement proposals are prioritised and finalised using the following parameters:

- Urgency of need for improvement
- Ease of implementation
- Cost of improvement

### 4.3.6 STRUCTURAL INVESTIGATIONS

Inventory and condition survey of structures are the two most essential requirements for operation and maintenance of highway structure. These tasks are carried out as per procedure and guidelines corresponding to IRC: SP:35. As part of this activity, detailed inventory and condition survey are carried out for all the existing structures in the Project Stretch.

#### 4.3.6.1 INVENTORY and Visual Condition Survey

Salient features for which data is collected as part of inventory survey are in accordance with IRC: SP: 35 Proforma. Main features recorded as part of inventory survey are listed below:

- Bridge number/ Name
- Location (Chainage)
- Type of structure (Major bridge, minor bridge, pipe culverts, box culverts, slab culverts, underpasses, flyovers etc.) and year of construction if available from records.
- Span Arrangement details like numbers of spans, span length, vent height from deepest stream bed level.
- Details and type of vehicle restraint systems such as safety barriers or R.C.C railing or parapet wall.
- Clear width and overall width of structure.
- Total width of structure
- Main features recorded as part of detailed condition survey are listed below.
- Condition of wearing coat such as potholes, cracks, and patches.
- Condition of expansion joints such as bump in riding, leakage in expansion joint, damaged sealing compound, silt and debris filled in expansion joint gap.
- Damaged and missing details of RCC railing/ safety barrier/ parapet wall.
- Damaged and missing details of drainage spouts and down take pipes extended below the soffit of deck slab, status of drainage spout chambers filled with debris and silt and missing or damaged gratings, covered on rainwater collection chambers.
- Spalling of concrete from super structure and sub structure elements.
- Delamination in girders, soffit of deck slab and substructure.
- Corroded reinforcement exposed anywhere in deck slab and substructure.
- Mapping of cracks in girders, deck slabs, sub structure.
- Visible voids and honey combing in concrete surfaces.
- Scouring near foundations and damage to protection works.

During the detailed inventory and conditional survey by bridge experts, Mobile Bridge Inspection Unit (MBIU) is also engaged at inaccessible bridge locations.



**Figure 4.28: Mobile Bridge Inspection Unit (MBIU)**

Apart from detailed visual survey to record the condition of structures, various non-destructive tests (NDT) are also conducted on elements of some of the structures whose condition looks not good such as presence of corroded steel and spalling of concrete etc. The method of testing and significance of tests are detailed below.

#### 4.3.6.2 Non-Destructive Testing (NDT)

ND Tests are analysis techniques used in construction industry to evaluate the properties of a material, component or system without causing damage to original element of structure. Methodology and objective of each of Non-destructive tests that were used in the project as part of condition survey of highway structures are presented here.

#### 4.3.6.3 Rebound Hammer Test

**Schmidt's rebound hammer test for determining the concrete compressive strength as per (IRC: SP- 40 AND IS: 516 (part-5/sec-4):2020**

The Rebound Hammer test has been used to assess concrete compressive strength at several locations.

#### 4.3.6.4 The Equipment

Concrete Test Hammer Type N manufactured and supplied by PROCEQ, Switzerland is used as shown in Fig. A. It has impact energy of 2.207N.m (0.225 kg m), which is meant for non-destructive testing of the quality of concrete in the finished structure. When testing, the 'Rebound Number' is measured which depends on the strength of the concrete/mortar close to the surface. The rebound number is read off along a graduated scale and is designated as the rebound number.




**Figure 4.29: Rebound Hammer Equipment**

***Correlation between Compressive Strength of Concrete and Rebound Number***

A correlation (depending up on the position of rebound hammer used at work site) between Rebound Number and the likely existing compressive strength is provided by the manufacturer as shown below in Figure.

However, to have more realistic and precise assessment, a 'Site – Specific' correlation shall be developed which is based on the compressive strength of core samples taken from RCC elements of particular structure and their rebound values taken at the location of coring.

For this particular structure two correlations have been prepared as difference in original quality of concrete (used for construction of Basement level II Part 1) is observed. The correlations established are shown as Figure.

### 4.3.6.5 Procedure

Smooth, clean and dry surfaces are selected for testing. Rough surfaces are avoided for this purpose. Points of impact are kept away from edges. The rebound hammer is held at right angles to the surface. Concrete surface shall be rubbed clean with a grinding stone before making the impact. About six readings are taken at each point, which are then averaged to get the final value in accordance with standard procedure.

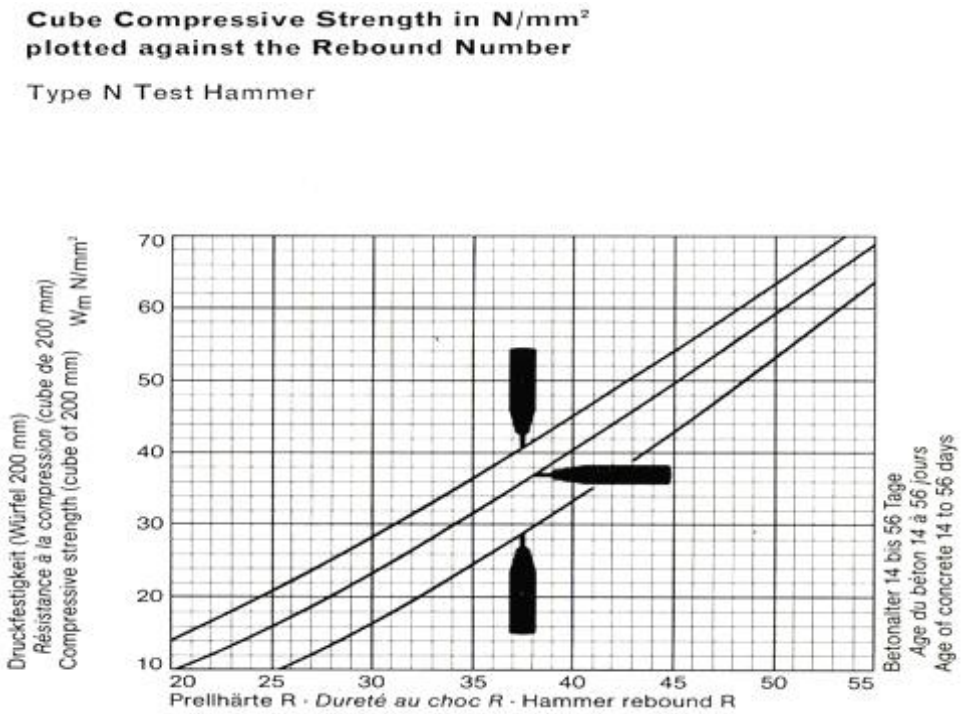



**Figure 4:30: Correlation Curve Supplied by Manufacturer i.e. Proceq, Switzerland**



**Figure 4.31: Rebound Hammer Test at Site**

### 4.3.6.6 Ultrasonic Pulse Velocity Test

***Ultrasound pulse velocity test for establishment the quality of concrete as per (IRC: SP- 40 AND IS: 516 Part-5/sec-1:2018)***

The ultrasonic pulse velocity (UPV) measurements are taken to obtain information about concrete quality i.e., voids, flaws, cracks, honeycombing etc. in terms of ultrasonic pulse velocity. The results help in identifying the areas required to be strengthened.

#### 4.3.6.6.1 The Equipment

Ultrasonic Instrument manufactured and supplied by PROCEQ (PUNDIT LAB+), Switzerland is used for taking UPV measurements and is shown below in Fig. C. It has two standard transducers of 54 kHz natural frequency along with all the other accessories. One transducer (transmitter) sends the ultrasonic wave into the medium and other (receiver) receives it on the other face.



**Figure 4.32: Ultrasonic Pulse Velocity Equipment**

#### *4.3.6.6.2* The Principle

The underlying principle of assessing the quality of concrete is that comparatively higher velocities are obtained when the quality of concrete in terms of density, homogeneity and uniformity is good. In case of poor quality, lower velocities are obtained. If there is a crack, void or flaw inside the concrete, which comes in the way of transmission of pulses, the pulse strength is attenuated and it passes around the discontinuity, thereby making the path longer. Consequently, lower velocities are obtained. The actual pulse velocity obtained depends primarily upon the materials and mix proportions of concrete. Density and modulus of elasticity of aggregate also affect the pulse velocity.

#### *4.3.6.6.3* Procedure

The measurement points are first identified and the distance between these points is measured. Coupling paste is applied to the contact surfaces of the transducers (thinner coat to the finer concrete surface, thicker coat for the rough surface) and Measurements are taken after feeding necessary inputs in the equipment. The measurements can be taken in three manners:

a. Direct Transmission or Cross Probing: When both the probes are kept (at 180°) on opposite faces.
b. Semi-direct Transmission: Both the probes are kept (at 90°) on diagonally opposite faces.
c. Indirect Transmission or *Surface Probing: When both the probes are kept (at 180°) on the same face. All these methods have been illustrated in Figure.

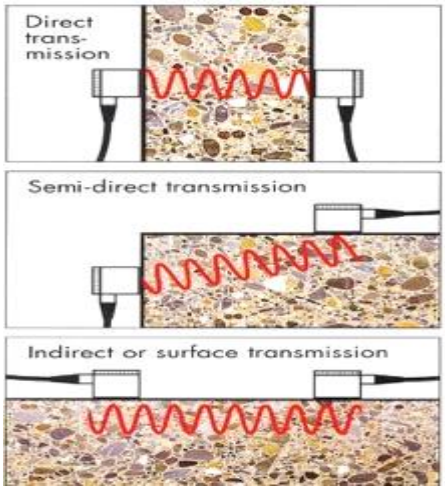



**Figure 4.33: Methods of UPV Measurement**

Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s.

The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks or segregation etc. indicative of the level of workmanship employed, can be assessed using the guidelines given in Table I below, which have been evolved for characterizing the quality of concrete in structures in terms of the ultrasonic pulse velocity.



**Figure 4.34: Ultrasonic Pulse Velocity Test at Site**

#### 4.3.6.7 Carbonation Depth Test (CD)

Chemical reaction of the concrete surface to a Phenolphthalein based staining agent was recorded at varying depth at the same location. The first depth was the stain turned pink was recorded as the depth of carbonation. These tests were carried out in close proximity to the surface strength profile test locations to note the densification effect of carbonation on surface strength.



**Figure 4.35: Snapshot of CD Testing**

#### 4.3.6.8 Transient Dynamic Response Test (TDR)

TDR tests are similar to UPV testing, unlike UPV the pulse is generated by blow of the hammer on the surface to be tested. This produces the transient dynamic pulses in the medium, which is tested. The wave moves in the medium and wherever there is change in density or material property the wave has a reflection. This reflection moves to the top of the surface. The geophone of the surface picks this reflection. Analysis of the reflection enables us to determine the state of the concrete and behavior under transient dynamic loading. The wave normally reflects wherever there are small cracks, voids, change of cross section, change of density etc. all these changes should be sudden to cause of reflection. The wave is either tandem or in reverse with the original wave.

The processed data are then plotted as a graph of the section mobility against frequency. The result plot is termed the frequency response or signal response curve for the concrete section.

The results are utilized to analyse the structural integrity of concrete laminae and to determine the Characteristic strength (fck) of the concrete.



**Figure 4.36: Snapshot of TDR Testing**

#### 4.3.6.9 Infrared Thermography

Infrared Thermography (IRT) is a test which is used to determine the cracking and delamination in the bridge deck and in locations like piers (especially good for masonry piers) IRT provides very useful data which can be used to create historical evidence of propagation of cracks, and delamination etc. in the bridge components.

The test is conducted by capturing images of the object to be tested from different locations. One has to ensure that proper sunlight is available on the object to be tested. Multiple pictures need to be captured to provide continuous information of the tested object. Like any camera, photography, the picture has boundaries. If the object is larger than the frame of the picture captured, then overlapping images will be created.



**Figure 4.37: Snapshot of IRT Testing**

#### 4.3.6.10 Half Cell Method (HCP)

This test is useful to evaluate the corrosion activity as well as actual condition of the cover layer during testing. In this test Continuity of steel is assumed / checked. Prior to testing, one rebar needs to be exposed to act as a one point. This is connected to the Copper - Copper Sulphate half-cell through a multimeter. The other point of the half-cell is directly connected at various locations on the concrete surface, which is in pre wet condition. Completion of circuit give a reading on the multimeter, which is the potential difference between the tested points. High negative difference indicates that the corrosion potential is maximum. Various readings are taken within a close grid at equal interval of 150 or 300 mm centre to centre. Contours are then drawn to indicate areas with varying corrosion potential.

**Probability of Corrosion (%)**

| Potential Level | Probability of Corrosion(%) |
|---|---|
| Less than 200 | 10% |
| 200 to 350 | Uncertain |
| 350 to 500 | 90% |
| Above 500 | 95% |



**Figure 4.38: Snapshot of HCP Testing**

#### 4.3.6.11 Vibration Monitoring (VB)

Vibration monitoring shall be carried out at all such locations where it is required to assess the effect of induced vibrations due to moving traffic and at locations, where it is essential to estimate the load capacity of the structural element. A standard vibration monitoring system shall carry out this assessment by vibration monitoring method. This equipment should be able to evaluate the parameters of vibrations. Permissible limits of vibrations shall be as defined by relevant compliance code. In India, they shall confirm to Indian Standard Codes.

The method adopted shall measure peak pulse velocity / peak acceleration / peak displacement in vertical direction for a particular frequency. Every structure has its own frequency and unless the induced vibration frequency does not match with this resonance frequency, the structure can sustain vibration safely.

Monitoring of deflections and vibrations for live load is classified based on the type of vehicle like two wheelers, four wheelers, Tempo, Truck, Multi axle and Heavier multi axle. This monitoring is done for a series of moving vehicles at restricted speeds above 10 kmph and below 30 kmph. Typically, two to three readings are taken at mid span for each live load type. Such an array of readings generates a typical load v/s deflection table and is plotted in a graph and the readings are then extrapolated to higher loadings to evaluate the maximum load at limiting deflection for the span that is tested. This method enables testing of each span without stopping the traffic and yields near accurate results.



**Figure 4.39: Snapshot of VB Testing**

#### 4.3.6.12 Estimation of Remaining Life of Structures

The service life of structure or its main components such as super structure, substructure and foundations and their constituent materials is defined as the period after installation during which its essential properties exceed the minimum acceptable values, on regular routine check-up and the same if rectified immediately, no excessive expenditure is required in operation, maintenance period.

The service life is estimated considering the degradation causing factors, deterioration process and damage modes. Deterioration of reinforced cement concrete structures or its components, are mainly due to carbonation, corrosion, ingress of chloride into concrete body, apart from externally applied forces or loads such as earthquake, cyclones etc.

Some of the recommended procedures approaches to estimate Service life of any Bridge are given below.

- Based on Bridge performance rating in a scale of 1 to 9 (Very low to high, 1-9). Rating of 9 will be given for a bridge having full design life as its service life. Rating 1 denotes the bridge is not fit for use and not fit for repairs also.
- Based on depth of penetration of carbonation relative to clear cover to reinforcement.

### 4.3.7 Toll Plaza System Audit

Existing toll plazas including infrastructure, toll management system (TMS, if any) and operational activities are inspected thoroughly for understanding their suitability and deficiencies. A team of TMS expert and technical assistants have visited and reviewed all toll plazas. During the site visit, information related following heads are collected.

- Lane Terminals: software and database components related to lane terminals and lane operation
- Operation and health of plaza servers
- All system generated reports
- Audit procedure
- Cash-up procedure
- Point of Sale (POS)
- Incident generation and validation managements

# Chapter 5. Design Standards

# 5. DESIGN STANDARDS, CODES AND SPECIFICATIONS

## 5.1 INTRODUCTION

The design standards for improvement proposals of the Project Stretch are presented here after reviewing the relevant latest Indian Roads Congress Codes (IRC), Manual of Specification & Standards for Six Laning of Highways Through Public Private Partnership (IRC:SP:87-2019) and international standards such as AASHTO etc.

The design standards have been grouped under the following.

**A. Road Works**

(a) Geometric Design Standards

- Terrain classification & Design Speed
- Horizontal Alignment
- Vertical Alignment
- Cross sectional Element

(b) Road drainage

**B. Bridges and Cross Drainage Works**

The Consultant's design methodology is based on the consideration of alignment, cross-sectional layout, geometrics, safety to cater the review of uninterrupted movement of through traffic. The consultant has also considered that the improvement proposals should be to the extent feasible within the present Right of Way (ROW) or with minimum land acquisition.

## 5.2 BASIC POSTULATES

The project road is recently built; existing road opened to traffic in 2016. As per the ToR, the Consultant is required to review the various elements of the project road and propose suitable rectification if required.

Before finalizing the design philosophy, the basic postulates of the Project Road is required to be kept in view which are as under:

- The uniformity of the Design Standards shall be maintained throughout the length.
- The design should thus be consistent within any area and the standards proposed for the different elements should be compatible with one another.
- The selected design should minimize the total transportation cost, including initial construction costs, costs for the maintenance of the facility and the costs borne by the road users.
- Safety should form an integral part of the design elements.
- "Ruling" standards should be followed as a matter of routine. "Minimum" standards should be followed only where serious restrictions are imposed by technical or economic considerations.
- Existing Horizontal Curves, which are found deficient in radius, layout, transition lengths or super-elevation, shall be corrected to the specified standards if possible within existing ROW.

Geometric Design Standards for the Project Road have been drafted based on the following Guidelines:

- Manual for safety in Road Design by Government of India, Ministry of Road Transport & Highways (Road Wing –September 1998)
- Manual of Specification & Standards for Six Laning of Highways Through Public Private Partnership (IRC: SP:87-2019)

- Manual on Road Safety Audit (IRC: SP:88-2019)
- NHAI circular No. 17.5.82 dated 24 May 2021.
- Other IRC Guidelines/Manuals and
- All notations, abbreviations and symbols used in the reports, documents and drawings shall be as per IRC: 71.

## 5.3 HIGHWAY DESIGN PARAMETERS

The following design standard shall follow minimum proposed, for the improvement proposals.

### 5.3.1 Terrain Classification

The terrain is classified based on the general slope of the ground across the highway alignment and is given below in **Table 1.1**.

**Table 5.1: Terrain Classification for 6 Lane Highways**

| Sl. No. | Terrain Classification | Cross Slope of the Ground |
|---|---|---|
| 1 | Plain and Rolling | Up to 25 Percent |
| 2 | Mountainous and Steep | More than 25 Percent |

The project road passes through Plain terrain.

### 5.3.2 Design Speed

The Design Speed to be adopted for the various terrain classifications are tabulated in **Table 5.2.**

**Table 5.2: Design Speed for 6 Lane Highways**

| Sl. No. | Nature of Terrain | Design Speed (Km/hr) | |
|---|---|---|---|
| | | Ruling | Minimum |
| 1 | Plain and Rolling | 100 | 80 |
| 2 | Mountainous and Steep | 60 | 40 |

### 5.3.3 Extra Widening on Sharp Curve

On Horizontal curves with radius up to 300m, width of pavement and roadway in each carriageway shall be increased as given in **Table 5.3**

**Table 5.3: Extra Width of Pavement and Roadway in each carriageway for 6 Lane Highways**

| Radius of Curve | Extra Widening |
|---|---|
| 75-100 m | 0.9 m |
| 101-300 | 0.6 m |

### 5.3.4 Horizontal Alignment

The essential elements of the horizontal alignment are as under:

a) Minimum Radii of the Horizontal Curve
b) Super elevation
c) Transition Length
d) Sight Distance

***Radii of Horizontal Curves***

The desirable minimum and absolute minimum radii of horizontal curves for various classes of terrain are given in **Table 5.4**

**Table 5.4: Minimum Radii of Horizontal Curves for 6 Lane Highways**

| Nature of Terrain | Desirable Minimum | Absolute Minimum |
|---|---|---|
| Plain and Rolling | 400 m | 250 m |
| Rolling | 150 m | 75 m |

***Super Elevation***

Super-elevation shall be limited to 7.0 percent, if radius of curve is less than desirable minimum radius. It shall be limited to 5.0 percent, if radius is more than desirable minimum.

***Transition Curves***

The minimum length of transition curve shall be determined from the following two considerations and the larger of the two values shall be adopted for design:

i) The rate of change of centrifugal acceleration should not cause discomfort to drivers. From this consideration, the length of transition curve is given by:

Ls =0.0215 $V^3$ /CR

Where:

Ls = Length of Transition Curve in meters

V = Speed in Km/hr

R = Radius of Circular Curve in meters

C=80/ (75+V) (Subject to a maximum of 0.80 and minimum of 0.50)

ii) The rate of change of super elevation should be such as not to cause discomfort to travellers. Further, rate of change should not be steeper than 1 in 150 for roads in Plain/Rolling Terrain, and 1 in 60 in Mountainous/Steep Terrain.

The minimum length of Transition Curve based on this consideration is given by the equation:

Ls=2.7 $V^2$ /R.

The minimum values of Transition lengths for different Speeds and Curve Radii are given in **Table 5.5**.

**Table 5.5: Minimum Values of Transitions**

| *Plain and Rolling Terrain* | | | | | | | *Mountainous and Steep Terrain* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Curve Radius | Design Speed (Km/hr) | | | | | | Curve Radius | Design Speed (Km/hr) | | | | | |
| (m) | 100 | 80 | 65 | 50 | 40 | 35 | (m) | 50 | 40 | 30 | 25 | 20 | |
| | *Transition Length in Metres* | | | | | | | *Transition Length in Metres* | | | | | |
| 45 | - | - | - | - | NA | 70 | 14 | - | - | - | NA | 30 | |
| 60 | - | - | - | NA | 75 | 55 | 20 | - | - | - | 35 | 20 | |
| 90 | - | - | - | 75 | 50 | 40 | 25 | - | - | NA | 25 | 20 | |
| 100 | - | - | NA | 70 | 45 | 35 | 30 | - | - | 30 | 25 | 15 | |
| 150 | - | - | 80 | 45 | 30 | 25 | 40 | - | NA | 25 | 20 | 15 | |
| 170 | - | - | 70 | 40 | 25 | 20 | 50 | - | 40 | 20 | 15 | 15 | |
| 200 | - | NA | 60 | 35 | 25 | 20 | 55 | - | 40 | 20 | 15 | 15 | |
| 240 | - | 90 | 50 | 30 | 20 | NR | 70 | NA | 30 | 15 | 15 | 15 | |
| 300 | NA | 75 | 40 | 25 | NR | - | 80 | 55 | 25 | 15 | 15 | NR | |
| 360 | 130 | 60 | 35 | 20 | - | - | 90 | 45 | 25 | 15 | 15 | | |
| 400 | 115 | 55 | 30 | 20 | - | - | 100 | 45 | 20 | 15 | 15 | | |
| 500 | 95 | 45 | 25 | NR | - | - | 125 | 35 | 15 | 15 | NR | | |
| 600 | 80 | 35 | 20 | - | - | - | 150 | 30 | 15 | 15 | | | |
| 700 | 70 | 35 | 20 | - | - | - | 170 | 25 | 15 | NR | | | |
| 800 | 60 | 30 | NR | - | - | - | 200 | 20 | 15 | - | | | |
| 900 | 55 | 30 | - | - | - | - | 250 | 15 | 15 | - | | | |
| 1000 | 50 | 30 | - | - | - | - | 300 | 15 | NR | - | | | |
| 1200 | 40 | NR | - | - | - | - | 400 | 15 | - | - | | | |
| 1500 | 35 | - | - | - | - | - | 500 | NR | - | - | | | |
| 1800 | 30 | - | - | - | - | - | - | - | - | - | | | |
| 2000 | NR | - | - | - | - | - | - | - | - | - | | | |

***Sight Distance***

The safe stopping sight distance and desirable minimum sight distance for divided carriageway for various design speeds are given in **Table 5.6**. The desirable values of sight distance shall be adopted throughout. A minimum of safe stopping sight distance shall be available throughout.

**Table 5.6: Sight Distances for Various Speeds for 6 Lane Highways**

| Speed (Km/hr) | Safe Stopping Sight Distance (m) | Desirable Minimum Sight Distance (m) |
|---|---|---|
| 100 | 180 | 360 |
| 80 | 130 | 260 |
| 60 | 90 | 180 |
| 40 | 45 | 90 |

### 5.3.5 Vertical Alignment

There are two major elements in vertical geometry of an alignment i.e. longitudinal gradient and vertical curve.

**Longitudinal Gradient**

The ruling and the Limiting gradient for various class of terrain to be followed are given in **Table 5.7.**

Ruling Gradients shall be adopted as far as possible. Limiting Gradient shall be adopted in difficult situations and for short lengths.

**Table 5.7: Recommended Gradients for 4 Lane and 6 Lane Highways**

| Nature of Terrain | Ruling Gradient | Limiting Gradient |
|---|---|---|
| Plain and Rolling | 2.5 % | 3.3 % |
| Mountainous | 5.0 % | 6.0 % |
| Steep | 6.0 % | 7.0 % |

**Vertical Curve**

Due to changes in grade in the vertical alignment of the highway vertical curves at the interchanges and at locations where underpasses are to be inserted different grades will be provided in the design so as to smoothen the vertical profile resulting in easing off of the changes in the gradients for the fast moving vehicles. Both summit curves and valley curves will be introduced as per IRC guidelines.

Length of summit curve and valley curves (L) is guided by S, the sight distance and the deviation angle (N).

**For Summit Curves:**

When length of the curve is greater than sight distance $L = NS^2 / 4.4$

When length of the curve is less than sight distance $L = 2 S – 4.4 / N$

**For Valley Curves:**

When length of curve is greater than stopping sight distance $L = NS^2 / (1.5 + 0.035 S)$

When length of curve is less than stopping sight distance $L = 2 S – (1.5 + 0.035 S) / N$

### 5.3.6 Cross Sectional Elements

The details of cross-sectional elements adopted for the Project Stretch are as per 6 Laning Manual. The adopted cross-sectional elements are presented in the **Table 5.8.**

**Table 5.8: Design Parameters**

| S. No. | Description | Adopted Standards | |
|---|---|---|---|
| 1 | **Design speed (Kmph) Plain and Rolling Terrain** | **Ruling** | **Minimum** |
| | | 100 | 80 |
| | **Mountainous and steep terrain** | 60 | 40 |
| 2 | **Lane width** | 3.5 m | |
| 3 | **Depressed median with Crash Barriers** | 7 m including 0.6m wide Kerb Shyness | |
| | **Raised median** | | |
| | a) Built up Sections | 2.5 m including 0.5m wide Kerb Shyness | |

| S. No. | Description | | Adopted Standards | |
|---|---|---|---|---|
| | b) Other sections | | 5.0 m including 0.5m wide Kerb Shyness | |
| 4 | **Paved Shoulder width** | | | |
| | a) Rural section | | Plain Terrain | 2.5 m |
| | b) Urban sections | | | 2.5 m |
| 5 | **Earthen Shoulder width** | | | |
| | a) Rural section | | Plain Terrain | 1.5 m |
| | b) Urban sections | | | - |
| 6 | **Width of utility corridor** | | | |
| | a) Rural section | | | 2.0m |
| | b) Urban sections | | | 2.0m |
| 7 | **Width of service roads** | | | 5.50/7.0m |
| 8 | **Minimum width of Footpath** | | | 1.5m |
| 9 | **Minimum width of separation island between main carriage and service road** | | | 1.5 m |
| 10 | **Cross-slopes** | Carriageway Paved shoulder and Unpaved shoulder | | 2.5 % |
| | | | | 3.0 % |
| 11 | **Maximum super elevation** | Super elevation shall be limited to 7%, if radius of curve is less than desirable minimum radius. It shall be limited to 5%, if radius is more than desirable minimum. | | |
| 12 | **Minimum horizontal curve radius** | For | **Desirable Minimum** | **Absolute Minimum** |
| | | a) Plain and Rolling Terrain | 400 m | 250 m |
| | | b) Mountainous and steep Terrain | 150 m | 75 m |
| 13 | **Radii beyond which super elevation not required** | For | | |
| | | 100 kmph | 1800 m | |
| | | 80 kmph | 1100 m | |
| | | 65 kmph | 750 m | |
| 14 | **Super elevation runoff rate** | For Plain and Rolling | <1 in 150 | |
| | | For mountainous & steep | <1 in 60 | |
| 15 | **Minimum Length of Vertical Curves / Grade change not requiring vertical curve** | **Design Speed** | **Min. curve length** | **Max. grade change for not requiring a vertical curve** |
| | | 100kmph | 60m | 0.50% |
| | | 80kmph | 50m | 0.60% |
| 16 | **Vertical curve 'K' values Crest vertical curve/Sag vertical curve** | **For design Speed** | **Crest for SSD/ISD** | **Sag** |
| | | 100kmph | 74/135 | 42 |
| | | 80kmph | 33/60 | 26 |
| | | 65kmph | 19/33.8 | 18 |
| | | 50 kmph | 9/15 | 10 |
| | | 40 kmph | 5.0/8.4 | 6.5 |
| 17 | **Vertical clearance** | Road over road | 5.5 m | |
| | | Road over railway | 6.525 m | |
| | | Electrical power lines | 6.0m (Up to 650 V) | |
| | | H.T. Electrical lines | 6.5m (More than 650 V) | |
| | | Telecommunication Lines | 5.5m (Up to 110 V) | |

### 5.3.7 Service Roads/Slip Road

a) Service Roads shall be assessed as per the requirement of the site.

b) A minimum design speed of 40 kmph shall be adopted for service roads.

c) The width of the service roads shall be minimum 5.5 m / 7.5 m for 6 Lane Highway.

d) The crust composition of service roads for 6 Lane Highways shall be for 10 msa Design Traffic.

e) Wherever service roads are provided, provisions shall be made for proper entry and exit ramps between the main highway and the service road through properly designed acceleration and deceleration lanes.

### 5.3.8 At Grade Junctions

- The At Grade Intersections shall be provided at crossing locations, where the traffic on the crossroads are low to moderate.
- The type of intersections to be provided shall be as under:
  - Three Leg Intersection
  - Four Leg Intersection
  - Multi Leg Intersection
- The Design of different elements of intersection shall be done as per IRC: SP: 41 and as per MOR&TH-Type Designs for Intersections on National Highways, 1992.
- Design Standards shall be as per IRC: SP: 41.
- Traffic Control Devices (such as Road Markings, Signs, Reflectors, etc.) shall be provided as per the provisions of IRC: SP: 41, IRC: 35 and also IRC: 67.

### 5.3.9 Traffic Control Devices and Road Safety Works

The Traffic Control Devices and Road Safety Works shall consist of the following:

a) Road Signs
b) Road Markings
c) Road Delineators
d) Reflective Pavement Markers (Road Studs)
e) Roadside and Median Safety Barriers
f) Road Boundary Stones

***Road Signs***

a) Three types of Road signs shall generally be provided (such as Mandatory/Regulatory, Cautionary/Warnings, and informatory signs.
b) Locations of Signs shall conform to IRC: 67, Section 800 of MOR&TH Specifications and IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).
c) Proper signs shall be provided for the main carriageway, service and slip roads, toll plaza and other project highway facilities. Clustering and proliferation of road signs shall be avoided for enhancing their effectiveness.

***Road Markings***

a) Road Markings shall be of hot applied thermoplastic materials with glass reflectorizing beads.
b) Road markings shall conform to IRC: 35 and IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).
c) The approach noses of the traffic islands will be marked for additional guidance of traffic by means of diagonal markings and chevrons.
d) Transverse Bar markings/ Rumble strips shall be provided before median openings, where the need for alerting the drivers for a reduction in speed is desired. Rumble

Strips are formed by a sequence of transverse strips laid across a carriageway.

***Road Delineators***

These are roadway indicators, hazard markers and object markers and shall conform to IRC 79.

***Reflective Pavement Markers (Road Studs)***

The Reflective Pavement Markers (Road Studs) shall be provided to improve the visibility in night-time and wet weather conditions. The locations and details of road studs shall conform to IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).

***Roadside and Median Safety Barriers***

a. The following types of Road Safety Barriers shall be provided on the Project Road Sections:
   i. Semi-rigid type such as “W” Beam Type Steel Barriers and Thrie beam type steel barrier.
   ii. Rigid Type such as Concrete Crash Barriers.
   iii. Flexible type such as wire rope fencing.
b. Semi-rigid type barrier at the edge of formation shall be provided at all embankments with height 3.0m or more with delineating reflectors fitted on them. These barriers shall also be provided along all curves having radii up to 450m for complete length of curves including transitions and 20m further before and after the curve.
c. Semi rigid barrier and flexible barrier shall not be installed upon a structure.
d. Steel barriers shall be provided in non-built-up sections, whereas concrete barriers shall be provided in built up sections.
e. Rigid barriers shall also be provided at the following locations: -
   i. Where embankment is retained by a retaining structure
   ii. On valley side of highway in mountainous and steep terrain.
   iii. Between main carriageway and ***footpath*** in bridges.

***Kilometer / Hectometer Stones / Posts –*** The Kilometer and Hectometer stones are provided if missing at site. The design and placement of Highway kilometer stones, their dimensions, size, color and arrangement of letters shall be as per IRC: 8-1980. For installation and maintenance of 200-metre stones (Hectometer Stones), IRC: 26-1967 shall be applied.

***Road Boundary Stones***

Road Boundary stones shall be provided at the boundary on both sides of the Right of Way available under control and shall conform to IRC:25. These shall be spaced at 50m center to center interval along 6 Lane Highway.

### 5.3.10 Road Drainage

Adequate drainage is a primary requirement for maintaining the structural condition and functional effect of a good pavements structure including sub grade. Pavement must be protected from any ingress of water. Otherwise over a period of time it may weaken the sub grade by saturating it and cause distress in the pavement structure. The GSB layer shall extend through the full formation width and shall act as the drainage layer for effective subsurface drainage.

### 5.3.11 Project Facilities

***Highway Lighting***

Solar Street light system shall be provided at the following locations conforming to IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).

i. Toll Plaza Area
ii. Way Side Amenities
iii. Truck Lay byes
iv. Bus Bays and Bus Shelters
v. Grade Separated structures, Interchanges, Flyovers, Underpasses and Overpasses.
vi. Built Up Sections on the Project Highway both in the median of the main carriageway and on the service road on either side.

***Solar Blinkers at Median opening***

Traffic blinkers powered with solar energy required at the gaps in median openings. Adequate solar blinkers at every gap in median shall be provided.

***Truck Lay Bye***

Truck Lay bye shall be located near check barriers, interstate borders, places of conventional stops of the truck operators etc. The layout of the truck lay bye shall conform to IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).

The truck lay bye shall have the following facilities

i. Paved Parking
ii. Rest Areas with Toilets and drinking water
iii. Telephone

***Bus Bays***

The buses shall be allowed to stop for dropping and picking up passengers only at the bus bays, which shall be provided on both sides of the project highway near the underpass/flyovers, existing bus stop locations and near built up areas etc.

The layout of the Bus Bay shall conform to IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).

***Way Side Amenities***

The Wayside Amenities shall be provided along the project Highway at suitable locations in discussion with NHAI. The Way Side Amenities shall have the following facilities such as toilets, telephones, cafeteria, restaurant, parking for cars, buses and trucks, dormitory, rest rooms, shops for travel needs, fuel stations and garage, first aid etc. within minimum 5 acres of land (length and depth preferably in the ration of 3:2) conforming to NHAI Circular No. 11014/11/2016 HR-I dated 12.06.2017.

The layout of the Wayside Amenities shall conform to IRC: SP:87-2019 (Manual of Specifications & Standards for Six Laning of Highways through Public Private Partnership).

## 5.4 DESIGN STANDARDS FOR BRIDGES

This section deals with the standards to be adopted in design and as well as repair and rehabilitation of highway structures vis-à-vis Flyovers, Bridges, Underpasses, Overpasses, ROBs, RUBs and Culverts. It also provides the type of materials and their specifications that would be adopted for the above structures along with the loads and forces to be considered.

All bridges which are structurally distressed will be considered for reconstruction. However, wherever main components like superstructure, substructure and foundations

are in good condition, replacement or reconstruction is proposed for bearings, expansion joints, railings, safety barriers and wearing surface etc. if necessary. Minor structural works such as pointing, plastering, and protection works are proposed as per 7.2.2 of IRC: SP: 87-2019. All the repair and rehabilitation are proposed in accordance with IRC SP 40, MOR&TH Specifications, along with other codes mentioned in design below.

New structures will be proposed at new service roads and grade separators, wherever planned as part of project improvements. The necessary codes referred for these new structures are also listed in **Table 5.9 - IRC Codes** below.

### 5.4.1 Design Standards & Codes of Practice

Design standards and loading to be considered are generally based on the requirements laid down in the latest editions of IRC and IS codes of practices and standards specifications, and guidelines of MoRT&H. Additional technical references would be used wherever the provisions of IRC / IS codes are found inadequate. Following IRC/IS Codes shall be used in the design.

**Table 5.9: IRC Codes Adopted in the Design**

| | | |
|---|---|---|
| • IRC:5-2015 | - | Section I, General Features of Design (7th Revision) |
| • IRC:6-2017 | - | Section II, Loads and Stresses (Revised Edition) |
| • IRC:22-2015 | - | Section VI, Composite construction (Limit State Design) (2nd Revision) |
| • IRC:24-2010 | - | Steel Road Bridges (Limit State Method) (3rd Revision) |
| • IRC: 37 - 2018 | - | Guidelines for Flexible Pavement Design |
| • IRC:40-2002 | - | Brick, Stone and Cement Concrete Block Masonry |
| • IRC:78-2014 | - | Section VII, Foundations and Substructure (Revised Edition) |
| • IRC:83 (Part I) - 2015 | - | Section IX (Part I), Metallic Bearings (1st Revision) |
| • IRC:83 (Part II) - 2015 | - | Section IX (Part II), Elastomeric Bearings |
| • IRC:83 (Part III)- 2002 | - | Section IX (Part III), POT, Pot cum PTFE, Pin and Metallic Guide Bearings. |
| • IRC:83 (Part IV)- 2014 | | Section IX (Part IV), Bearing (Spherical and Cylindrical) |
| • IRC:87-2011 | - | Guidelines for Formwork, Falsework and Temporary Structures (First Revision) |
| • IRC:112-2020 | | Code of Practice for Concrete Road Bridges |
| • IRC: 115-2014 | - | Guidelines for Structural Evaluation and Strengthening of Flexible Road Pavements Using Falling Weight Deflectometer (FWD) |
| • IRC: 117-2015 | - | Guidelines for the Structural Evaluation of Rigid Pavement Falling Weight Deflectometer |

- IRC:89–1997 - Guidelines for design and construction of River Training and Control Works for Road Bridges (I$^{st}$ Revision)
- IRC:123-2017 - Guidelines on Geophysical Investigation for Bridges
- IRC: SP:18-1978 - Manual for Highway Bridge Maintenance Inspection
- IRC: SP:35-1990 - Guidelines for Inspection and Maintenance of Bridges
- IRC: SP:37-2010 - Guidelines for Evaluation of Load Carrying Capacity of Bridges (First Revision)
- IRC: SP:40-1993 - Guidelines on Techniques for Strengthening and Rehabilitation of Bridges
- IRC: SP:47-1998 - Guidelines on Quality Systems for Road Bridges (Plain, Reinforced, Prestressed and Composite Concrete)
- IRC: SP:51-2015 - Guidelines for Load Testing of Bridges (First Revision)
- IRC: SP:56-2011 - Guidelines for Steel Pedestrian Bridges
- IRC: SP:64-2005 - Guidelines for Analysis and Design of cast in place voided slab superstructure
- IRC: SP:65-2005 - Guidelines for Design and Construction of Segmental Bridges
- IRC: SP:66-2005 - Guidelines for Design of Continuous Bridges
- IRC: SP:67-2005 - Guidelines for use of external and unbonded prestressing tendons in bridge structures
- IRC: SP:69-2011 - Guidelines and Specifications for Expansion Joints (First Revision)
- IRC: SP:71-2006 - Guidelines for Design and Construction of Pretensioned Girder of Bridges
- IRC: SP:73-2018 - Manual of Standards & Specifications for Two laning of Highways with Paved Shoulders.
- IRC: SP:74-2007 - Guidelines for Repair and Rehabilitation of Steel Bridges
- IRC: SP:75-2008 - Guidelines for Retrofitting of Steel Bridges by Prestressing
- IRC: SP:82-2008 - Guidelines for Design of Causeways and Submersible bridge
- IRC: SP:84-2019 - Manual for Specifications & Standards for Four laning of Highways through Public Private Partnership (Second Revision).

- IRC: SP:87-2019 - Manual for Specification and Standards for Six laning of Highways through Public Private Partnership (Second Revision).
- IRC: SP:88-2019 - Manual on Road Safety Audit
- IRC: SP:90-2010 - Manual for Grade Separators and Elevated Structures
- IRC: SP:99-2013 - Manual of Specifications and Standards for Expressways.
- IRC: SP:102-2014 - Guidelines for Design and Construction of Reinforced Soil Walls.
- IRC: SP:104-2015 - Guidelines for fabrication and erection of steel bridges
- IRC: SP:109-2015 - Guidelines for design and construction of small diameter piles for road bridges
- IRC: SP:114-2018 - Guidelines for Seismic Design of Road Bridges
- IRC: SP:116-2018 - Guidelines for Design and Installation of Gabion Structures.
- IS:2062-2011 - Hot rolled medium and high tensile structural steel.

### 5.4.2 Cross-sectional Elements

- **Structural width for proposed Bridges / Flyovers**

The overall width of new bridges shall be same as the roadway width of the approaches. All the new bridges shall have a footpath on left side of the traffic. The typical cross-section for new bridge with footpath should be as per IRC: 87-2014, Cl 7.3, Fig 7.2.

### 5.4.3 Design Loading

The new bridge shall be designed for the combination of live load specified in Table 6 under Clause 204.3 of IRC: 6-2017 depending upon carriageway width.

a) The proposed bridge with carriageway width of 8.50m with one side footpath shall be designed for 2 lanes of IRC Class A loading OR one lane of IRC Class-70R loading whichever governs.

b) IRC SV loading.

***Congestion Factor***

Congestion factors due to live loads shall be considered as per Table 7 in accordance with clause 204.4 of IRC:6-2017. The vehicular forces shall be multiplied with a relevant factor from Table 7. The congestion factor depends upon the span of the bridge. Horizontal forces due to braking / acceleration, centrifugal forces and temperature effects shall not be considered while applying congestion factor.

***Reduction Factor***

Longitudinal effects of loads shall be reduced in case of bridges having more than two lanes. The required reduction factor shall be as per table under clause 205 of IRC:6-2017. The number of lanes supported on any individual substructure and foundation shall be considered while applying the reduction factor. In case of 3 lane carriageway, the reduction factor of 10% shall be applied on longitudinal forces.

***Seismic Analysis***

As per the seismic map given in IRC: 6-2017, the project road passes through seismic zone–III.

***Soil Parameters***

Soil parameters proposed to be taken for the backfill material behind abutments and retaining walls shall generally be:

$\phi = 30^0$, $\delta = 20^0$, $\gamma_d$ =20 kN/m$^3$, $\Upsilon_{sub}$ = 10 kN/m$^3$

For the design of foundations for the bridges, soil characteristics will be reviewed on case-to-case basis, following the results obtained from actual borings to be carried out at each bridge site.

***Type of Structures***

a) **Foundations**

Depending upon hydrology of the channel, and type of founding strata available, open/Raft, pile or well foundations shall be proposed.

b) **Substructure**

| | | |
|---|---|---|
| Abutments | : | RCC Wall type |
| Piers | : | RCC Wall type or circular column type depending upon the site requirement |

c) **Superstructure**

Appropriate types of superstructure will be proposed for each location, bearing in mind the type and appearance of the proposed structures and easy and economical construction. In general, the proposal will be as follows: -

| | | |
|---|---|---|
| • Spans up to 12m length | : | Reinforced concrete solid slab. |
| • Spans ranging from 12m to 25m | : | RCC voided slab/RCC Precast girder with cast in situ deck slab |
| • Spans ranging from 25m to 30m | : | PSC voided slab |
| • Spans ranging from 25m to 45m | : | PSC Girder with cast-in-situ deck slab |
| • Spans ranging from 30m to 60m | : | PSC cast in situ Box Girder |
| • ROBs–Spans ranging from 18m to 36m | : | Steel plate girder with RCC deck slab composite type |
| • ROBs– 45 m Span | : | Bowstring type steel girder with RCC deck slab composite type |

Where considered appropriate, continuous span superstructures shall be proposed.

d) **Bearings**

Bearings shall be designed depending upon the loads, forces and type of superstructure. POT-PTFE, Spherical, Elastomeric or Tar paper bearings shall be proposed.

e) **Crash Barriers and Railings**

Crash barriers and railings shall be provided over all the bridges in accordance with the provision of IRC: 5-2015.

f) **Expansion Joints**

Single Strip seal type expansion joints or filler type joints shall be proposed depending upon the anticipated expansion / contraction and shall be provided as per provision of IRC: SP-69 - 2011.

g) **Wearing Course**

65 mm thick wearing course comprising of 40mm thick asphaltic concrete overlaid with 25mm thick mastic asphalt shall be provided as per provision of MoRT&H standards.

h) **Approach Slab**

Reinforced concrete approach slabs, 3.5m long and 300mm thick, in M30 grade concrete at either end of the bridge, will be proposed, with one end supported on the reinforced concrete bracket projecting out from the dirt wall and the other end resting over the soil, in accordance with the guidelines issued by MoRT&H. A leveling course, 15 cm thick, in M 15 grade concrete will be provided under the approach slab.

i) **Drainage Spouts**

Drainage spouts will be proposed in accordance with MoRT&H standard plans.

j) **Protection Works**

Details of protection works provided for the existing bridges will be studied and new proposals framed as per provision of IRC: 89 - 1997 taking into account the behavior and performance of the existing protection works.

### 5.4.4 Specifications for Material

**Concrete:** As the minimum grade of concrete required in design of structures considering the durability aspect of the concrete, the concrete is influenced by the condition of exposure of structure. The exposure condition of bridges in project road section shall be categorised as 'Moderate' as per definition in Table 54.1 of IRC: 112-2011. The grade of concrete for various components of the bridges shall be adopted accordingly as follows:

| | | |
|---|---|---|
| PSC Superstructure | - | M45 / M50 |
| RCC Superstructure | - | M30 / M35 |
| RCC Substructure | - | M30 / M35 |
| RCC Solid Slab | - | M30 |
| Bored cast in situ Pile | - | M35 |
| Open Foundations | - | M30 / M35 |
| RCC Box | - | M30 |
| RCC Crash Barriers | - | M40 |
| Approach Slab | - | M30 |
| Leveling Course under foundations | - | M10 |
| Leveling Course under Approach slab | - | M15 |

**Steel:**

***HYSD Reinforcement***

Thermo Mechanical Treated (TMT) / Corrosion Resistant HYSD Grade designation Fe-500D, conforming to IS: 1786 shall be used.

***Pre-stressing Steel***

(a) Cables : 19T13 or 12T13cables consisting of uncoated, stress relieved, low relaxation strands, conforming to IS: 14268, will be provided. It will avoid grouping of cables and also reduce the number of cables.

(b) Pre-stressing Stages : The number of stages of pre-stressing will be kept to the minimum, preferably not more than 2

***Structural Steel*** : Structural steel grade E250/E350 conforming to IS: 2062-2011 will be used

### 5.4.5 Repair and Rehabilitation

The defects found during inventory and condition shall be recommended for required corrective measures and repair works shall be carried out accordingly. Replacements of wearing coat, replacement of old non-functional bearings, replacement of railing with seach of the retained bridges.

## 5.5 TOLL PLAZA

The layout plan of existing toll plaza shall be reviewed based on NHAI Circular 17.5.82 dated 24th May 2021, taking into consideration the projected peak hour tollable traffic, permissible service time, adopted toll collection system and the capacity of service lanes. The number of lanes at any toll plaza would, however, be not less than four times that number of lanes for which the highway has been designed.

The design of pavement for the toll plaza shall be done taking into account the layout features and the various stresses induced by the acceleration, deceleration, braking of vehicles and the effect of possible oil spillage from stationary vehicles. The setting up, operation and administration costs for the proposed toll collection system shall be worked out.

# Chapter 6. Pavement Condition Assessment

# PAVEMENT CONDITION ASSESSMENT

## 6.1 GENERAL

Highway pavements are layered structures comprising of combination of materials to carry traffic load in given climate for a specified time interval. The pavement structure is designed in such a way that the transmitted stresses due to wheel load are sufficiently reduced, so that they will not exceed bearing capacity of the sub-grade. It should also be able to provide a surface of acceptable riding quality under all weather conditions with the highest possible degree of safety. The performance of any highway pavement is measured by two indicators, namely Functional Performance and Structural Performance. The functional performance includes aspects such as riding quality, surface distress and skid resistance. Whilst recognising these functional requirements, the pavement should also have adequate strength as a load bearing structure that is required to carry the traffic load under the prevailing environmental conditions (structural performance).

The existing pavement of the project road is Four lane divided carriageway with paved shoulder facility having flexible pavement as well as rigid pavement along the project corridor.

The existing pavement investigation includes pavement condition by Network Survey Vehicle (NSV) as well as visual means, pavement structural strength evaluation by FWD, subgrade investigation and existing pavement material investigation which includes core cutting on bituminous layers. The new pavement for main carriageway, service road and toll plaza pavement for additional lanes are also designed based on pavement and material investigation.

The data collected from the pavement investigation at site was further used for analysis. The collected data related to pavement is used for the analysis of following aspects of pavement.

- Estimation of Existing subgrade Strength by Test Pit Analysis
- Evaluation of pavement Material Properties
- Estimation of Vehicle damage factor and Design Traffic
- Analysis of Riding Quality and pavement condition in terms of Roughness and Rutting parameters
- Estimation of Pavement Condition Index (PCI) by analysing pavement distresses
- Remaining Life Analysis from FWD data
- Overlay Design of Existing Pavement and
- Future Maintenance Requirement

All these above aspects are presented in this chapter.

## 6.2 DESIGN METHODOLOGY

The scope of work as per Term of reference (TOR) related to pavement includes pavement investigation (pavement composition, pavement condition, pavement roughness and pavement structural strength survey by Falling Weight Deflectometer), subgrade characteristics and strength (DCP CBR, field and lab test), Existing

pavement materials investigation (granular layer and bituminous layer core cutting) and Pavement design (structural overlay design, functional overlay design and future maintenance requirements).

Traffic Survey is being carried out by **M/s Translink Infra** appointed by the NHAI.

The steps and methodology of pavement investigation and analysis is presented graphically as shown in **Figure 6.1** below.

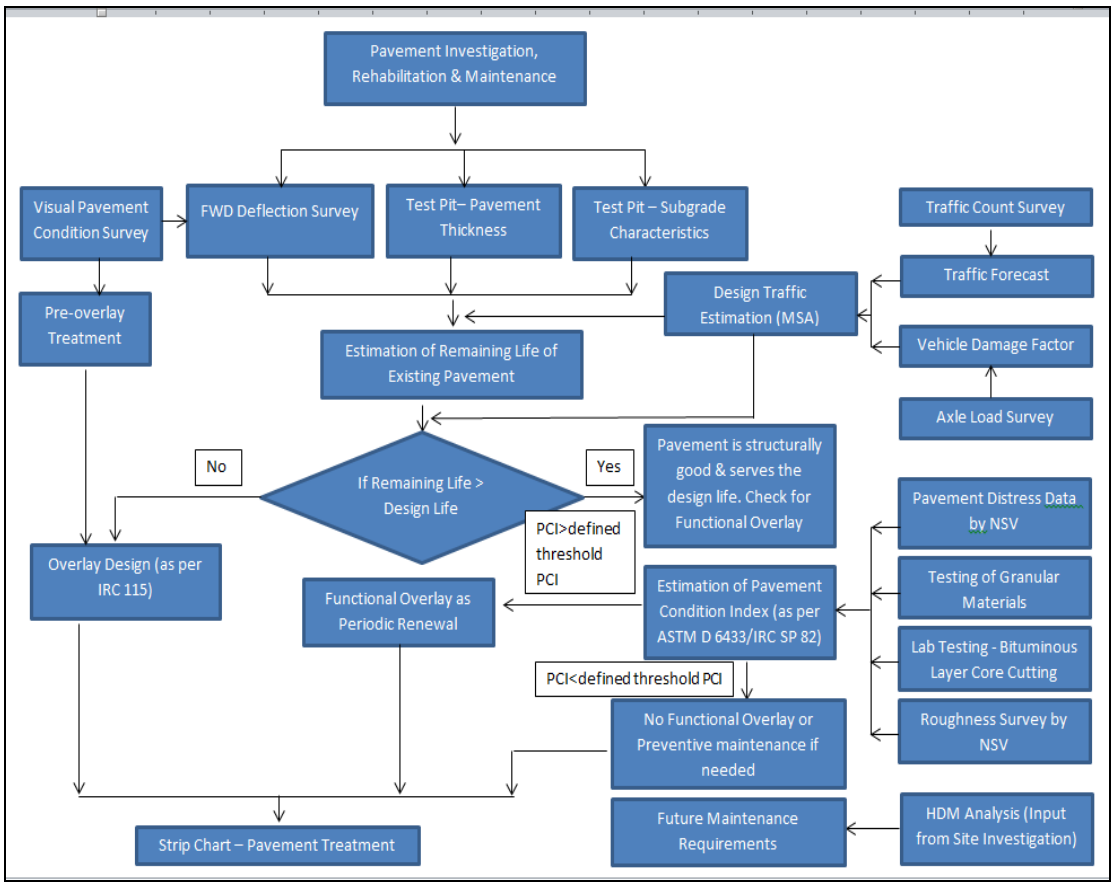



**Figure 6.1: Design Methodology**

## 6.3 ESTIMATION OF AXLE LOAD AND VEHICLE DAMAGE FACTOR

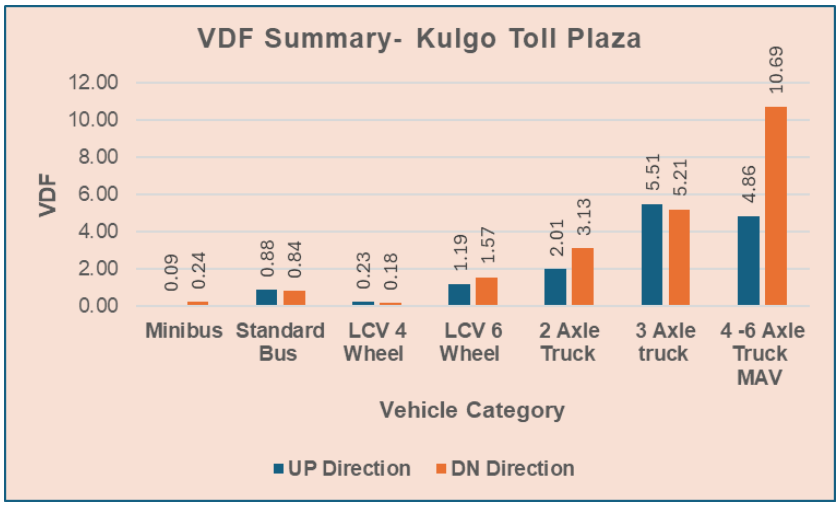
Traffic loading on highway pavements is a heterogeneous combination of different types of vehicles, carrying a wide spectrum of wheel loads. It is very much essential to convert this heterogeneous traffic to an equivalent homogenous traffic in terms of a chosen standard vehicle. One way of achieving this objective is the use of Equivalent Standard Axle Load (ESAL) factors like VDF.

The vehicle damage factor (VDF) is a multiplier to convert the number of commercial vehicles of different axle loads and axle configuration to the number of standard axle load repetitions. VDF is determined as the average value for each category of the commercial vehicle. For design purposes, the variation in axle loads is determined by converting the actual axle loads to “Equivalent Standard Axle Load (ESAL)”. An equivalency is a convenient means of indexing the wide spectrum of actual loads to one common scale or value. Axle load survey is being carried out by consultant appointed by the NHAI and VDF & MSA value given at following **Table 6.1 & table 6.2**.

VDF assumed at this stage for various categories of commercial vehicles along project road is presented below:

**Table 6.1: – Vehicle Damage Factor (VDF)**

| At Kulgo Toll Plaza | | | |
|---|---|---|---|
| **Vehicle** | **UP Direction** | **DN Direction** | **Adopted** |
| Minibus | 0.09 | 0.24 | 0.24 |
| Standard Bus | 0.88 | 0.84 | 0.88 |
| LCV 4 Wheel | 0.23 | 0.18 | 0.23 |
| LCV 6 Wheel | 1.19 | 1.57 | 1.57 |
| 2 Axle Truck | 2.01 | 3.13 | 3.13 |
| 3 Axle truck | 5.51 | 5.21 | 5.51 |
| 4 -6 Axle Truck MAV | 4.86 | 10.69 | 10.69 |
| Oversized Vehicles | 0.00 | 0.00 | 0.00 |




## 6.4 DESIGN TRAFFIC ESTIMATION

The design traffic is considered in terms of the cumulative number of standard axles in both directions of the carriageway during the design life of the road. This can be computed using the following equation:

$$N = \frac{365 \times [(1+r)^n - 1]}{r} \times A \times D \times F$$

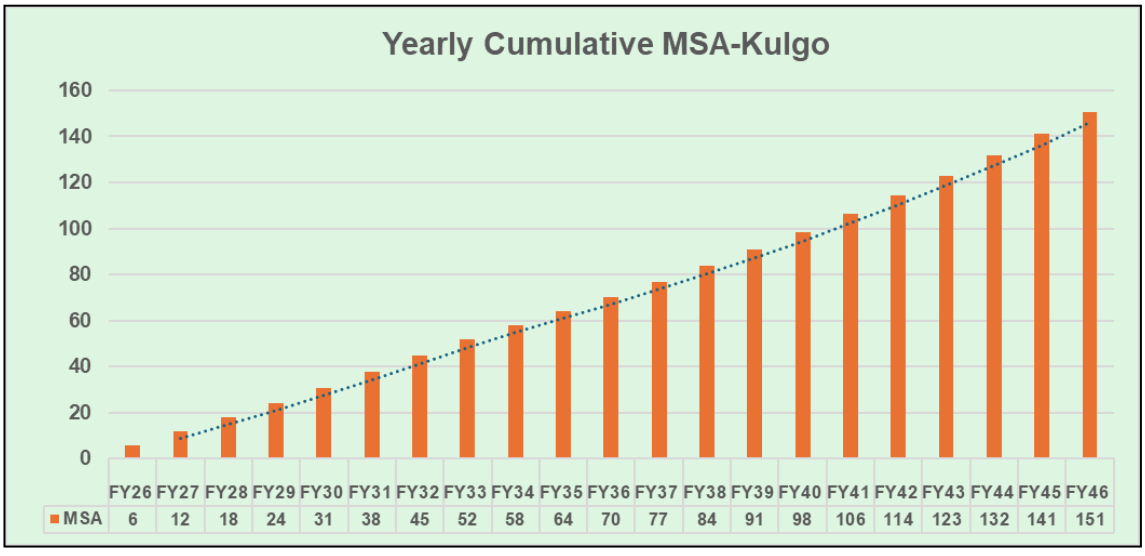
where N is the cumulative number of standard axles to be catered for the design in terms of Million Standards Axle (MSA), A is the initial traffic in terms of the number of commercial vehicles per day, D is the lane distribution factors, F is the vehicle damage factor, n is the design life in years, and r is the annual growth rate of commercial vehicles (considered minimum 5 %).

Lane distribution factor considered for calculating design traffic, is 0.60 of the commercial vehicles in each direction (dual three lane carriageway) as per IRC 37-2018.

The project road is considered as one homogeneous section based on traffic characteristics. The estimated yearly design traffic considering the traffic (Survey carried out by consultant appointed by the NHAI) and MSA is presented in Table 6.2 below:

**Table 6.2: – Estimated Yearly Traffic**

| At Kulgo Toll Plaza | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Financial Year** | **Minibus** | **Standard Bus** | **LCV-4** | **LCV-6** | **2A** | **3A** | **4 -6 Axle Truck MAV** | **OSV** | **Yearly Design ESA** | **MSA** | **Design Period** |
| **VDF** | ***0.24*** | ***0.88*** | ***0.23*** | ***1.57*** | ***3.13*** | ***5.51*** | ***10.69*** | ***0.00*** | | | |
| FY26 | 26 | 342 | 364 | 684 | 544 | 876 | 4135 | 3 | 5,779,734 | **6** | ***0*** |
| FY27 | 29 | 351 | 399 | 726 | 577 | 884 | 4255 | 3 | 5,947,335 | **12** | ***1*** |
| FY28 | 31 | 361 | 426 | 762 | 606 | 881 | 4376 | 3 | 6,122,831 | **18** | ***2*** |
| FY29 | 32 | 369 | 448 | 797 | 633 | 874 | 4533 | 3 | 6,305,056 | **24** | ***3*** |
| FY30 | 34 | 374 | 466 | 837 | 665 | 873 | 4728 | 3 | 6,554,336 | **31** | ***4*** |
| FY31 | 35 | 384 | 483 | 877 | 697 | 872 | 4914 | 4 | 6,793,580 | **38** | ***5*** |
| FY32 | 36 | 393 | 501 | 920 | 731 | 871 | 5113 | 4 | 7,068,386 | **45** | ***6*** |
| FY33 | 36 | 404 | 503 | 907 | 720 | 812 | 5132 | 4 | 7,029,897 | **52** | ***7*** |
| FY34 | 35 | 414 | 479 | 788 | 626 | 653 | 4682 | 4 | 6,348,046 | **58** | ***8*** |
| FY35 | 34 | 424 | 469 | 722 | 574 | 557 | 4450 | 4 | 5,985,698 | **64** | ***9*** |
| FY36 | 36 | 432 | 491 | 758 | 602 | 559 | 4665 | 5 | 6,276,878 | **70** | ***10*** |
| FY37 | 37 | 437 | 508 | 796 | 633 | 562 | 4897 | 5 | 6,553,916 | **77** | ***11*** |
| FY38 | 38 | 447 | 525 | 837 | 664 | 566 | 5136 | 5 | 6,858,330 | **84** | ***12*** |
| FY39 | 39 | 456 | 546 | 877 | 696 | 569 | 5383 | 5 | 7,172,498 | **91** | ***13*** |
| FY40 | 41 | 467 | 564 | 919 | 730 | 573 | 5649 | 6 | 7,530,802 | **98** | ***14*** |
| FY41 | 42 | 477 | 584 | 962 | 764 | 576 | 5906 | 6 | 7,837,468 | **106** | ***15*** |
| FY42 | 44 | 487 | 607 | 1008 | 800 | 580 | 6182 | 6 | 8,188,159 | **114** | ***16*** |
| FY43 | 45 | 495 | 625 | 1052 | 836 | 583 | 6456 | 6 | 8,535,741 | **123** | ***17*** |
| FY44 | 47 | 500 | 644 | 1100 | 874 | 587 | 6749 | 7 | 8,931,511 | **132** | ***18*** |
| FY45 | 48 | 510 | 663 | 1149 | 913 | 590 | 7052 | 7 | 9,292,363 | **141** | ***19*** |
| FY46 | 49 | 520 | 683 | 1202 | 955 | 595 | 7374 | 7 | 9,700,619 | **151** | ***20*** |




## 6.5 TESTING SCHEDULE

For evaluating the existing pavement and the characteristics of existing subgrade soils, field and laboratory investigations are carried out which are shown in **Table 6.3**. Reconnaissance survey of the existing pavement condition was conducted prior to commencement of investigation work. As per requirements in ToR and Reconnaissance survey, the frequency of testing was adopted.

**Table 6-3: Pavement and Subgrade Investigation Testing Schedule**

| Sl. No. | Investigation | Frequency | Field Testing | Laboratory Testing Criteria | |
|---|---|---|---|---|---|
| | | | | Description of Test/Findings | Standard Code Applicable |
| i) | Existing Subgrade - Small test Pit of Size 0.6mX0.6m | @ 0.5 Km | Pavement Thickness & Composition | Soil Classification | IS 1498 |
| | | | Field DCP Test | Sieve Analysis | IS 2720 (Part – 4) |
| | | | | Atterberg Limits | IS 2720 (Part – 5) |
| | | | In-situ Density | Laboratory Compaction Test (Modified Proctor Test) | IS 2720 (Part – 8) |
| | | | Moisture Content | 4-days soaked and un-soaked CBR at 3 energy levels corresponding to 10, 35 & 65 blows | IS 2720 (Part – 16) |
| | | | | Free Swell Index | IS 2720 (Part – 40) |
| ii) | Core Cutting | @ 5.0 Km | | Thickness of core | |
| | | | | Percent of bitumen used in bituminous layer | |

## 6.6 DESIGN TRAFFIC ESTIMATION

The following IRC/internationals codes/guidelines/publications have been referred and used for pavement design and analysis.

- IRC: 37 – 2018, “Guidelines for the Design of Flexible Pavements, 4th Revision”.
- IRC: 115 – 2014, “Guidelines for Structural evaluation and strengthening of Flexible Road pavements using Falling Weight Deflectometer (FWD) Technique”.
- IRC: 82-2023, “Code of Practice for Maintenance of Bituminous Road Surfaces, 2nd Revision.
- ASTM D 6433-07, “Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys”

## 6.7 PAVEMENT AND EXISTING SUBGARDE INVESTIGATION

### 6.7.1 Pavement Condition Survey

Detailed pavement condition survey was carried out in August 2025 by Network Survey Vehicle (NSV) by capturing pavement distresses through its digital imagining system. The distresses on the roads were identified and captured in a virtual environment through viewing of stereo-pair high resolution images. The images of the pavement captured are used to identify sample units (10 m section) and the type and severity of pavement distress is assessed by visualizing the processed digital image in the feature extraction software and then marking the distresses in the sample unit.

Detailed visual pavement condition is also carried out by the Senior Pavement Engineer of the Consultants separately, in order to have more clear understanding of the pavement condition with respect to adjoining areas and also have finer analysis of existing pavement which is not possible to be apprehended by NSV image analysis

such as narrow cracks (width<3mm) and texture of pavement surface. Moreover, the exact condition of earthen shoulder, embankment and drainage condition is also picked up during visual pavement condition which is not taken up by NSV. The frequency of the FWD testing was also decided based on visual pavement condition.

The objective of the pavement condition (NSV and Visual) was to identify distresses and sections with similar characteristics. All distresses were systematically recorded and quantified for the purpose of determining Pavement condition index (PCI) and mode of rehabilitation and maintenance. The survey covers following conditions.

- Pavement condition (surface distress type)
- Shoulder condition
- Embankment condition

The details of pavement condition survey taken from NSV survey and from visual condition survey. The photographs of condition of existing pavement are shown in **Figure 6.2**. The summary of pavement (as good, fair and poor) of main carriageway is shown in **Table 6.4**.

The project road is having Flexible as well as Rigid Pavement along the length of project road. The location wise type of pavement is presented below in **Table 6.4**

**Table 6-4: Summary of Pavement Condition**

| S. No. | Existing Kilometre (Km) LHS | | Pavement Type LHS | Existing Kilometre (Km) RHS | | Pavement Type RHS |
|---|---|---|---|---|---|---|
| | From | To | | From | To | |
| 1 | 320+810 | 400+632 | Flexible | 320+810 | 400+632 | Flexible |

From the above summary, both side of carriageway 100% flexible pavement except toll plaza having rigid pavement. The condition of the Flexible pavement part of project road is fair to good throughout the section in LHS side and on RHS side. The flushing/bleeding is observed very few location at the project road on both LHS and RHS of main carriageway.

The details of pavement condition survey taken from NSV and visual condition survey. The photographs showing existing condition of existing pavement are shown in **Figure 6.2**.

There is no major problem noticed during the visual pavement condition of embankment and earthen shoulder condition at flexible pavement. At Rigid pavement section of service road/Slip Road is affected by cracks, and potholes throughout the section. Major portion of project road is having embankment which is in fair condition.

There are service roads to give access to public along the project road. The condition of the service road is fair to good with distresses such as minor cracking, ravelling, and bleeding is noticed. The main problem in the service road is having unauthorised access, poor maintenance shoulder and embankment as it has found to be broken at many places along the service road.



*Fair Condition at Project Road*



*Fair Condition at Project Road*



*Rutting & Distresses at Project Road*



*Rutting & Distresses at Project Road*

**Figure 6.2: Pavement Conditions Photos**

### 6.7.2 Pavement Composition Survey

Pavement Composition is determined from test pits investigations which are excavated along the project corridor at every 0.50 Km in staggered manner on either side of the project roads. It has been observed from the investigation that the existing pavement is flexible and the composition of layer predominantly consists of bituminous layers laid over granular base/granular subbase in flexible pavement. Typical photographs of test pits shown in **Figure 6.3**.




*KM 386+100 LHS*




*KM 380+500 RHS*

**Figure 6.3: Trial Pit Photographs**

After excavation up to subgrade, the thickness of each identified layer was measured with a measuring tape, at three different locations on the pit and the average of the three is noted as thickness of the layer. The existing pavement thicknesses for flexible pavement as measured in the test pits are shown for both LHS and RHS of carriageway separately in **Figure 6.4a** to **Figure 6.4d.**

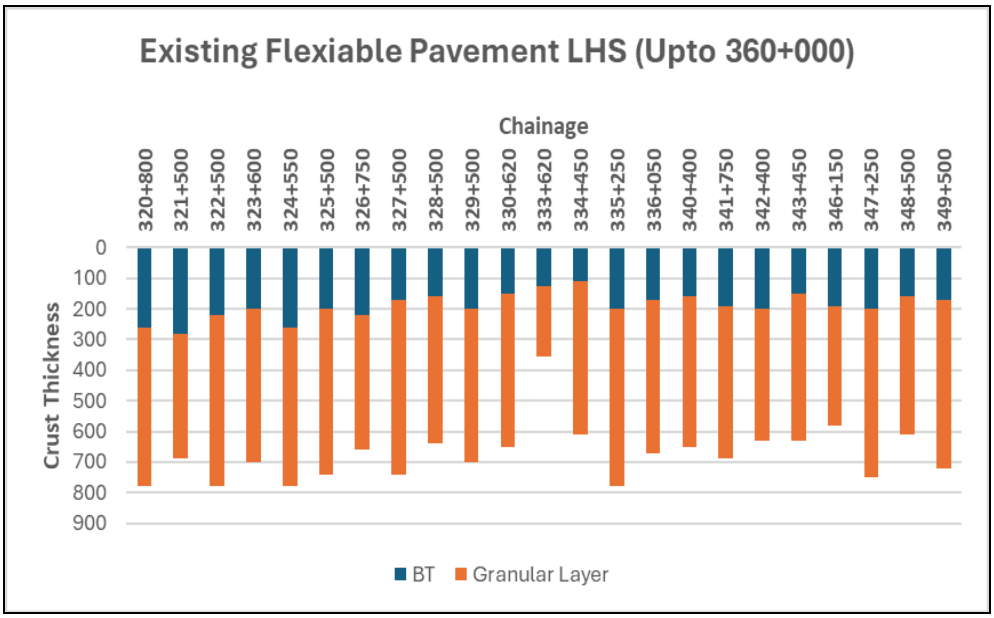



**Figure 6.4a: Crust Composition of Existing Flexible Pavement**

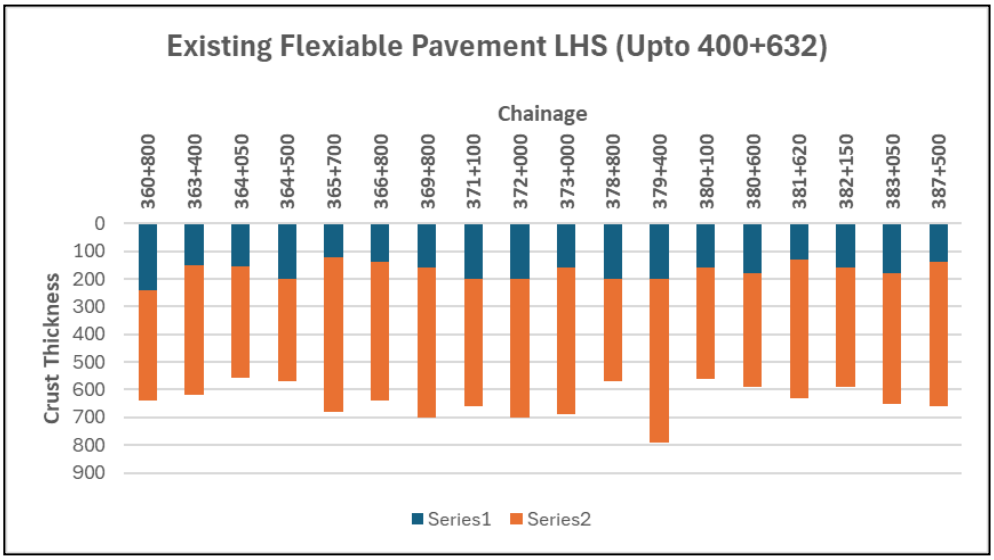



**Figure 6.4b: Crust Composition of Existing Flexible Pavement**

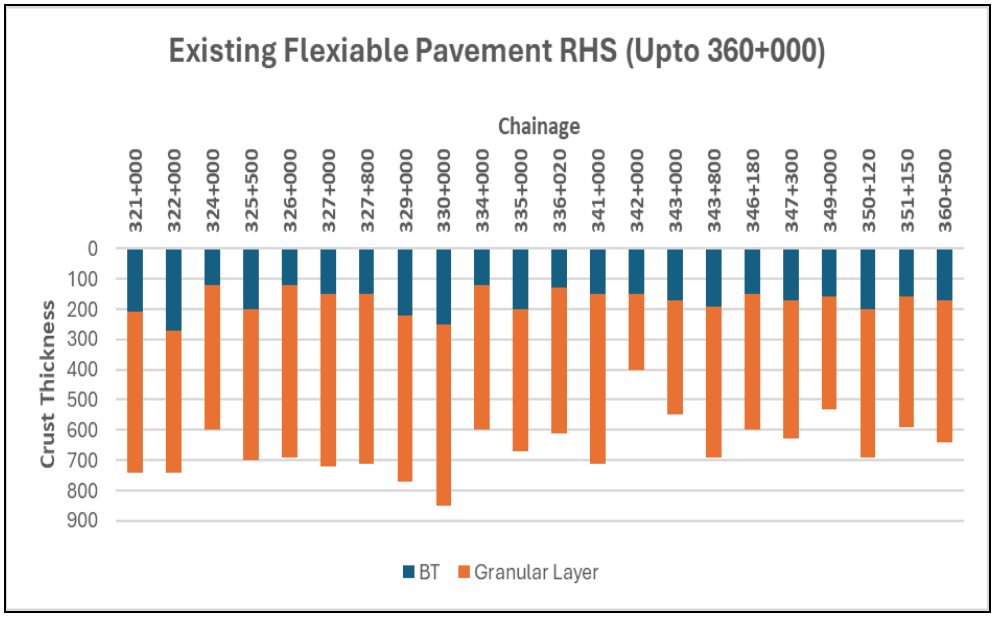



**Figure 6.4c: Crust Composition of Existing Flexible Pavement**

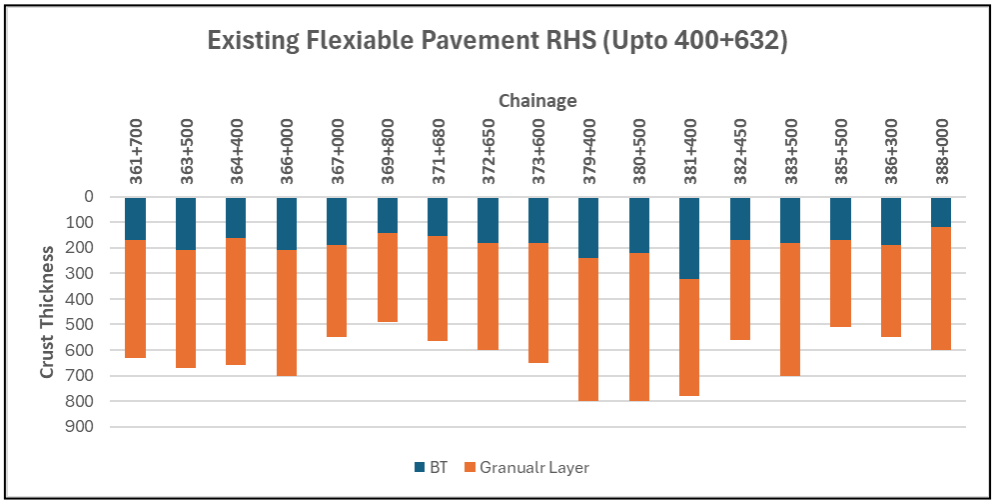



**Figure 6.4d: Crust Composition of Existing Flexible Pavement**

It has been observed from the test pit investigation that the existing flexible pavement structure consisted of bituminous layer, generally having thickness in the range of 230-600 mm. Both LHS and RHS of Main carriageway have almost similar pavement composition and layer thickness. The minimum, maximum and average thickness of the existing pavement (LHS & RHS) is shown in Table 6.5.

**Table 6-5: Pavement Composition Summary for Flexible Pavement**

| | BT | WMM + GSB (Granular Layer | Total Crust |
|---|---|---|---|
| **Average** | 180 | 473 | 652 |
| **Minimum** | 110 | 230 | 335 |
| **Maximum** | 320 | 600 | 850 |

GSB – Granular Subbase, WMM – Wet Mix Macadam

### 6.7.3 Existing Subgrade Investigation

The Subgrade investigations were carried out to know the strength properties of the existing soil. Visual inspection of the existing pavement condition was carried out prior to commencement of sub-grade investigation work. The general testing scheme of existing road will indicate testing of at least three subgrade soil samples for each homogeneous road segment or three samples for each soil type encountered, whichever is more. It was ensured to dig subgrade strength test pits at every 0.5 km (or) less on the project alignment, even though same soil strata encountered on lengthy homogeneous sections, while collecting samples. The various in-situ tests conducted, and laboratory tests included in the testing program on soil samples along the alignment as per the project requirements are summarized in Table 6.3 above. Details on the tests conducted and results obtained are presented in the following sections.

### I. Laboratory Tests:

Various laboratory tests were conducted on existing subgrade soil sample as mentioned in **Table 6.3.** About 40 Kg of soil sample was collected in a bag from each test pit. Proper identification mark and location of the sample was recorded and sent to the laboratory for testing. As per requirements mentioned in ToR, the consultants have collected samples at 0.5 km interval and laboratory testing was conducted which includes soil classification, Atterberg limit, Soaked CBR. The results obtained adequately represent the entire project road.

The summary of subgrade soil samples is presented in **Table 6.6** which shows the general and broad characteristics of subgrade Soil.

**Table 6-6: Summary of existing Subgrade Soil**

| Soil Properties | Value |
|---|---|
| Range of LL | 21.90- 24.80 |
| Range of PI | - |
| OMC (%) | 9.10-13.00 |
| MDD (gm/cc) | 1.94 - 2.09 |
| Range of 4-days Soaked CBR (97% Compaction) (%) | 12.50 - 17.50 |
| Range of Un-Soaked CBR (%) | - |

The composition of representative existing subgrade material along the project road is presented in **Figure 6.6** below:

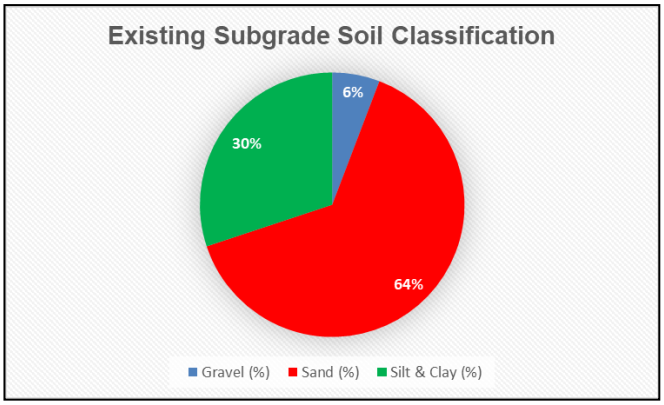



**Figure 6.6: Soil Classifications of Subgrade Soil**

Along the project road section, the existing subgrade soil is predominately comprising of Sandy soil of about 64.10 % and Silt and Clay is nearly about 30.10 % Gravel 5.80 % Gravel soil which is mainly found along the project corridor.

4-days Soaked CBR (at 97% Compaction) is varying in the range of 12.50% and 17.50 % with around 70% sample having CBR between 15-16 %.

### I. Comparison and Analysis of Field and Laboratory Tests:

### (a) Dry Density and Moisture Content

A comparison of OMC v/s FMC is included in **Table 6.7**. Graphical comparisons of OMC v/s FMC are shown in **Figure 6.7**

**Table 6-7: Summary of Test Results of Existing Subgrade Soil**

| Value | MDD (gm/cc) | OMC (%) |
|---|---|---|
| Maximum | 2.09 | 12.70 |
| Minimum | 1.95 | 9.10 |
| Average | 2.03 | 10.50 |

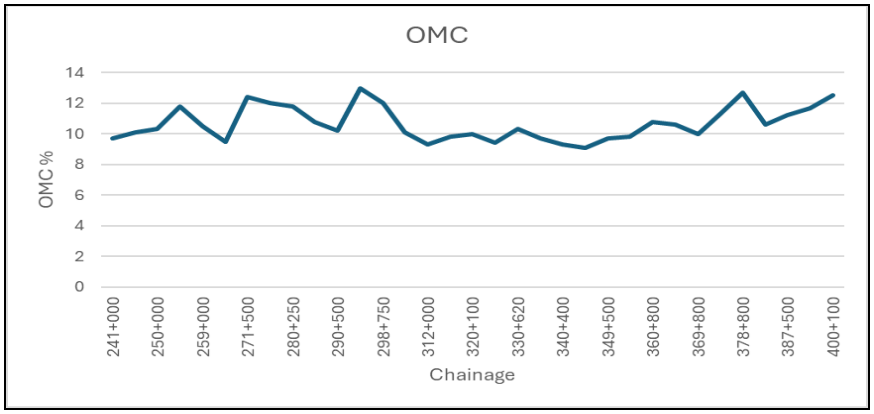



**Figure 6.7: Optimum Moisture content**

### (b) California Bearing Ratio

The CBR values of existing Subgrade Laboratory Test is analysed. The graphical comparisons of Laboratory CBR (97% compaction) along the project corridor is presented in **Figure 6.8.**

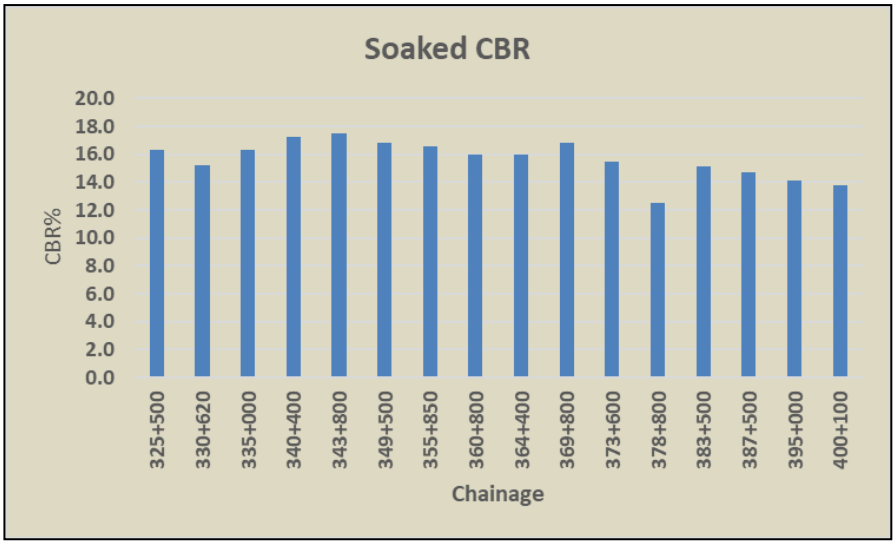



**Figure 6.8: Existing Subgrade CBR**

Laboratory soaked CBR (97% Compaction) is found varying between 9.30% and 16.00%. The details report of existing subgrade material is presented in **Table 6.8.**

### 6.7.4 Existing Pavement material Investigation

#### (i) Granular Base and Subbase Material

Total Sixteen (16) samples of granular material from existing pavement at an interval of about 5 km were collected. At the time of test pit investigation, it was observed that it is not possible to demarcate WMM and GSB separately in test pit as the material is get mixed at shoulder edge. The photos of test pit are shown in **Figure 6.9** for reference.




**Figure 6.9: Test Pit Photographs**

Thus, the samples were collected considering as granular materials and the laboratory test as mentioned in Table 6.3 was conducted and the test results are shown in **Table 6.8**.

**Table 6-8: Summary of Subgrade Test Results**

| S. No. | Location | Side | Grain Size Analysis | | | Atterberg's Limit | | | OMC | MDD | Soaked | N.M.C (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Gravel (%) | Sand (%) | Silt & Clay (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % | gm/cc | CBR % | |
| 1 | 325+500 | RHS | 7.3 | 57.3 | 35.4 | 24.5 | N.P | N.P | 9.40 | 2.07 | 16.3 | 6.3 |
| 2 | 330+620 | LHS | 5.5 | 59.0 | 35.5 | 24.3 | N.P | N.P | 10.3 | 2.03 | 15.2 | 6.1 |
| 3 | 335+000 | RHS | 6.9 | 62.5 | 30.6 | 23.6 | N.P | N.P | 9.70 | 2.06 | 16.3 | 6.0 |
| 4 | 340+400 | LHS | 8.3 | 55.1 | 36.6 | 24.5 | N.P | N.P | 9.30 | 2.09 | 17.2 | 6.8 |
| 5 | 343+800 | RHS | 8.8 | 56.9 | 34.3 | 24.1 | N.P | N.P | 9.10 | 2.09 | 17.5 | 7.1 |
| 6 | 349+500 | LHS | 7.2 | 61.8 | 31.0 | 23.8 | N.P | N.P | 9.70 | 2.07 | 16.8 | 5.5 |
| 7 | 355+850 | RHS | 7.4 | 60.3 | 32.3 | 23.8 | N.P | N.P | 9.80 | 2.05 | 16.6 | 5.9 |
| 8 | 360+800 | LHS | 6.1 | 57.0 | 36.9 | 24.8 | N.P | N.P | 10.8 | 2.02 | 16.0 | 6.6 |
| 9 | 364+400 | RHS | 6.5 | 58.9 | 34.6 | 24.4 | N.P | N.P | 10.6 | 2.01 | 16.0 | 6.6 |
| 10 | 369+800 | LHS | 7.7 | 62.0 | 30.3 | 23.5 | N.P | N.P | 10.0 | 2.06 | 16.8 | 6.0 |
| 11 | 373+600 | RHS | 5.3 | 66.6 | 28.1 | 22.9 | N.P | N.P | 11.3 | 2.00 | 15.5 | 6.8 |
| 12 | 378+800 | LHS | 2.9 | 64.3 | 32.8 | 23.6 | N.P | N.P | 12.7 | 1.95 | 12.5 | 7.2 |
| 13 | 383+500 | RHS | 5.0 | 70.7 | 24.3 | 22.2 | N.P | N.P | 10.6 | 2.02 | 15.1 | 7.0 |
| 14 | 387+500 | LHS | 4.6 | 67.3 | 28.1 | 23.0 | N.P | N.P | 11.2 | 2.01 | 14.7 | 6.3 |
| 15 | 395+000 | RHS | 4.1 | 63.2 | 28.7 | 23.4 | N.P | N.P | 11.7 | 2.00 | 14.1 | 6.1 |
| 16 | 400+100 | LHS | 3.2 | 64.4 | 32.3 | 24.1 | N.P | N.P | 12.5 | 1.98 | 13.8 | 5.8 |

Existing base and subbase layers' samples were collected at a regular interval of not more than 5 km along the Project Stretch. Care has taken to collect the appropriate granular layer like DLC/ WMM/GSB/ CTSB separately from the excavated test pit. The thickness of existing Granular layer is presented in **Table 6.9** as below:

**Table 6-9: Existing Crust Thickness**

| Sr. No. | Chainage | Side | BT (mm) | Granular (mm) | Total thickness (mm) |
|---|---|---|---|---|---|
| 1 | 320+800 | LHS | 260 | 520 | 780 |
| 2 | 321+000 | RHS | 210 | 530 | 740 |
| 3 | 321+500 | LHS | 280 | 410 | 690 |
| 4 | 322+000 | RHS | 270 | 470 | 740 |
| 5 | 322+500 | LHS | 220 | 560 | 780 |
| 6 | 323+600 | LHS | 200 | 500 | 700 |
| 7 | 324+000 | RHS | 120 | 480 | 600 |
| 8 | 324+550 | LHS | 260 | 520 | 780 |
| 9 | 325+500 | RHS | 200 | 500 | 700 |
| 10 | 325+500 | LHS | 200 | 540 | 740 |
| 11 | 326+000 | RHS | 120 | 570 | 690 |
| 12 | 326+750 | LHS | 220 | 440 | 660 |
| 13 | 327+000 | RHS | 150 | 570 | 720 |
| 14 | 327+500 | LHS | 170 | 570 | 740 |
| 15 | 327+800 | RHS | 150 | 560 | 710 |
| 16 | 328+500 | LHS | 160 | 480 | 640 |
| 17 | 329+000 | RHS | 220 | 550 | 770 |
| 18 | 329+500 | LHS | 200 | 500 | 700 |
| 19 | 330+000 | RHS | 250 | 600 | 850 |
| 20 | 330+620 | LHS | 150 | 500 | 650 |
| 21 | 333+620 | LHS | 125 | 230 | 355 |
| 22 | 334+000 | RHS | 120 | 480 | 600 |
| 23 | 334+450 | LHS | 110 | 500 | 610 |
| 24 | 335+000 | RHS | 200 | 470 | 670 |
| 25 | 335+250 | LHS | 200 | 580 | 780 |
| 26 | 336+020 | RHS | 130 | 480 | 610 |
| 27 | 336+050 | LHS | 170 | 500 | 670 |
| 28 | 340+400 | LHS | 160 | 490 | 650 |
| 29 | 341+000 | RHS | 150 | 560 | 710 |
| 30 | 341+750 | LHS | 190 | 500 | 690 |
| 31 | 342+000 | RHS | 150 | 250 | 400 |
| 32 | 342+400 | LHS | 200 | 430 | 630 |
| 33 | 343+000 | RHS | 170 | 380 | 550 |
| 34 | 343+450 | LHS | 150 | 480 | 630 |
| 35 | 343+800 | RHS | 190 | 500 | 690 |
| 36 | 346+150 | LHS | 190 | 390 | 580 |
| 37 | 346+180 | RHS | 150 | 450 | 600 |
| 38 | 347+250 | LHS | 200 | 550 | 750 |
| 39 | 347+300 | RHS | 170 | 460 | 530 |
| 40 | 348+500 | LHS | 160 | 450 | 610 |
| 41 | 349+000 | RHS | 160 | 370 | 530 |
| 42 | 349+500 | LHS | 170 | 550 | 720 |
| 43 | 350+120 | RHS | 200 | 490 | 690 |
| 44 | 351+150 | RHS | 160 | 430 | 590 |
| 45 | 360+500 | RHS | 170 | 470 | 640 |
| 46 | 360+800 | LHS | 240 | 400 | 640 |
| 47 | 361+700 | RHS | 170 | 460 | 630 |
| 48 | 363+400 | LHS | 150 | 470 | 620 |
| 49 | 363+500 | RHS | 210 | 460 | 670 |
| 50 | 364+050 | LHS | 155 | 400 | 555 |

| Sr. No. | Chainage | Side | BT (mm) | Granular (mm) | Total thickness (mm) |
|---|---|---|---|---|---|
| 51 | 364+400 | RHS | 160 | 500 | 660 |
| 52 | 364+500 | LHS | 200 | 370 | 570 |
| 53 | 365+700 | LHS | 120 | 560 | 680 |
| 54 | 366+000 | RHS | 210 | 490 | 700 |
| 55 | 366+800 | LHS | 140 | 500 | 640 |
| 56 | 367+000 | RHS | 190 | 360 | 550 |
| 57 | 369+800 | RHS | 140 | 350 | 490 |
| 58 | 369+800 | LHS | 160 | 540 | 700 |
| 59 | 371+100 | LHS | 200 | 460 | 660 |
| 60 | 371+680 | RHS | 155 | 410 | 565 |
| 61 | 372+000 | LHS | 200 | 500 | 700 |
| 62 | 372+650 | RHS | 180 | 420 | 600 |
| 63 | 373+000 | LHS | 160 | 530 | 690 |
| 64 | 373+600 | RHS | 180 | 470 | 650 |
| 65 | 378+800 | LHS | 200 | 370 | 570 |
| 66 | 379+400 | LHS | 200 | 590 | 790 |
| 67 | 379+400 | RHS | 240 | 560 | 800 |
| 68 | 380+100 | LHS | 160 | 400 | 560 |
| 69 | 380+500 | RHS | 220 | 580 | 800 |
| 70 | 380+600 | LHS | 180 | 410 | 590 |
| 71 | 381+400 | RHS | 320 | 460 | 780 |
| 72 | 381+620 | LHS | 130 | 500 | 630 |
| 73 | 382+450 | RHS | 170 | 390 | 560 |
| 74 | 382+150 | LHS | 160 | 430 | 590 |
| 75 | 383+050 | LHS | 180 | 470 | 650 |
| 76 | 383+500 | RHS | 180 | 520 | 700 |
| 77 | 385+500 | RHS | 170 | 340 | 510 |
| 78 | 386+300 | RHS | 190 | 360 | 550 |
| 79 | 387+500 | LHS | 140 | 520 | 660 |
| 80 | 388+000 | RHS | 120 | 480 | 600 |

WMM – Wet Mix Macadam, GSB – Granular Subbase

### 6.7.5 Existing Bituminous Layer/ PQC Testing

**(I) Bituminous Layer Materials-Core Cutting**

Bituminous layers' / PQC layer thickness measured during test pits for collection of subgrade material test and also by using core cutting drilling machine to obtain the bituminous / rigid pavement core specimens as shown in **Figure 6-10**.













**Figure 6.10: Core Cutting Photographs**

Consultants have carried out core cutting of rigid pavement and bituminous layers in order to carry out various test.

- **Flexible Pavement**: Binder Content and Density of Bituminous layers and the extent/depth of cracking if any in the layer.

The details of all bituminous specimens are mentioned in **Table 6.10**.

**Table 6-10: Bituminous Layer**

| Sr. No. | Chainage | Side | Height of Core (mm) | Remarks |
|---|---|---|---|---|
| | | | BT | |
| 1 | 325+000 | RHS | 170 | Flexible Pavement |
| 2 | 330+000 | LHS | 180 | Flexible Pavement |
| 3 | 335+000 | RHS | 200 | Flexible Pavement |
| 4 | 340+650 | LHS | 150 | Flexible Pavement |
| 5 | 345+400 | RHS | 180 | Flexible Pavement |
| 6 | 349+950 | LHS | 160 | Flexible Pavement |

| Sr. No. | Chainage | Side | Height of Core (mm) | Remarks |
|---|---|---|---|---|
| | | | BT | |
| 7 | 355+850 | RHS | 180 | Flexible Pavement |
| 8 | 360+340 | LHS | 190 | Flexible Pavement |
| 9 | 365+250 | RHS | 160 | Flexible Pavement |
| 10 | 369+900 | LHS | 180 | Flexible Pavement |
| 11 | 375+600 | RHS | 170 | Flexible Pavement |
| 12 | 380+600 | LHS | 150 | Flexible Pavement |
| 13 | 385+400 | RHS | 150 | Flexible Pavement |
| 14 | 389+700 | LHS | 180 | Flexible Pavement |
| 15 | 395+000 | RHS | 170 | Flexible Pavement |
| 16 | 400+100 | LHS | 190 | Flexible Pavement |

Laboratory tests were conducted on collected bituminous pavement samples. The test result for Flexible Pavement is presented in **Table 6.11**.

**Table 6-11: Core Cutting Test Results of Bituminous Layer**

| Sl. No | Chainage | Side | Bulk Density g/cc | Bitumen Content (%) |
|---|---|---|---|---|
| 1 | 325+000 | RHS | 2.57 | 4.78 |
| 2 | 330+000 | LHS | 2.56 | 4.92 |
| 3 | 335+000 | RHS | 2.54 | 5.12 |
| 4 | 340+650 | LHS | 2.58 | 5.20 |
| 5 | 345+400 | RHS | 2.59 | 5.00 |
| 6 | 349+950 | LHS | 2.65 | 4.60 |
| 7 | 355+850 | RHS | 2.66 | 4.66 |
| 8 | 360+340 | LHS | 2.61 | 4.41 |
| 9 | 365+250 | RHS | 2.63 | 4.32 |
| 10 | 369+900 | LHS | 2.60 | 4.20 |
| 11 | 375+600 | RHS | 2.54 | 4.70 |
| 12 | 380+600 | LHS | 2.55 | 4.80 |
| 13 | 385+400 | RHS | 2.50 | 5.00 |
| 14 | 389+700 | LHS | 2.58 | 5.10 |
| 15 | 395+000 | RHS | 2.61 | 5.05 |
| 16 | 400+100 | LHS | 2.63 | 5.15 |

From the above table, it has been observed that the binder content of the bituminous layer varies in the range of 4.20 % to 5.20 % with average value of 4.81%. The percentage of binder content is combined value of DBM and BC binder content.

### 6.7.6 Pavement Structural Strength by Falling Weight Deflectometer (FWD)- Flexible Pavement

#### (a) General Description of FWD Test

Falling Weight Deflectometer (FWD) test was carried out on Project Road in the months of August 2025. The objective was to evaluate the structural strength of existing flexible pavement in terms of deflections.

In FWD test, an impulsive load is applied on the road surface. The magnitude of the load, duration and area of loading is so adjusted that it corresponds to the effect of loading due to standard axle on an in-service pavement. The instantaneous deflections of the road surface are measured by geophones which are located at a number of points at different distances radially outward from the center of the falling weight. Thus, the shape of deflection bowl is obtained. Information on structural health condition can be extracted from the analysis (by back calculation) of FWD data. The spacing or frequency between tests points is as per IRC: 115-2014.

A trailer mounted falling weight deflectometer of Pave test UK make FWD machine with seven Geophones has been used for this project. A pre-determined offset has been kept between the sensors/ geophones to determine the deflection bowl at the test point. The locations of the sensors from loading point are given in the **Table 6.12**.

**Table 6-12: Distribution of Geophones**

| Deflection Sensor | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|---|---|---|---|---|---|---|---|
| **Offset, mm** | 0 | 200 | 300 | 450 | 600 | 900 | 1500 |

The Component of FWD are:

- Load cells to measure the applied load
- Loading plate of dia. 300mm
- Rubber pad of 5mm thick glued to the bottom of loading plate for uniform distribution of load
- Falling mass in the range of 50kg to 350kg is dropped from a height of fall in the range of 100 to 600mm
- Data Acquisition system

Representative photographs showing FWD survey being conducted at project site are shown in **Figure 6.11.**







**Figure 6.11: FWD conducted at Project Site**

### (b) Analysis of FWD Data

The FWD data collected from different drops at each point consist of peak load and peak deflection at different radial locations. Average values of load and deflections

were calculated from the drop test data collected at test locations. The deflections were normalized to correspond to a standard load of 40 kN. In addition to deflection values measured at site by FWD, the following data are required as input to KGP Back software for calculation of elastic modulus of pavement layers.

- Thickness of existing bituminous layer and granular crust.
- Field CBR / Modulus of existing subgrade.

Above information has been obtained by conducting pavement composition survey discussed earlier in this chapter. The data thus obtained had been used as an input to back analysis software (KGP- Back). Range of moduli values (termed as seed value) of existing pavement layers are further required as input to KGPBACK software to improve the accuracy of back-calculated moduli and also to shorten computation time. Layer moduli values adopted as per IRC: 115-2014.

**(d) Back-Calculated Elastic Modulus of Pavement Layers**

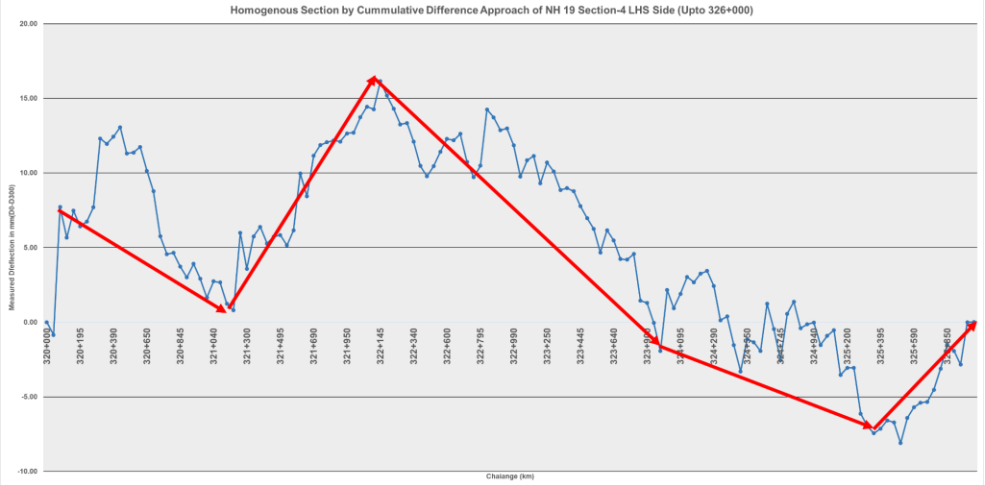
The collected FWD data has been analyzed to determine the elastic modulus of existing pavement layers. The back calculation was carried out using KGPBACK software, a product developed by IIT Kharagpur.

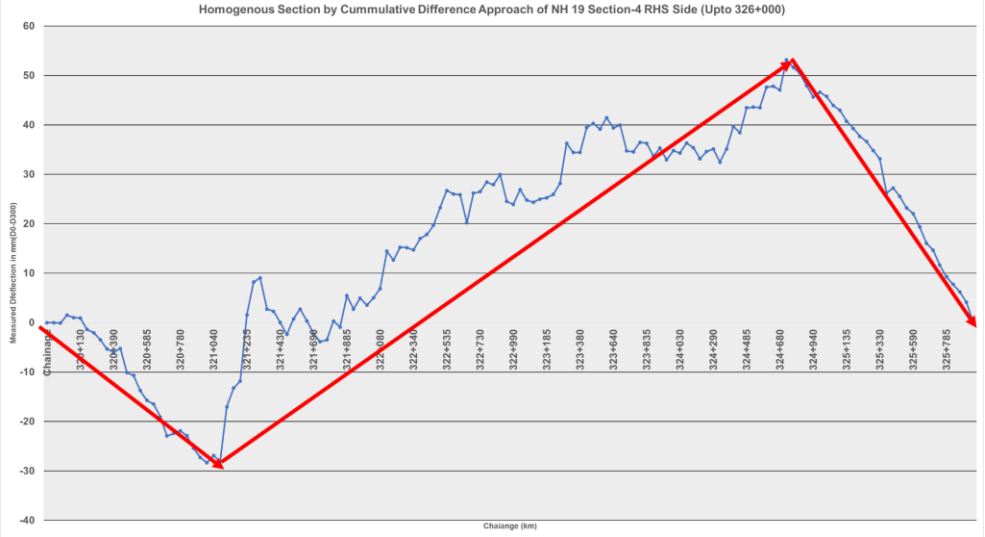
### 6.7.7 Deflection Characteristics and Estimation of Homogenous Section

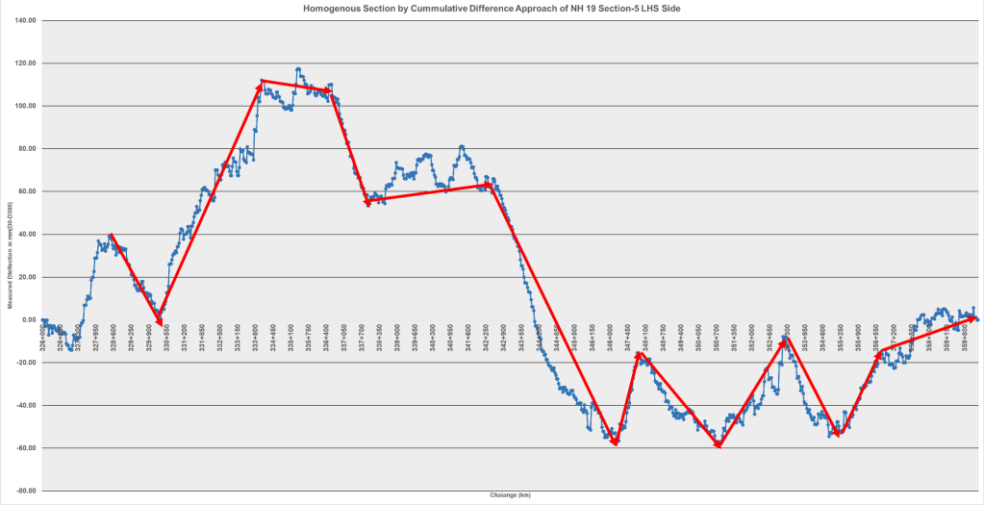
The assessment of the remining life of existing pavement and the strengthening requirement in terms of bituminous overlay will be done on the basis of the backcalcualted moduli of in-service pavement layers. Therefore, it is essential to identify homogenous section for the purpose of structural design primarily based on deflection bowl parameters and other relevant information.

In order to identify homogeneous section for structural overlay, Peak deflection values ($D_0$) and surface curvature ($D_0$-$D_{300}$) values for LHS and RHS sides are plotted, Scatter in deflection data is quite normal in FWD test. It seems impossible to define visually the homogeneous section from these plots. Some statistical tools such as cumulative difference approach would be quite helpful. Cumulative difference approach (CDA) as suggested in IRC: 115-2014 and AASHTO guide for the design of pavement structure (1993) was used to divide the road into statically homogeneous units, also called analysis units. The pavement response parameters to delineate the pavement into homogeneous sections are (a) peak deflection, $D_0$, (b) surface curvature index, $D_0$-$D_{300}$, from FWD survey and (c) existing subgrade strength, from $DCP_{CBR}$ etc. Peak deflection D0 and Surface curvature index (SCI) $D_0$-$D_{300}$ were considered as variable “X” and the series of cumulative difference $Z_x$ is plotted as per equation (3), clause 6.2.3 of IRC 115-2014.

As FWD was carried out separately for inner lane and outer lane on both LHS and RHS as per IRC 115-2014, the cumulative difference approach graph is prepared for all the lanes separately. Total Twenty-Eight homogenous sections are delineated for both LHS and Twenty-Two section for RHS from the graphs and the same is considered for estimating 15$^{th}$ percentile design elastic modulus values of existing pavement layers. **Figure 6.12** shows the unit delineation graphs of inner lanes of LHS and RHS based on deflection response using cumulative difference approach.


Homogenous Section by Cummulative Difference Approach of NH 19 Section-4 LHS Side (Upto 326+000)
Measured Diflection in mm(D0-D300)
Chainage (km)


Homogenous Section by Cummulative Difference Approach of NH 19 Section-4 RHS Side (Upto 326+000)
Measured Diflection in mm(D0-D300)
Chainage (km)


Homogenous Section by Cummulative Difference Approach of NH 19 Section-5 LHS Side
Chainage (km)

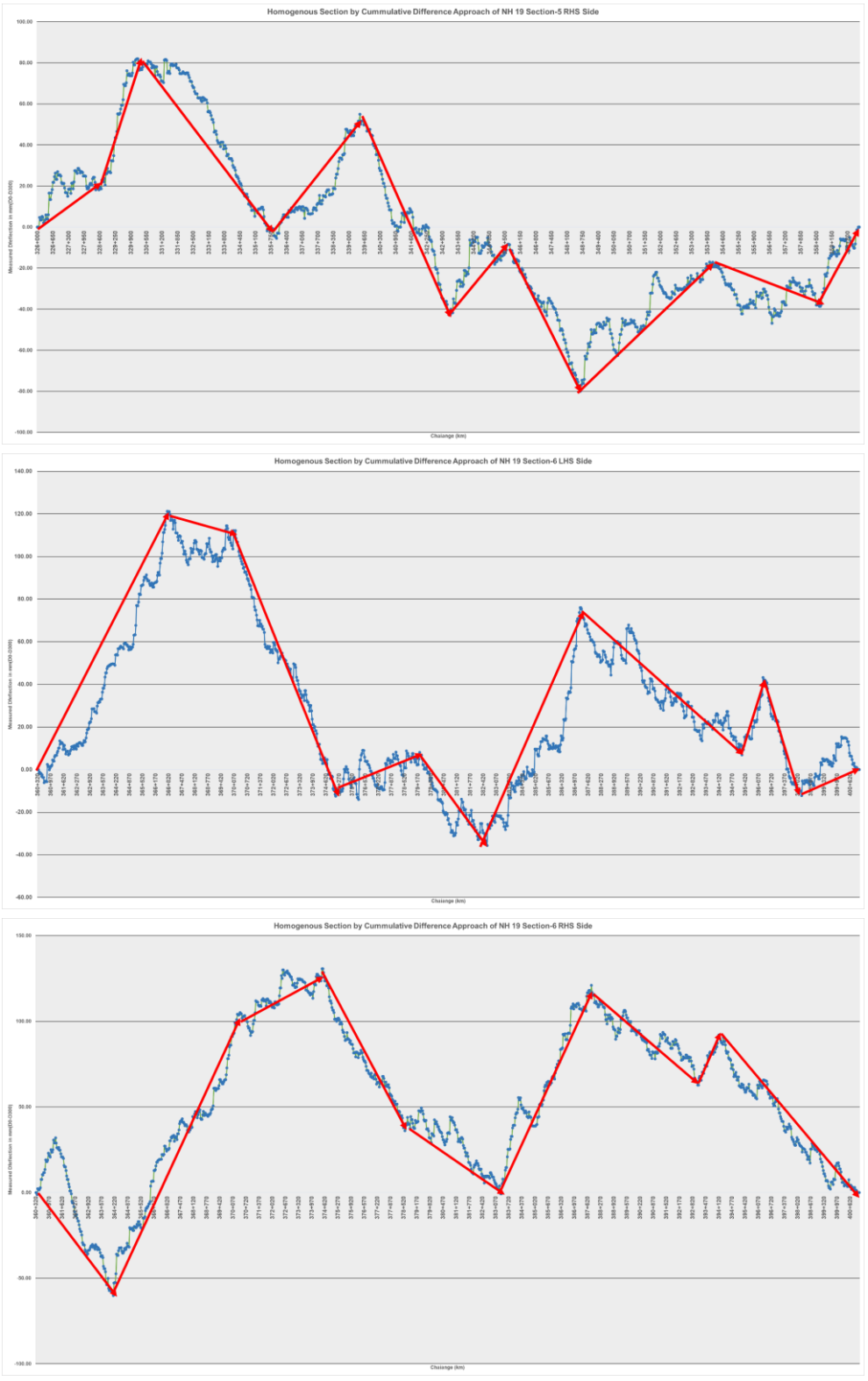



**Figure 6.12 Delineation Graphs based on Deflection response using Cumulative Difference Approach**

As discussed above, homogeneous section of the project (Flexible Pavement) is presented in **Table 6.13** as below: Homogeneous section.

**Table 6-13: List of Homogeneous Section**

| (LHS) | | | | (RHS) | | |
|---|---|---|---|---|---|---|
| **Section-1** | | | | | | |
| **Sl No** | **Chainage** | | **Length (Km)** | **Chainage** | | **Length (Km)** |
| | **From** | **To** | | **From** | **To** | |
| 1 | 320+000 | 321+000 | 1.00 | 320+000 | 321+000 | 1.00 |
| 2 | 321+000 | 322+000 | 1.00 | 321+000 | 324+000 | 3.00 |
| 3 | 322+000 | 324+000 | 2.00 | 324+000 | 326+000 | 2.00 |
| 4 | 324+000 | 325+000 | 1.00 | | | |
| 5 | 325+000 | 326+000 | 1.00 | | | |
| **Section-2** | | | | | | |
| 6 | 326+000 | 328+000 | 2.00 | 326+000 | 328+000 | 2.00 |
| 7 | 328+000 | 330+000 | 2.00 | 328+000 | 330+000 | 2.00 |
| 8 | 330+000 | 333+000 | 3.00 | 330+000 | 336+000 | 6.00 |
| 9 | 333+000 | 336+000 | 3.00 | 336+000 | 339+000 | 3.00 |
| 10 | 336+000 | 338+000 | 2.00 | 339+000 | 343+000 | 4.00 |
| 11 | 338+000 | 342+000 | 4.00 | 343+000 | 345+000 | 2.00 |
| 12 | 342+000 | 346+000 | 4.00 | 345+000 | 348+000 | 3.00 |
| 13 | 346+000 | 348+000 | 2.00 | 348+000 | 354+000 | 6.00 |
| 14 | 348+000 | 351+000 | 3.00 | 354+000 | 358+000 | 4.00 |
| 15 | 351+000 | 353+000 | 2.00 | 358+000 | 360+000 | 2.00 |
| 16 | 353+000 | 355+000 | 2.00 | | | |
| 17 | 355+000 | 356+000 | 1.00 | | | |
| 18 | 356+000 | 360+000 | 4.00 | | | |
| **Section-3** | | | | | | |
| 19 | 360+000 | 367+000 | 7.00 | 360+000 | 364+000 | 4.00 |
| 20 | 367+000 | 370+000 | 3.00 | 364+000 | 370+000 | 6.00 |
| 21 | 370+000 | 375+000 | 5.00 | 370+000 | 375+000 | 5.00 |
| 22 | 375+000 | 379+000 | 4.00 | 375+000 | 378+000 | 3.00 |
| 23 | 379+000 | 382+000 | 3.00 | 378+000 | 383+000 | 5.00 |
| 24 | 382+000 | 387+000 | 5.00 | 383+000 | 388+000 | 5.00 |
| 25 | 387+000 | 395+000 | 8.00 | 388+000 | 393+000 | 5.00 |
| 26 | 395+000 | 396+000 | 1.00 | 393+000 | 394+000 | 1.00 |
| 27 | 396+000 | 398+000 | 2.00 | 394+000 | 401+000 | 7.00 |
| 28 | 398+000 | 401+000 | 3.00 | | | |

The elastic moduli for each layer have been categorized for as Poor, Fair and Good based on the range obtained from FWD analysis for each layer. The rating for the moduli range and the direction wise summary of length of Project Stretch in each range is shown in the **Table 6.14** and presented graphically in **Figure 6.13a, 6.13b and 6.13c** of main carriageway as below:

**Table 6-14: Direction wise Modulus Summary**

| **Back calculated Elastic Modulus Values** | | | | |
|---|---|---|---|---|
| **Layer Type** | **Condition** | **Modulus Range** | **Length in km*** | |
| | | | **LHS** | **RHS** |
| Bituminous | Good | More than 3000 | 0.00 | 0.00 |
| | Fair | 3000 – 750 | 81.00 | 81.00 |
| | Poor | Less than 750 | 0.00 | 0.00 |
| Granular | Good | More than 500 | 0.00 | 0.00 |
| | Fair | 500 – 100 | 81.00 | 81.00 |
| | Poor | Less than 100 | 0.00 | 0.00 |
| Subgrade | Good | More than 200 | 0.00 | 0.00 |
| | Fair | 65 – 200 | 81.00 | 81.00 |
| | Poor | Less than 65 | 0.00 | 0.00 |

As per above table, the bituminous layer, granular layer and subgrade layer moduli are in fair conditions on both sides.

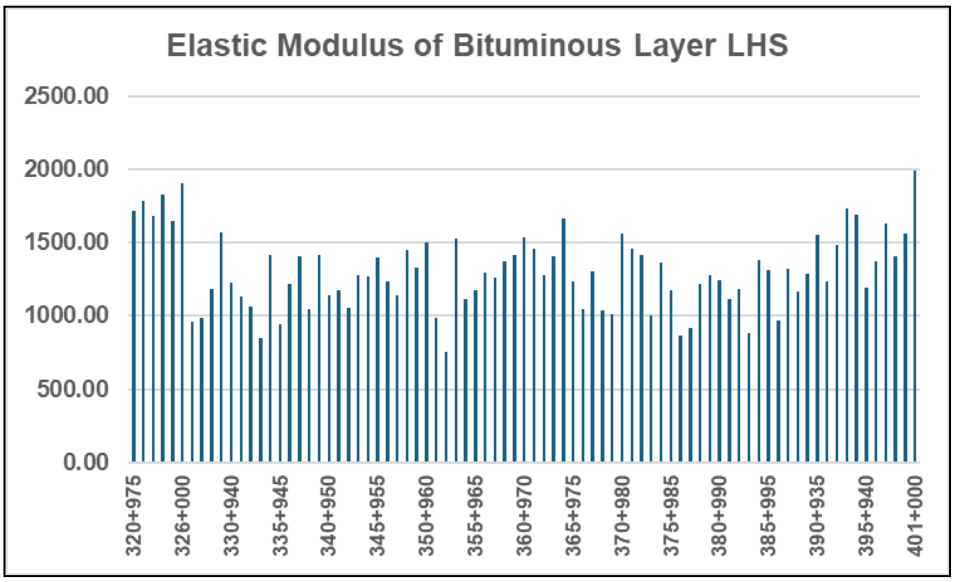



**Figure 6.13a: Elastic Modulus Values of Bituminous Layers-LHS**

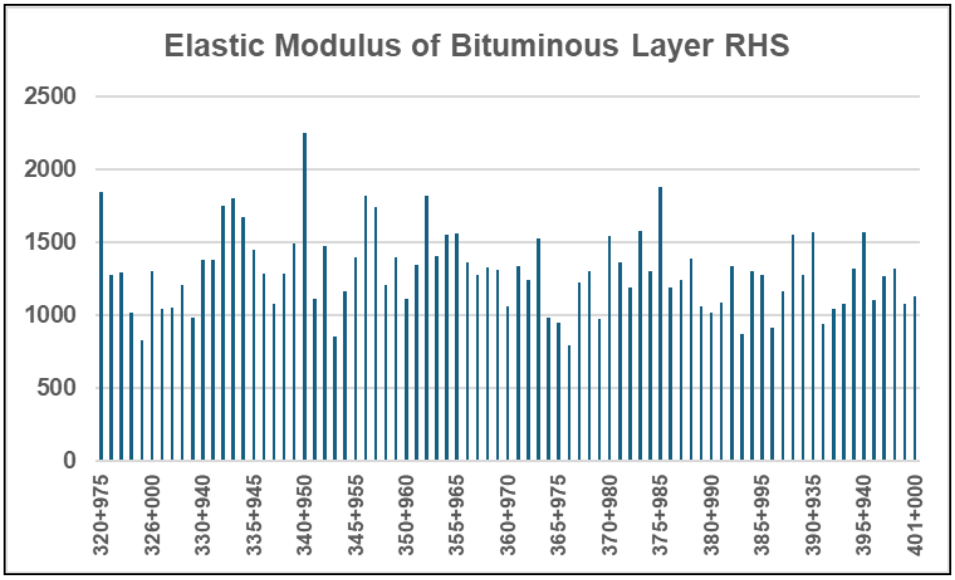



**Figure 6.13a: Elastic Modulus Values of Bituminous Layers-RHS**

The elastic moduli of Bituminous layer were found to be varying from 754.33 MPa to 2252.31 MPa as shown in the figures above.

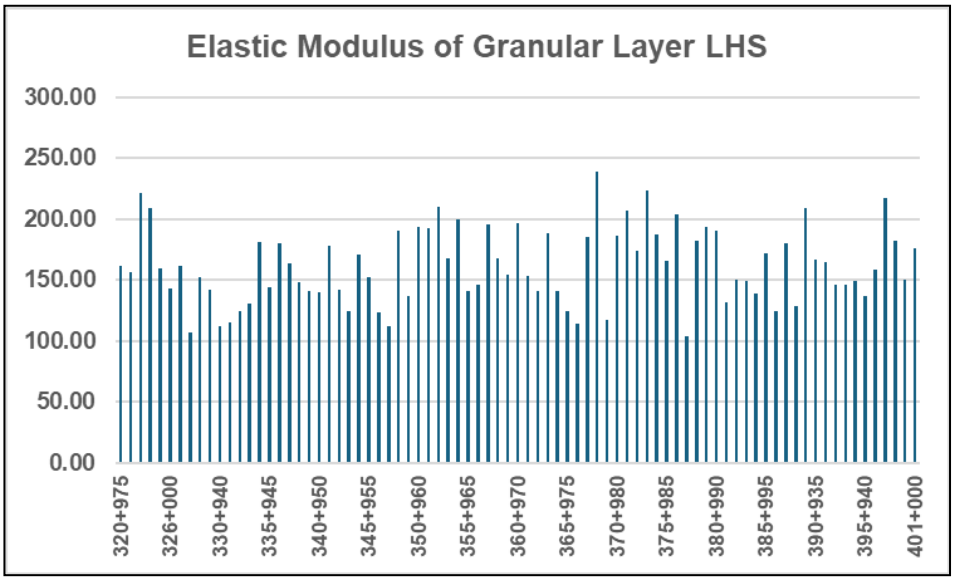



**Figure 6.13b: Elastic Modulus Values of Granular Layers – LHS**

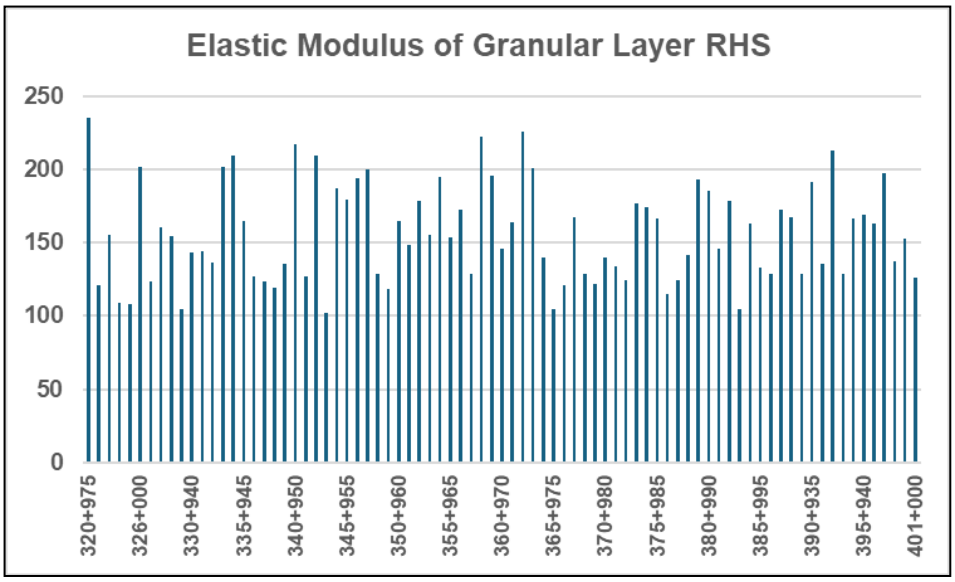



**Figure 6.13b: Elastic Modulus Values of Granular Layers – RHS**

The elastic moduli of granular layer were found to be varying from 102.08 MPa to 239 MPa as shown in the figures above.

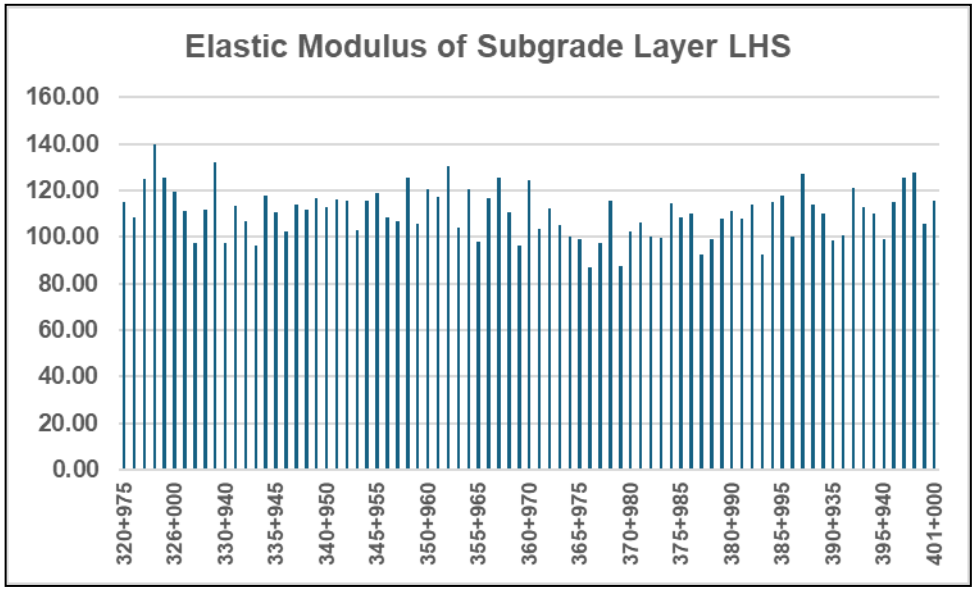



**Figure 6.13c: Elastic Modulus Values of Subgrade Layers – LHS**

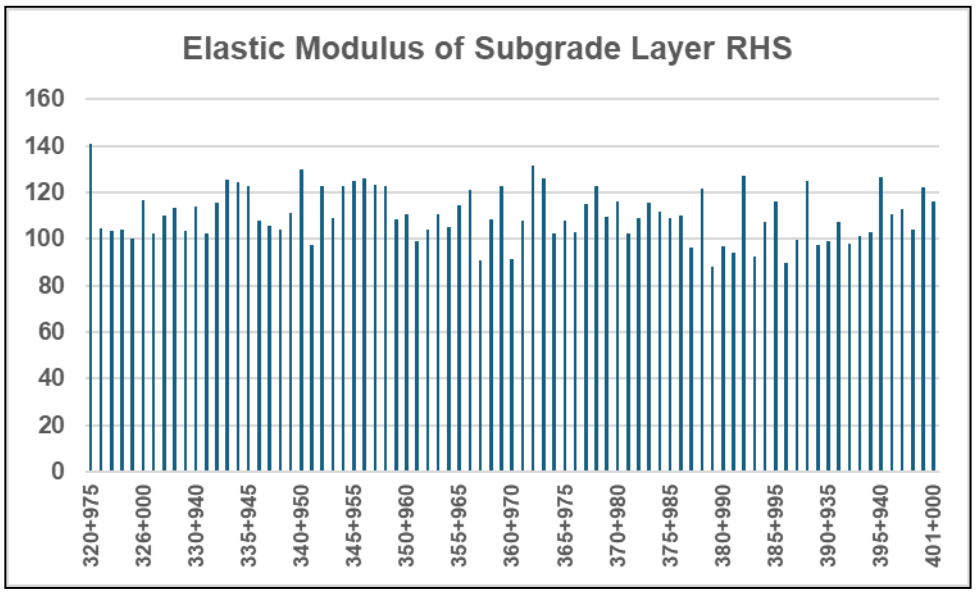



**Figure 6.13c: Elastic Modulus Values of Subgrade Layers – RHS**

The elastic moduli of subgrade layer were found to be in between 86.94 to 141.16 as shown in the figures above. The elastic modulus of the subgrade layer is greatly dependent on the CBR of subgrade soil.

### 6.7.8 Remaining Life of Pavement

#### (a) Design Elastic Modulus of existing pavement layers

For each homogeneous sub-section, the moduli of the existing bituminous layer (E1), granular crust (E2) and subgrade (E3) had been estimated by back analysis of measured deflection values as per IRC: 115-2014. The back calculated modulus values were duly corrected for temperature and moisture as appropriate. As per IRC 115; 2014, 15$^{th}$ percentile moduli are used as the design modulus for pavement design, thus the 15th percentile modulus values (corrected for temperature and moisture) of each pavement layers had been worked out for each homogenous section for both LHS and RHS. As the FWD was conducted

on inner lane and outer lane, 15th percentile modulus values are estimated for inner lane and outer lane separately and the most critical (lesser) elastic modulus values are considered as design modulus values. The back calculated design moduli (15th percentile) values for Bituminous, Granular and subgrade layers of existing pavement for each homogenous section for both LHS and RHS thus obtained are summarized in **Table 6.15.**

**Table 6-15: 15th Percentile Elastic Moduli of Pavement Layers**

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | |
|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade |
| **LHS** | | | | | | | | |
| **Section-1** | | | | | | | | |
| 1 | 320+000 | 321+000 | 1.00 | 165 | 450 | 1720.26 | 161.07 | 114.92 |
| 2 | 321+000 | 322+000 | 1.00 | 165 | 450 | 1788.74 | 156.87 | 108.26 |
| 3 | 322+000 | 324+000 | 2.00 | 165 | 450 | 1684.79 | 218.25 | 126.60 |
| 4 | 324+000 | 325+000 | 1.00 | 165 | 450 | 1652.59 | 159.05 | 125.38 |
| 5 | 325+000 | 326+000 | 1.00 | 165 | 450 | 2024.29 | 147.88 | 121.65 |
| **Section-2** | | | | | | | | |
| 1 | 326+000 | 328+000 | 2.00 | 165 | 450 | 992.45 | 132.16 | 101.36 |
| 2 | 328+000 | 330+000 | 2.00 | 165 | 450 | 1283.22 | 153.20 | 113.30 |
| 3 | 330+000 | 333+000 | 3.00 | 165 | 450 | 1191.51 | 119.92 | 103.19 |
| 4 | 333+000 | 336+000 | 3.00 | 165 | 450 | 918.53 | 152.36 | 111.02 |
| 5 | 336+000 | 338+000 | 2.00 | 165 | 450 | 1349.00 | 173.58 | 106.09 |
| 6 | 338+000 | 342+000 | 4.00 | 165 | 450 | 1221.15 | 149.28 | 116.24 |
| 7 | 342+000 | 346+000 | 4.00 | 165 | 450 | 1361.88 | 153.20 | 115.50 |
| 8 | 346+000 | 348+000 | 2.00 | 165 | 450 | 1176.09 | 120.86 | 109.21 |
| 9 | 348+000 | 351+000 | 3.00 | 165 | 450 | 1475.16 | 169.21 | 118.29 |
| 10 | 351+000 | 353+000 | 2.00 | 165 | 450 | 1083.54 | 190.02 | 116.99 |
| 11 | 353+000 | 355+000 | 2.00 | 165 | 450 | 1247.60 | 184.24 | 111.65 |
| 12 | 355+000 | 356+000 | 1.00 | 165 | 450 | 1206.96 | 148.38 | 103.52 |
| 13 | 356+000 | 360+000 | 4.00 | 165 | 450 | 1343.66 | 167.90 | 115.73 |
| **Section-3** | | | | | | | | |
| 1 | 360+000 | 367+000 | 7.00 | 165 | 450 | 1320.19 | 147.57 | 104.76 |
| 2 | 367+000 | 370+000 | 3.00 | 165 | 450 | 1079.70 | 190.52 | 100.39 |
| 3 | 370+000 | 375+000 | 5.00 | 165 | 450 | 1436.77 | 193.82 | 106.46 |
| 4 | 375+000 | 379+000 | 4.00 | 165 | 450 | 1093.66 | 177.18 | 106.82 |
| 5 | 379+000 | 382+000 | 3.00 | 165 | 450 | 1247.86 | 178.57 | 109.77 |
| 6 | 382+000 | 387+000 | 5.00 | 165 | 450 | 1160.62 | 146.90 | 108.24 |
| 7 | 387+000 | 395+000 | 8.00 | 165 | 450 | 1375.72 | 165.38 | 112.90 |
| 8 | 395+000 | 396+000 | 1.00 | 165 | 450 | 1264.51 | 149.65 | 100.55 |
| 9 | 396+000 | 398+000 | 2.00 | 165 | 450 | 1565.40 | 200.50 | 125.10 |
| 10 | 398+000 | 401+000 | 3.00 | 165 | 450 | 1699.06 | 161.51 | 108.19 |

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | |
|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade |
| **RHS** | | | | | | | | |
| **Section-1** | | | | | | | | |
| 1 | 320+000 | 321+000 | 1.00 | 165 | 450 | 1306.33 | 201.90 | 116.90 |
| 2 | 321+000 | 324+000 | 3.00 | 165 | 450 | 890.05 | 119.90 | 102.14 |
| 3 | 324+000 | 326+000 | 2.00 | 165 | 450 | 1392.78 | 150.10 | 111.76 |
| **Section-2** | | | | | | | | |
| 1 | 326+000 | 328+000 | 2.00 | 165 | 450 | 1081.05 | 153.68 | 105.04 |
| 2 | 328+000 | 330+000 | 2.00 | 165 | 450 | 1023.93 | 123.90 | 107.90 |
| 3 | 330+000 | 336+000 | 6.00 | 165 | 450 | 1615.74 | 161.54 | 119.04 |

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | |
|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade |
| **RHS** | | | | | | | | |
| 4 | 336+000 | 339+000 | 3.00 | 165 | 450 | 1280.94 | 125.14 | 106.72 |
| 5 | 339+000 | 343+000 | 4.00 | 165 | 450 | 1433.92 | 177.01 | 116.13 |
| 6 | 343+000 | 345+000 | 2.00 | 165 | 450 | 1033.18 | 176.12 | 115.21 |
| 7 | 345+000 | 348+000 | 3.00 | 165 | 450 | 1583.99 | 191.89 | 125.56 |
| 8 | 348+000 | 354+000 | 6.00 | 165 | 450 | 1392.91 | 155.10 | 107.82 |
| 9 | 354+000 | 358+000 | 4.00 | 165 | 450 | 1415.48 | 159.92 | 105.68 |
| 10 | 358+000 | 360+000 | 2.00 | 165 | 450 | 1341.37 | 211.80 | 121.30 |
| **Section-3** | | | | | | | | |
| 1 | 360+000 | 364+000 | 4.00 | 165 | 450 | 1211.00 | 189.70 | 113.96 |
| 2 | 364+000 | 370+000 | 6.00 | 165 | 450 | 1041.14 | 133.96 | 111.46 |
| 3 | 370+000 | 375+000 | 5.00 | 165 | 450 | 1461.53 | 157.44 | 110.30 |
| 4 | 375+000 | 378+000 | 3.00 | 165 | 450 | 1275.06 | 135.02 | 105.98 |
| 5 | 378+000 | 383+000 | 5.00 | 165 | 450 | 1113.36 | 177.39 | 102.86 |
| 6 | 383+000 | 388+000 | 5.00 | 165 | 450 | 1119.47 | 140.30 | 101.62 |
| 7 | 388+000 | 393+000 | 5.00 | 165 | 450 | 1281.97 | 154.67 | 107.89 |
| 8 | 393+000 | 394+000 | 1.00 | 165 | 450 | 1406.57 | 169.80 | 106.08 |
| 9 | 394+000 | 401+000 | 7.00 | 165 | 450 | 1245.13 | 165.62 | 116.31 |

### (b) Remaining Life of Pavement

Remaining life of the in-service pavement is worked out considering the existing pavement as 3- layer system which is linear, homogeneous, and isotropic, each layer being characterized by its thickness, its elastic modulus E (as per table above used as input) and its Poisson's ratio μ as per IRC: 115-2014. The in-service three-layer pavement system has been analysed using IIT PAVE software with the estimated back calculated moduli values ($15^{th}$ percentile). The interfaces between layers are assumed to be bonded. The FWD load of 40000N which exerts a uniform pressure of 0.56 MPa was considered.

The remaining life is calculated by using IIT Pave for LHS and RHS respectively. The IIT-Paved outputs for remaining. The models used for fatigue and rutting performance criteria are as per IRC 115-2014 and these models are shown below for reference.

**Fatigue Model:**

$$Nf = 0.711 * 10^{-04} \times [1/\varepsilon t]^{3.89} * [1/MR]^{0.854}$$

Where,

Nf = fatigue life in number of standard axles,

εt = Maximum Tensile strain at the bottom of the bituminous layer

MR= resilient modulus of the bituminous layer.

**Rutting Model:**

$$N= 1.41 \times 10^{-08} [1/\varepsilon v]^{4.5337}$$

Where,

N= Number of cumulative standard axles, and

εv= Vertical strain in the subgrade

## Table 6-16: 15th Percentile Elastic Moduli of Pavement Layers and Remaining Life

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | | IIT Pave Result | | Rutting Life | Fatigue Life | Remaining life |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade | Tensile Strain at Bottom BT | Vertical Strain at top of Subgrade | | | |
| **LHS** | | | | | | | | | | | | | |
| **Section-1** | | | | | | | | | | | | | |
| 1 | 320+000 | 321+000 | 1.00 | 165 | 450 | 1720.26 | 161.07 | 114.92 | 2.36E-04 | 2.31E-04 | 434.58 | 15.88 | 15.88 |
| 2 | 321+000 | 322+000 | 1.00 | 165 | 450 | 1788.74 | 156.87 | 108.26 | 2.33E-04 | 2.38E-04 | 374.48 | 16.07 | 16.07 |
| 3 | 322+000 | 324+000 | 2.00 | 165 | 450 | 1684.79 | 218.25 | 126.60 | 2.14E-04 | 2.08E-04 | 696.57 | 23.67 | 23.67 |
| 4 | 324+000 | 325+000 | 1.00 | 165 | 450 | 1652.59 | 159.05 | 125.38 | 2.46E-04 | 2.20E-04 | 536.77 | 13.83 | 13.83 |
| 5 | 325+000 | 326+000 | 1.00 | 165 | 450 | 2024.29 | 147.88 | 121.65 | 2.24E-04 | 2.16E-04 | 591.93 | 16.76 | 16.76 |
| **Section-2** | | | | | | | | | | | | | |
| 1 | 326+000 | 328+000 | 2.00 | 165 | 450 | 992.45 | 132.16 | 101.36 | 3.56E-04 | 2.89E-04 | 156.72 | 5.09 | 5.09 |
| 2 | 328+000 | 330+000 | 2.00 | 165 | 450 | 1283.22 | 153.20 | 113.30 | 2.90E-04 | 2.50E-04 | 303.01 | 9.14 | 9.14 |
| 3 | 330+000 | 333+000 | 3.00 | 165 | 450 | 1191.51 | 119.92 | 103.19 | 3.29E-04 | 2.78E-04 | 186.57 | 5.94 | 5.94 |
| 4 | 333+000 | 336+000 | 3.00 | 165 | 450 | 918.53 | 152.36 | 111.02 | 3.47E-04 | 2.70E-04 | 212.98 | 6.03 | 6.03 |
| 5 | 336+000 | 338+000 | 2.00 | 165 | 450 | 1349.00 | 173.58 | 106.09 | 2.67E-04 | 2.53E-04 | 287.04 | 11.96 | 11.96 |
| 6 | 338+000 | 342+000 | 4.00 | 165 | 450 | 1221.15 | 149.28 | 116.24 | 3.01E-04 | 2.49E-04 | 307.45 | 8.23 | 8.23 |
| 7 | 342+000 | 346+000 | 4.00 | 165 | 450 | 1361.88 | 153.20 | 115.50 | 2.80E-04 | 2.44E-04 | 339.58 | 9.91 | 9.91 |
| 8 | 346+000 | 348+000 | 2.00 | 165 | 450 | 1176.09 | 120.86 | 109.21 | 3.36E-04 | 2.68E-04 | 220.66 | 5.56 | 5.56 |
| 9 | 348+000 | 351+000 | 3.00 | 165 | 450 | 1475.16 | 169.21 | 118.29 | 2.57E-04 | 2.33E-04 | 417.90 | 12.97 | 12.97 |
| 10 | 351+000 | 353+000 | 2.00 | 165 | 450 | 1083.54 | 190.02 | 116.99 | 2.87E-04 | 2.44E-04 | 340.21 | 11.00 | 11.00 |
| 11 | 353+000 | 355+000 | 2.00 | 165 | 450 | 1247.60 | 184.24 | 111.65 | 2.71E-04 | 2.46E-04 | 325.41 | 12.14 | 12.14 |
| 12 | 355+000 | 356+000 | 1.00 | 165 | 450 | 1206.96 | 148.38 | 103.52 | 3.04E-04 | 2.70E-04 | 214.78 | 7.95 | 7.95 |
| 13 | 356+000 | 360+000 | 4.00 | 165 | 450 | 1343.66 | 167.90 | 115.73 | 2.71E-04 | 2.41E-04 | 357.85 | 11.33 | 11.33 |
| **Section-3** | | | | | | | | | | | | | |
| 1 | 360+000 | 367+000 | 7.00 | 165 | 450 | 1320.19 | 147.57 | 104.76 | 2.90E-04 | 2.63E-04 | 241.16 | 8.87 | 8.87 |
| 2 | 367+000 | 370+000 | 3.00 | 165 | 450 | 1079.70 | 190.52 | 100.39 | 2.87E-04 | 2.67E-04 | 222.53 | 10.94 | 10.94 |
| 3 | 370+000 | 375+000 | 5.00 | 165 | 450 | 1436.77 | 193.82 | 106.46 | 2.46E-04 | 2.44E-04 | 337.06 | 15.63 | 15.63 |
| 4 | 375+000 | 379+000 | 4.00 | 165 | 450 | 1093.66 | 177.18 | 106.82 | 2.96E-04 | 2.61E-04 | 248.37 | 9.69 | 9.69 |
| 5 | 379+000 | 382+000 | 3.00 | 165 | 450 | 1247.86 | 178.57 | 109.77 | 2.75E-04 | 2.50E-04 | 301.91 | 11.46 | 11.46 |
| 6 | 382+000 | 387+000 | 5.00 | 165 | 450 | 1160.62 | 146.90 | 108.24 | 3.12E-04 | 2.64E-04 | 234.62 | 7.46 | 7.46 |
| 7 | 387+000 | 395+000 | 8.00 | 165 | 450 | 1375.72 | 165.38 | 112.90 | 2.70E-04 | 2.44E-04 | 336.44 | 11.36 | 11.36 |

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | | IIT Pave Result | | Rutting Life | Fatigue Life | Remaining life |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade | Tensile Strain at Bottom BT | Vertical Strain at top of Subgrade | | | |
| **LHS** | | | | | | | | | | | | | |
| 8 | 395+000 | 396+000 | 1.00 | 165 | 450 | 1264.51 | 149.65 | 100.55 | 2.96E-04 | 2.72E-04 | 207.35 | 8.55 | 8.55 |
| 9 | 396+000 | 398+000 | 2.00 | 165 | 450 | 1565.40 | 200.50 | 125.10 | 2.31E-04 | 2.16E-04 | 586.97 | 18.65 | 18.65 |
| 10 | 398+000 | 401+000 | 3.00 | 165 | 450 | 1699.06 | 161.51 | 108.19 | 2.42E-04 | 2.41E-04 | 359.88 | 14.49 | 14.49 |

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | | IIT Pave Result | | Rutting Life | Fatigue Life | Remaining life |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade | Tensile Strain at Bottom BT | Vertical Strain at top of Subgrade | | | |
| **RHS** | | | | | | | | | | | | | |
| **Section-1** | | | | | | | | | | | | | |
| 1 | 320+000 | 321+000 | 1.00 | 165 | 450 | 1306.33 | 201.90 | 116.90 | 2.53E-04 | 2.33E-04 | 417.09 | 15.16 | 15.16 |
| 2 | 321+000 | 324+000 | 3.00 | 165 | 450 | 890.05 | 119.90 | 102.14 | 3.94E-04 | 2.97E-04 | 137.41 | 3.76 | 3.76 |
| 3 | 324+000 | 326+000 | 2.00 | 165 | 450 | 1392.78 | 150.10 | 111.76 | 2.79E-04 | 2.48E-04 | 310.83 | 9.85 | 9.85 |
| **Section-2** | | | | | | | | | | | | | |
| 1 | 326+000 | 328+000 | 2.00 | 165 | 450 | 1081.05 | 153.68 | 105.04 | 3.18E-04 | 2.71E-04 | 208.40 | 7.37 | 7.37 |
| 2 | 328+000 | 330+000 | 2.00 | 165 | 450 | 1023.93 | 123.90 | 107.90 | 3.60E-04 | 2.78E-04 | 188.10 | 4.78 | 4.78 |
| 3 | 330+000 | 336+000 | 6.00 | 165 | 450 | 1615.74 | 161.54 | 119.04 | 2.48E-04 | 2.29E-04 | 452.98 | 13.64 | 13.64 |
| 4 | 336+000 | 339+000 | 3.00 | 165 | 450 | 1280.94 | 125.14 | 106.72 | 3.15E-04 | 2.66E-04 | 227.12 | 6.59 | 6.59 |
| 5 | 339+000 | 343+000 | 4.00 | 165 | 450 | 1433.92 | 177.01 | 116.13 | 2.56E-04 | 2.35E-04 | 398.14 | 13.45 | 13.45 |
| 6 | 343+000 | 345+000 | 2.00 | 165 | 450 | 1033.18 | 176.12 | 115.21 | 3.05E-04 | 2.52E-04 | 292.78 | 9.04 | 9.04 |
| 7 | 345+000 | 348+000 | 3.00 | 165 | 450 | 1583.99 | 191.89 | 125.56 | 2.34E-04 | 2.17E-04 | 579.63 | 17.59 | 17.59 |
| 8 | 348+000 | 354+000 | 6.00 | 165 | 450 | 1392.91 | 155.10 | 107.82 | 2.76E-04 | 2.53E-04 | 284.99 | 10.35 | 10.35 |
| 9 | 354+000 | 358+000 | 4.00 | 165 | 450 | 1415.48 | 159.92 | 105.68 | 2.70E-04 | 2.54E-04 | 278.95 | 11.09 | 11.09 |
| 10 | 358+000 | 360+000 | 2.00 | 165 | 450 | 1341.37 | 211.80 | 121.30 | 2.44E-04 | 2.24E-04 | 493.70 | 17.11 | 17.11 |
| **Section-3** | | | | | | | | | | | | | |
| 1 | 360+000 | 364+000 | 4.00 | 165 | 450 | 1211.00 | 189.70 | 113.96 | 2.71E-04 | 2.43E-04 | 344.68 | 12.38 | 12.38 |
| 2 | 364+000 | 370+000 | 6.00 | 165 | 450 | 1041.14 | 133.96 | 111.46 | 3.44E-04 | 2.68E-04 | 220.28 | 5.57 | 5.57 |
| 3 | 370+000 | 375+000 | 5.00 | 165 | 450 | 1461.53 | 157.44 | 110.30 | 2.66E-04 | 2.46E-04 | 322.43 | 11.34 | 11.34 |
| 4 | 375+000 | 378+000 | 3.00 | 165 | 450 | 1275.06 | 135.02 | 105.98 | 3.07E-04 | 2.66E-04 | 229.06 | 7.35 | 7.35 |

| Sl No | Chainage | | Length (Km) | Avg Crust Thick | | 15th Percentile E Value (Mpa) | | | IIT Pave Result | | Rutting Life | Fatigue Life | Remaining life |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | Bituminous | Granular Layer | Bituminous Layer | Granular Layer | Subgrade | Tensile Strain at Bottom BT | Vertical Strain at top of Subgrade | | | |
| **RHS** | | | | | | | | | | | | | |
| 5 | 378+000 | 383+000 | 5.00 | 165 | 450 | 1113.36 | 177.39 | 102.86 | 2.93E-04 | 2.66E-04 | 227.12 | 9.89 | 9.89 |
| 6 | 383+000 | 388+000 | 5.00 | 165 | 450 | 1119.47 | 140.30 | 101.62 | 3.25E-04 | 2.79E-04 | 182.67 | 6.57 | 6.57 |
| 7 | 388+000 | 393+000 | 5.00 | 165 | 450 | 1281.97 | 154.67 | 107.89 | 2.89E-04 | 2.58E-04 | 263.58 | 9.23 | 9.23 |
| 8 | 393+000 | 394+000 | 1.00 | 165 | 450 | 1406.57 | 169.80 | 106.08 | 2.64E-04 | 2.52E-04 | 292.78 | 12.15 | 12.15 |
| 9 | 394+000 | 401+000 | 7.00 | 165 | 450 | 1245.13 | 165.62 | 116.31 | 2.84E-04 | 2.44E-04 | 335.81 | 10.06 | 10.06 |

The existing HAM Concessionaire shall be responsible required overlay till Year 2036.

## 6.8 ANALYSIS OF NSV DATA – Pavement Condition

### 6.8.1 Pavement Condition Rating (PCI)

Analysis of Pavement Distress in terms of cracks, potholes, patching, rutting, shoving etc. has carried out to determine PCI. For this purpose, the pavement distress data obtained from NSV are analysed in this section to estimate pavement condition index (PCI). Types of distresses recorded by NSV are longitudinal cracking, Transverse cracking, Alligator cracking, Pothole, Patching, Ravelling, Shoving, Flushing/bleeding, Depression, Edge Break, Delamination, and corrugation along with its severity level. In order to estimates the present condition of the pavement and its future maintenance requirements, the analysis of these measured distresses are performed to determine the PCI of the project road kilometre-wise.

PCI provides a measure of the present condition of the pavement based on the distress observed on the surface of the pavement, which also indicates the structural integrity and surface operational condition (localized roughness and safety). The PCI cannot measure structural capacity, nor does it provide direct measurement of skid resistance or roughness. It provides an objective and rational basis for determining maintenance and repair needs and priorities".

For pavement monitoring, this codes states that, "Continuous monitoring of the PCI is used to establish the rate of pavement deterioration, which permits early identification of major rehabilitation needs. The PCI provides feedback on pavement performance for validation or improvement of current pavement design and maintenance procedures".

Pavement condition rating as per ASTM D 6433 as a function of the PCI value that varies from "failed" to "excellent" are shown in **Figure 6.14** and the same is used for this project.




**Figure 6.14: Pavement Condition Index**

The steps for calculating the PCI as per the IRC 82-2023 code from measured distress type are listed below.

While recording the distresses the details for the following pavement surface distresses are visually noted and recorded in percentage for each km length. Details surveys are attached at Annexture 2.1.

1. Cracking (Alligator or fatigue cracking, Longitudinal and transverse cracking).
2. Bleeding

3. Depressions/Settlements
4. Pothole
5. Patching
6. Ravelling

Pavement condition surveys can be broadly classified into manual methods and instrumented condition surveys. While manual methods are cumbersome, slow to perform and includes safety risks, automated surveys can be conducted at high speed with greater level of precision.

### 6.8.2 Instrumented Method

This method involves use of advanced laser and camera-based system for recording of international roughness index, rut depth and pavement surface distresses from a moving vehicle. Examples are Automatic Road Survey System (ARSS) / Network Survey Vehicle (NSV), which have become popular to record and assess pavement surface automatically at highway speeds and recommended for expressways, highways and urban roads.

| Road Category | Roughness | Surface Distress | Rut Depth (mm) |
|---|---|---|---|
| Four Lane Divided or More | It is recommended that the roughness of the existing pavement Shall be assessed in terms of Roughness Index (mm/km) or International Roughness Index (m/km) as per the procedure given in IRC SP: 16-2019 document. | ARSS/NSV | ARSS/NSV |

Following the ASTM D 6433 steps as mentioned above, the pavement condition index (PCI) has been worked out for project road from pavement distress data collected by NSV. PCI is estimated for LHS and RHS of main carriageway separately and are shown kilometre-wise in **Table 6.17.** The PCI variation along the stretch on RHS and LHS side is shown in **Figure 6.15.**

**Table 6-17: Shown PCI Weighted kilometre-wise**

| Sl. No | Chainage | | LHS | | RHS | |
|---|---|---|---|---|---|---|
| | From | To | PCI Weighted | Maintenance Recommendation | PCI Weighted | Maintenance Recommendation |
| 1 | 320+810 | 321+000 | 96.89 | Routine Maintenance | 76.07 | Periodic Maintenance |
| 2 | 321+000 | 322+000 | 79.11 | Periodic Maintenance | 79.36 | Periodic Maintenance |
| 3 | 322+000 | 323+000 | 80.03 | Preventive Maintenance | 80.75 | Preventive Maintenance |
| 4 | 323+000 | 324+000 | 69.00 | Periodic Maintenance | 85.76 | Preventive Maintenance |
| 5 | 324+000 | 325+000 | 76.13 | Periodic Maintenance | 67.76 | Periodic Maintenance |
| 6 | 325+000 | 326+000 | 84.26 | Preventive Maintenance | 79.00 | Periodic Maintenance |
| 7 | 326+000 | 327+000 | 75.77 | Periodic Maintenance | 68.23 | Periodic Maintenance |
| 8 | 327+000 | 328+000 | 70.28 | Periodic Maintenance | 66.55 | Periodic Maintenance |
| 9 | 328+000 | 329+000 | 93.48 | Routine Maintenance | 79.54 | Periodic Maintenance |
| 10 | 329+000 | 330+000 | 82.84 | Preventive Maintenance | 93.17 | Routine Maintenance |
| 11 | 330+000 | 331+000 | 73.11 | Periodic Maintenance | 78.66 | Periodic Maintenance |
| 12 | 331+000 | 332+000 | 66.44 | Periodic Maintenance | 65.29 | Periodic Maintenance |
| 13 | 332+000 | 333+000 | 79.86 | Periodic Maintenance | 69.21 | Periodic Maintenance |
| 14 | 333+000 | 334+000 | 90.34 | Routine Maintenance | 67.84 | Periodic Maintenance |
| 15 | 334+000 | 335+000 | 66.79 | Periodic Maintenance | 65.66 | Periodic Maintenance |
| 16 | 335+000 | 336+000 | 92.30 | Routine Maintenance | 58.19 | Minor Rehabilitation |

| Sl. No | Chainage | | LHS | | RHS | |
|---|---|---|---|---|---|---|
| | From | To | PCI Weighted | Maintenance Recommendation | PCI Weighted | Maintenance Recommendation |
| 17 | 336+000 | 337+000 | 74.25 | Periodic Maintenance | 66.93 | Periodic Maintenance |
| 18 | 337+000 | 338+000 | 73.08 | Periodic Maintenance | 95.06 | Routine Maintenance |
| 19 | 338+000 | 339+000 | 82.36 | Preventive Maintenance | 78.68 | Periodic Maintenance |
| 20 | 339+000 | 340+000 | 83.53 | Preventive Maintenance | 77.58 | Periodic Maintenance |
| 21 | 340+000 | 341+000 | 71.47 | Periodic Maintenance | 93.74 | Routine Maintenance |
| 22 | 341+000 | 342+000 | 69.73 | Periodic Maintenance | 63.93 | Periodic Maintenance |
| 23 | 342+000 | 343+000 | 66.00 | Periodic Maintenance | 92.09 | Routine Maintenance |
| 24 | 343+000 | 344+000 | 66.10 | Periodic Maintenance | 77.55 | Periodic Maintenance |
| 25 | 344+000 | 345+000 | 62.63 | Periodic Maintenance | 69.53 | Periodic Maintenance |
| 26 | 345+000 | 346+000 | 64.92 | Periodic Maintenance | 78.16 | Periodic Maintenance |
| 27 | 346+000 | 347+000 | 67.52 | Periodic Maintenance | 75.37 | Periodic Maintenance |
| 28 | 347+000 | 348+000 | 80.19 | Preventive Maintenance | 93.93 | Routine Maintenance |
| 29 | 348+000 | 349+000 | 80.85 | Preventive Maintenance | 81.54 | Preventive Maintenance |
| 30 | 349+000 | 350+000 | 72.20 | Periodic Maintenance | 77.06 | Periodic Maintenance |
| 31 | 350+000 | 351+000 | 74.61 | Periodic Maintenance | 69.56 | Periodic Maintenance |
| 32 | 351+000 | 352+000 | 76.77 | Periodic Maintenance | 66.08 | Periodic Maintenance |
| 33 | 352+000 | 353+000 | 77.39 | Periodic Maintenance | 66.24 | Periodic Maintenance |
| 34 | 353+000 | 354+000 | 67.30 | Periodic Maintenance | 70.34 | Periodic Maintenance |
| 35 | 354+000 | 355+000 | 91.92 | Routine Maintenance | 93.09 | Routine Maintenance |
| 36 | 355+000 | 356+000 | 66.82 | Periodic Maintenance | 94.08 | Routine Maintenance |
| 37 | 356+000 | 357+000 | 66.52 | Periodic Maintenance | 83.76 | Preventive Maintenance |
| 38 | 357+000 | 358+000 | 60.41 | Periodic Maintenance | 95.73 | Routine Maintenance |
| 39 | 358+000 | 359+000 | 64.13 | Periodic Maintenance | 95.28 | Routine Maintenance |
| 40 | 359+000 | 360+000 | 66.82 | Periodic Maintenance | 83.60 | Preventive Maintenance |
| 41 | 360+000 | 361+000 | 76.21 | Periodic Maintenance | 83.47 | Preventive Maintenance |
| 42 | 361+000 | 362+000 | 70.46 | Periodic Maintenance | 81.01 | Preventive Maintenance |
| 43 | 362+000 | 363+000 | 68.83 | Periodic Maintenance | 76.81 | Periodic Maintenance |
| 44 | 363+000 | 364+000 | 78.87 | Periodic Maintenance | 95.36 | Routine Maintenance |
| 45 | 364+000 | 365+000 | 75.18 | Periodic Maintenance | 94.68 | Routine Maintenance |
| 46 | 365+000 | 366+000 | 92.28 | Routine Maintenance | 72.33 | Periodic Maintenance |
| 47 | 366+000 | 367+000 | 92.95 | Routine Maintenance | 80.55 | Preventive Maintenance |
| 48 | 367+000 | 368+000 | 76.88 | Periodic Maintenance | 67.94 | Periodic Maintenance |
| 49 | 368+000 | 369+000 | 80.83 | Preventive Maintenance | 81.59 | Preventive Maintenance |
| 50 | 369+000 | 370+000 | 69.01 | Periodic Maintenance | 95.88 | Routine Maintenance |
| 51 | 370+000 | 371+000 | 83.69 | Preventive Maintenance | 64.19 | Periodic Maintenance |
| 52 | 371+000 | 372+000 | 56.46 | Minor Rehabilitation | 59.62 | Minor Rehabilitation |
| 53 | 372+000 | 373+000 | 84.35 | Preventive Maintenance | 84.16 | Preventive Maintenance |
| 54 | 373+000 | 374+000 | 71.57 | Periodic Maintenance | 96.57 | Routine Maintenance |
| 55 | 374+000 | 375+000 | 80.66 | Preventive Maintenance | 77.60 | Periodic Maintenance |
| 56 | 375+000 | 376+000 | 93.42 | Routine Maintenance | 73.76 | Periodic Maintenance |
| 57 | 376+000 | 377+000 | 70.20 | Periodic Maintenance | 74.30 | Periodic Maintenance |
| 58 | 377+000 | 378+000 | 95.07 | Routine Maintenance | 82.13 | Preventive Maintenance |
| 59 | 378+000 | 379+000 | 95.03 | Routine Maintenance | 82.39 | Preventive Maintenance |
| 60 | 379+000 | 380+000 | 93.94 | Routine Maintenance | 94.67 | Routine Maintenance |
| 61 | 380+000 | 381+000 | 82.92 | Preventive Maintenance | 95.40 | Routine Maintenance |
| 62 | 381+000 | 382+000 | 77.44 | Periodic Maintenance | 94.09 | Routine Maintenance |
| 63 | 382+000 | 383+000 | 77.54 | Periodic Maintenance | 95.21 | Routine Maintenance |
| 64 | 383+000 | 384+000 | 93.18 | Routine Maintenance | 84.10 | Preventive Maintenance |
| 65 | 384+000 | 385+000 | 92.28 | Routine Maintenance | 79.71 | Periodic Maintenance |
| 66 | 385+000 | 386+000 | 95.39 | Routine Maintenance | 96.69 | Routine Maintenance |
| 67 | 386+000 | 387+000 | 81.71 | Preventive Maintenance | 95.75 | Routine Maintenance |
| 68 | 387+000 | 388+000 | 93.19 | Routine Maintenance | 95.51 | Routine Maintenance |
| 69 | 388+000 | 389+000 | 95.03 | Routine Maintenance | 96.02 | Routine Maintenance |
| 70 | 389+000 | 390+000 | 93.57 | Routine Maintenance | 95.02 | Routine Maintenance |
| 71 | 390+000 | 391+000 | 93.28 | Routine Maintenance | 91.83 | Routine Maintenance |

| Sl. No | Chainage | | LHS | | RHS | |
|---|---|---|---|---|---|---|
| | From | To | PCI Weighted | Maintenance Recommendation | PCI Weighted | Maintenance Recommendation |
| 72 | 391+000 | 392+000 | 92.17 | Routine Maintenance | 74.00 | Periodic Maintenance |
| 73 | 392+000 | 393+000 | 92.50 | Routine Maintenance | 69.32 | Periodic Maintenance |
| 74 | 393+000 | 394+000 | 76.03 | Periodic Maintenance | 66.13 | Periodic Maintenance |
| 75 | 394+000 | 395+000 | 76.74 | Periodic Maintenance | 84.16 | Preventive Maintenance |
| 76 | 395+000 | 396+000 | 81.18 | Preventive Maintenance | 82.26 | Preventive Maintenance |
| 77 | 396+000 | 397+000 | 93.56 | Routine Maintenance | 86.94 | Preventive Maintenance |
| 78 | 397+000 | 398+000 | 64.86 | Periodic Maintenance | 65.94 | Periodic Maintenance |
| 79 | 398+000 | 399+000 | 77.33 | Periodic Maintenance | 96.31 | Routine Maintenance |
| 80 | 399+000 | 400+000 | 94.89 | Routine Maintenance | 96.01 | Routine Maintenance |
| 81 | 400+000 | 401+000 | 94.90 | Routine Maintenance | 76.81 | Periodic Maintenance |

The existing HAM Concessionaire shall be for maintenance of existing road till Year 2036 for Section 2 and Section 3. In case of section 1, DPR for six lanning is in progress and pavement shall be constructed for design life of 20 years. Therefore, routine maintenance has not considered in this project under Public InvIT.

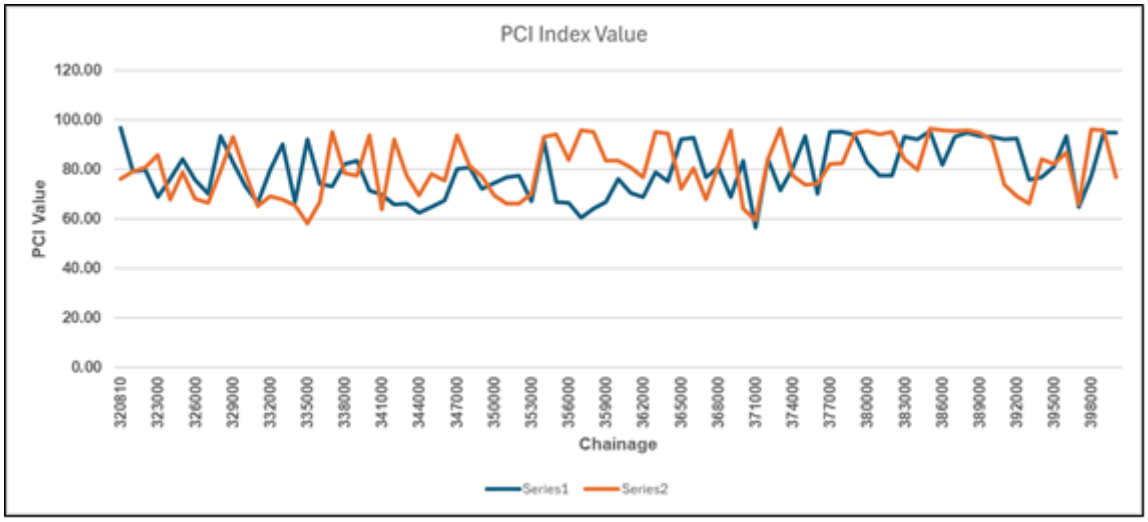



**Figure 6.15: PCI Variation along the Project Road**

As per above table and figure, the PCI value generally indicates good condition of pavement with LHS had better PCI than RHS from the start of the road. The summary of pavement condition as per ASTM D 6433 rating based on PCI is shown in **Table 6.18**.

**Table 6-18: Pavement condition Summary based on PCI Values (Flexible)**

| Condition | PCI Rating | LHS | | RHS | |
|---|---|---|---|---|---|
| | | Length | Percentage | Length | Percentage |
| **Excellent** | **100-90** | 22.19 | 27.67% | 25.00 | 31.18% |
| **Good** | **90-80** | 14.00 | 17.46% | 16.00 | 19.95% |
| **Satisfactory** | **80-60** | 43.00 | 53.62% | 37.19 | 46.38% |
| **Fair** | **60-40** | 1.00 | 1.25% | 2.00 | 2.49% |
| **Poor** | **40-20** | 0.00 | 0.00% | 0.00 | 0.00% |
| **Fail** | **20-0** | 0.00 | 0.00% | 0.00 | 0.00% |

### 6.8.3 NSV Rutting Data Analysis – Flexible Pavement

As per IRC 82-2023, “rutting is longitudinal depression or groove in the pavement

along the wheel path' and is one of the important parameters in determining the functional as well as structural performance of pavement and as per IRC 82-2023, the pavement condition with respect to value of rutting is shown below.

For the project road, digital laser profiler component (DLP) of NSV was used for determining the rutting. All data is measured and reported in accord with the recommendations contained within the Austroads Guide to Asset Management, Part 5C – Rutting. The DLP measures a 3-meter transverse profile measured every 50 mm of longitudinal travel and the processing software allows both lane and wheel path rutting to be measured using the string line and straight edge models.

For the project road, Rutting is measured along the inner and outer lane of both LHS and RHS of main carriageway. The average rut on each lane is presented at graphically and shown in **Figure 6.16 to Figure 6.19**.

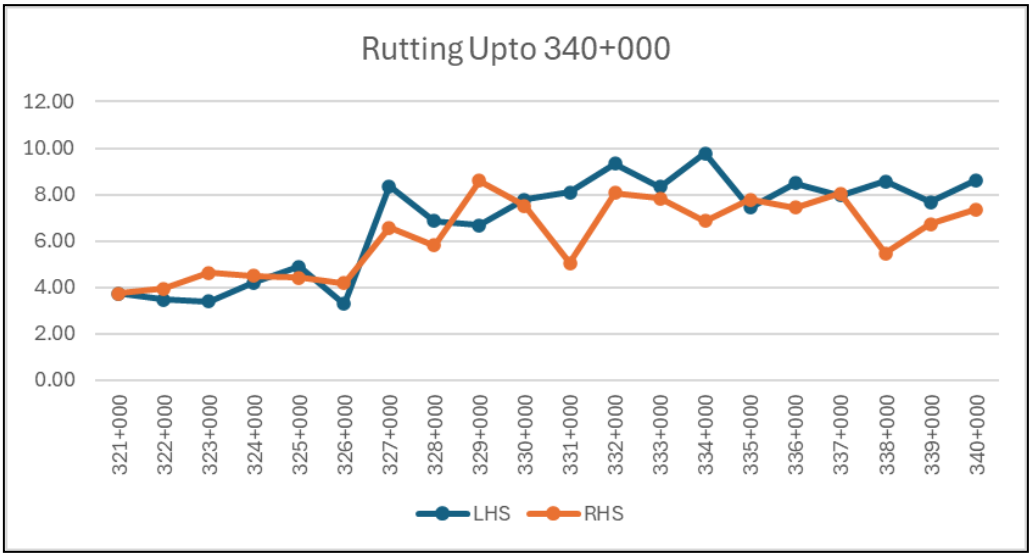



**Figure 6.16: Rutting along the Project Road**

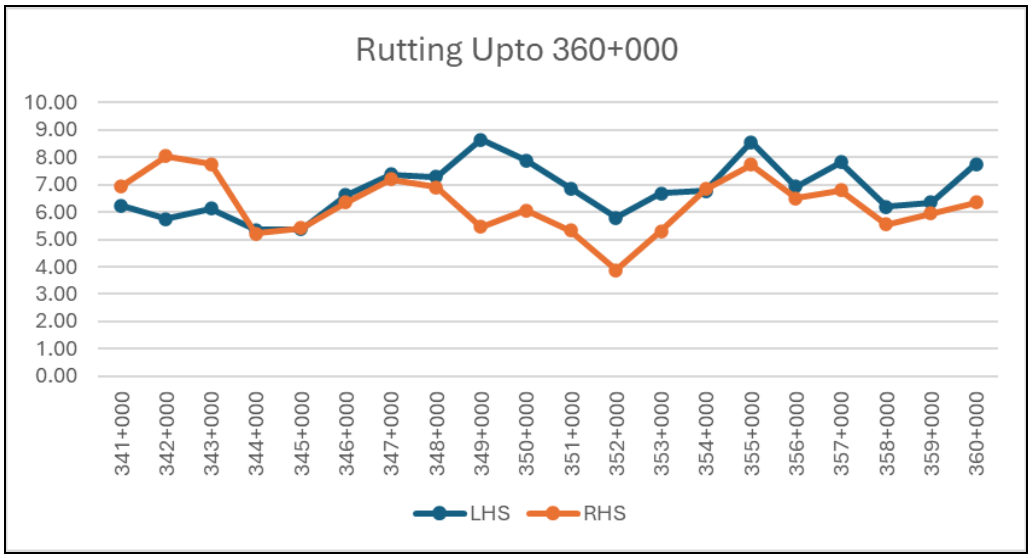



**Figure 6.17: Rutting along the Project Road**

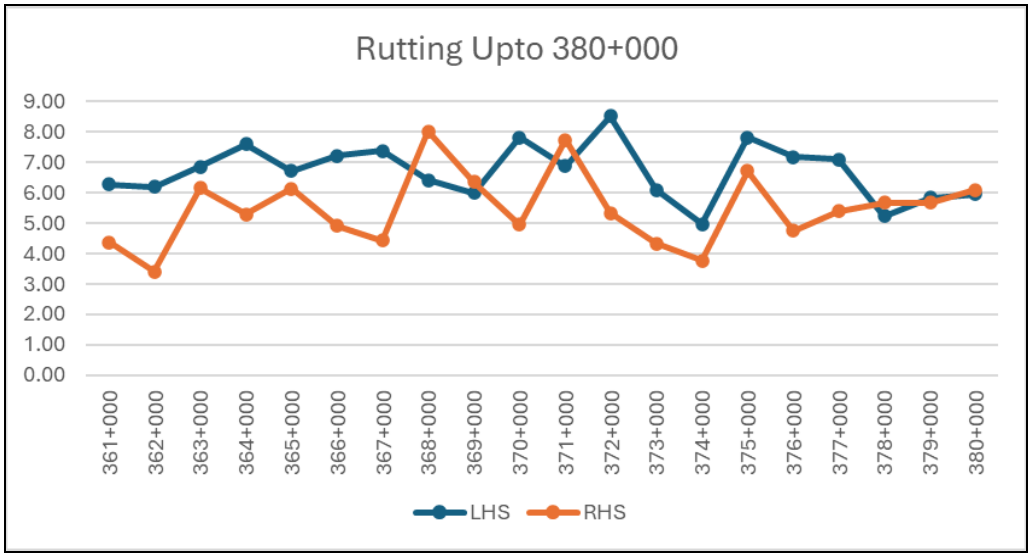



**Figure 6.18: Rutting along the Project Road**

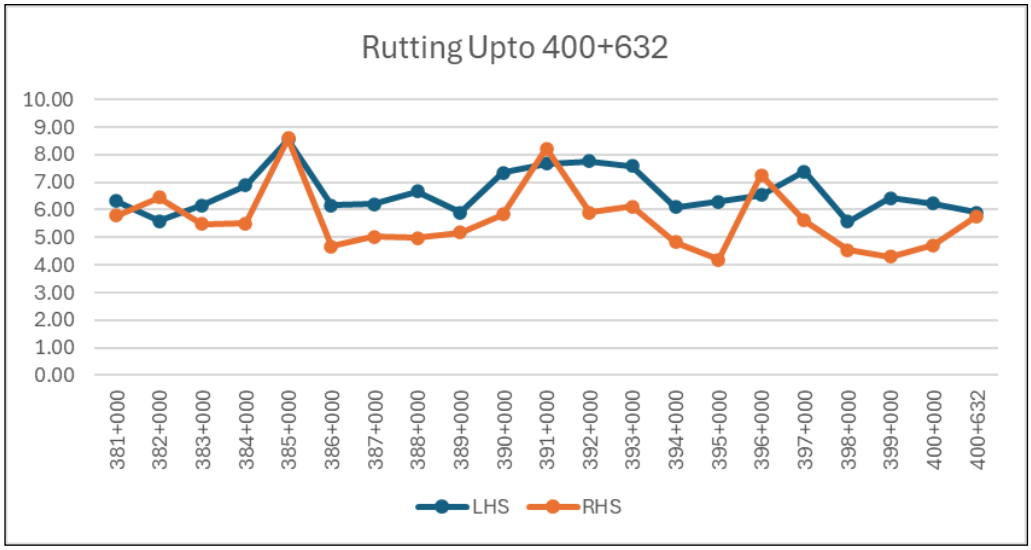



**Figure 6.19: Rutting along the Project Road**

The rutting found to have low severity varies in the range of 1.72 mm to 17.00 mm in LHS and in the range of 1.56 mm to 18.16 mm in RHS.

The pavement with respect to measured rut along the project road is summarized in **Table 6.19.**

**Table 6-19: Pavement Condition based on Rutting**

| Sl No. | Pavement | Section | Chainage | | Length (Km) | Range | Condition | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | L-1 | L-2 | L-3 | R-1 | R-2 | R-3 |
| 1 | Flexible Pavement | Section-1 | 320+810 | 326+000 | 5.19 | <5 | 3.35 | 4.82 | 0.00 | 2.41 | 4.68 | 0.00 |
| | | | | | | 5 to 10 | 1.61 | 0.36 | 0.00 | 2.52 | 0.49 | 0.00 |
| | | | | | | >10 | 0.23 | 0.01 | 0.00 | 0.26 | 0.02 | 0.00 |
| 2 | Flexible Pavement | Section-2 | 326+000 | 360+300 | 34.30 | <5 | 2.30 | 11.30 | 0.10 | 3.50 | 12.80 | 22.75 |
| | | | | | | 5 to 10 | 21.90 | 17.70 | 0.00 | 19.85 | 18.20 | 0.00 |
| | | | | | | >10 | 10.10 | 5.30 | 0.00 | 10.95 | 3.30 | 0.70 |
| 3 | Flexible Pavement | Section-3 | 360+300 | 400+632 | 40.33 | <5 | 5.90 | 19.40 | 0.10 | 5.70 | 22.45 | 36.05 |
| | | | | | | 5 to 10 | 28.33 | 18.43 | 0.00 | 25.63 | 15.88 | 0.00 |
| | | | | | | >10 | 6.10 | 2.50 | 0.00 | 9.00 | 2.00 | 0.00 |

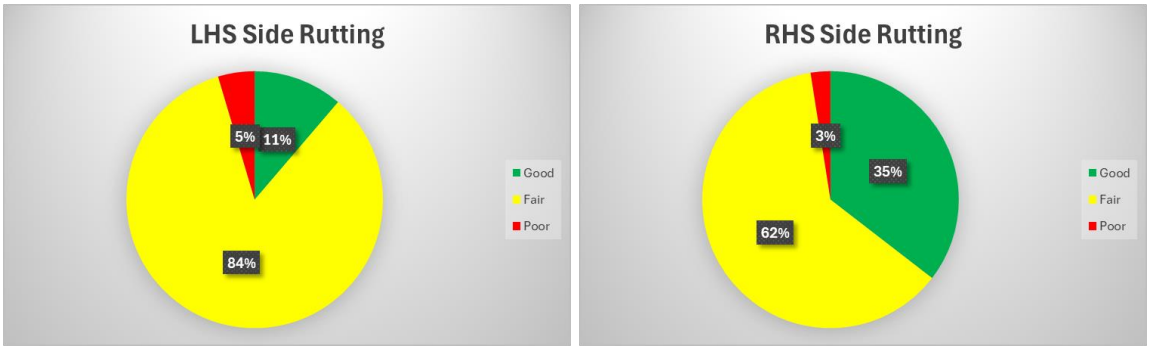



**Figure 6.20: Rutting Index for LHS and RHS carriageway (Flexible)**

### 6.8.4 NSV Roughness (IRI) Data Analysis

American Society for Testing and Materials (ASTM) specification E867-82A, Roughness is defined as "The deviations of a surface from a true planar surface with characteristic dimensions that affect vehicle dynamics, ride quality, dynamic loads and drainage." Roughness is a characteristic of the longitudinal profile in the wheel paths of the travelled surface and is best defined with respect to its impact on both the functional and structural performance of the road. As per World Bank Document-Road Deterioration and Maintenance Effects, “Roughness has an appreciable impact on vehicle operating costs and the safety, comfort and speed of travel. It also increases the dynamic loadings imposed by vehicles on the surface, accelerating the deterioration of the pavement structure”. Thus, Roughness is major parameter in evaluating the condition of the pavement generally functional aspect with respect to the user.

For the Project road, the roughness is measured by using the lasers and accelerometers located in each wheel path of the NSV. The roughness are presented in graphically at **Figure 6.21 to Figure 6.23** for both LHS and RHS.

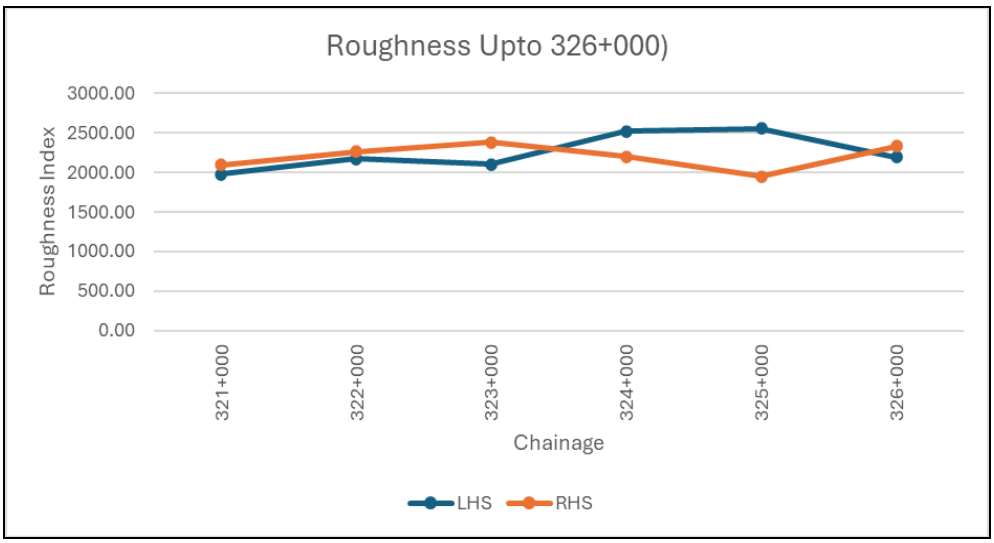



**Figure 6.21: Roughness along the Project Road**

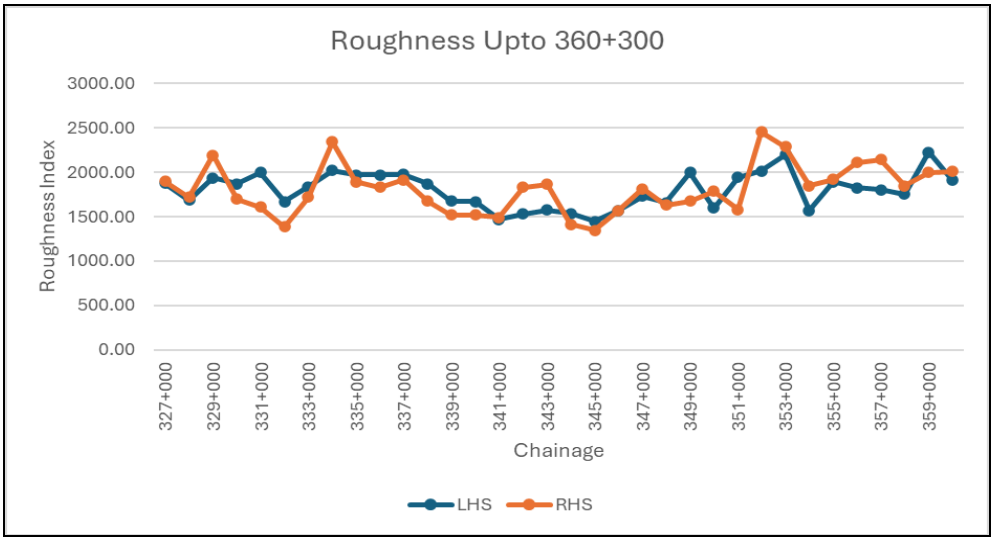



**Figure 6.22: Roughness along the Project Road**

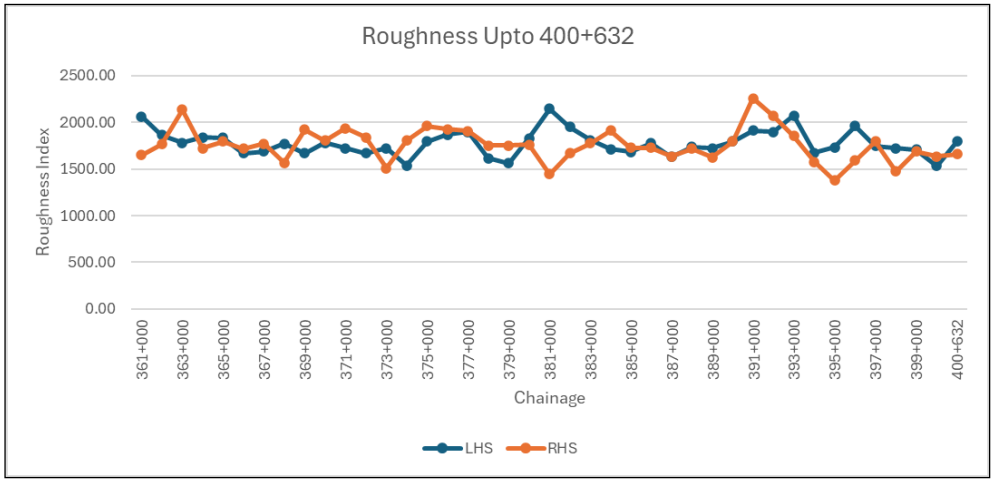



**Figure 6.23: Roughness along the Project Road**

It is observed that roughness index was similar in inner lane as compared to outer lane for both the direction. The Roughness Index of both lanes at many sections were beyond the desirable limit of 2000 mm/km in BHS.

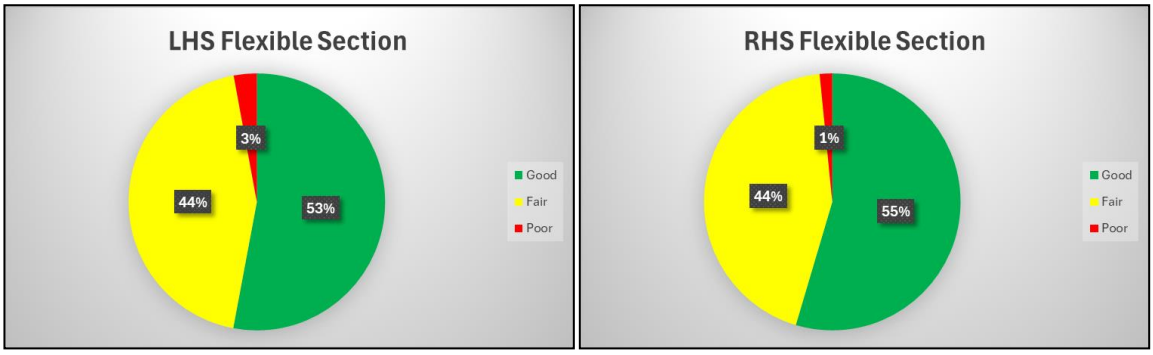



**Figure 6.24: Roughness Condition Index for LHS and RHS carriageway**

It is observed from pie-chart, 34% length of Project Stretch on LHS has roughness value in Poor condition as compared to 32% in RHS for Rigid Section & 3% length of Project Stretch on LHS has roughness value in Poor condition as compared to 1% in

RHS.

As per IRC SP 16-2004, the pavement condition of flexible pavement based on the roughness values are shown in **Table 6.20.**

**Table 6-20: Pavement condition based on Roughness**

| Sl No. | Pavement | Section | Chainage | | Length (Km) | Range | Condition | |
|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | LHS | RHS |
| 1 | Flexible Pavement | Section-1 | 320+810 | 326+000 | 5.19 | <1800 | 0 | 0 |
| | | | | | | 1800 - 2400 | 3.19 | 4.94 |
| | | | | | | >2400 | 2 | 0.25 |
| 2 | Flexible Pavement | Section-2 | 326+000 | 360+300 | 34.3 | <1800 | 15 | 16.3 |
| | | | | | | 1800 - 2400 | 19 | 17 |
| | | | | | | >2400 | 0.3 | 1 |
| 3 | Flexible Pavement | Section-3 | 360+300 | 400+632 | 40.33 | <1800 | 27 | 27 |
| | | | | | | 1800 - 2400 | 13.33 | 13.33 |
| | | | | | | >2400 | 0 | 0 |

## 6.9 SUMMARY OF NSV Survey Report

### A) Flexible Pavement

Based in NSV Survey the result are summarized in the following Table:

**Table 6-21: NSV Survey Result (Flexible Pavement)**

| Chainage | | Length (m) | Side | Roughness (mm/km) |
|---|---|---|---|---|
| From | To | | | |
| 320+810 | 321+000 | 190 | LHS | 2261.60 |
| 321+000 | 322+000 | 1000 | LHS | 2169.13 |
| 322+000 | 323+000 | 1000 | LHS | 2103.74 |
| 323+000 | 324+000 | 1000 | LHS | 2517.05 |
| 324+000 | 325+000 | 1000 | LHS | 2557.06 |
| 325+000 | 326+000 | 1000 | LHS | 2191.94 |
| 326+000 | 327+000 | 1000 | LHS | 1873.68 |
| 327+000 | 328+000 | 1000 | LHS | 1688.89 |
| 328+000 | 329+000 | 1000 | LHS | 1937.97 |
| 329+000 | 330+000 | 1000 | LHS | 1867.34 |
| 330+000 | 331+000 | 1000 | LHS | 2000.13 |
| 331+000 | 332+000 | 1000 | LHS | 1668.30 |
| 332+000 | 333+000 | 1000 | LHS | 1837.69 |
| 333+000 | 334+000 | 1000 | LHS | 2020.22 |
| 334+000 | 335+000 | 1000 | LHS | 1970.35 |
| 335+000 | 336+000 | 1000 | LHS | 1970.90 |
| 336+000 | 337+000 | 1000 | LHS | 1973.67 |
| 337+000 | 338+000 | 1000 | LHS | 1871.24 |
| 338+000 | 339+000 | 1000 | LHS | 1673.69 |
| 339+000 | 340+000 | 1000 | LHS | 1670.83 |
| 340+000 | 341+000 | 1000 | LHS | 1469.99 |
| 341+000 | 342+000 | 1000 | LHS | 1528.46 |
| 342+000 | 343+000 | 1000 | LHS | 1577.19 |
| 343+000 | 344+000 | 1000 | LHS | 1537.91 |
| 344+000 | 345+000 | 1000 | LHS | 1445.40 |
| 345+000 | 346+000 | 1000 | LHS | 1571.19 |
| 346+000 | 347+000 | 1000 | LHS | 1729.39 |
| 347+000 | 348+000 | 1000 | LHS | 1656.63 |
| 348+000 | 349+000 | 1000 | LHS | 1998.97 |
| 349+000 | 350+000 | 1000 | LHS | 1595.79 |
| 350+000 | 351+000 | 1000 | LHS | 1941.22 |
| 351+000 | 352+000 | 1000 | LHS | 2015.50 |
| 352+000 | 353+000 | 1000 | LHS | 2199.08 |
| 353+000 | 354+000 | 1000 | LHS | 1568.98 |
| 354+000 | 355+000 | 1000 | LHS | 1892.74 |

| Chainage | | Length (m) | Side | Roughness (mm/km) |
|---|---|---|---|---|
| From | To | | | |
| 355+000 | 356+000 | 1000 | LHS | 1822.89 |
| 356+000 | 357+000 | 1000 | LHS | 1801.31 |
| 357+000 | 358+000 | 1000 | LHS | 1755.44 |
| 358+000 | 359+000 | 1000 | LHS | 2224.60 |
| 359+000 | 360+000 | 1000 | LHS | 1916.17 |
| 360+000 | 360+300 | 300 | LHS | 2479.24 |
| 360+300 | 361+000 | 700 | LHS | 1887.54 |
| 361+000 | 362+000 | 1000 | LHS | 1862.57 |
| 362+000 | 363+000 | 1000 | LHS | 1780.96 |
| 363+000 | 364+000 | 1000 | LHS | 1841.96 |
| 364+000 | 365+000 | 1000 | LHS | 1835.16 |
| 365+000 | 366+000 | 1000 | LHS | 1671.10 |
| 366+000 | 367+000 | 1000 | LHS | 1690.44 |
| 367+000 | 368+000 | 1000 | LHS | 1770.02 |
| 368+000 | 369+000 | 1000 | LHS | 1668.29 |
| 369+000 | 370+000 | 1000 | LHS | 1780.33 |
| 370+000 | 371+000 | 1000 | LHS | 1720.95 |
| 371+000 | 372+000 | 1000 | LHS | 1671.24 |
| 372+000 | 373+000 | 1000 | LHS | 1724.55 |
| 373+000 | 374+000 | 1000 | LHS | 1538.34 |
| 374+000 | 375+000 | 1000 | LHS | 1796.31 |
| 375+000 | 376+000 | 1000 | LHS | 1870.27 |
| 376+000 | 377+000 | 1000 | LHS | 1896.21 |
| 377+000 | 378+000 | 1000 | LHS | 1617.20 |
| 378+000 | 379+000 | 1000 | LHS | 1562.06 |
| 379+000 | 380+000 | 1000 | LHS | 1832.42 |
| 380+000 | 381+000 | 1000 | LHS | 2146.51 |
| 381+000 | 382+000 | 1000 | LHS | 1953.79 |
| 382+000 | 383+000 | 1000 | LHS | 1812.32 |
| 383+000 | 384+000 | 1000 | LHS | 1714.73 |
| 384+000 | 385+000 | 1000 | LHS | 1685.72 |
| 385+000 | 386+000 | 1000 | LHS | 1775.94 |
| 386+000 | 387+000 | 1000 | LHS | 1628.64 |
| 387+000 | 388+000 | 1000 | LHS | 1737.31 |
| 388+000 | 389+000 | 1000 | LHS | 1721.57 |

| Chainage | | Length (m) | Side | Roughness (mm/km) |
|---|---|---|---|---|
| From | To | | | |
| 389+000 | 390+000 | 1000 | LHS | 1797.19 |
| 390+000 | 391+000 | 1000 | LHS | 1912.17 |
| 391+000 | 392+000 | 1000 | LHS | 1897.30 |
| 392+000 | 393+000 | 1000 | LHS | 2072.33 |
| 393+000 | 394+000 | 1000 | LHS | 1675.67 |
| 394+000 | 395+000 | 1000 | LHS | 1735.45 |
| 395+000 | 396+000 | 1000 | LHS | 1961.63 |
| 396+000 | 397+000 | 1000 | LHS | 1749.98 |
| 397+000 | 398+000 | 1000 | LHS | 1722.85 |
| 398+000 | 399+000 | 1000 | LHS | 1708.77 |
| 399+000 | 400+000 | 1000 | LHS | 1532.54 |
| 400+000 | 401+000 | 1000 | LHS | 1795.96 |
| 320+810 | 321+000 | 190 | RHS | 2628.00 |
| 321+000 | 322+000 | 1000 | RHS | 2264.85 |
| 322+000 | 323+000 | 1000 | RHS | 2378.81 |
| 323+000 | 324+000 | 1000 | RHS | 2197.81 |
| 324+000 | 325+000 | 1000 | RHS | 1947.75 |
| 325+000 | 326+000 | 1000 | RHS | 2330.06 |
| 326+000 | 327+000 | 1000 | RHS | 1896.99 |
| 327+000 | 328+000 | 1000 | RHS | 1720.65 |
| 328+000 | 329+000 | 1000 | RHS | 2190.89 |
| 329+000 | 330+000 | 1000 | RHS | 1696.80 |
| 330+000 | 331+000 | 1000 | RHS | 1609.04 |
| 331+000 | 332+000 | 1000 | RHS | 1387.72 |
| 332+000 | 333+000 | 1000 | RHS | 1721.71 |
| 333+000 | 334+000 | 1000 | RHS | 2345.65 |
| 334+000 | 335+000 | 1000 | RHS | 1890.16 |
| 335+000 | 336+000 | 1000 | RHS | 1832.13 |
| 336+000 | 337+000 | 1000 | RHS | 1914.30 |
| 337+000 | 338+000 | 1000 | RHS | 1672.83 |
| 338+000 | 339+000 | 1000 | RHS | 1521.02 |
| 339+000 | 340+000 | 1000 | RHS | 1517.47 |
| 340+000 | 341+000 | 1000 | RHS | 1493.46 |
| 341+000 | 342+000 | 1000 | RHS | 1828.55 |
| 342+000 | 343+000 | 1000 | RHS | 1862.09 |
| 343+000 | 344+000 | 1000 | RHS | 1414.94 |
| 344+000 | 345+000 | 1000 | RHS | 1346.03 |
| 345+000 | 346+000 | 1000 | RHS | 1568.45 |
| 346+000 | 347+000 | 1000 | RHS | 1812.16 |
| 347+000 | 348+000 | 1000 | RHS | 1629.10 |
| 348+000 | 349+000 | 1000 | RHS | 1676.63 |
| 349+000 | 350+000 | 1000 | RHS | 1784.03 |
| 350+000 | 351+000 | 1000 | RHS | 1579.10 |
| 351+000 | 352+000 | 1000 | RHS | 2452.38 |
| 352+000 | 353+000 | 1000 | RHS | 2286.14 |
| 353+000 | 354+000 | 1000 | RHS | 1846.71 |
| 354+000 | 355+000 | 1000 | RHS | 1921.54 |
| 355+000 | 356+000 | 1000 | RHS | 2108.05 |
| 356+000 | 357+000 | 1000 | RHS | 2145.47 |

| Chainage | | Length (m) | Side | Roughness (mm/km) |
|---|---|---|---|---|
| From | To | | | |
| 357+000 | 358+000 | 1000 | RHS | 1846.53 |
| 358+000 | 359+000 | 1000 | RHS | 1998.50 |
| 359+000 | 360+000 | 1000 | RHS | 2009.62 |
| 360+000 | 360+300 | 300 | RHS | 1446.78 |
| 360+300 | 361+000 | 700 | RHS | 1739.36 |
| 361+000 | 362+000 | 1000 | RHS | 1767.76 |
| 362+000 | 363+000 | 1000 | RHS | 2137.71 |
| 363+000 | 364+000 | 1000 | RHS | 1723.95 |
| 364+000 | 365+000 | 1000 | RHS | 1794.86 |
| 365+000 | 366+000 | 1000 | RHS | 1720.23 |
| 366+000 | 367+000 | 1000 | RHS | 1773.91 |
| 367+000 | 368+000 | 1000 | RHS | 1568.00 |
| 368+000 | 369+000 | 1000 | RHS | 1924.16 |
| 369+000 | 370+000 | 1000 | RHS | 1807.62 |
| 370+000 | 371+000 | 1000 | RHS | 1938.19 |
| 371+000 | 372+000 | 1000 | RHS | 1839.04 |
| 372+000 | 373+000 | 1000 | RHS | 1508.07 |
| 373+000 | 374+000 | 1000 | RHS | 1803.86 |
| 374+000 | 375+000 | 1000 | RHS | 1961.85 |
| 375+000 | 376+000 | 1000 | RHS | 1929.44 |
| 376+000 | 377+000 | 1000 | RHS | 1906.10 |
| 377+000 | 378+000 | 1000 | RHS | 1751.12 |
| 378+000 | 379+000 | 1000 | RHS | 1752.19 |
| 379+000 | 380+000 | 1000 | RHS | 1761.41 |
| 380+000 | 381+000 | 1000 | RHS | 1443.90 |
| 381+000 | 382+000 | 1000 | RHS | 1667.50 |
| 382+000 | 383+000 | 1000 | RHS | 1778.72 |
| 383+000 | 384+000 | 1000 | RHS | 1914.58 |
| 384+000 | 385+000 | 1000 | RHS | 1728.01 |
| 385+000 | 386+000 | 1000 | RHS | 1727.59 |
| 386+000 | 387+000 | 1000 | RHS | 1633.83 |
| 387+000 | 388+000 | 1000 | RHS | 1717.07 |
| 388+000 | 389+000 | 1000 | RHS | 1627.49 |
| 389+000 | 390+000 | 1000 | RHS | 1794.29 |
| 390+000 | 391+000 | 1000 | RHS | 2256.54 |
| 391+000 | 392+000 | 1000 | RHS | 2070.49 |
| 392+000 | 393+000 | 1000 | RHS | 1852.50 |
| 393+000 | 394+000 | 1000 | RHS | 1577.18 |
| 394+000 | 395+000 | 1000 | RHS | 1375.72 |
| 395+000 | 396+000 | 1000 | RHS | 1592.12 |
| 396+000 | 397+000 | 1000 | RHS | 1793.94 |
| 397+000 | 398+000 | 1000 | RHS | 1472.84 |
| 398+000 | 399+000 | 1000 | RHS | 1688.77 |
| 399+000 | 400+000 | 1000 | RHS | 1633.69 |
| 400+000 | 401+000 | 1000 | RHS | 1658.67 |

## 6.10 DETERMINATION OF MAINTENANCE REQUIREMENTS

The performance of a pavement is affected by the type, time of application, quality of the maintenance it receives. Preventive maintenance slows the rate of pavement deterioration due to traffic and environmentally applied loads. Delays in maintenance and deferred maintenance increase the quantity of defects and their severity so that, when corrected, the cost of repair is greater as shown in figure below:

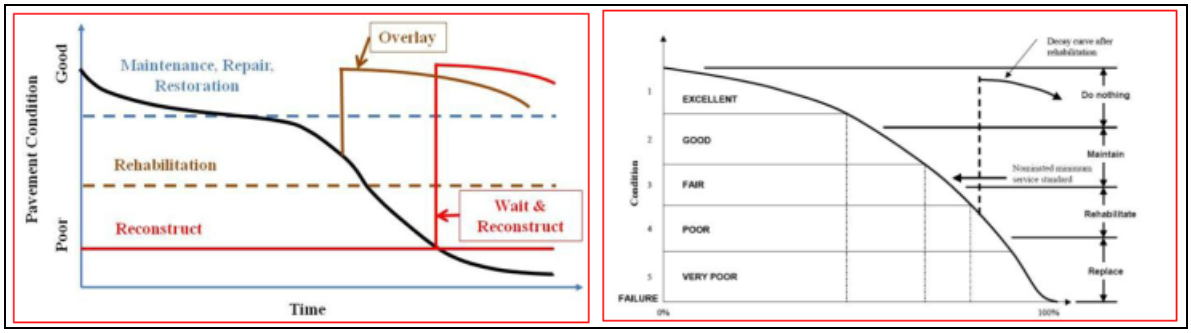



**Figure: 6.25: Pavement Deterioration / Rehabilitation Relationship**

The requirement of major maintenance is planned to carryout in stage construction. Base Year Major Maintenance Requirement based on current survey carried out and subsequent overpay requirement is forecasted based on HDM Analysis.

### 6.10.1 Base Year Maintenance Requirement (Base Year Cycle)

Based on the pavement investigation survey results, the sections along the Project Stretch were identified for overlay requirement and routine maintenance requirement. The sections have been rated based on four criteria, namely PCI, Roughness, Rutting and Remaining Life (based on FWD) in case of Flexible Pavement.

The limits and ranges for each criterion are mentioned below table:

**Table 6-22: Ranges for Rating of each criteria (Flexible Pavement)**

| Ratings | Pavement Condition Index | Roughness (mm / km) | Rut Depth (mm) | Remaining Life of Pavement |
|---|---|---|---|---|
| Good | > 70 | <2000 | <5 | <10 MSA |
| Average | 40 – 70 | 2000-3000 | 5-10 | |
| Poor | < 40 | >3000 | >10 | > 10 MSA |

## 6.11 PAVEMENT MAINTENANCE STRATEGY

The road maintenance activities can be categorized into three main categories i.e., routine maintenance, periodic maintenance and extraordinary maintenance:

- **Routine Maintenance**: It is done with a preventive approach with a purpose to preserve the pavement condition and keep it traffic worthy. Activities covered items such as filling of potholes, repairing of cracks and patch work, shoulder dressing, drain desilting etc., which are undertaken by the maintenance staff all through the year. Routine maintenance is also required for pavement markings on the bituminous surfaces to guide the road users and enhance road safety.
- **Preventive Maintenance**: Preventive maintenance is performed to improve or extend the functional life of pavement surface while in good structural condition. This may defer the timing for periodic maintenance and rehabilitation during the design life
- **Periodic Maintenance**: This includes regular maintenance operations compared to preventive maintenance such as applying a non-structural renewal coat. Periodic renewals are required to be carried out at specified frequency (scheduled response) or based upon condition and performance of road surface

(performance based) depending upon category of road, traffic and climatic conditions to improve the riding quality and reduce the rate of deterioration of the pavements.

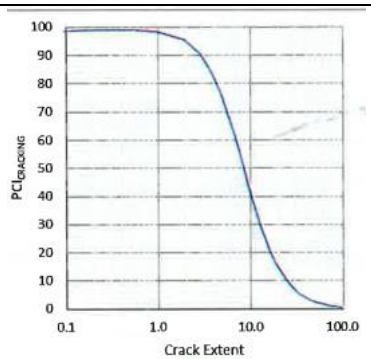
To establish an optimal maintenance strategy to preserve both functional and structural characteristics, it is necessary to predict the behaviour of the pavement under different maintenance strategies using Pavement Deterioration Models. These are mathematical models which forecast the behaviour of pavement on the basis of certain data inputs, collected directly from the road with precision equipment (Traffic loading, Roughness, deflections, layers thickness, etc.) and making reasonable assumptions in cases where data is not available.

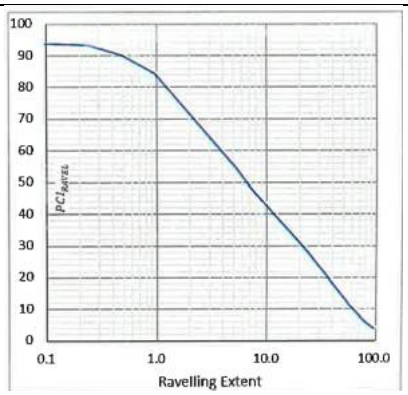
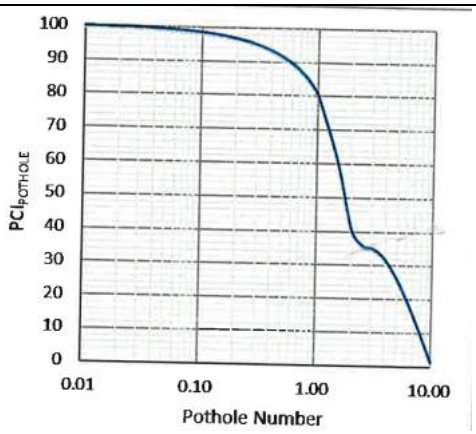
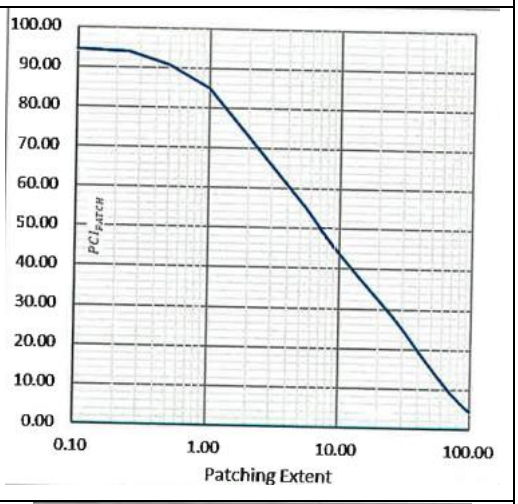
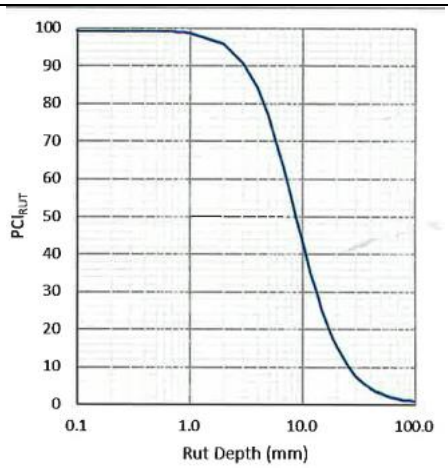
The first step towards planning of maintenance operations is the evaluation of the existing pavement surface in terms of its physical condition as well as structural capacity. For this purpose, pavement condition surveys may be undertaken using manual or instruments by identifying type, location and magnitude of the distress as described in paragraph 6.7.1. Determination of PCI for different classes of roads, are given in Table 6.24. Maintenance recommendations based on PCI value (0-100 scale) can be as per Table 6.23, As per IRC 82 – 2023 Determination of PCI for Highways/ Expressway using Table 6.24.

**Table 6-23: PCI based ratings for Highways**

| Condition | Excellent to Good | | Satisfactory to Fair | | Poor to Fail | |
|---|---|---|---|---|---|---|
| | Excellent | Good | Satisfactory | Fair | Poor | Fail |
| **PCI Rating** | >90 to 100 | >80 to 90 | >60 to 80 | >40 to 60 | >20 to 40 | 0 to 20 |
| **Recommendations** | Routine Maintenance | Preventive Maintenance | Resurfacing (based on structural evaluation) | Minor Rehabilitation (based on Structural evaluation) | Major Rehabilitation/ Structural Overlay | Re-Construction |

**Table 6-24: PCI based ratings for Highways.**

| Defects (Type) | Equations | Curve |
|---|---|---|
| Cracking (%) | $PCI_{CRACKING} = \frac{7231}{CE^2 - 0.737 \times CE + 73.09}$<br>Where CE=Crack Extent |  |

| Defects (Type) | Equations | Curve |
|---|---|---|
| Ravelling (%) | $PCI_{RAVEL} = 52.92 * e^{-0.02525*RE} + 44.1 * e^{-0.2899*RE}$<br>Where RE=Ravelling Extent |  |
| Pothole (Number) | $PCI_{POTHOLE} = \frac{-77.29 \times PN^3 + 1080 \times PN^2 - 3284 \times PN + 3192}{PN^3 + 5.665 \times PN^2 - 27.78 \times PN + 32.05}$<br>Where PN=Pothole Number |  |
| Patching (%) | $PCI_{PATCH} = 52.92 * e^{-0.02525*PaE} + 44.1 * e^{-0.2899*PaE}$<br>Where PE=Patch Extent |  |
| Rut Depth (mm) | $PCI_{RUT} = \frac{7231}{RD^2 - 0.737 \times RD + 73.09}$<br>Where RD = Rut Depth (mm) |  |

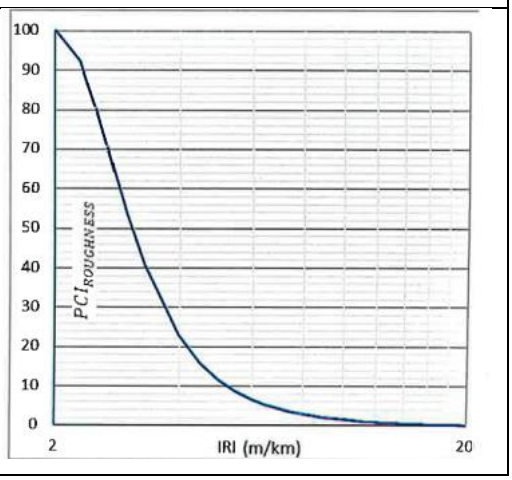
| Defects (Type) | Equations | Curve |
|---|---|---|
| Roughness (IRI) | $PCI_{ROUGHNESS} = \frac{100}{IRI^{1.91} - 3.542 \times IRI + 4.315}$ |   |

**Table 6-25: PCI Condition Based on PCI Index**

| Condition | PCI Rating | LHS | | RHS | |
|---|---|---|---|---|---|
| | | Length | Percentage | Length | Percentage |
| **Excellent** | **100-90** | 22.19 | 27.67% | 25.00 | 31.18% |
| **Good** | **90-80** | 14.00 | 17.46% | 16.00 | 19.95% |
| **Satisfactory** | **80-60** | 43.00 | 53.62% | 37.19 | 46.38% |
| **Fair** | **60-40** | 1.00 | 1.25% | 2.00 | 2.49% |
| **Poor** | **40-20** | 0.00 | 0.00% | 0.00 | 0.00% |
| **Fail** | **20-0** | 0.00 | 0.00% | 0.00 | 0.00% |

## 6.12 MAINTENANCE STRATEGY

The pavement strength, comfort, and safety are three key aspects in the operation and management of roads. Pavement Strength defines the capabilities of the pavement to absorb traffic loads in terms of ESALs. The designed pavement has the capacity to support a determined volume of commercial traffic. In addition, pavement strength will decrease due to external agents (traffic loads, environmental factors and inadequate drainage). Therefore, it is necessary to study how much traffic each homogeneous section is able to support, in order to know when it will be required to propose structural improvement works. At the same time user comfort and safety are related to the functional capacity of the pavement defined largely by Roughness Index. Simulates all major parameters of pavement distress i.e. cracking, rutting, ravelling etc. the Roughness draws together impact of all these pavement distress forms. In other words, Roughness is the dominant criteria of pavement performance and hence has been used in this study along with the Structural Number to work out the maintenance strategy.

As per IRC: SP:16-2019 the recommended standards for Roughness values are as follows:

| Surface Type | Condition of Road Surface | | | | | |
|---|---|---|---|---|---|---|
| | Good | | Average | | Poor | |
| | BI mm/km | IRI (m/km) | BI mm/km | IRI (m/km) | BI (mm/km) | IRI (m/km) |
| Rigid Pavement | <2000 | <2.81 | 200 to 2400 | 2.81 to 3.30 | >2400 | >3.30 |
| Flexible Pavement | <1800 | <2.55 | 1800 to 2400 | 2.55 to 3.30 | >2400 | >3.30 |

The pavement maintenance strategy has been prepared to ensure that the pavement roughness stays close to "Good" range i.e. less than 2.55m/km of IRI. "**Currently Project Highway are under HAM mode in Section 2 and 3. Section 1 is likely to awarded under** EPC Contractor for six lanning, therefore no routine and periodic maintenance required in this project till 2036."

**Table 6-26: Project Details of Agency & Maintenance period**

| Sl. No. | Pavement | Section | Name of Agency | Mode of Contract | Chainage | | PCOD / COD | O&M Handover Date |
|---|---|---|---|---|---|---|---|---|
| | | | | | From | To | | |
| 1 | Flexible Pavement | Section-1 | Progressive Construction Limited & Sunway Construction Berhad, Malaysia | Item Rate | 320+810 | 326+000 | Not Applicable | |
| 2 | Flexible Pavement | Section-2 | M/s Gorhar Khairatunda Highways Pvt. Ltd. | HAM | 326+000 | 360+300 | 16.10.2021/ 31.03.2022 | 15-10-2036 |
| 3 | Flexible Pavement | Section-3 | M/s Ashoka Khairatunda Barwa Adda Road Limited (AKBARL) | HAM | 360+300 | 400+632 | 09.10.2021/ 21.04.2022 | 08.10.2036 |

The maintenance strategy worked out from IRC 82 - 2023 analysis is given in Table 6.27. It includes the Structural Overlays to improve the strength of the pavement to carry the traffic for further years as well as the Functional overlays to improve the surface condition of the pavement for better riding quality.

**Table 6-27: Maintenance Strategy for Project Section**

| Chainage (PKG) | Year | Main Carriageway | Service Road |
|---|---|---|---|
| 326+000 to 360+300 (Section-2) | FY 38 | 40 mm | Not required since existing pavement is rigid |
| 360+300 to 400+632 (Section-3) | FY 38 | 40 mm | |

# Chapter 7. Condition Assessment of Toll Plaza

# 7. CONDITION ASSESSMENTS OF EXISTING TOLL PLAZA AND IMPROVEMENT PROPOSAL

## 7.1 GENERAL

The project road exists in Six lanes which starts from Km 320+810 and ends at Km 401+332 of NH-19 and old NH-2 is situated in the State of Jharkhand and the project was started in, 2022 Revenue collection operations are conducted at the designated Kulgo toll plaza at Km 352+100.

The toll collection is being collected by M/s West Well Iron & Steel, based in Kolkata.

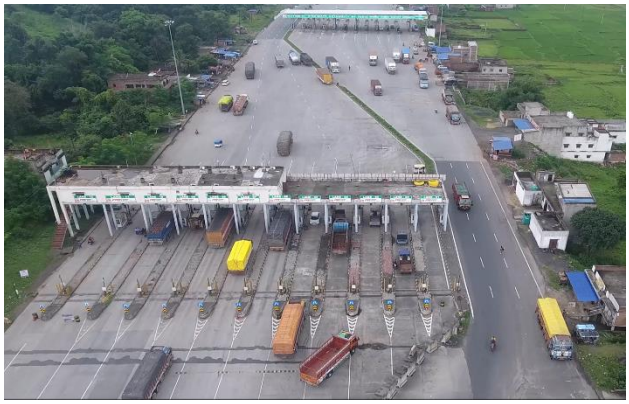
The project road is having following toll plaza:

**a) KULGO -TOLL PLAZA at KM 352+100**

The condition assessment of each toll plaza is described in subsequent section below.

## 7.2 CONDITION ASSESSMENT OF KULUGO TOLL PLAZA at KM 352+100

This is an HAM project and has been currently operating M/S PATH LTD since





**Km 352+100 Kulgo Toll Plaza**

### 7.2.1 Inventory of Toll Plaza Infrastructure

Details of existing infrastructure at Toll Plaza are furnished in **Table 7.1**.

**Table 7.1: Inventory of Existing Infrastructure at Fee Plaza**

| S. No. | Particulars | Details |
|---|---|---|
| 1 | Toll Plaza Chainage and name | 352+100 Kulgo |
| 3 | Number of Toll Lanes | 12+12 lanes |
| 4 | No. of ETC system | 12+12 lanes |
| 5 | No. of Toll Booths | 24 |
| 6 | Canopy/ FOB | Yes |
| 7 | Admin Building | Yes |
| 8 | Availability of Tunnel | Yes |
| 9 | Toilets (Gents & Ladies) | Yes |
| 10 | Type of Pavement at Toll Lanes | Rigid |
| 11 | Medium Speed Weigh in Motion Facility | Yes |
| 12 | Static Weigh Bridge | Yes |
| 13 | Availability of loading/unloading facilities | No |
| 14 | Storage facility of overloaded material | No |
| 15 | High Mast Light | 6 Nos |
| 16 | Streetlights | Yes |

### 7.2.2 Existing Toll Management System

Toll collection is being done through Hybrid ETC System. The status of each component is as follows:

#### a) Km 352+100, Kulgo Toll Plaza

| S. No. | Lane Equipment | Equipment per lane | Qty. | Specification | Status |
|---|---|---|---|---|---|
| **(1) Lane Level Equipment** | | | | | |
| 1 | RFID ETC with Mounted on Pole | 01 | 24 | ZEBRA/IDTECH | Working |
| 2 | Toll Lane Controller | 01 | 24 | DEVADITYA | Working |
| 3 | User Fare Display with mounting Pole | 01 | 24 | DEVADITYA | Working |
| 4 | Automatic barrier Gate | 01 | 24 | DEVADITYA | Working |
| 5 | Overhead Lane Status Light (OHLS) | 01 | 24 | ENVOYS | Working |
| 6 | Traffic Light with mounting Pole | 01 | 24 | ENVOYS | Working |
| 7 | Incident Capture Camera with mounting Pole | 01 | 24 | HIKVISION | Working |
| 8 | License Plate Image Capture Camera with mounting Pole or/ Automatic Number Plate Recognition System. | 01 | 24 | HIKVISION | Working but ANPR function not available |
| 9 | AOC TFT Monitor | 01 | 24 | LENOVA | Working |
| 10 | Customized Industrial Grade Keyboard | 01 | 24 | DEVADITYA | Working |
| 11 | Printers / Thermal Receipt Printers | 01 | 24 | EPSON | Working |
| 12 | Barcode Reader with Stand | 00 | 00 | | NA |
| 13 | Violation Light & Alarm (on exiting Pole) and Foot Switch in Booth | 01 | 24 | DEVADITYA | Working |
| 14 | CCTV Camera with Voice Recording | 01 | 24 | HIKVISION | Working |
| 15 | Intercom Slave Unit in Booth | 01 | 24 | AI PHONE | Working |
| 16 | Height Sensor with Mounting Pole | 02 | 24 | DEVADITYA | Working |
| 17 | AVC including Sensor, loop and detector | 01 | 24 | DEVADITYA | Working |
| 18 | Loop with Detector | 01 | 24 | DEVADITYA | Working |
| 19 | Working of software/Lane level | 01 | 24 | DEVADITYA | Working |
| 20 | MSWIM | 01 | 24 | ESSAE | WORKING |
| 21 | SWB | 01 | 01 | ESSAE | NOT WORKING |
| **(2) Plaza Level Equipment** | | | | | |
| 22 | Plaza Server with Hot Standby configuration | 01 | 01 | HP | Single server without hot standby working |
| 23 | Office PC with Monitor and Keyboard Mouse | 01 | 01 | LENOVA | Working |
| 24 | PC with Keyboard/Mouse | 04 | 04 | LENOVA | 4 TERMINALS FOR CASH, LSUD, POS AND REORTS |
| 25 | Network Printer | 01 | 01 | HP | Working |
| 26 | Network Switch | 01 | 01 | CISCO | 24 PORT-01 Working |
| 27 | Internet Router for Connection to the CCH | 01 | 02 | DLINK | Working |
| 28 | UPS with Battery Bank | 02 | 26 | NUMERIC | 2 KVA-24 LANE,10 KVA - 2 NOS FOR |

| S. No. | Lane Equipment | Equipment per lane | Qty. | Specification | Status |
|---|---|---|---|---|---|
| | | | | | SERVERS, Working,16 BATTERIES |
| 29 | Outdoor Wi-Fi Access Point (Managed & Rugged) | 02 | 02 | DLINK | Working |
| 30 | LED Display for CCTV Monitoring | 01 | 01 | 55" SAMSUNG | Working |
| 31 | Network Video Recorder (NVR) For CCTV Recording | 01 | 01 | HIKVISION (32 PORT) | Working |
| 32 | CCTV Camera for Control Room, Cash Room, Manager Room, Office Out | 01 | 04 | HIKVISION | Working |
| 33 | Intercom Master Unit in Control Room | 01 | 01 | AI PHONE | working |
| 34 | DG Set | 01 | 01 | 120 KVA | Working |
| 35 | Firewall | 01 | 01 | FORTNET | Working |
| 36 | Server Stabilizer | 01 | 01 | KRYCARD | Working |
| 37 | Cabling / Networking | 01 | 01 | DEVADITYA | Working |
| 38 | Broadband Internet Connection | 02 | 02 | AIRTEL, JIO | Working |
| 39 | Working of software/Plaza Level | 01 | 01 | DEVADITYA | Working |

**Some photographs of Toll Plaza are attached as below:**

1. **Kulgo Toll Plaza at Km 352+100**









### 7.2.3 Upgradation of Toll Management System

NHAI has awarded M/s Path Ltd (Kulgo Toll Plaza) & M/s Software to install TMS System and work has commenced by the agency. The work is expected to be completed by end of October 24.

### 7.2.4 Condition Survey Status and Proposals

For improvisation we visited the toll and audited the existing condition of the Plaza WRT to Section 10 of IRC SP 84-2014 provisions for toll plaza. Proposals are recommended with condition report.
As per survey conducted below mentioned, Kulgo Toll Plaza area it is observed that the HETC system of M/S DEVADITYA is installed as an upgrade from IHMCL It is noticed that ICT 2.5 is installed and the condition of TMS and the toll plaza lanes is in good condition. The control room is established in a very unprofessional way with the TMS server, and the UPS are installed

### 7.2.5 Recommendation/ Suggestions for Improvement

#### a) Km 352+100 Kulgo Toll Plaza

1. The SI M/S DEVADITYA installed the system in 2021 and the Hybrid ETC system works in all 24 lanes in two staggered toll plazas with 12 lanes each WITH GANTRY. The ETC system was upgraded in 2021
2. There is a tunnel available for the mounting of LC and TC in both the plazas
3. The Hybrid ETC system with ANPR is installed in all 24 lanes and last two lanes are dedicated cash/VIP lanes in both plazas.
4. The average traffic is 8000 vehicles with an average collection of 35 lacs
   Out of total traffic MAV-30%, car/passenger -40% and truck/LCV/BUS-30%. Two wheelers are exempted from Toll
5. Penalty collection of non FASTAG vehicles is done in all lanes
6. Currently there is a FASTAG penetration of 96% and audit/validation of transactions done at the end of the shift
7. The current CCH is YES BANK and ICT 2.5 is implemented
8. There is tunnel available in both plazas
9. 2 Nos. of Plaza PTZ available and working
10. The toll collection is operated by M/S PATH TECHNOLOGIES with 130 manpower for 3 shifts
11. The control room for TMS with 1 NO OF 55” inch monitor is INSTALLED
12. The control room is in admin building with both TMS and ATMS servers with 2 - 10KVA central UPS FOR SERVERS and batteries. The lane UPS 2KVA is installed in booths. The TMS server currently has no backup server in hot standby provision
13. There is separate POS Windows on the ground floor
14. Handheld machines are not currently used for charging wrong/faulty/no FASTAG users in the lane
15. There is a DG of 125 KVA available for the backup of the toll plaza operations
16. The TMS system is not maintained well and needs further rectification. It is recently installed by M/S DEVADITYA.
17. NHAI is implementing Multi Lane Free Flow (MLFF) in all toll plaza, it is therefore recommended to provide MLFF system for toll collection at same location.

### 7.2.6 Toll Lane Requirement Analysis for Toll Plaza

All toll lanes are equipped with Hybrid ETC Lanes and capacity of each lane is considered as 400 vehicle / hour as per NHAI / Policy Guidelines/ Management of Plaza / 2021 dated 24th May 2022.

Based on above guidelines, Numbers of existing Toll Lane is derived, and it is found that existing toll lanes are sufficient for next 20 years.

## 7.3 ATMS

The existing ATMS equipment are as follows:

| S. No. | Equipment Description | Unit | Total Quantity | | |
|---|---|---|---|---|---|
| | | | Km 320+810 to Km 326+000 | Km 326+000 to Km 360+300 | Km 360+300 to Km 401.332 |
| 1 | CCTV PTZ Cameras | No | DPR in Progress | 11 | 9 |
| 2 | VIDS/VIDES | No | | 2 | 8 |
| 3 | ATCC | No | | 2 | 2 |
| 4 | VMS | No | | 3 | 2 |
| 5 | MET | No | | 1 | - |
| 6 | Portable VMS | No | | - | 1 |
| 7 | ECB | No | | 12 | 17 |

**Conclusion:** As per the new policy circular of ATMS, 2023 all projects installed with 2016 circular shall get upgraded to the same with change of scope being awarded by IHMCL. Hence it is advised that the current ATMS shall be migrated to 2023 at the earliest possible.

The Concessionaire shall also integrate existing ATMS with new ATMS. Entire ATMS shall retain and maintain all components throughout the Concession Period.

The Concessionaire shall also maintain existing ATMS after the O & M Handover Date.

### Various Component of ATMS

#### 7.3.1 CLOSE CIRCUIT (CCTV):

I. INFORMATION

The purpose of the Video surveillance system is to monitor specific areas of the Highway remotely from the CCR by use of cameras installed at such critical junctions. This shall help in managing incidents. The system shall also record and store video for analysis and future reference. The functional and technical requirement of the Closed-Circuit Television (CCTV) System to be used as a sub-system of ATMS Implementation shall include fixed cameras and PTZ cameras.

II. LOCATION: Currently not installed

The system monitors vehicles and other road related activity along the highway stretch.

CCTV system is required to ensure effective surveillance of the target road section

and related surrounding areas and generate a tamperproof record for post event analysis.

The software supplied and installed at the ATMS Control Centre to operate the CCTV systems shall be able to integrate with/Export data to and import data from the ATMS unified database located in ATMS Control Centre.

### 7.3.2 VIDEO INCIDENT DETECTION SYSTEM (VIDS)

I. PURPOSE AND GENERAL INFORMATION

The purpose of the VIDS is to sense, detect and record the incident. The system shall be an intelligent image detection using camera. The VIDS shall have inbuilt intelligence to ascertain when the image has meaningfully deviated from the standard image originally recorded. A pilot run for VIDS is suggested before implementation.

The specification, functional and technical requirement of the CCTV based VIDS to be used as a sub-system of ATMS implementation, for automatic detection of incidents and generation of local visual alerts. It also includes the associated visual alerts in the form of flashing lights which are connected to and activated by the VIDS. The system offered shall have the capability to also operate in low light conditions normally experienced during night. In very poor visibility conditions such as during winter fog/smog, the system shall detect the condition of poor visibility and generate visual alerts. Further it shall raise an alarm if signal/image quality is too poor to reliably process.

The Incident Detection system shall be capable of the following:

a) Measurement of traffic flow speed between 0 and 150 km/hr for up to 6-lanes.
b) Detection of vehicles driving in wrong direction
c) Automatic detection of 5 types of traffic flow: normal, dense, delayed, Congested, stop and go
d) Detection of stopped vehicles, within 10 secs and for up to 16 detections zones.
e) Monitor Zone occupancy of the detection area
f) Detection of deceleration
g) Detection of fog/smoke

II. LOCATION: Currently not installed

VIDS is established at strategic locations. The software supplied and installed at the ATMS Control Centre to operate the CCTV-based VIDS shall be able to integrate with/Export data to and import data from the ATMS unified database located in ATMS Control Centre.



**Figure 7.1 : VIDS System**

### 7.3.3 VEHICLE ACTUATED SPEED DISPLAY SYSTEM

**Currently the speed detection and challan system in the project is installed and handled by Road Transport Authority of Pinakollu. There are 3 installations done on gantry by the department with 3 Nos of 2D cameras. The speed violation challan is generated after displaying the same to driver**

VASD was introduced to ITS by considering the number of accidental deaths on highways causing by over speeding vehicles. Vehicle automatic speed detection system will be working as a violation warning for those vehicles which cross the maximum allowed speed on that route. This system will be capturing the Speed of each vehicle and also will capture the Image for those vehicles which crosses the speed limit on that route and find the details from vahan.nic.in and penalize the person to restrict them from repeating the same.



**Figure 7.2: Vehicle Speed Display System**

FEATURES:

a) Awareness of the road user about their speed.
b) Displaying the vehicle speed on bigger display.
c) Online Penalty impose on speed violation.
d) Reducing the number of over speeding vehicles
e) Increasing Road-Safety.

### 7.3.4 AUTOMATIC NUMBER PLATE RECOGNITION (ANPR):

**Currently not installed in the project**

Automatic Number Plate Recognition (ANPR) system is based on artificial intelligence, providing a robust and ready-to-integrate system, capturing diverse types of license plates.

ANPR is also known as Automatic License Plate Recognition (ALPR), is software used to recognize the number plates automatically by performing sophisticated optical character recognition on images to read the license plates of vehicles.



**Figure 7.3: ANPR System**

### 7.3.5 AUTOMATIC TRAFFIC COUNT AND CLASSIFIER (ATCC): CURRENTLY NOT INSTALLED

The ATCC is a data-gathering instrument for use in the field (roadway). With Phoenix ATCC and possible combinations of sensors; traffic data and vehicle classification can be recorded and later retrieved. Speed, Number of Axles, Vehicle Class Type are just a few types of data, which can be gathered with this instrument. For the unit itself, the welded aluminium case is durable, lightweight, and weather resistant. The Interior keypad & display are both sealed to prevent moisture from damaging them. Inside the case is the heart of the unit, the microprocessor. Printed circuit boards contain the microprocessor, backup battery, charging network, memory, and all other support circuitry for the unit.



**Figure 7.4: ATCC System**

### 7.3.6 TRAVEL TIME ESTIMATION SYSTEM: CURRENTLY NOT INSTALLED IN THE PROJECT

The Travel Time Measurement System (TTES) is used to estimate the travel time over a highway segment between any two defined locations. The TTES employs RFID transceivers at such defined locations to identify vehicles by reading the RFID FASTag or any valid 18000-6C RFID tag (e.g. the OEM tags on many new vehicles) affixed oon their windshields. The travel time estimation algorithm that executes on an exclusive server networked with the above transceivers, looks for the matching of tag numbers (the Tag-ID) read at the source (start location) of the segment with tag numbers read at the destination (end location of the segment). A statistical estimate of the travel time between the two locations is arrived at based on the calculated time difference between the reads at these two locations for several matching tags.

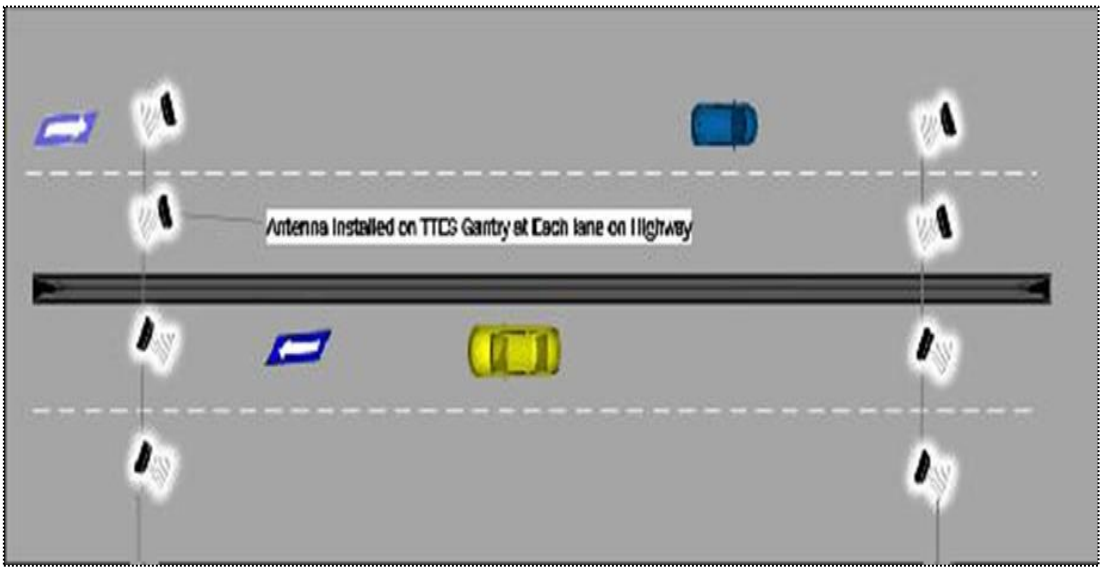



**Figure 7.5: TTES System**

### 7.3.7 OFC BACKBONE

I. PURPOSE AND GENERAL INFORMATION

The purpose of the OFC backbone is to transport voice, data, LAN and video services between the field equipment and CCR.

As the transmission system would be used as a backbone network, the system shall have following characteristics:

a) High Availability
b) High Reliability
c) Dual ring configuration
d) Easy to install and operate
e) Scalability
f) High degree of flexibility with respect to the types of interfaces

II. LOCATION: Currently not installed

OFC shall be laid all through the Highway. It may be laid on RHS or LHS of the main carriageway or in the median. Lateral elements shall be connected on OFC or copper.

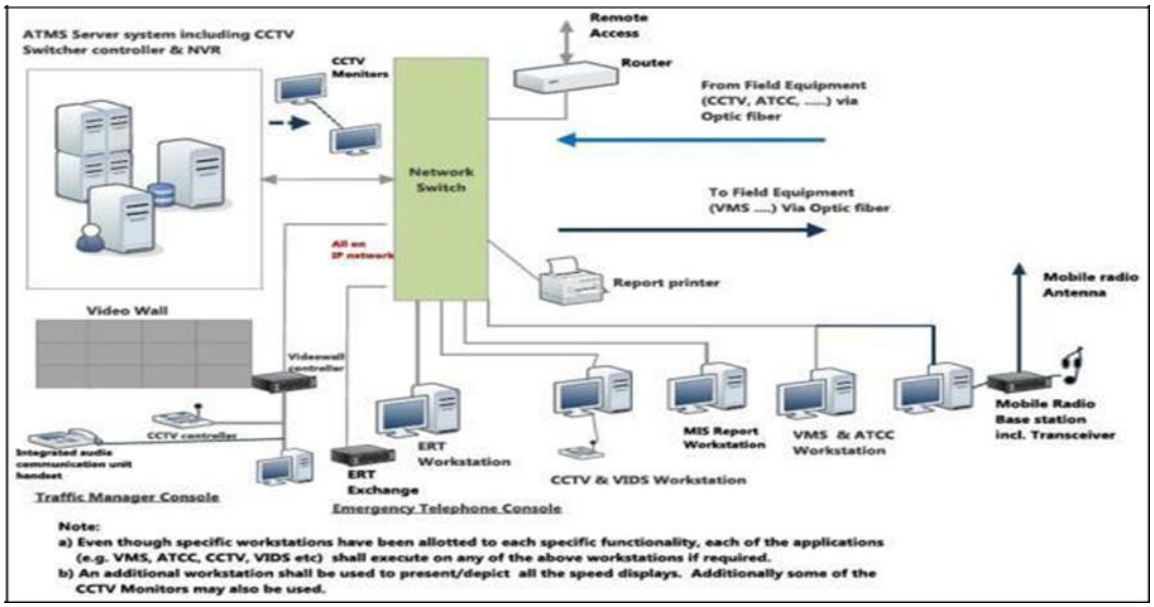



**Figure 7.6: OFC Backbone**

### 7.3.8 NETWORK MANAGEMENT SYSTEM

I. PURPOSE AND GENERAL INFORMATION

This system provides connectivity between ATMS Control Centre and outdoor equipment such as Emergency Roadside Phones, Variable Message Signs, Mobile and fixed CCTV cameras, Speed Displays, ATCC, Mobile Weigh in motion Stations, etc.

It also provides the external data connectivity required between the ATMS control centre and the NHAI ATMS Cloud as well as between the ATMS control center and the NHAI ATMS Master & relevant Regional Control Centres.

The Fiber Optic Transmission System shall be equipped with a user-friendly, Microsoft, Windows-based Network Management System (NMS). The NMS shall allow the operator to manage and monitor multiple sub-networks in an efficient way.

The NMS shall have the following functionality: network configuration, configuration of services, monitoring, diagnostics, activation-deactivation of interface modules, bandwidth allocation, alarms and event logging and graphical network representation.

The network management hardware shall consist of a Personal Computer, which at the time of installation is the current industry standard. The NMS architecture shall be based on Employer-server technology. It shall be possible to connect multiple active Employers to the NMS server allowing network management from multiple and/or remote locations or by multiple users.

II. LOCATION: Currently not installed in the project
Software at Central Control Room.

### 7.3.9 CENTRAL CONTROL ROOM (CCR)

I. PURPOSE AND GENERAL INFORMATION

The purpose of the CCR is to monitor the Highway and to provide information to the road user. The CCR also houses the central servers and data processing equipment.

The CCR shall provide the real-time information and assistance to the Highway users, collect data for the use of Highway authorities and to monitor and control the Traffic on the Highway as per the requirements.

The CCR shall be designed for round-the-clock operations of monitoring, on-line information acquisition and processing the same for decision making. The CCR shall be the repository of all the data acquired from the field and their processing, storing, and archiving. All the information for real time monitoring oh Highway shall be generated at the CCR, and the relevant information shall be disseminated to the users through VMS, and to O&M teams through mobile radio.

ATMS Control Centre would be the facility from where all the activities of the ATMS would be controlled. ATMS Control Centre would primarily comprise the indoor portion of CCTV, VMS, and other support systems. All the subsystems shall preferably reside in a dedicated permanent structure with adequate floor area to house the required manpower and equipment. Where such a permanent floor/building/structure cannot be made available, the ATMS Control Centre shall be housed in temporary portable cabins.

II. LOCATION: Currently not installed in the project
There shall be one CCR located in any toll plaza.

### 7.3.10 GRAPHIC USER INTERFACE (GUI)

The GUI for the system shall be map based and menu driven. The changes commands/ menu shall be simple to be executed by the operator. There shall be a

screen depicting the map of the highway along with other equipment installed on the route. The highway map shall be capable of displaying an overview level showing the whole area covered by the system. It shall then be possible with no loss of definition, to zoom to a detailed map. It shall be possible to display both static and dynamic data on the Map.

Two level of mapping shall be supported as a minimum:

a) Highway Overview.
b) Highway section wise detailed view.

Icons shall be placed on the map to identify different equipment types. Both shall be automatically tagged with grid reference data to allow them to appear in the correct relative positions at both levels of map. Positioning the mouse pointer over an icon or poly-line shall display the corresponding equipment status information.

For poly-lines representing route data, the user shall be able to configure a number of thresholds for the different data types available. An example would be congestion for links where up to X% percentage thresholds can be defined. Each threshold shall be represented by a distinct colour or changed shapes. The map shall use this scheme to display the poly-lines based on comparisons with the current real-time data.

The user shall have the ability to configure the map view to display the data layers of choice, for example to show Met Sensor only or ATCC together with current incidents.

**Conclusion: The ATMS system to be installed as per the latest circular of the 2023 in the entire project of Gorhar to Barwa Adda covering the entire stretch of 80.522 km.**

# Chapter 8. Materials Investigation

# 8. MATERIALS INVESTIGATION

## 8.1 INTRODUCTION

This report presents the findings of the Materials Investigation conducted along with the alignment of the project road under in the state of Jharkhand. The project corridor begins at Km 320+810 and ends at Km 401+332 of NH-02 (New NH-19), covering the Gorhar to Barwa Adda section, located within the states of Jharkhand.

The survey and investigations include Identification of borrow area locations and laboratory testing on borrow soil samples, Identification and laboratory testing of Quarry materials and identification and laboratory testing of locally available industrial waste.

As per TOR, the scope of the services with regard to material investigation broadly includes:

(a) Locate, explore and evaluate the suitability of locally available sources of borrow soil / natural gravel, riverbed material for use in the embankment and subgrade.

(b) Identify existing sources of rock aggregates within short haulage distance from the project road for subbase / base course, cement concrete works and bituminous works.

(c) Identify potential sources of sand and water

(d) Identify existing sources of Fly ash and Pond ash material if available in the vicinity of project area for use in Embankment fill, pavement layers and concrete works. Identify sources of construction materials like cement, bitumen, steel, admixtures etc.

(e) Establish quality and quantity of various construction materials which mainly includes borrow soil, sand, aggregates & water and recommend their use on the basis of techno-economic principles.

(f) Perform relevant laboratory tests to determine engineering properties of the materials from (a) to (d) above and evaluate the suitability of each material for use in the construction of the project road.

(g) Preparation of mass haul diagram and quarry charts indicating the location of selected borrow areas and quarries.

(h) Preparation and testing of bituminous mixes for various layers and concrete mixes of different design mix grades using suitable materials (binders, aggregates, sand filler etc.) as identified during Material Investigation to conform to latest MoRT&H specification.

## 8.2 SAMPLING AND TESTING

For evaluating the characteristics and suitability of borrow soils and construction materials, representative samples of soil/construction materials as mentioned in TOR, were collected from identified borrow area, identified quarries of stone metal/sand and water sources. Fly ash samples are also collected for laboratory testing. The sampling and various laboratory tests conducted on soil and other construction materials are presented in **Table 8.1** below:

**Table 8.1: Sampling and Testing Criteria**

| Sl. No. | Investigation | Frequency | Laboratory Testing Criteria | |
|---|---|---|---|---|
| | | | Description of Test | Standard Code Applicable |
| i) | Borrow Soil Samples | @ 8 Km | Soil Classification | IS 1498 |
| | | | Sieve Analysis | IS 2720 (Part – 4) |
| | | | Atterberg Limits | IS 2720 (Part – 5) |
| | | | Laboratory Compaction Test (Modified Proctor Test) | IS 2720 (Part – 8) |
| | | | 4-day soaked CBR at 3 energy levels corresponding to 10, 35 & 65 blows | IS 2720 (Part – 16) |
| | | | Free Swell Index | IS 2720 (Part – 40) |
| ii) | Stone metal samples from crushers/quarries | @ 25 Km | Sieve Analysis | IS:2386 (Part-1) |
| | | | Flakiness and Elongation Index | IS 2386 (Part – 1) |
| | | | Specific Gravity and Water Absorption | IS 2386 (Part – 3) |
| | | | Aggregate Impact Value (AIV) | IS 2386 (Part – 4) |
| | | | Stripping and Coating test | IS 6241 |
| | | | Soundness if Water Absorption is more than 2% | IS: 2386 (Part 5) |
| iii) | Fine Aggregates | @ 25 Km | Grain Size Analysis | IS 2386 (Part – 1) |
| | | | Designation of sand zone | IS 383 - 1997 |
| | | | Fineness Modulus | IS 383 - 1997 |
| | | | Specific Gravity and Water Absorption | IS 2386 (Part – 3) |
| iv) | Water sample | @ 10 Km | pH Value, Chlorides, Sulphates ($SO_3$), Acidity, Alkalinity, Organic, Inorganic impurities and suspended matter | MORTH ($5^{th}$ Revision) |
| v) | Pond/Fly Ash | One Source | Sieve Analysis | IS 2720 (Part-4) |
| | | | Atterberg's Limits | IS 2720 (Part-5) |
| | | | Compaction Test (Modified proctor test) | IS 2720 (Part-8) |
| | | | CBR at three energy level | IS 2720 (Part-16) |
| | | | Shear strength parameters (Direct shear) | IS 2720 (Part-13) |

## 8.3 BORROW AREA INVESTIGATION AND TESTING

The objective of borrow area investigation was to identify suitable borrow sources (in terms of quantity and quality) in the near vicinity of the project road(s) for embankment fill & sub-grade. The exploration is conducted in each identified borrow area by excavating test pits measuring 1 m x 1m in plan to a depth of 1 to 2 m so that topsoil and vegetation layer shall not be collected for sampling. Soil samples were collected from excavated pits of each borrows area for laboratory testing. The laboratory testing conducted on borrows soil samples collected from identified locations are mentioned in **Table 8.2**

A total of Ten (10) borrow area have been identified, visited, inspected, and sampled. A summary description of the borrow areas indicating their location with respect to project road chainage, approximate distance from the source to the nearest point on the project road, estimated available quantity of soil at **Table 8.2**. The existing site conditions at borrow sources are presented in **Fig 8.1** and Lead chart has been shown in **Fig 8.3**

**Table 8.2: Description of Soil Borrow Source for Pkg-1**

| BA No. | Chainage/ Side | Lead from Existing Road Km | Type of Land | Depth (m) |
|---|---|---|---|---|
| BA-1 | 321+650 L/S | 1.0 | PVT | 1 |
| BA-2 | 350+900 R/S | 1.0 | PVT | 1 |
| BA-3 | 360+300 R/S | 1.6 | PVT | 1 |
| BA-4 | 373+070 L/S | 0.8 | PVT | 1 |
| BA-5 | 395+700 R/S | 1.0 | PVT | 1 |



***BA-1 350+900 R/S***



***BA-3 373+070 L/S***

**Fig 8.1: Photographs of Borrow Area Sources**

The test results of borrow area soil are summarized in **Table 8.4** From the **Table 8.2** the following conclusions can be made:

a) Borrow soil suitable for embankment and subgrade can be borrowed from these locations.

b) The lead of the borrow area location is within 5 Km with maximum lead distance is 2.0 km.

c) It is observed from the laboratory testing that the soils from the investigated borrow areas are predominantly fine grained i.e. silty or clayey (about 80% of the soil samples collected) classified as CL and ML.

d) The liquid limit of the borrow soil varies in the range of 2.46 to 35.9 and the soil PI found in the range of 3.1 to 12.0. The MDD of the soil is found to be in the range of 1.93 gm/cc to 9.80 gm/cc with OMC varying from 7.2% to 11.6%.

e) The soaked CBR (97% compaction) of the borrow soil sample is found to be in the range of 14.0% to 19.2% with 80% of soil samples have CBR at 97% compaction greater than 10%.

f) All the borrow soils are suitable for construction of embankment and subgrade as per the MORTH standards.

**Table 8.4: Physical Characteristics of Borrow Area Soils**

| BA No. | Location / Chainage | Sieve Analysis (% Passing by Weight) | | | | | | | Atterberg Limit | | Soil Classification as per IS | Laboratory Compaction | | 95% Compaction | 97% Compaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 100 mm | 75 mm | 19 mm | 4.75 mm | 2.0 mm | 425 micron | 75 micron | LL % | PI % | | OMC (%) | MDD (gm/cc) | CBR (%) | CBR (%) |
| 1 | 321+650 L/S | - | - | 100 | 81.54 | 72.92 | 59.79 | 18.46 | 32.6 | 10.7 | GC | 10.40 | 2.010 | 15.45 | 16.30 |
| 2 | 350+900 R/S | - | - | 87.59 | 71.54 | 59.92 | 47.21 | 28.46 | 24.6 | 3.1 | GC | 9.8 | 2.060 | 17.55 | 18.50 |
| 3 | 360+300 R/S | - | - | 92.15 | 76.61 | 62.42 | 44.53 | 33.41 | 31.9 | 7.3 | GC | 10.90 | 1.955 | 14.2 | 15.1 |
| 4 | 373+070 L/S | - | - | 94.80 | 74.29 | 61.51 | 46.21 | 29.92 | 32.2 | 30.2 | GC | 10.10 | 2.100 | 14.9 | 15.8 |
| 5 | 395+700 R/S | - | - | 95.92 | 73.88 | 59.05 | 43.61 | 34.28 | 35.9 | 12.0 | GC | 11.60 | 1.935 | 13.0 | 14.0 |

## 8.4 SOURCE OF CRUSHED ROCK AGGREGATE, NATURAL SAND

The locations of most of the presently known sources of quarry and sand in the project vicinity have been examined.

The location and general details of quarry/ commercial crusher for aggregate source and natural sand with the approximate lead distance from each source to the nearest point on the project road are given in **Table 8.5a and 1.5b** respectively. Photos of identified crushing plant producing rock aggregate and sand source are shown in **Fig. 8.2.**

**Table 8.5a: Description of Aggregate Source**

| Source ID | Existing Chainage / Side | Location / Village Name | Lead from Nearest Point of Project Road (km) | Quantity |
|---|---|---|---|---|
| Q1 | 400+132 L/S | Vikash Crusher | 39.2 | Plenty |

**Table 8.5b: Description of Natural Sand Source**

| Source ID | Location / Village Name | Lead from nearest point of project road (km) | Quantity | River |
|---|---|---|---|---|
| SQ1 | Chirkunda | 62.8 | Huge | Barakar River |

From each of the above-mentioned sources representative Aggregate samples & natural sand have been obtained.




*Aggregate Source-Q1 (400+132 L/S)*

**Fig 8.2: Photographs of Stone Crusher and Sand Source**

Representative samples of rock aggregate and sand have been collected from above sources for laboratory testing. Test results of aggregate samples and representative sand samples collected are presented in **Table 8.6** and **Table 8.7** respectively.

**Table 8.6: Aggregate Test Results**

| Source ID. | Location / Chainage | Size (mm) | Specific Gravity | Water Absorption (%) | Combined Flakiness & Elongation | AIV (%) |
|---|---|---|---|---|---|---|
| Q1 | Ekta Engineering Works | 40 | 2.762 | 0.44 | 25.5 | 26.7 |
| | | 20 | 2.738 | 0.55 | 27.2 | |
| | | 10 | 2.722 | 0.93 | 27.4 | |
| | | Stone Dust | 2.623 | 1.49 | - | |

**Table 8.7: Natural Sand Test Results**

| Sieve Size (mm) | S1<br>Barakar River |
|---|---|
| | Cumulative % Passing (by mass) on the sieve |
| 10<br>4.75<br>2.36<br>1.18<br>0.600<br>0.300<br>0.150<br>0.075 | 100<br>100<br>93.4<br>84.11<br>71.47<br>24.10<br>4.58<br>3.0 |
| Fineness Modulus* | 2.8 |
| Grading Zone as per Clause 1008 of MORT&H | III |
| Specific Gravity | 2.58 |
| Water Absorption (%) | 1.4 |

*Fineness modulus of fine aggregate shall neither be less than 2.0 nor greater than 3.5.

Comparing the above results (as available) with Table 8000-2 of MORT&H specification, it can be concluded that samples from sand from Narmada River (S1) are comply with the grading zone for concrete sand.

## 8.5 SOURCE OF CONSTRUCTION WATER

The primary source of water for concrete works could be natural streams, springs and ground water. The latter can be obtained from deep bore wells. Potable water is generally acceptable for concrete works.

## 8.6 SOURCES OF POND ASH & FLY ASH

Flyash and bottom ash are the by-products of combustion of pulverized coal in thermal power plants. Flyash is the fine grained dusty material collected from the flue gases using suitable precipitators and Bottom ash is the slag which accumulates on the heat absorbing surfaces of the furnace. Pond ash refers to the ash collected and stored in the ash ponds by the hydraulic fill method. It is obtained as the mixture of bottom ash and flyash. As per the circular issued by MoEF&CC, the Gazatte of India dated 25th January 2016, pond ash shall be collected for sampling if falls within 300km periphery of the project area.

One no of coal fired thermal power plants described in **Table 8.7** has been identified within 57 km of project road vicinity as source of pond ash. Representative samples of pond ash had been collected from this source. The location and the approximate distance

from power plant to the nearest poin.t on the project road are given in the table mentioned below.

**Table 8.8: Description of Flyash Source**

| S.No | Plant | Details | Lead (km) |
|---|---|---|---|
| 1 | Koderma Thermal Power Station | Chandwara, Jharkhand | 72.4 |

### 8.6.1 Lead Chart

following figure shows the lead chart for the Borrow Area, Aggregate Quarry and Sand Quarry of the Project Stretch.

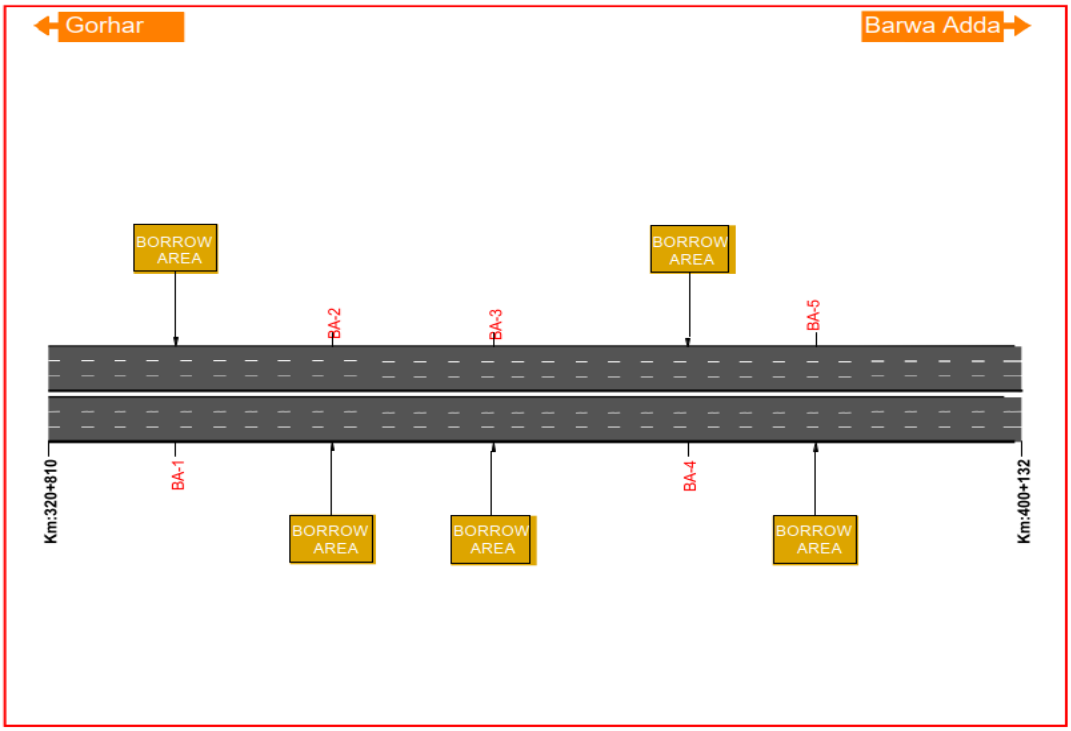



**Fig 8.3: Lead Chart of borrow area location**

# Chapter 9. Road Safety Assessment

# 9. ROAD SAFETY ASSESSMENT

## 9.1 BACKGROUND

Ensuring road user safety is of utmost importance - whether for motorized road users, Vulnerable Road Users like pedestrians, cyclists & motorcyclists. Accordingly, road facilities and assets are reviewed from the perspective of all users, and wherever feasible, forgiving road furniture is recommended to enhance safe mobility. Elements such as road signs, markings, delineation, and safety barriers play a critical role in facilitating safe travel. Therefore, it is advised to adopt the latest specifications outlined in the revised IRC publications and policy circulars for integration with the existing project highway.

Road environment (land use around road) is very dynamic and hence highway needs to be augmented regularly to keep pace with changing land use. Accordingly, the existing service road is suggested to be extended to cover the extended urbanization / built-up.

Accordingly, a Road Safety Audit during the operation and maintenance period has been conducted along the Project Stretch to assess the gravity of the current situation, suggestions and improvement measures required along the Project Stretch.

The project road is divided into three (3) sections based on existing road configuration and concession period:

A. Km 320+810 to Km 326+000 (Four Lane Existing Retain)
B. Km 326+000 to Km 361+000 (Existing 360+300) (Six Lane completed under HAM by M/s DBL)
C. Km 361+300 (Existing 360+300) to Km 401+332 (Existing 400+632) (Six Lane completed under HAM by M/s ABL)

**This Chapter covers the following:**

- Desk study of GFC and As-built drawings and suggestion for safety enhancement.
- Latest specifications through revised manual or latest policy circulars to be adopted wherever possible/feasible
- Identifying road safety issues & their remedial action. Data is gathered through
  - Daytime site inspection/Audit.
  - Drone Video analysis

## 9.2 DESK STUDY

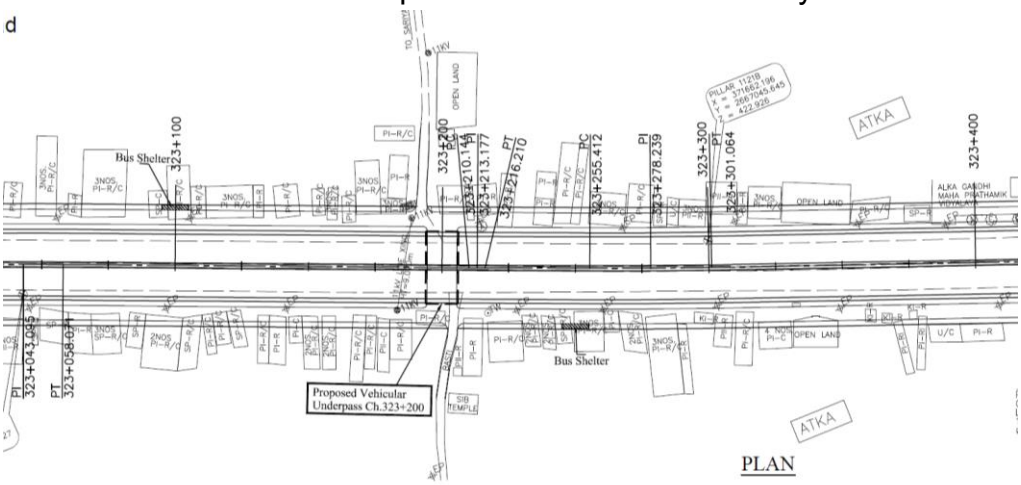
Consultant reviewed the GFC for all 3 sections and as-built drawing for any deficiency with respect to the revised specifications and/or site requirement. The findings from the review of GFC and As-Buit drawings are as follows:

## A. Km 320+810 to Km 326+000 (Four Lane Existing Retain)

### 1. VUP

**Observation** –

Proposed VUP at 323+200 is not as per Schedule - A/B. This may incur additional cost.




**Recommendation** –

Remove VUP which are not included in Schedule - A/B.

### 2. Junctions are directly Connected with MCW:

**Observation** –

Junctions at 324+050 (LHS) & 324+140 (RHS) are connected to MCW with direct access without acceleration and deceleration lane without proper radius for turning.




**Recommendation** –

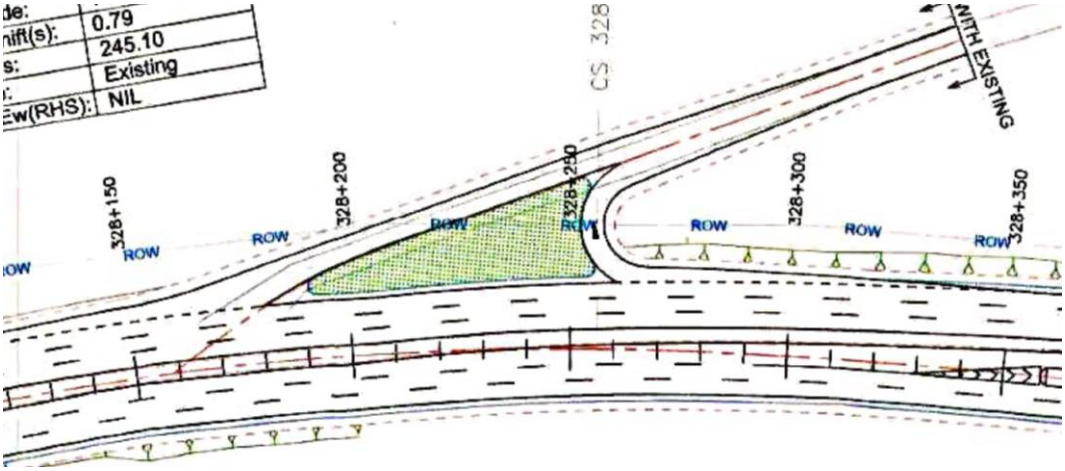
All junctions are to be developed with left-in/left-out as per Fig 3.7 of IRC: SP:87-2019.

## B. Km 326+000 to Km 361+000 (Existing 360+300) (Six Lane completed)

### 1. Absence of Speed breaker on side road

**Observation** –

Absence of active traffic calming measures on side road at junction [328+250 (LHS)].



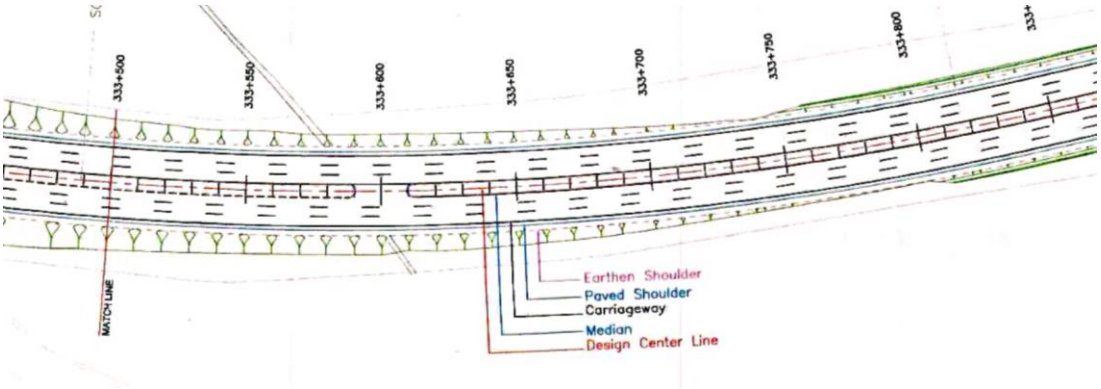

**Recommendation** –

Provide speed breaker on side road at junction as per IRC:99-2018 because vehicles approaching from the minor road need to slow down to “dead speed” before they can find gaps on the major road.

## 2. Median Opening

**Observation** –

Unauthorized Median opening found at 333+610.



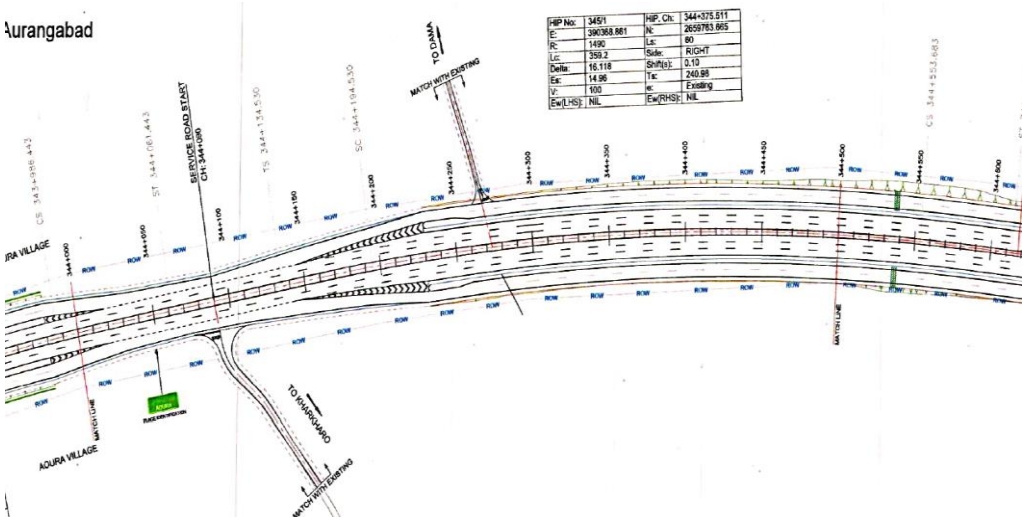

**Recommendation** –

Close Unauthorized Median opening at high priority to prevent accidents caused by illegal and dangerous crossing maneuvers.

## 3. Junction is directly Connected with MCW:

**Observation** –

Junction at 344+080 (RHS) is connected to MCW with direct access without acceleration and deceleration lane without proper radius for turning.



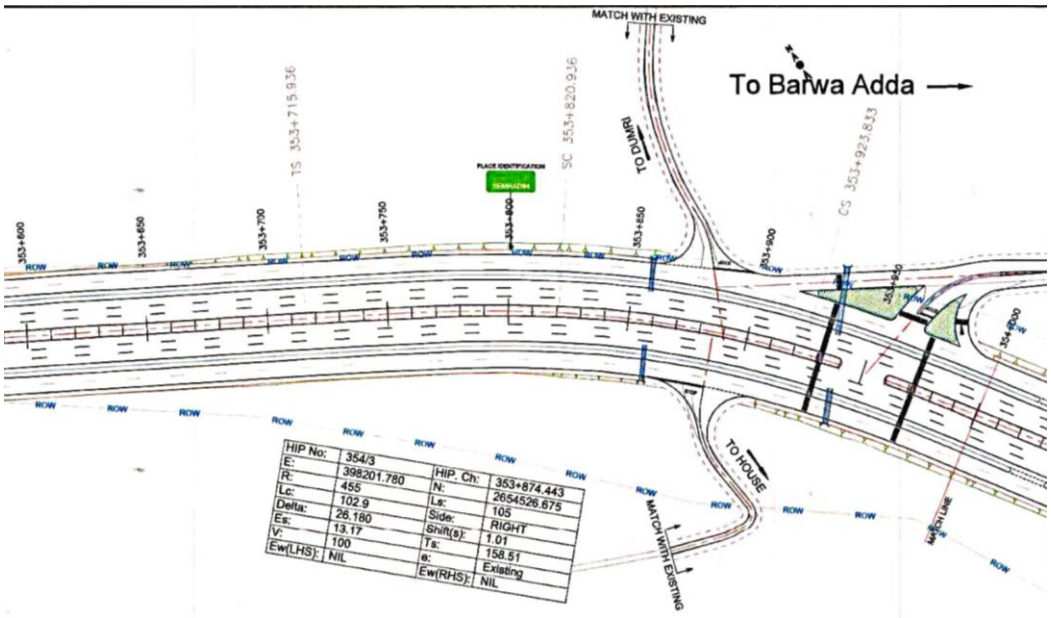

**Recommendation** –

All junctions are to be developed with left-in/left-out as per Fig 3.7 of IRC: SP:87-2019.

## 4. Unsafe Junction

**Observation** –

Junctions at 353+860 (LHS) & 353+970 (LHS) are not designed properly, very close to each other. This proximity could cause traffic conflicts, as it might not allow enough space for vehicles to merge, diverge, or turn safely without interfering with traffic from the other junction.




**Recommendation** –

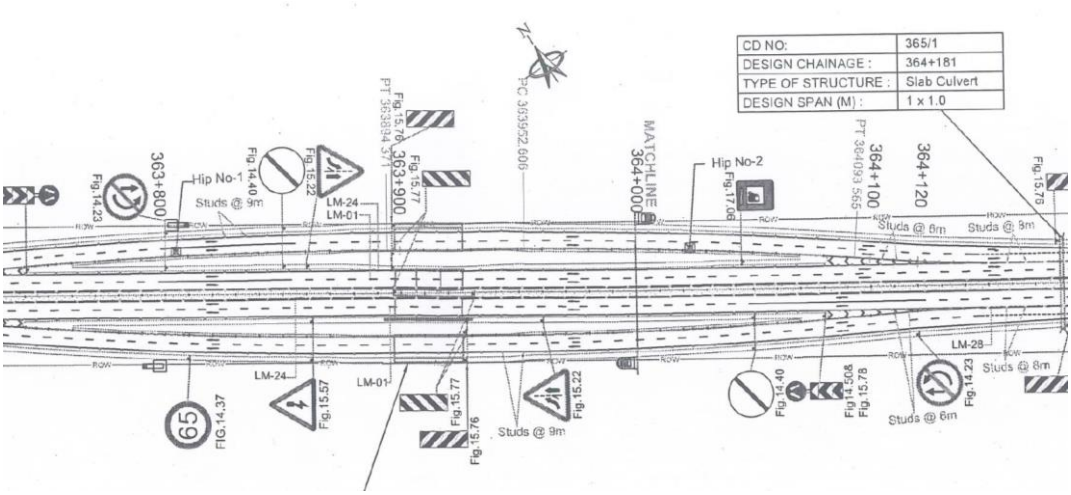
It requires re-engineering the junction design to reduce conflict points and manage traffic flow safely.

## C. Km 360+300 to Km 400+632 (Existing 401+132) (Six Lane completed)

### 1. Incorrect placement of Warning sign

**Observation** –

"Merging Traffic Ahead (From Left)" sign is provided at 363+880 (LHS) & 363+970 (RHS) which is way before the point where the traffic from service road is merging.



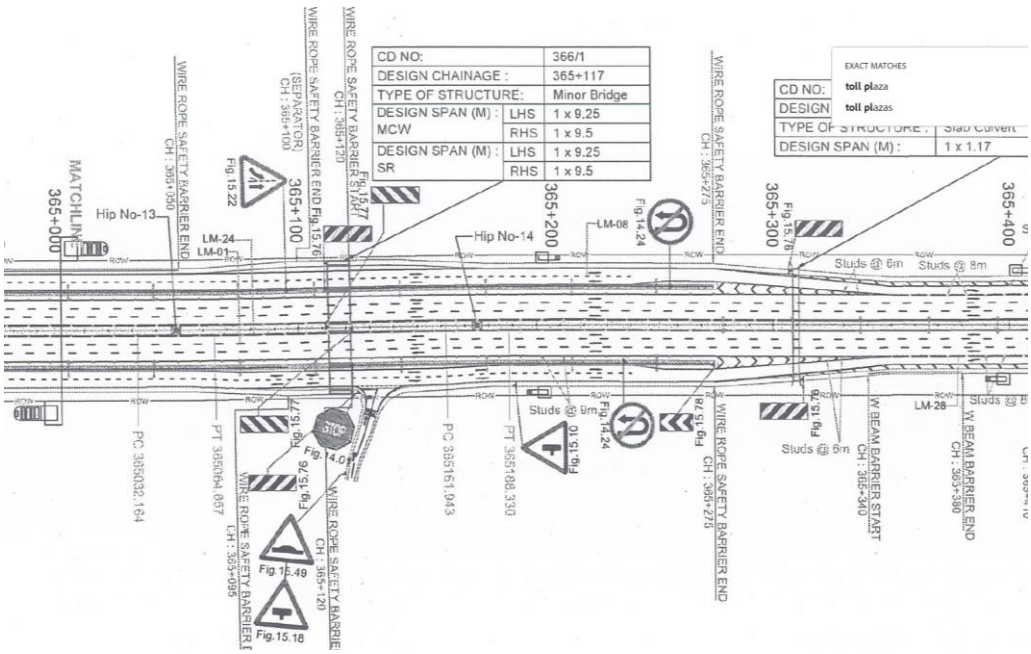

**Recommendation** –

Provide "Merging Traffic Ahead (From Left)" sign 150m before the point where the traffic from service road is merging.

### 2. Missing Informatory sign

**Observation** –

Advance Direction signs including Flag type sign are missing at 365+200 (RHS) before junction.

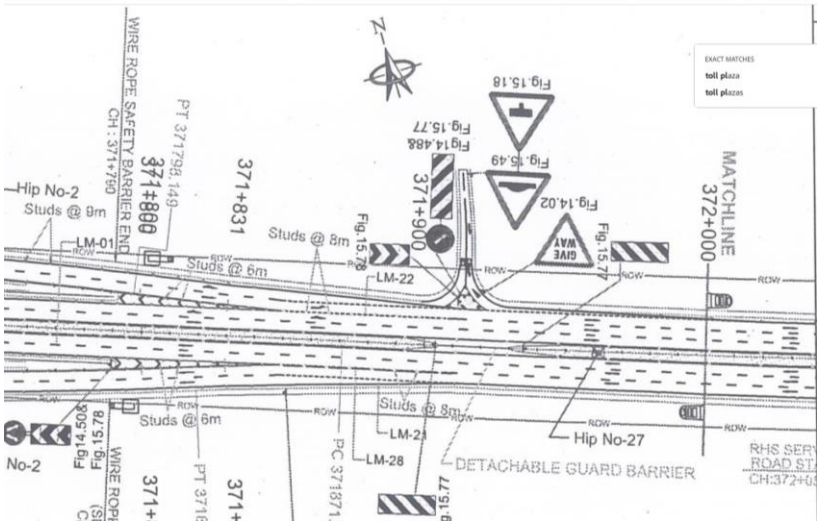


**Recommendation** –
All informatory signs must be provided before junction, as per IRC:67-2022, to give information to the road users about the destination.

## 3. Median Opening

**Observation** –

Unauthorized Median opening found at 371+900.

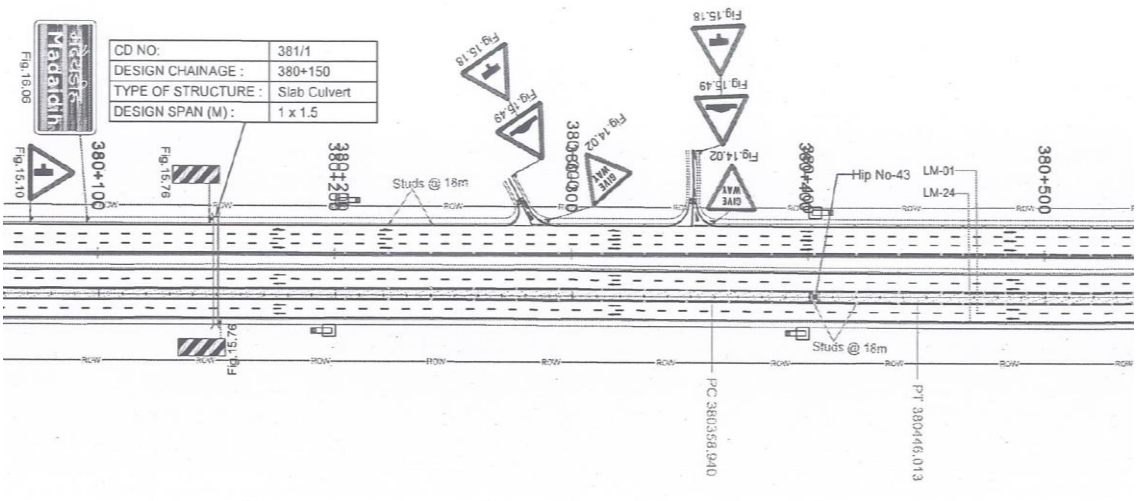



**Recommendation** –
Close Unauthorized Median opening at high priority to prevent accidents caused by illegal and dangerous crossing maneuvers.

## 4. Absence of Traffic Calming measures

**Observation** –

Vehicles traveling on MCW may continue to accelerate while meeting the slow speed traffic of side road at junctions 380+300 & 380+360 (LHS) which may result in a fatal crash.



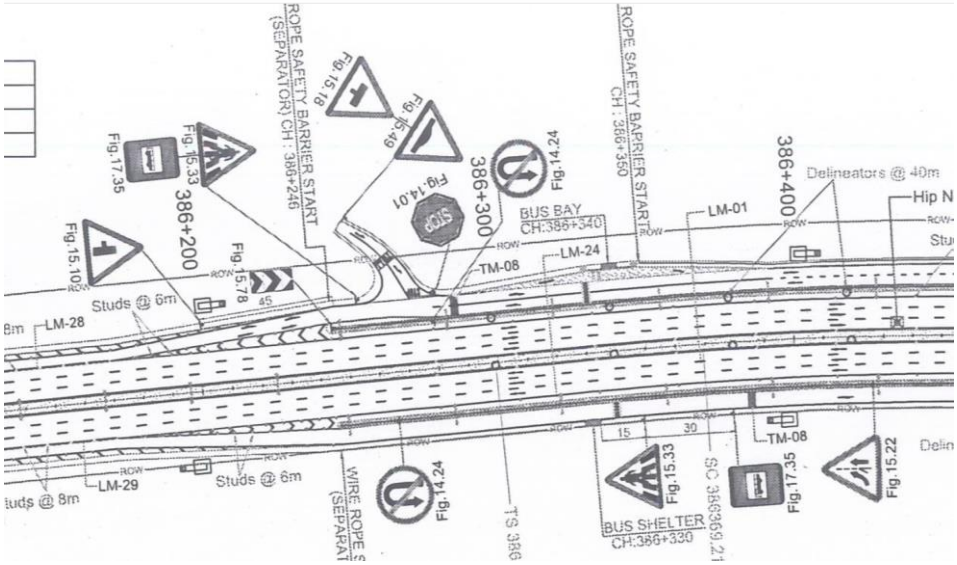
**Recommendation** –

Provide Active Traffic calming measures like Transverse Bar Markers (as per IRC:99-2018) on MCW well in advance of the junctions to alert drivers.

### 5. Bus Bay near intersection

**Observation** –

Buses stopping near an intersection at Bus bay [386+330 (LHS)] can conflict with vehicles attempting to make left turn, leading to potential side-on collisions or risky overtaking maneuvers. A stopped bus can obscure the line of sight for drivers on the main road, those on the minor road waiting to turn, and crossing pedestrians, significantly increasing the risk of collisions.




**Recommendation** –

At minor intersections (e.g. junctions with village roads), Bus bay should be provided at a distance of 60 m from the tangent point of intersections to start/end of the bus bay.

## 9.3 LATEST SPECIFICATIONS & POLICY CIRCULARS

Latest specifications through revised manual or latest policy circulars to be adopted wherever possible/feasible to upgrade the road network to be safe and efficient. Where there is a constraint of ROW width, the substandard specification may be adopted with adequate traffic control devices, road markings and road signages.

Road safety audit was carried out during daytime to evaluate the efficiency of the road safety measures existing along the project highway & to ascertain the need of additional road safety measures.

While auditing the existing road, the main emphasis is given on traffic control devices, road signages, road markings, provision of solar blinker, storage lane, clear visibility at median openings, location & safety arrangements at median openings, antiglare measures, Crash barriers, junctions, bus bays, truck lay byes, needs of vulnerable road users, and access management. Findings of the road safety audit of existing road are presented in this section.

Below mentioned general features of the road were investigated as per the revised manual & latest policy circulars to enhancing the effectiveness and safety of existing facilities.

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.1 | Median | Section 2.5 of manual & Circular RW-NH-29023/02/2019-S&R(P&B) dated 01.01.2020 | Crash barrier is MUST on medians to check median crossovers. |
| | | | ***Vegetation / plantation on median need to be maintained & trimmed***. |
| 3.2 | Kerb Shyness | Section 2.5.1 of Manual | Minimum 0.5m kerb shyness on either side of median. |
| | | | ***Incase existing kerb shyness of <0.5m, at the time of road marking edge & lane marking to be shifted towards the shoulder side. Additionally, it will improve the visibility of lane marking, road studs.*** |
| 3.3 | Median Drain | Section 2.5.2 of Manual | Water should not stagnate in the median |
| | | | ***Provide Rainwater Harvesting System (RWHS) is case of no drainage outfall.***<br>Rainwater harvesting system shall be designed as Type 4 confirming to clause 10.7.5 of IRC SP: 42-2014 |
| 3.4 | Change in Median Width | refer section 2.5.4 | Transition of 1 in 50 shall be provided |

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.5 | Antiglare measures | refer section 2.5.6 | Suitable antiglare measure shall be provided |
| | | | ***As a thumb rule spacing of antiglare screen is 3 times the width of screen.*** |
| 3.6 | Shoulder | refer section 2.6 of manual | Minimum Width 1.5m<br>Dressing / proper surface finish. |
| | | | ***No edge drop,***<br>***No undulation &***<br>***No rain cuts allowed in shoulder*** |
| | | | ***Encroachment by vegetation, shops, advertisement etc to be removed.*** |
| 3.7 | Entry/exit arrangement with service/Slip Road | refer section 2.12 of Manual | with main carriageway Exit must have 210m length & Entry must have 225m length. For markings and details (refer Fig 2.1 A & Fig 2.1 C of manual) |
| ***3.8*** | ***Existing service road.*** | ***With the urbanization and ribbon development along the project highway.*** | ***Extend the existing service road to cover all the present-day settlements on either side of existing service road.*** |
| 3.9 | Existing Median Openings (MO) | Clause 2.14 of Manual | Provide Solar Blinker & Shelter Lane. NO plantation & NO object in 120m length from MO tip to ensure visibility. |
| | | | ***High mast light arrangement to be provided at all median openings on project highway.*** |
| ***3.10*** | ***Emergency median openings*** | | ***Provide Swing type median opening for safe operation in case of requirement.*** |

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.11 | Entry/exit arrangement with Fuel Station & way side amenities etc | Ministry Circular RW-NH-33032/01/2017-S&R(R) dated 26.06.2020 | Initial guidelines were issued vide circular no. RW-NH-33023/19/99/-DO-III dated 24.07.2013. |
| | | | |
| ***3.12*** | ***Footpath cum drain*** | ***Clause 2.15 of Manual*** | ***Cover manholes, Surface finish of the footpath should be safe for pedestrian movement.***<br>***Footpath should continue over culverts and minor bridges.*** |
| 3.13 | Major junctions & Minor Junctions | Clause 3.2.5 of manual | At grade junctions to be augmented as per the junction layout given in Fig 3.1 through Fig 3.7 of manual. |
| | | | ***In case of significant increase of traffic, grade separation to be provided.*** |
| | | | Crossroad to be matched with service road or main carriageway at almost zero gradient. |
| 3.14 | Embankment | Section 4.2.3.2 of Manual | Side slope shall not be steeper than 2H:1V unless soil is retained by suitable soil retaining structure. |
| | | | ***Maintain free slope in 2H: 1V, this will save the road users in case of unfortunate incident of Run-off-road crashes.*** |
| | | | ***No rain cuts allowed in embankment slope.*** |
| | | | ***Vegetation / plantation need to be maintained & trimmed*** |

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.15 | Surface Drainage | Section 6.2 of Manual | Connect drain to nearest outfall. Provide additional (Rainwater Harvesting System) RWHS.<br>Rainwater harvesting system shall be designed as Type 4 confirming to clause 10.7.5 of IRC SP: 42-2014 |
| 3.16 | Drainage of Service Road or slip road | Section 6.8.2.7 of Manual | Water from structure shall not be allowed to flow over the service road or Slip Road. |
| 3.17 | Drainage for structures | Section 6.8.3 of Manual | Where rainwater cannot flow by gravity provide vertical drains and/or pumping. |
| 3.18 | Width of Structures | Section 7.3 of Manual | Shoulder and or footpath shall continue over the culverts and minor bridges. |
| 3.19 | Road signs | Section 9.2 of Manual,<br>IRC:67-2022 &<br>Circular RT-25035/07/2023-RS (Part) (221534) dated 24.12.2024 | Road signs ensure safe and efficient usage of the road network hence it is principally agreed that latest IRC and latest circulars related to road furniture in particular road signs need to be adopted. |
| 3.20 | Road Markings | Section 9.3 of Manual<br>IRC:35-2015<br>Circular RT-25035/07/2023-RS (Part) (221534) dated 24.12.2024 | Road markings need to be augment at following places.<br>1. Speed limit by road marking at 5km interval.<br>2. Chevron sign at all diversion of MCW & SR. |
| 3.21 | Road Delineator | Section 9.4 of Manual<br>IRC:79-2015 | All highway lighting poles, road signpost on median or shoulder shall be delineated.<br>***Provide three band reflective tape Yellow - Red - Yellow.*** |

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.22 | Reflective Pavement Markers (Road studs) | Section 9.5 of Manual | Replace all ineffective road studs. |
| 3.23 | Traffic Impact Attenuators | Section 9.6 of Manual | All diversions/gore area in-between 2L+2L bridges & in-between main carriageway and Service Road to be provided with Impact Attenuator & hazard sign. |
| 3.24 | Safety Barriers | Section 9.7 of Manual & and MORTH Circular No. RW/NH – 29023/02/2019-S&R (P&B) dated 01.01.2020 | 50-meter long MBCB (Modified Blocking Barriers) shall be installed on all four approaches to each grade-separated structure. On the median side, the MBCBs shall be joined at their ends in a semi-circular shape, as specified in the manual.<br>RCC crash barriers shall commence at the start of the valley curve and extend beyond the end of the valley curve, after the grade separator.<br>End Treatment of Steel barriers/Rope Barrier shall be specified i.e. MELT or P-4 confirming to EN 1317-4, TT, MBCB barrier to Concrete Barrier<br>End Treatment to Concrete barrier shall be done as specified in the manual |
| 3.25 | Pedestrian Facility | Section 9.8 of Manual | Pedestrian Guard Rail to be provided at major built-up area.<br>FOB to be provided at major crossing area. |

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.26 | Prevention of Overloading | Section 10.6 of Manual | Weigh in motion in all toll lanes and static weigh bridge and area to hold off loaded goods from overloaded vehicle shall be provided. |
| 3.27 | Road Boundary wall | Section 12.2 of Manual & RW-NH-24036/27/2010-PPP dated 04.02.2019 | Provide boundary wall in non-built-up areas. This will check unplanned development along project highway and restricts free cattle movement on highway. |
| 3.28 | Highway lighting | Section 12.5 of Manual | Augment the highway lighting to have a minimum 40 Lux.<br>Provide solar lighting on median openings. |
| 3.29 | Truck Lay-byes | Section 12.6 of Manual | 2 new Truck lay-byes are proposed to be provided. |
| 3.30 | Bus bays & Passenger Shelters | Section 12.7 of Manual | Augment the existing bus bays and bus shelters to the specification with more sitting area and to make it more user friendly. |
| 3.31 | Highway Patrol Units Emergency Medical Service & crane service | Section 12.10, 12.11 and 12.12 of Manual,<br>NHAI/Policy/guidelines/Strengthening the incident management services/ 2018 Policy no 12.12 dated 20.03.18 | Augment the existing system in line with latest specifications. |
| 3.32 | Advanced Traffic Management Systems (ATMS) | Section 12.14 of Manual | Augment the ATMS & incident management system as per the latest specifications. |

| Sr. No. | General Feature | Reference of latest manual & policy circulars | Minimum criteria to be adopted in case of available RoW |
|---|---|---|---|
| 3.33 | Sign Board | New Circular RT/25035/07/2023-RS (Part) (221534) dated 24.12.2024 | Provide sign boards as per latest specifications. |
| 3.34 | QR Code on Sign Board | NHAI/ Policy Guidelines/ Road Safety / 2025 Policy Circular No. 12.41/2025 dated 23.09.2025 | Install informatory signs having QR Code sign boards to provide relevant Project Stretch Information. |

### 9.4 Safety Audit

Road safety audit was conducted during daytime to comprehend road user safety. Findings of the audit/inspection are as follows:

### A. Km 320.810 to Km 326.000 (Four Lane Existing Retain)

The section of road is retained as four lanes which was originally proposed for Six Lane and work awarded to M/s DBL Gorhar Khairatunda Highway Pvt. Ltd. The section is descoped from M/s DBL and thus retained as four lane. The safety observations along four lane road are as follows:

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 1. | **Observation:**<br>Four Lane retained between six lane stretch for approximately 12 km length.<br><br>**Recommendation**:<br>It is advised to provide continuous six lane for 12 km long section as well. As per PIU, Hazaribagh, DPR Consultant has been appointed to prepare DPR for six laning work. |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 2 | **321+230**<br>**Observation:**<br>Median Openings are provided without shelter lane and road safety devices.<br><br>**Recommendation**:<br>Median opening shall be provided with additional 3.0 m wide shelter lane by the side of median in both directions for waiting of vehicles to take U-turn. Additionally, provide Blinkers, sign boards, transverse bar marking, etc. for improved safety. |  |
| 3 | **Observation:**<br>Unauthorized median opening has been found at many locations causing road safety hazards.<br><br>**Recommendation**:<br>All Unauthorized median openings are to be closed on priority basis. |  |
| 4 | **322+070**<br>**Observation:**<br>Minor Junction is connected to MCW without acceleration and deceleration lane without having proper radius for turning.<br><br>**Recommendation**:<br>All minor junctions are to be developed with left-in/ left-out as per Fig 3.5 of IRC:SP:84-2019. |  |
| 5 | **Observation:**<br>Narrow median without antiglare will be a safety hazard during nighttime.<br><br>**Recommendation**:<br>Provide Metal Beam Crash Barrier with Antiglare arrangement. |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 6 | **325+730**<br>**Observation:**<br>Vehicles exiting from the Fuel pump may accelerate while meeting the high speed traffic of MCW which may cause side collision resulting in a fatal crash.<br><br>**Recommendation**:<br>Provide Rumble strip at the exit point of the fuel pump & Transverse Bar Markers on MCW well in advance of the exit point. |  |
| 7 | **323+200**<br>**Observation:**<br>Absence of warning signs before junction.<br><br>**Recommendation**:<br>Provide traffic signs including warning signs before junction & pedestrian crossing as per IRC:67-2022. |  |

**B. KM 326+000 to KM 360+300 (Six Lane completed)**

The project road is already constructed as 6-lane. Some major traffic safety observations are presented below:

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 1 | **326+410 (LHS) & 326+500 (RHS)**<br>**Observation:**<br>Minor Junctions are connected to MCW without acceleration and deceleration lane without proper radius for turning.<br><br>**Recommendation**:<br>All minor junctions are to be developed with left-in/ left-out as per Fig 3.7 of IRC:SP:87-2019. |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 2 | **328+000 (LHS)**<br>**Observation:** Absence of Traffic Signs before Junction<br><br>**Recommendation**:<br>Provide Traffic Signs as per IRC:67-2022 and as per MoRTH Circular No. RT-25035/07/2023-RS (Part) (221534) dated 24th Dec 2024 |  |
| 3 | **328+210 (LHS)**<br>**Observation:**<br>Traffic Island at junction is NOT developed properly<br><br>**Recommendation**:<br>As per IRC:SP:88-2019, the minor/side road shall be flat for a minimum distance of 5 and desirably up to 10 m if the proportion of goods traffic entering from the minor road is substantial. Near to Flat Gradient for side road must be 0 to 0.5% so that vehicles entering the NH do not enter the NH suddenly and can wait on side road for suitable gap to safely enter the NH |  |
| 4 | **327+250**<br>**Observation:**<br>Temporary stall/hut present near MCW, highly unsafe<br><br>**Recommendation**:<br>Remove such unauthorized stall/hut immediately for enhanced safety of high speed traffic |  |
| 5 | **327+850 (RHS)**<br>**Observation:**<br>Unauthorized truck parking is noticed on MCW. These random parking issues cause safety hazards.<br><br>**Recommendation**:<br>Truck Lay-byes with facility to be provided to avoid unauthorized parking of trucks. |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 6 | **330+120**<br>**Observation:**<br>Absence of Arrow Markings on LHS<br><br>**Recommendation**:<br>Provide Arrow Markings as per IRC:35-2015 |  |
| 7 | **331+580 (RHS)**<br>**Observation:**<br>Separator between SR & MCW is broken/open causing safety hazard<br><br>**Recommendation**:<br>Separator between SR & MCW must be closed immediately to protect road users especially VRUs. |  |
| 8 | **333+210 (RHS)**<br>**Observation:**<br>Missing zebra crossing at junction<br><br>**Recommendation**:<br>A continuous facility shall be provided for pedestrian crossing at junction |  |
| 9 | **333+600 (LHS)**<br>**Observation:**<br>Transverse Bar Markers are missing before junction.<br><br>**Recommendation**:<br>Provide Transverse Bar Markers as per IRC:99-2018 for traffic calming. |  |
| 10 | **333+600 (LHS)**<br>**Observation:**<br>Unauthorized Median opening is found which is hazardous for all road users especially VRUs<br><br>**Recommendation**:<br>Unauthorized Median opening must be closed at high priority |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 11 | **339+430**<br>**Observation:**<br>Median Opening is provided without shelter lane and road safety devices.<br><br>**Recommendation**:<br>Median opening shall be provided with additional 3.0 m wide shelter lane by the side of median in both directions for waiting of vehicles to take U-turn. Additionally, provide Blinkers, sign boards, transverse bar marking, etc. for improved safety. |  |
| 12 | **344+700**<br>**Observation:**<br>No VUP found as per Schedule-B<br><br>**Recommendation**:<br>Provide VUP at 344+700 for safe crossing of vehicles under the project highway as proposed in Schedule-B |  |

### C. KM 360+300 to KM 400+332 (Six Lane completed)

The project road is already constructed as 6-lane. Some major traffic safety observations are presented below:

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 1. | **360+280**<br>**Observation:**<br>It is observed that no Informatory signs (flag type, stack type) are provided before junction. Also, Road Markings, particularly, Arrow markings are poorly maintained.<br><br>**Recommendation**:<br>Provide Informatory signs as per IRC:67-2022 & road markings as per IRC:35-2015. |  |
| 2 | **364+400**<br>**Observation:**<br>Traffic calming measures are absent thereby leading to severe hazards<br><br>**Recommendation**:<br>Transverse Thermoplastic Bar Markings shall be provided as per NHAI Circular (105/2012) issued vide letter no. 11041/218/2007-Admn, dated- 11th June |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| | 2012 and IRC:99-2018, at the hazardous locations like junctions | |
| 3 | **362+310**<br>**Observation:**<br>Plantation is missing in the median.<br><br>**Recommendation**:<br>Median width is more than 2.5 m, therefore, Shrubs shall be planted and maintained to cut-off headlight glare from traffic in the opposite direction. |  |
| 4 | **365+750 (RHS)**<br>**Observation:**<br>Minor Junction is connected to MCW without acceleration and deceleration lane without proper radius for turning.<br><br>**Recommendation**:<br>All minor junctions are to be developed with left-in/ left-out as per Fig 3.7 of IRC:SP:87-2019. |  |
| 5 | **365+750 (RHS)**<br>**Observation:**<br>Unsafe zebra crossing without adequate signs & signals<br><br>**Recommendation**:<br>Provide safe crossing facilities for pedestrians with refuge island in the median |  |
| 6 | **369+210 (RHS)**<br>**Observation:**<br>Markings on Minor Road at junction are NOT provided as per IRC standards<br><br>**Recommendation**:<br>Provide road markings on minor road as per IRC:35-2015 |  |
| 7 | **369+490 (LHS)**<br>**Observation:**<br>Temporary stall/hut present near MCW, highly unsafe<br><br>**Recommendation**:<br>Remove such unauthorized stall/hut immediately for enhanced safety of high speed traffic |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 8 | **379+920 (LHS)**<br>**Observation:**<br>Unauthorized truck parking is noticed on MCW. These random parking factors cause safety hazards.<br><br>**Recommendation**:<br>Truck Lay-bys with facility to be provided to avoid unauthorized parking. |  |
| 9 | **381+400 (LHS)**<br>**Observation:**<br>Absence of Arrow Markings on MCW<br><br>**Recommendation**:<br>Provide Arrow Markings as per IRC:35-2015 |  |
| 10 | **389+710 (RHS)**<br>**Observation:**<br>Separator between SR & MCW is broken/open causing safety hazard<br><br>**Recommendation**:<br>Separator between SR & MCW must be closed immediately to protect road users especially VRUs. |  |
| 11 | **383+450 (LHS)**<br>**Observation:**<br>Missing zebra crossing at junction<br><br>**Recommendation**:<br>A continuous facility shall be provided for pedestrian crossing at junction |  |
| 12 | **380+410**<br>**Observation:**<br>Unauthorized Median opening is found which is hazardous for all road users especially VRUs<br><br>**Recommendation**:<br>Unauthorized Median opening must be closed at high priority |  |

| Sr. No. | Safety Observation | Site Photograph |
|---|---|---|
| 13 | **375+850**<br>**Observation:**<br>No VUP found as per Schedule-B<br><br>**Recommendation**:<br>Provide VUP at 375+850 for safe crossing of vehicles under the project highway as proposed in Schedule-B |  |
| 14 | **382+010**<br>**Observation:**<br>Broken crash barrier found<br><br>**Recommendation**:<br>Provide continuous crash barrier to avoid any fatal crash |  |

## 9.5 SAFETY ISSUES AND CONCERNS ON THE PROJECT ROAD

### 9.5.1 Existing median openings

There are 30 Median Openings provided in the project stretch. The location of the Median openings is given below:

| S. No. | Chainage Km | | Length of opening (m) | Storage Lane (Yes/No) |
|---|---|---|---|---|
| | From | To | | |
| **Section-1 from Km 320+810 to Km 326+000 (Retained 4 Lane)** | | | | |
| 1 | 321+219 | 321+244 | 25 | No |
| 2 | 323+185 | 323+210 | 25 | No |
| 3 | 324+171 | 324+193 | 22 | No |
| 4 | 325+801 | 325+817 | 16 | No |
| **Section-2 from Km 326+000 to Km 361+040 (Ex. Km 360+300) (6 Lane)** | | | | |
| 5 | 340+628 | 340+653 | 25 | No |
| 6 | 344+088 | 344+113 | 25 | No |
| 7 | 345+378 | 345+403 | 25 | No |
| 8 | 347+728 | 347+753 | 25 | No |
| 9 | 349+028 | 349+053 | 25 | No |
| 10 | 350+688 | 350+713 | 25 | No |
| 11 | 352+318 | 352+343 | 25 | No |
| 12 | 353+908 | 353+933 | 25 | Yes |
| 13 | 355+508 | 355+533 | 25 | No |
| 14 | 359+080 | 359+120 | 40 | No |
| 15 | 360+488 | 360+513 | 25 | No |

| S. No. | Chainage Km | | Length of opening (m) | Storage Lane (Yes/No) |
|---|---|---|---|---|
| | From | To | | |
| **Section-3 from Km 360+300 to Km 400+632 (Ex. Km 400+132) (6 Lane)** | | | | |
| 16 | 361+038 | 361+063 | 25 | No |
| 17 | 364+338 | 364+363 | 25 | No |
| 18 | 365+638 | 365+663 | 25 | No |
| 19 | 367+608 | 367+633 | 25 | No |
| 20 | 371+888 | 371+913 | 25 | No |
| 21 | 375+825 | 375+875 | 50 | Yes |
| 22 | 377+688 | 377+713 | 25 | Yes |
| 23 | 379+088 | 379+113 | 25 | No |
| 24 | 381+438 | 381+463 | 25 | No |
| 25 | 382+938 | 382+963 | 25 | No |
| 26 | 386+798 | 386+823 | 25 | No |
| 27 | 388+438 | 388+463 | 25 | No |
| 28 | 393+438 | 393+463 | 25 | No |
| 29 | 397+638 | 397+663 | 25 | No |
| 30 | 399+198 | 399+223 | 25 | No |

### Safety concerns observed at median openings

1. Shelter lanes are not provided in both directions as per clause 2.14.3 of IRC: SP:87-2019.
2. Blinkers were not provided at the median openings.
3. Transverse bar markers were not provided.
4. Sign Boards, road Studs not found at median openings.

### Short Term Remedial Measures

1. Provide Solar Blinkers as shown in Fig.1 with Object markers at the central median.
2. Provide transverse bar markers to calm the speed of the vehicle near the median opening as shown for reference in Fig.2
3. Provide warning sign in the median to caution the road users about the median openings as per IRC:67-2022
4. Provide speed limit signboard before the median openings as per IRC:67-2022.

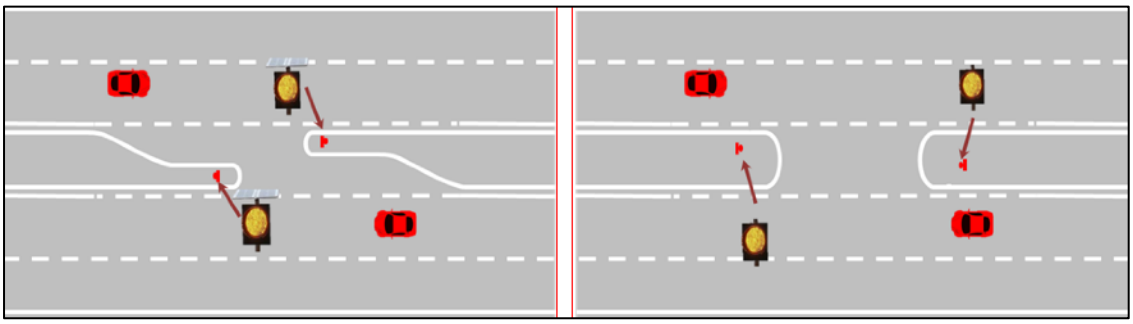


**Figure-1**

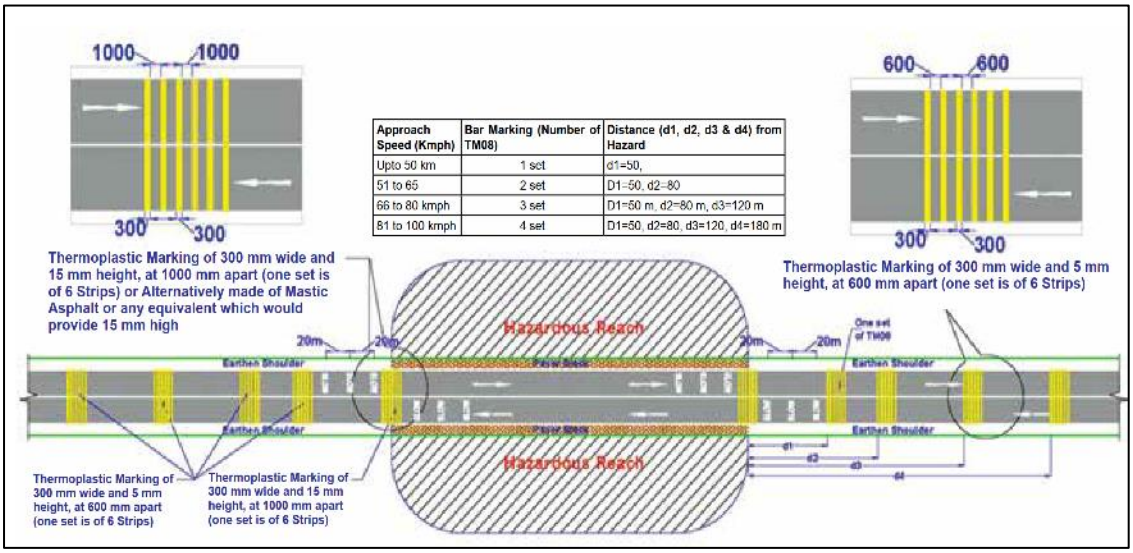



**Figure-2**

## Long Term remedial Measures (Options)

1. Alter the Horizontal geometry of the road with additional land and provide a 3m additional shelter lane to the existing arrangement, including all the short-term measures mentioned earlier.
2. It is recommended to close all the unauthorized & non-standard median openings.
3. The median openings (other than closed ones which are used for emergency purposes) can be redesigned with a slight change in horizontal geometry by provisioning only for U-turn as shown in Fig.3. The proposed Median opening is more of a protected U-Turn Channelizing the traffic and limiting it to only for U-Turn.

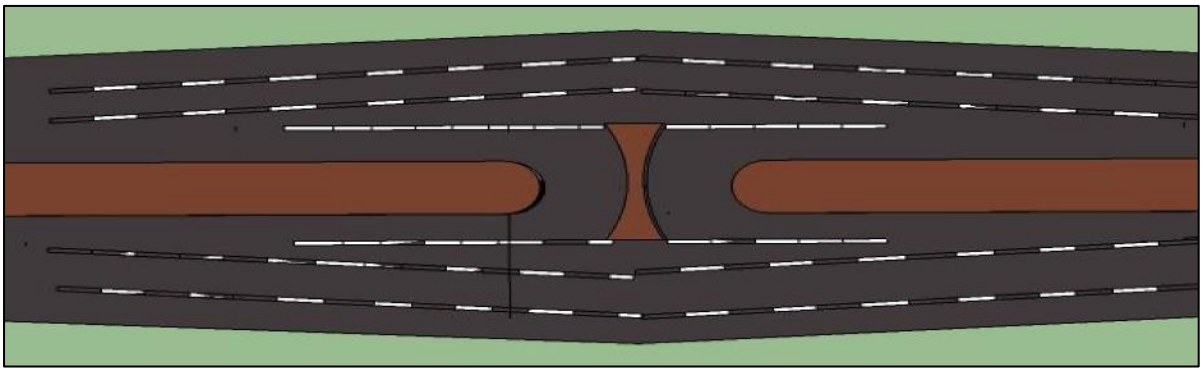


**Figure-3**

Following median openings need to be closed:

| S. No. | Chainage Km | | Length of opening (m) | Storage Lane Yes/No | Proposal | Remarks |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 1 | 344+088 | 344+113 | 25 | No | Median Opening to be closed | VUP Proposed |
| 2 | 347+728 | 347+753 | 25 | No | Median Opening to be closed | Service Road |
| 3 | 349+028 | 349+053 | 25 | No | Median Opening to be closed | VUP Proposed |

| S. No. | Chainage Km | | Length of opening (m) | Storage Lane Yes/No | Proposal | Remarks |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 4 | 350+688 | 350+713 | 25 | No | Median Opening to be closed | Service Road |
| 5 | 353+908 | 353+933 | 25 | Yes | Median Opening to be closed | Service Road |
| 6 | 359+080 | 359+120 | 40 | No | Median Opening to be closed | Service Road |
| 7 | 360+488 | 360+513 | 25 | No | Median Opening to be closed | Service Road |
| 8 | 364+338 | 364+363 | 25 | No | Median Opening to be closed | Service Road |
| 9 | 365+638 | 365+663 | 25 | No | Median Opening to be closed | Service Road |
| 10 | 375+825 | 375+875 | 50 | Yes | Median Opening to be closed | VUP Proposed |
| 11 | 379+088 | 379+113 | 25 | No | Median Opening to be closed | VUP Proposed |
| 12 | 381+438 | 381+463 | 25 | No | Median Opening to be closed | Service Road |
| 13 | 386+798 | 386+823 | 25 | No | Median Opening to be closed | Service Road |
| 14 | 397+638 | 397+663 | 25 | No | Median Opening to be closed | Existing Service Road |

### 9.5.2 Service Road along Built Up

Road environment (land use around road) is very dynamic and hence highway needs to be augmented regularly to keep pace with changing land use. Accordingly, the existing service road is suggested to be extended to cover the extended urbanization / built-up.

**Proposed Service Road along the Project Stretch**

| S. No | Chainage | | Side | Total Length |
|---|---|---|---|---|
| | From (Km) | To (Km) | | |
| 1 | 330+180 | 331+070 | BHS | 1780 |
| 2 | 333+500 | 335+000 | BHS | 3000 |
| 3 | 335+500 | 336+150 | BHS | 1300 |
| 4 | 336+100 | 336+400 | RHS | 300 |
| 5 | 340+720 | 342+300 | BHS | 3160 |
| 6 | 342+900 | 344+000 | BHS | 2200 |
| 7 | 345+900 | 346+450 | LHS | 550 |
| 8 | 345+900 | 346+450 | RHS | 550 |
| 9 | 346+930 | 347+550 | LHS | 620 |
| 10 | 346+930 | 347+550 | RHS | 620 |
| 11 | 347+880 | 348+920 | BHS | 2080 |
| 12 | 350+120 | 350+880 | BHS | 1520 |
| 13 | 352+600 | 352+980 | BHS | 760 |
| 14 | 360+100 | 360+400 | BHS | 600 |
| 15 | 360+820 | 360+860 | LHS | 40 |
| 16 | 361+690 | 361+770 | RHS | 80 |
| 17 | 363+380 | 363+700 | BHS | 640 |
| 18 | 364+080 | 364+550 | BHS | 940 |
| 19 | 365+250 | 366+400 | BHS | 2300 |
| 20 | 368+950 | 369+400 | LHS | 450 |
| 21 | 368+980 | 369+400 | RHS | 420 |
| 22 | 369+700 | 369+980 | BHS | 560 |
| 23 | 370+880 | 371+450 | LHS | 570 |
| 24 | 371+780 | 372+240 | LHS | 460 |
| 25 | 372+400 | 373+780 | LHS | 1380 |
| 26 | 372+400 | 373+450 | RHS | 1050 |
| 27 | 379+900 | 381+800 | LHS | 1900 |

| S. No | Chainage | | Side | Total Length |
|---|---|---|---|---|
| | From (Km) | To (Km) | | |
| 28 | 381+800 | 382+460 | BHS | 1320 |
| 29 | 383+050 | 383+690 | LHS | 640 |
| 30 | 383+050 | 383+690 | RHS | 640 |
| 31 | 385+150 | 386+220 | BHS | 2140 |
| 32 | 386+970 | 388+080 | BHS | 2220 |
| 33 | 399+020 | 399+130 | RHS | 110 |
| **Total Length** | | | | **36,900** |

### 9.5.3 Major Junctions

It is noticed that major junctions are not designed properly causing safety hazards. Therefore, it is recommended to provide VUP at following locations:

| Sr. No. | Chainage (Km) | LHS Roadway Width (m) | RHS Roadway Width (m) | Super Structure Provision in Median | Clear Span (m) | Minimum Vertical Clearance (m) | Skew Angle | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | 344+710 | 1x14.00 | 1x14.00 | RCC Box | 1x20 | 5.5 | - | |
| 2 | 349+610 | 1x14.00 | 1x14.00 | RCC Box | 1x20 | 5.5 | - | |
| 3 | 375+865 | 1x14.00 | 1x14.00 | RCC+PCC Girder | 1x15+1x30+1x15 | 5.5 | - | SH |
| 4 | 379+110 | 1x14.00 | 1x14.00 | RCC Box | 1x20 | 5.5 | - | |

### 9.5.4 Provision of ATMS

The main aim of Advance Traffic Management System (ATMS) is to provide traffic management solutions that enable authorities and stakeholders to take appropriate actions to improve the safety of road users along with improving the traffic flow, transportation system efficiency, increasing economic productivity and enhancing mobility.

The project road stretch currently lacks ATMS equipment. Hence, it is proposed to design, install, operate and maintain ATMS as part of the project facilities. ATMS shall be installed to achieve following objectives:

- Smooth and uninterrupted traffic flow
- Enhance road safety
- Provide Real–time traffic information and guide road users
- Display dynamic variable message signs providing informative message or warnings to road users.
- Emergency assistance and reduced response time to an accident. This leads to an improved coordination between police and emergency services.
- Alerts for abnormal road and weather conditions
- Reduced journey time and inconvenience

The ATMS system shall be provided and maintained as per NHAI / Policy Guidelines / Standard Documents 2023, Policy Circular No. 11.53/2023 dated 10th October 2023.

### Components of ATMS

The ATMS components comprise of various ITS applications to be deployed and integrated with existing ATMS System.

It shall include the following components listed in table below*:*

- ***Video Surveillance system / Traffic monitoring camera system (TMCS).***
- ***Video Incident Detection Enforcement System (VIDES).***
- ***Vehicle Actuated Speed Display System (VASDS).***
- ***Communication Network with OFC Backbone.***
- ***ATMS Command & Control Center.***
- ***Power Supply for Field Equipment as well as for ATMS Command & Control Center.***
- ***Operation & Maintenance (O&M) of the entire ATMS Facility.***
- ***Maintenance Vehicle.***

# Chapter 10. Improvement Proposal

# 10. IMPROVEMENT PROPOSALS

## 10.1 GENERAL

This chapter is covered all improvement proposal that are required based on Technical Due Diligence Study carried out by the Consultant.

**Development of the Project Highway**

The Project Highway shall generally follow the existing horizontal and vertical alignment. However, following Improvement Proposal shall be executed as per prescribed standard & specification and the engineering drawings for the same shall be approved by IE.

## 10.2 ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS)

It is proposed to Advanced Traffic Management System as per standards and specifications specified in the manual and as per NHAI Policy Circular No. 11.53/2023 Dated 10th Oct 2023 and shall be maintained throughout the contract period. The entire system should efficiently as an integrated solution during the entire O&M period / Concession period.

### 10.2.1 Video Surveillance system / Traffic monitoring camera system (TMCS)

The system monitors vehicular and other road related activity along the highway stretch through PTZ Camera mounted on Poles. Generally, the camera should be placed at a distance not greater than 1km so as to effectively monitor all the lanes of the entire stretch of Highway. In case certain stretches include regular curves, ramps etc not allowing central line of sight, then additional TMCS camera shall be put to ensure effective surveillance of the entire stretch. The TMCS cameras should also be placed on the following Junctions below the Grade Separated Structure.

The minimum number of TMCS – 68 Nos

### 10.2.2 Video incident Detection System (VIDS)

The VIDS include Gantry Mounted ANPR Cameras, Overview Cameras and associated incident detection software system to effectively detect pre-defined actionable incidents which triggers enforcement and incident response system. The VIDS should also act as Automatic Traffic Counting and Classifying (ATCC) system. The VIDS should be provided at following locations:

| S. No. | Location (Km) | LHS/ RHS/ BHS | Remarks |
|---|---|---|---|
| Km 320+810 to Km 401+332 - 8 Nos | | | |

### 10.2.3 Vehicle Actuated Speed Display System (VASDS)

The VASD system shall include gantry mounted Radar and Speed Display system for each lane to warn the road users of their speed. The system shall act as a Speed Calming Measure.

| S. No. | Location (Km) | LHS/ RHS/ BHS | Remarks |
|---|---|---|---|
| Km 320+810 to Km 401+332 - 4 Nos | | | |

### 10.2.4 Communication Network with OFC Backbone

The entire 80.522 Km shall be provided with minimum 24 Core OFC Backbone as per the standards & specifications. The short haul connections like between field equipment to access points, access points to OFC backbone etc shall be done with minimum 12 Core cable required 80.190 Km. The OFC shall be laid strictly as per the Standards and Specification.

### 10.2.5 ATMS Command & Control Center

The ATMS Command and Control Centre structure will be at established at Toll Plaza. The ATMS Command and Control Center as per the Standards and Specification.

| S. No. | Location (Km) | LHS/ RHS/ BHS | Remarks |
|---|---|---|---|
| 1 | Existing Kulgo Toll Plaza – 1 Nos | | |

### 10.2.6 Power Supply for Field Equipment as well as for ATMS Command & Control Center.

24x7 supply for the ATMS Command and Control Centre and Field Equipment with supply power from Electricity Department as primary source supported by UPS renewable power (Solar etc.) and DG Set of adequate capacity.

## 10.3 IMPROVEMENT OF TOLL COLLECTION SYSTEM

NHAI is implementing Multi-Lane Free Flow (MLFF) Barrier Less Tolling System throughout the nation for effective toll collection and to provide seamless traffic flow. It is proposed to provide MLFF system at existing Toll Plaza (Kulgo). The brief description of the system is as follows:

1. The Concessionaire shall implement Automatic Number Plate Recognition (ANPR) Camera and RFID (FASTAG) based Barrier Less Multi Lane Free Flow (MLFF) Tolling System at the proposed Toll Plaza location on the Highway stretch.

2. The Solution shall be integrated with e-Notice Module developed by National Informatics Center (NIC) through Central Clearing House (CCH) wherein the violators will be issued e-Notice in case they cross the Toll Plaza with FASTag that is not valid and functional. The Authority shall provide assistance in integrating the system with the e-Notice Module prepared by NIC.

3. The e-Notice shall be issued to the violators by NIC for amount equal to two times the fee applicable to that category of vehicles as per sub-rule (2) of rule 4 of the National Highways Fee (Determination of Rates and Collection) Rules 2008.The payment received against the e-Notice shall be settled through the Payment Gateway (PG) to the designated Bank Account(s) as per the prevailing guidelines.

4. In case of non-payment of fees against the e-Notice within prescribed time, the road user shall have restrictions on the VAHAN based services and blacklisting of VRN / FASTag under NETC system.

# Chapter 11. Cost Estimate

# 11. COST ESTIMATE

## 11.1 GENERAL

The cost estimate is prepared for the Project Stretch. Details of Project Stretch are presented in table below for ready reference.

**Table 11.1: Project Stretch**

| NH No. | Existing Kilometer (Km) | | Description of Road | Length (Km) |
|---|---|---|---|---|
| | From | To | | |
| NH-19 | 320+810 | 401+332 | Gorhar-Barwa Adda | 80.522 |

The Project cost estimates have been prepared for the following works:

- Advanced Traffic Management System (ATMS)
- Updation of Toll Collection System

## 11.2 COST ESTIAMTE FOR IMPROVEMENT PROPOSAL

**Cost for FY 2025/26**

| Sl. No. | Item Description | Quantity | | Amount (Rs in Cr.) |
|---|---|---|---|---|
| | | Unit | Qty. | |
| 1 | Advanced Traffic Management System (ATMS) | Km | 80.522 | 14.570 |
| 2 | Providing Multi Lane Free Flow (MLFF) at Toll Plaza | Nos | 1 | 5.00 |
| **Total Amount (excl GST)** | | | | **19.570** |

## 11.3 ESTIMATE OF OPERATION AND MAINTENANCE COST

Operational Expenditure has calculated based on NHAI Circular dated 29.04.2011 and 25.11.11 with 5 % escalation to arrive cost for FY 2025 /26. The basis of calculation of OPEX is as follows:

| | | |
|---|---|---|
| Routine Maintenance Costs | 0.035 crores/Km/Year (Year FY 2011-12) -flexible and 0.04 crores/Km/Year (Year FY 2011-12) -Rigid | As per the base documents provided by NHAI (circular no. NHAI/11033/CGM (Finn)/2011 dated 25th nov 2011 provided to us by NHAI). For four lane, for two lane 60% of this and 150 % for Six Lane has been assumed. |
| Periodic Maintenance Costs | 0.35 crores/Km/every 6 Years (Year FY 2011-12) | As per the base documents provided by NHAI (circular no. NHAI/11033/CGM (Finn)/2011 dated 25th nov 2011 provided to us by NHAI). For four lane, for two lane 60% of this and 150 % for Six Lane has been assumed. |
| Electricity and Patrolling Expenses | 0.0125 crores/Km/Year (Year FY 2010-11) | As per the base documents provided by NHAI (circular no. NHAI/11033/CGM (Finn)/2011 dated 29th April, 2011 provided to us by NHAI).For four lane, for two lane 60% of this and 150 % for Six Lane has been assumed. |

| | | |
|---|---|---|
| Office Expenditure | 2.5 crores/Year (Year FY 2010-11) | As per the base documents provided by NHAI (circular no. NHAI/11033/CGM (Finn)/2011 dated 29th April, 2011 provided to us by NHAI). |
| Insurance | 0.15% of Total Project Cost (TPC | As per the base documents provided by NHAI (circular no. NHAI/11033/CGM (Finn)/2011 dated 29th April, 2011 provided to us by NHAI). |
| Toll Expense | 1.60 crore per Toll Plaza (Year FY 2010-11) for Four Lane | As per the base documents provided by NHAI (circular no. NHAI/11033/CGM (Finn)/2011 dated 29th April, 2011 provided to us by NHAI). |

The cost arrived as of 2025 / 26 is tabled as below:

| Year | Routine Maintenance | Toll Plaza & ATMS Operation and Maintenance | Electricity & Patrolling expenses | Other office expenses | Insurance | Total Maintenance Amount incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount incl GST |
|---|---|---|---|---|---|---|---|
| 2026-2027 | - | 2.13 | 0.14 | 0.30 | 0.19 | 3.25 | - |
| 2027-2028 | - | 2.13 | 0.14 | 0.30 | 0.19 | 3.25 | - |
| 2028-2029 | 0.19 | 3.72 | 0.14 | 0.30 | 0.19 | 5.35 | - |
| 2029-2030 | 0.38 | 5.32 | 0.14 | 0.30 | 0.19 | 7.46 | - |
| 2030-2031 | 0.38 | 5.32 | 0.14 | 0.30 | 0.19 | 7.46 | - |
| 2031-2032 | 0.38 | 5.32 | 0.14 | 0.30 | 0.19 | 7.46 | - |
| 2032-2033 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2033-2034 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2034-2035 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2035-2036 | 0.57 | 5.32 | 0.21 | 0.30 | 0.28 | 7.88 | - |
| 2036-2037 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2037-2038 | - | 5.32 | 3.30 | 5.46 | 3.90 | 21.21 | 103.70 |
| 2038-2039 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2039-2040 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2040-2041 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2041-2042 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2042-2043 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2043-2044 | - | 5.32 | 3.30 | 5.46 | 3.90 | 21.21 | 103.70 |
| 2044-2045 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2045-2046 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2046-2047 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2047-2048 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2048-2049 | 12.92 | 5.32 | 3.30 | 5.46 | 3.90 | 36.45 | - |
| 2049-2050 | - | 5.32 | 3.30 | 5.46 | 3.90 | 21.21 | 103.70 |
| **Total** | **145.73** | **119.67** | **47.83** | **79.40** | **56.84** | **530.36** | **311.11** |

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**January □2026**

# Public InvIT-01 REPORT



*Submitted by:-*

*Chaitanya Projects Consultancy Ltd.*

**Head Office**
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**Sec – 62, Noida, UP – 201301**

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# EXECUTIVE SUMMARY

## 1. INTRODUCTION

National Highways Authority of India (NHAI), an autonomous agency of the Government of India (GoI), is responsible for the development, maintenance and management of National highways network in India.

There are currently approximately 1,32,500 kilometres of national highways in India, constituting approximately 2.2% of India's entire road network but carrying approximately 40% of total road traffic.

To meet the growing need for further industrialization and development of the country, GoI has planned to expand the network of National Highways across the length and width of the country at a rapid pace. The various programmes which have been taken by GoI through NHAI are:

Phase I: Golden Quadrilateral (GQ) Comprising 4/6-laning of National Highways connecting four metro cities, namely, Delhi, Mumbai, Chennai and Kolkata with a total length of approximately 5846 km (which is mostly completed), and

Phase II: North-South and East-West Corridors (NSEW) comprising 4/6-laning of National Highways connecting Srinagar to Kanya Kumari and Silchar to Porbandar. Total length this NSEW corridor is approximately 7300 km. The projects of NSEW are mostly awarded and construction is also largely completed.

Bharatmala Pariyojana: A flagship highway development programme which envisions the development of 50 economic corridors, provide connectivity to 550 districts in the country through National Highway linkages and improve the average speed of road travel in India.

In addition to this, various NHDP programs has been taken up by NHAI to match the rapid pace of modernization and industrial development of the country. The Government has planned to continue developing the National Highways at a rapid pace, which will require significant funding in the near future.

The National Highways Authority of India (NHAI) has initiated the process of setting up an infrastructure investment trust to monetize its road assets. This is a private listed InvIT, through which institutional investors can invest in operational road projects offered by

NHAI to the InvIT. In this model, the offered road assets are acquired by the InvIT while the investors acquire the units issued by the InvIT. Income generated from the underlying road assets is paid out as distributions to the unit holders in the form of interest, dividend and return of capital. The InvIT is managed by a competent Investment Manager staffed with experts to manage the assets efficiently.

Under the InvIT frame work, the right of collection of user fees of selected NH projects is assigned for a specific time period to a Concessionaire. During this period, the O&M responsibility will also vest with the selected Concessionaire (unless costs are to be borne by existing concessionaires as per extant agreements). In return, the Concessionaire will pay an upfront quoted Concession Fee to NHAI.

Following is the stretches which shall be awarded in Publi InvIT model:

| Section No. | Section Name | | Chainage (Km) | | Length (Km) |
|---|---|---|---|---|---|
| | From | To | From | To | |
| **Section-1** | Chilakaluripet | Vijayawada | 355+000 | 357+342 | 2.342 |
| | Chilakaluripet Bypass | | 0+000 | 16+499 | 16.499 |
| | Chilakaluripet | Vijayawada | 372+038 | 422+605 | 50.567 |
| **Section-2** | Chennai Bypass | | 0+000 | 32+600 | 32.6 |
| **Section-3** | Chennai Tada | | 21+400 | 54+400 | 33.0 |
| **Section-4** | Neelmangla | Tumkur | 29+500 | 61+520 | 32.02 |
| | Tumkur Bypass | | 61+520 | 74+168 | 12.648 |

Accordingly, detailed reports on inventory & physical condition have been carried out for the above stretch including a study of improvement proposals. Below general details of Vijayawada-Chilakaluripet stretch is presented.

## 2. STUDY OBJECTIVE

The main objective of this assignment is to assess physical condition of selected National Highway Stretches and preparation of detailed project reports, technical and maintenance schedules for bidding process. Physical condition of any Stretch is established based on the geometric parameters of the highway, condition of pavement, structures, road safety features, condition of existing facilities like toll plazas etc. Based on physical condition of highway stretches, options are worked out for improvement of safety of existing road and strengthening of pavement and structures. Cost associated with all improvement proposals are also estimated as part of this Study. Scope of services as per Terms of Reference (ToR) are presented below:

- Investigation for accessing condition of pavement including shoulder, embankment, drainage etc. using visual means, advanced laser profilometer and image processing software and falling weight Deflectometer.
- Investigation for perception of existing pavement composition.
- Conducting road safety audit for evaluating geometry of road, adequacy and condition of existing of safety features etc.
- Identification of black spots along the Project Stretch and propose corrective measures for the same.
- Inventory of all structures along the Project Stretch like bridges, culverts, ROBs, underpasses, flyovers etc. covering physical and hydraulic parameters. Investigations shall be carried out for accessing structural conditions using Mobile Bridge Inspection Unit (MBIU) as per IRC-SP:35. For the bridges identified to be in a distressed condition based upon the visual condition survey, supplementary testing shall be carried out as per IRC-SP:35 and IRC-SP:40. Selection of tests may be made based on the specific requirement of the structure.
- Identification of source of construction materials quarry sites, sand source and borrow areas and assessment of quality of various construction materials.
- Preparation of improvement strategy for strengthening of pavement and structures, rehabilitation and design for road safety features, road furniture etc.
- Estimation of detailed cost based on improvement proposal.
- Preparation and submission of following items –

- Detailed project report and drawings covering all above-mentioned details.
- Technical schedule and bid documents for tendering.

## 3. PROJECT STRETCH

**Vijayawada-Chilakaluripet:** The Site of Six lane divided Project Highway comprises the section commencing from (Km 355+000 to Km 357+342), (Km 372+038 to Km 422+605), (Km 0+000 to Km 16+499) at Vijayawada of NH-16 and has Kaza toll Plazas at Km 420+500 on project Section in the state of Andhra Pradesh. The total length of Project Stretch is 69.408 km.

The Project Highway Vijayawada- Chilakaluripet section is under PBMC from Km 355+000 to Km 357+342 & from Km 372+038 to Km 422+605 and under HAM from Km 0+000 to Km 16+499. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements. The details of agency, section and COD/PCOD date is tabled as below:

**Vijayawada-Chilakaluripet section**

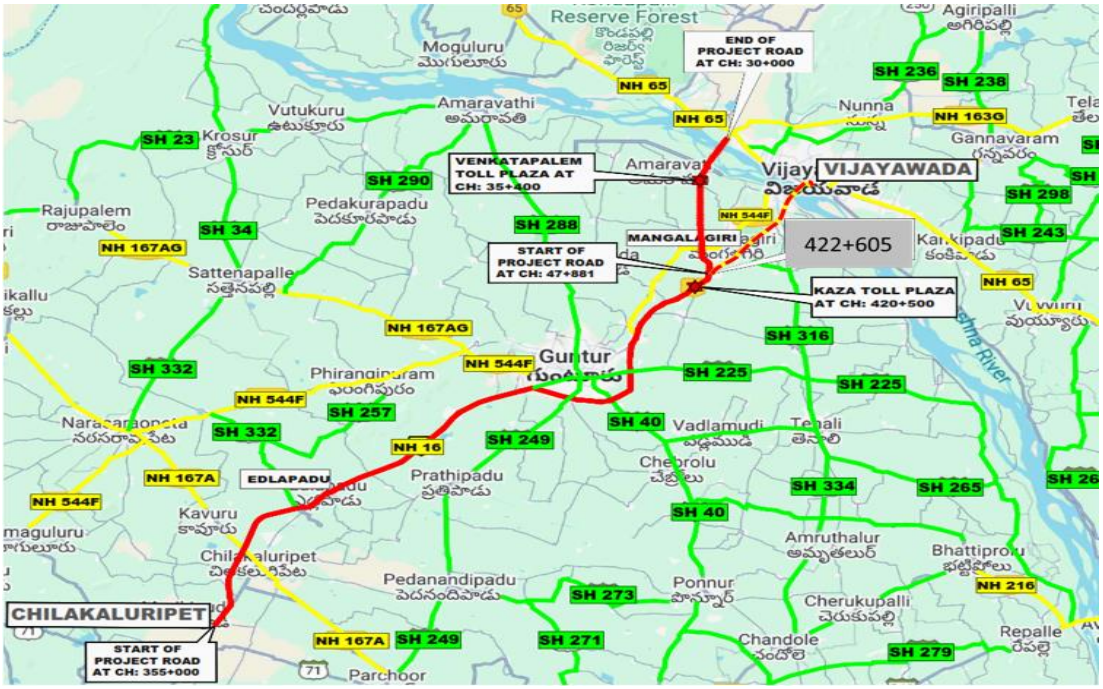
| Name of Agency | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/S. Shiva Build Tech Pvt. Ltd. | PBMC | 355+000 | 357+342 | 2.342 | - | 24.03.2032 |
| | | 372+038 | 422+605 | 50.567 | | |
| M/S. Chilakaluripet Bypass Pvt. Ltd. | HAM | 0+000 | 16+499 | 16.499 | 29.10.2024 | 28.10.2039 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

Project highway is a part of National Highway 16 which is a major Indian highway running along the country's, to eastern coast, connecting Kolkata, West Bengal Chennai, Tamil Nadu. It is a

crucial part of the Golden Quadrilateral project. The highway serves important cities including Bhubaneswar, Visakhapatnam, and Vijayawada.




***Index Map of Project Highway***

**Chennai Bypass:** Project Stretch starts from Km 0+000 and ends at Km 32+600 of NH-32/ NH-48 and has Vanagram toll Plazas at Km 16+500 and Surapattu toll Plazas at Km 28+600 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 32.600 km.

The Project Highway Chennai bypasss section is under O&M (Annual Maintanance) from Km 0+000 to Km 32+600 and under EPC (Major Maintanance) from Km 0+000 to Km 32+600. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements. The details of agency, section and COD/PCOD date is tabled as below:

**Chennai Bypass section from Km 0+000 to Km 32+600**

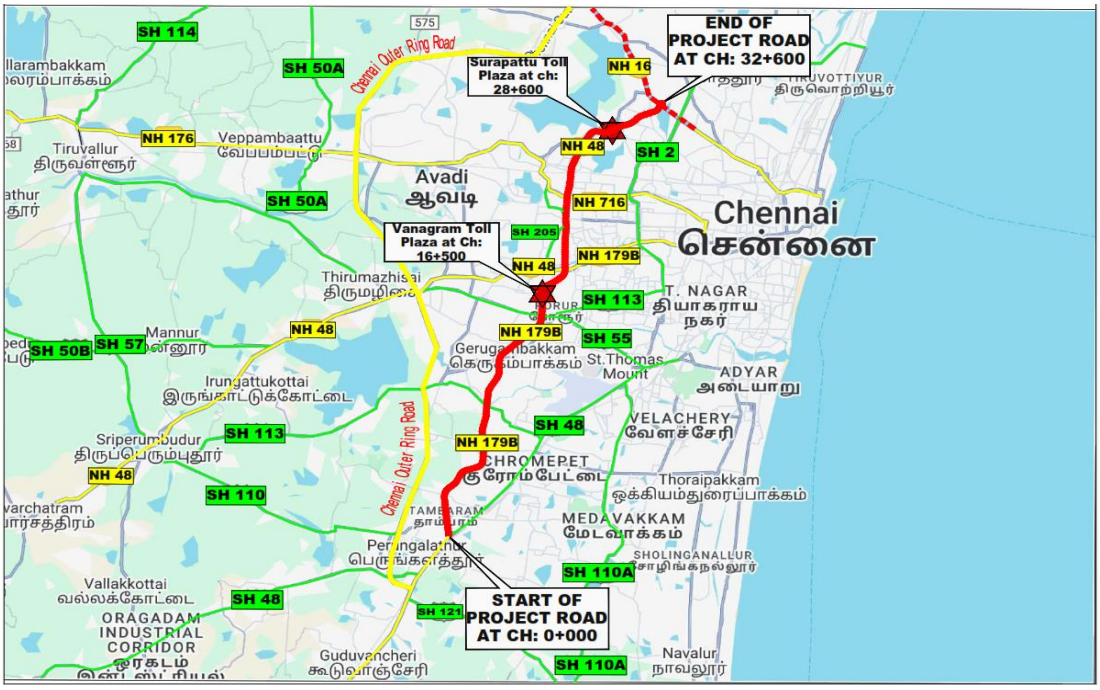
| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/s Arjunvaishanvi Infrastructure & Developers Pvt. Ltd | O&M (Annual Maintenance) | 0+000 | 32+600 | 32.600 | - | 30.03.2026 |

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/s Babuji Civil construction | EPC (Major Maintenance) | | | | - | 30.05.2028 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

Project highway is a part of NH-48 and NH-32, National Highway 48 (NH-48), a major national highway connecting Delhi and Chennai, intersects with National Highway 32 (NH-32), which links Chennai to Thoothukudi, near the city of Chennai in Tamil Nadu. Formerly known as the East Coast Road (ECR), NH 32 serves as an important coastal route for transportation, trade, and tourism. NH-48, a much longer highway spanning seven states, is a critical part of the Golden Quadrilateral project.




***Index Map of Project Highway***

**Chennai-Tada:** Project Stretch starts from Km 21+400 and ends at Km 54+400 of NH-16 and has Nallur toll Plazas at Km 21+625 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 33.00 km.

The Project Highway Chennai Tada section is under EPC (Six Laning) from Km 21+400 to Km 54+400. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements. The details of agency, section and COD/PCOD date is tabled as below:

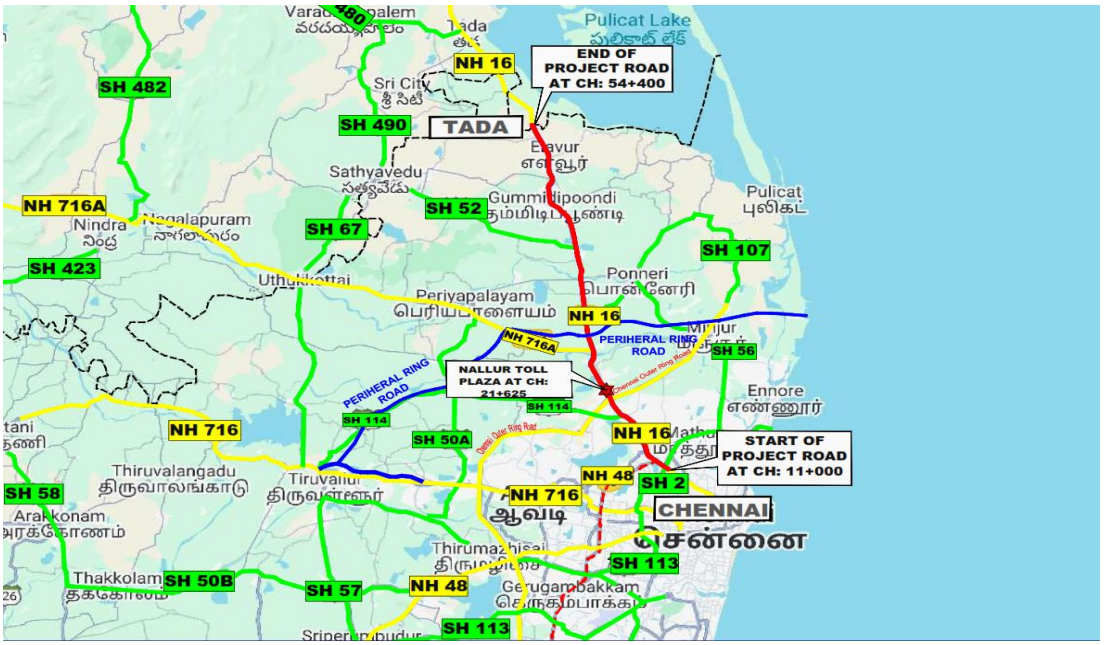
**Chennai-Tada section from Km 21+400 to Km 54+400**

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/s. SPL Infrastructure Pvt Ltd | EPC (Six laning) | 21+400 | 54+400 | 33.000 | 09.02.2022 | 09.02.2026 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

Project highway is a part of National Highway 16 which is a major Indian highway running along the country's eastern coast, connecting Kolkata, West Bengal, to Chennai, Tamil Nadu. It is a crucial part of the Golden Quadrilateral project. The highway serves important cities including Bhubaneswar, Visakhapatnam, and Vijayawada.




**Index Map of Project Highway**

**Note*:-** In Chennai-Tada Section From Km 11+000 to Km 21+400 is descoped from Public InvIT-01

**Neelmangla- Tumkur:** Project Stretch starts from Km 29+500 and ends at Km 74+168 of NH-48 and has kulumepalya toll plazas at Km 30+000 and Chokkenahalli toll plaza Km 61+500 on project Section in the state of Karnataka. The total length of Project Stretch is 44.668 km.
The Project Highway Neelmangla- Tumkur section is under EPC (Six Laning) from Km 29+500 to Km 49+900, from Km 61+520 to 74+168 is under EPC and DPR is invited for section from km 49+900 to Km 61+520. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements.

The section from Km 52+700 to Km 53+500 is an additional stretch along with Km 29+500 to Km 49+900 (EPC six-laning work) and falls under the scope of the EPC Contractor, M/s H.G. Infra Engineering Limited. The stretch from Km 52+700 to Km 53+500 shall be maintained by the EPC Contractor till completion of the DLP period. This section is not part of the DPR invited and does not fall under the scope of M/s Sri Chowdeshwari Concrete India Pvt. Ltd.

Currently, toll is collected at Kulumepalya (Ch. 30+000) and Chokkenahalli (Ch. 61+500). Upon completion of six-laning of the respective stretch, toll collection will be shifted to the new toll plazas at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425), and the existing toll plazas at Kulumepalya and Chokkenahalli will be demolished.

The details of agency, section and COD/PCOD date is tabled as below:

**Neelmangla- Tumkur section from Km 29+500 to Km 74+168**

| Name of Agency | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/s H G Infra Engineering Ltd. | EPC (Six laning) | 29+500 | 49+900 | 20.4 | 31.03.2027 | 31.03.2032 |
| | EPC | 61+520 | 74+168 | 12.648 | 31.03.2027 | 31.03.2032 |

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| **DPR Invited (Six laning)** | | 49+900 | 61+520 | 11.62 | 30.09.2028 | 30.09.2033 |
| **Sri Chowdeshwari concrete India Pvt. Ltd.** | **O&M** | 49+900 | 61+520 | 11.62 | - | 05.06.2029 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

The project highway is a part of National Highway 48 which is a major north-south highway in India, connecting the capital city of Delhi with Chennai in Tamil Nadu. As a critical part of the Golden Quadrilateral network, it is a key economic and infrastructure corridor for the country. The highway passes through seven states: Delhi, Haryana, Rajasthan, Gujarat, Maharashtra, Karnataka, and Tamil Nadu connecting numerous important cities, including Gurugram, Jaipur, Ahmedabad, Mumbai, Pune, and Bengaluru, and facilitates trade, logistics, and economic development along its path.




***Index Map of Project Highway***

## 4. SUMMARY ROAD INVENTORY

Detailed inventory of Project Stretch is captured through NSV and field reconnaissance. Salient features like built-up settlements, carriageway dimensions, surface type, junctions, service roads, road furniture etc. are recorded for entire Project Stretch. The road inventory is linked to the existing km stones established along the roadside.

| Description | | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|---|
| | | | | | Neelmangla-Tumkur | Tumkur Bypass |
| **Length of project stretch** | | 69.408 km | 32.600 Km | 33.00 Km | 32.020 Km | 12.648 Km |
| **Lane Configuration** | | 6 Lane with paved shoulder | 6 Lane with paved shoulder | 6 Lane with paved shoulder | 4/6 Lane with paved shoulder | 6 Lane with paved shoulder |
| **Pavement Type** | **Flexible (m)** | 68808 | 32455 | 32535 | 31220 | 12648 |
| | **Rigid (m)** | 600 | 145 | 465 | 800 | 0 |
| **Length of Service/Slip road (m)** | | 121044 | 43205 | 67103 | 40800 | 24774 |
| **Major/ Minor Junction** | | 20 Nos. /218 Nos. | 10 Nos. /198 Nos. | 10 Nos. /95 Nos. | 2 Nos. /46 Nos. | 3 Nos. /8 Nos. |
| **Major/ Minor Bridge** | | 3 Nos. /23 Nos. | 3 Nos. /3 Nos. | 3 Nos. /9 Nos. | 2 Nos. /10 Nos. | 2 Nos. /8 Nos. |
| **Culverts** | | 90 Nos. | 140 Nos. | 56 Nos. | 50 Nos. | 19 Nos. |
| **ROBs/RUBs** | | 1 Nos./0 No | 1 Nos./1 No | 0 Nos./0 No | 2 Nos./0 No | 1 Nos./0 No |
| **VUPs/LVUPs/SVUPs** | | 27 Nos | 18 Nos | 9 Nos | 8 Nos | 11 Nos |
| **PUPs/CUPs** | | 26 Nos. | 2 Nos. | 7 Nos. | 1 Nos. | - |
| **FOBs** | | 0 Nos. | 0 Nos. | 1 Nos. | 1 Nos. | 1 Nos. |
| **Toll Plazas** | | Kaza (420+500) | Vanagram (16+500) and Surapattu (28+600) | Nallur (21+625) | Kulumepalya (30+000) and | - |

| Description | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|
| | | | | Neelmangla-Tumkur | Tumkur Bypass |
| | | | | Chokkenahalli (61+500) | |
| **Bus Bays with shelters/ Bus Shelters** | 21 Nos. | 1 Nos. | 36 Nos. | 12 Nos. | 1 Nos. |
| **Truck Lay Bye** | 1 Nos. | 0 Nos. | 0Nos. | 2 Nos. | - |
| **Median Openings** | 4 Nos. | 9 Nos. | 10 Nos. | 12 Nos. | - |

**For Section-04 Neelmangla Tumkur**

*These details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

## 5. REVIEW OF PAVEMENT

The project road has four/six lanes with paved shoulder. Field Survey for Surface Distress and Riding Quality was carried out using Network Survey Vehicle (NSV). NSV is a highly-specialized survey Vehicle designed and developed for in time assessment of Pavement Surface Condition by getting information with respect to distress type and its severity.

NSV is equipped with a fully integrated data collection system obtained from a Multi-Laser Profiler, Digital Imaging System and Video camera unit whose outputs are all linked via a highly accurate distance measuring instrument and this data is later processed with the help of adequate software applications to get for rutting, graveling, roughness (IRI), cracking etc; and subsequently many of this data was used to calculate the Pavement Condition Index (PCI) values.

Roughness and Rutting of pavement are measured using a Digital Laser Profiler (DLP), Integrated into the NSV.

The profiler is capable of measuring:

- Pavement Roughness (one laser in each wheel path and centre)
- Rutting (full transverse pavement measurement)

Roughness and Rutting are two most important quality parameters of pavement describing its riding quality and durability and are very significant in gaining negative or positive feedback from road users.

- **ROUGHNESS**

  The National Highway Authority of India (NHAI), via letter no. 11041/218/2007 –Admn. dated 03.11.2009 on POLICY MATTERS –TECHNICAL (37/2009) has approved the use of Laser Profiling devices for NHAI works. Consequently, IRI measurement has been progressively introduced in India. IRI correlation with BI values can be calculated by the following formula:

$$BI = 630 \cdot (IRI)^{1.12}$$

  where,

  BI: Bump Integrator Roughness or Unevenness Index (mm/km).

IRI: International Roughness Index.

Roughness of the project stretch is shown in the table below:

**Vijayawada-Chilakaluripet (Km 355+000 to Km 422+605)**

**LHS**

| Criteria IRI (m/km) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 69.41 | 100.00% | 66.91 | 96.40% | 65.51 | 94.93% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 1.50 | 2.16% | 2.50 | 3.62% |
| More than 3.301 | Poor | 0.00 | 0.00% | 1.00 | 1.44% | 1.00 | 1.45% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.008 | 100% |

**RHS**

| Criteria IRI (m/km) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 66.91 | 96.40% | 66.91 | 96.40% | 67.41 | 97.12% |
| 2.81 to 3.301 | Fair | 2.00 | 2.88% | 2.00 | 2.88% | 2.00 | 2.88% |
| More than 3.301 | Poor | 0.50 | 0.72% | 0.50 | 0.72% | 0.00 | 0.00% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.008 | 100% |

**In LHS**, 97.11% of the Project Stretch has a Roughness value in Good condition, whereas 1.93% of the Project Stretch is in Fair condition. And 0.96% of the project stretch is in Poor condition.

**In RHS**, 96.64% of the Project Stretch has a Roughness value in Good condition, whereas 2.88% of the Project Stretch is in Fair condition. And 0.48% of the project stretch is in Poor condition.

**Chennai Bypass (Km 0+000 to Km 32+600)**

**LHS**

| Criteria IRI (m/km) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 32.60 | 100.00% | 32.60 | 100.00% | 32.00 | 98.16% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.60 | 1.84% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |

**RHS**

| Criteria IRI (m/km) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 32.60 | 100.00% | 31.60 | 96.93% | 32.60 | 100.00% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 1.00 | 3.07% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |

**In LHS**,99.39% of the Project Stretch has a Roughness value in Good condition, whereas 0% of the Project Stretch is in Fair condition. And 0.61% of the project stretch is in Poor condition.

**In RHS**, 98.98% of the Project Stretch has a Roughness value in Good condition, whereas 1.02% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

**Chennai Tada (Km 21+400 to Km 54+400)**

**LHS**

| Criteria IRI (m/km) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 33.00 | 100.00% | 33.00 | 100.00% | 33.00 | 100.00% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 33.000 | 100% | 33.000 | 100% | 33.000 | 100% |

**RHS**

| Criteria IRI (m/km) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 32.00 | 96.97% | 33.00 | 100.00% | 33.00 | 100.00% |
| 2.81 to 3.301 | Fair | 1.00 | 3.03% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 33.00 | 100% | 33.000 | 100% | 33.000 | 100% |

- **In LHS**, 100% of the Project Stretch has a Rutting value in Good condition, whereas 0.00% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.

- **In RHS**, 100.00% of the Project Stretch has a Rutting value in Good condition, whereas 0.00% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.
- **RUTTING**

  Rutting is one of the important factors which determine the functional performance of pavement. Rutting is characterized by permanent deformation of the pavement in wheel path due to heavy load vehicles. It is one of the main modes of failure in asphalt mixes. Length wise rutting condition details for both the direction are given in the table below:

  **Vijayawada-Chilakaluripet (Km 355+000 to Km 422+605)**

**LHS**

| Criteria Rutting (mm) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 69.41 | 100.00% | 69.41 | 100.00% | 69.41 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.408 | 100% |

**RHS**

| Criteria Rutting (mm) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 69.41 | 100.00% | 69.41 | 100.00% | 69.41 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.408 | 100% |

**Chennai Bypass (Km 0+000 to Km 32+600)**

**LHS**

| Criteria Rutting (mm) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 32.60 | 100.00% | 31.60 | 96.93% | 32.60 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 1.00 | 3.07% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |

**RHS**

| Criteria Rutting (mm) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 32.60 | 100.00% | 31.60 | 96.93% | 32.60 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 1.00 | 3.07% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| **Total** | | **32.600** | **100%** | **32.600** | **100%** | **32.600** | **100%** |

**In LHS**, 98.98% of the Project Stretch has a Rutting value in Good condition, whereas 1.02% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.

**In RHS**, 98.98% of the Project Stretch has a Rutting value in Good condition, whereas 1.02% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.

**Chennai Tada (Km 21+400 to Km 54+400)**

**LHS**

| Criteria Rutting (mm) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 31.60 | 95.76% | 32.40 | 98.18% | 21.60 | 65.45% |
| 5mm to 10 mm | Fair | 1.40 | 4.24% | 0.60 | 1.82% | 11.40 | 34.55% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| **Total** | | **33.00** | **100%** | **33.00** | **100%** | **33.00** | **100%** |

**RHS**

| Criteria Rutting (mm) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 31.60 | 95.76% | 28.00 | 84.85% | 32.60 | 98.79% |
| 5mm to 10 mm | Fair | 1.40 | 4.24% | 5.00 | 15.15% | 0.40 | 1.21% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| **Total** | | **33.00** | **100%** | **33.00** | **100%** | **33.00** | **100%** |

**In LHS**, 87.47 % of the Project Stretch has a Rutting value in Good condition, whereas 12.53% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

**In RHS**, 93.13 % of the Project Stretch has a Rutting value in Good condition, whereas 6.87% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

- **VEHICLE DAMAGE FACTOR**

The VDF is a multiplier for converting the number of commercial vehicles of different axle loads to the number of standard axle load repetitions.

As per Traffic Consultant Report, the VDF is presented in the table below:

**Vijayawada-Chilakaluripet (Km 355+000 to Km 437+500)**

**VDF of Kaza Toll Plaza**

| Vehicle Category | Vijayawada to Chilakaluripet | Chilakaluripet to Vijayawada |
|---|---|---|
| Minibus | 0.04 | 0.05 |
| Standard Bus | 1.78 | 1.49 |
| LCV 4 Wheel | 0.06 | 0.06 |
| LCV 6 Wheel | 1.24 | 0.88 |
| 2 Axle Truck | 1.74 | 2.49 |
| 3 Axle truck | 3.86 | 6.13 |
| MAV | 7.34 | 8.88 |

**Chennai Bypass (Km 0+000 to Km 32+600)**

**VDF of Vanagram Toll Plaza**

| Vehicle Category | Tambaram to Madhavaram | Madhavaram to Tambaram |
|---|---|---|
| Minibus | 0.05 | 0.19 |
| Standard Bus | 1.28 | 1.59 |
| LCV 4 Wheel | 0.05 | 0.23 |
| LCV 6 Wheel | 0.71 | 0.75 |
| 2 Axle Truck | 1.60 | 2.00 |
| 3 Axle truck | 12.72 | 4.97 |
| MAV | 11.67 | 7.44 |

**VDF of Surapattu Toll Plaza**

| Vehicle Category | Tambaram to Madhavaram | Madhavaram to Tambaram |
|---|---|---|
| Minibus | 0.00 | 0.06 |
| Standard Bus | 0.54 | 0.81 |
| LCV 4 Wheel | 0.11 | 0.33 |
| LCV 6 Wheel | 0.70 | 0.81 |

| Vehicle Category | Tambaram to Madhavaram | Madhavaram to Tambaram |
|---|---|---|
| 2 Axle Truck | 1.84 | 3.00 |
| 3 Axle truck | 6.83 | 4.38 |
| MAV | 11.02 | 7.49 |

**Chennai-Tada (Km 21+400 to Km 54+400)**

**VDF of Nallur Toll Plaza**

| Vehicle Category | Chennai to Tada | Tada to Chennai |
|---|---|---|
| Minibus | 0.10 | 0.00 |
| Standard Bus | 1.34 | 0.92 |
| LCV 4 Wheel | 0.05 | 0.05 |
| LCV 6 Wheel | 0.54 | 0.87 |
| 2 Axle Truck | 1.31 | 3.18 |
| 3 Axle truck | 2.97 | 3.71 |
| MAV | 5.85 | 9.76 |

**Neelmangla-Tumkur (Km 29+500 to Km 74+168)**

**VDF of Kulumepalya Toll Plaza**

| Vehicle Category | Neelmangla to Tumkur | Tumkur to Neelmangla |
|---|---|---|
| Minibus | 0.18 | 0.00 |
| Standard Bus | 2.47 | 2.96 |
| LCV 4 Wheel | 0.11 | 0.38 |
| LCV 6 Wheel | 0.94 | 0.99 |
| 2 Axle Truck | 2.62 | 2.19 |
| 3 Axle truck | 9.12 | 8.79 |
| MAV | 9.38 | 10.07 |

**VDF of Chokkenahalli Toll Plaza**

| Vehicle Category | Neelmangla to Tumkur | Tumkur to Neelmangla |
|---|---|---|
| Minibus | 0.17 | 0.04 |
| Standard Bus | 1.52 | 1.60 |
| LCV 4 Wheel | 0.05 | 0.15 |
| LCV 6 Wheel | 0.91 | 1.36 |
| 2 Axle Truck | 2.40 | 2.28 |
| 3 Axle truck | 4.22 | 5.49 |
| MAV | 6.75 | 9.40 |

- **ESTIMATED DESIGN TRAFFIC**

The design traffic is calculated in terms of the cumulative number of standard axles in two directions of the carriageway during the design life of the road.

As per Traffic Consultant Report, the estimated Design MSA presented in the table below:

**Vijayawada-Chilakaluripet (Km 355+000 to Km 437+500)**

**MSA Calculation of Kaza Toll Plaza**

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.05 | 1.78 | 0.06 | 1.24 | 2.49 | 6.13 | 8.88 | 0.00 | | |
| FY26 | 335 | 2525 | 755 | 1307 | 693 | 1388 | 3164 | 3 | 48,95,376 | 5 |
| FY27 | 351 | 2583 | 790 | 1361 | 721 | 1372 | 3030 | 4 | 47,80,960 | 10 |
| FY28 | 368 | 2643 | 830 | 1416 | 750 | 1344 | 2786 | 4 | 45,63,801 | 14 |
| FY29 | 386 | 2702 | 871 | 1500 | 795 | 1358 | 2944 | 4 | 47,50,311 | 19 |
| FY30 | 406 | 2764 | 916 | 1592 | 844 | 1375 | 3138 | 4 | 49,89,773 | 24 |
| FY31 | 425 | 2823 | 959 | 1685 | 893 | 1391 | 3335 | 4 | 52,31,184 | 29 |
| FY32 | 455 | 2881 | 1025 | 1790 | 949 | 1408 | 3567 | 5 | 55,25,143 | 35 |
| FY33 | 486 | 2948 | 1096 | 1900 | 1007 | 1423 | 3811 | 5 | 58,03,534 | 41 |
| FY34 | 464 | 3007 | 1046 | 1799 | 953 | 1210 | 3156 | 5 | 50,03,306 | 46 |
| FY35 | 434 | 3080 | 979 | 1712 | 907 | 995 | 2424 | 5 | 41,33,544 | 50 |
| FY36 | 464 | 3137 | 1046 | 1683 | 892 | 890 | 2096 | 6 | 37,55,692 | 53 |
| FY37 | 484 | 3192 | 1091 | 1762 | 934 | 897 | 2255 | 6 | 39,39,577 | 57 |
| FY38 | 505 | 3255 | 1138 | 1843 | 976 | 904 | 2424 | 6 | 41,44,112 | 62 |
| FY39 | 525 | 3308 | 1184 | 1925 | 1020 | 911 | 2601 | 6 | 43,55,468 | 66 |
| FY40 | 547 | 3294 | 1233 | 2009 | 1065 | 918 | 2729 | 7 | 45,19,279 | 70 |
| FY41 | 620 | 3316 | 1397 | 2067 | 1095 | 924 | 2887 | 7 | 46,87,734 | 75 |
| FY42 | 647 | 3368 | 1460 | 2157 | 1143 | 931 | 3033 | 7 | 48,70,647 | 80 |
| FY43 | 676 | 3427 | 1524 | 2249 | 1192 | 938 | 3183 | 8 | 50,59,680 | 85 |
| FY44 | 706 | 3480 | 1592 | 2346 | 1243 | 944 | 3341 | 8 | 52,70,557 | 90 |
| FY45 | 738 | 3532 | 1663 | 2446 | 1296 | 951 | 3506 | 8 | 54,62,023 | 96 |
| FY46 | 763 | 3586 | 1721 | 2542 | 1347 | 957 | 3657 | 9 | 56,51,574 | 101 |

**Chennai Bypass (Km 0+000 to Km 32+600)**

**MSA Calculation of Vanagram Toll Plaza**

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.19 | 1.59 | 0.23 | 0.75 | 2.00 | 12.72 | 11.67 | 0.00 | | |
| FY26 | 1302 | 2945 | 747 | 877 | 184 | 551 | 2008 | 7 | 40,64,776 | 4 |
| FY27 | 1335 | 3030 | 766 | 918 | 192 | 555 | 2062 | 7 | 41,63,851 | 8 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY28 | 1370 | 3118 | 786 | 957 | 201 | 564 | 2152 | 7 | 43,26,151 | 13 |
| FY29 | 1407 | 3210 | 808 | 1004 | 211 | 577 | 2223 | 7 | 44,49,234 | 17 |
| FY30 | 1440 | 3294 | 826 | 1026 | 215 | 581 | 2266 | 8 | 45,29,398 | 22 |
| FY31 | 1472 | 3422 | 845 | 1050 | 220 | 585 | 2368 | 8 | 46,93,990 | 26 |
| FY32 | 1505 | 3510 | 864 | 1087 | 228 | 589 | 2437 | 8 | 48,24,266 | 31 |
| FY33 | 1538 | 3599 | 883 | 1132 | 237 | 593 | 2499 | 8 | 49,20,037 | 36 |
| FY34 | 1569 | 3681 | 900 | 1173 | 246 | 597 | 2555 | 8 | 50,18,406 | 41 |
| FY35 | 1603 | 3773 | 920 | 1197 | 251 | 601 | 2664 | 8 | 51,86,473 | 46 |
| FY36 | 1635 | 3904 | 938 | 1242 | 260 | 605 | 2733 | 8 | 53,26,096 | 52 |
| FY37 | 1648 | 3939 | 946 | 1252 | 263 | 606 | 2765 | 8 | 53,62,264 | 57 |
| FY38 | 1657 | 3963 | 951 | 1258 | 264 | 607 | 2785 | 9 | 53,95,833 | 62 |
| FY39 | 1663 | 3980 | 954 | 1267 | 266 | 608 | 2806 | 9 | 54,28,060 | 68 |
| FY40 | 1666 | 3988 | 956 | 1270 | 266 | 608 | 2813 | 9 | 54,54,152 | 73 |
| FY41 | 1669 | 4001 | 958 | 1272 | 267 | 609 | 2820 | 9 | 54,51,862 | 79 |
| FY42 | 1672 | 4009 | 959 | 1276 | 268 | 609 | 2831 | 9 | 54,67,902 | 84 |
| FY43 | 1674 | 4016 | 961 | 1280 | 268 | 609 | 2840 | 9 | 54,81,997 | 90 |
| FY44 | 1677 | 4024 | 962 | 1283 | 269 | 609 | 2848 | 9 | 55,10,788 | 95 |
| FY45 | 1680 | 4032 | 964 | 1287 | 270 | 610 | 2858 | 9 | 55,11,180 | 101 |
| FY46 | 1683 | 4044 | 966 | 1290 | 271 | 610 | 2866 | 9 | 55,23,624 | 106 |

## MSA Calculation of Surapattu Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.06 | 0.81 | 0.33 | 0.81 | 3.00 | 6.83 | 11.02 | 0.00 | | |
| FY26 | 1312 | 265 | 1478 | 1078 | 254 | 1007 | 3765 | 13 | 57,39,547 | 6 |
| FY27 | 1374 | 273 | 1548 | 1114 | 262 | 1015 | 3870 | 13 | 58,86,175 | 12 |
| FY28 | 1440 | 281 | 1623 | 1140 | 269 | 1022 | 4016 | 13 | 60,98,997 | 18 |
| FY29 | 1281 | 289 | 1444 | 982 | 231 | 875 | 3441 | 13 | 52,18,257 | 23 |
| FY30 | 1097 | 297 | 1236 | 805 | 189 | 722 | 2827 | 14 | 42,96,572 | 27 |
| FY31 | 1142 | 308 | 1287 | 816 | 192 | 727 | 2960 | 14 | 44,70,915 | 32 |
| FY32 | 1189 | 316 | 1340 | 836 | 197 | 732 | 3049 | 14 | 46,04,573 | 36 |
| FY33 | 1238 | 324 | 1395 | 861 | 203 | 737 | 3127 | 15 | 47,00,302 | 41 |
| FY34 | 1283 | 332 | 1446 | 883 | 208 | 741 | 3197 | 15 | 47,97,606 | 46 |
| FY35 | 1334 | 340 | 1503 | 895 | 211 | 746 | 3339 | 15 | 49,84,258 | 51 |
| FY36 | 1384 | 352 | 1559 | 918 | 216 | 751 | 3428 | 15 | 51,20,155 | 56 |
| FY37 | 1434 | 360 | 1616 | 930 | 219 | 755 | 3528 | 16 | 52,39,810 | 61 |
| FY38 | 1480 | 367 | 1668 | 940 | 221 | 759 | 3618 | 16 | 53,59,650 | 67 |
| FY39 | 1532 | 375 | 1726 | 964 | 227 | 764 | 3759 | 16 | 55,45,333 | 72 |
| FY40 | 1584 | 383 | 1784 | 978 | 230 | 768 | 3852 | 16 | 56,85,465 | 78 |
| FY41 | 1635 | 395 | 1843 | 989 | 233 | 772 | 3955 | 17 | 58,06,996 | 84 |
| FY42 | 1688 | 403 | 1902 | 1013 | 238 | 776 | 4108 | 17 | 60,08,241 | 90 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY43 | 1735 | 410 | 1955 | 1034 | 244 | 780 | 4248 | 17 | 61,91,876 | 96 |
| FY44 | 1784 | 417 | 2010 | 1053 | 248 | 784 | 4370 | 17 | 63,71,102 | 102 |
| FY45 | 1823 | 423 | 2054 | 1071 | 252 | 787 | 4484 | 17 | 65,03,401 | 109 |
| FY46 | 1857 | 431 | 2093 | 1080 | 254 | 789 | 4556 | 18 | 65,98,712 | 115 |

## Chennai-Tada (Km 21+400 to Km 54+400)

### MSA Calculation of Nallur Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.10 | 1.34 | 0.05 | 0.87 | 3.18 | 3.71 | 9.76 | 0.00 | | |
| FY26 | 2135 | 1048 | 1224 | 1876 | 762 | 1394 | 6099 | 18 | 77,33,099 | 8 |
| FY27 | 2235 | 1079 | 1281 | 1993 | 810 | 1423 | 6538 | 18 | 82,49,830 | 16 |
| FY28 | 2336 | 1111 | 1339 | 2118 | 861 | 1450 | 7014 | 18 | 88,30,779 | 25 |
| FY29 | 2444 | 1145 | 1401 | 2255 | 916 | 1477 | 7567 | 19 | 94,48,473 | 34 |
| FY30 | 2549 | 1178 | 1461 | 2391 | 972 | 1502 | 8123 | 19 | 1,00,93,420 | 44 |
| FY31 | 2618 | 1210 | 1501 | 2476 | 1006 | 1480 | 8443 | 19 | 1,04,52,681 | 55 |
| FY32 | 2688 | 1242 | 1540 | 2567 | 1043 | 1454 | 8815 | 19 | 1,08,97,951 | 66 |
| FY33 | 2791 | 1276 | 1600 | 2704 | 1099 | 1453 | 9296 | 20 | 1,14,22,390 | 77 |
| FY34 | 2901 | 1307 | 1662 | 2853 | 1159 | 1462 | 9837 | 20 | 1,20,47,169 | 89 |
| FY35 | 3018 | 1341 | 1730 | 3016 | 1225 | 1471 | 10475 | 20 | 1,27,80,457 | 102 |
| FY36 | 3134 | 1373 | 1796 | 3177 | 1291 | 1481 | 11085 | 20 | 1,35,19,591 | 115 |
| FY37 | 3248 | 1406 | 1862 | 3344 | 1359 | 1492 | 11719 | 21 | 1,42,11,873 | 130 |
| FY38 | 3358 | 1437 | 1924 | 3506 | 1424 | 1501 | 12336 | 21 | 1,49,21,671 | 145 |
| FY39 | 3473 | 1469 | 1990 | 3677 | 1494 | 1511 | 13001 | 21 | 1,56,84,754 | 160 |
| FY40 | 3590 | 1486 | 2058 | 3854 | 1566 | 1520 | 13692 | 21 | 1,65,20,743 | 177 |
| FY41 | 3707 | 1510 | 2124 | 4031 | 1638 | 1530 | 14461 | 21 | 1,73,50,347 | 194 |
| FY42 | 3755 | 1535 | 2152 | 4104 | 1668 | 1534 | 14781 | 22 | 1,77,16,755 | 212 |
| FY43 | 3799 | 1557 | 2177 | 4173 | 1695 | 1537 | 15084 | 22 | 1,80,62,842 | 230 |
| FY44 | 3823 | 1580 | 2191 | 4210 | 1710 | 1539 | 15246 | 22 | 1,83,00,241 | 248 |
| FY45 | 3835 | 1602 | 2198 | 4228 | 1718 | 1540 | 15329 | 22 | 1,83,46,491 | 267 |
| FY46 | 3840 | 1623 | 2201 | 4237 | 1722 | 1540 | 15370 | 23 | 1,83,96,449 | 285 |

## Neelmangla-Tumkur (Km 29+500 to Km 74+168)

### MSA Calculation of Kulumepalya Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.18 | 2.96 | 0.38 | 0.99 | 2.62 | 9.12 | 10.07 | 0.00 | | |
| FY26 | 2271 | 3850 | 2481 | 2774 | 890 | 1874 | 4940 | 25 | 94,23,785 | 9 |
| FY27 | 2358 | 3986 | 2577 | 2951 | 947 | 1887 | 5283 | 25 | 99,08,084 | 19 |
| FY28 | 2458 | 4125 | 2686 | 3137 | 1006 | 1909 | 5623 | 26 | 1,04,30,219 | 30 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY29 | 2383 | 4254 | 2604 | 2953 | 948 | 1623 | 4747 | 27 | 91,29,996 | 39 |
| FY30 | 2288 | 4400 | 2500 | 2735 | 877 | 1332 | 3749 | 28 | 77,12,931 | 47 |
| FY31 | 2335 | 4538 | 2551 | 2805 | 900 | 1288 | 3757 | 29 | 77,40,167 | 54 |
| FY32 | 2381 | 4596 | 2602 | 2873 | 922 | 1236 | 3747 | 30 | 77,33,030 | 62 |
| FY33 | 2468 | 4596 | 2696 | 3015 | 967 | 1238 | 3908 | 31 | 79,28,632 | 70 |
| FY34 | 2551 | 4737 | 2788 | 3186 | 1022 | 1253 | 4151 | 32 | 83,03,057 | 78 |
| FY35 | 2637 | 4881 | 2881 | 3365 | 1079 | 1268 | 4406 | 33 | 86,93,984 | 87 |
| FY36 | 2721 | 5021 | 2973 | 3543 | 1137 | 1282 | 4663 | 33 | 91,09,602 | 96 |
| FY37 | 2814 | 5149 | 3075 | 3729 | 1196 | 1290 | 4930 | 34 | 94,77,938 | 106 |
| FY38 | 2900 | 5291 | 3169 | 3920 | 1258 | 1304 | 5208 | 35 | 98,94,577 | 115 |
| FY39 | 2986 | 5433 | 3263 | 4115 | 1320 | 1318 | 5493 | 36 | 1,03,20,852 | 126 |
| FY40 | 3073 | 5577 | 3358 | 4317 | 1385 | 1332 | 5790 | 37 | 1,07,91,322 | 137 |
| FY41 | 3171 | 5708 | 3465 | 4526 | 1452 | 1346 | 6098 | 38 | 1,12,13,498 | 148 |
| FY42 | 3261 | 5854 | 3564 | 4742 | 1521 | 1353 | 6417 | 39 | 1,16,77,230 | 159 |
| FY43 | 3352 | 6001 | 3662 | 4963 | 1592 | 1366 | 6745 | 40 | 1,21,56,826 | 172 |
| FY44 | 3444 | 6151 | 3764 | 5193 | 1666 | 1380 | 7089 | 41 | 1,26,93,404 | 184 |
| FY45 | 3549 | 6289 | 3878 | 5434 | 1743 | 1394 | 7450 | 42 | 1,31,79,579 | 198 |
| FY46 | 3647 | 6446 | 3986 | 5686 | 1824 | 1407 | 7830 | 43 | 1,37,29,280 | 211 |

## MSA Calculation of Chokkenahalli Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.17 | 1.60 | 0.15 | 1.36 | 2.40 | 5.49 | 9.40 | 0.00 | | |
| FY26 | 2155 | 3610 | 1656 | 2461 | 1181 | 1859 | 5389 | 23 | 83,25,594 | 8 |
| FY27 | 2275 | 3737 | 1748 | 2621 | 1258 | 1874 | 5744 | 24 | 87,86,471 | 17 |
| FY28 | 2401 | 3868 | 1845 | 2788 | 1338 | 1908 | 6120 | 25 | 93,08,588 | 26 |
| FY29 | 2534 | 3989 | 1948 | 2966 | 1424 | 1943 | 6522 | 26 | 98,10,452 | 36 |
| FY30 | 2672 | 4126 | 2054 | 3156 | 1515 | 1983 | 6997 | 27 | 1,04,25,129 | 47 |
| FY31 | 2799 | 4255 | 2151 | 3304 | 1586 | 1991 | 7312 | 27 | 1,08,35,965 | 57 |
| FY32 | 2930 | 4310 | 2252 | 3457 | 1659 | 1970 | 7633 | 28 | 1,12,53,796 | 69 |
| FY33 | 3070 | 4309 | 2359 | 3636 | 1745 | 1992 | 8039 | 29 | 1,17,23,469 | 80 |
| FY34 | 3220 | 4442 | 2475 | 3846 | 1846 | 2028 | 8543 | 30 | 1,23,72,468 | 93 |
| FY35 | 3090 | 4560 | 2375 | 3186 | 1529 | 1573 | 6832 | 31 | 1,00,94,624 | 103 |
| FY36 | 2933 | 4675 | 2254 | 2432 | 1167 | 1100 | 4861 | 32 | 75,19,806 | 110 |
| FY37 | 3065 | 4794 | 2356 | 2561 | 1229 | 1104 | 5142 | 33 | 78,65,041 | 118 |
| FY38 | 3201 | 4926 | 2460 | 2695 | 1293 | 1122 | 5435 | 33 | 82,54,048 | 127 |
| FY39 | 3338 | 5058 | 2566 | 2831 | 1359 | 1141 | 5735 | 34 | 86,53,073 | 135 |
| FY40 | 3480 | 5192 | 2674 | 2972 | 1427 | 1159 | 6048 | 35 | 90,91,686 | 144 |
| FY41 | 3625 | 5314 | 2786 | 3118 | 1497 | 1177 | 6373 | 36 | 94,93,098 | 154 |
| FY42 | 3774 | 5451 | 2901 | 3270 | 1569 | 1181 | 6711 | 37 | 99,28,361 | 164 |
| FY43 | 3925 | 5587 | 3017 | 3424 | 1643 | 1199 | 7057 | 38 | 1,03,81,343 | 174 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY44 | 4082 | 5727 | 3137 | 3585 | 1721 | 1217 | 7420 | 39 | 1,08,86,105 | 185 |
| FY45 | 4245 | 5856 | 3263 | 3754 | 1802 | 1235 | 7802 | 40 | 1,13,51,928 | 196 |
| FY46 | 4415 | 6002 | 3393 | 3931 | 1887 | 1254 | 8204 | 41 | 1,18,74,321 | 208 |

- **PAVEMENT CRUST COMPOSITION**

Pavement is layered structures comprising a combination of materials. These materials, their associated properties, and their interactions determine properties of the resultant pavement. Therefore, a good understanding of these materials, how they are characterized, and how they perform is fundamental for understanding pavement behaviour and deterioration.

Details of existing pavement composition (pavement course, material type, and thickness) were recorded at every 500 m interval by measuring thickness of each crust layer in test pit excavated to evaluate the sub-grade strength along the Project Stretch.

**Summary of Pavement Layer Thickness:**

**Section-01 Vijayawada-Chilakaluripet**

| S.No. | Side | Average Bituminous Layer(mm) | Average Granular Layer(mm) |
|---|---|---|---|
| 1 | LHS | 175 | 450 |
| 2 | RHS | 175 | 450 |

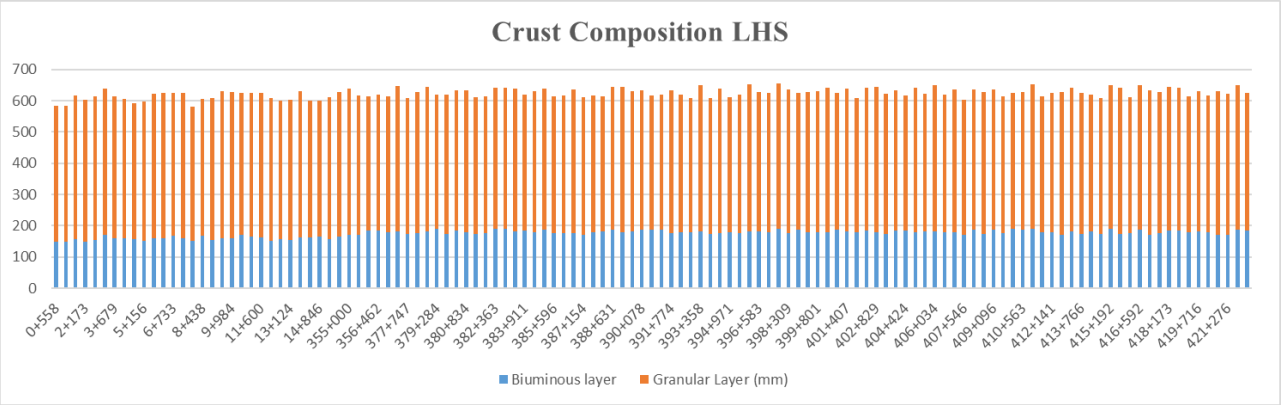
**Section-02 Chennai Bypass**

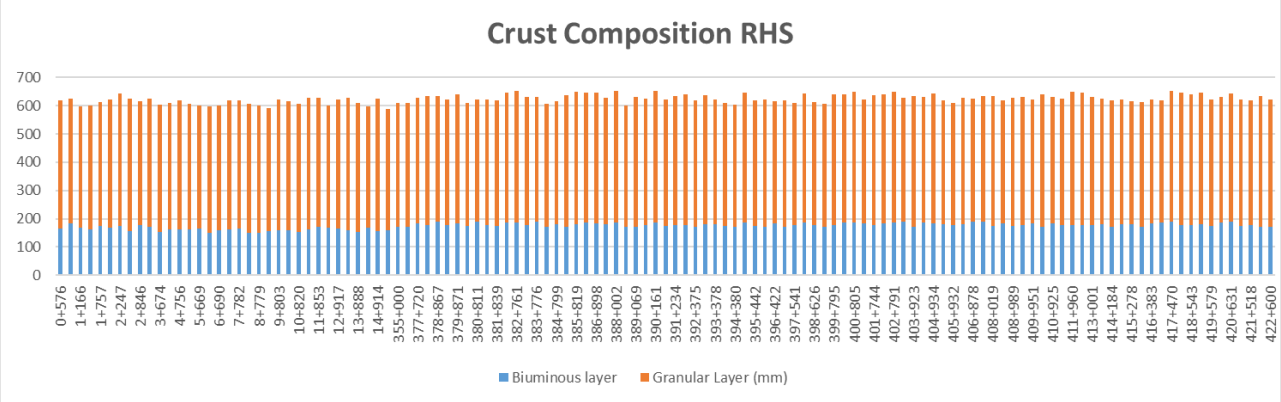
| S.No. | Side | Average Bituminous Layer(mm) | Average Granular Layer(mm) |
|---|---|---|---|
| 1 | LHS | 220 | 450 |
| 2 | RHS | 220 | 450 |

**Section-03 Chennai-Tada**

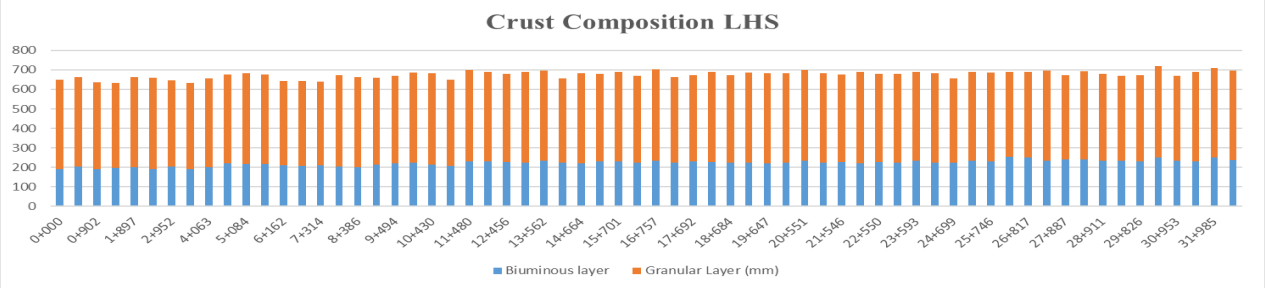
| S.No. | Side | Average Bituminous Layer(mm) | Average Granular Layer(mm) |
|---|---|---|---|
| 1 | LHS | 180 | 450 |
| 2 | RHS | 180 | 450 |

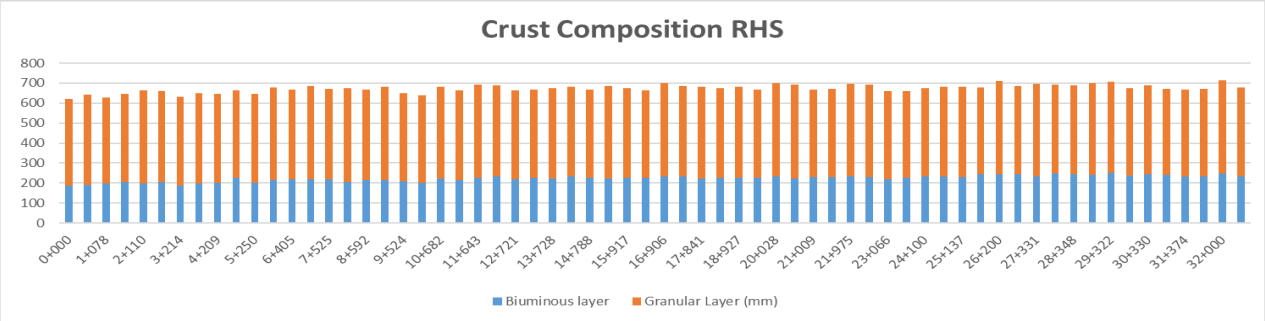
## Section-01 Vijayawada-Chilakaluripet



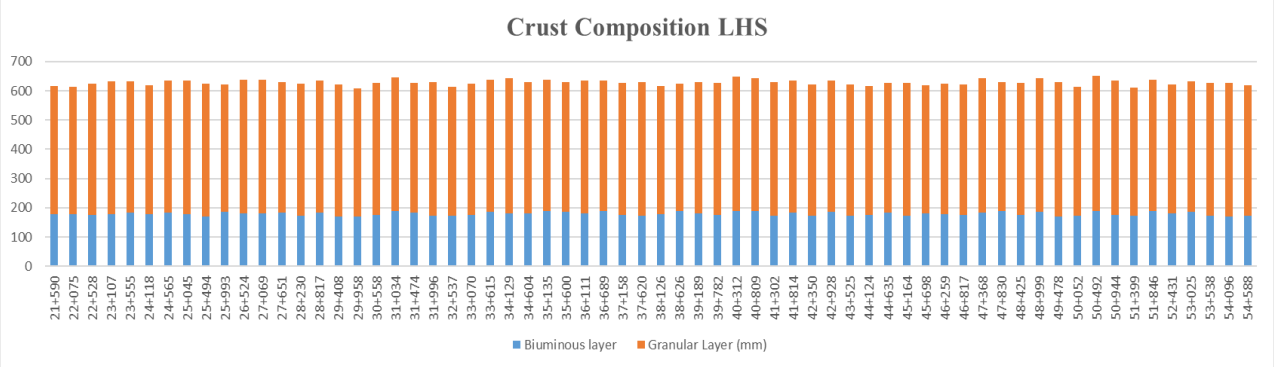



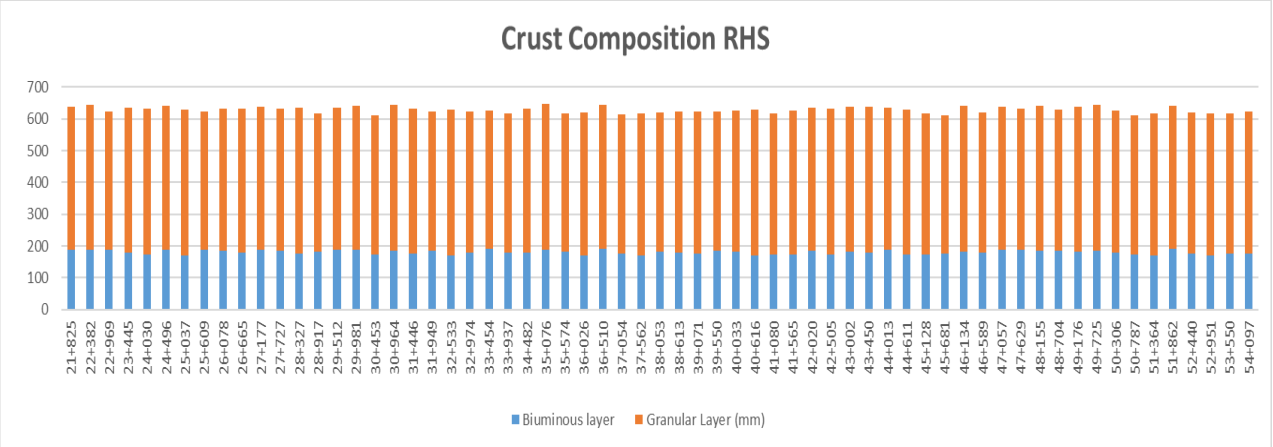

## Section-02 Chennai Bypass



**Section-03 Chennai-Tada**




- **ANALYSIS OF PAVEMENT CONDITION DATA**

  Structural Condition of pavement has been evaluated using Falling Weight Deflectometer (FWD) and subsequent analysis was carried out to ascertain the relative performance of the pavement for entire Project Stretch, in the context of evaluating its residual life, overlay and other maintenance requirements based on Roughness and Rutting.

  - **Flexible Pavement Overlay on Main carriageway**

**Section-01 Vijayawada-Chilakaluripet**

| Chainage (km) | | Length (m) | Side | Adopted Overlay (mm) | | Milling |
|---|---|---|---|---|---|---|
| From | To | | | BC | DBM | |
| Nil | | | | | | |

**Section-02 Chennai Bypass**

| Chainage (km) | | Length (m) | Side | Adopted Overlay (mm) | | Milling |
|---|---|---|---|---|---|---|
| From | To | | | BC | DBM | |
| Nil | | | | | | |

**Section-03 Chennai-Tada**

| Chainage (km) | | Length (m) | Side | Adopted Overlay (mm) | | Milling |
|---|---|---|---|---|---|---|
| From | To | | | BC | DBM | |
| Nil | | | | | | |

***Recommended Overlay on Service Road***

**Section 01 Vijayawada Chilakaluripet**

| Chainage (km) | | Length (m) | Side | Adopted Overlay (mm) | | Milling |
|---|---|---|---|---|---|---|
| From | To | | | BC | DBM | |
| Nil | | | | | | |

**Section 02 Chennai Bypass**

| Chainage (km) | | Length (m) | Side | Adopted Overlay (mm) | | Milling |
|---|---|---|---|---|---|---|
| From | To | | | BC | DBM | |
| Nil | | | | | | |

## 6. STRUCTURE REPAIR AND REHABILITATION

There are deficiencies noted in the structures and relevant repair-rehabilitation measures are suggested.

- Remove of vegetation and cleaning is required
- Expansion Joint Cleaning
- Cleaning of drainage Spout is required
- Cleaning, Greasing of Bearings and Corrosion protection of Bearings
- Replacement of Hand Railing with RCC Crash Barrier

- Providing of Missing Drain pipe
- Epoxy Grouting at Honey Combing locations
- Shortcreting & Guniting at reinforcement exposed locations

## 7. TOLL PLAZA

Toll Plaza on this project stretch is located near Kaza toll Plazas at Km 420+500 on Vijayawada-Chilakaluripet, Vanagram toll Plazas at Km 16+500 & Surapattu toll Plazas at Km 28+600 on Chennai Bypass, Nallur toll Plazas at Km 21+625 on Chennai- Tada and kulumepalya toll plazas at Km 30+000 and Chokkenahalli toll plaza Km 61+500 on Neelmangla- Tumkur.

**Section-01 Vijayawada-Chilakaluripet**




***Kaza toll Plaza (420+500)***

**Section-02 Chennai Bypass**



***Vanagram toll Palaza (16+500)***




***Surapattu toll Plaza (28+600)***

## Section-03 Chennai-Tada



*Nallur toll Plaza (21+625)*



*Nallur toll Plaza (21+625)*

## Section 04 Neelmangla-Tumkur



*Kulumepalya toll Plaza (30+000)*




*Chokkenahalli (61+500)*

## 8. COST ESTIMATE

The Project cost estimates have been prepared based on various items of works required and Initial Cost for Engineering and Safety Improvements for base year 2025-26 is provided below-

**Section-01 Vijayawada-Chilakaluripet**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| ATMS | KM | 52.91 | 8.237 |
| MLFF at existing Toll Plaza | Nos | 1 | 5.000 |
| **Total Excluding @18% GST** | | | **13.237** |
| **GST @18%** | | | **2.383** |
| **Total Amount** | | | **15.619** |

**Section-02 Chennai Bypass**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| ATMS | KM | 32.6 | 4.981 |
| MLFF at existing Toll Plaza Lanes (Surapattu) | Nos | 1 | 5.000 |
| **Total Excluding @18% GST** | | | **9.981** |
| **GST @18%** | | | **1.797** |
| **Total Amount** | | | **11.777** |

**Section-03 Chennai-Tada**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| ATMS | KM | 33 | 5.498 |
| New Toll Plaza with MLFF | Nos | 1 | 8.436 |
| **Total Excluding @18% GST** | | | **13.934** |
| **GST @18%** | | | **2.508** |
| **Total Amount** | | | **16.442** |

**Section-04 Neelmangla Tumkur**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| **Nil** | | | |

*Note: - The rates for ATMS equipment and MLFF have been considered based on prevailing NHAI practices and accepted cost norms used in similar NHAI projects.*

## 9. OPERATION AND MAINTENANCE COST

The Project Operation and Maintenance cost estimates have been prepared based on various circulars and analysis.

Total cost of operation and maintenance consist of both regular and periodic maintenance.

**Total OMEX (Routine & Perodic) with Esclation**

**Section-01 Vijayawada-Chilakaluripet**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 5.91 | 0.00 | 5.91 |
| 2027-2028 | 6.21 | 0.00 | 6.21 |
| 2028-2029 | 6.52 | 0.00 | 6.52 |
| 2029-2030 | 6.85 | 0.00 | 6.85 |
| 2030-2031 | 7.19 | 0.00 | 7.19 |
| 2031-2032 | 7.55 | 0.00 | 7.55 |
| 2032-2033 | 39.89 | 0.00 | 39.89 |
| 2033-2034 | 41.88 | 0.00 | 41.88 |
| 2034-2035 | 43.98 | 0.00 | 43.98 |
| 2035-2036 | 46.17 | 0.00 | 46.17 |
| 2036-2037 | 48.48 | 0.00 | 48.48 |
| 2037-2038 | 50.91 | 0.00 | 50.91 |
| 2038-2039 | 32.21 | 270.70 | 302.91 |
| 2039-2040 | 66.71 | 0.00 | 66.71 |
| 2040-2041 | 70.05 | 0.00 | 70.05 |

**Section-02 Chennai Bypass**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 23.92 | 0.00 | 23.92 |

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2027-2028 | 25.12 | 0.00 | 25.12 |
| 2028-2029 | 26.37 | 0.00 | 26.37 |
| 2029-2030 | 27.69 | 0.00 | 27.69 |
| 2030-2031 | 29.08 | 0.00 | 29.08 |
| 2031-2032 | 30.53 | 0.00 | 30.53 |
| 2032-2033 | 23.42 | 102.57 | 125.99 |
| 2033-2034 | 33.66 | 0.00 | 33.66 |
| 2034-2035 | 35.34 | 0.00 | 35.34 |
| 2035-2036 | 37.11 | 0.00 | 37.11 |
| 2036-2037 | 38.96 | 0.00 | 38.96 |
| 2037-2038 | 40.91 | 0.00 | 40.91 |
| 2038-2039 | 31.38 | 137.46 | 168.84 |
| 2039-2040 | 45.11 | 0.00 | 45.11 |
| 2040-2041 | 47.36 | 0.00 | 47.36 |

**Section-03 Chennai-Tada**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 21.59 | 0.00 | 21.59 |
| 2027-2028 | 22.66 | 0.00 | 22.66 |
| 2028-2029 | 23.80 | 0.00 | 23.80 |
| 2029-2030 | 24.99 | 0.00 | 24.99 |
| 2030-2031 | 26.24 | 0.00 | 26.24 |
| 2031-2032 | 27.55 | 0.00 | 27.55 |
| 2032-2033 | 28.93 | 0.00 | 28.93 |
| 2033-2034 | 19.51 | 139.42 | 158.93 |
| 2034-2035 | 31.89 | 0.00 | 31.89 |
| 2035-2036 | 33.49 | 0.00 | 33.49 |
| 2036-2037 | 35.16 | 0.00 | 35.16 |
| 2037-2038 | 36.92 | 0.00 | 36.92 |
| 2038-2039 | 38.76 | 0.00 | 38.76 |
| 2039-2040 | 26.15 | 186.83 | 212.98 |
| 2040-2041 | 42.74 | 0.00 | 42.74 |

## Section-04 Neelmangla-Tumkur

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 14.38 | 0.00 | 14.38 |
| 2027-2028 | 15.10 | 0.00 | 15.10 |
| 2028-2029 | 15.85 | 0.00 | 15.85 |
| 2029-2030 | 25.82 | 0.00 | 25.82 |
| 2030-2031 | 27.11 | 0.00 | 27.11 |
| 2031-2032 | 28.46 | 0.00 | 28.46 |
| 2032-2033 | 44.06 | 0.00 | 44.06 |
| 2033-2034 | 49.21 | 0.00 | 49.21 |
| 2034-2035 | 51.67 | 0.00 | 51.67 |
| 2035-2036 | 49.88 | 54.81 | 104.69 |
| 2036-2037 | 56.97 | 0.00 | 56.97 |
| 2037-2038 | 59.82 | 0.00 | 59.82 |
| 2038-2039 | 49.25 | 175.76 | 225.01 |
| 2039-2040 | 65.95 | 0.00 | 65.95 |
| 2040-2041 | 63.67 | 69.95 | 133.62 |

# CHAPTER 1

## PROJECT DESCRIPTION

National Highways Authority of India (NHAI), an autonomous agency of the Government of India (GoI), is responsible for the development, maintenance and management of National Highways network in India.

There are currently approximately 1,32,500 kilometres of National Highways in India, constituting approximately 2.2% of India's entire road network but carrying approximately 40% of total road traffic.

To meet the growing need for further industrialization and development of the country, GoI has planned to expand the network of National Highways across the length and width of the country at a rapid pace. The various programmes which have been taken by GoI through NHAI are:

Phase I: Golden Quadrilateral (GQ) Comprising 4/6-laning of National Highways connecting four metro cities, namely, Delhi, Mumbai, Chennai and Kolkata with a total length of approximately 5846 km (which is mostly complete), and

Phase II: North-South and East-West Corridors (NSEW) comprising 4/6-laning of National Highways connecting Srinagar to Kanyakumari and Silchar to Porbandhar. Total length this NSEW corridor is approximately 7300 km. The projects of NSEW are mostly awarded and construction is also largely complete.

Bharatmala Pariyojana: A flagship highway development programme which envisions the development of 50 economic corridors, provide connectivity to 550 districts in the country through National Highway linkages and improve the average speed of road travel in India.

In addition to this, various NHDP programs has been taken up by NHAI to match the rapid pace of modernization and industrial development of the country. The Government has planned to continue developing the National Highways at a rapid pace, which will require significant funding in the near future.

The National Highways Authority of India (NHAI) has initiated the process of setting up an infrastructure investment trust (InvIT) to monetize its road assets. This is a private listed InvIT, through which institutional investors can invest in operational road projects offered by NHAI to the InvIT. In this model, the offered road assets are acquired by the InvIT while the investors

acquire the units issued by the InvIT. Income generated from the underlying road assets is paid out as distributions to the unit holders in the form of interest, dividend and return of capital. The InvIT is managed by a competent Investment Manager staffed with experts to manage the assets efficiently.

Under the InvIT frame work, the right of collection of user fees of selected NH projects is assigned for a specific time period to a Concessionaire. During this period, the O&M responsibility will also vest with the selected Concessionaire (unless costs are to be borne by existing concessionaires as per extant agreements). In return, the Concessionaire will pay an upfront quoted Concession Fee to NHAI.

Following is the stretch which shall be awarded on TOT model:

| Section No. | Section Name | | Chainage (Km) | | Length (Km) |
|---|---|---|---|---|---|
| | From | To | From | To | |
| Section-1 | Chilakaluripet | Vijayawada | 355+000 | 357+342 | 2.342 |
| | Chilakaluripet Bypass | | 0+000 | 16+499 | 16.499 |
| | Chilakaluripet | Vijayawada | 372+038 | 422+605 | 50.567 |
| Section-2 | Chennai Bypass | | 0+000 | 32+600 | 32.6 |
| Section-3 | Chennai | Tada | 21+400 | 54+400 | 33.0 |
| Section-4 | Neelmangla | Tumkur | 29+500 | 61+520 | 32.02 |
| | Tumkur Bypass | | 61+520 | 74+168 | 12.648 |

Accordingly, detailed reports on inventory & physical condition have been carried out for all stretches including a study of improvement proposals. Below general details of Project stretch are mentioned.

## 1.1 Objective of study and Scope of work

The main objective of this consultancy service is to access physical condition of selected National Highway Stretch for preparation of detailed project reports with technical schedules and bid documents for tendering. Physical condition of any Stretch shall be

established based on its highway design, pavement design, condition of structures, road safety features, condition of existing facilities like toll plazas etc.

Based on physical condition of highway Stretch, options shall be worked out for improvement of safety of existing road and strengthening of pavement and structures. Cost associated with all improvement proposals shall also be estimated as part of this Study.

**Note: -** This report has been prepared based on the information, data, and documents made available to the Consultant at the time of study. While due care has been exercised in the preparation of this report, the Consultant does not guarantee the accuracy or completeness of the information provided by third parties.

## 1.2 Scope of Service

The main objective of this assignment is to assess physical condition of selected National Highway Stretch and preparation of detailed project reports, technical and maintenance schedules for bidding process. Physical condition of any Stretch are established based on the geometric parameters of the highway, condition of pavement, structures, road safety features, condition of existing facilities like toll plazas etc. Based on physical condition of highway Stretches, options are worked out for improvement of safety of existing road and strengthening of pavement and structures. Cost associated with all improvement proposals are also estimated as part of this Study. Scope of services as per Terms of Reference (ToR) are presented below:

- Investigation for accessing condition of pavement including shoulder, embankment, drainage etc. using visual means, advanced laser profilometer and image processing software and falling weight Deflectometer.
- Investigation for perception of existing pavement composition.
- Conducting road safety audit for evaluating geometry of road, adequacy and condition of existing of safety features etc.
- Identification of black spots along the Project Stretch and propose corrective measures for the same.
- Inventory of all structures along the Project Stretch like bridges, culverts, ROBs, underpasses, flyovers etc. covering physical and hydraulic parameters.

Investigations shall be carried out for accessing structural conditions using Mobile Bridge Inspection Unit (MBIU) as per IRC-SP:35. For the bridges identified to be in a distressed condition based upon the visual condition survey, supplementary testing shall be carried out as per IRC-SP:35 and IRC-SP:40. Selection of tests may be made based on the specific requirement of the structure.

- Identification of source of construction materials quarry sites, sand source and borrow areas and assessment of quality of various construction materials.
- Preparation of improvement strategy for strengthening of pavement and structures, rehabilitation and design for road safety features, road furniture etc.
- Estimation of detailed cost based on improvement proposal.
- Preparation and submission of following items –
- Detailed project report and drawings covering all above-mentioned details.
- Technical schedule and bid documents for tendering.

## 1.3 Project Stretch

**Vijayawada-Chilakaluripet:** Project Stretch starts from Km 355+000 of NH-16 at Vijayawada and ends at Km 422+605 of NH-16 at Chilakaluripet and has Kaza toll Plazas at Km 420+500 on project Section in the state of Andhra Pradesh. The total length of Project Stretch is 69.408 km.

The Project Highway Vijayawada- Chilakaluripet section is under PBMC from Km 355+000 to Km 357+342 & from Km 372+038 to Km 422+605 and under HAM from Km 0+000 to Km 16+499. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements. The details of agency, section and COD/PCOD date is tabled as below:

**Vijayawada-Chilakaluripet section from Km 355+000 to Km 422+605 from Km 0+000 to Km 16+499**

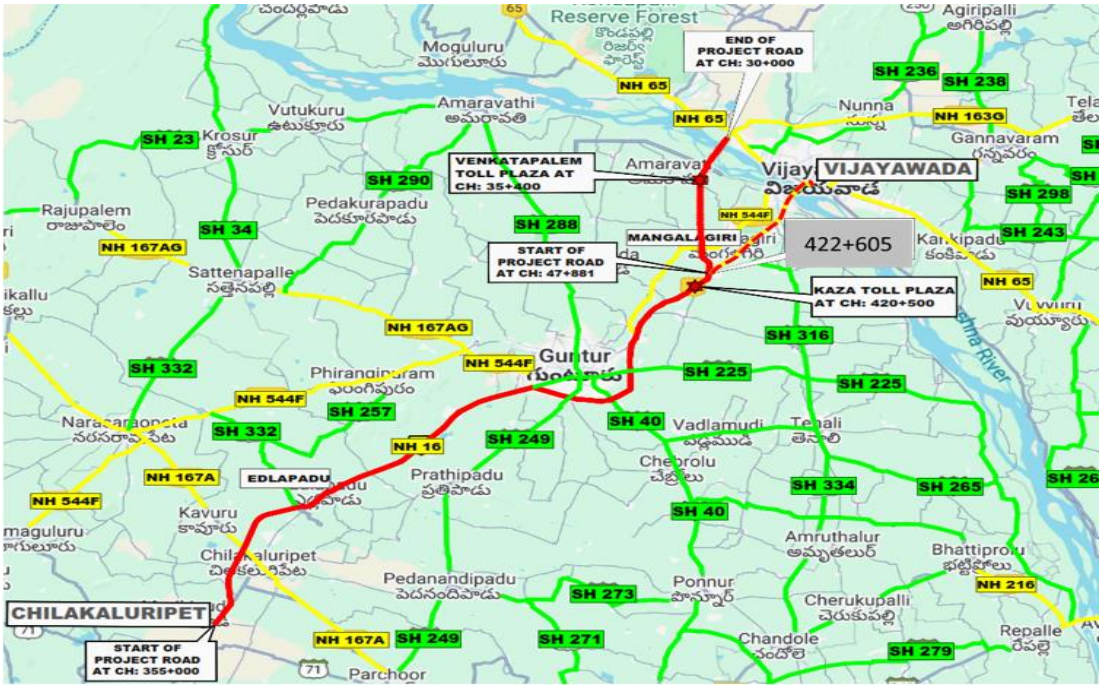
| Name of Agency | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| | PBMC | 355+000 | 357+342 | 2.342 | - | 24.03.2032 |

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/S. Shiva Build Tech Pvt. Ltd. | | 372+038 | 422+605 | 50.567 | | |
| M/S. Chilakaluripet Bypass Pvt. Ltd. | HAM | 0+000 | 16+499 | 16.499 | 29.10.2024 | 28.10.2039 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

Project highway is a part of National Highway 16 which is a major Indian highway running along the country's eastern coast, connecting Kolkata, West Bengal, to Chennai, Tamil Nadu. It is a crucial part of the Golden Quadrilateral project. The highway serves important cities including Bhubaneswar, Visakhapatnam, and Vijayawada.




***Index Map of Project Highway***

**Chennai Bypass:** Project Stretch starts from Km 0+000 and ends at Km 32+600 of NH-32/ NH-48 and has Vanagram toll Plazas at Km 16+500 and Surapattu at Km 28+600 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 32.600 km.

The Project Highway Chennai bypasss section is under O&M (Annual Maintanance) from Km 0+000 to Km 32+600 and under EPC (Major Maintanance of Pavement) from Km 0+000 to Km 32+600. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements. The details of agency, section and COD/PCOD date is tabled as below:

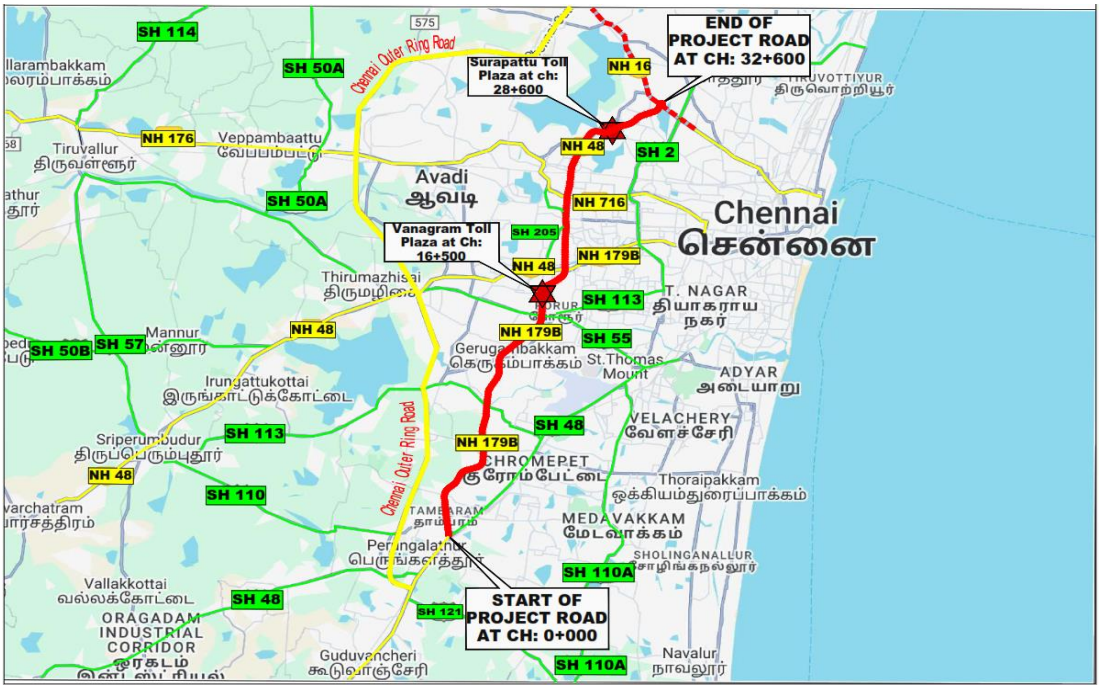
**Chennai Bypass section from Km 0+000 to Km 32+600**

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/s. Arjunvaishanvi Infrastructure & Developers Pvt. Ltd | O&M (Annual Maintenance) | 0+000 | 32+600 | 32.600 | - | 30.03.2026 |
| M/s Babuji Civil construction | EPC (Major Maintenance) | | | | - | 30.05.2028 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

Project highway is a part of NH-48 and NH-32, National Highway 48 (NH-48), a major national highway connecting Delhi and Chennai, intersects with National Highway 32 (NH-32), which links Chennai to Thoothukudi, near the city of Chennai in Tamil Nadu. Formerly known as the East Coast Road (ECR), NH-32 serves as an important coastal route for transportation, trade, and tourism. NH-48, a much longer highway spanning seven states, is a critical part of the Golden Quadrilateral project.




**Index Map of Project Highway**

**Chennai-Tada:** Project Stretch starts from Km 21+400 and ends at Km 54+400 of NH-16 and has Nallur at Km 21+625 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 33.00 km.

The Project Highway Chennai Tada section is under EPC (Six Laning) from Km 21+400 to Km 54+400. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements. The details of agency, section and COD/PCOD date is tabled as below:

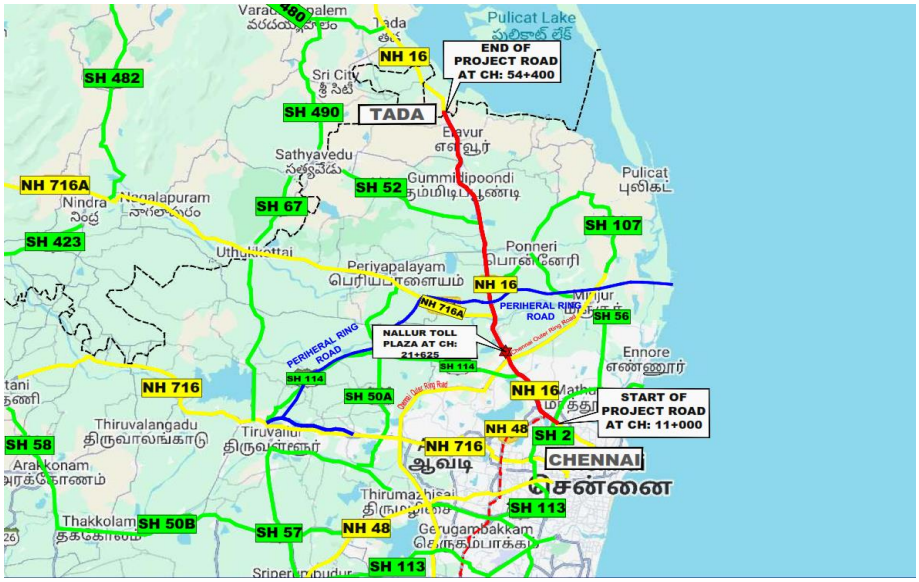
**Chennai-Tada section from Km 21+400 to Km 54+400**

| Name of Agency | Mode of Contract | Chainage (Km) | | Length (Km) | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | | | |
| M/s. SPL Infrastructure Pvt Ltd | EPC (Six laning) | 21+400 | 54+400 | 33.000 | 09.02.2022 | 09.02.2026 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

Project highway is a part of National Highway 16 which is a major Indian highway running along the country's eastern coast, connecting Kolkata, West Bengal, to Chennai, Tamil Nadu. It is a crucial part of the Golden Quadrilateral project. The highway serves important cities including Bhubaneswar, Visakhapatnam, and Vijayawada.




**Index Map of Project Highway**

**Note*:-** In Chennai-Tada Section From Km 11+000 to Km 21+400 is descoped from Public InvIT-01

**Neelmangla-Tumkur** Project Stretch starts from Km 29+500 and ends at Km 74+168 of NH-48 and has kulumepalya toll plazas at Km 30+000 and Chokkenahalli toll plaza Km 61+500 on project Section in the state of Karnataka. The total length of Project Stretch is 44.668 km.

The Project Highway Neelmangla- Tumkur section is under EPC (Six Laning) from Km 29+500 to Km 49+900, from Km 61+520 to Km 74+168 is under EPC and DPR is invited for section from km 49+900 to Km 61+520. Existing Concessionaire/ Contractor shall operate and maintain the project up to Handover date pursuant to and in accordance with the existing Concession/Contract agreements.

The section from Km 52+700 to Km 53+500 is an additional stretch along with Km 29+500 to Km 49+900 (EPC six-laning work) and falls under the scope of the EPC Contractor, M/s H.G. Infra Engineering Limited. The stretch from Km 52+700 to Km 53+500 shall be maintained by the EPC Contractor till completion of the DLP period. This section is not part of the DPR invited and does not fall under the scope of M/s Sri Chowdeshwari Concrete India Pvt. Ltd.

Currently, toll is collected at Kulumepalya (Ch. 30+000) and Chokkenahalli (Ch. 61+500). Upon completion of six-laning of the respective stretch, toll collection will be shifted to the new toll plazas at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425), and the existing toll plazas at Kulumepalya and Chokkenahalli will be demolished.

The details of agency, section and COD/PCOD date is tabled as below:

**Neelmangla-Tumkur section from Km 29+500 to Km 74+168**

| Name of Agency | Mode of Contract | Chainage (Km) | | Length | COD/ PCOD | O&M Handover Date |
|---|---|---|---|---|---|---|
| | | From | To | (Km) | | |
| M/s H G Infra Engineering Ltd. | EPC (Six laning) | 29+500 | 49+900 | 20.4 | 31.03.2027 | 31.03.2032 |
| | EPC | 61+520 | 74+168 | 12.648 | 31.03.2027 | 31.03.2032 |
| DPR Invited (Six laning) | | 49+900 | 61+520 | 11.62 | 30.09.2028 | 30.09.2033 |
| Sri Chowdeshwari concrete India Pvt. Ltd. | O&M | 49+900 | 61+520 | 11.62 | - | 05.06.2029 |

**O&M Handover date mentioned above are tentative and may vary based on the actual completion date of the project and there will be no financial implication for that.*

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

The project highway is a part of National Highway 48 which is a major north-south highway in India, connecting the capital city of Delhi with Chennai in Tamil Nadu. As a critical part of the Golden Quadrilateral network, it is a key economic and infrastructure corridor for the country. The highway passes through seven states: Delhi, Haryana, Rajasthan, Gujarat, Maharashtra, Karnataka, and Tamil Nadu connecting numerous important cities, including Gurugram, Jaipur, Ahmedabad, Mumbai, Pune, and Bengaluru, and facilitates trade, logistics, and economic development along its path.




**Index Map of Project Highway**

## 1. SUMMARY ROAD INVENTORY

Detailed inventory of Project Stretch is captured through NSV and field reconnaissance. Salient features like built-up settlements, carriageway dimensions, surface type, junctions, service roads, road furniture etc. are recorded for entire Project Stretch. The road inventory is linked to the existing km stones established along the roadside.

| Description | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|
| | | | | Neelmangla-Tumkur | Tumkur Bypass |
| **Length of project stretch** | 69.408 km | 32.600 Km | 33.00 Km | 32.020 Km | 12.648 Km |
| **Lane Configuration** | 6 Lane with paved shoulder | 6 Lane with paved shoulder | 6 Lane with paved shoulder | 4/6 Lane with paved shoulder | 6 Lane with paved shoulder |

| Description | | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|---|
| | | | | | Neelmangla-Tumkur | Tumkur Bypass |
| Pavement Type | Flexible (m) | 68808 | 32455 | 32535 | 31220 | 12648 |
| | Rigid (m) | 600 | 145 | 465 | 800 | 0 |
| Length of Service/Slip road (m) | | 121044 | 43205 | 67103 | 40800 | 24774 |
| Major/ Minor Junction | | 20 Nos. /218 Nos. | 10 Nos. /198 Nos. | 10 Nos. /95 Nos. | 2 Nos. /46 Nos. | 3 Nos. /8 Nos. |
| Major/ Minor Bridge | | 3 Nos. /23 Nos. | 3 Nos. /3 Nos. | 3 Nos. /9 Nos. | 2 Nos. /10 Nos. | 2 Nos. /8 Nos. |
| Culverts | | 90 Nos. | 140 Nos. | 56 Nos. | 50 Nos. | 19 Nos. |
| ROBs/RUBs | | 1 Nos./0 No | 1 Nos./1 No | 0 Nos./0 No | 2 Nos./0 No | 1 Nos./0 No |
| VUPs/LVUPs/SVUPs | | 27 Nos | 18 Nos | 9 Nos | 8 Nos | 11 Nos |
| PUPs/CUPs | | 26 Nos. | 2 Nos. | 7 Nos. | 1 Nos. | - |
| FOBs | | 0 Nos. | 0 Nos. | 1 Nos. | 1 Nos. | 1 Nos. |
| Toll Plazas | | Kaza (420+500) | Vanagram (16+500) and Surapattu (28+600) | Nallur (21+625) | Kulumepalya (30+000) and Chokkenahalli (61+500) | - |

| Description | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|
| | | | | Neelmangla-Tumkur | Tumkur Bypass |
| **Bus Bays with shelters/ Bus Shelters** | 21 Nos. | 1 Nos. | 36 Nos. | 12 Nos. | 1 Nos. |
| **Truck Lay Bye** | 1 Nos. | 0 Nos. | 0Nos. | 2 Nos. | - |
| **Median Openings** | 4 Nos. | 9 Nos. | 10 Nos. | 12 Nos. | - |

**For Section-04 Neelmangla Tumkur**

*These details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

# CHAPTER 2

# OVERVIEW OF NHAI

## 2.1 NHAI Establishment

The National Highways Authority of India was constituted by an act of Parliament, "The National Highways Authority of India Act, 1988". It is responsible for the development, maintenance and management of National Highways entrusted to it and for matters connected or incidental thereto. The Authority was operationalized in February 1995 with the appointment of full time Chairman and other Members. Additional information about NHAI activities and other details can be found on www.nhai.org. The source of information provided in this report is taken from NHAI website.

## 2.2 NHAI Vision

"To meet the nation's need for the provision and maintenance of National Highways network to global standards and to meet user's expectations in the most time bound and cost effective manner, within the strategic policy framework set by the Government of India and thus promote economic well-being and quality of life of the people."

## 2.3 NHDP Mandate

### NHDP Programme

Primary mandate is time and cost bound implementation of National Highways Development Project (NHDP) through host of funding options including from external multilateral agencies like World Bank, Asian Development Bank, JBIC etc. Work mainly comprises of strengthening and four laning of high-density corridors around 13,146 Kms.

The components are:

- Golden Quadrilateral - 5,846 Kms connecting Delhi-Kolkata-Chennai-Mumbai
- North-South-East-West Corridor-7,300 Kms connecting Kashmir to Kanyakumari and Silchar to Porbandhar
- Providing Road connectivity to major Ports.

- Involving the private sector in financing the construction, maintenance and operation of National Highways and wayside amenities
- Improvement, maintenance and augmentation of the existing National Highways network.
- Implementation of road safety measures and environmental management.
- Introducing Information Technology in Construction, maintenance and all operation of NHAI.

**Bharatmala Pariyojana**

NHAI has been entrusted with the development of Bharat Mala Project comprising over 65000 Kms of National Highway and State roads. The objective of programme is to optimize the efficiency of freight and passenger movement across the country by bridging critical infrastructure gaps through development of Economic Corridors, Inter Corridors and Feeder Routes, National Corridor Efficiency Improvement, Border and International connectivity roads, Coastal and Port connectivity roads and Green field expressways. The stretches are to be developed to minimum 4- lane National Highway standards. The Bharat Mala Project will be implemented in two phases.

Construction of a total length of about 24800 Kms is being taken up under Phase-I of Bharatmala Pariyojana. In addition, Phase-I would also include about 10000 Kms of residual works of NHDP programme.

### 2.3.1 NHAI Organization

- A full-time Chairman heads NHAI. As per NHAI act, there are five full time Members, namely Member (Admn), Member (Finance) and three Members (Technical). There is also four-part time (ex officio) Members of the Authority.
- The Authority has its field offices in the form of Project Implementation Units (PIUs) and Corridor Management Units (CMU) spread all over the country. These units are headed by Project Directors (PD) who are responsible for implementation of various NHDP Projects and operation and maintenance of the completed sections. All procurement related to woks, services, equipment and goods i.e. civil contractors, consultants and suppliers are made by the head office. PDs are also responsible for all pre-construction activities and liaison with the

Departments concerned of Union and State Government for successful implementation of the Projects.

- The Government has approved a proposal of restructuring NHAI. The salient points of the proposal are, inter alia; increase of full-time Members from 5 to 6 and part time Members from 4 to 6, creation of 26 posts at the level of CGM and to build a core of permanent employees of NHAI over a period of time. However, this restructuring will involve amendment of NHAI act. This process has been taken up.
- A detailed organization chart of NHAI is given in Fig. 2.1.

### 2.3.2 National Highway Development Program (NHDP)

The National Highways have a total length of 70,548 km to serve as the arterial network of the country. National Highways comprise only about 2% of the total length of road network in the country but carry 40% of the road traffic. The development of National Highways is the responsibility of the Government of India. The Government of India has launched major initiatives to upgrade and strengthen National Highways through various phases of National Highways Development Project (NHDP). National Highway Development Project is envisaged to plan, design and construct a network of world class highways to support the economic growth of the country. Infrastructure in India has been found to be a bottleneck/ speed breaker for the trade and business, poverty alleviation and economic growth of the country.

National Highways Development Project is being implemented in 7 phases, which are briefly as under:

- NHDP Phase-I: NHDP Phase-I was approved by Cabinet Committee on Economic Affairs (CCEA) in December 2000 at an estimated cost of Rs30,000 crore comprises mostly of GQ (5,846 km) and NS-EW Corridor (981km), port connectivity (356 km) and other national highways (315 km), with a total of 7498km.
- NHDP Phase-II: NHDP Phase-II was approved by CCEA in December 2003 at an estimated cost of Rs. 34,339 crores (2002 prices) comprises mostly NS-EW

Corridor (6,161 km) and other National Highways of 486 km length. The total length of Phase II is 6,647 km.

- NHDP Phase-III: Government approved on 5.3.2005 up gradation and 4 laning of 4,035 km of National Highways on BOT basis at an estimated cost of Rs. 22,207 crores (2004 prices). Government approved in April 2007 up gradation and 4 laning at 8074 km at an estimated cost of Rs. 54,339 crores.
- NHDP Phase-IV: Government approved on 31.10.2013 up gradation and 4 laning of 20,000 km of National Highways out of which 14,799 km as assigned to NHAI remaining Km with MORT&H.
- NHDP Phase-V: CCEA has approved on 5.10.2006 six laning of 6,500 km of existing 4 lane highways under NHDP Phase V (on DBFO basis). Six laning of 6,500 km includes 5,700 km of GQ and other stretches.
- NHDP Phase-VI: CCEA has approved on November 2006 for 1000 km of expressways at an estimated cost of Rs. 16680 crores.
- NHDP Phase-VII: CCEA has approved on December 2007 for 700 km of Ring Roads, Bypasses and flyovers and selected stretches at an estimated cost of Rs. 16680 crores.

National Highway Development Project is envisaged to plan, design and construct a network of world class highways to support the economic growth of the country. Infrastructure in India has been found to be a bottleneck/ speed breaker for the trade and business, poverty alleviation and economic growth of the country. An advantage of providing well developed network of highways is as follows:

- Savings in vehicle operating costs by reduced fuel consumption and maintenance costs
- Travel time saving by faster and comfortable journeys
- Safer travel
- Benefits to trade especially in movement of perishable goods
- Reduce demographic shift to urban areas
- Poverty alleviation and all round development of areas

**NHDP's focus** is on developing International standard roads with facilities for uninterrupted flow of traffic with:

- Enhanced safety features
- Better Riding Surface.
- Better Road Geometry
- Better Traffic Management and Noticeable Signage.
- Divided carriageways and Service roads
- Grade separators
- Over bridges and Underpasses
- Bypasses
- Wayside amenities

### 2.3.3 Components of Bharatmala Pariyojana

#### a. Economic Corridors:

These are identified Highway Corridors of Economic importance and are expected to carry of freight in the coming years. Around 2620 km of Economic corridor have been identified to be developed as Economic corridors out of which 9000 Kms are being taken up in Phase-I of the program.

#### b. Inter-corridor and feeder roads to National and Economic Corridors:

Around 8000km of inter-corridor and around 7500km of feeder roads have been identified, out of which 6000kms are being taken up in Phase-I of the program.

#### c. National Corridors Efficiency Improvement:

The Golden-Quadrilateral and NS-EW corridors carry 35% of India's freight and would be declared as National corridors. Lane expansion and de-congestion of existing National Corridors through Ring roads and bypasses/elevated corridors will be undertaken. Around 5000kms are being taken up under this category in Phase-I of the program.

#### d. Border and International connectivity roads:

Around 3300km of border roads have been identified to be built along the international border for their strategic importance. Around 2000 km roads are required for connecting India's major highway corridor to International trade points so as to facilitate Export-Import (EXIM) trade with neighbouring countries. Around 2000 Kms are being taken up under this category in Phase-I of the program.

### e. Coastal and Port connectivity roads:

Around 2100 km of coastal roads have been identified to be built along the coast of India, to boost both tourism and industrial development of the coastal region. Around 2000 km of port connectivity to non-major ports. Around 2000kms are being taken up under this category in Phase-I of the program.

### f. Green-Field Expressways:

Certain sections of National and economic corridors with traffic exceeding 50000 PCUs have developed several choke points. Around 1900 km of these stretches have been identified for development of green-field expressways. Around 800kms are being taken up under this category in Phase-I of the program.

The Phase-I of Bharatmala Pariyojana program is to be implemented over a period of five years i.e. FY 2017-18 to FY 2021-2022. The Summary of components identified under Phase-I and the approved outlay for the same is given below:

**Table 2-1 : Components of Bharatmala Pariyojana**

| S. No. | Components | Length (km) | Outlay (Crores) |
|---|---|---|---|
| A. | Bharatmala | | |
| 1 | Economic corridors developments | 9000 | 120000 |
| 2 | Inter-corridor & feeder roads | 6000 | 80000 |
| 3 | National Corridors Efficiency improvements | 5000 | 100000 |
| 4 | Border & international connectivity roads | 2000 | 25000 |
| 5 | Coastal & port connectivity roads | 2000 | 20000 |
| 6 | Expressways | 800 | 40000 |
| | Sub Total | 24800 | 385000 |
| B. | Balance Road Works under NHDP | | 150000 |
| | **Total** | | **535000** |

Finance Mechanisms: NHAI proposes to finance its projects by a host of financing mechanisms. Some of them are as follows:

**The Government of India- Budgetary Allocation**

In a historic decision, the Government of India introduced a Cess on both Petrol and Diesel. This amount at that time (at 1999 prices) came to a total of approximately Rs. 2,000 crores per annum. Further, Parliament decreed that the fund so collected were to be put aside in a non-lapsable Central Road Fund (CRF) for exclusive utilization for the development of a modern road network through Central Road Fund Act 2000. The developmental work that it could be tapped to fund, and the agencies to whom it was available were clearly defined as follows:

- Construction and Maintenance of State Highways by State Governments.
- Development of Rural Roads by State Governments.
- Construction of Rail over- bridges by Indian Railways.
- Construction and Maintenance of National Highways by NHAI and Ministry of Road Transport & Highway.

In 2016-2017 the total collection in CRF was about Rs. 80,800 cr.

**Loan Assistance from International Funding Agencies**

Loan assistance is available from multilateral development agencies like Asian Development Bank and World Bank or Other overseas lending agencies like Japanese Bank of International Co - Operation.

**Market Borrowing**

Government is allowing NHAI to tap the market by issuing Infrastructure bonds and support the NHDP.

**Private Sector Participation**

Major policy initiatives have been taken by the Government to attract foreign as well as domestic private investments. To promote involvement of the private sector in

construction and maintenance of National Highways, Projects are offered on Build Operate and Transfer (BOT) basis to private agencies. After the concession period, which can range up to 30 years, this road is transferred back to NHAI by the Concessionaries. NHAI funds are also leveraged by the setting up of Special Purpose Vehicles (SPVs). The SPVs borrow funds and repay these through toll revenues in the future. Some more models have emerged for better leveraging of funds available with NHAI such as Annuity, which is a variant of BOT model.

### 2.3.4 Government Policy Initiatives

*Policy Initiatives for Attracting Private Investment*

- Government will carry out all preparatory work including land acquisition and utility removal. Right of way (ROW) to be made available to concessionaires free from all encumbrances.
- NHAI / GOI to provide capital grant up to 40% of project cost to enhance viability on a case to case basis
- 100% tax exemption for 5 years and 30% relief for next 5 years, which may be availed of in 20 years.
- Concession period allowed up to 30 years
- Arbitration and Conciliation Act 1996 based on UNICITRAL provisions.
- In BOT projects entrepreneur are allowed to collect and retain tolls
- Duty free import of specified modern high capacity equipment for highway construction.

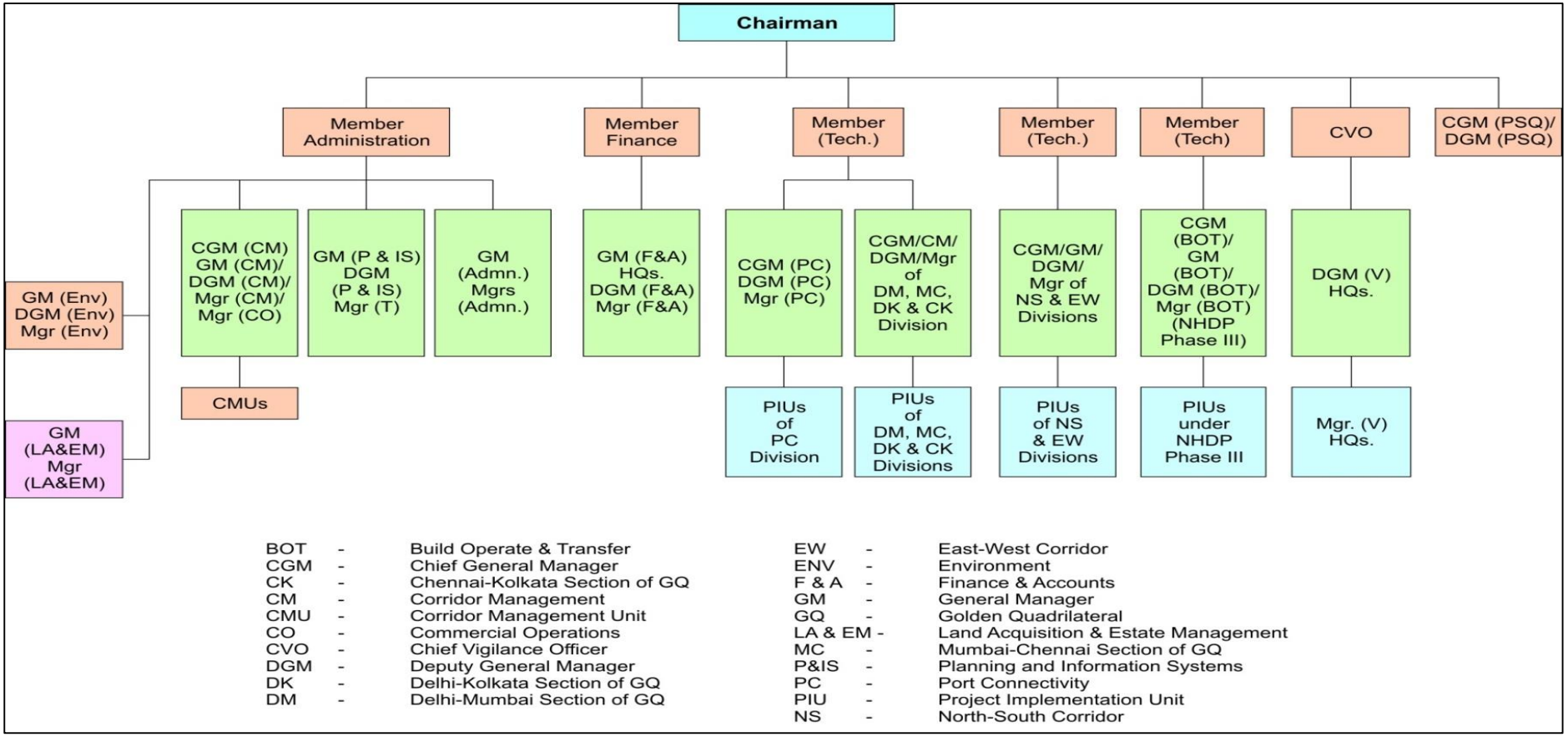



**Figure 2-1– Organization Chart of NHAI**

# CHAPTER 3

# METHODOLOGY ADOPTED

## 3.1 General

The broad methodology as outlined in the Inception Report, prepared on the basis of Scope of Work mentioned in the Terms of Reference, has been generally followed, with certain additions as felt necessary during conducting the study. The methodology has been described in details in the following sections.

## 3.2 Secondary Data

Secondary data related to Project Stretch are collected from various authorities, institution etc. and reviewed for understanding the Project Stretch. Following are the list of relevant documents collected, reviewed in this study.

- As Build drawings
- Highway and structure inventory
- ROW details
- Accident data

## 3.3 Survey and Investigations

Physical condition of Project Stretch is assessed based on data captured through various surveys and investigations. Details of all these surveys and investigations are presented in next few sections.

### 3.3.1 Site Visit (Visual Inspection)

Site visit was made by the team of engineers in the month of July to September 2025. The following parameters were recorded during site visit:

Detailed reconnaissance of the project area and recorded important features and that is importance in terms of operation & maintenance of the project.

Consultant recorded following features of project

- Existing pavement condition

- Intersecting/Crossroads
- Major water bodies
- Major CD structures
- Bottlenecks in road alignment
- Operational Issue, if any
- Visual inspection and assessment of the condition of the pavement surface
- Visual inspection and assessment of the condition of all major structures such as Bridges, ROBs, Flyovers, underpass and cross drainage structures in accordance with IRC: SP 18
- Review and assessment of Highway Traffic Management System (HTMS) and Toll Management System (TMS) along with scope of WIM and ETC
- Inventory of various elements of TMS and HTMS systems along with their remaining life
- Collection of local material aggregates, sand, cement rates
- Review of construction sites where facilities (e.g. service road, flyover, toll plaza etc.) are to be provided as per Schedule B of CA.

### 3.3.2 Pavement Investigation and Asset Inventory (NSV)

To access condition of existing pavement and assets, investigations are carried out using Network Survey Vehicle (NSV). Details of these investigations are presented in following sections.

**Network Survey Vehicle**

Network Survey Vehicle is manual method where each and every distress needs to assess using video data. In this systems all outputs are linked via a highly accurate distance measuring instrument and DGPS system. It allows all the data to be collected in a single pass consequently minimising both the cost and the time needed to complete the data collection.

Chaitanya Project Consultancy Ltd utilises a team of trained and experienced field staff. Having Network Survey Vehicle for all customised needs of client's requirement. We will deploy the team and our professional staff for data collections.




***Figure 3-1 : NSV Survey along the project Stretch***

**Features**

- Fully integrated system with common data and survey control referencing
- Enables safe and efficient data collection for both urban and rural surveys
- Survey time is reduced by collecting all condition data and imagery in a single pass.

**Applications**

- Network and project level road data collection
- Routine pavement monitoring surveys
- Roadside inventory and asset management

**Laser Profile System**

The data collected includes: International Roughness Index (IRI), Ride Number (RN), Rut Depth and Longitudinal / Transverse Profile of Road.

- **Features**

1. Operational at highway speeds to reduce survey time and costs.
2. Measurements possible on all sealed surfaces.
3. Data is linked to Chainage and GPS coordinates.

- **Applications**

1. Network level surveys with international standard results
2. Accurate quality assessments
3. Baseline information of road

- **Available Output**

1. Roughness
2. Longitudinal profile
3. Transverse profile
4. Rutting
5. Distance

- **Digital Imaging System**

The system comprises the latest digital camera technology and produces crisp, high-resolution video frames to ensure a continuous digital record of the roadway. The calibrated video cameras accurately log digital images of roadside assets against other parameters such as distance and GPS.

- **Features**

1. Provides continuous, high-resolution, full-coloured digital images.
2. Uses .AVI storage files.
3. Data is linked to Chainage and GPS coordinates.
4. Operational at highway speeds to reduce survey time and costs.
5. Images can be used to measure, geo-reference and note points of interest.

- **Applications**

1. Visual identification of roadside features and assets
2. Right-of-way roadside condition assessment

3. Asset location for GIS applications
4. Road safety assessment

- **Available Output**

1. Digital imagery
2. GPS location / distance

- **Criteria for Analysis**

From the digital images, a host of information are extracted. This information is linearly (Chainage) and spatially (GPS) referenced. The information extracted is presented in the table below:

**Table 3-1 : NSV Information extracted from NSV**

| Coding Parameters | Coding Type |
|---|---|
| General Features and Utilities | |
| Built up Area | Length |
| Avenue plantation / Roadside arboriculture | Present/Not Present |
| Wayside amenities, Bus bays, truck lay Bye, etc... | Present/Not Present |
| Main Carriageway Features | |
| Pavement type | Bituminous, Concrete |
| Junction (Major / Minor & X / T/ Y) & type of road crossing / merging | Type |
| Carriageway width (lane wise) | Width |
| Paved shoulder (width) | Width |
| Earthen shoulder (width) | Width |
| Footpath (physical condition) | Present/Not Present, Condition |
| Drain width (lined & Unlined, along with general condition) | Lined/Unlined, Condition |
| Median (width) | Width |
| Median opening (length) | Length |
| Road markings (lane wise) | Condition |
| Presence of Road Studs (Lane wise) - Yes / No | Yes/No |
| Sign boards identifications (both sides of carriageway) – Type | Present/Not Present |
| Gantry boards identifications | Present/Not Present |
| Kilometre & hectometre stones | Present/Not present |
| Guard rails | Present/Not present Condition |
| Safety barriers – Type and Physical Condition | Present/Not present Condition |

| Coding Parameters | Coding Type |
|---|---|
| Delineators | Length |
| Guard / guide posts | Length |
| Street Light and High Mast Light | Type |
| Location of Structures | Type |
| Service Road | |
| Pavement type | Bituminous, Concrete |
| Carriageway width (lane wise) | Width |
| Drain width (lined & Unlined, along with general condition) | Lined/Unlined, Condition |
| Road markings (lane wise) | Condition |

### 3.3.3 Falling Weight Deflectometer (FWD)

Structural Condition of pavement is evaluated using Falling Weight Deflectometer (FWD) and subsequent analysis is carried out to ascertain the relative performance of the pavement for all Project Stretches, in the context of evaluating residual life, overlay and other maintenance requirements.

#### Methodology of Falling Weight Deflectometer

Falling Weight Deflectometer is a non-destructive pavement testing device which provides accurate data on the response of the pavement (specifically the surface deflection bowl) to dynamic loads by simulating actual wheel loads in both responses and duration. This allows more accurate and rapid measurement of pavement deflection under load than traditional methods.

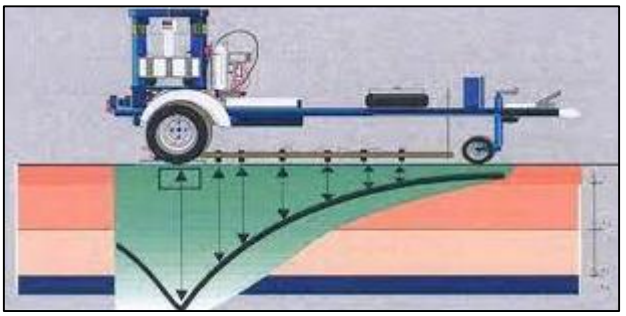


**Figure 3-2: FWD Survey arrangement**

A dynamic load is generated by the dropping of a mass from a pre-set height onto a 300 mm diameter plate. The magnitude of the load and the pavement response are measured by a load cell and nine geophones. One geophone is located immediately under the load, whilst the others are located at variable offsets from the centre of the load. The test load is varied between 7 and 150 KN to meet the requirements of the particular task and the pavement response for up to four different magnitudes of load are measured during any test sequence. The offsets of the geophones can be set to any distance up to 1800 mm from the centre of the load and a typical sequence is completed in approximately one minute. Highly accurate deflection bowl measurements are therefore obtained; therefore, it is very useful for carrying out large-scale pavement surveys. The FWD is integrally mounted on a trailer which is towed by a dedicated vehicle. All testing is controlled by a personal computer which is located in the vehicle towing the FWD. As a result, only one operator is required to conduct a survey on most occasions making it less labour/ equipment intensive than traditional methods.

## Working Principle

- A set of weights is dropped onto a platform with springs (rubber buffers) and the impact load is transferred to the pavement through a loading plate.
- The load simulates the dynamic load from a truck.
- Normally, the load applied on road pavements is 40 KN.
- When subjected to a load, the pavement will bend and a deflection bowl is created. The deflections at various distances from the loading centre are recorded by the sensors (geophones) and stored in a data file.

## Data Collection

Methods of data collection using FWD are described in steps given below.

- Preparing the FWD unit for deflection testing
- Bringing the FWD to a stopped position at the beginning of the test section, centred on the outside wheel path (or specific position), and take a measurement by applying load using following sequence: One settling drop to ensure proper contact. Three drops with an applied load of 40 KN ± 10% (or Specified Load).

- Deflections are recorded from the sensors located at the centre of the loading plate for each drop except the settling drop.
- Along with these deflection data, the parameter like Chainage, Temperature, Date and Time and position of Sensors will also be recorded.
- After each measurement, drive the FWD forward to next measurement point.




**Figure 3-3: FWD Survey**

**Analysis Stages:**

Analysis including back calculation of layer moduli and remaining life analysis is done on the basis of standard procedure and guidelines as give in IRC 115 and KGPBACK.

### 3.3.4 Test Pits, Core Cutting and Material Investigations

As per the Scope of Work mentioned in the RFP, the following field observations are carried out

1. Pavement Composition of the Project Stretches

2. Subgrade Characteristics and Strength

Visual inspection of the existing pavement condition has been carried out prior to commencement of pavement investigation work to finalize the test pit and core cutting locations.

## Test Pits, Core Cutting and Material Investigations

Field studies are carried out to assess the adequacy of the pavement layers and effectiveness of the existing pavement layers. Efforts are made to examine the condition of existing sub-grade, and WMM by taking sample test pits of 1m x 1m at every 5 km interval at the interface of paved shoulder and earthen shoulders. Pavement composition details (pavement course, material type, and thickness) are recorded at every test pit.

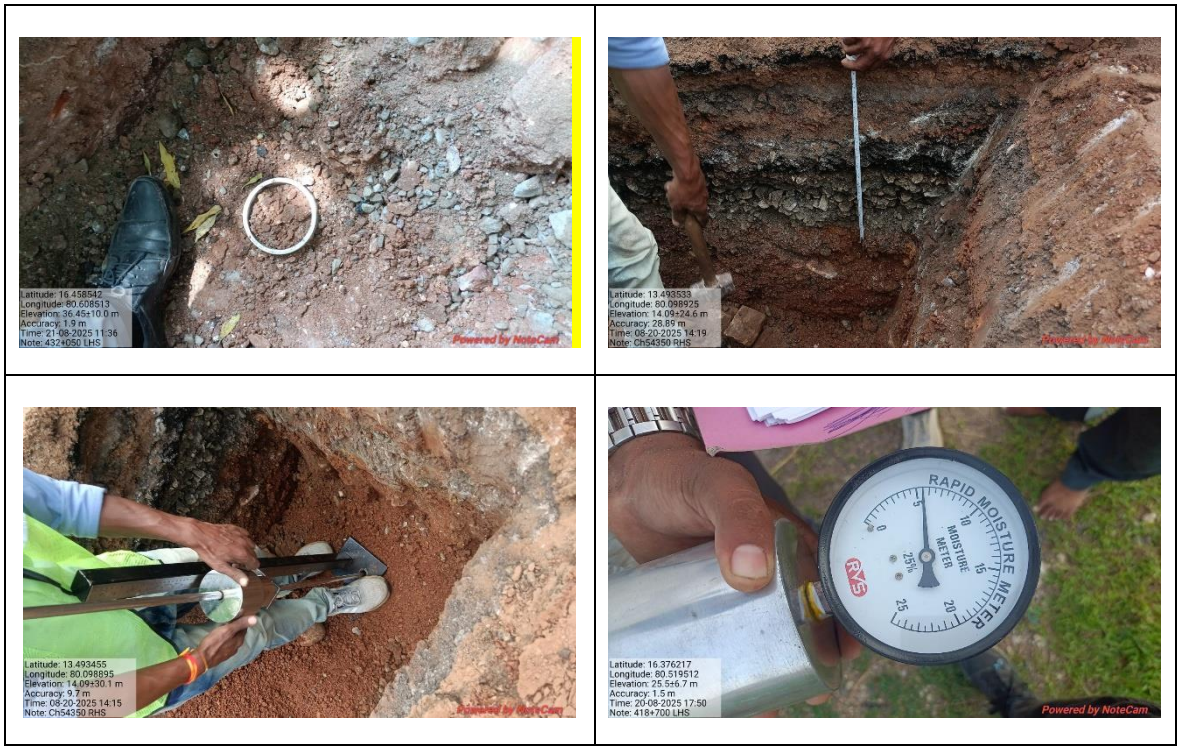



**Figure 3-4: Test pit Survey**

The various in-situ tests conducted and laboratory tests included in the testing program on soil, GSB and WMM samples along the alignment as per the requirements are summarized below:

## Field Tests on Soil Subgrade

- Field Moisture Content & Field Dry Density Determination
- Filed CBR using Dynamic Cone Penetrometer at each test pit
- Laboratory Tests on Subgrade Soil Sample

- Soil Classification, Sieve Analysis, Atterberg Limits
- Laboratory Proctor Compaction Test
- 4 day soaked CBR Test
- Free swell index

**Material Investigations**:

The activities performed for material investigations include -

- Identification of potential sources near project stretch (including use of fly-ash/slag), quarry sites and borrow areas.
- Collection of samples and conducting relevant laboratory tests.
- Evaluation of test results and assessment of the suitability thereof for incorporation in various works and making recommendation on the use of the materials from different sources based on techno-economic principles.
- Assess adequacy of quality and quantities of various construction materials available.
- Preparation of mass haul diagram and quarry charts indicating the location of selected borrow areas, quarries and the respective estimated quantities
- Preparation and testing of bituminous mixes for various layers and concrete mixes of different grades using suitable materials (binders, aggregates, sand fillers etc.) as identified during material investigation to conform to latest specifications

The equipment's used during investigations include hand tools like crow bars, spades, wedges etc. for collecting representative samples. The samples are packed in suitable bags, labelled and sent to laboratory for testing. Samples of stone aggregates are collected from existing crushers using the stone from the respective quarries.

The Material Expert has reviewed all the laboratory test results for consistency and compatibility. For example, for soils and other granular materials, the quality given by classification and maximum dry density results are compared against that given by CBR. For rock samples, the specific gravity, water absorption and the aggregate impact values are checked.

**Table 3-2 : Crusher Detail**

| Section No. | Section Name | | Source | Latitude | Longitude |
|---|---|---|---|---|---|
| | From | To | | | |
| Section-1 | Chlakaluripet | Vijayawada | 377+480 (LHS) | 16.192188 | 80.248731 |
| | | | 425+400 (LHS) | 16.416153 | 80.565323 |
| | | | 426+600 (RHS) | 16.42226 | 80.574327 |
| Section-2 | Chennai Bypass | | 4+500 (LHS) | 12.95049 | 80.110187 |
| | | | 31+300 (RHS) | 13.146127 | 80.203975 |
| Section-3 | Chennai | Tada | 17+150 (RHS) | 13.185623 | 80.1925 |
| | | | 44+300 (LHS) | 13.409205 | 80.120062 |

### 3.3.5 Road Safety Audit

Methodology for identification of road safety concerns and development of improvement proposals along the project Stretches is listed in following steps.

i. Review of past data and identification of accident blackspot locations along the Project Stretches.

ii. Field investigations to understand the current safety concerns along the Project Stretches and specifically at the identified accident prone locations.

iii. Identification and prioritization of improvement proposals based on requirements as immediate, medium term and long term to provide safer driving conditions.

The detailed methodology followed the safety enhancement along the Project Stretches is described in further sections.

**Review of Past Data and Identification of Accident Blackspot locations**

Available past accident data on the Project Stretches are collected from NHAI and analysed in detail w.r.t. location, severity, number of accidents, causes of accidents etc. In addition to analysis of accident data, already identified blackspot locations by NHAI PIU are studied.

**Field Investigations to understand Safety Concerns along the Project Stretch**

Safe Road Environment along the highway depends upon condition of various components of the highway such as alignment, provision and placement of street furniture, intersection geometry, availability of adequate sight distance, night vision along the highway, etc. It is essential to understand all these aspects on the highway from safety point of view. For this purpose, the team of Certified Road Safety Auditor/Engineer and Transport Planner has carried out detailed site reconnaissance.



**Figure 3-5: Road Safety Audit**

Following details are recorded during the field investigations.

- Status of current signboards along the Project Stretch i.e. - condition, location, visibility in day and night, etc.
- Current arrangement at intersections, pedestrian crossings, adequacy of the same all along the Project Stretch.
- Condition of Service Roads and their intersection with main carriageway
- Identifying reasons for accidents at the identified accident prone locations such as – improper visibility, inadequacy of signage and information, inappropriate geometrical design, etc.
- Identification of locations for minor and major improvements

The above details are observed and recorded along the Project Stretches during the day as well as at night. Along with manual observations, entire Project Stretch is video graphed. In addition to above, current conditions of road furniture are obtained from Network Survey Vehicle.

## Identification and Prioritization of Improvement Proposals along the Project Stretches:

As described above, details related to current situation of various road furniture and geometrical aspects are recorded during the field investigations. Along with current situations, the improvements required at various locations are also identified. Project Stretches were developed almost before a decade or more as a part of Golden Quadrilateral. While suggesting the improvement measures, Provisions of latest standards and best practices are taken in to consideration. IRC: SP:87-2019, Manual of Specifications and Standards for Six Laning of Highways (Second Revision) and latest specifications are followed for improvement proposals. Identification of safety improvement proposals are classified as immediate and long-term Improvement Proposals. Some of the proposals listed as below:

- **Immediate Proposals** – New Service Roads, Improvements in road furniture such as Sign Boards, Pavement Markings, Safety Barriers, Pedestrian Guard Rails, Street Lights, blinkers etc.
- **Long-term Proposals** – Major improvement proposals such as provision of underpasses, flyovers, corridor improvements etc.

Above safety improvement proposals are prioritised and finalised using the following parameters:

- Urgency of need for improvement
- Ease of implementation
- Cost of improvement

### 3.3.6 Structural Investigations

Inventory and condition survey of structures are the two most essential requirements for operation and maintenance of highway structure. These tasks are carried out as per procedure and guidelines corresponding to IRC: SP: 35. As part of this activity, detailed inventory and condition survey are carried out for all the existing structures in the Project Stretch.

**Inventory and Visual Condition Survey**

Salient features for which data is collected as part of inventory survey are in accordance with IRC: SP: 35 Performa. Main features recorded as part of inventory survey are listed below:

- Bridge number/ Name
- Location (Chainage)
- Type of structure (Major bridge, minor bridge, pipe culverts, box culverts, slab culverts, underpasses, flyovers etc.) and year of construction if available from records.
- Span Arrangement details like numbers of spans, span length, vent height from deepest stream bed level.
- Details and type of vehicle restraint systems such as safety barriers or R.C.C railing or parapet wall.
- Clear width and overall width of structure.
- Main features recorded as part of detailed condition survey are listed below.
- Condition of wearing coat such as potholes, cracks, and patches.
- Condition of expansion joints such as bump in riding, leakage in expansion joint, damaged sealing compound, silt and debris filled in expansion joint gap.
- Damaged and missing details of RCC railing/ safety barrier/ parapet wall.

- Damaged and missing details of drainage spouts and down take pipes extended below the soffit of deck slab, status of drainage spout chambers filled with debris and silt and missing or damaged gratings, covered on rainwater collection chambers.
- Spalling of concrete from super structure and sub structure elements.
- Delamination in girders, soffit of deck slab and substructure.
- Corroded reinforcement exposed anywhere in deck slab and substructure.
- Mapping of cracks in girders, deck slabs, sub structure.
- Visible voids and honey combing in concrete surfaces.

Scouring near foundations and damage to ***protection*** works.



***Figure 3-6: Inventory and Condition Surveys of Existing Structures***

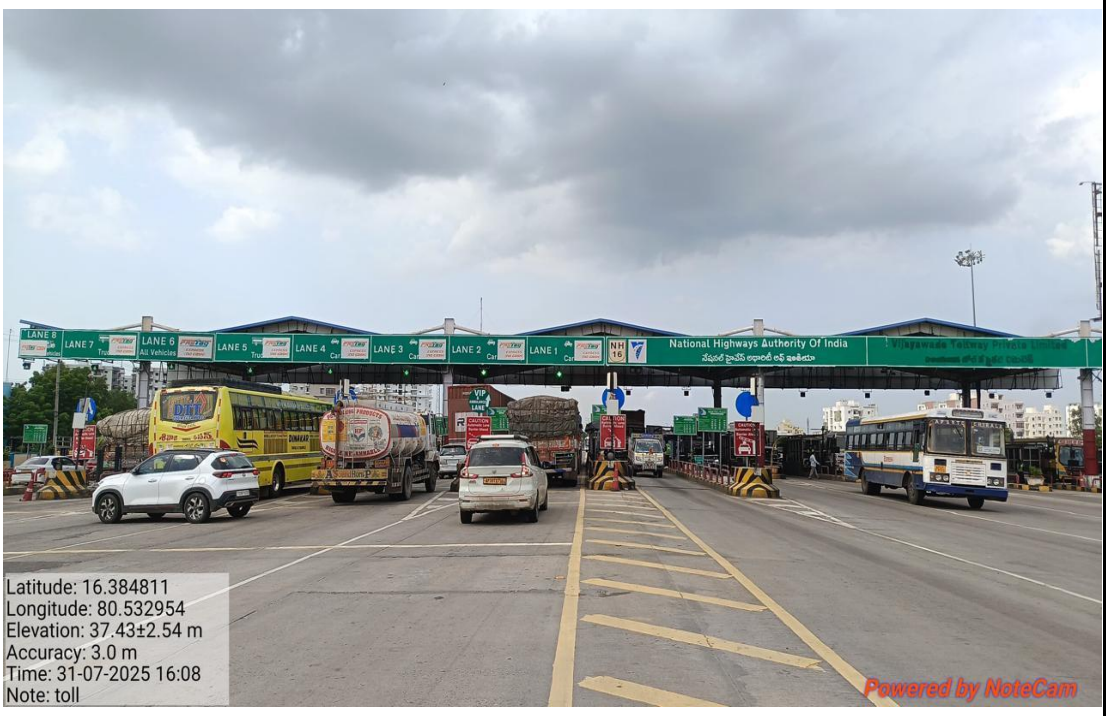
### 3.3.7 Toll Plaza System Audit

Existing toll plazas including infrastructure, toll management system (TMS, if any) and operational activities are inspected thoroughly for understanding their suitability and deficiencies. A team of TMS expert and technical assistants have visited and reviewed all toll plazas. During the site visit, information related following heads are collected.

Lane terminals; software and database components related to lane terminals and lane operation

- Operation and health of plaza servers
- All system generated reports
- Audit procedure
- Cash-up procedure
- Point of Sale (POS)
- Incident generation and validation management

**Vijayawada-Chilakaluripet (Km 355+000 to Km 422+605)**




***Kaza toll plaza at km 420+500***

**Chennai Bypass (Km 0+000 to Km 32+600)**




*Vanagram Toll Plaza at Km 16+500*




*Surapattu Toll Plaza at Km 28+600*

**Chennai Tada (Km 21+400 to Km 54+400)**




*Nallur Toll Plaza at Km 21+625*

**Neelmangla-Tumkur (Km 29+500 to Km 74+168)**




*Kulumepalya Toll Plaza at Km 30+000*




*Chokkenahalli Toll Plaza at Km 61+500*

***Figure 3-7: Toll Plaza Inventory***

## 3.4 Schedule of Investigations

The following table presents schedule for all investigations outcomes of which are presented and used in this report.

**Table 3-3 : Schedule of Investigations**

| S. No. | Description of Works | Stretch Name | | | |
|---|---|---|---|---|---|
| | | Vijaywada-Chilakaluripet | Chennai Bypass | Chennai Tada | Neelmangala-Tumkur |
| 1 | Road and Structure Inventory and Condition Survey | 31-07-2025 | 09-08-2025 | 14-08-2025 | 21-08-2025 |
| 2 | Test Pit and Core Cutting | 02-08-2025 | 11-08-2025 | 16-08-2025 | 23-08-2025 |
| 3 | MBIU Survey | 31-07-2025 | 09-08-2025 | 14-08-2025 | 21-08-2025 |
| 4 | NSV Survey | 31-07-2025 | 09-08-2025 | 14-08-2025 | 21-08-2025 |
| 5 | FWD Survey | 31-07-2025 | 09-08-2025 | 14-08-2025 | 21-08-2025 |
| 6 | Topographic Survey (Arial Lidar) | 13-08-2025 | 20-08-2025 | 23-08-2025 | 30-08-2025 |
| 7 | Retro Reflective Survey | 10-08-2025 | 17-08-2025 | 20-08-2025 | 27-08-2025 |

# CHAPTER 4

# INDICATIVE DESIGN STANDARD METHODOLOGY AND SPECIFICATION

## 4.1 General

The design standards for improvement proposals of the Project Stretch are adopted after reviewing the relevant latest Indian Roads Congress Codes (IRC), Manual of Specifications and Standards for Six Laning of Highways published by Indian Road Congress and international standards such as AASHTO etc:

**Table 4-1 : IRC Codes adopted for the Highway Design**

| IRC Code | Description |
|---|---|
| IRC: 32-1969 | Standard for vertical & horizontal clearances of overhead electric power and telecommunication lines as related to roads |
| IRC: 35-2015 | Code of practice for road markings |
| IRC: 37-2019 | Guidelines for the design of flexible pavements |
| IRC: 67-2022 | Code of practice for road signs |
| IRC: 73 – 1990 | Geometric Design Standards for Rural (Non-Urban) Highways |
| IRC: 98-2011 | Guidelines on accommodation of utility services on roads in urban areas |
| IRC: 103-2012 | Guidelines for pedestrian facilities |
| IRC: SP-42-2014 | Guidelines on road drainage |
| IRC: SP-50-2013 | Guidelines on Urban drainage |
| IRC: SP-41-1994 | Guidelines for the design of At-Grade intersection in rural & urban areas |
| IRC SP 84- 2019 | Manual of Specifications and Standards for Four Laning of Highways (Second Revision) |
| IRC SP 87- 2019 | Manual of Specifications and Standards for Six Laning of Highways (Second Revision) |

## 4.2 Lateral and Vertical Clearances at Underpasses for Vehicular Traffic as per IRC

Wherever a cross road is proposed to be taken below the Project Stretch, minimum clearances at underpasses are provided as given below:

| S. No | Type of Underpass | Vertical Clearance | Horizontal Clearance |
|---|---|---|---|
| 1. | VUP | 5.5m | 20m |
| 2. | LVUP | 4m/ 4.5m | 12m |
| 3. | SVUP | 4m/ 4.5m | 7m |

## 4.3 Service Roads

### Design speed

A minimum design speed of 40 kmph shall be adopted for service roads.

### Width of Service road

(i) Width of Service Road: 7.50 m (minimum)

(ii) Merging as per IRC SP 84 or atleast with taper at merge: 1 in 15 beyond design length.

Width should be minimum 7.5 m as per Manual and Specification of 4-laning; however, 7/5.5 m width is proposed at some sections due to unviability of required Row.

## 4.4 Traffic Safety Features, Road Furniture, Road Markings and Other Facilities

For safety and operational reasons, it will be necessary to provide suitable safety features, road furniture and other facilities along the project road. These features will include safety barriers, road signs, road markings, road lighting, route markers, kilometre and hectometre stones, road delineators, ROW pillars, parking areas & rest areas, bus stops/bays, and landscaping. Where possible these features will be provided in accordance with relevant IRC or other standard, as detailed below. If no IRC Codes or MORTH Specifications are available, international standards such as BIS /AASHTO/ ASTM /British Standards should be used in detail

**Safety Barriers** - Traffic barriers to be provided as per IRC: 119-2015, Traffic barriers are protective devices that are placed between traffic and a potential hazard off the roadway, with the intention of reducing the severity of a collision when an errant vehicle leaves the travelled portion of the roadway.

Barriers are to be provided at high embankments, sharp curves and bridge approaches. The barrier is to be located in unpaved shoulders.

**Road Signs** - Road signs are to place according to IRC: 67-2012. The signs are to be placed on embankment such that extreme edge of sign would be 2.0m away from the edge of the carriageway. The location of each sign is to be decided in accordance with the guidelines therein.

**Road Markings** - Road markings shall be as per IRC: 35-2015. These markings shall be applied to road centre lines, edge line, continuity line, stop lines, give-way lines, diagonal/chevron markings, zebra crossing and at parking areas. The approach noses of the traffic islands will be marked for additional guidance of traffic by means of diagonal markings and chevrons.

**Highway Lighting** - Solar Street light system is proposed to be provided at the junctions provided in or nearby urban/semi-urban areas and over/ underpass/ flyovers. Lighting is also proposed to be provided at truck terminals, if any. In case of truck rest areas, the lighting shall be provided. It is proposed to provide solar lights with maintenance free battery or operation & maintenance of such streetlights may be given to

the same supplier.

**Solar blinkers at Median opening** - Traffic blinkers powered with solar energy required at the gaps in median openings. Adequate solar blinkers at every gap in median shall be provided.

**Transverse Bar markings/ Rumble strips** - Provide transverse bar markings before median openings, where the need for alerting the drivers for reduction in speed is desired. Rumble Strips are formed by a sequence of transverse strips laid across a carriageway.

**Kilometre / Hectometre Stones / Posts** - The design and placement of Highway kilometre stones, their dimensions, size, colour and arrangement of letters shall be as per IRC: 8-1980. For the 200-metre stones,

IRC:26-1967 shall be applied.

**Road Delineators** - The design and location for road delineators shall be as per IRC: 79-1981

## 4.5 Pavement Design

The design and construction of new pavement sections and of strengthening measures (overlay) for the existing pavement shall be carried out in accordance with the criteria, standards and specifications given in the IRC SP 84:2019. Where alternative specifications or materials are proposed to bring in innovation

in design etc., provisions of Paras 1.9 and 1.11 of IRC SP 84:2019 Manual shall apply.

- The design of new pavement sections or strengthening of existing pavements shall take into account all relevant factors for assuring reliable performance and shall also satisfy the specified minimum performance requirements.
- The Concessionaire shall undertake the necessary soil, material and pavement investigations, traffic volume and axle load studies in accordance with the good industry practice for preparing detailed designs.
- The materials, mixes and construction practice shall meet the requirements prescribed in the MORTH/IRC Specifications.
- Where problematic conditions such as expansive soils, swamps or marshes, flooding, poor drainage, frost susceptible areas etc. are found to exist, adequate measures shall be adopted to deal with such site conditions.

## 4.6 Toll Plaza

The Concessionaire shall provide the Toll Plazas at the locations specified in Schedule 'B' for collection of toll fee as per the Concession Agreement. The fee collection system shall be speedy, efficient and user friendly. The design of the Toll Plazas should be such that they are aesthetically pleasing and efficient and the fee collection staff should be quick, courteous and adequately trained before deployment.

The total number of toll booths and lanes shall be designed as per latrest circular policy for a period of 10 years. Refer ch.11 for details.

## 4.7 Lighting

i. The Concessionaire shall provide lighting at locations of the Project Highway specified in Schedule 'C' using appropriate system and source of electric power as per the requirements of IRC SP 87:2019.

ii. The Concessionaire shall make suitable arrangements for procuring power supply to ensure uninterrupted lighting during night and when visibility is low, including provision of DG sets as standby arrangements.

The Concessionaire shall bear all costs of procurement, installation, running and operation cost of all lighting.

# CHAPTER 5

# SOCIO AND ECONOMIC PROFILE OF INFLUENCE AREA

## 5.1 Introduction

This Chapter provides a socio-economic profile and the relative status of the state and districts. The aspects covered include demography, employment pattern, state income and major economic sectors including transport infrastructure. The profile discusses the past performance and the present scenario and also presents a broad assessment of the perspective growth of the economy as a basis for estimating the future growth in transport demand.

## 5.2 Demography

**Andhra Pradesh** is a state in the southern coastal region of India. It is the seventh-largest state and the tenth-most populous in the country. Telugu, one of India's classical languages, is the primary official language and the most widely spoken language in state and as well as in South India. Amaravati is the state capital, while the largest city is Visakhapatnam also the financial capital of AP. The state shares borders with Odisha to the northeast, Chhattisgarh to the north, Karnataka to the southwest, Tamil Nadu to the south, Telangana to the northwest and the Bay of Bengal to the east. It has the second-longest coastline in India at about 974 km (605 mi).

Based on the 2011 Census of India, the population of Andhra Pradesh is 49,577,103, with a density of 304/km2 (790/sq mi). The rural population accounts for 70.53%, while the urban population accounts for 29.47%. The state has 17.08% scheduled caste (SC) and 5.53% scheduled tribe (ST) population. Children in the age group of 0–6 years' number 5,222,384, constituting 10.6% of the total population. [110] The state has a sex ratio of 997 females per 1000 males, higher than the national average of 926 per 1000. The literacy rate in the state stands at 67.35%. Erstwhile West Godavari district has the highest literacy rate of 74.32%, and erstwhile Vizianagaram district has the lowest with 58.89%.

Human Development Index (HDI) of the state for the year 2022 is 0.642.

**Tamil Nadu** is a state in the southern coastal region of India. It is the tenth-largest state by area (approximately 130,058 km²) and the sixth-largest by population (72,147,030 as

of the 2011 Census). Tamil, one of India's classical languages, is the state's official language and the most widely spoken language. Chennai serves as both the state capital and the largest city. Tamil Nadu has the second-longest coastline in India, stretching approximately 1,076 km along the Coromandel Coast of the Bay of Bengal.

Based on the 2011 Census, Tamil Nadu had a population density of about 555 per km², with 51.6% of the population living in urban areas and 48.4% in rural areas. The sex ratio stood at 996 females per 1,000 males—higher than the national average of 943. Children aged 0–6 years numbered approximately 7.42 million, representing about 10.3% of the total population. The literacy rate was 80.09% as per the 2011 Census. Scheduled Castes accounted for around 20.0% and Scheduled Tribes around 1.1% of the population.

The Human Development Index (HDI) for Tamil Nadu in 2022 stood at 0.692.

**Karnataka** is a state in the southwestern region of India. It is the sixth-largest state by area, covering approximately 191,791 km², and the eighth-largest by population, with 61,095,297 residents according to the 2011 Census . Kannada, one of India's classical languages, is both the official and most widely spoken language in Karnataka. The state capital and largest city is Bengaluru, which had about 15.26 million in its metro area (or 10.46 million in the city proper, depending on definitions). Karnataka shares its western boundary with the Laccadive Sea and is bordered by Goa (northwest), Maharashtra (north), Telangana (northeast), Andhra Pradesh (east), Tamil Nadu (southeast), and Kerala (southwest).

According to the 2011 Census, Karnataka had a population density of about 319 per km², with 38.7% urban and 61.3% rural population. The sex ratio was 973 females per 1,000 males. The literacy rate was approximately 75.4% (overall), with male and female literacy reflecting typical regional patterns. Scheduled categories' percentages are not detailed here.

The HDI for Karnataka in 2022 was 0.673

## 5.3 Language

**Andhra Pradesh**: Telugu is the first official language, and Urdu is the second official language of the state. Telugu is the mother tongue of nearly 90% of the population.

Tamil, Kannada, and Odia are spoken in the border areas. Lambadi and several other languages are spoken by the scheduled tribes of the state. 19% of the population aged 12+ years can read and understand English, as per the Indian readership survey for Q4 2019.

**Tamil Nadu**: Tamil is the official language of the state and is spoken as the mother tongue by the vast majority of the population. Telugu, Kannada, and Malayalam are spoken in the border areas, while Urdu is spoken by a significant minority. Scheduled tribes of the state speak languages such as Irula, Toda, and Badaga. English is widely used in education, business, and administration, and about 21% of the population aged 12+ years can read and understand English, as per the Indian readership survey for Q4 2019.

**Karnataka**: Kannada is the official language of the state and is spoken as the mother tongue by around two-thirds of the population. Urdu, Telugu, Tamil, Marathi, Hindi, Konkani, Tulu, Kodava, and Malayalam are also spoken widely across different regions. Tribal communities of the state speak languages like Soliga and Yerava. English is commonly used in higher education, technology, and business sectors, and around 20% of the population aged 12+ years can read and understand English, as per the Indian readership survey for Q4 2019.

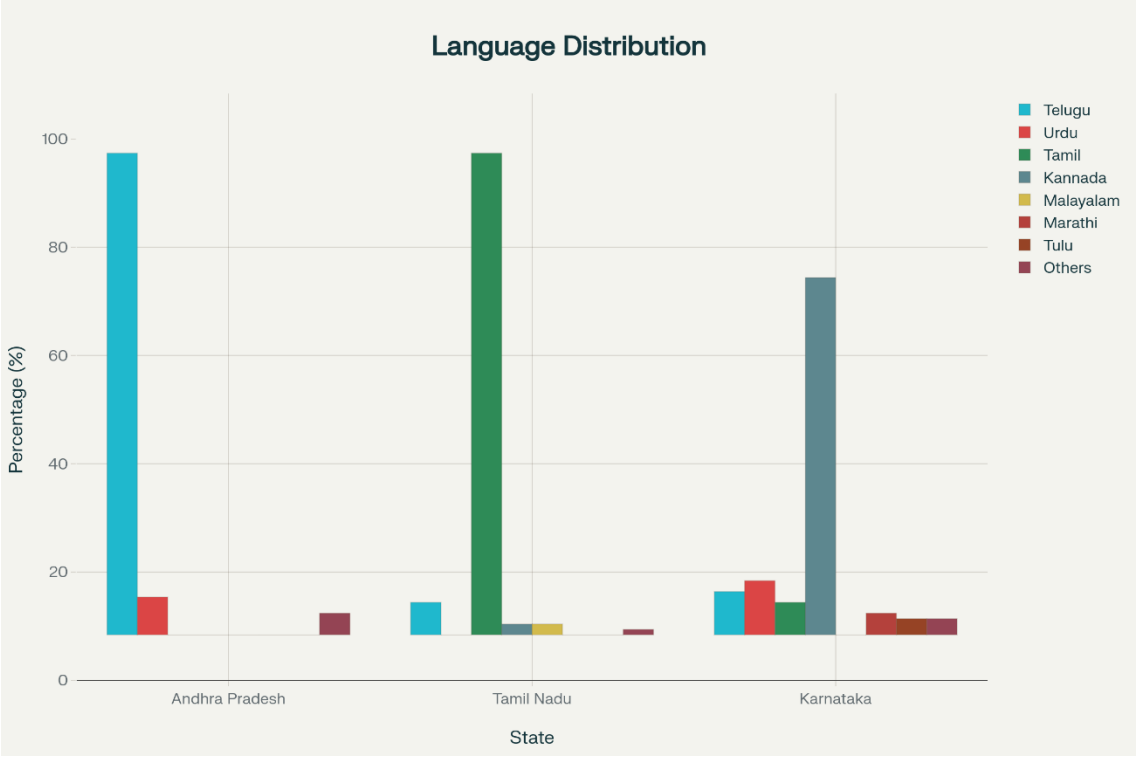



***Figure 5-1: Language in Project Area***

## 5.4 Economy

**Andhra Pradesh's** economy showcased robust growth in 2025, marked by a Gross State Domestic Product (GSDP) reaching ₹18.3 lakh crore, a 14% increase from the previous year. The state stands third among all states and union territories in per capita income growth, recording ₹2,66,240 in 2024-25, projected to climb to ₹2,98,065 in 2025-26. Agriculture forms the backbone, contributing significantly to value addition, with recent initiatives boosting the primary and secondary sectors, especially agriculture and construction. Infrastructure expansion, public-private partnership initiatives, and a declining revenue deficit (1.8% of GSDP) reflect the state's focus on sustainable growth and fiscal prudence.

**Tamil Nadu** has achieved the highest real economic growth rate in the country for 2025, registering 11.19% growth—a national record. The industrious state's success comes from its thriving manufacturing and construction sectors, driving the secondary sector's growth to 13.4% in 2024-25. Tamil Nadu's MSME sector has also expanded rapidly, with over 35 lakh registered units employing more than 2.47 crore people, contributing to both job creation and exports. The Dravidian Model Government's emphasis on industrial development and social welfare has propelled the state's per capita income to around ₹1,96,309, making it one of the strongest economies in India.

**Karnataka's** economy continues as a powerhouse, with a GSDP of ₹30.7 lakh crore projected for 2025-26, growing at 7% over 2024-25. The state boasts the highest per capita income in India for 2024-25, crossing ₹2,04,605—a 93.6% increase over a decade. Services, especially IT and financial services concentrated in Bengaluru, dominate the economy, complemented by manufacturing and a vibrant startup ecosystem. Karnataka's fiscal health is supported by inclusive development policies, a relatively low and declining revenue deficit (0.6% of GSDP), and strong investment in infrastructure and industry.

## 5.5 Climate

**Andhra Pradesh** generally experiences a hot and humid climate in its extensive coastal regions, while semi-arid conditions prevail inland in Rayalaseema and areas like Anantapur and Kadapa. Summers extend from March to June, with temperatures often surpassing 40°C, especially inland. The coastline's humidity leads to high heat indices. The state's key seasonal driver is the Southwest Monsoon (June–September), which

provides most rainfall, with about a third coming from the Northeast Monsoon in October. As a result, annual precipitation is highest along the coast (near 1,000–1,200 mm) and lowest in inland plateaus (as little as 300–400 mm). Winters (October–February) are milder, especially along the coast, and attract many visitors.

**Tamil Nadu** has a predominantly tropical climate, with major variation between the hot, humid coast—including Chennai and the Coromandel Coast—and the hotter, drier inland plains. The state depends heavily on the Northeast Monsoon (October–December) for rainfall, unlike much of India. Summers (March–June) are long and hot, with temperatures frequently over 40°C, especially in the interior north and northwest. Winters are generally mild, except for some chilly nights in highland pockets like the Nilgiris, which offer a much cooler, temperate climate. The climate supports multiple cropping seasons and a variety of agriculture.

**Karnataka's** climate ranges from coastal tropical monsoon (in districts like Udupi and Dakshina Kannada) to semi-arid (in the Deccan Plateau, such as Bijapur and Bagalkot). The Western Ghats induce heavy rainfall in coastal districts during the Southwest Monsoon (June–September), with parts of Malnad among the wettest in India. Inland, especially in the Deccan region, rainfall drops sharply, and droughts are not uncommon. Summers (March–May) are warm throughout the state, but highland regions like Coorg and Chikmagalur are cooler and favored as hill stations. Winters are short and generally pleasant, except for foggy cold spells in the plateau zone.

## 5.6 Tourism

**Andhra Pradesh's** tourism sector is experiencing rapid growth, with an ambitious target of 20% annual expansion and major investments in infrastructure and destination development. The state ranks third in domestic tourism, drawing over 278 million domestic visitors annually and aiming to enhance its international appeal. Key attractions include pilgrimage sites like Tirupati and Annavaram, natural wonders such as Araku Valley and Gandikota, beach circuits, hill stations, and pristine backwaters. The government is prioritizing sustainable tourism, event-based promotion, and immersive experiences like eco-tourism and cruise circuits, aiming to increase the average stay duration and tourist spending while boosting employment and private investment in the sector.

**Tamil Nadu** remains India's leading state for both domestic and foreign tourist arrivals, celebrated for its extraordinary temple architecture, UNESCO heritage sites, and vibrant festivals. Visitors flock annually to destinations like Mahabalipuram, Thanjavur, Madurai, and the hill stations of Ooty and Kodaikanal. The coastline, wildlife sanctuaries, and hill regions add natural beauty, making the state popular among culture, nature, and adventure enthusiasts. Major events, improved amenities, and strong marketing have driven tourist volumes upward, leveraging the state's economic strength and ongoing infrastructure improvements for tourism.

**Karnataka** is famed for its versatile tourism, merging history, nature, and technology. The state's tourist circuit includes UNESCO-listed monuments in Hampi, royal heritage in Mysuru, the cosmopolitan allure of Bengaluru, and the rainforests and beaches of coastal districts. Wildlife enthusiasts are drawn to Nagarhole and Bandipur reserves, while the coffee estates of Coorg and Chikmagalur offer tranquil hill vacations. Karnataka continues to innovate in eco-tourism and experiential travel, with active government investment supporting new adventure and heritage initiatives alongside urban tourism in Bengaluru and Mysuru.

## 5.7 Geology

**Andhra Pradesh's** geology is marked by its location along the eastern edge of the Indian peninsula, with the Eastern Ghats mountain range dominating its landscape. These mountains are composed mainly of ancient metamorphic rocks such as charnockite, granite, khondalite, and quartzite formed during the Archean and Proterozoic eras. The state features diverse topography with rugged hills in the interior, coastal plains, and plateaus. The Krishna basin in Andhra Pradesh mainly contains Archaean rock formations, Deccan Trap basalt lavas, and sedimentary sequences from the Cuddapah and Vindhyan groups. Lateritic soil and alluvium are found in various parts, especially in river basins. Hydrogeologically, groundwater occurs both under water table and confined conditions due to the fractured rock structures.

**Tamil Nadu's** geology is varied and characterized by the presence of the Eastern Ghats in the north and northwest, and the Western Ghats along the western border with Kerala and Karnataka. The state has ancient crystalline rocks including gneisses and charnockites, with large portions covered by sedimentary formations and volcanic rock deposits. The

Nilgiri hills, part of the Western Ghats, are a key geological feature comprising older rocks like granite and gneiss, giving rise to their rugged terrain and rich biodiversity. Sedimentary basins, including Cuddapah and Vindhyan formations, are also found in parts of Tamil Nadu. The diverse geology influences soil types ranging from alluvial and red soils in plains to lateritic and forest soils in hilly regions.

**Karnataka's** geology is dominated by the Deccan Plateau and significant mountain ranges, including the Western Ghats along the west coast and the eastern extension of the Eastern Ghats in the northeast. The state is rich in ancient crystalline rock formations such as granites, gneisses, and charnockites, forming much of the peninsular shield. It also contains volcanic basalt flows from the Deccan Traps, which cover large areas. Important mineral deposits like iron ore and manganese occur primarily in the Karnataka region. The terrain varies from coastal plains to undulating plateaus and forested hills, resulting in a wide range of geological and soil types supporting diverse ecosystems.

## 5.8 Districts along the Project Stretch

### A. Krishna District, Andhra Pradesh

Krishna district, with its headquarters at Machilipatnam, is a coastal district in Andhra Pradesh named after the holy Krishna River that flows through it before emptying into the Bay of Bengal. Covering an area of approximately 3,773 sq. km and featuring an 88 km coastline, the district has a tropical climate with hot summers and mild winters. Agriculture is the mainstay of its economy, with paddy as the primary food crop. The district has a gross cropped area of about 3.76 lakh hectares, with a significant portion under irrigation via the Prakasam Barrage canals of the Krishna River. Other crops include sugarcane, mango, and tomato. The district is well-connected by roads and railways, including the major railway junction at Gudivada and the Machilipatnam port serving its minor seaport needs. Krishna district’s population density is high, reflecting urban centers like Machilipatnam and Gudivada, and it has a strong emphasis on education and literacy initiatives.

### B. Guntur District, Andhra Pradesh

(As Guntur district details were not specifically fetched, this is a summarized reference from general Andhra Pradesh data)

Guntur district is an agriculturally rich district in Andhra Pradesh known for its significant production of chili, cotton, and tobacco, besides paddy cultivation. The district lies in the fertile delta region of the Krishna River and features a mix of plains and some hilly terrain. The economy is primarily agrarian but increasingly diversifying into manufacturing and services. Guntur city is an important commercial hub with vibrant trade and commerce. The district benefits from good connectivity through road and rail, integrating it closely with the rest of the state's economic network.

### C. Tiruvallur District, Tamil Nadu

Tiruvallur is an industrially growing district located on the northwestern border of the Chennai metropolitan region in Tamil Nadu. With a mix of urban, suburban, and rural areas, it functions as a key manufacturing and logistics hub due to proximity to Chennai Port and major highways. The district experiences a tropical climate with hot summers and moderate monsoon rainfall, mainly benefiting agriculture and industrial growth. Tiruvallur supports automobile, textile, and chemical industries and has rapidly developed infrastructure catering to its expanding population.

### D. Chennai District, Tamil Nadu

Chennai district, housing the capital city of Tamil Nadu, is the pivotal metropolitan district of the state with a highly urbanized economy centered on IT, manufacturing, trade, and services. Chennai's coastal geography along the Bay of Bengal influences its tropical wet and dry climate. The district is a major cultural, economic, and educational center with a diverse population. Key industries include automobile manufacturing, software services, petrochemicals, and financial services. The extensive transport networks through roadways, railways, and one of the largest ports in India support its economic robustness.

### E. Tumkur (Tumakuru) District, Karnataka

Tumkur district lies west of Bangalore and is characterized by a mix of agricultural land and growing industrial activities. It has a semi-arid to moderate climate and features undulating terrain with some forested hills. Agriculture dominates, with cultivation of

crops like ragi, groundnut, and sunflower, supported by irrigation projects. The district has been witnessing increased industrialization, particularly with the development of industrial estates and better connectivity to Bangalore and other regions. Education and infrastructure development are priorities in Tumkur for balanced socio-economic growth. Industrial activity in Supaul is limited but growing. Small-scale industries such as rice mills, agro-processing units, and brick kilns are operational. The region also has potential for dairy development and jute-based industries. Proximity to Nepal facilitates small-scale cross-border trade, further supporting local economic activity.

# CHAPTER 6

# HIGHWAY INVENTORY AND CONDITION ASSESMENT OF HIGHWAY ASSET

## 6.1 General

Existing inventory of features of Project Stretch is captured through NSV physical inventory and field reconnaissance. Features like built-up settlements, carriageway dimensions, service roads, junctions, road furniture etc. are recorded for entire Project Stretch. The highway inventory is linked to the existing km posts established along the Project Stretch. Detailed inventory including an overview of the Project Stretch is presented in this chapter.

The road inventory data presented in this Detailed Project Report (DPR) has been compiled from previous project documents and as per site. Since inventory details may vary as per site conditions.

| Section No. | Section Name | | Chainage (Km) | | Length (Km) | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | From | | To | |
| | From | To | From | To | | Latitude | Longitude | Latitude | Longitude |
| Section-1 | Chlakaluripet | Vijayawada | 355+000 | 422+605 | 69.408 | 16° 1'40.03"N | 80° 7'40.91"E | 16°23'51.42"N | 80°32'53.89"E |
| Section-2 | Chennai Bypass | | 0+000 | 32+600 | 32.600 | 12°54'49.09"N | 80° 6'5.55"E | 13° 9'4.26"N | 80°12'40.47"E |
| Section-3 | Chennai | Tada | 21+400 | 54+400 | 33.000 | 13° 8'31.37"N | 80°13'25.27"E | 13°29'36.20"N | 80° 5'56.19"E |
| Section-4 | Neelmangla | Tumkur | 29+500 | 61+520 | 32.020 | 13° 6'40.38"N | 77°22'39.82"E | 13°18'16.86"N | 77° 9'28.76"E |
| | Tumkur Bypass | | 61+520 | 74+168 | 12.648 | 13°18'16.86"N | 77° 9'28.76"E | 13°23'19.78"N | 77° 5'38.26"E |

## 6.2 Start and End Point

All details of Project Stretch are provided with respect to LHS and RHS. Description of LHS and RHS are given below:

**Table 6-1 : Description of LHS and RHS**

| Section No. | Section Name | | Direction | Chainage (Km) | | Length (Km) | Remarks |
|---|---|---|---|---|---|---|---|
| | From | To | | From | To | | |
| Section-1 | Chilakaluripet | Vijayawada | Left Hand Side (LHS) | 355+000 | 357+342 | 2.342 | From Chilakaluripet to Chilakaluripet |

| Section No. | Section Name | | Direction | Chainage (Km) | | Length (Km) | Remarks |
|---|---|---|---|---|---|---|---|
| | From | To | | From | To | | |
| | | | Right Hand Side (RHS) | 357+342 | 355+000 | 2.342 | From Chilakaluripet to Chilakaluripet |
| | | | Left Hand Side (LHS) | 372+038 | 422+605 | 50.567 | From Chilakaluripet to Vijayawada |
| | | | Right Hand Side (RHS) | 422+605 | 372+038 | 50.567 | From Vijayawada to Chilakaluripet |
| | | | Left Hand Side (LHS) | 0+000 | 16+499 | 16.499 | From Chilakaluripet to Vijayawada |
| | | | Right Hand Side (RHS) | 16+499 | 0+000 | 16.499 | From Vijayawada to Chilakaluripet |
| Section-2 | Chennai Bypass | | Left Hand Side (LHS) | 0+000 | 32+600 | 32.6 | From Tambram to Madhavaram |
| | | | Right Hand Side (RHS) | 32+600 | 0+000 | 32.6 | From Madhavaram to Tambram |
| Section-3 | Chennai Tada | | Left Hand Side (LHS) | 21+400 | 54+400 | 33 | From Chennai to Tada |
| | | | Right Hand Side (RHS) | 54+400 | 21+400 | 33 | From Tada to Chennai |
| Section-4 | Neelmangla | Tumkur | Left Hand Side (LHS) | 29+500 | 50+000 | 20.500 | From Neelmangla to Tumkur |
| | | | Right Hand Side (RHS) | 50+000 | 29+500 | 20.500 | From Tumkur to Neelmangla |
| | | | Left Hand Side (LHS) | 50+000 | 62+000 | 12.000 | From Neelmangla to Tumkur |
| | | | Right Hand Side (RHS) | 62+000 | 50+000 | 12.000 | From Tumkur to Neelmangla |
| | Tumkur Bypss | | Left Hand Side (LHS) | 62+000 | 74+168 | 12.168 | From Neelmangla to Tumkur |
| | | | Right Hand Side (RHS) | 74+168 | 62+000 | 12.168 | From Tumkur to Neelmangla |

## 6.3 Summary of Inventory

While inventory is captured Chainage-wise with their existing conditions (wherever necessary), an overview of all inventory is presented in the table below for quick reference.

**Table 6-2 : Summary of Inventory**

| Description | | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|---|
| | | | | | Neelmangla-Tumkur | Tumkur Bypass |
| **Length of project stretch** | | 69.408 km | 32.600 Km | 33.00 Km | 32.020 Km | 12.648 Km |
| **Lane Configuration** | | 6 Lane with paved shoulder | 6 Lane with paved shoulder | 6 Lane with paved shoulder | 4/6 Lane with paved shoulder | 6 Lane with paved shoulder |
| **Pavement Type** | **Flexible (m)** | 68808 | 32455 | 32535 | 31220 | 12648 |
| | **Rigid (m)** | 600 | 145 | 465 | 800 | 0 |
| **Length of Service/Slip road (m)** | | 121044 | 43205 | 67103 | 40800 | 24774 |
| **Major/ Minor Junction** | | 20 Nos. /218 Nos. | 10 Nos. /198 Nos. | 10 Nos. /95 Nos. | 2 Nos. /46 Nos. | 3 Nos. /8 Nos. |
| **Major/ Minor Bridge** | | 3 Nos. /23 Nos. | 3 Nos. /3 Nos. | 3 Nos. /9 Nos. | 2 Nos. /10 Nos. | 2 Nos. /8 Nos. |
| **Culverts** | | 90 Nos. | 140 Nos. | 56 Nos. | 50 Nos. | 19 Nos. |
| **ROBs/RUBs** | | 1 Nos./0 No | 1 Nos./1 No | 0 Nos./0 No | 2 Nos./0 No | 1 Nos./0 No |
| **VUPs/LVUPs/SVUPs** | | 27 Nos | 18 Nos | 9 Nos | 8 Nos | 11 Nos |
| **PUPs/CUPs** | | 26 Nos. | 2 Nos. | 7 Nos. | 1 Nos. | - |
| **FOBs** | | 0 Nos. | 0 Nos. | 1 Nos. | 1 Nos. | 1 Nos. |

| Description | Vijayawada-Chilakaluripet | Chennai Bypass | Chennai-Tada | Neelmangla- Tumkur* | |
|---|---|---|---|---|---|
| | | | | Neelmangla-Tumkur | Tumkur Bypass |
| **Toll Plazas** | Kaza (420+500) | Vanagram (16+500) and Surapattu (28+600) | Nallur (21+625) | Kulumepalya (30+000) and Chokkenahalli (61+500) | - |
| **Bus Bays with shelters/ Bus Shelters** | 21 Nos. | 1 Nos. | 36 Nos. | 12 Nos. | 1 Nos. |
| **Truck Lay Bye** | 1 Nos. | 0 Nos. | 0Nos. | 2 Nos. | - |
| **Median Openings** | 4 Nos. | 9 Nos. | 10 Nos. | 12 Nos. | - |

**For Section-04 Neelmangla Tumkur**

*These details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

## 6.4 Highway Features

Details of Chainage-wise highway inventory are presented in below sections.

### 6.4.1 Built-up Settlement

There details of Settlements along with Length and Name of the settlement along the Project Stretch are given below:

**Table 6-3 : Built-up Settlement**
**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | | Length (m) | Name of Settlement | |
|---|---|---|---|---|---|
| | From | To | | LHS | RHS |
| 1 | 373+700 | 374+600 | 900 | Edlapadu | Edlapadu |
| 2 | 374+750 | 375+300 | 550 | | Edlapadu |
| 3 | 374+750 | 376+350 | 1600 | Edlapadu | |
| 4 | 377+250 | 377+450 | 200 | | Vankayalapadu |
| 5 | 378+150 | 378+900 | 750 | Boyapalem | |
| 6 | 378+150 | 379+400 | 1250 | | Boyapalem |
| 7 | 380+000 | 380+350 | 350 | Thummalpalem | |
| 8 | 380+750 | 381+450 | 700 | | Thummalpalem |
| 9 | 383+400 | 383+850 | 450 | Nadimpalem | |
| 10 | 384+050 | 384+300 | 250 | Nadimpalem | Nadimpalem |
| 11 | 384+800 | 385+650 | 850 | Chinakondrupadu | |
| 12 | 387+100 | 387+450 | 350 | | Chowdavaram |
| 13 | 388+150 | 388+550 | 400 | Chowdavaram | |
| 14 | 389+300 | 389+800 | 500 | Dasaripalem | Dasaripalem |
| 15 | 390+250 | 390+450 | 200 | | Chowdavaram |
| 16 | 391+100 | 391+500 | 400 | ObulnaiduPalem | |
| 17 | 391+700 | 392+450 | 750 | | Pothur |
| 18 | 392+500 | 393+300 | 800 | Pothur | |
| 19 | 394+450 | 395+200 | 750 | Ankireddy Palem | |
| 20 | 395+800 | 397+600 | 1800 | Guntur | |
| 21 | 396+600 | 397+900 | 1300 | | Guntur |
| 22 | 398+950 | 399+200 | 250 | | Lalupuram |
| 23 | 399+600 | 401+900 | 2300 | Guntur | Guntur |
| 24 | 410+000 | 410+250 | 250 | | Takkellapadu |
| 25 | 410+400 | 411+750 | 1350 | Autonagar | |

| S. No. | Chainage Km | | Length (m) | Name of Settlement | |
|---|---|---|---|---|---|
| | From | To | | LHS | RHS |
| 26 | 412+750 | 413+850 | 1100 | Yuvajananagar | Pedakakani |
| 27 | 414+180 | 414+450 | 270 | Pedakakani | |
| 28 | 414+800 | 415+550 | 750 | Namburu | |
| 29 | 417+900 | 418+150 | 250 | | Kantheru |
| 30 | 418+250 | 418+600 | 350 | Namburu | |
| 31 | 418+800 | 420+250 | 1450 | | Namburu |
| 32 | 420+800 | 421+100 | 300 | Kaza | |
| 33 | 421+100 | 422+700 | 1600 | | Kaza |
| 34 | 421+800 | 422+050 | 250 | Kaza | |
| **Total** | | | **25570** | | |

## Section 02 Chennai Bypass

| S. No. | Chainage Km | | Length (m) | Name of Settlement | |
|---|---|---|---|---|---|
| | From | To | | LHS | RHS |
| 1 | 0+000 | 3+200 | 3200 | Tambaram | Tambaram |
| 2 | 6+100 | 6+340 | 240 | Tiruneermalai | Tiruneermalai |
| 3 | 7+100 | 9+100 | 2000 | Kundrathur | Anakaputhur |
| 4 | 10+400 | 10+900 | 500 | Thandalam | |
| 5 | 10+900 | 14+100 | 3200 | | Gerugambakkam |
| 6 | 11+980 | 14+000 | 2020 | Paraniputhur | |
| 7 | 15+850 | 19+000 | 3150 | Vanagram | Vanagram |
| 8 | 19+000 | 23+600 | 4600 | Ayanambakkam | |
| 9 | 19+000 | 29+400 | 10400 | | Ambattur |
| 10 | 23+600 | 28+020 | 4420 | Ambattur | |
| 11 | 28+500 | 29+500 | 1000 | Surapet | |
| 12 | 29+400 | 32+600 | 3200 | | Kadirvedu |
| 13 | 29+500 | 32+600 | 3100 | Puzhal | |
| **Total** | | | **41030** | | |

## Section 03 Chennai Tada

| S. No. | Chainage Km | | Length (m) | Name of Settlement | |
|---|---|---|---|---|---|
| | From | To | | LHS | RHS |
| 1 | 21+400 | 32+400 | 11000 | Janappanchatram, Panjetty, Keelmeni | |
| 2 | 21+400 | 24+400 | 3000 | | Nallur, Sholavaram |
| 3 | 25+500 | 32+400 | 6900 | | Jaganathapuram, Pancheti |
| 4 | 33+300 | 34+000 | 700 | | Durainallur |
| 5 | 37+500 | 39+600 | 2100 | | Kavaraipettai |
| 6 | 38+300 | 39+200 | 900 | Deendayal Nagar | |
| 7 | 43+000 | 46+900 | 3900 | New Gummidipoondi, Kayalarmedu | |
| 8 | 43+800 | 47+100 | 3300 | | Gummidipoondi, Peddikuppam |
| 9 | 48+500 | 51+300 | 2800 | Chinnaobulapuram | |
| 10 | 48+500 | 49+300 | 800 | | Gummidipoondi |
| 11 | 49+600 | 51+000 | 1400 | | Elavur |
| **Total** | | | **36800** | | |

## Section 04 Neelmangla-Tumkur

| S. No. | Chainage Km | | Length (m) | Name of Settlement |
|---|---|---|---|---|
| | From | To | | |
| 1* | 39+440 | 39+800 | 360 | Dodderi |
| 2* | 41+300 | 41+600 | 300 | Mahimapura gate |
| 3* | 47+240 | 47+500 | 260 | Yedehalli |
| 4* | 49+814 | 50+000 | 186 | Dobbaspet |
| 5 | 55+380 | 55+500 | 120 | Nandhalli |
| 6 | 58+060 | 58+400 | 340 | Chikkahalli and Hirehalli |
| 7 | 59+720 | 60+320 | 600 | Manchakalkuppe |
| 8* | 62+040 | 62+218 | 178 | Tumkur Bypass Section |
| 9* | 62+238 | 62+317 | 79 | |
| 10* | 62+809 | 63+084 | 275 | |
| 11* | 65+100 | 65+713 | 613 | |

| S. No. | Chainage Km | | Length (m) | Name of Settlement |
|---|---|---|---|---|
| | From | To | | |
| 12* | 66+645 | 66+828 | 183 | |
| 13* | 66+848 | 66+878 | 30 | |
| 14* | 67+172 | 67+437 | 265 | |
| 15* | 67+453 | 67+820 | 367 | |
| 16* | 67+830 | 67+978 | 148 | |
| 17* | 68+309 | 68+754 | 445 | |
| 18* | 68+770 | 68+897 | 127 | |
| 19* | 68+907 | 69+345 | 438 | |
| 20* | 69+357 | 69+859 | 502 | |
| 21* | 70+003 | 71+179 | 1176 | |
| 22* | 71+197 | 71+267 | 70 | |
| 23* | 71+639 | 72+805 | 1166 | |
| 24* | 73+247 | 73+460 | 213 | |
| 25* | 74+020 | 74+168 | 180 | |
| **Total** | | | **8621** | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT/InvIT concessionaire after the completion of the DLP period.

### 6.4.2 Right of way

The details of ROW are given below:

**Table 6-4 : ROW details along the Project Stretch**

**Section 01 Vijayawada-Chilakaluripet**

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | From | To | | |
| 1 | 0+000 | 16+499 | 16499 | 80 |
| 2 | 355+000 | 357+342 | 2342 | 80 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | From | To | | |
| 3 | 372+035 | 373+800 | 1765 | 78 |
| 4 | 373+800 | 374+400 | 600 | 52 |
| 5 | 374+000 | 374+168 | 200 | 52 |
| 6 | 374+400 | 374+600 | 200 | 58 |
| 7 | 374+600 | 375+200 | 600 | 52 |
| 8 | 375+200 | 378+200 | 3000 | 78 |
| 9 | 378+200 | 378+400 | 200 | 52 |
| 10 | 378+400 | 378+600 | 200 | 52 |
| 11 | 378+600 | 378+800 | 200 | 52 |
| 12 | 378+800 | 395+740 | 16940 | 78 |
| 13 | 395+740 | 396+200 | 460 | 97 |
| 14 | 396+200 | 412+200 | 16000 | 78 |
| 15 | 412+200 | 415+200 | 3000 | 52 |
| 16 | 415+200 | 420+270 | 5070 | 78 |
| 17 | 420+270 | 420+300 | 30 | 113 |
| 18 | 420+300 | 420+400 | 100 | 173 |
| 19 | 420+400 | 420+433 | 33 | 173 |
| 20 | 420+433 | 420+600 | 167 | 98 |
| 21 | 420+600 | 420+800 | 200 | 129 |
| 22 | 420+800 | 421+000 | 200 | 105 |
| 23 | 421+000 | 422+605 | 1605 | 78 |

**Section 02 Chennai Bypass**

| S.No | Chainage (km) | | Lenth (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 1 | 0+000 | 22+138 | 22138.00 | 60 |
| 2 | 22+138 | 24+600 | 2462.00 | 36 |
| 3 | 24+600 | 25+045 | 445.00 | 45.5 |
| 4 | 25+045 | 32+600 | 7555.00 | 60 |

## Section 03 Chennai Tada

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 1 | 21+400 | 21+425 | 25 | 157 |
| 2 | 21+425 | 21+450 | 25 | 185 |
| 3 | 21+450 | 21+475 | 25 | 190 |
| 4 | 21+475 | 21+500 | 25 | 190 |
| 5 | 21+500 | 21+525 | 25 | 195 |
| 6 | 21+525 | 21+550 | 25 | 200 |
| 7 | 21+550 | 21+575 | 25 | 180 |
| 8 | 21+575 | 21+600 | 25 | 180 |
| 9 | 21+600 | 21+625 | 25 | 180 |
| 10 | 21+625 | 21+650 | 25 | 180 |
| 11 | 21+650 | 21+675 | 25 | 180 |
| 12 | 21+675 | 21+725 | 50 | 180 |
| 13 | 21+725 | 21+750 | 25 | 180 |
| 14 | 21+750 | 21+775 | 25 | 174 |
| 15 | 21+775 | 21+800 | 25 | 170 |
| 16 | 21+800 | 21+825 | 25 | 164 |
| 17 | 21+825 | 21+850 | 25 | 158 |
| 18 | 21+850 | 21+875 | 25 | 150 |
| 19 | 21+875 | 21+900 | 25 | 120 |
| 20 | 21+900 | 21+925 | 25 | 100 |
| 21 | 21+925 | 21+950 | 25 | 87 |
| 22 | 21+950 | 21+975 | 25 | 76 |
| 23 | 21+975 | 22+000 | 25 | 86 |
| 24 | 22+000 | 22+025 | 25 | 92 |
| 25 | 22+025 | 22+050 | 25 | 112 |
| 26 | 22+050 | 22+075 | 25 | 116 |
| 27 | 22+075 | 22+100 | 25 | 91 |
| 28 | 22+100 | 22+125 | 25 | 95 |
| 29 | 22+125 | 22+175 | 50 | 100 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 30 | 22+175 | 22+200 | 25 | 101 |
| 31 | 22+200 | 22+225 | 25 | 92 |
| 32 | 22+225 | 22+250 | 25 | 83 |
| 33 | 22+250 | 22+275 | 25 | 73 |
| 34 | 22+275 | 22+300 | 25 | 62 |
| 35 | 22+300 | 22+325 | 25 | 61 |
| 36 | 22+325 | 22+425 | 100 | 60 |
| 37 | 22+425 | 22+450 | 25 | 62 |
| 38 | 22+450 | 22+475 | 25 | 64 |
| 39 | 22+475 | 22+500 | 25 | 68 |
| 40 | 22+500 | 22+525 | 25 | 70 |
| 41 | 22+525 | 22+550 | 25 | 69 |
| 42 | 22+550 | 22+575 | 25 | 71 |
| 43 | 22+575 | 22+600 | 25 | 73 |
| 44 | 22+600 | 22+625 | 25 | 75 |
| 45 | 22+625 | 22+650 | 25 | 77 |
| 46 | 22+650 | 22+675 | 25 | 78 |
| 47 | 22+675 | 22+700 | 25 | 80 |
| 48 | 22+700 | 22+725 | 25 | 85 |
| 49 | 22+725 | 22+875 | 150 | 90 |
| 50 | 22+875 | 22+900 | 25 | 80 |
| 51 | 22+900 | 22+925 | 25 | 78 |
| 52 | 22+925 | 22+950 | 25 | 74 |
| 53 | 22+950 | 22+975 | 25 | 71 |
| 54 | 22+975 | 23+000 | 25 | 68 |
| 55 | 23+000 | 23+025 | 25 | 65 |
| 56 | 23+025 | 25+750 | 2725 | 60 |
| 57 | 25+750 | 25+775 | 25 | 63 |
| 58 | 25+775 | 25+800 | 25 | 74 |
| 59 | 25+800 | 25+825 | 25 | 90 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 60 | 25+825 | 25+850 | 25 | 134 |
| 61 | 25+850 | 25+900 | 50 | 140 |
| 62 | 25+900 | 25+925 | 25 | 129 |
| 63 | 25+925 | 25+950 | 25 | 88 |
| 64 | 25+950 | 25+975 | 25 | 83 |
| 65 | 25+975 | 26+000 | 25 | 78 |
| 66 | 26+000 | 26+025 | 25 | 89 |
| 67 | 26+025 | 26+050 | 25 | 94 |
| 68 | 26+050 | 26+075 | 25 | 103 |
| 69 | 26+075 | 26+100 | 25 | 105 |
| 70 | 26+100 | 26+125 | 25 | 107 |
| 71 | 26+125 | 26+150 | 25 | 110 |
| 72 | 26+150 | 26+250 | 100 | 120 |
| 73 | 26+250 | 26+275 | 25 | 108 |
| 74 | 26+275 | 26+300 | 25 | 95 |
| 75 | 26+300 | 26+325 | 25 | 86 |
| 76 | 26+325 | 26+350 | 25 | 78 |
| 77 | 26+350 | 26+375 | 25 | 69 |
| 78 | 26+375 | 26+400 | 25 | 64 |
| 79 | 26+400 | 26+875 | 475 | 60 |
| 80 | 26+875 | 26+900 | 25 | 62 |
| 81 | 26+900 | 26+950 | 50 | 64 |
| 82 | 26+950 | 26+975 | 25 | 62 |
| 83 | 26+975 | 27+275 | 300 | 60 |
| 84 | 27+275 | 27+325 | 50 | 61 |
| 85 | 27+325 | 27+375 | 50 | 63 |
| 86 | 27+375 | 27+400 | 25 | 62 |
| 87 | 27+400 | 27+525 | 125 | 61 |
| 88 | 27+525 | 27+550 | 25 | 63 |
| 89 | 27+550 | 27+600 | 50 | 65 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 90 | 27+600 | 27+625 | 25 | 63 |
| 91 | 27+625 | 27+875 | 250 | 61 |
| 92 | 27+875 | 27+925 | 50 | 66 |
| 93 | 27+925 | 27+950 | 25 | 63 |
| 94 | 27+950 | 28+600 | 650 | 62 |
| 95 | 28+600 | 28+625 | 25 | 61 |
| 96 | 28+625 | 28+650 | 25 | 63 |
| 97 | 28+650 | 28+700 | 50 | 64 |
| 98 | 28+700 | 28+725 | 25 | 58 |
| 99 | 28+725 | 29+175 | 450 | 50 |
| 100 | 29+175 | 29+550 | 375 | 51 |
| 101 | 29+550 | 30+125 | 575 | 50 |
| 102 | 30+125 | 30+150 | 25 | 58 |
| 103 | 30+150 | 30+175 | 25 | 59 |
| 104 | 30+175 | 30+200 | 25 | 54 |
| 105 | 30+200 | 30+225 | 25 | 53 |
| 106 | 30+225 | 30+250 | 25 | 52 |
| 107 | 30+250 | 30+275 | 25 | 51 |
| 108 | 30+275 | 31+150 | 875 | 50 |
| 109 | 31+150 | 31+175 | 25 | 52 |
| 110 | 31+175 | 31+200 | 25 | 56 |
| 111 | 31+200 | 31+225 | 25 | 62 |
| 112 | 31+225 | 31+250 | 25 | 64 |
| 113 | 31+250 | 31+275 | 25 | 58 |
| 114 | 31+275 | 31+300 | 25 | 53 |
| 115 | 31+300 | 31+325 | 25 | 51 |
| 116 | 31+325 | 31+350 | 25 | 53 |
| 117 | 31+350 | 31+375 | 25 | 54 |
| 118 | 31+375 | 31+400 | 25 | 56 |
| 119 | 31+400 | 31+425 | 25 | 57 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 120 | 31+425 | 31+450 | 25 | 58 |
| 121 | 31+450 | 31+475 | 25 | 59 |
| 122 | 31+475 | 31+800 | 325 | 60 |
| 123 | 31+800 | 31+825 | 25 | 61 |
| 124 | 31+825 | 32+175 | 350 | 62 |
| 125 | 32+175 | 32+200 | 25 | 65 |
| 126 | 32+200 | 32+225 | 25 | 64 |
| 127 | 32+225 | 32+250 | 25 | 62 |
| 128 | 32+250 | 32+425 | 175 | 61 |
| 129 | 32+425 | 32+775 | 350 | 60 |
| 130 | 32+775 | 32+825 | 50 | 63 |
| 131 | 32+825 | 32+850 | 25 | 62 |
| 132 | 32+850 | 33+000 | 150 | 60 |
| 133 | 33+000 | 33+050 | 50 | 61 |
| 134 | 33+050 | 33+075 | 25 | 63 |
| 135 | 33+075 | 33+125 | 50 | 65 |
| 136 | 33+125 | 33+150 | 25 | 63 |
| 137 | 33+150 | 33+875 | 725 | 61 |
| 138 | 33+875 | 33+925 | 50 | 68 |
| 139 | 33+925 | 33+950 | 25 | 63 |
| 140 | 33+950 | 34+600 | 650 | 60 |
| 141 | 34+600 | 34+625 | 25 | 67 |
| 142 | 34+625 | 34+650 | 25 | 70 |
| 143 | 34+650 | 34+675 | 25 | 121 |
| 144 | 34+675 | 34+725 | 50 | 141 |
| 145 | 34+725 | 34+750 | 25 | 120 |
| 146 | 34+750 | 34+775 | 25 | 90 |
| 147 | 34+775 | 34+875 | 100 | 82 |
| 148 | 34+875 | 34+900 | 25 | 66 |
| 149 | 34+900 | 34+975 | 75 | 65 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 150 | 34+975 | 35+000 | 25 | 64 |
| 151 | 35+000 | 35+025 | 25 | 60 |
| 152 | 35+025 | 35+075 | 50 | 59 |
| 153 | 35+075 | 35+125 | 50 | 56 |
| 154 | 35+125 | 35+150 | 25 | 50 |
| 155 | 35+150 | 35+175 | 25 | 52 |
| 156 | 35+175 | 35+275 | 100 | 60 |
| 157 | 35+275 | 35+325 | 50 | 51 |
| 158 | 35+325 | 35+350 | 25 | 52 |
| 159 | 35+350 | 35+375 | 25 | 51 |
| 160 | 35+375 | 35+400 | 25 | 50 |
| 161 | 35+400 | 35+425 | 25 | 51 |
| 162 | 35+425 | 35+450 | 25 | 52 |
| 163 | 35+450 | 35+475 | 25 | 51 |
| 164 | 35+475 | 35+500 | 25 | 50 |
| 165 | 35+500 | 35+575 | 75 | 52 |
| 166 | 35+575 | 35+600 | 25 | 53 |
| 167 | 35+600 | 35+675 | 75 | 55 |
| 168 | 35+675 | 35+700 | 25 | 56 |
| 169 | 35+700 | 35+750 | 50 | 58 |
| 170 | 35+750 | 35+775 | 25 | 61 |
| 171 | 35+775 | 35+800 | 25 | 63 |
| 172 | 35+800 | 35+825 | 25 | 64 |
| 173 | 35+825 | 35+850 | 25 | 62 |
| 174 | 35+850 | 35+925 | 75 | 63 |
| 175 | 35+925 | 36+000 | 75 | 60 |
| 176 | 36+000 | 36+050 | 50 | 61 |
| 177 | 36+050 | 36+250 | 200 | 62 |
| 178 | 36+250 | 36+275 | 25 | 63 |
| 179 | 36+275 | 36+300 | 25 | 64 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 180 | 36+300 | 36+325 | 25 | 63 |
| 181 | 36+325 | 36+575 | 250 | 62 |
| 182 | 36+575 | 36+600 | 25 | 63 |
| 183 | 36+600 | 36+650 | 50 | 65 |
| 184 | 36+650 | 36+675 | 25 | 63 |
| 185 | 36+675 | 36+825 | 150 | 62 |
| 186 | 36+825 | 36+850 | 25 | 64 |
| 187 | 36+850 | 36+875 | 25 | 66 |
| 188 | 36+875 | 36+900 | 25 | 69 |
| 189 | 36+900 | 36+925 | 25 | 73 |
| 190 | 36+925 | 36+950 | 25 | 76 |
| 191 | 36+950 | 36+975 | 25 | 86 |
| 192 | 36+975 | 37+000 | 25 | 102 |
| 193 | 37+000 | 37+025 | 25 | 96 |
| 194 | 37+025 | 37+050 | 25 | 66 |
| 195 | 37+050 | 37+075 | 25 | 61 |
| 196 | 37+075 | 37+325 | 250 | 62 |
| 197 | 37+325 | 37+350 | 25 | 64 |
| 198 | 37+350 | 37+375 | 25 | 66 |
| 199 | 37+375 | 37+400 | 25 | 81 |
| 200 | 37+400 | 37+425 | 25 | 91 |
| 201 | 37+425 | 37+475 | 50 | 101 |
| 202 | 37+475 | 37+500 | 25 | 91 |
| 203 | 37+500 | 37+525 | 25 | 81 |
| 204 | 37+525 | 37+550 | 25 | 76 |
| 205 | 37+550 | 37+575 | 25 | 71 |
| 206 | 37+575 | 37+600 | 25 | 61 |
| 207 | 37+600 | 37+875 | 275 | 62 |
| 208 | 37+875 | 37+900 | 25 | 67 |
| 209 | 37+900 | 37+925 | 25 | 66 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 210 | 37+925 | 37+950 | 25 | 63 |
| 211 | 37+950 | 37+975 | 25 | 62 |
| 212 | 37+975 | 38+000 | 25 | 60 |
| 213 | 38+000 | 38+050 | 50 | 59 |
| 214 | 38+050 | 38+225 | 175 | 58 |
| 215 | 38+225 | 38+250 | 25 | 56 |
| 216 | 38+250 | 38+300 | 50 | 51 |
| 217 | 38+300 | 39+150 | 850 | 52 |
| 218 | 39+150 | 39+225 | 75 | 57 |
| 219 | 39+225 | 39+275 | 50 | 58 |
| 220 | 39+275 | 39+325 | 50 | 59 |
| 221 | 39+325 | 39+400 | 75 | 60 |
| 222 | 39+400 | 39+450 | 50 | 61 |
| 223 | 39+450 | 39+875 | 425 | 62 |
| 224 | 39+875 | 40+175 | 300 | 61 |
| 225 | 40+175 | 40+225 | 50 | 62 |
| 226 | 40+225 | 40+250 | 25 | 68 |
| 227 | 40+250 | 40+275 | 25 | 66 |
| 228 | 40+275 | 40+300 | 25 | 63 |
| 229 | 40+300 | 41+350 | 1050 | 61 |
| 230 | 41+350 | 41+375 | 25 | 62 |
| 231 | 41+375 | 41+425 | 50 | 64 |
| 232 | 41+425 | 41+450 | 25 | 70 |
| 233 | 41+450 | 41+475 | 25 | 69 |
| 234 | 41+475 | 41+600 | 125 | 61 |
| 235 | 41+600 | 41+625 | 25 | 63 |
| 236 | 41+625 | 41+675 | 50 | 65 |
| 237 | 41+675 | 41+700 | 25 | 63 |
| 238 | 41+700 | 42+025 | 325 | 61 |
| 239 | 42+025 | 42+100 | 75 | 60 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 240 | 42+100 | 42+150 | 50 | 59 |
| 241 | 42+150 | 42+325 | 175 | 58 |
| 242 | 42+325 | 42+450 | 125 | 57 |
| 243 | 42+450 | 42+575 | 125 | 56 |
| 244 | 42+575 | 42+600 | 25 | 57 |
| 245 | 42+600 | 42+800 | 200 | 58 |
| 246 | 42+800 | 42+900 | 100 | 59 |
| 247 | 42+900 | 43+000 | 100 | 60 |
| 248 | 43+000 | 43+100 | 100 | 61 |
| 249 | 43+100 | 43+175 | 75 | 60 |
| 250 | 43+175 | 43+225 | 50 | 59 |
| 251 | 43+225 | 43+475 | 250 | 60 |
| 252 | 43+475 | 43+525 | 50 | 61 |
| 253 | 43+525 | 43+700 | 175 | 60 |
| 254 | 43+700 | 43+775 | 75 | 59 |
| 255 | 43+775 | 43+875 | 100 | 58 |
| 256 | 43+875 | 43+950 | 75 | 57 |
| 257 | 43+950 | 44+025 | 75 | 57 |
| 258 | 44+025 | 44+400 | 375 | 56 |
| 259 | 44+400 | 44+475 | 75 | 61 |
| 260 | 44+475 | 44+500 | 25 | 56 |
| 261 | 44+500 | 44+525 | 25 | 58 |
| 262 | 44+525 | 44+550 | 25 | 59 |
| 263 | 44+550 | 44+575 | 25 | 60 |
| 264 | 44+575 | 44+600 | 25 | 61 |
| 265 | 44+600 | 44+625 | 25 | 67 |
| 266 | 44+625 | 44+650 | 25 | 69 |
| 267 | 44+650 | 44+675 | 25 | 76 |
| 268 | 44+675 | 44+725 | 50 | 101 |
| 269 | 44+725 | 44+750 | 25 | 71 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 270 | 44+750 | 44+775 | 25 | 66 |
| 271 | 44+775 | 44+800 | 25 | 58 |
| 272 | 44+800 | 44+850 | 50 | 56 |
| 273 | 44+850 | 44+875 | 25 | 57 |
| 274 | 44+875 | 44+925 | 50 | 59 |
| 275 | 44+925 | 44+950 | 25 | 57 |
| 276 | 44+950 | 45+175 | 225 | 56 |
| 277 | 45+175 | 45+925 | 750 | 55 |
| 278 | 45+925 | 45+950 | 25 | 65 |
| 279 | 45+950 | 45+975 | 25 | 74 |
| 280 | 45+975 | 46+050 | 75 | 99 |
| 281 | 46+050 | 46+075 | 25 | 88 |
| 282 | 46+075 | 46+100 | 25 | 75 |
| 283 | 46+100 | 46+125 | 25 | 72 |
| 284 | 46+125 | 46+150 | 25 | 70 |
| 285 | 46+150 | 46+175 | 25 | 68 |
| 286 | 46+175 | 46+200 | 25 | 65 |
| 287 | 46+200 | 46+225 | 25 | 63 |
| 288 | 46+225 | 46+250 | 25 | 61 |
| 289 | 46+250 | 46+275 | 25 | 60 |
| 290 | 46+275 | 46+300 | 25 | 57 |
| 291 | 46+300 | 46+350 | 50 | 55 |
| 292 | 46+350 | 46+375 | 25 | 57 |
| 293 | 46+375 | 46+475 | 100 | 58 |
| 294 | 46+475 | 46+525 | 50 | 63 |
| 295 | 46+525 | 46+550 | 25 | 61 |
| 296 | 46+550 | 46+625 | 75 | 60 |
| 297 | 46+625 | 46+700 | 75 | 61 |
| 298 | 46+700 | 46+775 | 75 | 63 |
| 299 | 46+775 | 46+925 | 150 | 62 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 300 | 46+925 | 46+950 | 25 | 63 |
| 301 | 46+950 | 46+975 | 25 | 65 |
| 302 | 46+975 | 47+000 | 25 | 72 |
| 303 | 47+000 | 47+025 | 25 | 75 |
| 304 | 47+025 | 47+050 | 25 | 79 |
| 305 | 47+050 | 47+075 | 25 | 81 |
| 306 | 47+075 | 47+125 | 50 | 102 |
| 307 | 47+125 | 47+150 | 25 | 70 |
| 308 | 47+150 | 47+175 | 25 | 64 |
| 309 | 47+175 | 47+850 | 675 | 56 |
| 310 | 47+850 | 47+875 | 25 | 59 |
| 311 | 47+875 | 47+925 | 50 | 63 |
| 312 | 47+925 | 47+950 | 25 | 64 |
| 313 | 47+950 | 47+975 | 25 | 62 |
| 314 | 47+975 | 48+000 | 25 | 59 |
| 315 | 48+000 | 48+125 | 125 | 56 |
| 316 | 48+125 | 48+225 | 100 | 58 |
| 317 | 48+225 | 48+325 | 100 | 59 |
| 318 | 48+325 | 48+400 | 75 | 60 |
| 319 | 48+400 | 48+725 | 325 | 62 |
| 320 | 48+725 | 48+850 | 125 | 61 |
| 321 | 48+850 | 48+875 | 25 | 62 |
| 322 | 48+875 | 48+925 | 50 | 64 |
| 323 | 48+925 | 48+950 | 25 | 61 |
| 324 | 48+950 | 48+975 | 25 | 63 |
| 325 | 48+975 | 49+025 | 50 | 64 |
| 326 | 49+025 | 49+100 | 75 | 63 |
| 327 | 49+100 | 49+125 | 25 | 64 |
| 328 | 49+125 | 49+150 | 25 | 66 |
| 329 | 49+150 | 49+175 | 25 | 65 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 330 | 49+175 | 49+200 | 25 | 63 |
| 331 | 49+200 | 49+325 | 125 | 62 |
| 332 | 49+325 | 49+400 | 75 | 61 |
| 333 | 49+400 | 49+425 | 25 | 67 |
| 334 | 49+425 | 49+450 | 25 | 68 |
| 335 | 49+450 | 49+475 | 25 | 80 |
| 336 | 49+475 | 49+500 | 25 | 101 |
| 337 | 49+500 | 49+525 | 25 | 100 |
| 338 | 49+525 | 49+550 | 25 | 79 |
| 339 | 49+550 | 49+575 | 25 | 69 |
| 340 | 49+575 | 49+600 | 25 | 66 |
| 341 | 49+600 | 49+625 | 25 | 64 |
| 342 | 49+625 | 49+650 | 25 | 61 |
| 343 | 49+650 | 49+675 | 25 | 60 |
| 344 | 49+675 | 49+700 | 25 | 66 |
| 345 | 49+700 | 49+725 | 25 | 60 |
| 346 | 49+725 | 49+825 | 100 | 56 |
| 347 | 49+825 | 49+850 | 25 | 53 |
| 348 | 49+850 | 50+550 | 700 | 52 |
| 349 | 50+550 | 50+675 | 125 | 51 |
| 350 | 50+675 | 50+700 | 25 | 52 |
| 351 | 50+700 | 50+750 | 50 | 54 |
| 352 | 50+750 | 50+800 | 50 | 55 |
| 353 | 50+800 | 50+850 | 50 | 56 |
| 354 | 50+850 | 50+900 | 50 | 57 |
| 355 | 50+900 | 50+925 | 25 | 58 |
| 356 | 50+925 | 50+975 | 50 | 59 |
| 357 | 50+975 | 51+000 | 25 | 60 |
| 358 | 51+000 | 51+050 | 50 | 61 |
| 359 | 51+050 | 51+125 | 75 | 54 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 360 | 51+125 | 51+175 | 50 | 53 |
| 361 | 51+175 | 51+200 | 25 | 54 |
| 362 | 51+200 | 51+225 | 25 | 55 |
| 363 | 51+225 | 51+250 | 25 | 54 |
| 364 | 51+250 | 51+275 | 25 | 51 |
| 365 | 51+275 | 51+300 | 25 | 53 |
| 366 | 51+300 | 51+375 | 75 | 56 |
| 367 | 51+375 | 51+500 | 125 | 50 |
| 368 | 51+500 | 51+525 | 25 | 53 |
| 369 | 51+525 | 52+000 | 475 | 56 |
| 370 | 52+000 | 52+050 | 50 | 57 |
| 371 | 52+050 | 52+075 | 25 | 57 |
| 372 | 52+075 | 52+100 | 25 | 55 |
| 373 | 52+100 | 52+125 | 25 | 57 |
| 374 | 52+125 | 52+150 | 25 | 59 |
| 375 | 52+150 | 52+175 | 25 | 66 |
| 376 | 52+175 | 52+200 | 25 | 76 |
| 377 | 52+200 | 52+225 | 25 | 83 |
| 378 | 52+225 | 52+300 | 75 | 107 |
| 379 | 52+300 | 52+325 | 25 | 86 |
| 380 | 52+325 | 52+350 | 25 | 81 |
| 381 | 52+350 | 52+375 | 25 | 101 |
| 382 | 52+375 | 52+400 | 25 | 106 |
| 383 | 52+400 | 52+425 | 25 | 104 |
| 384 | 52+425 | 52+450 | 25 | 80 |
| 385 | 52+450 | 52+475 | 25 | 70 |
| 386 | 52+475 | 52+500 | 25 | 60 |
| 387 | 52+500 | 52+525 | 25 | 64 |
| 388 | 52+525 | 52+550 | 25 | 66 |
| 389 | 52+550 | 52+650 | 100 | 67 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 390 | 52+650 | 52+700 | 50 | 70 |
| 391 | 52+700 | 52+725 | 25 | 71 |
| 392 | 52+725 | 52+750 | 25 | 72 |
| 393 | 52+750 | 52+775 | 25 | 73 |
| 394 | 52+775 | 52+850 | 75 | 74 |
| 395 | 52+850 | 52+875 | 25 | 80 |
| 396 | 52+875 | 52+900 | 25 | 85 |
| 397 | 52+900 | 52+925 | 25 | 92 |
| 398 | 52+925 | 52+950 | 25 | 115 |
| 399 | 52+950 | 52+975 | 25 | 118 |
| 400 | 52+975 | 53+000 | 25 | 94 |
| 401 | 53+000 | 53+075 | 75 | 100 |
| 402 | 53+075 | 53+100 | 25 | 70 |
| 403 | 53+100 | 53+125 | 25 | 60 |
| 404 | 53+125 | 53+150 | 25 | 63 |
| 405 | 53+150 | 53+175 | 25 | 63 |
| 406 | 53+175 | 53+225 | 50 | 65 |
| 407 | 53+225 | 53+250 | 25 | 63 |
| 408 | 53+250 | 53+875 | 625 | 62 |
| 409 | 53+875 | 53+900 | 25 | 64 |
| 410 | 53+900 | 53+925 | 25 | 66 |
| 411 | 53+925 | 53+950 | 25 | 72 |
| 412 | 53+950 | 53+975 | 25 | 77 |
| 413 | 53+975 | 54+000 | 25 | 96 |
| 414 | 54+000 | 54+025 | 25 | 140 |
| 415 | 54+025 | 54+050 | 25 | 130 |
| 416 | 54+050 | 54+075 | 25 | 110 |
| 417 | 54+075 | 54+100 | 25 | 88 |
| 418 | 54+100 | 54+125 | 25 | 80 |
| 419 | 54+125 | 54+150 | 25 | 65 |

| S.No | Chainage (km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | Start | End | | |
| 420 | 54+150 | 54+175 | 25 | 61 |
| 421 | 54+175 | 54+400 | 225 | 61 |

## Section 04 Neelmangla-Tumkur

| S. No. | Chainage (Km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | From | To | | |
| 1* | 29+500 | 29+900 | 400 | 60 |
| 2* | 29+900 | 30+100 | 200 | 60 |
| 3* | 30+100 | 30+590 | 490 | 60 |
| 4* | 30+590 | 30+610 | 20 | 80 |
| 5* | 30+610 | 30+730 | 120 | 60 |
| 6* | 30+730 | 31+550 | 820 | 52.5 |
| 7* | 30+730 | 31+550 | 820 | 46.5 |
| 8* | 31+550 | 32+092 | 542 | 60 |
| 9* | 32+092 | 32+109 | 17 | 100 |
| 10* | 32+110 | 32+600 | 490 | 60 |
| 11* | 32+600 | 32+850 | 250 | 60 |
| 12* | 32+850 | 33+750 | 900 | 60 |
| 13* | 33+750 | 34+050 | 300 | 60 |
| 14* | 34+050 | 34+237 | 187 | 60 |
| 15* | 34+237 | 34+249 | 12 | 100 |
| 16* | 34+249 | 34+450 | 201 | 60 |
| 17* | 34+450 | 34+700 | 250 | 60 |
| 18* | 34+700 | 39+500 | 4800 | 60 |
| 19* | 39+500 | 39+800 | 300 | 60 |
| 20* | 39+800 | 40+300 | 500 | 55 |
| 21* | 40+300 | 43+045 | 2745 | 60 |
| 22* | 43+045 | 43+065 | 20 | 100 |

| S. No. | Chainage (Km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | From | To | | |
| 23* | 43+065 | 43+650 | 585 | 52.5 |
| 24* | 43+065 | 43+100 | 35 | 52.5 |
| 25* | 43+100 | 43+450 | 350 | 46.5 |
| 26* | 43+450 | 43+650 | 200 | 52.5 |
| 27* | 43+650 | 43+800 | 150 | 60 |
| 28* | 43+800 | 43+850 | 50 | 60 |
| 29* | 43+850 | 43+900 | 50 | 60 |
| 30* | 43+900 | 44+312 | 412 | 60 |
| 31* | 44+312 | 44+324 | 12 | 100 |
| 32* | 44+324 | 44+800 | 476 | 60 |
| 33* | 44+800 | 45+000 | 200 | 60 |
| 34* | 45+000 | 45+200 | 200 | 52.5 |
| 35* | 45+000 | 45+200 | 200 | 46.5 |
| 36* | 45+200 | 45+450 | 250 | 60 |
| 37* | 45+450 | 46+200 | 750 | 60 |
| 38* | 46+200 | 46+250 | 50 | 60 |
| 39* | 46+250 | 46+550 | 300 | 60 |
| 40* | 46+550 | 46+800 | 250 | 60 |
| 41* | 46+800 | 46+900 | 100 | 60 |
| 42* | 46+900 | 46+980 | 80 | 60 |
| 43* | 46+980 | 47+020 | 40 | 100 |
| 44* | 47+020 | 47+050 | 30 | 60 |
| 45* | 47+050 | 48+150 | 1100 | 60 |
| 46* | 48+150 | 48+200 | 50 | 60 |
| 47* | 48+200 | 48+350 | 150 | 60 |
| 48* | 48+350 | 48+400 | 50 | 60 |
| 49* | 48+400 | 48+500 | 100 | 60 |
| 50* | 48+500 | 48+650 | 150 | 60 |
| 51* | 48+650 | 48+750 | 100 | 60 |
| 52* | 48+750 | 49+500 | 750 | 60 |

| S. No. | Chainage (Km) | | Length (m) | ROW (m) |
|---|---|---|---|---|
| | From | To | | |
| 53 | 49+500 | 49+750 | 250 | 60 |
| 54 | 49+750 | 49+900 | 150 | 60 |
| 55 | 49+900 | 51+300 | 1400 | 45 |
| 56 | 51+300 | 51+450 | 150 | 45 |
| 57 | 51+450 | 53+000 | 1550 | 45 |
| 58 | 53+000 | 53+200 | 200 | 45 |
| 59 | 53+200 | 53+950 | 750 | 45 |
| 60 | 53+950 | 54+150 | 200 | 45 |
| 61 | 54+150 | 54+600 | 450 | 45 |
| 62 | 54+600 | 54+800 | 200 | 45 |
| 63 | 54+800 | 56+600 | 1800 | 45 |
| 64 | 56+600 | 56+950 | 350 | 45 |
| 65 | 56+950 | 57+300 | 350 | 45 |
| 66 | 57+300 | 57+550 | 250 | 45 |
| 67 | 57+550 | 58+250 | 700 | 45 |
| 68 | 58+250 | 58+300 | 50 | 45 |
| 69 | 58+300 | 58+500 | 200 | 45 |
| 70 | 58+500 | 58+550 | 50 | 45 |
| 71 | 58+550 | 59+100 | 550 | 45 |
| 72 | 59+100 | 59+300 | 200 | 45 |
| 73 | 59+300 | 59+600 | 300 | 45 |
| 74 | 59+600 | 59+850 | 250 | 45 |
| 75 | 59+850 | 61+150 | 1300 | 45 |
| 76 | 61+150 | 61+800 | 650 | 84.2 |
| 77 | 61+800 | 62+040 | 240 | 48.3 |
| 78* | 62+040 | 62+150 | 110 | 60 |
| 79* | 62+150 | 62+400 | 250 | 60 |
| 80* | 62+400 | 62+950 | 550 | 60 |
| 81* | 62+950 | 63+050 | 100 | 60 |
| 82* | 63+050 | 74+168 | 11118 | 60 |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT/InvIT concessionaire after the completion of the DLP period.

### 6.4.3 Carriageway

Generally, the existing carriageway is of four lane divided standards. The carriageway width slightly varies at merging and diverging at junctions, median openings, at approaches to structures and on structures. It may be noted that, details of carriageway on structures shall be referred from Structures Inventory section of this chapter. The existing paved shoulder varies from 0 to 2.5 m along the project length on both side and 0.25-0.5 m wide shyness towards median. The earthen shoulder varies from 0-1.5 m on the project highway.

Details of carriageway along the Project Stretch are provided below:




**Figure 6-1 : Cross Sections along the Project Stretch**

## Table 6-5 : Details of Existing Carriageway

### Section 01 Vijayawada-Chilakaluripet

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 0+000 | 0+100 | 100 | 0.5 | 10.5 | 1.5 | | 4 | 0.5 | 10.5 | 1.5 | |
| 0+100 | 0+200 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+200 | 0+300 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+300 | 0+400 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+400 | 0+500 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+500 | 0+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+600 | 0+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+700 | 0+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+800 | 0+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 0+900 | 1+060 | 160 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 1+060 | 1+100 | 40 | 0.5 | 10.5 | 2-1.5 | 0 | 4 | 0.5 | 10.5 | 2-1.5 | 0 |
| 1+100 | 1+200 | 100 | 0.5 | 10.5 | 2-1.5 | 0 | 4 | 0.5 | 10.5 | 2-1.5 | 0-2 |
| 1+200 | 1+300 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+300 | 1+400 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+400 | 1+500 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+500 | 1+600 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+600 | 1+700 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+700 | 1+800 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+800 | 1+900 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 1+900 | 2+000 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 2+000 | 2+100 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 2+100 | 2+200 | 100 | 0.5 | 10.5 | 1.5 | 0 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 2+200 | 2+300 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 2+300 | 2+400 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 2+400 | 2+500 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 2+500 | 2+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 2+600 | 2+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 2+700 | 2+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 2+800 | 2+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 2+900 | 3+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+000 | 3+050 | 50 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+050 | 3+100 | 50 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+100 | 3+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+100 | 3+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+200 | 3+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+300 | 3+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+400 | 3+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+500 | 3+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+600 | 3+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+700 | 3+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+800 | 3+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 3+900 | 4+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 4+000 | 4+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 4+100 | 4+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 4+200 | 4+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 4+300 | 4+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 4+400 | 4+560 | 160 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 4+560 | 4+600 | 40 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 4+600 | 4+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 4+700 | 4+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 4+800 | 4+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 4+900 | 5+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 5+000 | 5+100 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 5+100 | 5+240 | 140 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 5+240 | 5+300 | 60 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+300 | 5+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+400 | 5+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+500 | 5+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+600 | 5+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+700 | 5+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+800 | 5+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 5+900 | 6+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+000 | 6+100 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+100 | 6+200 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+200 | 6+300 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+300 | 6+400 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+400 | 6+500 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+500 | 6+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+600 | 6+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+700 | 6+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+800 | 6+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 6+900 | 7+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+000 | 7+100 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+100 | 7+200 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+200 | 7+300 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+300 | 7+400 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 7+400 | 7+500 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+500 | 7+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+600 | 7+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+700 | 7+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+800 | 7+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 7+900 | 8+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 8+000 | 8+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+100 | 8+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+200 | 8+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+300 | 8+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+400 | 8+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+500 | 8+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+600 | 8+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+700 | 8+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+800 | 8+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 8+900 | 9+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 9+000 | 9+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 9+100 | 9+200 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 9+200 | 9+300 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 9+300 | 9+400 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 9+400 | 9+500 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 9+500 | 9+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 9+600 | 9+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 9+700 | 9+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 9+800 | 9+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 9+900 | 10+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 10+000 | 10+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+100 | 10+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+200 | 10+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+300 | 10+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+400 | 10+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+500 | 10+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+600 | 10+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+700 | 10+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+800 | 10+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 10+900 | 11+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+000 | 11+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+100 | 11+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+200 | 11+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+300 | 11+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+400 | 11+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+500 | 11+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+600 | 11+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+700 | 11+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+800 | 11+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 11+900 | 12+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 12+000 | 12+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 12+100 | 12+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 12+200 | 12+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 12+300 | 12+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 12+400 | 12+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 12+500 | 12+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 12+600 | 12+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 12+700 | 12+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 12+800 | 12+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 12+900 | 13+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 13+000 | 13+100 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 13+100 | 13+200 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 13+200 | 13+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+300 | 13+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+400 | 13+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+500 | 13+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+600 | 13+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+700 | 13+800 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+800 | 13+900 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 13+900 | 14+000 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+000 | 14+100 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+100 | 14+200 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+200 | 14+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+300 | 14+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+400 | 14+500 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+500 | 14+650 | 150 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 14+650 | 14+700 | 50 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 14+700 | 14+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 14+800 | 14+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 14+900 | 15+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+000 | 15+100 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+100 | 15+200 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 15+200 | 15+300 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+300 | 15+400 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+400 | 15+500 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+500 | 15+600 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+600 | 15+700 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+700 | 15+800 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+800 | 15+900 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 15+900 | 16+000 | 100 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 16+000 | 16+140 | 140 | 1 | 10.5 | 2 | | 4 | 1 | 10.5 | 2 | |
| 16+140 | 16+200 | 60 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 16+200 | 16+300 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 16+300 | 16+400 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 16+400 | 16+499 | 99 | 0.5 | 10.5 | 1.5 | 2 | 4 | 0.5 | 10.5 | 1.5 | 2 |
| 355+000 | 355+100 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 355+100 | 355+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 355+200 | 355+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 355+300 | 355+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 355+400 | 355+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 355+500 | 355+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 355+600 | 355+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 355+700 | 355+800 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 355+800 | 355+900 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 355+900 | 356+000 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 356+000 | 356+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 356+100 | 356+200 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 356+200 | 356+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 356+300 | 356+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 356+400 | 356+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 356+500 | 356+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 356+600 | 356+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 356+700 | 356+800 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 356+800 | 356+900 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 356+900 | 357+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 357+000 | 357+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 357+100 | 357+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 357+200 | 357+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 357+300 | 357+342 | 42 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+038 | 372+100 | 62 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+100 | 372+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+200 | 372+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+300 | 372+400 | 100 | 0.5 | 10.5 | - | - | 4.5-5.5 | 0.5 | 10.5 | - | - |
| 372+400 | 372+500 | 100 | 0.5 | 10.5 | - | - | 4.5-5.5 | 0.5 | 10.5 | - | - |
| 372+500 | 372+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+600 | 372+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+700 | 372+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+800 | 372+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 372+900 | 373+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 373+000 | 373+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 373+100 | 373+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 373+200 | 373+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 373+300 | 373+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 - 8.0 | 0.5 | 10.5 | 1.5 | - |
| 373+400 | 373+500 | 100 | 0.5 | 10.5 | 1.5 | - | 8 - 20.0 | 0.5 | 10.5 | 1.5 | - |
| 373+500 | 373+600 | 100 | 0.5 | 10.5 | 1.5 | - | 20 | 0.5 | 10.5 | 1.5 | - |
| 373+600 | 373+700 | 100 | 0.5 | 10.5 | 1.5 | - | 20 | 0.5 | 10.5 | 1.5 | - |
| 373+700 | 373+800 | 100 | 0.5 | 10.5 | 1.5 | - | 12.0-21.0 | 0.5 | 10.5 | 1.5 | - |
| 373+800 | 373+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 - 11.0 | 0.5 | 10.5 | 1.5 | - |
| 373+900 | 374+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5-1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+000 | 374+100 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+100 | 374+168 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+168 | 374+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+300 | 374+400 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+400 | 374+500 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+500 | 374+600 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+600 | 374+700 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+700 | 374+800 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+800 | 374+900 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 374+900 | 375+000 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 375+000 | 375+100 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 375+100 | 375+200 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 375+200 | 375+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 375+300 | 375+400 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 375+400 | 375+500 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 375+500 | 375+600 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2-4.5 | 0.5 | 10.5 | 1.5 | - |
| 375+600 | 375+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 375+700 | 375+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 375+800 | 375+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 375+900 | 376+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+000 | 376+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+100 | 376+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+200 | 376+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+300 | 376+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+400 | 376+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+500 | 376+600 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 376+600 | 376+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+700 | 376+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+800 | 376+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 376+900 | 377+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+000 | 377+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+100 | 377+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+200 | 377+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+300 | 377+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+400 | 377+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+500 | 377+600 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4.5 | 0.5 | 10.5 | 1.5 | 2 |
| 377+600 | 377+700 | 100 | 0.5 | 10.5 | 1.5 | 2 | 4.5 | 0.5 | 10.5 | 1.5 | 2 |
| 377+700 | 377+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 377+800 | 377+900 | 100 | 0.5 | 10.5 | - | - | 4.5 | 0.5 | 10.5 | - | - |
| 377+900 | 378+000 | 100 | 0.5 | 10.5 | - | - | 4.5 | 0.5 | 10.5 | - | - |
| 378+000 | 378+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 378+100 | 378+200 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2-4.5 | 0.5 | 10.5 | 1.5 | - |
| 378+200 | 378+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+300 | 378+400 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+400 | 378+500 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+500 | 378+600 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+600 | 378+700 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+700 | 378+800 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+800 | 378+900 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 378+900 | 379+000 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2-4.5 | 0.5 | 10.5 | 1.5 | - |
| 379+000 | 379+100 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 379+100 | 379+200 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 379+200 | 379+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 379+300 | 379+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 379+400 | 379+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 379+500 | 379+600 | 100 | 0.5 | 10.5 | - | - | 4.5 | 0.5 | 10.5 | - | - |
| 379+600 | 379+700 | 100 | 0.5 | 10.5 | - | - | 4.5 | 0.5 | 10.5 | - | - |
| 379+700 | 379+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 379+800 | 379+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 379+900 | 380+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+000 | 380+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+100 | 380+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+200 | 380+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+300 | 380+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+400 | 380+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+500 | 380+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 380+600 | 380+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+700 | 380+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+800 | 380+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 380+900 | 381+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+000 | 381+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+100 | 381+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+200 | 381+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+300 | 381+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+400 | 381+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+500 | 381+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+600 | 381+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+700 | 381+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+800 | 381+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 381+900 | 382+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+000 | 382+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+100 | 382+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+200 | 382+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+300 | 382+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+400 | 382+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+500 | 382+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+600 | 382+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+700 | 382+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+800 | 382+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 382+900 | 383+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+000 | 383+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+100 | 383+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 383+200 | 383+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+300 | 383+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+400 | 383+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+500 | 383+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+600 | 383+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+700 | 383+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+800 | 383+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 383+900 | 384+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+000 | 384+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+100 | 384+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+200 | 384+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+300 | 384+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+400 | 384+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+500 | 384+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+600 | 384+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+700 | 384+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+800 | 384+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 384+900 | 385+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+000 | 385+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+100 | 385+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+200 | 385+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+300 | 385+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+400 | 385+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+500 | 385+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+600 | 385+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+700 | 385+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 385+800 | 385+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 385+900 | 386+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+000 | 386+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+100 | 386+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+200 | 386+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+300 | 386+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+400 | 386+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+500 | 386+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+600 | 386+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+700 | 386+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+800 | 386+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 386+900 | 387+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+000 | 387+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+100 | 387+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+200 | 387+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+300 | 387+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+400 | 387+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+500 | 387+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+600 | 387+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+700 | 387+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+800 | 387+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 387+900 | 388+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+000 | 388+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+100 | 388+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+200 | 388+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+300 | 388+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 388+400 | 388+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+500 | 388+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+600 | 388+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+700 | 388+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+800 | 388+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 388+900 | 389+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+000 | 389+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+100 | 389+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+200 | 389+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+300 | 389+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+400 | 389+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+500 | 389+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+600 | 389+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+700 | 389+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+800 | 389+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 389+900 | 390+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+000 | 390+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+100 | 390+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+200 | 390+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+300 | 390+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+400 | 390+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+500 | 390+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+600 | 390+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+700 | 390+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+800 | 390+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 390+900 | 391+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 391+000 | 391+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+100 | 391+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+200 | 391+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+300 | 391+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+400 | 391+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+500 | 391+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+600 | 391+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+700 | 391+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+800 | 391+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 391+900 | 392+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+000 | 392+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+100 | 392+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+200 | 392+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+300 | 392+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+400 | 392+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+500 | 392+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+600 | 392+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+700 | 392+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 392+800 | 392+900 | 100 | 0.5 | 10.5 | 1.5 | 0-2 | 4.5 | 0.5 | 10.5 | 1.5 | 0-2 |
| 392+900 | 393+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+000 | 393+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+100 | 393+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+200 | 393+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+300 | 393+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+400 | 393+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+500 | 393+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 393+600 | 393+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+700 | 393+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+800 | 393+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 393+900 | 394+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+000 | 394+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+100 | 394+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+200 | 394+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+300 | 394+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+400 | 394+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+500 | 394+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+600 | 394+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+700 | 394+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+800 | 394+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 394+900 | 395+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+000 | 395+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+100 | 395+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+200 | 395+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+300 | 395+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+400 | 395+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+500 | 395+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+600 | 395+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+700 | 395+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+800 | 395+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 395+900 | 396+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+000 | 396+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+100 | 396+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 396+200 | 396+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+300 | 396+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+400 | 396+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+500 | 396+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+600 | 396+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 396+700 | 396+800 | 100 | 0.5 | 10.5 | - | - | 1.5-4.5 | 0.25 | 10.5 | - | - |
| 396+800 | 396+900 | 100 | 0.5 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 396+900 | 397+000 | 100 | 0.5 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 397+000 | 397+100 | 100 | 0.5 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 397+100 | 397+200 | 100 | 0.5 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 397+200 | 397+300 | 100 | 0.5 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 397+300 | 397+400 | 100 | 0.5 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 397+400 | 397+500 | 100 | 0.5 | 10.5 | - | - | 1.5-4.5 | 0.25 | 10.5 | - | - |
| 397+500 | 397+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 397+600 | 397+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 397+700 | 397+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 397+800 | 397+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 397+900 | 398+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+000 | 398+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+100 | 398+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+200 | 398+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+300 | 398+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+400 | 398+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+500 | 398+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+600 | 398+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 398+700 | 398+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+800 | 398+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 398+900 | 399+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+000 | 399+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+100 | 399+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+200 | 399+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+300 | 399+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+400 | 399+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+500 | 399+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+600 | 399+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+700 | 399+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+800 | 399+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 399+900 | 400+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 400+000 | 400+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 400+100 | 400+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 400+200 | 400+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.5-4.5 | 0.25 | 11-10.5 | - | - |
| 400+300 | 400+400 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 400+400 | 400+500 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 400+500 | 400+600 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 400+600 | 400+700 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 400+700 | 400+800 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 400+800 | 400+900 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 400+900 | 401+000 | 100 | 0.25 | 10.5 | 0 | - | 1.5 | 0.25 | 10.5 | - | - |
| 401+000 | 401+100 | 100 | 0.25 | 11-10.5 | 0 | - | 1.5 | 0.25 | 11-10.5 | - | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 401+100 | 401+200 | 100 | 0.5 | 10.5 | 1.5 | - | 1.5-4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+200 | 401+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+300 | 401+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+400 | 401+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+500 | 401+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+600 | 401+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+700 | 401+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+800 | 401+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 401+900 | 402+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+000 | 402+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+100 | 402+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+200 | 402+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+300 | 402+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+400 | 402+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+500 | 402+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+600 | 402+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+700 | 402+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+800 | 402+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 402+900 | 403+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+000 | 403+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+100 | 403+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+200 | 403+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+300 | 403+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+400 | 403+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+500 | 403+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+600 | 403+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 403+700 | 403+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+800 | 403+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 403+900 | 404+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 404+000 | 404+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 404+100 | 404+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 404+200 | 404+300 | 100 | 0.25 | 11-10.5 | - | - | 1.5-4.5 | 0.5 | 10.5 | 1.5 | - |
| 404+300 | 404+400 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 11-10.5 | - | - |
| 404+400 | 404+500 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 404+500 | 404+600 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 404+600 | 404+700 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 404+700 | 404+800 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 404+800 | 404+900 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 404+900 | 405+000 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 405+000 | 405+100 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 405+100 | 405+200 | 100 | 0.25 | 11-10.5 | - | - | 1.5-4.5 | 0.25 | 11-10.5 | - | - |
| 405+200 | 405+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+300 | 405+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+400 | 405+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+500 | 405+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+600 | 405+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+700 | 405+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+800 | 405+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 405+900 | 406+000 | 100 | 0.25 | 7 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 406+000 | 406+100 | 100 | 0.25 | 7 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 406+100 | 406+200 | 100 | 0.25 | 7 | 1.5 | - | 4.5-5 | 0.5 | 10.5 | 1.5 | - |
| 406+200 | 406+300 | 100 | 0.25 | 7 | 1.5 | - | 5.0 - 6.0 | 0.5 | 10.5 | 1.5 | - |
| 406+300 | 406+400 | 100 | 0.25 | 7 | 1.5 | - | 6 | 0.5 | 10.5 | 1.5 | - |
| 406+400 | 406+500 | 100 | 0.25 | 7 | 1.5 | - | 6 | 0.5 | 10.5 | 1.5 | - |
| 406+500 | 406+600 | 100 | 0.25 | 7 | 1.5 | - | 6 | 0.5 | 10.5 | 1.5 | - |
| 406+600 | 406+700 | 100 | 0.25 | 7 | 1.5 | - | 5.0 - 6.0 | 0.5 | 10.5 | 1.5 | - |
| 406+700 | 406+800 | 100 | 0.5 | 10.5 | 1.5 | - | 5-4.5 | 0.5 | 10.5 | 1.5 | - |
| 406+800 | 406+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 406+900 | 407+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+000 | 407+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+100 | 407+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+200 | 407+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+300 | 407+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+400 | 407+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+500 | 407+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+600 | 407+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+700 | 407+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+800 | 407+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 407+900 | 408+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+000 | 408+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+100 | 408+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+200 | 408+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+300 | 408+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+400 | 408+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+500 | 408+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 408+600 | 408+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+700 | 408+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+800 | 408+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 408+900 | 409+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+000 | 409+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+100 | 409+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+200 | 409+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+300 | 409+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+400 | 409+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+500 | 409+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+600 | 409+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+700 | 409+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+800 | 409+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 409+900 | 410+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+000 | 410+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+100 | 410+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+200 | 410+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+300 | 410+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+400 | 410+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+500 | 410+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+600 | 410+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+700 | 410+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+800 | 410+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 410+900 | 411+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 411+000 | 411+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 411+100 | 411+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 411+200 | 411+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 411+300 | 411+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 411+400 | 411+500 | 100 | 0.25 | 11-10.5 | - | - | 1.5-4.5 | 0.25 | 11-10.5 | - | - |
| 411+500 | 411+600 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 411+600 | 411+700 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 411+700 | 411+800 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 411+800 | 411+900 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 411+900 | 412+000 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 412+000 | 412+100 | 100 | 0.25 | 10.5 | - | - | 1.5 | 0.25 | 10.5 | - | - |
| 412+100 | 412+200 | 100 | 0.25 | 11-10.5 | - | - | 1.5 | 0.25 | 11-10.5 | - | - |
| 412+200 | 412+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+300 | 412+400 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+400 | 412+500 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+500 | 412+600 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+600 | 412+700 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+700 | 412+800 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+800 | 412+900 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 412+900 | 413+000 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+000 | 413+100 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+100 | 413+200 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+200 | 413+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+300 | 413+400 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+400 | 413+500 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+500 | 413+600 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+600 | 413+700 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 413+700 | 413+800 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+800 | 413+900 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 413+900 | 414+000 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+000 | 414+100 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+100 | 414+200 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+200 | 414+300 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+300 | 414+400 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+400 | 414+500 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+500 | 414+600 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+600 | 414+700 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+700 | 414+800 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+800 | 414+900 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 414+900 | 415+000 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 415+000 | 415+100 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2 | 0.5 | 10.5 | 1.5 | - |
| 415+100 | 415+200 | 100 | 0.5 | 10.5 | 1.5 | - | 1.2-4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+200 | 415+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+300 | 415+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+400 | 415+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+500 | 415+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+600 | 415+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+700 | 415+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+800 | 415+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 415+900 | 416+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+000 | 416+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+100 | 416+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+200 | 416+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 416+300 | 416+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+400 | 416+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+500 | 416+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+600 | 416+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+700 | 416+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+800 | 416+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 416+900 | 417+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 417+000 | 417+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 417+100 | 417+200 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+200 | 417+300 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+300 | 417+400 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+400 | 417+500 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+500 | 417+600 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+600 | 417+700 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+700 | 417+800 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 417+800 | 417+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 417+900 | 418+000 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+000 | 418+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+100 | 418+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+200 | 418+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+300 | 418+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+400 | 418+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+500 | 418+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+600 | 418+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 418+700 | 418+800 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 418+800 | 418+900 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 418+900 | 419+000 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 419+000 | 419+100 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 419+100 | 419+200 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 419+200 | 419+300 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 419+300 | 419+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 419+400 | 419+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 419+500 | 419+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 419+600 | 419+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 419+700 | 419+800 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 419+800 | 419+900 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 419+900 | 420+000 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 420+000 | 420+100 | 100 | - | 15.8 | - | - | 5 | - | 16.5 | - | - |
| 420+100 | 420+200 | 100 | - | 15.8 | - | - | 5 | - | 16.5 | - | - |
| 420+200 | 420+800 | 100 | - | 20-52 | - | - | - | - | 20-52 | - | - |
| 420+800 | 420+900 | 100 | - | 18 | - | - | 4.5 | - | 18 | - | - |
| 420+900 | 421+000 | 100 | - | 18 | - | - | 4.5 | - | 18 | - | - |
| 421+000 | 421+100 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+100 | 421+200 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+200 | 421+300 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+300 | 421+400 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+400 | 421+500 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+500 | 421+600 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+600 | 421+700 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+700 | 421+800 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+800 | 421+900 | 100 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |
| 421+900 | 422+000 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |

| Chainage | | Length (m) | LHS | | | | Median Width (m) | RHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | Earthen Shoulder (m) |
| 422+000 | 422+100 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 422+100 | 422+200 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 422+200 | 422+300 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 422+300 | 422+400 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 422+400 | 422+500 | 100 | 0.5 | 10.5 | 1.5 | - | 5 | 0.5 | 10.5 | 1.5 | - |
| 422+500 | 422+605 | 105 | 0.5 | 10.5 | 1.5 | - | 4.5 | 0.5 | 10.5 | 1.5 | - |

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| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 0+000 | 0+100 | 100 | 0.5 | 7.5 | 5 | 0.5 | 7.5 |
| 0+100 | 0+200 | 100 | 0.5 | 7.5 | 5 | 0.5 | 7.5 |
| 0+200 | 0+300 | 100 | 0.5 | 7.5-11.5 | 5 | 0.5 | 7.5-11.5 |
| 0+300 | 0+400 | 100 | 0.5 | 11.5-10.5 | 5 | 0.5 | 11.5-10.5 |
| 0+400 | 0+500 | 100 | 0.5 | 10.5 | 5-10 | 0.5 | 11-17 |
| 0+500 | 0+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5-13.5 |
| 0+600 | 0+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 0+700 | 0+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 0+800 | 0+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 0+900 | 1+000 | 100 | 0.5 | 10.5 | 1-5 | 0.5 | 10.5 |
| 1+000 | 1+100 | 100 | 0.5 | 10.5 | 0-5 | 0.5 | 10.5 |
| 1+100 | 1+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+200 | 1+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+300 | 1+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 1+400 | 1+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+500 | 1+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+600 | 1+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+700 | 1+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+800 | 1+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 1+900 | 2+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+000 | 2+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+100 | 2+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+200 | 2+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+300 | 2+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+400 | 2+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+500 | 2+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+600 | 2+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+700 | 2+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+800 | 2+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 2+900 | 3+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+000 | 3+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+100 | 3+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+200 | 3+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+300 | 3+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+400 | 3+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+500 | 3+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+600 | 3+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+700 | 3+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+800 | 3+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 3+900 | 4+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+000 | 4+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+100 | 4+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+200 | 4+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 4+300 | 4+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+400 | 4+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+500 | 4+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+600 | 4+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+700 | 4+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+800 | 4+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 4+900 | 5+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+000 | 5+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+100 | 5+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+200 | 5+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+300 | 5+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+400 | 5+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+500 | 5+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+600 | 5+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+700 | 5+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+800 | 5+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 5+900 | 6+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+000 | 6+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+100 | 6+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+200 | 6+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+300 | 6+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+400 | 6+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+500 | 6+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+600 | 6+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+700 | 6+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+800 | 6+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 6+900 | 7+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+000 | 7+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+100 | 7+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 7+200 | 7+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+300 | 7+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+400 | 7+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+500 | 7+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+600 | 7+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+700 | 7+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+800 | 7+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 7+900 | 8+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+000 | 8+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+100 | 8+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+200 | 8+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+300 | 8+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+400 | 8+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+500 | 8+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+600 | 8+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+700 | 8+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+800 | 8+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 8+900 | 9+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+000 | 9+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+100 | 9+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+200 | 9+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+300 | 9+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+400 | 9+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+500 | 9+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+600 | 9+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+700 | 9+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+800 | 9+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 9+900 | 10+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+000 | 10+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 10+100 | 10+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+200 | 10+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+300 | 10+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+400 | 10+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+500 | 10+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+600 | 10+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+700 | 10+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+800 | 10+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 10+900 | 11+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+000 | 11+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+100 | 11+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+200 | 11+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+300 | 11+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+400 | 11+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+500 | 11+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+600 | 11+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+700 | 11+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+800 | 11+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 11+900 | 12+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+000 | 12+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+100 | 12+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+200 | 12+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+300 | 12+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+400 | 12+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+500 | 12+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+600 | 12+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+700 | 12+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+800 | 12+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 12+900 | 13+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 13+000 | 13+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+100 | 13+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+200 | 13+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+300 | 13+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+400 | 13+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+500 | 13+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+600 | 13+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+700 | 13+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+800 | 13+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 13+900 | 14+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+000 | 14+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+100 | 14+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+200 | 14+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+300 | 14+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+400 | 14+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+500 | 14+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+600 | 14+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+700 | 14+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+800 | 14+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 14+900 | 15+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+000 | 15+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+100 | 15+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+200 | 15+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+300 | 15+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+400 | 15+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+500 | 15+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+600 | 15+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+700 | 15+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 15+800 | 15+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 15+900 | 16+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 16+000 | 16+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 16+100 | 16+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 16+200 | 16+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 16+300 | 16+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 16+400 | 16+500 | 100 | 0.5 | 10.5-14.5 | 3-5 | 0.5 | 10.5-14.5 |
| 16+500 | 16+600 | 100 | 0.5 | 14.5-24.5 | - | 0.5 | 14.5 |
| 16+600 | 16+700 | 100 | 0.5 | 24.5 | - | 0.5 | 14.5-24.5 |
| 16+700 | 16+800 | 100 | 0.5 | 14.5-24.5 | - | 0.5 | 14.5-24.5 |
| 16+800 | 16+900 | 100 | 0.5 | 10.5-14.5 | 0-5 | 0.5 | 13.7-14.5 |
| 16+900 | 17+000 | 100 | 0.5 | 10.5 | 0-5 | 0.5 | 10.5 |
| 17+000 | 17+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+100 | 17+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+200 | 17+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+300 | 17+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+400 | 17+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+500 | 17+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+600 | 17+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+700 | 17+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+800 | 17+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 17+900 | 18+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+000 | 18+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+100 | 18+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+200 | 18+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+300 | 18+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+400 | 18+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+500 | 18+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+600 | 18+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+700 | 18+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 18+800 | 18+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 18+900 | 19+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+000 | 19+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+100 | 19+200 | 100 | 0.5 | 10.5-14 | 5 | 0.5 | 10.5-14 |
| 19+200 | 19+300 | 100 | 0.5 | 14 | 5 | 0.5 | 14 |
| 19+300 | 19+400 | 100 | 0.5 | 14-10.5 | 5 | 0.5 | 14-10.5 |
| 19+400 | 19+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+500 | 19+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+600 | 19+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+700 | 19+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+800 | 19+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 19+900 | 20+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+000 | 20+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+100 | 20+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+200 | 20+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+300 | 20+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+400 | 20+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+500 | 20+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+600 | 20+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+700 | 20+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+800 | 20+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 20+900 | 21+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+000 | 21+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+100 | 21+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+200 | 21+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+300 | 21+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+400 | 21+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+500 | 21+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+600 | 21+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 21+700 | 21+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+800 | 21+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 21+900 | 22+000 | 100 | 0.5 | 10.5 | 5-8 | 0.5 | 10.5 |
| 22+000 | 22+100 | 100 | 0.5 | 10.5 | 8-13 | 0.5 | 10.5 |
| 22+100 | 22+200 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+200 | 22+300 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+300 | 22+400 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+400 | 22+500 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+500 | 22+600 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+600 | 22+700 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+700 | 22+800 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+800 | 22+900 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 22+900 | 23+000 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+000 | 23+100 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+100 | 23+200 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+200 | 23+300 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+300 | 23+400 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+400 | 23+500 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+500 | 23+600 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+600 | 23+700 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+700 | 23+800 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+800 | 23+900 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 23+900 | 24+000 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+000 | 24+100 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+100 | 24+200 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+200 | 24+300 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+300 | 24+400 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+400 | 24+500 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+500 | 24+600 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 24+600 | 24+700 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+700 | 24+800 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+800 | 24+900 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 24+900 | 25+000 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 25+000 | 25+100 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 25+100 | 25+200 | 100 | 0.5 | 10.5 | - | 0.5 | 10.5 |
| 25+200 | 25+300 | 100 | 0.5 | 10.5 | - | 0.5 | 16.5 |
| 25+300 | 25+400 | 100 | 0.5 | 14-16 | 1-5 | 0.5 | 14-16 |
| 25+400 | 25+500 | 100 | 0.5 | 11-14 | 5 | 0.5 | 11-14 |
| 25+500 | 25+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 25+600 | 25+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 25+700 | 25+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 25+800 | 25+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 25+900 | 26+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+000 | 26+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+100 | 26+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+200 | 26+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+300 | 26+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+400 | 26+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+500 | 26+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+600 | 26+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+700 | 26+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+800 | 26+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 26+900 | 27+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+000 | 27+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+100 | 27+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+200 | 27+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+300 | 27+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+400 | 27+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 27+500 | 27+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+600 | 27+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+700 | 27+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+800 | 27+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 27+900 | 28+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 28+000 | 28+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 28+100 | 28+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 28+200 | 28+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 28+300 | 28+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 28+400 | 28+500 | 100 | 0.5 | 10.5-18.5 | 5 | 0.5 | 10.5-18.5 |
| 28+500 | 28+600 | 100 | 0.5 | 18.5-30 | - | 0.5 | 18.5-30 |
| 28+600 | 28+700 | 100 | 0.5 | 25-32 | - | 0.5 | 30-35 |
| 28+700 | 28+800 | 100 | 0.5 | 20-25 | - | 0.5 | 16.5-30 |
| 28+800 | 28+900 | 100 | 0.5 | 10.5-16.5 | 5 | 0.5 | 10.5-16.5 |
| 28+900 | 29+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+000 | 29+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+100 | 29+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+200 | 29+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+300 | 29+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+400 | 29+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+500 | 29+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+600 | 29+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+700 | 29+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+800 | 29+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 29+900 | 30+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+000 | 30+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+100 | 30+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+200 | 30+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+300 | 30+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

| Chainage | | Length (m) | LHS | | Median Width (m) | RHS | |
|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | | Shyness each side (m) | MCW Width (m) |
| 30+400 | 30+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+500 | 30+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+600 | 30+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+700 | 30+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+800 | 30+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 30+900 | 31+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+000 | 31+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+100 | 31+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+200 | 31+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+300 | 31+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+400 | 31+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+500 | 31+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+600 | 31+700 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+700 | 31+800 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+800 | 31+900 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 31+900 | 32+000 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 32+000 | 32+100 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 32+100 | 32+200 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 32+200 | 32+300 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 32+300 | 32+400 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 32+400 | 32+500 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |
| 32+500 | 32+600 | 100 | 0.5 | 10.5 | 5 | 0.5 | 10.5 |

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| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 21+400 | 21+850 | 450 | - | 30-50 | - | 1.5-4.5 | - | 30-50 | - |
| 21+850 | 21+900 | 50 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 21+900 | 22+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+000 | 22+100 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+100 | 22+200 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+200 | 22+300 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+300 | 22+400 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+400 | 22+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+500 | 22+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+600 | 22+700 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+700 | 22+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+800 | 22+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 22+900 | 23+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+000 | 23+100 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+100 | 23+200 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+200 | 23+300 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+300 | 23+400 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+400 | 23+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+500 | 23+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+600 | 23+700 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+700 | 23+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+800 | 23+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 23+900 | 24+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+000 | 24+100 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+100 | 24+200 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+200 | 24+300 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+300 | 24+400 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 24+400 | 24+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+500 | 24+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+600 | 24+700 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+700 | 24+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+800 | 24+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 24+900 | 25+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+000 | 25+100 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+100 | 25+200 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+200 | 25+300 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+300 | 25+400 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+400 | 25+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+500 | 25+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 25+600 | 25+700 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 25+700 | 25+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 25+800 | 25+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 25+900 | 26+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 26+000 | 26+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 26+100 | 26+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 26+200 | 26+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 26+300 | 26+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 26+400 | 26+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 26+500 | 26+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 26+600 | 26+700 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 26+700 | 26+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 26+800 | 26+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 26+900 | 27+000 | 100 | 0.5 | 10.5 | 1.2 | 1.5-2 | 0.5 | 10.5 | 1 |
| 27+000 | 27+100 | 100 | 0.5 | 10.5 | 1.2 | 1.5 | 0.5 | 10.5 | 1 |
| 27+100 | 27+200 | 100 | 0.5 | 10.5 | 1.2 | 1.5 | 0.5 | 10.5 | 1 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 27+200 | 27+300 | 100 | 0.5 | 10.5 | 1.2 | 1.5 | 0.5 | 10.5 | 1 |
| 27+300 | 27+400 | 100 | 0.5 | 10.5 | 1.2 | 1.5 | 0.5 | 10.5 | 1 |
| 27+400 | 27+500 | 100 | 0.5 | 10.5 | 1.2 | 1.5 | 0.5 | 10.5 | 1 |
| 27+500 | 27+600 | 100 | 0.5 | 10.5 | 1.2 | 1.5 | 0.5 | 10.5 | 1 |
| 27+600 | 27+700 | 100 | 0.5 | 10.5 | 1 | 2-4.5 | 0.5 | 10.5 | 1 |
| 27+700 | 27+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 27+800 | 27+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 27+900 | 28+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 28+000 | 28+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5-4.5 | 0.5 | 10.5 | 1.5 |
| 28+100 | 28+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 2 |
| 28+200 | 28+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+300 | 28+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+400 | 28+500 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+500 | 28+600 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+600 | 28+700 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+700 | 28+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+800 | 28+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 28+900 | 29+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+000 | 29+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+100 | 29+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+200 | 29+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+300 | 29+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+400 | 29+500 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+500 | 29+600 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+600 | 29+700 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+700 | 29+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+800 | 29+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 29+900 | 30+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 30+000 | 30+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+100 | 30+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+200 | 30+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+300 | 30+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+400 | 30+500 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+500 | 30+600 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+600 | 30+700 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+700 | 30+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+800 | 30+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 30+900 | 31+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 31+000 | 31+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 31+100 | 31+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 31+200 | 31+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 31+300 | 31+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 31+400 | 31+500 | 100 | 0.5 | 10.5 | 1.5 | 2-4.5 | 0.5 | 10.5 | 1.5 |
| 31+500 | 31+600 | 100 | 0.5 | 10.5 | 1.5 | 4.5 | 0.5 | 10.5 | 1.5 |
| 31+600 | 31+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 31+700 | 31+800 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 31+800 | 31+900 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 31+900 | 32+000 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+000 | 32+100 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+100 | 32+200 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+200 | 32+300 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+300 | 32+400 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+400 | 32+500 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+500 | 32+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+600 | 32+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+700 | 32+800 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 32+800 | 32+900 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 32+900 | 33+000 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 33+000 | 33+100 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 33+100 | 33+200 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 33+200 | 33+300 | 100 | 0.5 | 10.5 | - | 2-4.5 | 0.5 | 10.5 | - |
| 33+300 | 33+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 33+400 | 33+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 33+500 | 33+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 33+600 | 33+700 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 33+700 | 33+800 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 33+800 | 33+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 33+900 | 34+000 | 100 | 0.5 | 10.5 | - | 2-4.5 | 0.5 | 10.5 | - |
| 34+000 | 34+100 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+100 | 34+200 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+200 | 34+300 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+300 | 34+400 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+400 | 34+500 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+500 | 34+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+600 | 34+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 34+700 | 34+800 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 34+800 | 34+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 34+900 | 35+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 35+000 | 35+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 35+100 | 35+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 35+200 | 35+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 35+300 | 35+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 35+400 | 35+500 | 100 | 0.5 | 10.5 | - | 1.5-4.5 | 0.5 | 10.5 | - |
| 35+500 | 35+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 35+600 | 35+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 35+700 | 35+800 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 35+800 | 35+900 | 100 | 0.5 | 10.5 | - | 4.2 | 0.5 | 10.5 | - |
| 35+900 | 36+000 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+000 | 36+100 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+100 | 36+200 | 100 | 0.5 | 10.5 | - | 4 | 0.5 | 10.5 | - |
| 36+200 | 36+300 | 100 | 0.5 | 10.5 | - | 4 | 0.5 | 10.5 | - |
| 36+300 | 36+400 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+400 | 36+500 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+500 | 36+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+600 | 36+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+700 | 36+800 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+800 | 36+900 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 36+900 | 37+000 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 37+000 | 37+100 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 37+100 | 37+200 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 37+200 | 37+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+300 | 37+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+400 | 37+500 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+500 | 37+600 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+600 | 37+700 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+700 | 37+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+800 | 37+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 37+900 | 38+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+000 | 38+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+100 | 38+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+200 | 38+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+300 | 38+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 38+400 | 38+500 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+500 | 38+600 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+600 | 38+700 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+700 | 38+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+800 | 38+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 38+900 | 39+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 39+000 | 39+100 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 39+100 | 39+200 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 39+200 | 39+300 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 39+300 | 39+400 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 39+400 | 39+500 | 100 | 0.5 | 10.5 | 1.5 | 1.5-4.5 | 0.5 | 10.5 | 1.5 |
| 39+500 | 39+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 39+600 | 39+700 | 100 | 0.5 | 10.5 | - | 1.5-4.5 | 0.5 | 10.5 | - |
| 39+700 | 39+800 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 39+800 | 39+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 39+900 | 40+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 40+000 | 40+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 40+100 | 40+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 40+200 | 40+300 | 100 | 0.5 | 10.5 | - | 1.5-3 | 0.5 | 10.5 | - |
| 40+300 | 40+400 | 100 | 0.5 | 10.5 | - | 1.5-4.5 | 0.5 | 10.5 | - |
| 40+400 | 40+500 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 40+500 | 40+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 40+600 | 40+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 40+700 | 40+800 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 40+800 | 40+900 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 40+900 | 41+000 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 41+000 | 41+100 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 41+100 | 41+200 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 41+200 | 41+300 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 41+300 | 41+400 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 41+400 | 41+500 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 41+500 | 41+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 41+600 | 41+700 | 100 | 0.5 | 10.5 | 1 | 3-4.5 | 0.5 | 10.5 | - |
| 41+700 | 41+800 | 100 | 0.5 | 10.5 | - | 1.5-3 | 0.5 | 10.5 | - |
| 41+800 | 41+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 41+900 | 42+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+000 | 42+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+100 | 42+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+200 | 42+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+300 | 42+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+400 | 42+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+500 | 42+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+600 | 42+700 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 42+700 | 42+800 | 100 | 0.5 | 10.5 | - | 1.5-3 | 0.5 | 10.5 | - |
| 42+800 | 42+900 | 100 | 0.5 | 10.5 | - | 3 | 0.5 | 10.5 | - |
| 42+900 | 43+000 | 100 | 0.5 | 10.5 | - | 3 | 0.5 | 10.5 | - |
| 43+000 | 43+100 | 100 | 0.5 | 10.5 | - | 3 | 0.5 | 10.5 | - |
| 43+100 | 43+200 | 100 | 0.5 | 10.5 | - | 3 | 0.5 | 10.5 | - |
| 43+200 | 43+300 | 100 | 0.5 | 10.5 | - | 3 | 0.5 | 10.5 | - |
| 43+300 | 43+400 | 100 | 0.5 | 10.5 | - | 3-4.5 | 0.5 | 10.5 | - |
| 43+400 | 43+500 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 43+500 | 43+600 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 43+600 | 43+700 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 43+700 | 43+800 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 43+800 | 43+900 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |
| 43+900 | 44+000 | 100 | 0.5 | 10.5 | 1.5 | 1.5 | 0.5 | 10.5 | 1.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 44+000 | 44+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+100 | 44+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+200 | 44+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+300 | 44+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+400 | 44+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+500 | 44+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+600 | 44+700 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+700 | 44+800 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+800 | 44+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 44+900 | 45+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+000 | 45+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+100 | 45+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+200 | 45+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+300 | 45+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+400 | 45+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+500 | 45+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+600 | 45+700 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+700 | 45+800 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+800 | 45+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 45+900 | 46+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+000 | 46+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+100 | 46+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+200 | 46+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+300 | 46+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+400 | 46+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+500 | 46+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 46+600 | 46+700 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 46+700 | 46+800 | 100 | 0.5 | 10.5 | - | 1.5-4 | 0.5 | 10.5 | - |
| 46+800 | 46+900 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 46+900 | 47+000 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 47+000 | 47+100 | 100 | 0.5 | 10.5 | - | 2-4.5 | 0.5 | 10.5 | - |
| 47+100 | 47+200 | 100 | 0.5 | 10.5 | - | 1.5-2 | 0.5 | 10.5 | - |
| 47+200 | 47+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+300 | 47+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+400 | 47+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+500 | 47+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+600 | 47+700 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+700 | 47+800 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+800 | 47+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 47+900 | 48+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 48+000 | 48+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 48+100 | 48+200 | 100 | 0.5 | 10.5 | - | 1.5-3 | 0.5 | 10.5 | - |
| 48+200 | 48+300 | 100 | 0.5 | 10.5 | - | 3-4.5 | 0.5 | 10.5 | - |
| 48+300 | 48+400 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 48+400 | 48+500 | 100 | 0.5 | 10.5 | - | 3.5-4 | 0.5 | 10.5 | - |
| 48+500 | 48+600 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 48+600 | 48+700 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 48+700 | 48+800 | 100 | 0.5 | 10.5 | - | 3-4.5 | 0.5 | 10.5 | - |
| 48+800 | 48+900 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 48+900 | 49+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 49+000 | 49+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 49+100 | 49+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 49+200 | 49+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 49+300 | 49+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 49+400 | 49+500 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 49+500 | 49+600 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 49+600 | 49+700 | 100 | 0.5 | 10.5 | - | 1.5-4.5 | 0.5 | 10.5 | - |
| 49+700 | 49+800 | 100 | 0.5 | 10.5 | - | 4.5 | 0.5 | 10.5 | - |
| 49+800 | 49+900 | 100 | 0.5 | 10.5 | - | 1.5-4.5 | 0.5 | 10.5 | - |
| 49+900 | 50+000 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 50+000 | 50+100 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 50+100 | 50+200 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 50+200 | 50+300 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 50+300 | 50+400 | 100 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 50+400 | 50+500 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 50+500 | 50+600 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 50+600 | 50+700 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 50+700 | 50+800 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 50+800 | 50+900 | 100 | 0.5 | 10.5 | 1 | 1.5-4.5 | 0.5 | 10.5 | 1 |
| 50+900 | 51+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 51+000 | 51+100 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 51+100 | 51+200 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 51+200 | 51+300 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 51+300 | 51+400 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 51+400 | 51+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 51+500 | 51+600 | 100 | 0.5 | 10.5 | 1 | 1.5-4.5 | 0.5 | 10.5 | 1 |
| 51+600 | 51+700 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 51+700 | 51+800 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 51+800 | 51+900 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 51+900 | 52+000 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 52+000 | 52+100 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 52+100 | 52+200 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 52+200 | 52+300 | 100 | 0.5 | 10.5 | 1 | 1.5 | 0.5 | 10.5 | 1 |
| 52+300 | 52+400 | 100 | 0.5 | 10.5 | 1 | 1.5-4.5 | 0.5 | 10.5 | 1 |
| 52+400 | 52+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 52+500 | 52+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 52+600 | 52+700 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 52+700 | 52+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 52+800 | 52+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 52+900 | 53+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+000 | 53+100 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+100 | 53+200 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+200 | 53+300 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+300 | 53+400 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+400 | 53+500 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+500 | 53+600 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+600 | 53+700 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+700 | 53+800 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+800 | 53+900 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 53+900 | 54+000 | 100 | 0.5 | 10.5 | 1 | 4.5 | 0.5 | 10.5 | 1 |
| 54+000 | 54+100 | 100 | 0.5 | 10.5 | 1 | 4.8 | 0.5 | 10.5 | 1 |
| 54+100 | 54+200 | 100 | 0.5 | 10.5 | 1 | 4.8 | 0.5 | 10.5 | 1 |
| 54+200 | 54+300 | 100 | 0.5 | 10.5 | 1 | 4.8 | 0.5 | 10.5 | 1 |
| 54+300 | 54+400 | 100 | 0.5 | 10.5 | 1.5 | 4.8 | 0.5 | 10.5 | 1.5 |

## Section 04 Neelmangla-Tumkur

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 29+500* | 29+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 29+600* | 29+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 29+700* | 29+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 29+800* | 29+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 29+900* | 30+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+000* | 30+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+100* | 30+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+200* | 30+300* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+300* | 30+420* | 120.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+420* | 30+500* | 80.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 30+500* | 30+607* | 107.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 30+607* | 30+730* | 123.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 30+730* | 30+800* | 70.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+800* | 30+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 30+900* | 31+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+000* | 31+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+100* | 31+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+200* | 31+300* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+300* | 31+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+400* | 31+500* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+500* | 31+550* | 50.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 31+550* | 31+600* | 50.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 31+600* | 31+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 31+700* | 31+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 31+800* | 31+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 31+900* | 32+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 32+000* | 32+092* | 92.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 32+092* | 32+208* | 116.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 32+208* | 32+300* | 92.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 32+300* | 32+400* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 32+400* | 32+500* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 32+500* | 32+600* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 32+600* | 32+700* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 32+700* | 32+800* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 32+800* | 32+900* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 32+900* | 33+000* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+000* | 33+100* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+100* | 33+200* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+200* | 33+300* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+300* | 33+400* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+400* | 33+500* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+500* | 33+600* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+600* | 33+700* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+700* | 33+840* | 140.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 33+840* | 33+900* | 60.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 33+900* | 34+000* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+000* | 34+100* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+100* | 34+200* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+200* | 34+300* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+300* | 34+400* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+400* | 34+500* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+500* | 34+599* | 99.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 34+599* | 34+700* | 101.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 34+700* | 34+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 34+800* | 34+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 34+900* | 35+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 35+000* | 35+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 35+100* | 35+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 35+200* | 35+240* | 40.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 35+240* | 35+300* | 60.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+300* | 35+400* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+400* | 35+500* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+500* | 35+600* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+600* | 35+700* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+700* | 35+800* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+800* | 35+900* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 35+900* | 36+000* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 36+000* | 36+100* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 36+100* | 36+200* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 36+200* | 36+300* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 36+300* | 36+440* | 140.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 36+440* | 36+500* | 60.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 36+500* | 36+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 36+600* | 36+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 36+700* | 36+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 36+800* | 36+930* | 130.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 36+930* | 37+000* | 70.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+000* | 37+100* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+100* | 37+200* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+200* | 37+300* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+300* | 37+400* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+400* | 37+500* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+500* | 37+600* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+600* | 37+700* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+700* | 37+800* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 37+800* | 37+900* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 37+900* | 38+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+000* | 38+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+100* | 38+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+200* | 38+300* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+300* | 38+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+400* | 38+500* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+500* | 38+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+600* | 38+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+700* | 38+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+800* | 38+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 38+900* | 39+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 39+000* | 39+100* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 39+100* | 39+200* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 39+200* | 39+300* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 39+300* | 39+440* | 140.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 39+440* | 39+500* | 60.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 39+500* | 39+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 39+600* | 39+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 39+700* | 39+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 39+800* | 39+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 39+900* | 40+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 40+000* | 40+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 40+100* | 40+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 40+200* | 40+300* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 40+300* | 40+400* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 40+400* | 40+500* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 40+500* | 40+600* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 40+600* | 40+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 40+700* | 40+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 40+800* | 40+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 40+900* | 41+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 41+000* | 41+100* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 41+100* | 41+190* | 90.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 41+190* | 41+300* | 110.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+300* | 41+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+400* | 41+500* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+500* | 41+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+600* | 41+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+700* | 41+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+800* | 41+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 41+900* | 42+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+000* | 42+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+100* | 42+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+200* | 42+300* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+300* | 42+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+400* | 42+500* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+500* | 42+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+600* | 42+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+700* | 42+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+800* | 42+870* | 70.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 42+870* | 42+970* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 42+970* | 43+065* | 95.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 43+065* | 43+257* | 192.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+257* | 43+300* | 43.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+300* | 43+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+400* | 43+500* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+500* | 43+560* | 60.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+560* | 43+600* | 40.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 43+600* | 43+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+700* | 43+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+800* | 43+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 43+900* | 44+010* | 110.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 44+012* | 44+100* | 88.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 44+100* | 44+200* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 44+200* | 44+300* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 44+300* | 44+400* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 44+400* | 44+500* | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 44+500* | 44+604* | 104.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 44+604* | 44+700* | 96.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 44+700* | 44+800* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 44+800* | 44+900* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 44+900* | 45+000* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 45+000* | 45+100* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 45+100* | 45+200* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 45+200* | 45+300* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 45+300* | 45+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 45+400* | 45+560* | 160.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 45+560* | 45+600* | 40.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 45+600* | 45+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 45+700* | 45+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 45+800* | 45+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 45+900* | 46+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+000* | 46+100* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+100* | 46+200* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+200* | 46+300* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+300* | 46+400* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+400* | 46+500* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 46+500* | 46+600* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+600* | 46+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+700* | 46+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+800* | 46+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 46+900* | 47+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 47+000* | 47+100* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 47+100* | 47+240* | 140.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 47+240* | 47+300* | 60.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 47+300* | 47+400* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 47+400* | 47+500* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 47+500* | 47+600* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 47+600* | 47+700* | 100.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 47+700* | 47+820* | 120.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 47+820* | 47+900* | 80.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 47+900* | 48+000* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 48+000* | 48+100* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 48+100* | 48+200* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 48+200* | 48+300* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 48+300* | 48+400* | 100.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 48+400* | 48+560* | 160.00 | 0.5 | 13.5 | - | 2.5 | 0.5 | 13.5 | - |
| 48+560* | 48+600* | 40.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 48+600* | 48+731* | 131.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 48+731* | 48+800* | 69.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 48+800* | 48+900* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 48+900* | 49+000* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+000* | 49+100* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+100* | 49+200* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+200* | 49+300* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+300* | 49+400* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 49+400* | 49+500* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+500* | 49+600* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+600* | 49+700* | 100.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+700* | 49+814* | 114.00 | 0.25 | 7 | 2.5 | 1.5 | 0.25 | 7 | 2.5 |
| 49+814* | 49+900* | 86.00 | 0.5 | 10.5 | 3.5 | 4.5 | 0.5 | 10.5 | 3.5 |
| 49+900 | 50+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+000 | 50+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+100 | 50+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+200 | 50+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+300 | 50+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+400 | 50+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+500 | 50+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+600 | 50+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+700 | 50+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+800 | 50+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 50+900 | 51+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+000 | 51+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+100 | 51+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+200 | 51+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+300 | 51+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+400 | 51+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+500 | 51+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+600 | 51+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+700 | 51+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+800 | 51+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 51+900 | 52+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+000 | 52+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+100 | 52+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+200 | 52+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+300 | 52+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+400 | 52+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 52+500 | 52+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+600 | 52+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+700 | 52+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+800 | 52+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 52+900 | 53+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+000 | 53+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+100 | 53+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+200 | 53+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+300 | 53+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+400 | 53+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+500 | 53+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+600 | 53+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+700 | 53+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+800 | 53+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 53+900 | 54+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+000 | 54+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+100 | 54+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+200 | 54+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+300 | 54+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+400 | 54+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+500 | 54+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+600 | 54+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+700 | 54+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+800 | 54+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 54+900 | 55+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 55+000 | 55+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 55+100 | 55+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 55+200 | 55+300 | 100.00 | 0.25 | 7 | 1.5 | 1.2-4.5 | 0.25 | 7 | 1.5 |
| 55+300 | 55+400 | 100.00 | 0.25 | 7 | 1.5 | 1.2-2.5 | 0.25 | 7 | 1.5 |
| 55+400 | 55+500 | 100.00 | 0.25 | 7 | 1.5 | 2.5-3 | 0.25 | 7 | 1.5 |
| 55+500 | 55+600 | 100.00 | 0.25 | 7 | 1.5 | 2.5-4 | 0.25 | 7 | 1.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 55+600 | 55+700 | 100.00 | 0.25 | 7 | 1 | 3.5 | 0.25 | 7 | 2.5 |
| 55+700 | 55+800 | 100.00 | 0.25 | 7 | 1.5 | 3.5-4.5 | 0.25 | 7 | 1.5 |
| 55+800 | 55+900 | 100.00 | 0.25 | 7 | 1.5 | 3.5-4.5 | 0.25 | 7 | 1.5 |
| 55+900 | 56+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+000 | 56+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+100 | 56+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+200 | 56+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+300 | 56+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+400 | 56+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+500 | 56+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+600 | 56+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+700 | 56+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+800 | 56+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 56+900 | 57+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+000 | 57+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+100 | 57+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+200 | 57+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+300 | 57+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+400 | 57+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+500 | 57+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+600 | 57+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+700 | 57+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+800 | 57+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 57+900 | 58+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+000 | 58+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+100 | 58+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+200 | 58+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+300 | 58+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+400 | 58+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+500 | 58+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+600 | 58+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 58+700 | 58+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+800 | 58+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 58+900 | 59+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+000 | 59+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+100 | 59+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+200 | 59+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+300 | 59+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+400 | 59+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+500 | 59+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+600 | 59+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+700 | 59+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+800 | 59+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 59+900 | 60+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+000 | 60+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+100 | 60+200 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+200 | 60+300 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+300 | 60+400 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+400 | 60+500 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+500 | 60+600 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+600 | 60+700 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+700 | 60+800 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+800 | 60+900 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 60+900 | 61+000 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 61+000 | 61+100 | 100.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 61+100 | 61+175 | 75.00 | 0.25 | 7 | 1.5 | 4.5 | 0.25 | 7 | 1.5 |
| 61+175 | 61+795 | 620.00 | - | 14-45 | - | - | - | 14-45 | - |
| 61+795 | 61+900 | 105.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 61+900 | 62+040 | 140.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+040* | 62+100* | 60.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 62+100* | 62+200* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 62+200* | 62+317* | 117.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 62+317* | 62+400* | 83.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+400* | 62+500* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+500* | 62+600* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+600* | 62+700* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+700* | 62+800* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+800* | 62+900* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 62+900* | 63+000* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 63+000* | 63+100* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 63+100* | 63+200* | 100.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 63+200* | 63+296* | 96.00 | 0.25 | 10.5 | 0.5 | 1.5 | 0.25 | 10.5 | 0.5 |
| 63+296* | 63+400* | 104.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 63+400* | 63+500* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 63+500* | 63+600* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 63+600* | 63+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 63+700* | 63+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 63+800* | 63+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 63+900* | 64+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+000* | 64+100* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+100* | 64+200* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+200* | 64+300* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+300* | 64+400* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+400* | 64+500* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+500* | 64+600* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+600* | 64+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+700* | 64+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+800* | 64+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 64+900* | 65+000* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 65+000* | 65+100* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 65+100* | 65+200* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 65+200* | 65+300* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 65+300* | 65+400* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 65+400* | 65+500* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 65+500* | 65+600* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 65+600* | 65+713* | 113.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 65+713* | 65+800* | 87.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 65+800* | 65+900* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 65+900* | 66+000* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+000* | 66+100* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+100* | 66+200* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+200* | 66+300* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+300* | 66+400* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+400* | 66+500* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+500* | 66+600* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+600* | 66+645* | 45.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+645* | 66+700* | 55.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 66+700* | 66+800* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 66+800* | 66+878* | 78.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 66+878* | 66+900* | 22.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 66+900* | 67+000* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 67+000* | 67+100* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 67+100* | 67+172* | 72.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 67+172* | 67+300* | 128.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+300* | 67+400* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+400* | 67+500* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+500* | 67+600* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+600* | 67+700* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+700* | 67+800* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+800* | 67+900* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 67+900* | 67+978* | 78.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 67+978* | 68+100* | 122.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 68+100* | 68+200* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 68+200* | 68+309* | 109.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 68+309* | 68+400* | 91.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 68+400* | 68+500* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 68+500* | 68+600* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 68+600* | 68+700* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 68+700* | 68+800* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 68+800* | 68+900* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 68+900* | 69+000* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+000* | 69+100* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+100* | 69+200* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+200* | 69+300* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+300* | 69+400* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+400* | 69+500* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+500* | 69+600* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+600* | 69+700* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+700* | 69+859* | 159.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 69+859* | 69+900* | 41.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 69+900* | 70+003* | 103.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 70+003* | 70+100* | 97.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+100* | 70+200* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+200* | 70+300* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+300* | 70+400* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+400* | 70+500* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+500* | 70+600* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+600* | 70+700* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+700* | 70+800* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 70+800* | 70+900* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 70+900* | 71+000* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 71+000* | 71+100* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 71+100* | 71+200* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 71+200* | 71+267* | 67.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 71+267* | 71+400* | 133.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 71+400* | 71+500* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 71+500* | 71+639* | 139.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 71+639* | 71+800* | 161.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 71+800* | 71+900* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 71+900* | 72+000* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+000* | 72+100* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+100* | 72+200* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+200* | 72+300* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+300* | 72+400* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+400* | 72+500* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+500* | 72+600* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+600* | 72+700* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+700* | 72+805* | 105.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 72+805* | 72+900* | 95.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 72+900* | 73+000* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 73+000* | 73+100* | 100.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 73+100* | 73+247* | 147.00 | 0.5 | 10.5 | - | 1.5 | 0.5 | 10.5 | - |
| 73+247* | 73+300* | 53.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 73+300* | 73+460* | 160.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 73+460* | 73+500* | 40.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 73+500* | 73+600* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 73+600* | 73+700* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 73+700* | 73+800* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |

| Chainage | | Length (m) | LHS | | | Median Width (m) | RHS | | |
|---|---|---|---|---|---|---|---|---|---|
| From (km) | To (km) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) | | Shyness each side (m) | MCW Width (m) | Paved Shoulder (m) |
| 73+800* | 73+900* | 100.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 73+900* | 74+020* | 120.00 | 0.5 | 13.5 | - | 4.5 | 0.5 | 13.5 | - |
| 74+020* | 74+120* | 100.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |
| 74+120* | 74+168* | 80.00 | 0.5 | 11 | - | 1.5 | 0.5 | 11 | - |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.
b) other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

*Carriageway widths and median widths varies at location of Structure approach, toll plaza, median opening, junctions etc.*

### 6.4.4 Lined Drain

Details of Lined Drain along the Project Stretch are provided below:

**Table 6-6 : Details of Lined Drain**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 1 | 0+000 | 0+200 | 200 | LHS | SR Shoulder | RCC Open Drain |
| 2 | 0+000 | 0+200 | 200 | LHS | Seperator | RCC Open Drain |
| 3 | 0+000 | 0+200 | 200 | RHS | Seperator | RCC Open Drain |
| 4 | 0+120 | 0+530 | 410 | LHS | Seperator | RCC Open Drain |
| 5 | 0+120 | 0+530 | 410 | RHS | Seperator | RCC Open Drain |
| 6 | 0+150 | 0+530 | 380 | BHS | Median | RCC Open Drain |
| 7 | 0+240 | 0+500 | 260 | RHS | SR Shoulder | RCC Covered Drain |
| 8 | 0+240 | 0+450 | 210 | RHS | SR Shoulder | RCC Covered Drain |
| 9 | 0+240 | 1+090 | 850 | LHS | SR Shoulder | RCC Covered Drain |
| 10 | 0+240 | 2+230 | 1990 | LHS | SR Shoulder | RCC Covered Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 11 | 0+600 | 1+090 | 490 | RHS | SR Shoulder | RCC Covered Drain |
| 12 | 0+600 | 2+200 | 1600 | RHS | SR Shoulder | RCC Covered Drain |
| 13 | 0+600 | 1+150 | 550 | BHS | Median | RCC Open Drain |
| 14 | 0+600 | 2+480 | 1880 | LHS | Seperator | RCC Open Drain |
| 15 | 0+600 | 1+000 | 400 | RHS | Seperator | RCC Open Drain |
| 16 | 2+250 | 2+480 | 230 | RHS | SR Shoulder | RCC Covered Drain |
| 17 | 2+250 | 2+500 | 250 | LHS | SR Shoulder | RCC Covered Drain |
| 18 | 2+300 | 2+480 | 180 | RHS | Seperator | RCC Open Drain |
| 19 | 2+290 | 2+480 | 190 | LHS | SR Shoulder | RCC Covered Drain |
| 20 | 2+500 | 4+200 | 1700 | LHS | Seperator | RCC Open Drain |
| 21 | 2+500 | 2+900 | 400 | RHS | Seperator | RCC Open Drain |
| 22 | 2+500 | 2+940 | 440 | RHS | SR Shoulder | RCC Covered Drain |
| 23 | 2+550 | 4+200 | 1650 | LHS | SR Shoulder | RCC Covered Drain |
| 24 | 2+550 | 2+940 | 390 | LHS | SR Shoulder | RCC Covered Drain |
| 25 | 2+700 | 2+930 | 230 | RHS | SR Shoulder | RCC Covered Drain |
| 26 | 3+250 | 4+200 | 950 | RHS | SR Shoulder | RCC Covered Drain |
| 27 | 4+400 | 4+750 | 350 | LHS | Seperator | RCC Open Drain |
| 28 | 4+400 | 4+650 | 250 | LHS | SR Shoulder | RCC Covered Drain |
| 29 | 4+400 | 4+750 | 350 | RHS | SR Shoulder | RCC Covered Drain |
| 30 | 4+600 | 4+750 | 150 | RHS | SR Shoulder | RCC Covered Drain |
| 31 | 4+600 | 4+750 | 150 | LHS | SR Shoulder | RCC Covered Drain |
| 32 | 4+640 | 4+750 | 110 | RHS | Seperator | RCC Open Drain |
| 33 | 4+770 | 5+230 | 460 | LHS | Seperator | RCC Open Drain |
| 34 | 4+770 | 5+080 | 310 | LHS | SR Shoulder | RCC Covered Drain |
| 35 | 4+770 | 6+300 | 1530 | RHS | SR Shoulder | RCC Covered Drain |
| 36 | 4+770 | 5+230 | 460 | RHS | Seperator | RCC Open Drain |
| 37 | 4+770 | 5+280 | 510 | LHS | SR Shoulder | RCC Covered Drain |
| 38 | 4+800 | 5+280 | 480 | RHS | SR Shoulder | RCC Covered Drain |
| 39 | 5+280 | 6+300 | 1020 | LHS | Seperator | RCC Open Drain |
| 40 | 5+900 | 6+300 | 400 | LHS | SR Shoulder | RCC Covered Drain |
| 41 | 5+930 | 6+300 | 370 | LHS | SR Shoulder | RCC Covered Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 42 | 5+930 | 6+300 | 370 | RHS | SR Shoulder | RCC Covered Drain |
| 43 | 5+930 | 6+300 | 370 | RHS | Seperator | RCC Open Drain |
| 44 | 6+320 | 7+430 | 1110 | LHS | SR Shoulder | RCC Covered Drain |
| 45 | 6+320 | 7+400 | 1080 | RHS | SR Shoulder | RCC Covered Drain |
| 46 | 6+320 | 6+920 | 600 | RHS | Seperator | RCC Open Drain |
| 47 | 6+320 | 7+040 | 720 | LHS | Seperator | RCC Open Drain |
| 48 | 6+320 | 7+400 | 1080 | LHS | SR Shoulder | RCC Covered Drain |
| 49 | 6+320 | 7+400 | 1080 | RHS | SR Shoulder | RCC Covered Drain |
| 50 | 6+990 | 7+400 | 410 | RHS | SR Shoulder | RCC Covered Drain |
| 51 | 7+120 | 7+400 | 280 | LHS | Seperator | RCC Open Drain |
| 52 | 7+480 | 8+400 | 920 | RHS | SR Shoulder | RCC Covered Drain |
| 53 | 7+480 | 8+030 | 550 | RHS | Seperator | RCC Open Drain |
| 54 | 7+480 | 8+030 | 550 | LHS | SR Shoulder | RCC Covered Drain |
| 55 | 7+500 | 8+030 | 530 | RHS | SR Shoulder | RCC Covered Drain |
| 56 | 7+500 | 8+190 | 690 | LHS | Seperator | RCC Open Drain |
| 57 | 7+500 | 8+080 | 580 | LHS | SR Shoulder | RCC Covered Drain |
| 58 | 8+200 | 8+400 | 200 | LHS | Seperator | RCC Open Drain |
| 59 | 8+520 | 8+900 | 380 | LHS | SR Shoulder | RCC Covered Drain |
| 60 | 8+520 | 8+900 | 380 | LHS | Seperator | RCC Open Drain |
| 61 | 8+520 | 8+900 | 380 | RHS | SR Shoulder | RCC Covered Drain |
| 62 | 8+960 | 9+390 | 430 | LHS | SR Shoulder | RCC Covered Drain |
| 63 | 8+960 | 9+390 | 430 | LHS | Seperator | RCC Open Drain |
| 64 | 8+960 | 9+390 | 430 | RHS | SR Shoulder | RCC Covered Drain |
| 65 | 9+120 | 9+390 | 270 | LHS | SR Shoulder | RCC Covered Drain |
| 66 | 9+120 | 9+390 | 270 | RHS | SR Shoulder | RCC Covered Drain |
| 67 | 9+200 | 9+390 | 190 | RHS | Seperator | RCC Open Drain |
| 68 | 9+400 | 12+850 | 3450 | LHS | SR Shoulder | RCC Covered Drain |
| 69 | 9+400 | 10+410 | 1010 | LHS | Seperator | RCC Open Drain |
| 70 | 9+400 | 12+800 | 3400 | RHS | SR Shoulder | RCC Covered Drain |
| 71 | 9+400 | 9+600 | 200 | LHS | SR Shoulder | RCC Covered Drain |
| 72 | 9+400 | 9+600 | 200 | RHS | SR Shoulder | RCC Covered Drain |
| 73 | 9+400 | 9+600 | 200 | RHS | Seperator | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 74 | 10+420 | 12+850 | 2430 | LHS | Seperator | RCC Open Drain |
| 75 | 12+510 | 12+850 | 340 | LHS | SR Shoulder | RCC Covered Drain |
| 76 | 12+510 | 12+800 | 290 | RHS | SR Shoulder | RCC Covered Drain |
| 77 | 12+560 | 12+800 | 240 | RHS | Seperator | RCC Open Drain |
| 78 | 12+850 | 13+200 | 350 | RHS | SR Shoulder | RCC Covered Drain |
| 79 | 12+850 | 13+200 | 350 | RHS | Seperator | RCC Open Drain |
| 80 | 12+850 | 14+860 | 2010 | RHS | SR Shoulder | RCC Covered Drain |
| 81 | 12+890 | 14+860 | 1970 | LHS | Seperator | RCC Open Drain |
| 82 | 12+890 | 13+200 | 310 | LHS | SR Shoulder | RCC Covered Drain |
| 83 | 12+890 | 14+860 | 1970 | LHS | SR Shoulder | RCC Covered Drain |
| 84 | 14+630 | 14+860 | 230 | LHS | SR Shoulder | RCC Covered Drain |
| 85 | 14+630 | 14+860 | 230 | RHS | SR Shoulder | RCC Covered Drain |
| 86 | 14+680 | 14+860 | 180 | RHS | Seperator | RCC Open Drain |
| 87 | 14+900 | 15+400 | 500 | RHS | SR Shoulder | RCC Covered Drain |
| 88 | 14+900 | 15+400 | 500 | RHS | Seperator | RCC Open Drain |
| 89 | 14+900 | 15+400 | 500 | RHS | SR Shoulder | RCC Covered Drain |
| 90 | 14+900 | 15+400 | 500 | LHS | Seperator | RCC Open Drain |
| 91 | 14+900 | 15+400 | 500 | LHS | SR Shoulder | RCC Covered Drain |
| 92 | 14+900 | 15+400 | 500 | LHS | SR Shoulder | RCC Covered Drain |
| 93 | 15+480 | 15+800 | 320 | BHS | Median | RCC Open Drain |
| 94 | 15+480 | 15+800 | 320 | RHS | SR Shoulder | RCC Covered Drain |
| 95 | 15+480 | 15+800 | 320 | RHS | Seperator | RCC Open Drain |
| 96 | 15+480 | 15+800 | 320 | RHS | SR Shoulder | RCC Covered Drain |
| 97 | 15+480 | 15+800 | 320 | LHS | Seperator | RCC Open Drain |
| 98 | 15+480 | 16+140 | 660 | LHS | SR Shoulder | RCC Covered Drain |
| 99 | 15+480 | 16+400 | 920 | LHS | SR Shoulder | RCC Covered Drain |
| 100 | 15+900 | 16+140 | 240 | RHS | SR Shoulder | RCC Covered Drain |
| 101 | 15+900 | 16+140 | 240 | RHS | Seperator | RCC Open Drain |
| 102 | 15+900 | 16+400 | 500 | RHS | SR Shoulder | RCC Covered Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 103 | 15+900 | 16+250 | 350 | BHS | Median | RCC Open Drain |
| 104 | 15+900 | 16+140 | 240 | LHS | Seperator | RCC Open Drain |
| 105 | 355+250 | 356+050 | 800 | LHS | Separator | RCC Open Drain |
| 106 | 355+250 | 356+050 | 800 | RHS | Separator | RCC Open Drain |
| 107 | 356+050 | 356+900 | 850 | LHS | Separator | RCC Open Drain |
| 108 | 356+050 | 356+900 | 850 | RHS | Separator | RCC Open Drain |
| 109 | 356+900 | 357+342 | 442 | LHS | Separator | RCC Open Drain |
| 110 | 356+900 | 357+342 | 442 | RHS | Separator | RCC Open Drain |
| 111 | 372+038 | 372+100 | 62 | BHS | Median | RCC Open Drain |
| 112 | 372+409 | 372+485 | 76 | BHS | Median | RCC Open Drain |
| 113 | 372+800 | 373+270 | 470 | RHS | Separator | RCC Open Drain |
| 114 | 372+800 | 373+300 | 500 | LHS | Separator | RCC Open Drain |
| 115 | 373+950 | 374+030 | 80 | RHS | SR Shoulder | RCC Covered Drain |
| 116 | 374+090 | 374+610 | 520 | RHS | SR Shoulder | RCC Covered Drain |
| 117 | 374+210 | 374+610 | 400 | LHS | SR Shoulder | RCC Covered Drain |
| 118 | 374+650 | 375+600 | 950 | RHS | SR Shoulder | RCC Open Drain |
| 119 | 374+650 | 375+600 | 950 | LHS | SR Shoulder | RCC Open Drain |
| 120 | 375+660 | 376+170 | 510 | RHS | Separator | RCC Open Drain |
| 121 | 375+660 | 376+170 | 510 | LHS | Separator | RCC Open Drain |
| 122 | 376+200 | 376+340 | 140 | RHS | Separator | RCC Open Drain |
| 123 | 376+200 | 376+400 | 200 | LHS | Separator | RCC Open Drain |
| 124 | 376+340 | 376+400 | 60 | RHS | Separator | RCC Open Drain |
| 125 | 376+400 | 377+780 | 1380 | LHS | Separator | RCC Open Drain |
| 126 | 376+400 | 377+780 | 1380 | RHS | Separator | RCC Open Drain |
| 127 | 377+780 | 378+120 | 340 | LHS | Separator | RCC Open Drain |
| 128 | 377+780 | 378+070 | 290 | RHS | Separator | RCC Open Drain |
| 129 | 378+170 | 378+900 | 730 | RHS | SR Shoulder | RCC Covered Drain |
| 130 | 378+150 | 378+300 | 150 | LHS | SR Shoulder | RCC Open Drain |
| 131 | 378+300 | 378+710 | 410 | LHS | SR Shoulder | RCC Covered Drain |
| 132 | 378+900 | 379+470 | 570 | RHS | Separator | RCC Open Drain |
| 133 | 378+900 | 379+470 | 570 | LHS | Separator | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 134 | 379+530 | 379+720 | 190 | RHS | Separator | RCC Open Drain |
| 135 | 379+530 | 379+720 | 190 | LHS | Separator | RCC Open Drain |
| 136 | 379+720 | 380+530 | 810 | LHS | Separator | RCC Open Drain |
| 137 | 379+720 | 380+530 | 810 | RHS | Separator | RCC Open Drain |
| 138 | 380+550 | 380+780 | 230 | RHS | Separator | RCC Open Drain |
| 139 | 380+550 | 380+780 | 230 | LHS | Separator | RCC Open Drain |
| 140 | 380+780 | 381+930 | 1150 | RHS | Separator | RCC Open Drain |
| 141 | 380+780 | 381+930 | 1150 | LHS | Separator | RCC Open Drain |
| 142 | 381+950 | 382+600 | 650 | RHS | Separator | RCC Open Drain |
| 143 | 381+950 | 382+600 | 650 | LHS | Separator | RCC Open Drain |
| 144 | 382+600 | 384+280 | 1680 | LHS | Separator | RCC Open Drain |
| 145 | 382+600 | 384+270 | 1670 | RHS | Separator | RCC Open Drain |
| 146 | 384+280 | 384+700 | 420 | LHS | Separator | RCC Open Drain |
| 147 | 384+270 | 384+700 | 430 | RHS | Separator | RCC Open Drain |
| 148 | 384+720 | 385+740 | 1020 | RHS | Separator | RCC Open Drain |
| 149 | 384+720 | 385+740 | 1020 | LHS | Separator | RCC Open Drain |
| 150 | 385+750 | 387+085 | 1335 | RHS | Separator | RCC Open Drain |
| 151 | 385+750 | 387+070 | 1320 | LHS | Separator | RCC Open Drain |
| 152 | 387+090 | 387+510 | 420 | RHS | Separator | RCC Open Drain |
| 153 | 387+080 | 387+510 | 430 | LHS | Separator | RCC Open Drain |
| 154 | 387+520 | 388+000 | 480 | LHS | Separator | RCC Open Drain |
| 155 | 387+520 | 388+000 | 480 | RHS | Separator | RCC Open Drain |
| 156 | 388+010 | 389+770 | 1760 | LHS | Separator | RCC Open Drain |
| 157 | 388+010 | 389+770 | 1760 | RHS | Separator | RCC Open Drain |
| 158 | 388+250 | 388+400 | 150 | LHS | SR Shoulder | RCC Covered Drain |
| 159 | 389+660 | 389+770 | 110 | BHS | Median | RCC Open Drain |
| 160 | 389+790 | 390+440 | 650 | LHS | Separator | RCC Open Drain |
| 161 | 389+790 | 390+440 | 650 | RHS | Separator | RCC Open Drain |
| 162 | 390+440 | 392+500 | 2060 | LHS | Separator | RCC Open Drain |
| 163 | 390+440 | 392+500 | 2060 | RHS | Separator | RCC Open Drain |
| 164 | 392+500 | 392+970 | 470 | RHS | Separator | RCC Open Drain |
| 165 | 392+500 | 392+970 | 470 | LHS | Separator | RCC Open Drain |
| 166 | 392+980 | 394+300 | 1320 | LHS | Separator | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 167 | 392+980 | 394+300 | 1320 | RHS | Separator | RCC Open Drain |
| 168 | 394+350 | 395+340 | 990 | LHS | Separator | RCC Open Drain |
| 169 | 394+350 | 395+340 | 990 | RHS | Separator | RCC Open Drain |
| 170 | 395+350 | 396+530 | 1180 | LHS | Separator | RCC Open Drain |
| 171 | 395+350 | 396+530 | 1180 | RHS | Separator | RCC Open Drain |
| 172 | 396+540 | 397+000 | 460 | LHS | Separator | RCC Open Drain |
| 173 | 396+540 | 397+100 | 560 | RHS | Separator | RCC Open Drain |
| 174 | 397+000 | 397+100 | 100 | LHS | Separator | RCC Open Drain |
| 175 | 397+150 | 397+540 | 390 | LHS | Separator | RCC Open Drain |
| 176 | 397+150 | 400+200 | 3050 | RHS | Separator | RCC Open Drain |
| 177 | 397+540 | 400+200 | 2660 | LHS | Separator | RCC Open Drain |
| 178 | 400+300 | 401+300 | 1000 | LHS | Separator | RCC Open Drain |
| 179 | 400+250 | 400+650 | 400 | RHS | Separator | RCC Open Drain |
| 180 | 400+700 | 400+800 | 100 | RHS | Separator | RCC Open Drain |
| 181 | 400+800 | 401+300 | 500 | RHS | Separator | RCC Open Drain |
| 182 | 401+280 | 401+390 | 110 | BHS | Median | RCC Open Drain |
| 183 | 401+300 | 403+120 | 1820 | LHS | Separator | RCC Open Drain |
| 184 | 401+300 | 403+120 | 1820 | RHS | Separator | RCC Open Drain |
| 185 | 403+120 | 404+200 | 1080 | LHS | Separator | RCC Open Drain |
| 186 | 403+120 | 405+050 | 1930 | RHS | Separator | RCC Open Drain |
| 187 | 403+470 | 403+680 | 210 | BHS | Median | RCC Open Drain |
| 188 | 404+200 | 404+250 | 50 | LHS | Separator | RCC Open Drain |
| 189 | 404+250 | 404+550 | 300 | LHS | Separator | RCC Open Drain |
| 190 | 404+550 | 404+650 | 100 | LHS | Separator | RCC Open Drain |
| 191 | 404+700 | 405+100 | 400 | LHS | Separator | RCC Open Drain |
| 192 | 405+050 | 405+700 | 650 | RHS | Separator | RCC Open Drain |
| 193 | 405+100 | 405+690 | 590 | LHS | Separator | RCC Open Drain |
| 194 | 406+697 | 406+890 | 193 | BHS | Median | RCC Open Drain |
| 195 | 406+950 | 411+450 | 4500 | RHS | Separator | RCC Open Drain |
| 196 | 406+980 | 411+450 | 4470 | LHS | Separator | RCC Open Drain |
| 197 | 411+460 | 412+170 | 710 | LHS | Separator | RCC Open Drain |
| 198 | 411+470 | 412+160 | 690 | RHS | Separator | RCC Open Drain |
| 199 | 412+170 | 412+470 | 300 | LHS | SR Shoulder | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 200 | 411+850 | 412+360 | 510 | RHS | SR Shoulder | RCC Open Drain |
| 201 | 412+280 | 412+360 | 80 | BHS | Median | RCC Open Drain |
| 202 | 412+284 | 412+455 | 171 | LHS | Separator | RCC Open Drain |
| 203 | 412+360 | 412+770 | 410 | RHS | SR Shoulder | RCC Covered Drain |
| 204 | 412+364 | 412+455 | 91 | RHS | Separator | RCC Open Drain |
| 205 | 412+880 | 413+010 | 130 | RHS | SR Shoulder | RCC Covered Drain |
| 206 | 413+130 | 413+800 | 670 | RHS | SR Shoulder | RCC Covered Drain |
| 207 | 412+470 | 413+800 | 1330 | LHS | SR Shoulder | RCC Covered Drain |
| 208 | 414+230 | 415+150 | 920 | LHS | SR Shoulder | RCC Covered Drain |
| 209 | 414+580 | 414+930 | 350 | RHS | SR Shoulder | RCC Covered Drain |
| 210 | 414+930 | 415+180 | 250 | RHS | SR Shoulder | RCC Open Drain |
| 211 | 415+170 | 415+580 | 410 | RHS | Separator | RCC Open Drain |
| 212 | 415+180 | 415+690 | 510 | LHS | Separator | RCC Open Drain |
| 213 | 415+590 | 415+850 | 260 | RHS | Separator | RCC Covered Drain |
| 214 | 415+690 | 415+800 | 110 | LHS | Separator | RCC Covered Drain |
| 215 | 415+850 | 418+410 | 2560 | RHS | Separator | RCC Open Drain |
| 216 | 415+800 | 415+980 | 180 | LHS | Separator | RCC Open Drain |
| 217 | 416+140 | 417+950 | 1810 | LHS | Separator | RCC Open Drain |
| 218 | 417+950 | 418+150 | 200 | LHS | Separator | RCC Covered Drain |
| 219 | 417+410 | 417+660 | 250 | BHS | Median | RCC Open Drain |
| 220 | 419+080 | 419+190 | 110 | BHS | Median | RCC Open Drain |
| 221 | 419+805 | 420+000 | 195 | BHS | Median | RCC Open Drain |
| 222 | 418+150 | 418+360 | 210 | LHS | Separator | RCC Open Drain |
| 223 | 418+360 | 418+580 | 220 | LHS | Separator | RCC Covered Drain |
| 224 | 418+410 | 418+580 | 170 | RHS | Separator | RCC Covered Drain |
| 225 | 418+580 | 419+900 | 1320 | LHS | Separator | RCC Open Drain |
| 226 | 418+580 | 419+900 | 1320 | RHS | Separator | RCC Open Drain |
| 227 | 419+900 | 420+350 | 450 | RHS | Separator | RCC Covered Drain |
| 228 | 420+000 | 420+200 | 200 | BHS | Median | RCC Open Drain |
| 229 | 420+200 | 420+350 | 150 | LHS | Separator | RCC Open Drain |
| 230 | 420+300 | 420+800 | 500 | RHS | Separator | RCC Covered Drain |
| 231 | 420+350 | 420+400 | 50 | RHS | Separator | RCC Open Drain |
| 232 | 420+350 | 420+750 | 400 | LHS | Separator | RCC Covered Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 233 | 420+400 | 420+550 | 150 | RHS | Separator | RCC Covered Drain |
| 234 | 420+750 | 420+800 | 50 | LHS | Separator | RCC Open Drain |
| 235 | 420+550 | 420+800 | 250 | RHS | Separator | RCC Open Drain |
| 236 | 421+050 | 421+340 | 290 | RHS | Separator | RCC Open Drain |
| 237 | 421+480 | 421+815 | 335 | LHS | Separator | RCC Open Drain |
| 238 | 421+600 | 421+740 | 140 | RHS | Separator | RCC Open Drain |
| 239 | 421+740 | 421+810 | 70 | RHS | Separator | RCC Open Drain |
| 240 | 421+810 | 422+740 | 930 | RHS | Separator | RCC Open Drain |
| 241 | 421+810 | 422+000 | 190 | LHS | Separator | RCC Open Drain |
| 242 | 422+000 | 422+605 | 605 | LHS | Separator | RCC Open Drain |

## Section 02 Chennai Bypass

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 1 | 1+200 | 1+250 | 50.00 | LHS | Separator | RCC Open Drain |
| 2 | 1+270 | 1+650 | 380.00 | LHS | Separator | RCC Open Drain |
| 3 | 1+635 | 2+225 | 590.00 | LHS | Separator | RCC Covered Drain |
| 4 | 2+225 | 2+520 | 295.00 | LHS | Separator | RCC Open Drain |
| 5 | 2+540 | 3+170 | 630.00 | LHS | Separator | RCC Open Drain |
| 6 | 3+170 | 3+750 | 580.00 | LHS | Separator | RCC Covered Drain |
| 7 | 3+750 | 3+800 | 50.00 | LHS | Separator | RCC Open Drain |
| 8 | 3+800 | 3+840 | 40.00 | LHS | Separator | RCC Covered Drain |
| 9 | 3+840 | 4+440 | 600.00 | LHS | Separator | RCC Open Drain |
| 10 | 4+440 | 4+950 | 510.00 | LHS | Separator | RCC Covered Drain |
| 11 | 4+950 | 5+230 | 280.00 | LHS | Separator | RCC Open Drain |
| 12 | 5+260 | 6+040 | 780.00 | LHS | Separator | RCC Open Drain |
| 13 | 6+040 | 7+070 | 1030.00 | LHS | Separator | RCC Open Drain |
| 14 | 7+110 | 7+410 | 300.00 | LHS | Separator | RCC Open Drain |
| 15 | 7+410 | 7+450 | 40.00 | LHS | Separator | RCC Covered Drain |
| 16 | 7+450 | 7+760 | 310.00 | LHS | Separator | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 17 | 7+760 | 8+600 | 840.00 | LHS | Separator | RCC Covered Drain |
| 18 | 8+600 | 9+000 | 400.00 | LHS | Separator | RCC Open Drain |
| 19 | 9+180 | 9+750 | 570.00 | LHS | Separator | RCC Open Drain |
| 20 | 9+750 | 9+820 | 70.00 | LHS | Separator | RCC Covered Drain |
| 21 | 9+820 | 10+350 | 530.00 | LHS | Separator | RCC Open Drain |
| 22 | 10+380 | 10+580 | 200.00 | LHS | Separator | RCC Open Drain |
| 23 | 10+580 | 10+840 | 260.00 | LHS | Separator | RCC Covered Drain |
| 24 | 10+840 | 10+980 | 140.00 | LHS | Separator | RCC Open Drain |
| 25 | 10+980 | 11+630 | 650.00 | LHS | Separator | RCC Covered Drain |
| 26 | 11+630 | 12+100 | 470.00 | LHS | Separator | RCC Open Drain |
| 27 | 12+120 | 12+450 | 330.00 | LHS | Separator | RCC Open Drain |
| 28 | 12+450 | 12+830 | 380.00 | LHS | Separator | RCC Covered Drain |
| 29 | 12+830 | 13+500 | 670.00 | LHS | Separator | RCC Open Drain |
| 30 | 15+900 | 16+100 | 200.00 | LHS | Shoulder | RCC Covered Drain |
| 31 | 16+100 | 16+480 | 380.00 | LHS | Shoulder | RCC Open Drain |
| 32 | 16+160 | 17+220 | 1060.00 | LHS | Separator | RCC Covered Drain |
| 33 | 16+480 | 16+580 | 100.00 | LHS | Shoulder | RCC Covered Drain |
| 34 | 16+580 | 16+840 | 260.00 | LHS | Shoulder | RCC Open Drain |
| 35 | 16+840 | 19+200 | 2360.00 | LHS | Shoulder | RCC Covered Drain |
| 36 | 19+000 | 19+200 | 200.00 | LHS | Separator | RCC Covered Drain |
| 37 | 19+500 | 21+170 | 1670.00 | LHS | Separator | RCC Covered Drain |
| 38 | 21+170 | 21+450 | 280.00 | LHS | Separator | RCC Open Drain |
| 39 | 21+450 | 22+120 | 670.00 | LHS | Separator | RCC Covered Drain |
| 40 | 22+120 | 24+400 | 2280.00 | LHS | Shoulder | RCC Covered Drain |
| 41 | 24+400 | 25+100 | 700.00 | LHS | Separator | RCC Open Drain |
| 42 | 25+200 | 25+580 | 380.00 | LHS | Separator | RCC Covered Drain |
| 43 | 25+400 | 27+240 | 1840.00 | LHS | Shoulder | RCC Covered Drain |
| 44 | 25+580 | 25+670 | 90.00 | LHS | Separator | RCC Open Drain |
| 45 | 25+670 | 25+790 | 120.00 | LHS | Separator | RCC Covered Drain |
| 46 | 25+790 | 26+190 | 400.00 | LHS | Separator | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 47 | 26+190 | 27+100 | 910.00 | LHS | Separator | RCC Covered Drain |
| 48 | 27+100 | 27+240 | 140.00 | LHS | Separator | RCC Open Drain |
| 49 | 27+260 | 27+450 | 190.00 | LHS | Separator | RCC Open Drain |
| 50 | 27+450 | 27+930 | 480.00 | LHS | Separator | RCC Covered Drain |
| 51 | 27+930 | 28+140 | 210.00 | LHS | Separator | RCC Open Drain |
| 52 | 28+180 | 28+530 | 350.00 | LHS | Separator | RCC Open Drain |
| 53 | 28+530 | 28+850 | 320.00 | LHS | Separator | RCC Covered Drain |
| 54 | 28+850 | 29+330 | 480.00 | LHS | Separator | RCC Open Drain |
| 55 | 29+330 | 29+950 | 620.00 | LHS | Separator | RCC Covered Drain |
| 56 | 29+950 | 30+390 | 440.00 | LHS | Separator | RCC Open Drain |
| 57 | 30+390 | 30+480 | 90.00 | LHS | Separator | RCC Covered Drain |
| 58 | 30+480 | 31+250 | 770.00 | LHS | Separator | RCC Open Drain |
| 59 | 31+250 | 31+300 | 50.00 | LHS | Separator | RCC Covered Drain |
| 60 | 31+300 | 31+350 | 50.00 | LHS | Separator | RCC Open Drain |
| 61 | 31+800 | 32+250 | 450.00 | LHS | Shoulder | RCC Covered Drain |
| 62 | 32+200 | 31+780 | 420.00 | RHS | Shoulder | RCC Covered Drain |
| 63 | 31+780 | 31+400 | 380.00 | RHS | Separator | RCC Open Drain |
| 64 | 31+450 | 30+480 | 970.00 | RHS | Separator | RCC Open Drain |
| 65 | 30+480 | 30+400 | 80.00 | RHS | Separator | RCC Covered Drain |
| 66 | 30+000 | 29+920 | 80.00 | RHS | Separator | RCC Open Drain |
| 67 | 29+920 | 29+800 | 120.00 | RHS | Separator | RCC Covered Drain |
| 68 | 29+730 | 29+700 | 30.00 | RHS | Separator | RCC Open Drain |
| 69 | 29+500 | 29+350 | 150.00 | RHS | Separator | RCC Covered Drain |
| 70 | 29+350 | 28+600 | 750.00 | RHS | Separator | RCC Open Drain |
| 71 | 28+600 | 28+260 | 340.00 | RHS | Separator | RCC Covered Drain |
| 72 | 28+260 | 28+160 | 100.00 | RHS | Separator | RCC Open Drain |
| 73 | 28+120 | 27+910 | 210.00 | RHS | Separator | RCC Open Drain |
| 74 | 27+910 | 27+450 | 460.00 | RHS | Separator | RCC Covered Drain |
| 75 | 27+450 | 27+280 | 170.00 | RHS | Separator | RCC Open Drain |
| 76 | 27+250 | 27+060 | 190.00 | RHS | Separator | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 77 | 27+060 | 26+160 | 900.00 | RHS | Separator | RCC Covered Drain |
| 78 | 26+160 | 25+990 | 170.00 | RHS | Separator | RCC Open Drain |
| 79 | 25+960 | 25+750 | 210.00 | RHS | Separator | RCC Open Drain |
| 80 | 25+750 | 25+620 | 130.00 | RHS | Separator | RCC Covered Drain |
| 81 | 25+620 | 25+550 | 70.00 | RHS | Separator | RCC Open Drain |
| 82 | 25+550 | 25+200 | 350.00 | RHS | Separator | RCC Covered Drain |
| 83 | 25+100 | 24+400 | 700.00 | RHS | Separator | RCC Open Drain |
| 84 | 24+400 | 22+130 | 2270.00 | RHS | Separator | RCC Covered Drain |
| 85 | 22+130 | 21+950 | 180.00 | RHS | Separator | RCC Covered Drain |
| 86 | 22+130 | 19+500 | 2630.00 | RHS | Shoulder | RCC Covered Drain |
| 87 | 21+950 | 21+810 | 140.00 | RHS | Separator | RCC Open Drain |
| 88 | 21+810 | 21+500 | 310.00 | RHS | Separator | RCC Covered Drain |
| 89 | 21+500 | 21+350 | 150.00 | RHS | Separator | RCC Open Drain |
| 90 | 21+340 | 21+200 | 140.00 | RHS | Separator | RCC Open Drain |
| 91 | 21+200 | 19+500 | 1700.00 | RHS | Separator | RCC Covered Drain |
| 92 | 19+200 | 19+000 | 200.00 | RHS | Shoulder | RCC Covered Drain |
| 93 | 19+000 | 18+760 | 240.00 | RHS | Shoulder | RCC Open Drain |
| 94 | 18+760 | 18+400 | 360.00 | RHS | Shoulder | RCC Covered Drain |
| 95 | 18+400 | 18+300 | 100.00 | RHS | Shoulder | RCC Open Drain |
| 96 | 18+300 | 17+920 | 380.00 | RHS | Shoulder | RCC Covered Drain |
| 97 | 17+920 | 17+860 | 60.00 | RHS | Shoulder | RCC Open Drain |
| 98 | 17+860 | 17+600 | 260.00 | RHS | Shoulder | RCC Covered Drain |
| 99 | 17+600 | 17+500 | 100.00 | RHS | Shoulder | RCC Open Drain |
| 100 | 17+500 | 17+420 | 80.00 | RHS | Shoulder | RCC Covered Drain |
| 101 | 17+420 | 17+350 | 70.00 | RHS | Shoulder | RCC Open Drain |
| 102 | 17+350 | 17+300 | 50.00 | RHS | Shoulder | RCC Covered Drain |
| 103 | 17+300 | 17+180 | 120.00 | RHS | Shoulder | RCC Open Drain |
| 104 | 17+180 | 16+800 | 380.00 | RHS | Shoulder | RCC Covered Drain |

## Section 03 Chennai Tada

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 1 | 22+500 | 22+730 | 230 | LHS | Separator | RCC Covered Drain |
| 2 | 22+860 | 23+110 | 250 | LHS | Separator | RCC Covered Drain |
| 3 | 24+465 | 25+050 | 585 | LHS | Shoulder | RCC Open Drain |
| 4 | 26+260 | 26+360 | 100 | LHS | Shoulder | RCC Covered Drain |
| 5 | 26+940 | 27+700 | 760 | LHS | Shoulder | RCC Covered Drain |
| 6 | 27+630 | 28+020 | 390 | LHS | Separator | RCC Covered Drain |
| 7 | 28+020 | 28+970 | 950 | LHS | Shoulder | RCC Covered Drain |
| 8 | 34+400 | 34+620 | 220 | LHS | Separator | RCC Covered Drain |
| 9 | 34+680 | 35+400 | 720 | LHS | Shoulder | RCC Covered Drain |
| 10 | 35+950 | 36+190 | 240 | LHS | Separator | RCC Covered Drain |
| 11 | 37+100 | 39+000 | 1900 | LHS | Shoulder | RCC Covered Drain |
| 12 | 39+100 | 39+390 | 290 | LHS | Shoulder | RCC Covered Drain |
| 13 | 41+720 | 41+970 | 250 | LHS | Shoulder | RCC Covered Drain |
| 14 | 43+620 | 44+240 | 620 | LHS | Shoulder | RCC Covered Drain |
| 15 | 46+050 | 46+550 | 500 | LHS | Shoulder | RCC Covered Drain |
| 16 | 47+150 | 48+150 | 1000 | LHS | Shoulder | RCC Covered Drain |
| 17 | 48+720 | 48+930 | 210 | LHS | Separator | RCC Covered Drain |
| 18 | 45+850 | 49+600 | 3750 | LHS | Shoulder | RCC Covered Drain |
| 19 | 49+700 | 49+940 | 240 | LHS | Separator | RCC Covered Drain |
| 20 | 49+940 | 50+900 | 960 | LHS | Shoulder | RCC Covered Drain |
| 21 | 51+530 | 52+150 | 620 | LHS | Shoulder | RCC Covered Drain |
| 22 | 52+300 | 51+500 | 800 | RHS | Shoulder | RCC Covered Drain |
| 23 | 50+720 | 50+650 | 70 | RHS | Separator | RCC Covered Drain |
| 24 | 50+500 | 49+800 | 700 | RHS | Shoulder | RCC Covered Drain |
| 25 | 49+820 | 49+630 | 190 | RHS | Separator | RCC Covered Drain |
| 26 | 49+400 | 48+770 | 630 | RHS | Shoulder | RCC Covered Drain |
| 27 | 48+770 | 48+440 | 330 | RHS | Separator | RCC Covered Drain |
| 28 | 48+130 | 47+330 | 800 | RHS | Shoulder | RCC Covered Drain |
| 29 | 46+230 | 46+150 | 80 | RHS | Shoulder | RCC Open Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 30 | 39+250 | 37+160 | 2090 | RHS | Shoulder | RCC Covered Drain |
| 31 | 36+120 | 35+870 | 250 | RHS | Separator | RCC Covered Drain |
| 32 | 35+320 | 35+000 | 320 | RHS | Shoulder | RCC Covered Drain |
| 33 | 31+060 | 30+900 | 160 | RHS | Shoulder | RCC Covered Drain |
| 34 | 29+000 | 27+960 | 1040 | RHS | Shoulder | RCC Covered Drain |
| 35 | 27+960 | 27+640 | 320 | RHS | Separator | RCC Covered Drain |
| 36 | 27+640 | 26+990 | 650 | RHS | Shoulder | RCC Covered Drain |
| 37 | 26+390 | 26+220 | 170 | RHS | Shoulder | RCC Covered Drain |
| 38 | 26+170 | 25+600 | 570 | RHS | Shoulder | RCC Covered Drain |
| 39 | 25+110 | 25+010 | 100 | RHS | Shoulder | RCC Covered Drain |
| 40 | 24+960 | 24+450 | 510 | RHS | Shoulder | RCC Open Drain |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 1* | 29+500 | 30+730 | 1230 | LHS | Shoulder | RCC Covered Drain |
| 2* | 29+500 | 30+730 | 1230 | RHS | Shoulder | RCC Covered Drain |
| 3* | 29+500 | 30+730 | 1230 | LHS | Separator | RCC Covered Drain |
| 4* | 29+500 | 30+730 | 1230 | RHS | Separator | RCC Covered Drain |
| 5* | 30+730 | 31+550 | 820 | RHS | Separator | RCC Covered Drain |
| 6* | 30+730 | 31+550 | 820 | LHS | Shoulder | RCC Covered Drain |
| 7* | 30+730 | 31+550 | 820 | LHS | Separator | RCC Covered Drain |
| 8* | 31+550 | 43+100 | 11550 | LHS | Shoulder | RCC Covered Drain |
| 9* | 31+550 | 43+100 | 11550 | RHS | Shoulder | RCC Covered Drain |
| 10* | 31+550 | 43+100 | 11550 | LHS | Separator | RCC Covered Drain |
| 11* | 31+550 | 43+100 | 11550 | RHS | Separator | RCC Covered Drain |
| 12* | 43+100 | 43+450 | 350 | LHS | Separator | RCC Covered Drain |
| 13* | 43+100 | 43+450 | 350 | RHS | Shoulder | RCC Covered Drain |
| 14* | 43+100 | 43+450 | 350 | RHS | Separator | RCC Covered Drain |
| 15* | 43+450 | 44+980 | 1530 | LHS | Shoulder | RCC Covered Drain |

| S. No. | Chainage (Km) | | Length (m) | Side | Location | Type |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 16* | 43+450 | 44+980 | 1530 | RHS | Separator | RCC Covered Drain |
| 17* | 44+980 | 45+180 | 200 | RHS | Separator | RCC Covered Drain |
| 18* | 44+980 | 45+180 | 200 | LHS | Shoulder | RCC Covered Drain |
| 19* | 44+980 | 45+180 | 200 | LHS | Separator | RCC Covered Drain |
| 20* | 45+180 | 49+900 | 4720 | LHS | Shoulder | RCC Covered Drain |
| 21* | 45+180 | 49+900 | 4720 | RHS | Shoulder | RCC Covered Drain |
| 22* | 45+180 | 49+900 | 4720 | LHS | Separator | RCC Covered Drain |
| 23* | 45+180 | 49+900 | 4720 | RHS | Separator | RCC Covered Drain |
| 24* | 62+000 | 66+620 | 4620 | LHS | Shoulder | RCC Covered Drain |
| 25* | 62+000 | 66+620 | 4620 | RHS | Shoulder | RCC Covered Drain |
| 26* | 62+000 | 66+620 | 4620 | LHS | Separator | RCC Covered Drain |
| 27* | 62+000 | 66+620 | 4620 | RHS | Separator | RCC Covered Drain |
| 28* | 66+620 | 66+920 | 300 | LHS | Separator | RCC Covered Drain |
| 29* | 66+620 | 66+920 | 300 | RHS | Separator | RCC Covered Drain |
| 30* | 66+920 | 67+140 | 220 | LHS | Shoulder | RCC Covered Drain |
| 31* | 66+920 | 67+140 | 220 | RHS | Shoulder | RCC Covered Drain |
| 32* | 66+920 | 67+140 | 220 | LHS | Separator | RCC Covered Drain |
| 33* | 66+920 | 67+140 | 220 | RHS | Separator | RCC Covered Drain |
| 34* | 67+140 | 67+540 | 400 | LHS | Separator | RCC Covered Drain |
| 35* | 67+140 | 67+540 | 400 | RHS | Separator | RCC Covered Drain |
| 36* | 67+540 | 74+168 | 6660 | LHS | Shoulder | RCC Covered Drain |
| 37* | 67+540 | 74+168 | 6660 | RHS | Shoulder | RCC Covered Drain |
| 38* | 67+540 | 74+168 | 6660 | LHS | Separator | RCC Covered Drain |
| 39* | 67+540 | 74+168 | 6660 | RHS | Separator | RCC Covered Drain |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

Apart from above, earthen drain is also available along the project stretch and same shall also be maintained by the TOT/InvIT Concessionaire during Concession Period.

### 6.4.5 Service Road and Slip Road

Details of Service Road along the Project Stretch are provided below.

**Table 6-7 : Details of Service Road**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 1 | 0+100 | 1+060 | 960 | LHS | Flexible | 7.5 |
| 2 | 0+100 | 1+060 | 960 | RHS | Flexible | 7.5 |
| 3 | 1+060 | 2+200 | 1140 | LHS | Flexible | 7 |
| 4 | 2+200 | 2+900 | 700 | LHS | Flexible | 7.5 |
| 5 | 2+200 | 2+900 | 700 | RHS | Flexible | 7.5 |
| 6 | 2+900 | 4+560 | 1660 | LHS | Flexible | 7 |
| 7 | 4+560 | 5+240 | 680 | LHS | Flexible | 7.5 |
| 8 | 4+560 | 5+240 | 680 | RHS | Flexible | 7.5 |
| 9 | 5+240 | 5+900 | 660 | LHS | Flexible | 7 |
| 10 | 5+240 | 5+900 | 660 | RHS | Flexible | 7 |
| 11 | 5+900 | 8+000 | 2100 | LHS | Flexible | 7.5 |
| 12 | 5+900 | 8+000 | 2100 | RHS | Flexible | 7.5 |
| 13 | 8+000 | 9+100 | 1100 | LHS | Flexible | 7 |
| 14 | 9+100 | 9+600 | 500 | LHS | Flexible | 7.5 |
| 15 | 9+100 | 9+600 | 500 | RHS | Flexible | 7.5 |
| 16 | 9+600 | 10+700 | 1100 | LHS | Flexible | 7 |
| 17 | 10+700 | 12+500 | 1800 | LHS | Flexible | 7 |
| 18 | 12+500 | 13+200 | 700 | LHS | Flexible | 7.5 |
| 19 | 12+500 | 13+200 | 700 | RHS | Flexible | 7.5 |
| 20 | 13+200 | 14+650 | 1450 | LHS | Flexible | 7 |
| 21 | 14+650 | 16+200 | 1550 | LHS | Flexible | 7.5 |
| 22 | 14+650 | 16+200 | 1550 | RHS | Flexible | 7.5 |
| 23 | 355+100 | 357+342 | 2242 | LHS | Flexible | 7 |
| 24 | 355+100 | 357+342 | 2242 | RHS | Flexible | 5.5-7 |

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 25 | 372+690 | 373+450 | 760 | LHS | Flexible | 7 |
| 26 | 372+690 | 373+400 | 710 | RHS | Flexible | 7 |
| 27 | 373+800 | 405+745 | 31945 | LHS | Flexible | 5.5-10 |
| 28 | 373+800 | 373+900 | 100 | RHS | Flexible | 7 |
| 29 | 374+100 | 405+745 | 31645 | RHS | Flexible | 7-10.5 |
| 30 | 406+900 | 413+250 | 6350 | LHS | Flexible | 7-10.5 |
| 31 | 406+900 | 420+000 | 13100 | RHS | Flexible | 7-10.5 |
| 32 | 413+250 | 413+450 | 200 | LHS | Flexible | 5.5 |
| 33 | 413+450 | 413+920 | 470 | LHS | Flexible | 7 |
| 34 | 414+150 | 420+000 | 5850 | LHS | Flexible | 7 |
| 35 | 421+125 | 422+605 | 1480 | LHS | Flexible | 7-10.5 |
| **Total** | | | **121044** | | | |

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 1* | 405+740 | 405+940 | 200 | LHS | Flexible | 8 |
| 2* | 406+880 | 407+040 | 160 | LHS | Flexible | 8 |

*Under New Service Road these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

**Section 02 Chennai Bypass**

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 1 | 1+200 | 9+050 | 7850 | LHS | Flexible | 5.5 |
| 2 | 9+335 | 12+750 | 3415 | LHS | Flexible | 5.5 |
| 3 | 12+750 | 13+500 | 750 | LHS | Flexible | 9-12 |
| 4 | 15+870 | 19+100 | 3230 | LHS | Flexible | 5.5 |
| 5 | 19+220 | 22+130 | 2910 | LHS | Flexible | 5.5 |
| 6 | 22+130 | 24+650 | 2520 | LHS | Flexible | 7 |
| 7 | 24+650 | 25+200 | 550 | LHS | Flexible | 5.5 |
| 8 | 25+200 | 28+150 | 2950 | LHS | Flexible | 5.5 |
| 9 | 28+180 | 30+420 | 2240 | LHS | Rigid | 5.5 |

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 10 | 30+420 | 31+400 | 980 | LHS | Flexible | 5.5 |
| 11 | 31+640 | 32+260 | 620 | LHS | Flexible | 6 |
| 12 | 31+800 | 32+260 | 460 | LHS | Flexible | 5.5 |
| 13 | 32+260 | 30+400 | 1860 | RHS | Flexible | 5.5 |
| 14 | 30+000 | 29+500 | 500 | RHS | Rigid | 5.5 |
| 15 | 29+500 | 25+200 | 4300 | RHS | Flexible | 5.5 |
| 16 | 25+200 | 24+650 | 550 | RHS | Flexible | 5.5 |
| 17 | 24+650 | 22+130 | 2520 | RHS | Flexible | 7 |
| 18 | 22+130 | 19+530 | 2600 | RHS | Flexible | 5.5 |
| 19 | 19+200 | 16+800 | 2400 | RHS | Flexible | 5.5 |
| | | | 43205 | | | |

**Section 03 Chennai Tada**

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 1 | 22+020 | 24+590 | 2570 | LHS | Flexible | 7 |
| 2 | 24+590 | 24+780 | 190 | LHS | Rigid | 7 |
| 3 | 24+780 | 26+980 | 2200 | LHS | Flexible | 7 |
| 4 | 26+980 | 27+130 | 150 | LHS | Rigid | 17 |
| 5 | 27+130 | 50+475 | 23345 | LHS | Flexible | 6.5-7 |
| 6 | 51+330 | 53+960 | 263 | LHS | Flexible | 6.5-7 |
| 7 | 54+000 | 50+775 | 3225 | RHS | Flexible | 7 |
| 8 | 50+775 | 49+900 | 875 | RHS | Flexible | 6.5 |
| 9 | 49+900 | 43+475 | 6425 | RHS | Flexible | 7 |
| 10 | 42+665 | 25+700 | 16965 | RHS | Flexible | 7 |
| 11 | 25+700 | 25+600 | 100 | RHS | Flexible | 4.5 |
| 12 | 25+600 | 24+750 | 850 | RHS | Flexible | 7 |
| 13 | 24+750 | 24+585 | 165 | RHS | Rigid | 7 |
| 14 | 24+585 | 22+175 | 2410 | RHS | Flexible | 7 |
| 15 | 21+400 | 21+000 | 400 | RHS | Flexible | 7 |
| 16 | 20+520 | 20+450 | 70 | RHS | Flexible | 6.5 |
| 17 | 20+450 | 20+100 | 350 | RHS | Flexible | 4 |
| 18 | 20+100 | 19+800 | 300 | RHS | Flexible | 6.5 |

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 19 | 19+800 | 19+700 | 100 | RHS | Flexible | 4 |
| 20 | 19+700 | 19+530 | 170 | RHS | Flexible | 6.5 |
| 21 | 19+530 | 19+250 | 280 | RHS | Flexible | 4.5 |
| 22 | 19+180 | 17+400 | 1780 | RHS | Flexible | 6.5 |
| 23 | 16+980 | 16+900 | 80 | RHS | Flexible | 6.5 |
| 24 | 16+870 | 16+135 | 735 | RHS | Flexible | 6.5 |
| 25 | 16+085 | 13+850 | 2235 | RHS | Flexible | 6.5 |
| 26 | 13+650 | 12+780 | 870 | RHS | Flexible | 6.5 |
| | **Total** | | **67103** | | | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 1* | 29+500 | 30+730 | 1230 | BHS | Flexible | 8.75 |
| 2* | 30+730 | 31+550 | 820 | LHS | Flexible | 8.75 |
| 3* | 30+730 | 31+550 | 820 | RHS | Flexible | 5.75/7.25 |
| 4* | 31+550 | 43+100 | 11550 | BHS | Flexible | 8.75 |
| 5* | 43+100 | 43+450 | 350 | LHS | Flexible | 11.25 |
| 6* | 43+100 | 43+450 | 350 | RHS | Flexible | 7.25 |
| 7* | 43+450 | 44+012 | 562 | BHS | Flexible | 8.75 |
| 8* | 44+012 | 44+604 | 592 | LHS | Flexible | 5.5-6.5 |
| 9 | 44+012 | 44+604 | 592 | RHS | Flexible | 5.5 |
| 10* | 44+604 | 44+980 | 376 | BHS | Flexible | 8.75 |
| 11* | 44+980 | 45+180 | 200 | LHS | Flexible | 8.75 |
| 12* | 44+980 | 45+180 | 200 | RHS | Flexible | 11.25 |
| 13* | 45+180 | 48+560 | 3380 | BHS | Flexible | 8.75 |
| 14* | 48+560 | 49+814 | 1254 | BHS | Flexible | 7 |
| 15* | 49+814 | 49+900 | 86 | BHS | Flexible | 8.75 |
| 16* | 62+000 | 62+317 | 317 | BHS | Flexible | 8.75 |
| 17* | 62+317 | 62+809 | 492 | RHS | Flexible | 7 |
| 18* | 62+809 | 63+084 | 275 | BHS | Flexible | 8.75 |
| 19 | 63+084 | 63+300 | 216 | BHS | Flexible | 7 |
| 20* | 63+300 | 64+300 | 1000 | BHS | Flexible | 11 |

| S. No. | Chainage (Km) | | Length | Side | Pavement Type | Width (m) |
|---|---|---|---|---|---|---|
| | From | To | (m) | | | |
| 21* | 64+300 | 65+100 | 800 | LHS | Flexible | 11 |
| 22* | 65+100 | 65+710 | 610 | BHS | Flexible | 8.75 |
| 23* | 65+710 | 66+620 | 910 | BHS | Flexible | 7 |
| 24* | 66+620 | 66+920 | 300 | BHS | Flexible | 11.25 |
| 25* | 66+920 | 67+140 | 220 | LHS | Flexible | 5.5 |
| 26* | 66+920 | 67+140 | 220 | RHS | Flexible | 7 |
| 27* | 67+140 | 67+540 | 400 | BHS | Flexible | 11.25 |
| 28* | 67+540 | 67+978 | 438 | BHS | Flexible | 8.75 |
| 29* | 67+978 | 68+309 | 331 | BHS | Flexible | 7 |
| 30* | 68+390 | 69+859 | 1469 | BHS | Flexible | 8.75 |
| 31* | 69+859 | 70+003 | 144 | BHS | Flexible | 5.5 |
| 32* | 70+003 | 71+267 | 1264 | BHS | Flexible | 8.75 |
| 33* | 71+267 | 71+639 | 372 | BHS | Flexible | 7 |
| 34* | 71+639 | 72+805 | 1166 | BHS | Flexible | 8.75 |
| 35* | 72+805 | 73+247 | 442 | BHS | Flexible | 7 |
| 36* | 73+247 | 73+789 | 542 | BHS | Flexible | 8.75 |
| 37* | 73+789 | 73+812 | 23 | BHS | Flexible | 5.5-7 |
| 38* | 73+812 | 74+168 | 388 | BHS | Flexible | 8.75 |
| | **Total** | | **64642** | | | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

## Section 01 Vijayawada-Chilakaluripet






## Section 02 Chennai Bypass








**Section 03 Chennai Tada**





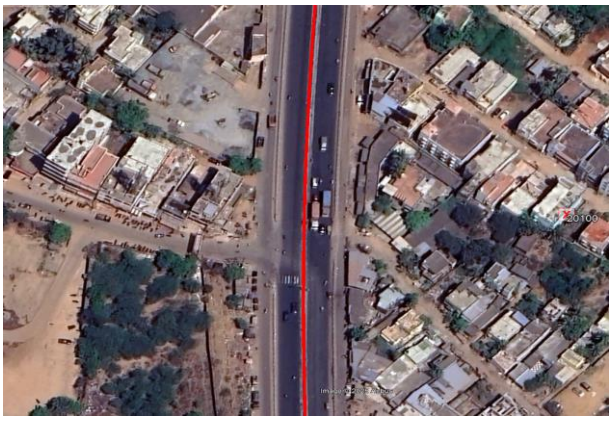




**Figure 6-2 : Service Road along the Project Stretch**

### 6.4.6 Ramp

The details of the Ramps along the Project highway are given below:

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Length | Side |
|---|---|---|---|---|
| | From | To | (m) | |
| NIL | | | | |

**Section 02 Chennai Bypass**

| S. No. | Chainage (Km) | | Length | Side |
|---|---|---|---|---|
| | From | To | (m) | |
| 1 | 18+900 | 19+200 | 300 | LHS |
| 2 | 19+200 | 18+900 | 300 | RHS |
| 3 | 19+200 | 19+400 | 200 | RHS |
| 4 | 19+200 | 19+400 | 200 | RHS |

**Section 03 Chennai Tada**

| S. No. | Chainage (Km) | | Length | Side |
|---|---|---|---|---|
| | From | To | (m) | |
| 1* | 22+000 | 22+300 | 300 | RHS |
| 2* | 22+770 | 23+200 | 430 | LHS |
| 3* | 27+035 | 27+055 | 20 | RHS |
| 4 | 34+500 | 34+900 | 400 | LHS |
| 5* | 35+900 | 36+200 | 300 | RHS |
| 6* | 45+900 | 46+300 | 400 | LHS |
| 7 | 52+150 | 52+470 | 320 | RHS |
| 8 | 52+800 | 53+100 | 300 | RHS |
| 9* | 54+000 | 54+120 | 120 | LHS |
| 10 | 21+900 | 21+100 | 800 | LHS |
| 11* | 22+400 | 22+770 | 370 | LHS |
| 12* | 27+035 | 27+055 | 20 | LHS |
| 13* | 34+500 | 34+700 | 200 | RHS |
| 14* | 35+950 | 36+180 | 230 | LHS |
| 15 | 46+900 | 47+200 | 300 | LHS |
| 16* | 49+400 | 49+640 | 240 | RHS |

| S. No. | Chainage (Km) | | Length | Side |
|---|---|---|---|---|
| | From | To | (m) | |
| 17 | 52+150 | 52+400 | 250 | LHS |
| 18 | 52+800 | 53+000 | 200 | LHS |
| 19* | 54+000 | 54+200 | 200 | RHS |

a) * Is the location of entry and exit ramps fall under the scope of the existing contractor and shall be constructed by them. After completion of the DLP period, the same shall be maintained by the TOT concessionaire.

### 6.4.7 Bypass

In existing Project Stretch, Details of Bypass are provided below.

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | | Length (Km) | Name of Bypass |
|---|---|---|---|---|
| | From | To | | |
| 1 | 396+800 | 412+000 | 15.20 | Guntur Bypass |
| 2 | 0+000 | 16+499 | 16.499 | Chilakaluripet Bypass |
| Total | | | 31.699 | |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | | Length (Km) | Name of Bypass |
|---|---|---|---|---|
| | From | To | | |
| NIL | | | | |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | | Length (Km) | Name of Bypass |
|---|---|---|---|---|
| | From | To | | |
| 1 | 22+750 | 26+250 | 3.50 | Sholavaram |
| 2 | 42+200 | 47+800 | 5.60 | Peddikuppam |
| **Total** | | | **9.10** | |

***Section 04 Neelmangla-Tumkur***

| S. No. | Chainage Km | | Length (Km) | Name of Bypass |
|---|---|---|---|---|
| | From | To | | |
| Nil | | | | |

### 6.4.8 Junction

In existing Project Stretch, Details of all junctions are provided below.

**Table 6-8 : List of Major Junctions**

**Section 01 Vijayawada-Chilakaluripet**

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1 | 0+550 | Y Junction | - | Old NH-16 |
| 2 | 7+420 | X Junction | NH-167A | NH-167A |
| 3 | 14+850 | X Junction | SH-332 | SH-332 |
| 4 | 15+820 | Y Junction | - | Old NH-16 |
| 5 | 355+470 | X Junction | MDR 43 | MDR 43 |
| 6 | 374+084 | T Junction | | MDR 37 |
| 7 | 374+350 | T Junction | | MDR 10 |
| 8 | 378+543 | X Junction | MDR 142 | MDR 45 |
| 9 | 396+340 | X Junction | MDR 189 | MDR 189 |
| 10 | 397+085 | Y Junction | NH 55F | |
| 11 | 400+670 | X Junction | SH 249 | SH 249 |
| 12 | 404+685 | X Junction | Guntur-Tenali Road | SH 40 |
| 13 | 408+737 | T Junction | SH255 | |
| 14 | 408+737 | T Junction | | SH255 |
| 15 | 411+850 | Y Junction | MDR 105 | |
| 16 | 413+408 | X Junction | NH 544F | Pedakakani Main Road |
| 17 | 416+100 | Y Junction | | MDR 42 |
| 18 | 418+245 | T Junction | MDR 35 | |
| 19 | 419+470 | T Junction | MDR 34 | |

**Section 02 Chennai Bypass**

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1 | 1+270 | X Junction | SH - 110 | SH - 110 |
| 2 | 9+050 | X Junction | SH- 113A | SH- 113A |
| 3 | 12+110 | X Junction | SH - 113 | SH - 113 |
| 4 | 15+850 | X Junction | SH - 55 | SH - 55 |
| 5 | 19+210 | X Junction | NH - 48 | NH - 179B |
| 6 | 22+300 | X Junction | SH - 112 | SH - 112 |
| 7 | 23+655 | X Junction | NH - 716 | NH - 716 |
| 8 | 27+255 | X Junction | SH - 205 | SH - 205 |
| 9 | 28+150 | X Junction | SH - 205 | SH - 205 |
| 10 | 31+380 | X Junction | Perambur Red Hills Rd | Perambur Red Hills Rd |

**Section 03 Chennai Tada**

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1 | 22+770 | Y Junction | | GNT Rd |
| 2 | 26+250 | Y Junction | | GNT Rd |
| 3 | 27+210 | T Junction | NH-716A | |
| 4 | 31+100 | T Junction | | SH-56 |
| 5 | 35+390 | T Junction | MDR 378 | |
| 6 | 35+680 | T Junction | | Ponneri |
| 7 | 38+900 | T Junction | SH-52 | |
| 8 | 42+225 | Y Junction | | MDR 634 |
| 9 | 44+710 | T Junction | MDR 599 | |
| 10 | 47+770 | Y Junction | | GNT Rd |

**Section 04 Neelmangla-Tumkur**

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1* | 49+000 | Y | NH 948A(Ramanagra) | |
| 2* | 49+300 | T | | NH648(Doddaballapura) |
| 3* | 63+761 | X | SH-94 | SH-94 |
| 4* | 66+150 | Y | Bangalore - Honnavar | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 5* | 71+500 | X | SH-33 | SH-33 |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

**Table 6-9 : List of Minor Junctions**

The details of the Minor Junction along the Project highway are given below:

**Section 01 Vijayawada-Chilakaluripet**

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1 | 2+450 | X Junction | Boppudi | Kotavaripalem |
| 2 | 4+780 | X Junction | MDR 51 | MDR 51 |
| 3 | 6+300 | X Junction | Pothavaram | Chilakaluripet |
| 4 | 9+400 | X Junction | Lingamguntla | Ganapavaram |
| 5 | 12+800 | X Junction | Nadendla | Ganapavaram |
| 6 | 15+400 | X Junction | Nadendla | Thimmapuram |
| 7 | 356+831 | T Junction | | Tatapudi |
| 8 | 357+300 | T Junction | Murikipudi | |
| 9 | 373+700 | Y Junction | Nadendla | |
| 10 | 373+725 | Y Junction | | Edlapadu |
| 11 | 373+910 | T Junction | | Edlapadu |
| 12 | 373+978 | Y Junction | | Edlapadu |
| 13 | 374+000 | Y Junction | Edlapadu | |
| 14 | 374+050 | T Junction | Maidavolu | |
| 15 | 374+168 | T Junction | Edlapadu | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 16 | 374+168 | T Junction | | Edlapadu |
| 17 | 374+237 | T Junction | | Edlapadu |
| 18 | 374+274 | T Junction | | Edlapadu |
| 19 | 374+315 | Y Junction | | Edlapadu |
| 20 | 374+355 | Y Junction | Edlapadu | |
| 21 | 374+380 | Y Junction | | Edlapadu |
| 22 | 374+422 | Y Junction | | Edlapadu |
| 23 | 374+574 | Y Junction | Edlapadu | |
| 24 | 374+591 | T Junction | Edlapadu | |
| 25 | 374+635 | T Junction | Edlapadu | |
| 26 | 374+635 | T Junction | | Edlapadu |
| 27 | 374+868 | Y Junction | | Edlapadu |
| 28 | 375+130 | T Junction | Edlapadu | |
| 29 | 375+650 | T Junction | | Edlapadu |
| 30 | 376+700 | Y Junction | | Vankayalapadu |
| 31 | 376+265 | X Junction | Spices Park Road | Vankayalapadu |
| 32 | 377+475 | T Junction | | Vankayalapadu |
| 33 | 377+490 | T Junction | Vankayalapadu | |
| 34 | 377+700 | Y Junction | Vankayalapadu | |
| 35 | 377+700 | Y Junction | | Vankayalapadu |
| 36 | 378+300 | T Junction | Boyapalem | |
| 37 | 378+300 | Y Junction | | Boyapalem |
| 38 | 378+434 | T Junction | Boyapalem | |
| 39 | 378+450 | Y Junction | | Boyapalem |
| 40 | 378+617 | Y Junction | | Boyapalem |
| 41 | 378+746 | T Junction | | Boyapalem |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 42 | 378+830 | T Junction | Boyapalem | |
| 43 | 379+275 | Y Junction | | Boyapalem |
| 44 | 379+392 | T Junction | | Boyapalem |
| 45 | 380+300 | T Junction | | Tummala Palem Road |
| 46 | 380+831 | Y Junction | | Thummalpalem |
| 47 | 381+110 | Y Junction | | Thummalpalem |
| 48 | 381+160 | Y Junction | | Thummalpalem |
| 49 | 381+450 | X Junction | Nadimpalem | Thummalpalem |
| 50 | 381+955 | T Junction | | Towards Farm |
| 51 | 382+300 | T Junction | Nadimpalem | |
| 52 | 382+725 | T Junction | Kondrupadu | |
| 53 | 382+750 | T Junction | Kondrupadu | |
| 54 | 382+938 | T Junction | Kondrupadu | |
| 55 | 383+140 | T Junction | | Prathipadu |
| 56 | 383+387 | T Junction | Kondrupadu | |
| 57 | 383+550 | T Junction | Nadimpalem | |
| 58 | 384+100 | X Junction | Edulapalem | Prathipadu |
| 59 | 38+050 | T Junction | | Guntur Engg. College Road |
| 60 | 385+842 | Y Junction | | Yanamadala |
| 61 | 386+050 | T Junction | | prathipadu |
| 62 | 386+450 | T Junction | Chinakondrupadu | |
| 63 | 386+678 | T Junction | | Edulapalem |
| 64 | 386+997 | T Junction | Prathipadu | |
| 65 | 387+035 | T Junction | Prathipadu | |
| 66 | 387+142 | T Junction | | Chowdavaram |
| 67 | 387+173 | T Junction | | Chowdavaram |
| 68 | 387+200 | T Junction | | Chowdavaram |
| 69 | 387+225 | T Junction | | Chowdavaram |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 70 | 387+300 | Y Junction | | Chowdavaram |
| 71 | 387+320 | T Junction | | Chowdavaram |
| 72 | 387+385 | T Junction | Chowdavaram | |
| 73 | 387+492 | T Junction | | Chowdavaram |
| 74 | 387+528 | T Junction | Chowdavaram | |
| 75 | 388+237 | T Junction | Chowdavaram | |
| 76 | 388+332 | X Junction | Chowdavaram | Chowdavaram |
| 77 | 388+595 | Y Junction | Chandramoulipuram | |
| 78 | 388+668 | T Junction | | Dasaripalem |
| 79 | 388+834 | T Junction | | Dasaripalem |
| 80 | 389+050 | Y Junction | RVE & JC College Road | |
| 81 | 389+422 | X Junction | Dasaripalem | Gayatri Nivas Marg |
| 82 | 389+639 | T Junction | | Dasaripalem |
| 83 | 389+691 | Y Junction | | Dasaripalem |
| 84 | 389+750 | Y Junction | Pothur | |
| 85 | 390+424 | T Junction | Pothur | |
| 86 | 391+128 | Y Junction | | Pothur |
| 87 | 391+150 | Y Junction | Pothur | |
| 88 | 391+285 | T Junction | Pothur | |
| 89 | 391+460 | Y Junction | ObulnaiduPalem | |
| 90 | 392+050 | Staggered | ObulnaiduPalem | Naidu Peta |
| 91 | 392+215 | Y Junction | | Naidu Peta |
| 92 | 392+272 | Y Junction | | Naidu Peta |
| 93 | 392+378 | T Junction | | Naidu Peta |
| 94 | 392+394 | Y Junction | Pothur | |
| 95 | 392+600 | Y Junction | | Vengalayapalem |
| 96 | 392+885 | T Junction | Pothur | |
| 97 | 393+080 | Y Junction | | Vengalayapalem |
| 98 | 393+150 | T Junction | | Vengalayapalem |
| 99 | 393+200 | T Junction | | Vengalayapalem |
| 100 | 393+950 | Y Junction | Sattenapalli-Hyderabad Link Road | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 101 | 394+000 | Y Junction | | Kornepadu |
| 102 | 394+350 | T Junction | Vengalayapalem | |
| 103 | 394+526 | Y Junction | Ankireddy Palem | |
| 104 | 394+876 | Y Junction | Ankireddy Palem | |
| 105 | 395+050 | T Junction | Bramha Reddy Nagar | |
| 106 | 395+228 | Y Junction | Ankireddy Palem | |
| 107 | 395+360 | T Junction | Mahatma Gandhi Ring Road | |
| 108 | 395+400 | T Junction | | Lingayapalem |
| 109 | 395+782 | T Junction | | Towards Factory |
| 110 | 396+732 | T Junction | | Ankireddy Palem |
| 111 | 397+315 | T Junction | | Lalupuram |
| 112 | 398+400 | T Junction | | Lalupuram |
| 113 | 398+400 | Y Junction | Lalupuram | |
| 114 | 399+200 | Y Junction | Lalupuram | |
| 115 | 399+200 | Y Junction | | Lalupuram |
| 116 | 399+455 | T Junction | | Lalupuram |
| 117 | 399+730 | X Junction | VIP Road | Lalupuram |
| 118 | 401+680 | X Junction | Nallacheruvu | Arundelpet |
| 119 | 401+890 | Y Junction | Bonthapadu road | |
| 120 | 403+100 | X Junction | Sangadigunta | Mantri Estates Road |
| 121 | 403+708 | Y Junction | Towards Factory | |
| 122 | 403+925 | T Junction | | Budampadu |
| 123 | 404+100 | Y Junction | | Towards Godown |
| 124 | 408+483 | T Junction | Towards Complex | |
| 125 | 410+200 | T Junction | Vasavi Nagar | |
| 126 | 410+211 | T Junction | | Takkellpadu Village Road |
| 127 | 410+738 | T Junction | Autonagar Road | |
| 128 | 411+005 | T Junction | Indra Autonagar | |
| 129 | 411+117 | T Junction | Autonagar | |
| 130 | 411+350 | T Junction | Autonagar | |
| 131 | 411+535 | T Junction | Autonagar | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 132 | 411+657 | T Junction | Autonagar | |
| 133 | 412+190 | T Junction | | peda kakani |
| 134 | 412+380 | T Junction | | peda kakani |
| 135 | 412+420 | T Junction | Towards warehouse | |
| 136 | 412+520 | T Junction | peda kakani | |
| 137 | 412+555 | T Junction | | MV Road |
| 138 | 412+600 | T Junction | | Towards Factory |
| 139 | 412+840 | T Junction | peda kakani | |
| 140 | 412+920 | T Junction | | peda kakani |
| 141 | 413+031 | T Junction | | Arundelpet |
| 142 | 413+031 | T Junction | Yuvajananagar | |
| 143 | 413+058 | T Junction | | Arundelpet |
| 144 | 413+074 | T Junction | Yuvajananagar | |
| 145 | 413+084 | T Junction | | Arundelpet |
| 146 | 413+100 | T Junction | | Muthyala Reddy Nagar |
| 147 | 413+136 | T Junction | | Muthyala Reddy Nagar |
| 148 | 413+187 | T Junction | | Muthyala Reddy Nagar |
| 149 | 413+200 | T Junction | Yuvajananagar | |
| 150 | 413+232 | T Junction | | Muthyala Reddy Nagar |
| 151 | 413+232 | T Junction | Yuvajananagar | |
| 152 | 413+263 | T Junction | | Muthyala Reddy Nagar |
| 153 | 413+300 | T Junction | Yuvajananagar | |
| 154 | 413+325 | T Junction | | peda kakani |
| 155 | 413+571 | T Junction | Venigandla Road | |
| 156 | 413+571 | T Junction | | Old MRO office Road |
| 157 | 413+621 | T Junction | Yuvajananagar | |
| 158 | 413+700 | Y Junction | | peda kakani |
| 159 | 413+722 | Y Junction | Yuvajananagar | |
| 160 | 414+250 | T Junction | | peda kakani |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 161 | 414+280 | T Junction | Yuvajananagar | |
| 162 | 414+375 | T Junction | Yuvajananagar | |
| 163 | 414+460 | T Junction | peda kakani | |
| 164 | 414+550 | Y Junction | | peda kakani |
| 165 | 414+586 | T Junction | peda kakani | |
| 166 | 415+015 | T Junction | Vengalrao Nagar | |
| 167 | 415+050 | T Junction | Vengalrao Nagar | |
| 168 | 415+085 | T Junction | Vengalrao Nagar | |
| 169 | 415+115 | T Junction | Vengalrao Nagar | |
| 170 | 415+150 | T Junction | Vengalrao Nagar | |
| 171 | 415+181 | T Junction | Vengalrao Nagar | |
| 172 | 415+220 | T Junction | Vengalrao Nagar | |
| 173 | 415+250 | T Junction | Vengalrao Nagar | |
| 174 | 415+300 | T Junction | Vengalrao Nagar | |
| 175 | 415+335 | T Junction | Vengalrao Nagar | |
| 176 | 415+376 | T Junction | Vengalrao Nagar | |
| 177 | 415+400 | T Junction | Vengalrao Nagar | |
| 178 | 415+440 | T Junction | Vengalrao Nagar | |
| 179 | 415+472 | T Junction | Vengalrao Nagar | |
| 180 | 415+577 | X Junction | Nambur Rly Station Road | Nambur |
| 181 | 415+690 | T Junction | | Nambur |
| 182 | 415+855 | T Junction | Nambur | |
| 183 | 416+870 | T Junction | | Nambur |
| 184 | 417+669 | T Junction | Koppuravuru to NH-5 Road | |
| 185 | 417+830 | T Junction | | Nambur |
| 186 | 417+936 | T Junction | | Nambur |
| 187 | 417+969 | T Junction | | Nambur |
| 188 | 418+000 | T Junction | | Nambur |
| 189 | 418+250 | T Junction | | Nambur Road |
| 190 | 419+868 | T Junction | Nagarjuna Nagar | |
| 191 | 419+950 | Y Junction | | Ramakrishna Housing Road |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 192 | 420+785 | Y Junction | Kaza | |
| 193 | 420+960 | Y Junction | | Kaza |
| 194 | 421+100 | Y Junction | | Panchayathi Road |
| 195 | 421+105 | T Junction | | Kaza |
| 196 | 421+273 | T Junction | | Kaza |
| 197 | 421+293 | Y Junction | Kaza | |
| 198 | 421+350 | T Junction | Kaza | |
| 199 | 421+500 | Y Junction | | Narayana Theertha Road |
| 200 | 421+637 | Y Junction | | Kaza |
| 201 | 421+800 | Y Junction | Kaza | |
| 202 | 421+850 | T Junction | | Kaza |
| 203 | 421+890 | T Junction | | |
| 204 | 421+900 | T Junction | | Kaza |
| 205 | 421+991 | T Junction | Kaza | |
| 206 | 422+006 | T Junction | | Kaza |
| 207 | 422+050 | T Junction | | Venkatareddy Palem |
| 208 | 422+085 | T Junction | | Venkatareddy Palem |
| 209 | 422+133 | T Junction | | Venkatareddy Palem |
| 210 | 422+185 | T Junction | | Venkatareddy Palem |
| 211 | 422+226 | T Junction | | Venkatareddy Palem |
| 212 | 422+264 | T Junction | | Venkatareddy Palem |
| 213 | 422+285 | T Junction | Kaza | |
| 214 | 422+320 | T Junction | | Venkatareddy Palem |
| 215 | 422+320 | T Junction | Kaza | |
| 216 | 422+350 | T Junction | Kaza | |
| 217 | 422+350 | T Junction | | Venkatareddy Palem |
| 218 | 422+417 | T Junction | | Mangalagiri |

## Section 02 Chennai Bypass

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1 | 0+385 | X Junction | Indra Nagar | Irumbuliyur |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 2 | 1+138 | T Junction | Karumariamman Nagar | |
| 3 | 1+480 | T Junction | Lakshmipuram Extension | |
| 4 | 1+540 | X Junction | Lakshmipuram Extension | Lakshmipuram Extension |
| 5 | 1+600 | T Junction | Lakshmipuram Extension | |
| 6 | 1+655 | T Junction | CTO Colony | |
| 7 | 1+712 | T Junction | CTO Colony | |
| 8 | 1+770 | T Junction | CTO Colony | |
| 9 | 1+820 | T Junction | Sree Sai Nagar | |
| 10 | 1+855 | T Junction | Sree Sai Nagar | |
| 11 | 2+012 | T Junction | Sree Sai Nagar | |
| 12 | 2+128 | T Junction | Sree Sai Nagar | |
| 13 | 2+168 | T Junction | Sree Sai Nagar | |
| 14 | 2+210 | T Junction | Sree Sai Nagar | |
| 15 | 2+257 | T Junction | Sree Sai Nagar | |
| 16 | 2+515 | X Junction | Varadharajapuram | West Tambaram |
| 17 | 3+000 | T Junction | Kannadapalayam | |
| 18 | 3+100 | T Junction | Nadu Street | |
| 19 | 3+200 | T Junction | Ankaputhur | |
| 20 | 3+915 | T Junction | | Pulikkuradu |
| 21 | 4+015 | T Junction | Ankaputhur | |
| 22 | 4+060 | T Junction | Ankaputhur | |
| 23 | 5+050 | T Junction | thirumangai alwarpuram | |
| 24 | 5+230 | X Junction | Tiruneermalai | West Tambaram |
| 25 | 6+010 | X Junction | Tiruneermalai | Chromepet |
| 26 | 6+232 | T Junction | Tiruneermalai | |
| 27 | 7+100 | X Junction | Tiruneermalai | Kamarajapuram |
| 28 | 7+155 | T Junction | Visveswarapuram | |
| 29 | 7+205 | T Junction | Visveswarapuram | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 30 | 7+300 | T Junction | Visveswarapuram | |
| 31 | 7+342 | T Junction | Visveswarapuram | |
| 32 | 7+437 | T Junction | Srinivasapuram | |
| 33 | 7+540 | X Junction | Srinivasapuram | Kamarajapuram |
| 34 | 8+375 | T Junction | Lakshmi Nagar | |
| 35 | 8+655 | T Junction | Thirumalai nagar | |
| 36 | 8+750 | T Junction | Thirumalai Nagar | |
| 37 | 8+837 | T Junction | Bommai Nagar | |
| 38 | 8+925 | T Junction | Quithe millath nagar | |
| 39 | 8+943 | T Junction | Quithe millath nagar | |
| 40 | 10+377 | X Junction | Thandalam | Sadanandapuram |
| 41 | 10+718 | T Junction | Thandalam | |
| 42 | 10+956 | T Junction | Thandalam | |
| 43 | 11+475 | Y Junction | Kovur | |
| 44 | 11+748 | T Junction | Kovur | |
| 45 | 12+515 | Y Junction | Rajappa Nagar | |
| 46 | 12+800 | Y Junction | Paraniputhur | |
| 47 | 13+060 | Y Junction | Periyapanicheri Road | |
| 48 | 13+275 | Y Junction | Paraniputhur | |
| 49 | 13+545 | X Junction | Paraniputhur | Mugalivakkam |
| 50 | 15+890 | T Junction | Gandhi Nagar | |
| 51 | 16+060 | T Junction | Gandhi Nagar | |
| 52 | 16+125 | T Junction | Devi Parasakthi Nagar | |
| 53 | 16+505 | T Junction | Rajas Garden | |
| 54 | 16+555 | T Junction | Rajas Garden | |
| 55 | 16+595 | T Junction | Rajas Garden | |
| 56 | 16+645 | T Junction | Rajas Garden | |
| 57 | 16+800 | T Junction | | Porur Gardens |
| 58 | 16+885 | X Junction | Gandhi Nagar | Porur Gardens |
| 59 | 16+930 | X Junction | Vijaya Nagar | Gandhi Main Road |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 60 | 17+635 | Y Junction | Indira Nagar | |
| 61 | 17+690 | Y Junction | | Subbammal Road |
| 62 | 18+020 | X Junction | Mettukuppam Road | Mettukuppam Road |
| 63 | 18+180 | Y Junction | | Odamanagar |
| 64 | 18+760 | Y Junction | | Kanniyamman Nagar |
| 65 | 19+530 | X Junction | Union Rd | Union Rd |
| 66 | 19+800 | T Junction | Maduravoyal | |
| 67 | 19+800 | T Junction | | Ambattur |
| 68 | 19+825 | T Junction | | Ambattur |
| 69 | 19+875 | T Junction | Maduravoyal | |
| 70 | 19+885 | T Junction | | Maduravoyal |
| 71 | 20+460 | T Junction | Ambattur | |
| 72 | 20+815 | T Junction | | Ambattur |
| 73 | 20+950 | T Junction | | Ambattur |
| 74 | 20+985 | T Junction | Indira Gandhi Street | |
| 75 | 20+985 | T Junction | | Ambattur |
| 76 | 21+190 | T Junction | | Mogappair West |
| 77 | 21+225 | T Junction | Ganapathy Street | |
| 78 | 21+335 | X Junction | TT Mathew Rd | Mogappair West |
| 79 | 21+390 | T Junction | | Mogappair West |
| 80 | 21+825 | T Junction | | Jaswant Nagar |
| 81 | 21+970 | Y Junction | | Jaswant Nagar |
| 82 | 22+505 | T Junction | | Ambattur |
| 83 | 22+525 | T Junction | Kalaivanar Nagar | |
| 84 | 22+720 | Y Junction | | Ambattur |
| 85 | 22+755 | T Junction | | Ambattur |
| 86 | 22+775 | T Junction | Ambattur | |
| 87 | 22+955 | T Junction | Ambattur | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 88 | 22+972 | T Junction | | Ambattur |
| 89 | 22+995 | T Junction | Mariamman Koil Street | |
| 90 | 23+120 | T Junction | Ambattur | |
| 91 | 23+190 | T Junction | Ambattur | |
| 92 | 23+230 | T Junction | | Ambattur |
| 93 | 23+310 | T Junction | | Ambattur |
| 94 | 23+320 | T Junction | Ambattur | |
| 95 | 23+355 | T Junction | | Ambattur |
| 96 | 23+400 | T Junction | | Ambattur |
| 97 | 23+455 | T Junction | | Ambattur |
| 98 | 23+505 | T Junction | Ambattur | |
| 99 | 23+565 | T Junction | | Ambattur |
| 100 | 23+792 | T Junction | Ambattur | |
| 101 | 23+792 | T Junction | | Ambattur |
| 102 | 23+852 | T Junction | Ambattur | |
| 103 | 23+890 | T Junction | | Ambattur |
| 104 | 24+052 | T Junction | Ambattur | |
| 105 | 24+205 | T Junction | | Ambattur |
| 106 | 24+215 | T Junction | Ambattur | |
| 107 | 24+450 | T Junction | Ambattur | |
| 108 | 24+605 | T Junction | | Ambattur |
| 109 | 24+745 | T Junction | Pattravakkam Rd | |
| 110 | 24+908 | T Junction | Godrej Road | |
| 111 | 25+185 | T Junction | Gnanamurthi Nagar | |
| 112 | 25+235 | T Junction | Sivgami Ammal Street | |
| 113 | 25+235 | Y Junction | | Sundaresa Pillai Street |
| 114 | 25+280 | T Junction | | Sundaram Street |
| 115 | 25+300 | T Junction | Gnanamoorthy Nagar | |
| 116 | 25+370 | T Junction | Kathiresan Street | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 117 | 25+415 | T Junction | Sathyanarayana Street | |
| 118 | 25+415 | T Junction | | Sathyanarayana Street |
| 119 | 25+455 | T Junction | Thirunavukarasu Street | |
| 120 | 25+465 | T Junction | | Thirunavukarasu Street |
| 121 | 25+515 | T Junction | Bhanu Street | |
| 122 | 25+540 | T Junction | | Bhanu Street |
| 123 | 25+570 | Y Junction | Vittal Street | |
| 124 | 25+675 | Y Junction | | Krishna Street |
| 125 | 25+705 | T Junction | | Netaji Street |
| 126 | 25+755 | Y Junction | Gandhi Street | |
| 127 | 25+810 | Y Junction | Pallavan Street | |
| 128 | 25+950 | X Junction | Karukku Main Road | Karukku Main Road |
| 129 | 25+995 | Y Junction | Menambedu | |
| 130 | 26+300 | T Junction | Menambedu | |
| 131 | 26+455 | T Junction | Indira Nagar Main Road | |
| 132 | 26+460 | Y Junction | | Munusamy Kovii Street |
| 133 | 26+578 | T Junction | | Rajaji Street |
| 134 | 26+625 | T Junction | | Madurai Veeran Street |
| 135 | 26+745 | T Junction | | Thilagavathi Street |
| 136 | 26+775 | T Junction | Kallikuppam | |
| 137 | 26+820 | T Junction | Kallikuppam | |
| 138 | 26+865 | T Junction | Kallikuppam | |
| 139 | 26+892 | T Junction | | Gayatri Nagar |
| 140 | 26+900 | T Junction | Kamarajar Street | |
| 141 | 26+925 | T Junction | | Thirunavukkarasu St |
| 142 | 26+940 | Y Junction | Indira Street | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 143 | 26+982 | T Junction | | Samundeeswari Street |
| 144 | 27+023 | T Junction | Anna Street | |
| 145 | 27+035 | T Junction | | Anna Main Road |
| 146 | 27+070 | T Junction | | Sanjay Gandhi Street |
| 147 | 27+080 | T Junction | Kambar Street | |
| 148 | 27+125 | T Junction | | Sai Baba Street |
| 149 | 27+140 | T Junction | Bharathi Street | |
| 150 | 27+190 | T Junction | | Annai Theraza Street |
| 151 | 27+378 | T Junction | Padasalai Street | |
| 152 | 27+400 | T Junction | | Gangai Amman Koil Street |
| 153 | 27+500 | Y Junction | | East Balaji Nagar |
| 154 | 27+530 | Y Junction | Perumal Koil Street | |
| 155 | 27+565 | T Junction | | East Balaji Nagar |
| 156 | 27+605 | Y Junction | Pillaiyar Koil Street | |
| 157 | 27+665 | T, Y Junction | Pillaiyar Koil Street | |
| 158 | 27+685 | T Junction | | East Balaji Nagar |
| 159 | 27+735 | Y Junction | Kallikuppam | |
| 160 | 27+760 | Y Junction | | East Balaji Nagar |
| 161 | 27+785 | Y Junction | East Balaji Nagar | |
| 162 | 27+830 | Y Junction | | East Balaji Nagar |
| 163 | 27+850 | Y Junction | East Balaji Nagar | |
| 164 | 27+915 | Y Junction | | East Balaji Nagar |
| 165 | 27+915 | Y Junction | East Balaji Nagar | |
| 166 | 28+017 | Y Junction | East Balaji Nagar | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 167 | 28+017 | Y Junction | | East Balaji Nagar |
| 168 | 28+035 | Y Junction | Murugambedu Main Road | |
| 169 | 28+460 | T Junction | | Kallikuppam |
| 170 | 28+500 | Y Junction | Jasmin Nagar Extension | |
| 171 | 28+845 | Y Junction | Madhanakuppam Rd | |
| 172 | 29+065 | X Junction | Andal Kovil Main Rd | Andal Kovil Main Rd |
| 173 | 29+220 | T Junction | Sivaprakasam Nagar | |
| 174 | 29+270 | T Junction | Sivaprakasam Nagar Main Road | |
| 175 | 29+318 | T Junction | | Puthagaram |
| 176 | 29+360 | Y Junction | Gandhi Street | |
| 177 | 29+755 | X Junction | Puthagaram Road | Puthagaram Road |
| 178 | 30+175 | T Junction | | Venkateshwara Nagar |
| 179 | 30+175 | X Junction | Surapet | Kolathur |
| 180 | 30+222 | Y Junction | Srinivasa Nagar Main Road | |
| 181 | 30+280 | Y Junction | | Padmavathi Nagar |
| 182 | 30+635 | Y Junction | | Padmavathi Nagar |
| 183 | 30+785 | Y Junction | Sathya Murthy Nagar | |
| 184 | 30+790 | Y Junction | | Padmavathi Nagar |
| 185 | 30+840 | T Junction | Kadirvedu | |
| 186 | 30+870 | Y Junction | | Padmavathi Nagar |
| 187 | 30+935 | T Junction | Iyappa Nagar | |
| 188 | 30+990 | T Junction | | Kadirvedu |
| 189 | 31+010 | T Junction | Kadirvedu | |
| 190 | 31+085 | T Junction | | Iyappa Nagar Extension |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 191 | 31+145 | Y Junction | INTUC Nagar | |
| 192 | 31+175 | T Junction | Rasi Nagar Street | |
| 193 | 31+515 | Y Junction | Madhavaram | |
| 194 | 31+580 | Y Junction | Madhavaram | |
| 195 | 31+688 | T Junction | | Katida Thozilalar Nagar |
| 196 | 31+725 | Y Junction | Madhavaram | |
| 197 | 31+920 | T Junction | | Puzhal |

**Section 03 Chennai Tada**

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1 | 21+430 | T Junction | Vijayanallur | |
| 2 | 21+725 | T Junction | | Angadu |
| 3 | 22+085 | T Junction | | Angadu |
| 4 | 22+130 | T Junction | Bungalow Rd | |
| 5 | 22+350 | T Junction | | Bajanai Koil St |
| 6 | 23+130 | Y Junction | 1st Street | |
| 7 | 24+665 | Y Junction | | Deva Neri - Karanodai Rd |
| 8 | 25+100 | Y Junction | Deva Neri - Karanodai Rd | |
| 9 | 25+155 | Y Junction | | Avvaiyar St |
| 10 | 25+550 | T Junction | Karanodai | |
| 11 | 25+605 | T Junction | Karanodai | |
| 12 | 25+630 | T Junction | Karanodai | |
| 13 | 25+655 | T Junction | Karanodai | |
| 14 | 25+655 | T Junction | | Karanodai |
| 15 | 25+680 | T Junction | towards Athur Rd | |
| 16 | 25+975 | Y Junction | | towards Athur Rd |
| 17 | 27+630 | T Junction | | Irulipattu Rd |
| 18 | 27+650 | T Junction | Sundaram Rd | |
| 19 | 27+670 | T Junction | | Irulipattu Rd |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 20 | 27+930 | Y Junction | Azhinjivakkam Village | |
| 21 | 28+395 | T Junction | Alinjiwakkam | |
| 22 | 28+460 | T Junction | | Jaganathapuram |
| 23 | 28+500 | Y Junction | | Alinjiwakkam |
| 24 | 28+780 | T Junction | Nadi Company Rd | |
| 25 | 28+830 | Y Junction | | Sivan Koil St |
| 26 | 29+840 | T Junction | White City | |
| 27 | 29+965 | T Junction | Panjetty | |
| 28 | 29+980 | T Junction | | Natham Village |
| 29 | 30+030 | T Junction | | Natham Village |
| 30 | 30+130 | T Junction | | Panjetty |
| 31 | 30+180 | T Junction | | Panjetty |
| 32 | 31+140 | T Junction | Golden City | |
| 33 | 31+450 | T Junction | | Thatchoor |
| 34 | 31+955 | T Junction | Keelamani taluk | |
| 35 | 31+980 | T Junction | | Peravallur |
| 36 | 32+075 | T Junction | Peravallur | |
| 37 | 32+225 | T Junction | | Peravallur |
| 38 | 32+900 | Y Junction | Peravallur | |
| 39 | 32+935 | Y Junction | | Perumal Koil Road |
| 40 | 33+655 | T Junction | Siruvapuri | |
| 41 | 33+820 | T Junction | | Durainallur |
| 42 | 33+980 | T Junction | | Durainallur |
| 43 | 34+100 | T Junction | | Tiruvallur |
| 44 | 34+735 | T Junction | Siruvapuri Rd | |
| 45 | 34+800 | T Junction | | Puduvoyal village |
| 46 | 34+865 | T Junction | | Puduvoyal village |
| 47 | 34+990 | Y Junction | | Perumal kovil street |
| 48 | 35+350 | Y Junction | | Perumal kovil street |
| 49 | 35+645 | T Junction | Puduvoyal | |
| 50 | 35+755 | T Junction | | Peruvaili |
| 51 | 36+320 | Y Junction | Peruvaili | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 52 | 37+650 | T Junction | Ariyathurai Temple Rd | |
| 53 | 38+420 | T Junction | | Sir Thyagarayar Street |
| 54 | 38+450 | T Junction | | Thiyagaraya St |
| 55 | 38+525 | T Junction | | Raja St |
| 56 | 38+585 | T Junction | TC Rd | |
| 57 | 38+595 | T Junction | | Railway Station Rd |
| 58 | 38+645 | T Junction | | Pulicat Rd |
| 59 | 39+985 | T Junction | | Perumal Koil St |
| 60 | 40+110 | T Junction | Kilmudalambedu | |
| 61 | 41+040 | T Junction | Verkadu | |
| 62 | 41+380 | T Junction | Verkadu | |
| 63 | 43+400 | Y Junction | Gummidipoondi | |
| 64 | 43+600 | Y Junction | | Pattupalli - Gummudipundi Rd |
| 65 | 43+610 | T Junction | 196 Kalathi St | |
| 66 | 43+820 | Y Junction | Pattupalli - Gummudipundi Rd | |
| 67 | 43+965 | T Junction | | Maposi Nagar |
| 68 | 44+020 | T Junction | Pattupalli - Gummudipundi Rd | |
| 69 | 44+275 | T Junction | | Vivekananda Nagar |
| 70 | 44+460 | T Junction | | Gummidipoondi |
| 71 | 45+050 | T Junction | Anthoni Pillai Nagar | |
| 72 | 45+050 | T Junction | | Jai Hind Nagar |
| 73 | 45+725 | T Junction | Gummidipundi | |
| 74 | 45+745 | T Junction | | Pappankuppam |
| 75 | 46+080 | T Junction | Gummidipoondi | |
| 76 | 46+320 | T Junction | | IRT Rd |
| 77 | 46+410 | T Junction | Kayalarmedu | |
| 78 | 46+565 | T Junction | Kandigai Rd | |
| 79 | 46+745 | Y Junction | | Old Bypass Road |
| 80 | 47+715 | T Junction | | Gummidipoondi |

| S.No. | Chainage Km | Type of Junction | Access Road Leads to | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 81 | 48+310 | Y Junction | Tiruvallur | |
| 82 | 48+515 | T Junction | Chinnaobulapuram | |
| 83 | 49+175 | T Junction | Chinnaobulapuram | |
| 84 | 49+235 | T Junction | | Elavur Bazzar |
| 85 | 49+460 | T Junction | Chinnaobulapuram | |
| 86 | 49+925 | T Junction | Elavur | |
| 87 | 50+325 | T Junction | Elavur | |
| 88 | 50+535 | T Junction | Elavur | |
| 89 | 50+740 | T Junction | | Elavur |
| 90 | 50+875 | Y Junction | Tiruvallur | |
| 91 | 51+000 | T Junction | | Elavur - Sunnambukulam Saalai |
| 92 | 51+160 | T Junction | Tiruvallur | |
| 93 | 51+210 | T Junction | Magalinga Nagar | |
| 94 | 51+285 | T Junction | Arambakkam | |
| 95 | 52+730 | T Junction | Gumpli | |

## Section 04 Neelmangla-Tumkur

| S.No. | Chainage Km | Type of Junction | Access Road Leads To | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 1* | 29+990 | Y | | Kulimepalya |
| 2* | 30+390 | Y | Happegowdanapalya | |
| 3* | 30+990 | Y | Bommanahalli | |
| 4* | 31+590 | Y | | Ueranangeepura |
| 5* | 32+510 | T | | Boodihal |
| 6* | 33+960 | T | Chamundeshwari Nagar | |
| 7* | 35+200 | T | | Begur |
| 8* | 35+770 | X | Begur | Malonagathihalli |
| 9* | 37+330 | T | Badayapa Halli | |
| 10* | 37+950 | Y | Thippagondana Halli | |

| S.No. | Chainage Km | Type of Junction | Access Road Leads To | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 11* | 38+580 | Y | Talakere | |
| 12* | 38+580 | T | | Dodden |
| 13* | 39+460 | Y | | Dodden |
| 14* | 40+760 | X | Timsandra | Thyamagondlu |
| 15* | 41+410 | Y | Mahimapura | |
| 16* | 42+660 | T | | Thyamagondlu |
| 17* | 43+050 | X | Kerekathiganur | Shivaganga |
| 18* | 43+460 | T | Aladahalli | |
| 19* | 43+460 | T | | Gundenahalli |
| 20* | 44+540 | T | Billanakote | |
| 21* | 44+540 | T | | Thyamagondlu |
| 22* | 45+640 | T | | Hosahalli |
| 23* | 46+160 | Y | Kengal Kempahalli | |
| 24* | 46+280 | T | Avverahalli | |
| 25* | 46+610 | Y | K G Srinivasapura | |
| 26* | 47+070 | Y | | Bharathipura |
| 27* | 47+750 | T | | Sompura Industrial Area |
| 28* | 48+260 | T | | Dobbaspet |
| 29* | 49+390 | Y | Devara Hosahalli | |
| 30 | 49+950 | T | | |
| 31 | 51+210 | T | | Muddanayakanahalli |
| 32 | 52+030 | T | | Hosanijagal |
| 33 | 52+670 | T | | Rayanapalya |
| 34 | 54+300 | T | Hale Nijagal | |
| 35 | 55+310 | T | | Nandihalli |
| 36 | 56+500 | Y | | Devarahalli |
| 37 | 56+830 | T | | Chikkahalli |
| 38 | 58+810 | T | Kodihalli | |
| 39 | 58+230 | T | | Vrdigere |

| S.No. | Chainage Km | Type of Junction | Access Road Leads To | |
|---|---|---|---|---|
| | | | LHS | RHS |
| 40 | 59+040 | Y | Factories | |
| 41 | 59+360 | T | Singanahalli Colony | |
| 42 | 59+360 | T | | Urdigere |
| 43 | 59+880 | T | Factories | |
| 44 | 60+400 | T | Village | |
| 45 | 60+400 | T | | Village |
| 46 | 61+350 | T | Machanahalli | |
| 47* | 63+030 | T | | Mydala |
| 48* | 64+000 | Y | Kyatsandra Town | |
| 49* | 65+380 | Y | | APMC Yard, Tumkur City |
| 50* | 65+970 | Y | | Devarayapattana |
| 51* | 69+080 | T | | Vaddarahalli |
| 52* | 72+480 | T | | Inside Industrail Area |
| 53* | 72+690 | T | Inside Tumkur City | |
| 54* | 73+800 | T | | Industrail Area, Tumkur |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

## Section 01 Vijayawada-Chilakaluripet






## Section 02 Chennai Bypass








**Section 03 Chennai Tada**









**Section 04 Neelmangla-Tumkur**



**Figure 6-3 : Junctions along the Project Stretch**

### 6.4.9 Median Opening

Details of median openings of Project Stretch are given in table below:

***Table 6-10 : List of Median Opening***

**Section 01 Vijayawada-Chilakaluripet**

| S. No | Chainage (Km) | | Length (m) | Storage Lane | Remark |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 5+451 | 5+473 | 20 | Not Present | Emergency MO |
| 2 | 10+690 | 10+710 | 20 | Not Present | Emergency MO |
| 3 | 420+200 | 420+460 | 260 | Not Present | Toll plaza U-turn Mo |
| 4 | 420+550 | 420+800 | 250 | Not Present | Toll plaza U-turn Mo |

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| S. No | Chainage (Km) | | Length (m) | Storage Lane | Remark |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 1+005 | 1+020 | 15 | Present | Authorized |
| 2 | 9+300 | 9+305 | 5 | Not Present | Unauthorized |
| 3 | 16+500 | 16+600 | 100 | Not Present | Toll plaza U-turn Mo |
| 4 | 16+715 | 16+730 | 15 | Not Present | Toll plaza U-turn Mo |
| 5 | 16+850 | 16+870 | 20 | Present | Emergency MO |
| 6 | 16+990 | 17+010 | 20 | Present | Emergency MO |
| 7 | 28+500 | 28+550 | 50 | Not Present | Toll plaza U-turn Mo |
| 8 | 28+630 | 28+680 | 50 | Not Present | Toll plaza U-turn Mo |
| 9 | 31+390 | 31+400 | 10 | Not Present | Unauthorized |

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| S. No | Chainage (Km) | | Length (m) | Storage Lane | Remark |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 12+100 | 12+105 | 5 | Not Present | Authorized |
| 2 | 13+535 | 13+550 | 15 | Not Present | Authorized |
| 3 | 13+835 | 13+865 | 30 | Not Present | Authorized |
| 4 | 14+480 | 14+490 | 10 | Not Present | Authorized |
| 5 | 15+345 | 15+370 | 25 | Not Present | Authorized |
| 6 | 16+970 | 16+995 | 25 | Not Present | Authorized |
| 7 | 17+250 | 17+275 | 25 | Not Present | Authorized |
| 8 | 18+510 | 18+535 | 25 | Not Present | Authorized |
| 9 | 18+975 | 19+000 | 25 | Not Present | Authorized |
| 10 | 20+065 | 20+070 | 5 | Not Present | Authorized |
| 11 | 20+660 | 20+670 | 10 | Not Present | Authorized |
| 12 | 21+495 | 21+515 | 20 | Not Present | Toll plaza U-turn Mo |

| S. No | Chainage (Km) | | Length (m) | Storage Lane | Remark |
|---|---|---|---|---|---|
| | From | To | | | |
| 13 | 21+760 | 21+775 | 15 | Not Present | Toll plaza U-turn Mo |
| 14 | 22+760 | 22+775 | 15 | Not Present | Authorized |
| 15 | 29+950 | 29+960 | 10 | Not Present | Emergency MO |
| 16 | 32+910 | 32+915 | 5 | Not Present | Authorized |
| 17 | 36+300 | 36+325 | 25 | Not Present | Emergency MO |
| 18 | 41+030 | 41+040 | 10 | Not Present | Emergency MO |
| 19 | 48+830 | 48+835 | 5 | Not Present | Authorized |
| 20 | 50+730 | 50+745 | 5 | Not Present | Emergency MO |
| 21 | 52+715 | 52+730 | 15 | Not Present | Authorized |

**Section 04 Neelmangla-Tumkur**

| S. No | Chainage (Km) | | Length (m) | Storage Lane | Remark |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 52+780 | 52+805 | 25 | Not Present | Authorized |
| 2 | 54+360 | 54+380 | 20 | Not Present | Authorized |
| 3 | 55+460 | 55+468 | 8 | Not Present | Authorized |
| 4 | 56+900 | 56+915 | 15 | Not Present | Authorized |
| 5 | 57+715 | 57+740 | 25 | Not Present | Authorized |
| 6 | 58+300 | 58+315 | 15 | Not Present | Authorized |
| 7 | 59+428 | 59+455 | 27 | Not Present | Authorized |
| 8 | 60+470 | 60+500 | 30 | Not Present | Authorized |
| 9 | 61+175 | 61+200 | 25 | Not Present | Authorized |
| 10 | 61+335 | 61+370 | 35 | Not Present | Authorized |
| 11 | 61+408 | 61+420 | 12 | Not Present | Toll plaza U-turn |
| 12 | 61+525 | 61+582 | 57 | Not Present | Toll plaza U-turn |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

**Section 01 Vijayawada-Chilakaluripet**






**Section 02 Chennai Bypass**








**Section 03 Chennai Tada**









**Section 04 Neelmangla-Tumkur**

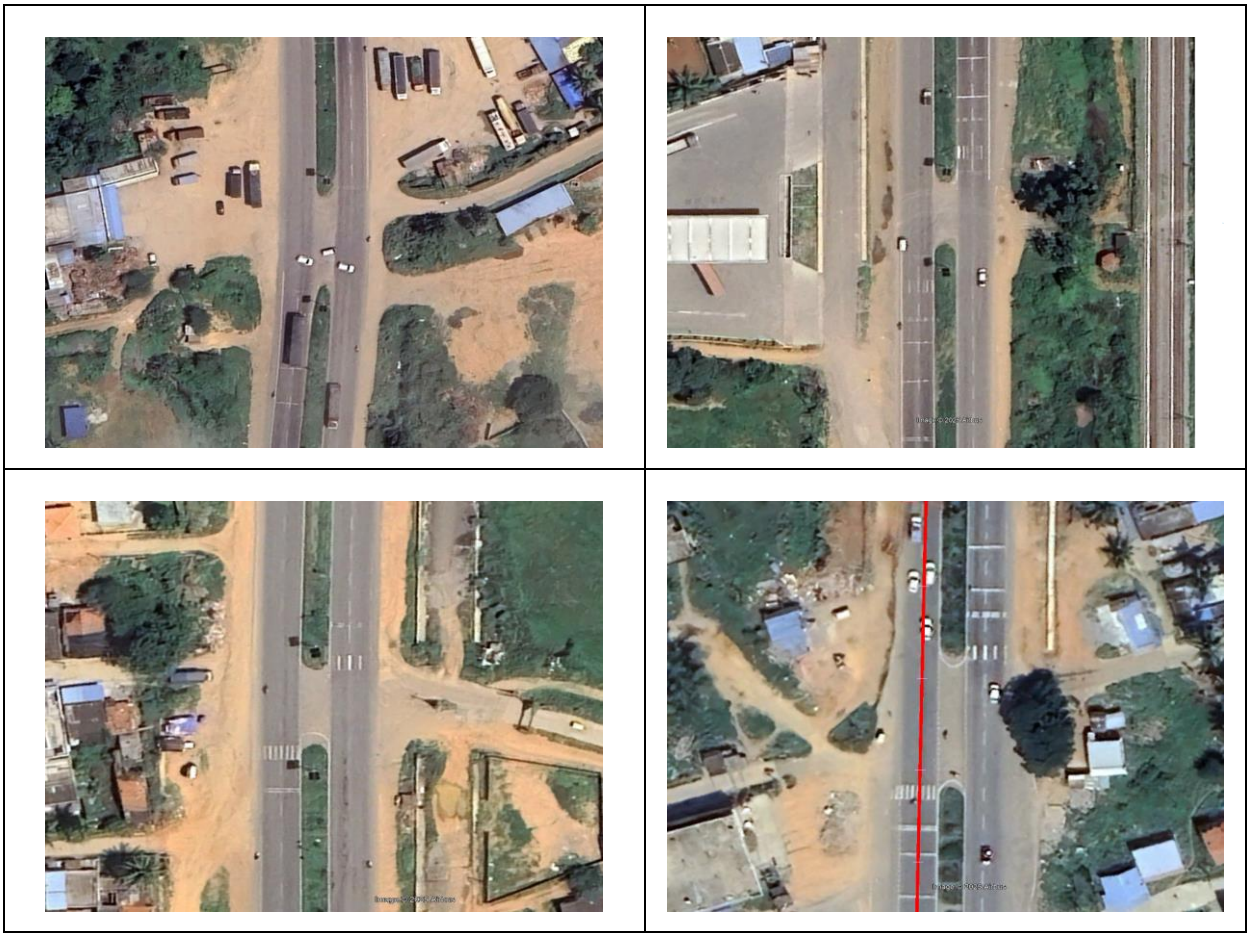


**Figure 6-4 : Median Opening along the Project Stretch**

### 6.4.10 Pavement Types

Pavement type along the Project Stretch including Toll Plaza area is as below:

**Table 6-11 : Pavement Type**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Length (m) | Pavement Type |
|---|---|---|---|---|
| | From | To | | |
| 1 | 0+000 | 16+499 | 16499 | Flexible |
| 2 | 355+000 | 357+342 | 2342 | Flexible |
| 3 | 372+038 | 420+200 | 48162 | Flexible |
| 4 | 420+200 | 420+800 | 600 | Rigid |
| 5 | 420+800 | 422+605 | 1805 | Flexible |
| **Total** | | | **69408** | |

**Section 02 Chennai Bypass**

| S. No. | Chainage (Km) | | Length (m) | Pavement Type |
|---|---|---|---|---|
| | From | To | | |
| 1 | 0+000 | 16+630 | 16630 | Flexible |
| 2 | 16+630 | 16+700 | 70 | Rigid |
| 3 | 16+700 | 28+605 | 11905 | Flexible |
| 4 | 28+605 | 28+680 | 75 | Rigid |
| 5 | 28+680 | 32+600 | 3920 | Flexible |
| **Total** | | | **32600** | |

**Section 03 Chennai Tada**

| S. No. | Chainage (Km) | | Length (m) | Pavement Type |
|---|---|---|---|---|
| | From | To | | |
| 1 | 21+400 | 21+865 | 465 | Rigid |
| 2 | 21+865 | 54+400 | 32535 | Flexible |
| **Total** | | | **33000** | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage (Km) | | Length (m) | Pavement Type |
|---|---|---|---|---|
| | From | To | | |
| 1* | 29+500 | 49+900 | 20400 | Flexible |
| 2 | 49+900 | 52+700 | 2800 | Flexible |
| 3* | 52+700 | 53+500 | 800 | Rigid |
| 4 | 53+500 | 61+430 | 7930 | Flexible |
| 5 | 61+430 | 61+527 | 97 | Flexible |
| 6* | 61+527 | 62+000 | 473 | Flexible |
| 7* | 62+000 | 74+168 | 12168 | Flexible |
| Total | | | **44668** | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period..

## 6.5 Structure

Structures are broadly classified into two types - cross drainage structures and grade separated structures. Cross drainage structures are classified into following three broad types as per IRC5.

- Major bridges having total length more than 60 m,
- Minor bridges having length between 6 and 60 m and
- Culverts having length below 6m. Depending on type of construction, culverts are again grouped in to pipe culverts, slab culverts and box culverts.

Grade separated structures are grouped in to five major categories depending on their function.

- Flyovers: elevated bridges for crossing by Project Stretch over any cross road with raised Project Stretch over cross road level.
- Vehicle underpasses (VUP) are constructed below the Project Stretch lowered cross road level with proper drainage arrangements.
- PUP/CUP is similar to VUP except they are meant for pedestrians and cattle crossing under the Project Stretch.
- ROB is similar to flyover except it is to cross Project Stretch over existing railway line.
- RUB is to take Project Stretch under the existing rail line with proper drainage arrangements.

### 6.5.1 Summary of Structure

Numbers of existing structures on Project Stretch under each group are furnished in table below.

**Table 6-12 : Summary of Structure**

The total numbers of existing structures along Project Highway are given below.

**Section 01 Vijayawada-Chilakaluripet**

| S. No | Type of Structures | Unit | Structures |
|---|---|---|---|
| 1 | Major Bridges | No | 3 |
| 2 | Minor Bridges | No | 23 |
| 3 | Flyover | No | 7 |
| 4 | ROB | No | 1 |
| 5 | RUB | No | 0 |
| 6 | VOP | No | 1 |
| 7 | VUP/LVUP/SVUP | No | 27 |
| 8 | PUP/CUP | No | 26 |
| 9 | EUP/AUP | No | 0 |
| 10 | FOB | No | 0 |
| 11 | Culverts | No | 90 |

**Section 02 Chennai Bypass**

| S. No | Type of Structures | Unit | Structures |
|---|---|---|---|
| 1 | Major Bridges | No | 3 |
| 2 | Minor Bridges | No | 3 |
| 3 | Flyover | No | 2 |
| 4 | ROB | No | 1 |
| 5 | RUB | No | 1 |
| 6 | VOP | No | 0 |
| 7 | VUP/LVUP/SVUP | No | 18 |
| 8 | PUP/CUP | No | 2 |
| 9 | EUP/AUP | No | 0 |
| 10 | FOB | No | 0 |
| 11 | Culverts | No | 140 |
| 12 | Elevated Corridor | No | 1 |
| 13 | Grade Separator | No | 0 |
| 14 | Interchange | No | 1 |

**Section 03 Chennai Tada**

| S. No | Type of Structures | Unit | Structures |
|---|---|---|---|
| 1 | Major Bridges | No | 3 |

| S. No | Type of Structures | Unit | Structures |
|---|---|---|---|
| 2 | Minor Bridges | No | 9 |
| 3 | Flyover | No | 5 |
| 4 | ROB | No | 0 |
| 5 | RUB | No | 0 |
| 6 | VOP | No | 2 |
| 7 | VUP/LVUP/SVUP | No | 9 |
| 8 | PUP/CUP | No | 7 |
| 9 | EUP/AUP | No | 0 |
| 10 | FOB | No | 1 |
| 11 | Culverts | No | 56 |
| 12 | Elevated Corridor | No | 0 |
| 13 | Grade Separator | No | 0 |
| 14 | Interchange | No | 0 |
| 15 | Subway | No | 0 |

**Section 04 Neelmangla-Tumkur**

| S. No | Type of Structures | Unit | Structures |
|---|---|---|---|
| 1 | Major Bridges | No | 4 |
| 2 | Minor Bridges | No | 18 |
| 3 | Flyover | No | 4 |
| 4 | ROB | No | 3 |
| 5 | RUB | No | 0 |
| 6 | VOP | No | 4 |
| 7 | VUP/LVUP/SVUP | No | 19 |
| 8 | PUP/CUP | No | 1 |
| 9 | EUP/AUP | No | 0 |
| 10 | FOB | No | 2 |
| 11 | Culverts | No | 69 |
| 12 | Elevated Corridor | No | 0 |
| 13 | Grade Separator | No | 0 |
| 14 | Interchange | No | 0 |
| 15 | Subway | No | 1 |

### 6.5.2 Major Bridge

Detailed inventory survey of the existing major bridge was carried out by experienced bridge engineers and data is furnished in this section.

**Section 01 Vijayawada-Chilakaluripet**

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## Section 02 Chennai Bypass












## Section 03 Chennai Tada









**Figure 6-5 : Major Bridges along the Project Stretch**

**Table 6-13 : Summary of Major Bridges**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 4+200 | 4+380 | LHS SR | 6 X 30 | 11 | RCC | PSC I Girder with RCC Slab |
| | | | LHS | 6 X 30 | 14.5 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 6 X 30 | 14.5 | RCC | PSC I Girder with RCC Slab |
| 2 | 8+400 | 8+520 | LHS SR | 4 X 30 | 11 | RCC | PSC I Girder with RCC Slab |
| | | | LHS | 4 X 30 | 14.5 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 4 X 30 | 14.5 | RCC | PSC I Girder with RCC Slab |
| 3 | 373+592 | 373+658 | LHS | 2 x 33 M | 14.05 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 2 x 33 M | 14.05 | RCC | PSC I Girder with RCC Slab |

## Section 02 Chennai Bypass

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 9+036 | 9+240 | LHS | (1 x 37 M + 9 x 18.5 M) | 1x12 | RCC Circular Pier | RCC Deck Slab |
| | | | RHS | 11x18.5 | 1x12 | RCC Circular Pier | RCC Deck Slab |
| 2 | 15+413 | 15+875 | LHS | 14*30.4+2*18.4 | 1x12 | RCC Rectangular Pier | RC cast in situ Deck Slab with I Girder |
| | | | RHS | | 1x12 | RCC Rectangular Pier | RC cast in situ Deck Slab with I Girder |
| 3 | 19+235 | 19+670 | LHS | (3 x 62 M +1 x 49M + 2 x 65 M + 1 x 7.949M + 2 x 26.998 M + 1 x 8.085 M) | 1x13.8 | RCC Circular Pier | RCC Deck Slab with I Girder |
| | | | RHS | | 1x13.8 | RCC Circular Pier | RCC Deck Slab with I Girder |

## Section 03 Chennai Tada

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 26+439 | 26+873 | LHS SR | 1x50+9x37.1+1x50 | 1 x 10.2 | RCC | PSC I Girder With RCC Slab |
| | | | LHS | 11x37.1 | 1 x 14.25 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | 11x37.1+2x12.95 | 1 x 14.25 | RCC | PSC I Girder With RCC Slab |
| | | | RHS SR | 11x37.1+2x12.95 | 1 x 10.2 | RCC | PSC I Girder With RCC Slab |
| 2 | 35+529 | 35+652 | LHS SR | 7x17.6 | 1 x 8.5 | RCC | I Girder With RCC Slab |
| | | | LHS | 7x17.6 | 1 x 14.25 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | 14x8.8 | 1 x 14.25 | RCC | RCC Deck Slab |
| | | | RHS SR | 7x17.6 | 1 x 8.5 | RCC | I Girder With RCC Slab |

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 3 | 52+617 | 52+721 | LHS SR | 2x26.4+2x25.78 | 1 x 10.2 | RCC | PSC I Girder With RCC Slab |
| | | | LHS | 2x26.4+2x25.78 | 1 x 14.25 | RCC | RCC Box Girder with Deck Slab |
| | | | RHS | 2x26.4+2x25.78 | 1 x 14.25 | RCC | RCC Box Girder with Deck Slab |
| | | | RHS SR | 2x26.4+2x25.78 | 1 x 10.2 | RCC | PSC I Girder With RCC Slab |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1* | 43+107 | 43+307 | LHS SR | 20x15 | 1 x 11.65 | RCC | RCC Box Girder with Deck Slab |
| 2* | 44+980 | 45+180 | RHS SR | 14x14.3 | 1 x 11.65 | RCC | RCC Box Girder with Deck Slab |
| 3* | 66+620 | 66+920 | BHS SR | 300 | | | |
| 4* | 67+140 | 67+540 | BHS SR | 400 | | | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT/InvIT concessionaire after the completion of the DLP period.

### 6.5.3 Minor Bridge

Details of all the existing minor bridges are given in table below. Structure photographs are also given in figure below:



**Figure 6-6 : Minor Bridges along the Project Stretch**

**Table 6-14 : Summary of Minor Bridges**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 1 | 8+920 | LHS SR | 2 X 20 | 11 | RCC | PSC I Girder with RCC Slab |
| | | LHS | 2 X 20 | 14.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS | 2 X 20 | 14.5 | RCC | PSC I Girder with RCC Slab |
| 2 | 15+400 | LHS SR | 1 X 25 + 1 X 15 | 11 | RCC | PSC I Girder with RCC Slab |
| | | LHS | 1 X 25 + 1 X 15 | 14.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS | 1 X 25 + 1 X 15 | 14.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS SR | 1 X 25 + 1 X 15 | 11 | RCC | PSC I Girder with RCC Slab |
| 3 | 356+055 | LHS SR | (2 x 3.75 M + 2 x 3.7 M) | 10 | RCC Box type | |
| | | LHS | (2 x 3.75 M + 2 x 3.7 M) | 13.5 | RCC | Slab |
| | | RHS | (2 x 3.75 M + 2 x 3.7 M) | 13.5 | RCC | Slab |
| | | RHS SR | (2 x 3.75 M + 2 x 3.7 M) | 10 | RCC Box type | |

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 4 | 372+340 | LHS | 3 x 19.75 M | 14.05 | RCC | PSC I Girder with RCC Slab |
| | | RHS | 3 x 19.75 M | 12.25 | RCC | PSC I Girder with RCC Slab |
| 5 | 374+610 | LHS SR | 2 x 6.1 M | 10 | RCC | Slab |
| | | LHS | 2 x 6.1 M | 13.5 | RCC | Slab |
| | | RHS | 2 x 6.1 M | 13.5 | RCC | Slab |
| | | RHS SR | 2 x 6.1 M | 10 | RCC | Slab |
| 6 | 377+786 | LHS SR | 2 x 6.75 M | 10 | RCC Box type | |
| | | LHS | 2 x 6.75 M | 13.5 | RCC | Slab |
| | | RHS | 2 x 6.75 M | 13.5 | RCC | Slab |
| | | RHS SR | 2 x 6.75 M | 10 | RCC Box type | |
| 7 | 380+538 | LHS SR | 5 x 4.75 M | 10 | RCC Box type | |
| | | LHS | 5 x 4.75 M | 13.5 | RCC | Slab |
| | | RHS | 5 x 4.75 M | 13.5 | RCC | Slab |
| | | RHS SR | 5 x 4.75 M | 10 | RCC Box type | |
| 8 | 384+710 | LHS SR | 6 x 3.75 M | 10 | RCC Box type | |
| | | LHS | 6 x 3.75 M | 13.5 | RCC Box type | |
| | | RHS | 6 x 3.75 M | 13.5 | RCC Box type | |
| | | RHS SR | 6 x 3.75 M | 10 | RCC Box type | |
| 9 | 387+075 | LHS SR | 4 x 3.8 M | 10.5 | RCC Box type | |
| | | LHS | 4 x 3.8 M | 15 | RCC Box type | |
| | | RHS | 4 x 3.8 M | 15 | RCC Box type | |
| | | RHS SR | 4 x 3.8 M | 10.5 | RCC Box type | |
| 10 | 388+000 | LHS SR | 3 x 5.8 M | 10 | RCC Box type | |
| | | LHS | 3 x 5.8 M | 13.5 | RCC | Slab |
| | | RHS | 3 x 5.8 M | 13.5 | RCC | Slab |
| | | RHS SR | 3 x 5.8 M | 10 | RCC Box type | |
| 11 | 388+870 | LHS SR | 3 x 6.8 M | 10 | RCC Box type | |
| | | LHS | 3 x 6.8 M | 13.5 | RCC | Slab |
| | | RHS | 3 x 6.8 M | 13.5 | RCC | Slab |
| | | RHS SR | 3 x 6.8 M | 10 | RCC Box type | |
| 12 | 389+782 | LHS SR | 5 x 3.8 M | 10 | RCC Box type | |

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| | | LHS | 5 x 3.8 M | 13.5 | RCC | Slab |
| | | RHS | 5 x 3.8 M | 13.5 | RCC | Slab |
| | | RHS SR | 5 x 3.8 M | 10 | RCC Box type | |
| 13 | 391+515 | LHS SR | 3 x 6.5 M | 10 | RCC Box type | |
| | | LHS | 3 x 6.5 M | 13.5 | RCC Box type | |
| | | RHS | 3 x 6.5 M | 13.5 | RCC Box type | |
| | | RHS SR | 3 x 6.5 M | 10 | RCC Box type | |
| 14 | 391+816 | LHS SR | 2 x 6.75 M | 10 | RCC Box type | |
| | | RHS SR | 2 x 6.75 M | 10 | RCC Box type | |
| 15 | 392+970 | LHS SR | 3 x 5.75 M | 10 | RCC Box type | |
| | | LHS | 3 x 5.75 M | 13.5 | RCC | Slab |
| | | RHS | 3 x 5.75 M | 13.5 | RCC | Slab |
| | | RHS SR | 3 x 5.75 M | 10 | RCC Box type | |
| 16 | 393+550 | LHS SR | 2 x 10.30 M | 10 | RCC Box type | |
| | | LHS | 2 x 10.30 M | 13.5 | RCC | Slab |
| | | RHS | 2 x 10.30 M | 13.5 | RCC | Slab |
| | | RHS SR | 2 x 10.30 M | 10 | RCC Box type | |
| 17 | 394+980 | LHS SR | 3 x 5.8 M | 10 | RCC Box type | |
| | | LHS | 3 x 5.8 M | 13.5 | RCC | Slab |
| | | RHS | 3 x 5.8 M | 13.5 | RCC | Slab |
| | | RHS SR | 3 x 5.8 M | 10 | RCC Box type | |
| 18 | 396+528 | LHS SR | 2 x 4.750 M | 10 | RCC Box type | |
| | | LHS | 2 x 4.750 M | 13.5 | RCC | Slab |
| | | RHS | 2 x 4.750 M | 13.5 | RCC | Slab |
| | | RHS SR | 2 x 4.750 M | 10 | RCC Box type | |
| 19 | 403+961 | LHS SR | 2 x 6.8 M | 10 | RCC Box type | |
| | | LHS | 2 x 6.8 M | 13.5 | RCC | Slab |
| | | RHS | 2 x 6.8 M | 13.5 | RCC | Slab |
| | | RHS SR | 2 x 6.8 M | 10 | RCC Box type | |
| 20 | 410+346 | LHS SR | 4 x 6.750 M | 10 | RCC Box type | |
| | | LHS | 4 x 6.750 M | 13.5 | RCC | Slab |
| | | RHS | 4 x 6.750 M | 13.5 | RCC | Slab |

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| | | RHS SR | 4 x 6.750 M | 10 | RCC Box type | |
| 21 | 411+379 | LHS SR | 3 x 4.750 M | 10 | RCC Box type | |
| | | LHS | 3 x 4.750 M | 13.5 | RCC | Slab |
| | | RHS | 3 x 4.750 M | 13.5 | RCC | Slab |
| | | RHS SR | 3 x 4.750 M | 10 | RCC Box type | |
| 22 | 420+827 | LHS | 5 x 2.70 M | 13.5 | RCC | Slab |
| | | RHS | 3 x 4.750 M | 13.5 | RCC | Slab |
| 23 | 421+814 | LHS SR | 2 x 5.4 M | 10 | RCC Box type | |
| | | LHS | 4 x 2.7 M | 13.5 | RCC | Slab |
| | | RHS | 2 x 5.4 M | 13.5 | RCC | Slab |
| | | RHS SR | 2 x 5.4 M | 10 | RCC Box type | |

**Section 02 Chennai Bypass**

| S.No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 1 | 14+110 | LHS | 1 x 7.8 M | 15 | RCC | RCC Box |
| | | RHS | | 15 | RCC | RCC Box |
| 2 | 30+425 | LHS | 13 x 4 M | 11 | RCC | RCC Box |
| | | RHS | | 11 | RCC | RCC Box |
| 3 | 31+255 | LHS | 12 x 4 M | 11 | RCC | RCC Box |
| | | RHS | | 11 | RCC | RCC Box |

**Section 03 Chennai Tada**

| S.No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 1 | 25+154 | LHS SR | 1x7 | 8.5 | RCC | Voided Slab |
| | | LHS | 1x7 | 14.25 | RCC | RCC GIRDER |
| | | RHS | 1x7 | 14.25 | PCC | RCC Slab |
| | | RHS SR | 1x7 | 8.5 | RCC | Voided Slab |
| 2 | 31+517 | LHS SR | 3x13.5 | 8.5 | RCC | Voided Slab |
| | | LHS | 3x13.5 | 14.25 | RCC | RCC GIRDER |
| | | RHS | 6x6.7 | 14.25 | PCC | RCC Slab |
| | | RHS SR | 3x13.5 | 8.5 | RCC | Voided Slab |

| S.No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 3 | 33+228 | LHS SR | 1x12.05 | 8.5 | RCC | RCC GIRDER |
| | | LHS | 1x12.05 | 14.25 | RCC | RCC GIRDER |
| | | RHS | 2x5.8 | 14.25 | PCC | RCC Slab |
| | | RHS SR | 1x12.05 | 8.5 | RCC | RCC GIRDER |
| 4 | 34+009 | LHS SR | 1x7 | 8.5 | RCC | RCC Box |
| | | LHS | 1x7 | 14.25 | RCC | RCC Slab |
| | | RHS | 1x6.8 | 14.25 | Masonry | RCC Slab |
| | | RHS SR | 1x6.8 | 8.5 | RCC | RCC Box |
| 5 | 37+127 | LHS SR | 1x21.625 | 8.5 | RCC | Voided Slab |
| | | LHS | 1x21.625 | 14.25 | RCC | RCC GIRDER |
| | | RHS | 1x5.4+1x10.825+1x5.4 | 14.25 | Masonry | RCC Slab |
| | | RHS SR | 1x21.625 | 8.5 | RCC | Voided Slab |
| 6 | 40+563 | LHS SR | 1x12.05 | 8.5 | RCC | Voided Slab |
| | | LHS | 1x12.05 | 14.25 | RCC | RCC Girder |
| | | RHS | 2x5.6 | 14.25 | Masonry | RCC Slab |
| | | RHS SR | 1x12.05 | 8.5 | RCC | Voided Slab |
| 7 | 40+841 | LHS SR | 3x5.7 | 8.5 | RCC Box type | RCC Box type |
| | | LHS | 1x17.425 | 14.25 | RCC | PSC Girder |
| | | RHS | 3x5.7 | 14.25 | PCC | RCC Slab |
| | | RHS SR | 3x5.7 | 8.5 | RCC Box type | RCC Box type |
| 8 | 43+510 | LHS SR | 1x13.4 | 8.5 | RCC | Voided Slab |
| | | LHS | 1x13.4 | 14.25 | RCC | RCC Girder |
| | | RHS | 1x13.4 | 14.25 | RCC | RCC Girder |
| | | RHS SR | 1x13.4 | 8.5 | RCC | Voided Slab |
| 9 | 53+807 | LHS SR | 3x13.3 | 8.5 | RCC | Voided Slab |
| | | LHS | 3x13.3 | 14.25 | RCC | RCC Girder |
| | | RHS | 3x13.3 | 14.25 | PCC | RCC Girder |
| | | RHS SR | 3x13.3 | 8.5 | RCC | Voided Slab |

## Section 04 Neelmangla-Tumkur

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 1* | 32+213 | LHS SR | 1x8.35 | 8 | RCC | RCC Slab |
| | | LHS | 1x8.35 | 11.75 | | |
| | | RHS | 1x8.35 | 11.75 | | |
| | | RHS SR | 1x8.35 | 8 | | |
| 2* | 34+702 | LHS SR | 3x6.8 | 8 | RCC | RCC Slab |
| | | LHS | 3x6.8 | 11.75 | | |
| | | RHS | 3x6.8 | 11.75 | | |
| | | RHS SR | 3x6.8 | 8 | | |
| 3* | 39+976 | LHS SR | 2x8.5 | 8 | RCC | RCC Slab |
| | | LHS | 2x8.5 | 11.75 | | |
| | | RHS | 2x8.5 | 11.75 | | |
| | | RHS SR | 2x8.5 | 8 | | |
| 4* | 43+263 | LHS SR | 1x15.5+1x11.75 | 8 | RCC | RCC Slab |
| | | LHS | 2x16+1x11.75 | 11.75 | | |
| | | RHS | 2x16+1x11.75 | 11.75 | | |
| | | RHS SR | 1x15.5+1x11.75 | 8 | | |
| 5* | 45+087 | LHS SR | 1x7.4 | 8 | RCC | RCC Slab |
| | | LHS | 1x7.4 | 11.75 | | |
| | | RHS | 1x7.4 | 11.75 | | |
| | | RHS SR | 1x7.4 | 8 | | |
| 6* | 48+721 | LHS SR | 2x3.2 | 12.4 | RCC Box Type | |
| | | LHS | 2x3.2 | 8.5 | | |
| | | RHS | 2x3.2 | 8.5 | | |
| | | RHS SR | 2x3.2 | 12.4 | | |
| 7 | 50+192 | LHS | 1x11.3 | 12.7 | RCC Wall type | RCC Solid Slab |
| | | RHS | | 14.2 | | |
| 8 | 50+975 | LHS | 3x3.1 | 12.7 | RCC Wall type | RCC Box Bridge |
| | | RHS | | 13.8 | | |
| 9 | 53+374 | LHS | 1x6.9 | 11.7 | RCC Wall type | RCC Solid Slab |
| | | RHS | | 13.9 | | |
| 10 | 60+904 | LHS | 1x6.8 | 12.3 | RCC Wall type | RCC Solid Slab |
| | | RHS | | 13.9 | | |
| 11* | 62+218 | LHS SR | 6x3.2 | 11.75 | RCC Box Type | |
| | | LHS | 6x3.2 | 14.2 | | |
| | | RHS | 6x3.2 | 14.2 | | |
| | | RHS SR | 6x3.2 | 11.75 | | |
| 12* | 66+838 | LHS SR | 1x20 | 11.75 | | |
| | | LHS | 1x20 | 13.5 | RCC | PSC Voided Slab |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| | | RHS | 1x20 | 13.5 | RCC | PSC Voided Slab |
| | | RHS SR | 1x20 | 11.75 | | |
| 13* | 67+445 | LHS SR | 1x14 | 11.75 | | |
| | | LHS | 1x14 | 13.5 | RCC | PSC Voided Slab |
| | | RHS | 1x14 | 13.5 | RCC | PSC Voided Slab |
| | | RHS SR | 1x14 | 11.75 | | |
| 14* | 67+825 | LHS SR | 3x3.2 | 11.75 | RCC Box Type | |
| | | LHS | 3x3.2 | 13.5 | | |
| | | RHS | 3x3.2 | 13.5 | | |
| | | RHS SR | 3x3.2 | 11.75 | | |
| 15* | 68+762 | LHS SR | 1x14 | 11.75 | RCC | RCC Solid Slab |
| | | LHS | 1x14 | 13.5 | | |
| | | RHS | 1x14 | 13.5 | | |
| | | RHS SR | 1x14 | 11.75 | | |
| 16* | 68+902 | LHS SR | 1x9.2 | 11.75 | RCC | RCC Solid Slab |
| | | LHS | 1x9.2 | 13.6 | | |
| | | RHS | 1x9.2 | 13.6 | | |
| | | RHS SR | 1x9.2 | 11.75 | | |
| 17* | 69+351 | LHS SR | 2x6.8 | 11.75 | RCC | RCC Solid Slab |
| | | LHS | 2x6.8 | 13.5 | | |
| | | RHS | 2x6.8 | 13.5 | | |
| | | RHS SR | 2x6.8 | 11.75 | | |
| 18* | 71+188 | LHS SR | 2x8.1 | 11.75 | RCC | RCC Solid Slab |
| | | LHS | 2x8.1 | 13.5 | | |
| | | RHS | 2x8.1 | 13.5 | | |
| | | RHS SR | 2x8.1 | 11.75 | | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT/InvIT concessionaire after the completion of the DLP period.

### 6.5.4 Flyover

The details of Flyovers along the project Stretch are furnished in below:

**Table 6-15 : Summary of Flyover**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 0+560 | 0+620 | LHS | 2x30 | 1x14.50 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 2x30 | 1x14.50 | RCC | PSC I Girder with RCC Slab |
| 2 | 7+454 | 7+494 | LHS | 2x20 | 1x14.50 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 2x20 | 1x14.50 | RCC | PSC I Girder with RCC Slab |
| 3 | 15+840 | 15+900 | LHS | 2x30 | 1x14.50 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 2x30 | 1x14.50 | RCC | PSC I Girder with RCC Slab |
| 4 | 397+120 | 397+150 | LHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |
| 5 | 400+650 | 400+680 | LHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |
| 6 | 404+670 | 404+700 | LHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 7 | 411+815 | 411+845 | LHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |
| | | | RHS | 1x30 | 1x12.25 | RCC | PSC I Girder with RCC Slab |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 19+090 | 19+235 | LHS | (2x48.22 M+1x49 M) | 1x15.5 | RCC Rectangular Pier | RCC Solid Slab with PSC Box Girder |
| | | | RHS | | 1x15.5 | RCC Rectangular Pier | RCC Solid Slab with PSC Box Girder |
| 2 | 32+238 | 32+283 | LHS | 1x45 | 1x12 | RCC Rectangular Pier | RCC Solid Slab with PSC Box Girder |
| | | | RHS | | 1x12 | RCC Rectangular Pier | RCC Solid Slab with PSC Box Girder |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 31+057 | 31+157 | LHS | 4x25 | 13.5 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | | 13.5 | | |
| 2 | 38+867 | 38+947 | LHS | 4x20 | 13.5 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | | 13.5 | | |
| 3 | 42+175 | 42+275 | LHS | 4x25 | 13.5 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | | 13.5 | | |
| 4 | 44+645 | 44+745 | LHS | 4x25 | 13.5 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | | 13.5 | | |
| 5 | 47+688 | 47+788 | LHS | 4x25 | 13.5 | RCC | PSC I Girder With RCC Slab |
| | | | RHS | | 13.5 | | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|---|
| | From | To | | | | | | |
| 1* | 46+990 | 47+030 | LHS<br>RHS | 2x20 | 2x13 | 5.5 | RCC | Girder + Box Girder |
| 2* | 48+956 | 49+043 | LHS<br>RHS | 2x22.5+1x42 | 2x14 | 6.5 | RCC | Girder + Box Girder |
| 3* | 49+296 | 49+426 | LHS<br>RHS | 2x22.5+2x42.00 | 2x14 | 6.5 | RCC | I Girder + Box Girder |
| 4* | 63+545 | 63+975 | LHS<br>RHS | 13x30+1x40 | 2x13.5 | 5.5 | | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period..

### 6.5.5 Road Over Bridge

The details of Road Over Bridge along the project Stretch are furnished in below:

**Table 6-16 : Summary of ROB**

The Details of ROB are as follows:

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1* | 406+300 | 406+331 | LHS | 1 x 31.28 | 16 | RCC | Steel T Girder |
| 1 | 406+300 | 406+316 | RHS | 1 x 16 | 12 | RCC | RCC Slab |

a) *Under Re-construction Structure these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 25+057 | 25+182 | LHS | (3x25m+2x7.5m+1x35m) | 1x20.75 | RCC | RCC Deck Slab+Steel T Girder |
| | | | RHS | | 1x20.75 | RCC | RCC Deck Slab+Steel T Girder |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| NIL | | | | | | | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|
| 1 | 50+200 | LHS | 5x12.6 | 10.7 | RCC | RCC Solid Slab |
| | | RHS | 7x12.6 | 14 | | |
| 2 | 55+800 | LHS | 2x11.5+4x12.5 | 10.7 | RCC | RCC Solid Slab |
| | | RHS | 6x12.6 | 14 | | |
| 3* | 64+635 | LHS | 6x12.6 | 10.7 | RCC | Girder with RCC Deck Slab |
| | | RHS | 6x12.6 | 14 | | RCC Solid Slab |

**For Section-04 Neelmangla Tumkur**

b) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

c) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period..

### 6.5.6 Road Under Bridge

The details of Road Under Bridge along the project Stretch are furnished in below:

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| NIL | | | | | | | |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Side | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|
| 1 | 15+850 | LHS | 2x7 | RCC | Steel T Girder |
| | | RHS | 2x7 | RCC | Steel T Girder |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| NIL | | | | | | | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | | Side | Span Arrangement (m) | Deck Width (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| NIL | | | | | | | |

### 6.5.7 Vehicular Overpass

The details of Underpasses along the project Stretch are furnished in below:

**Table 6-17 : Summary of VOP**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 408+737 | BHS | 2 x 45m | 12 | 5.5 | RCC | PSC I Girder with RCC Slab |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| Nil | | | | | | | |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 22+760 | LHS | 2x30 | - | 5.5 | RCC | PSC Girder |
| | | RHS | | | | | |
| 2 | 25+670 | LHS | 2x17.5 | 11.5 | 5.5 | RCC | PSC Girder |
| | | RHS | | | | | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1* | 33+350 | LHS | 2x22.7 | 1x12 | 5.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS | | 1x12 | | RCC | PSC I Girder with RCC Slab |
| 2* | 35+785 | LHS | 2x22.7 | 1x12 | 5.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS | | 1x12 | | RCC | PSC I Girder with RCC Slab |
| 3* | 37+305 | LHS | 2x22.7 | 1x12 | 5.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS | | 1x12 | | RCC | PSC I Girder with RCC Slab |
| 4* | 48+100 | LHS | 2x22.7 | 2x15.1 | 5.5 | RCC | PSC I Girder with RCC Slab |
| | | RHS | | 2x15.1 | | RCC | PSC I Girder with RCC Slab |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

*b)* Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

### 6.5.8 Vehicular Underpasses

The details of VUP along the project Stretch are furnished in below:

**Table 6-18 : Summary of VUP**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 2+509 | LHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| | | RHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| 2 | 4+764 | LHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| | | RHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| 3 | 6+316 | LHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| | | RHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| 4 | 9+390 | LHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| | | RHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| 5 | 12+849 | LHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| | | RHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| 6 | 14+868 | LHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| | | RHS | 1x12 | 1x14.5 | 5.5 | RCC | Single Cell RCC Box |
| 7 | 355+470 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 8 | 375+650 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 9 | 381+440 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 10 | 385+340 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 11 | 391+288 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 12 | 393+960 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 13 | 407+510 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 14 | 414+495 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 15 | 416+110 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 16 | 418+243 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| 17 | 422+170 | LHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |
| | | RHS | 1 x 20.0 | 1x13.75 | 5.5 | RCC | RCC girder type |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 1+270 | LHS | 2 x 10.0 | 11.5 | 5.5 | RCC | RCC Slab Tpye |
| | | RHS | 2 x 10.0 | 11.5 | 5.5 | RCC | RCC Slab Tpye |
| 2 | 27+248 | LHS | 2 x 10.0 | 14 | 5.5 | RCC | RCC Box Type |
| | | RHS | 2 x 10.0 | 14 | 5.5 | RCC | RCC Box Type |
| 3 | 28+152 | LHS | 2 x 10.0 | 14 | 5.5 | RCC | RCC Box Type |
| | | RHS | 2 x 10.0 | 14 | 5.5 | RCC | RCC Box Type |
| 4 | 31+380 | LHS | 2 x 10.0 | 14 | 6.5 | RCC | RCC Box Type |
| | | RHS | 2 x 10.0 | 14 | 6.5 | RCC | RCC Box Type |

## Section 03 Chennai Tada

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 27+205 | LHS | 2x25 | 13.5 | 5.5 | RCC | PSC I Girder With RCC Slab |
| | | RHS | | 13.5 | | RCC | PSC I Girder With RCC Slab |
| 2 | 28+475 | LHS | 1x25 | 13.5 | 5.5 | RCC | PSC I Girder With RCC Slab |
| | | RHS | | 13.5 | | RCC | PSC I Girder With RCC Slab |
| 3 | 35+100 | LHS | 1x25 | 13.5 | 5.5 | RCC | PSC I Girder With RCC Slab |
| | | RHS | | 13.5 | | RCC | PSC I Girder With RCC Slab |
| 4 | 37+660 | LHS | 1x25 | 13.5 | 5.5 | RCC | PSC I Girder With RCC Slab |
| | | RHS | | 13.5 | | RCC | PSC I Girder With RCC Slab |
| 5 | 51+912 | LHS | 1x25 | 13.5 | 5.5 | RCC | PSC I Girder With RCC Slab |
| | | RHS | | 13.5 | | RCC | PSC I Girder With RCC Slab |

## Section 04 Neelmangla-Tumkur

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1* | 32+100 | LHS | 1x15 | 15.5 | 5..5 | RCC | RCC Slab |
| | | RHS | | 15.5 | | RCC | RCC Slab |
| 2* | 34+243 | LHS | 1x10 | 13.5 | 5 | RCC | RCC Slab |
| | | RHS | | 13.5 | | RCC | RCC Slab |
| 3* | 43+055 | LHS | 1x20 | 15.5 | 5.5 | RCC | RCC Slab |
| | | RHS | | 15.5 | | RCC | RCC Slab |
| 4* | 43+400 | LHS | 1x15 | 15.5 | 5.5 | RCC | Single Box |
| | | RHS | | 15.5 | | RCC | Single Box |
| 5* | 44+311 | LHS | 1x10 | 13.6 | 5 | RCC | RCC Slab |
| | | RHS | | 13.6 | | RCC | RCC Slab |
| 6* | 62+547 | LHS | 1x22 | 13.5 | 5.5 | RCC | Girder Box Girder |
| | | RHS | | 13.5 | | RCC | |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 7* | 64+535 | LHS | 1x25 | 12.5 | 5.5 | | |
| | | RHS | | 12.5 | | | |
| 8* | 64+825 | LHS | 1x25 | 12.5 | 5.5 | | |
| | | RHS | | 12.5 | | | |
| 9* | 66+113 | LHS | 1x40 | 13.5 | | RCC | Girder Box Girder |
| | | RHS | | 13.5 | | RCC | |
| 10* | 68+098 | LHS | 1x21 | 13.5 | 5 | RCC | RCC Solid Slab |
| | | RHS | | 13.5 | | RCC | |
| 11* | 71+497 | LHS | 1x22.8 | 13.5 | 5.5 | RCC | RCC Solid Slab |
| | | RHS | | 13.5 | | RCC | |
| 12* | 72+935 | LHS | 1x40 | 13.5 | 5 | RCC | Girder Box Girder |
| | | RHS | | 13.5 | | RCC | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

**b)** Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period

### 6.5.9 Light Vehicular Underpasses

The details of LVUP along the project Stretch are furnished in below:

**Table 6-19 : Summary of LVUP**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 357+290 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| 2 | 374+040 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| 3 | 378+530 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |

| S. No. | Chainage (Km) | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| 4 | 388+330 | LHS | 1 x 12.0 | 1x13.25 | 4.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 4.5 | RCC | Single Cell RCC Box |
| 5 | 399+210 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| 6 | 399+730 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| 7 | 403+095 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| 8 | 410+000 | LHS | 1 x 12.0 | 1x13.25 | 4.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 4.5 | RCC | Single Cell RCC Box |
| 9 | 413+408 | LHS | 1 x 12.0 | 1x13.25 | 4.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 4.5 | RCC | Single Cell RCC Box |
| 10 | 419+470 | LHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |
| | | RHS | 1 x 12.0 | 1x13.25 | 3.5 | RCC | Single Cell RCC Box |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 0+380 | LHS | (1x10.0) | 12.5 | 4.5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 20 | 4.5 | RCC | RCC Slab Deck |
| | 1+540 | LHS | (1x10.0) | 11.5 | 3.5 | RCC | RCC Slab Deck |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 2 | | RHS | (1x10.0) | 11.5 | 3.5 | RCC | RCC Slab Deck |
| 3 | 2+520 | LHS | (1x10.0) | 11.5 | 5.5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 11.5 | 5.5 | RCC | RCC Slab Deck |
| 4 | 5+235 | LHS | (1x10.0) | 11.5 | 5.5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 11.5 | 5.5 | RCC | RCC Slab Deck |
| 5 | 6+010 | LHS | (1x10.0) | 11.5 | 5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 11.5 | 5 | RCC | RCC Slab Deck |
| 6 | 7+100 | LHS | (1x10.0) | 11.5 | 5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 11.5 | 5 | RCC | RCC Slab Deck |
| 7 | 10+375 | LHS | (1x10.0) | 12 | 5.2 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 12 | 5.2 | RCC | RCC Slab Deck |
| 8 | 12+110 | LHS | (1x10.0) | 12 | 5.5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 12 | 5 | RCC | RCC Slab Deck |
| 9 | 13+545 | LHS | (1x10.0) | 12 | 5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 12 | 5 | RCC | RCC Slab Deck |
| 10 | 18+020 | LHS | (1x10.0) | 12 | 4.5 | RCC | RCC Slab Deck |
| | | RHS | (1x10.0) | 12 | 4.5 | RCC | RCC Slab Deck |
| 11 | 21+333 | LHS | (1x10.0) | 14 | 4.5 | RCC | RCC Box Type |
| | | RHS | (1x10.0) | 14 | 4.5 | RCC | RCC Box Type |
| 12 | 25+952 | LHS | (1x10.0) | 14 | 5.1 | RCC | RCC Box Type |
| | | RHS | (1x10.0) | 14 | 5.1 | RCC | RCC Box Type |
| 13 | 29+067 | LHS | (1x10.0) | 14 | 5.2 | RCC | RCC Box Type |
| | | RHS | (1x10.0) | 14 | 5.2 | RCC | RCC Box Type |
| 14 | 30+176 | LHS | (1x10.0) | 14.09 | 5.5 | RCC | RCC Box Type |
| | | RHS | (1x10.0) | 14 | 5.5 | RCC | RCC Box Type |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 26+100 | LHS | 1x25 | 13.5 | 4.5 | RCC | PSC I Girder With RCC Slab |
| | | RHS | | 13.5 | | RCC | PSC I Girder With RCC Slab |

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 2 | 38+095 | LHS | 1x12 | 13.5 | 4 | RCC | RCC BOX Type |
| | | RHS | | 13.5 | | RCC | RCC BOX Type |
| 3 | 38+595 | LHS | 1x12 | 13.5 | 3.5 | RCC | RCC BOX Type |
| | | RHS | | 13.5 | | RCC | RCC BOX Type |
| 4 | 46+420 | LHS | 1x12 | 13.5 | 4 | RCC | RCC BOX Type |
| | | RHS | | 13.5 | | RCC | RCC BOX Type |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1* | 39+200 | LHS | 1x12 | 15.5 | 4 | RCC | Single Box |
| | | RHS | | 15.5 | | RCC | Single Box |
| 2* | 40+755 | LHS | 1x12 | 15.5 | 4 | RCC | Single Box |
| | | RHS | | 15.5 | | RCC | Single Box |
| 3* | 45+750 | LHS | 1x12 | 15.5 | 4 | RCC | Single Box |
| | | RHS | | 15.5 | | RCC | Single Box |
| 4* | 63+204 | LHS | 1x12 | 13.5 | 3.5 | RCC | RCC Solid Slab |
| | | RHS | | 13.5 | | RCC | RCC Solid Slab |
| 5* | 66+928 | LHS | 1x13.5 | 13.5 | 3.5 | RCC | RCC Solid Slab |
| | | RHS | | 13.5 | | RCC | RCC Solid Slab |
| 6* | 69+919 | LHS | 1x13.6 | 13.5 | 3.5 | RCC | RCC Solid Slab |
| | | RHS | | 13.5 | | RCC | RCC Solid Slab |
| 7* | 73+800 | LHS | 2x12 | 13.5 | 4 | RCC | RCC Box |
| | | RHS | | 13.5 | | RCC | RCC Box |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

### 6.5.10 Pedestrian/Cattle Underpasses

The details of Pedestrian/Cattle Underpasses along the project Stretch are furnished in below

## Table 6-20 : Summary of PUP/CUP

### Section 01 Vijayawada-Chilakaluripet

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 10+480 | LHS SR | 1x7 | 1x11 | 4 | Box type Structure | |
| | | LHS | 1x7 | 1x14.5 | | | |
| | | RHS | 1x7 | | | | |
| 2 | 373+020 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 3 | 374+350 | BHS | 1 x 7.50 | 1x13.25 | 3.272 | Box type Structure | |
| 4 | 377+260 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 5 | 380+280 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 6 | 382+895 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 7 | 384+090 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 8 | 385+040 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 9 | 387+320 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 10 | 389+415 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 11 | 390+620 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 12 | 392+050 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 13 | 393+160 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 14 | 395+550 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 15 | 396+340 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 16 | 398+395 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 17 | 401+682 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 18 | 404+560 | BHS | 1 x 7.50 | 1x11.75 | 2.5 | Box type Structure | |
| 19 | 405+360 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 20 | 409+235 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 21 | 411+120 | BHS | 1 x 7.50 | 1x20 | 2.5 | Box type Structure | |
| 22 | 412+780 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 23 | 413+760 | BHS | 1 x 6.80 | 1x13.25 | 2.5 | Box type Structure | |
| 24 | 415+580 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 25 | 416+860 | BHS | 1 x 7.50 | 1x13.25 | 2.5 | Box type Structure | |
| 26 | 421+330 | BHS | 1 x 6.80 | 1x13.25 | 2.5 | Box type Structure | |

## Section 02 Chennai Bypass

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 29+755 | LHS | 1x5.5 | 15 | 3.8 | RCC | RCC Box Type |
| | | RHS | 1x5.5 | 15 | 3.8 | RCC | RCC Box Type |

## Section 03 Chennai Tada

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 24+675 | LHS | 1x6 | 15 | 2.5 | RCC | RCC Box Type |
| | | RHS | | 15 | | | |
| 2 | 30+594 | LHS | 1x6 | 13.5 | 2.5 | RCC | RCC Box Type |
| | | RHS | | 13.5 | | | |
| 3 | 33+671 | LHS | 1x6 | 13.5 | 2.5 | RCC | RCC Box Type |
| | | RHS | | 13.5 | | | |
| 4 | 40+000 | LHS | 1x6 | 13.5 | 2.5 | RCC | RCC Box Type |
| | | RHS | | 13.5 | | | |
| 5 | 43+647 | LHS | 1x6 | 13.5 | 2.5 | RCC | RCC Box Type |
| | | RHS | | 13.5 | | | |
| 6 | 49+170 | LHS | 1x6 | 13.5 | 2.5 | RCC | RCC Box Type |
| | | RHS | | 13.5 | | | |
| 7 | 50+180 | LHS | 1x6 | 13.5 | 2.5 | RCC | RCC Slab |
| | | RHS | | 13.5 | | | |

## Section 04 Neelmangla-Tumkur

| S. No. | Chainage Km | Side | Span Arrangement (m) | Deck Width (m) | Vertical Clearance (m) | Sub Structure | Super Structure |
|---|---|---|---|---|---|---|---|
| 1 | 55+927 | LHS | 1x4.1 | 14.6 | 5 | RCC | RCC BOX |
| | | RHS | | 14.6 | 5 | | |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

### 6.5.11 Foot Over Bridge

The details of Foot Over Bridge along the project Stretch are furnished in below

**Table 6-21 : Summary of FOB**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage | Location |
|---|---|---|
| NIL | | |

**Section 02 Chennai Bypass**

| S. No. | Chainage | Location |
|---|---|---|
| NIL | | |

**Section 03 Chennai Tada**

| S. No. | Chainage | Location |
|---|---|---|
| 1 | 35+700 | Puduvoyal |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage | Location |
|---|---|---|
| 1* | 47+700 | Jindal |
| 2* | 65+100 | Fire station in Tumkur town |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

### 6.5.12 Culvert

The details of Culverts along the project Stretch are furnished in below

**Table 6-22 : Culvert Along the Project Highway**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Side |
|---|---|---|---|---|
| 1 | 0+695 | Pipe Culvert | 1x1.2 | BHS |
| 2 | 1+133 | Pipe Culvert | 1x1.2 | BHS |
| 3 | 2+215 | Pipe Culvert | 1x1.2 | BHS |
| 4 | 2+471 | Pipe Culvert | 2x1.2 | BHS |
| 5 | 2+542 | Pipe Culvert | 2x1.2 | BHS |
| 6 | 2+767 | Box Culvert | 1x2x2 | BHS |
| 7 | 2+927 | Pipe Culvert | 2x1.2 | BHS |
| 8 | 2+935 | Pipe Culvert | 2x1.2 | BHS |
| 9 | 3+200 | Pipe Culvert | 2x1.2 | BHS |
| 10 | 3+240 | Pipe Culvert | 2x1.2 | BHS |
| 11 | 5+060 | Pipe Culvert | 1x1.2 | BHS |
| 12 | 5+686 | Pipe Culvert | 1x1.2 | BHS |
| 13 | 6+307 | Pipe Culvert | 2x1.2 | BHS |
| 14 | 6+324 | Pipe Culvert | 2x1.2 | BHS |
| 15 | 6+720 | Pipe Culvert | 2x1.2 | BHS |
| 16 | 7+085 | Pipe Culvert | 1x1.2 | BHS |
| 17 | 7+225 | Pipe Culvert | 1x1.2 | BHS |
| 18 | 7+422 | Pipe Culvert | 2x1.2 | BHS |
| 19 | 7+494 | Pipe Culvert | 2x1.2 | BHS |
| 20 | 8+050 | Pipe Culvert | 2x1.2 | BHS |
| 21 | 9+340 | Box Culvert | 1x3x2 | BHS |
| 22 | 9+380 | Pipe Culvert | 2x1.2 | BHS |
| 23 | 9+403 | Pipe Culvert | 2x1.2 | BHS |
| 24 | 9+895 | Pipe Culvert | 1x1.2 | BHS |
| 25 | 10+440 | Pipe Culvert | 2x1.2 | BHS |
| 26 | 10+454 | Pipe Culvert | 2X1.2 | BHS |
| 27 | 12+124 | Pipe Culvert | 2x1.2 | BHS |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Side |
|---|---|---|---|---|
| 28 | 12+140 | Pipe Culvert | 2x1.2 | BHS |
| 29 | 12+838 | Pipe Culvert | 2x1.2 | BHS |
| 30 | 12+855 | Pipe Culvert | 2x1.2 | BHS |
| 31 | 13+599 | Pipe Culvert | 1x1.2 | BHS |
| 32 | 13+610 | Pipe Culvert | 1x1.2 | BHS |
| 33 | 13+762 | Pipe Culvert | 1x1.2 | BHS |
| 34 | 14+203 | Pipe Culvert | 2x1.2 | BHS |
| 35 | 14+508 | Pipe Culvert | 1x1.2 | BHS |
| 36 | 15+938 | Box Culvert | 1x2x2 | BHS |
| 37 | 375+595 | Pipe Culvert | 1x1.20 | BHS |
| 38 | 375+950 | Box Culvert | 1x3.00 | BHS |
| 39 | 376+695 | Box Culvert | 1x5.30 | SR |
| | | Slab Culvert | 1x5.30 | MCW |
| 40 | 379+022 | Box Culvert | 1x3.00 | BHS |
| 41 | 379+379 | Box Culvert | 1x3.5 | LHS SR |
| | | Box Culvert | 1x3.5 | LHS |
| | | Slab Culvert | 1x3.5 | RHS |
| | | Box Culvert | 1x3.5 | RHS SR |
| 42 | 379+715 | Box Culvert | 1x3.5 | SR |
| | | Slab Culvert | 1x3.5 | MCW |
| 43 | 379+940 | Box Culvert | 1x4.0 | SR |
| | | Slab Culvert | 1x4.0 | MCW |
| 44 | 380+975 | Box Culvert | 1x3.30 | SR |
| | | Slab Culvert | 1x3.30 | MCW |
| 45 | 381+567 | Box Culvert | 1x2.00 | SR |
| | | Slab Culvert | 1x2.00 | MCW |
| 46 | 381+932 | Box Culvert | 1x5.00 | SR |
| | | Slab Culvert | 1x5.00 | MCW |
| 47 | 382+595 | Box Culvert | 1x4.0 | SR |
| | | Slab Culvert | 1x4.0 | MCW |
| 48 | 383+510 | Box Culvert | 1x2.0 | SR |
| | | Slab Culvert | 1x2.0 | MCW |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Side |
|---|---|---|---|---|
| 49 | 384+036 | Box Culvert | 1x2.0 | BHS |
| 50 | 385+004 | Box Culvert | 1x5.00 | BHS |
| 51 | 385+218 | Box Culvert | 1x5.00 | LHS SR |
| | | Box Culvert | 1x6.00 | MCW |
| | | Box Culvert | 1x6.00 | RHS SR |
| 52 | 385+745 | Box Culvert | 2x2.50 | SR |
| | | Slab Culvert | 2x3.00 | MCW |
| 53 | 386+062 | Box Culvert | 2x3.65 | SR |
| | | Slab Culvert | 2x3.65 | MCW |
| 54 | 386+783 | Pipe Culvert | 1x1.00 | BHS |
| 55 | 387+513 | Box Culvert | 1x5.80 | BHS |
| 56 | 390+435 | Box Culvert | 1x5.90 | SR |
| | | Slab Culvert | 2x2.55 | LHS MCW |
| | | Slab Culvert | 1x5.90 | RHS MCW |
| 57 | 392+510 | Pipe Culvert | 1x1.00 | 1x1.20 |
| 58 | 395+345 | Box Culvert | 1x5.00 | SR |
| | | Slab Culvert | 1x5.00 | MCW |
| 59 | 399+228 | Pipe Culvert | 1x1.00 | BHS |
| 60 | 399+705 | Pipe Culvert | 1x1.20 | BHS |
| 61 | 400+631 | Box Culvert | 1x4.0 | BHS |
| 62 | 401+664 | Pipe Culvert | 1x1.20 | BHS |
| 63 | 403+125 | Pipe Culvert | 1x1.00 | BHS |
| 64 | 404+651 | Box Culvert | 1x4.0 | BHS |
| 65 | 405+565 | Pipe Culvert | 1x1.00 | BHS |
| 66* | 406+052 | Pipe Culvert | 1x1 | BHS |
| 67* | 406+280 | Pipe Culvert | 3x1 | BHS |
| 68* | 406+583 | Pipe Culvert | 4x1 | BHS |
| 69 | 407+023 | Pipe Culvert | 4x1 | BHS |
| 70 | 407+470 | Pipe Culvert | 1x1.00 | BHS |
| 71 | 407+910 | Pipe Culvert | 1x1.00 | BHS |
| 72 | 408+700 | Pipe Culvert | 2x1.00 | BHS |
| 73 | 408+766 | Pipe Culvert | 3x1.00 | BHS |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) | Side |
|---|---|---|---|---|
| 74 | 412+360 | Box Culvert | 1x4.50 | BHS |
| 75 | 413+385 | Pipe Culvert | 1x1.2 | BHS |
| 76 | 413+782 | Pipe Culvert | 1x1.00 | BHS |
| 77 | 413+850 | Pipe Culvert | 1x1.20(MCW) | 1x1.00 (SR) |
| 78 | 413+872 | Box Culvert | 1x1.00 | BHS |
| 79 | 414+541 | Box Culvert | 1x6.00 | BHS |
| 80 | 414+839 | Pipe Culvert | 1x1.00 | BHS |
| 81 | 415+184 | Pipe Culvert | 1x1.00 | BHS |
| 82 | 415+985 | Pipe Culvert | 1x1.00 | BHS |
| 83 | 416+399 | Pipe Culvert | 2x1.00 | BHS |
| 84 | 416+750 | Box Culvert | 1x3.00 | LHS SR |
| | | Slab Culvert | 1x3.00 | MCW |
| | | Slab Culvert | 1x3.00 | RHS SR |
| 85 | 417+305 | Pipe Culvert | 1x1.00 | BHS |
| 86 | 417+620 | Box Culvert | 1x2.5 | SR |
| | | Slab Culvert | 1x2.5 | MCW |
| 87 | 419+122 | Pipe Culvert | 1x1.00 | BHS |
| 88 | 419+742 | Pipe Culvert | 1x1.00 | BHS |
| 89 | 420+150 | Pipe Culvert | 1x1.00 | BHS |
| 90 | 421+695 | Pipe Culvert | 1x1.00 | BHS |
| | | Box Culvert | 1x1.00 | RHS MCW |

*Under Widen Structure these details are tentative these may varies as per site and same shall be maintained by TOT/InvIT concessionaire after end of DLP period.

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 1 | 0+050 | Pipe Culvert | 2x1.2 |
| 2 | 0+156 | Box Culvert | 2x3 |
| 3 | 0+673 | Pipe Culvert | 1x0.9 |
| 4 | 0+908 | Pipe Culvert | 1x0.9 |
| 5 | 1+010 | Pipe Culvert | 2x0.9 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 6 | 1+118 | Pipe Culvert | 1x1.2 |
| 7 | 1+263 | Utility Pipe Culvert | 1x0.6 |
| 8 | 1+284 | Pipe Culvert | 2x0.9 |
| 9 | 1+428 | Pipe Culvert | 2x0.9 |
| 10 | 1+500 | Utility Pipe Culvert | 1x0.6 |
| 11 | 1+533 | Pipe Culvert | 1x0.9 |
| 12 | 1+800 | Pipe Culvert | 1x0.9 |
| 13 | 1+963 | Pipe Culvert | 1x0.9 |
| 14 | 2+308 | Pipe Culvert | 1x0.9 |
| 15 | 2+339 | Pipe Culvert | 1x1.2 |
| 16 | 2+473 | Pipe Culvert | 1x0.6 |
| 17 | 2+492 | Pipe Culvert | 1x0.6 |
| 18 | 2+512 | Utility Pipe Culvert | 1x0.9 |
| 19 | 2+710 | Pipe Culvert | 1x1.2 |
| 20 | 2+961 | Pipe Culvert | 1x0.9 |
| 21 | 3+108 | Pipe Culvert | 2x0.9 |
| 22 | 3+341 | Pipe Culvert | 1x0.9 |
| 23 | 3+635 | Pipe Culvert | 2x0.9 |
| 24 | 3+740 | Pipe Culvert | 2x0.9 |
| 25 | 4+065 | Pipe Culvert | 1x0.9 |
| 26 | 4+280 | Pipe Culvert | 2x0.9 |
| 27 | 5+141 | Pipe Culvert | 2x0.9 |
| 28 | 5+141 | Utility Pipe Culvert | 1x0.9 |
| 29 | 5+461 | Pipe Culvert | 2x1.2 |
| 30 | 5+913 | Pipe Culvert | 1x0.9 |
| 31 | 6+007 | Pipe Culvert | 1x0.9 |
| 32 | 6+014 | Utility Pipe Culvert | 1x0.6 |
| 33 | 6+286 | Pipe Culvert | 1x0.9 |
| 34 | 6+338 | Pipe Culvert | 1x0.9 |
| 35 | 6+814 | Box Culvert | 1x3 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 36 | 6+960 | Pipe Culvert | 1x1.2 |
| 37 | 7+035 | Utility Pipe Culvert | 1x0.6 |
| 38 | 7+161 | Pipe Culvert | 1x0.9 |
| 39 | 7+443 | Pipe Culvert | 1x0.9 |
| 40 | 7+910 | Pipe Culvert | 1x0.9 |
| 41 | 8+030 | Pipe Culvert | 1x0.9 |
| 42 | 8+486 | Pipe Culvert | 1x0.9 |
| 43 | 8+813 | Pipe Culvert | 1x0.9 |
| 44 | 9+001 | Pipe Culvert | 1x0.9 |
| 45 | 9+445 | Pipe Culvert | 1x1.2 |
| 46 | 9+581 | Pipe Culvert | 1x1.2 |
| 47 | 9+814 | Box Culvert | 1x3 |
| 48 | 9+967 | Pipe Culvert | 2x1.2 |
| 49 | 10+168 | Pipe Culvert | 1x1.2 |
| 50 | 10+297 | Utility Pipe Culvert | 1x0.6 |
| 51 | 10+368 | Utility Pipe Culvert | 1x0.6 |
| 52 | 10+483 | Pipe Culvert | 2x1.2 |
| 53 | 10+783 | Pipe Culvert | 2x1.2 |
| 54 | 11+038 | Pipe Culvert | 1x1.2 |
| 55 | 11+109 | Pipe Culvert | 1x0.9 |
| 56 | 11+216 | Pipe Culvert | 1x0.9 |
| 57 | 11+295 | Utility Pipe Culvert | 1x0.6 |
| 58 | 11+426 | Pipe Culvert | 2x0.9 |
| 59 | 11+441 | Pipe Culvert | 1x1.2 |
| 60 | 11+458 | Box Culvert | 1x3 |
| 61 | 11+696 | Pipe Culvert | 2x1.2 |
| 62 | 11+806 | Utility Pipe Culvert | 1x0.6 |
| 63 | 11+843 | Box Culvert | 1x3 |
| 64 | 12+156 | Pipe Culvert | 1x0.9 |
| 65 | 12+189 | Pipe Culvert | 1x1.2 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 66 | 12+250 | Utility Pipe Culvert | 1x0.6 |
| 67 | 12+290 | Pipe Culvert | 1x1.2 |
| 68 | 12+405 | Utility Pipe Culvert | 1x0.6 |
| 69 | 12+405 | Utility Pipe Culvert | 1x0.6 |
| 70 | 12+487 | Pipe Culvert | 2x1.2 |
| 71 | 12+679 | Pipe Culvert | 1x1.2 |
| 72 | 12+715 | Box Culvert | 1x3 |
| 73 | 12+746 | Utility Pipe Culvert | 1x0.6 |
| 74 | 12+975 | Pipe Culvert | 1x0.9 |
| 75 | 13+009 | Utility Pipe Culvert | 1x0.6 |
| 76 | 13+284 | Pipe Culvert | 1x1.2 |
| 77 | 13+451 | Utility Pipe Culvert | 1x0.6 |
| 78 | 13+550 | Utility Pipe Culvert | 1x0.6 |
| 79 | 13+738 | Pipe Culvert | 1x1.2 |
| 80 | 13+893 | Pipe Culvert | 1x1.2 |
| 81 | 14+239 | Pipe Culvert | 1x1.2 |
| 82 | 14+325 | Pipe Culvert | 1x0.9 |
| 83 | 14+328 | Pipe Culvert | 2x0.9 |
| 84 | 14+490 | Pipe Culvert | 2x0.9 |
| 85 | 14+640 | Pipe Culvert | 1x1.2 |
| 86 | 14+810 | Pipe Culvert | 2x1.2 |
| 87 | 14+989 | Pipe Culvert | 1x1.2 |
| 88 | 15+195 | Pipe Culvert | 2x1.2 |
| 89 | 15+900 | Pipe Culvert | 1x0.9 |
| 90 | 16+370 | Pipe Culvert | 1x0.9 |
| 91 | 19+500 | Pipe Culvert(LHS SR) | 12x1.2 |
| 92 | 20+378 | Pipe Culvert | 2x1.2 |
| 93 | 20+810 | Pipe Culvert | 2x1.2 |
| 94 | 20+850 | Pipe Culvert | 2x1.2 |
| 95 | 21+138 | Pipe Culvert | 2x1.2 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 96 | 21+418 | Slab Culvert | 1x2 |
| 97 | 21+704 | Pipe Culvert | 2x1.2 |
| 98 | 22+233 | Slab Culvert | 1x2 |
| 99 | 22+806 | Slab Culvert | 1x2 |
| 100 | 24+414 | Slab Culvert | 1x2 |
| 101 | 25+638 | Slab Culvert | 1x2 |
| 102 | 25+896 | Utility Pipe Culvert | 1x0.6 |
| 103 | 25+902 | Pipe Culvert | 1x0.9 |
| 104 | 25+924 | Utility Pipe Culvert | 1x0.6 |
| 105 | 25+957 | Pipe Culvert | 3x1.2 |
| 106 | 26+000 | Pipe Culvert | 1x1.2 |
| 107 | 26+052 | Pipe Culvert | 1x1.2 |
| 108 | 26+098 | Pipe Culvert | 1x1.2 |
| 109 | 26+600 | Utility Pipe Culvert | 1x0.6 |
| 110 | 27+034 | Pipe Culvert | 2x0.9 |
| 111 | 27+177 | Utility Pipe Culvert | 1x0.6 |
| 112 | 27+182 | Pipe Culvert | 1x1.2 |
| 113 | 27+229 | Pipe Culvert | 1x1.2 |
| 114 | 27+234 | Utility Pipe Culvert | 1x0.6 |
| 115 | 27+325 | Pipe Culvert | 2x0.9 |
| 116 | 27+945 | Pipe Culvert | 2x0.9 |
| 117 | 28+077 | Pipe Culvert | 1x0.9 |
| 118 | 28+130 | Utility Pipe Culvert | 1x0.6 |
| 119 | 28+520 | Pipe Culvert | 1x0.9 |
| 120 | 28+600 | Pipe Culvert | 1x0.9 |
| 121 | 28+950 | Utility Pipe Culvert | 2x0.6 |
| 122 | 29+274 | Box Culvert | 1.3x1.579 |
| 123 | 29+297 | Box Culvert | 2x2.390 |
| 124 | 29+306 | Slab Culvert | 1x5 |
| 125 | 29+680 | Pipe Culvert | 2x1.2 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 126 | 29+907 | Pipe Culvert | 2x0.9 |
| 127 | 30+120 | Utility Pipe Culvert | 1x0.6 |
| 128 | 30+147 | Utility Pipe Culvert | 1 x 0.6 |
| 129 | 30+383 | Pipe Culvert | 1x0.9 |
| 130 | 30+400 | Box Culvert | 1x1.5 |
| 131 | 30+439 | Pipe Culvert | 1x0.9 |
| 132 | 31+210 | Pipe Culvert | 1x0.9 |
| 133 | 31+266 | Pipe Culvert | 1x0.9 |
| 134 | 31+375 | Utility Pipe Culvert | 1x0.9 |
| 135 | 31+430 | Pipe Culvert | 2x1.2 |
| 136 | 31+640 | Utility Pipe Culvert | 1x0.6 |
| 137 | 31+870 | Utility Pipe Culvert | 1x0.6 |
| 138 | 31+950 | Pipe Culvert | 1x0.9 |
| 139 | 32+050 | Utility Pipe Culvert | 1x0.9 |
| 140 | 32+500 | Pipe Culvert | 1x1.2 |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 1 | 21+963 | Box Culvert | 1 X 2 |
| 2 | 22+232 | Box Culvert | 1 X 2 |
| 3 | 23+255 | Pipe Culvert | 2 X 1 |
| 4 | 23+708 | Box Culvert | 1 X 2 |
| 5 | 24+040 | Pipe Culvert | 2 X 1.2 |
| 6 | 25+455 | Pipe Culvert | 2 X 1 |
| 7 | 26+000 | Box Culvert | 1 X 6 |
| 8 | 26+215 | Box Culvert | 1 X 2 |
| 9 | 27+384 | Slab Culvert | 1 X 1.8 |
| 10 | 28+134 | Box Culvert | 1 X 2 |
| 11 | 28+750 | Box Culvert | 1 X 2 |
| 12 | 29+400 | Box Culvert | 1 X 1.5 |
| 13 | 29+940 | Box Culvert | 1 X 3.5 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 14 | 30+150 | Slab Culvert | 1 X 1.16 |
| 15 | 30+300 | Box Culvert | 1 X 1.5 |
| 16 | 31+281 | Box Culvert | 1 X 4.8 |
| 17 | 31+806 | Box Culvert | 1 X 3 |
| 18 | 32+820 | Box Culvert | 1 X 3.5 |
| 19 | 34+240 | Box Culvert | 1 X 4 |
| 20 | 34+865 | Box Culvert | 1 X 2 |
| 21 | 35+050 | Box Culvert | 1 X 2 |
| 22 | 35+170 | Box Culvert | 1 X 2 |
| 23 | 35+400 | Box Culvert | 1 X 3 |
| 24 | 35+865 | Box Culvert | 1 X 3.3 |
| 25 | 35+970 | Pipe Culvert | 1 X 0.9 |
| 26 | 36+220 | Pipe Culvert | 2 X 0.9 |
| 27 | 36+340 | Pipe Culvert | 1 X 0.9 |
| 28 | 36+560 | Box Culvert | 1 X 1.5 |
| 29 | 36+925 | Pipe Culvert | 1 X 0.9 |
| 30 | 37+404 | Box Culvert | 1 X 2 |
| 31 | 37+740 | Pipe Culvert | 1 X 0.9 |
| 32 | 38+100 | Box Culvert | 1 X 2 |
| 33 | 38+100 | Pipe Culvert | 2 X 0.9 |
| 34 | 38+394 | Box Culvert | 1 X 2 |
| 35 | 38+723 | Box Culvert | 1 X 2 |
| 36 | 38+959 | Box Culvert | 1 X 2 |
| 37 | 39+270 | Box Culvert | 1 X 5 |
| 38 | 39+615 | Pipe Culvert | 1 X 0.9 |
| 39 | 39+745 | Box Culvert | 1 X 1.5 |
| 40 | 40+130 | Pipe Culvert | 1 X 1 |
| 41 | 40+940 | Pipe Culvert | 1 X 0.9 |
| 42 | 41+310 | Pipe Culvert | 1 X 0.9 |
| 43 | 41+460 | Pipe Culvert | 1 X 0.9 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 44 | 41+720 | Box Culvert | 1 X 1.5 |
| 45 | 42+200 | Box Culvert | 1 X 1.5 |
| 46 | 42+480 | Box Culvert | 1 X 1.5 |
| 47 | 42+750 | Box Culvert | 1 X 1.5 |
| 48 | 44+100 | Box Culvert | 1 X 2.5 |
| 49 | 44+500 | Box Culvert | 1 X 3 |
| 50 | 45+240 | Pipe Culvert | 1 X 0.9 |
| 51 | 45+330 | Pipe Culvert | 1 X 0.9 |
| 52 | 45+500 | Pipe Culvert | 1 X 0.9 |
| 53 | 47+150 | Pipe Culvert | 1 X 0.9 |
| 54 | 48+635 | Pipe Culvert | 1 X 0.9 |
| 55 | 49+700 | Pipe Culvert | 2 X 1 |
| 56 | 53+009 | Box Culvert | 1 X 2.5 |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 1* | 29+778 | Box Culvert | 1 X 3 |
| 2* | 30+180 | Box Culvert | 1 X 2 |
| 3* | 30+549 | Box Culvert | 1 X 6 |
| 4* | 31+496 | Box Culvert | 1 X 3 |
| 5* | 32+309 | Box Culvert | 1 X 2 |
| 6* | 32+400 | Box Culvert | 1 X 4 |
| 7* | 34+378 | Box Culvert | 1 X 1.5 |
| 8* | 34+955 | Box Culvert | 1 X 2 |
| 9* | 35+086 | Box Culvert | 1 X 2 |
| 10* | 35+150 | Box Culvert | 1 X 3 |
| 11* | 38+137 | Box Culvert | 1 X 4 |
| 12* | 39+206 | Box Culvert | 1 X 3 |
| 13* | 41+878 | Box Culvert | 1 X 2 |
| 14* | 43+201 | Box Culvert | 1 X 2 |
| 15* | 43+341 | Box Culvert | 1 X 2 |
| 16* | 44+254 | Pipe | 2 X 1 |
| 17* | 45+748 | Box Culvert | 1 X 6 |
| 18* | 46+740 | Box Culvert | 1 X 4 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 19* | 47+511 | Box Culvert | 1 X 2 |
| 20* | 47+620 | Box Culvert | 1 X 2 |
| 21 | 50+015 | Pipe | 3x1.2 |
| 22 | 51+178 | Slab | 1x4 |
| 23 | 51+614 | Pipe | 5x0.8 |
| 24 | 51+785 | Pipe | 3x0.9 |
| 25 | 52+260 | Slab | 1x3 |
| 26 | 52+680 | Pipe | 3x1.2 |
| 27 | 52+720 | Pipe | 1x0.6 |
| 28 | 53+436 | Slab | 1x1.5 |
| 29 | 53+773 | Slab | 1x1.1 |
| 30 | 54+322 | Stone Slab | 3x1.5 |
| 31 | 54+357 | Box | 2x3 |
| 32 | 54+800 | Slab | 1x1.8 |
| 33 | 54+900 | Slab | 1x1 |
| 34 | 55+141 | Slab | 1x3 |
| 35 | 55+504 | Pipe | 1x1 |
| 36 | 56+370 | Pipe | 5x1.2 |
| 37 | 56+660 | Pipe | 2x1 |
| 38 | 57+185 | Slab | 1x3 |
| 39 | 57+241 | Pipe | 4x1 |
| 40 | 57+715 | Pipe | 1x1 |
| 41 | 57+905 | Pipe | 2x1 |
| 42 | 58+378 | Pipe | 3x1 |
| 43 | 58+400 | Pipe | 1x0.6 |
| 44 | 58+500 | Pipe | 1x0.6 |
| 45 | 58+797 | Pipe | 3x1 |
| 46 | 59+794 | Pipe | 2x1 |
| 47 | 59+849 | Pipe | 2x1 |
| 48 | 60+262 | Pipe | 1x1 |
| 49 | 60+808 | Pipe | 1x1 |
| 50 | 61+400 | Pipe | 1x1 |
| 51* | 62+032 | Pipe | 1x1.2 |
| 52* | 62+279 | Box | 1x6.5 |
| 53* | 62+482 | Pipe | 1x1.2 |
| 54* | 62+753 | Pipe | 1x1.2 |
| 55* | 63+167 | Pipe | 3x1.2 |
| 56* | 64+099 | Box | 1x6 |

| S. No. | Chainage Km | Type of Culvert | Span Arrangement (m) |
|---|---|---|---|
| 57* | 65+031 | Pipe | 2x0.9 |
| 58* | 68+090 | Pipe | 1x1 |
| 59* | 68+121 | Pipe | 1x1 |
| 60* | 68+997 | Pipe | 3x1.2 |
| 61* | 69+070 | Pipe | 1x1 |
| 62* | 70+373 | Pipe | 1x1 |
| 63* | 70+389 | Pipe | 1x1 |
| 64* | 70+811 | Pipe | 1x0.9 |
| 65* | 71+464 | Pipe | 2x0.9 |
| 66* | 71+519 | Pipe | 1x0.9 |
| 67* | 72+584 | Pipe | 3x1 |
| 68* | 73+536 | Box | 1x2 |
| 69* | 73+658 | Box | 1x3.6 |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

## 6.6 Project Facilities

### 6.6.1 Toll Plaza

**Vijayawada-Chilakaluripet:** Project Stretch starts from Km 355+000 of NH-16 at Vijayawada and ends at Km 422+605 of NH-16 at Chilakaluripet and has Kaza toll Plazas at Km 420+500 on project Section in the state of Andhra Pradesh. The total length of Project Stretch is 69.408 km.

**Chennai Bypass:** Project Stretch starts from Km 0+000 and ends at Km 32+600 of NH-32/ NH-48 and has Vanagram toll Plazas at Km 16+500 and Surapattu at Km 28+600 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 32.600 km.

**Chennai-Tada:** Project Stretch starts from Km 21+400 and ends at Km 54+400 of NH-16 and has Nallur at Km 21+625 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 33.00 km.

**Neelmangla-Tumkur:** Project Stretch starts from Km 29+500 and ends at Km 74+168 of NH-48 and has kulumepalya toll plazas at Km 30+000 and Chokkenahalli toll plaza Km 61+500 on project Section in the state of Karnataka. The total length of Project Stretch is 44.668 km.

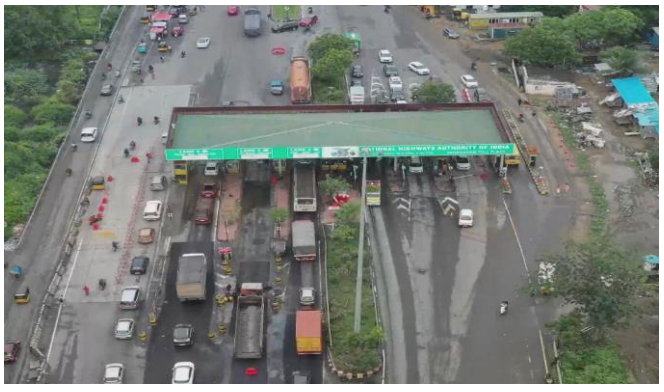
Note*- The existing two toll plazas at Kulumepalya and Chokkenahalli will be demolished, and new toll plazas at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425) shall be constructed by the Authority. Accordingly, the Toll Management System (TMS) will be provided by the Authority and shall be maintained by the TOT/InvIT Concessionaire after the completion of the DLP period.

**Section-01 Vijayawada-Chilakaluripet**




***Kaza toll Plaza (420+500)***

**Section-02 Chennai Bypass**



***Vanagram toll Palaza (16+500)***




***Surapattu toll Plaza (28+600)***

**Section-03 Chennai-Tada**



*Nallur toll Plaza (21+625)*



*Nallur toll Plaza (21+625)*

**Section 04 Neelmangla-Tumkur**



*Kulumepalya toll Plaza (30+000)*




*Chokkenahalli (61+500)*

***Table 6-23 : Infrastructure at Toll Plaza***

**Section 1 Vijayawada-Chilakaluripet**

| S. No. | Particulars | Details of Kaza Toll Plaza |
|---|---|---|
| 1 | Toll Plaza Chainage and name | 420+500 |
| 2 | Number of Toll Lanes | 16 |
| 3 | No of ETC system | 16 |
| 4 | No of Toll Booths | 15 |
| 5 | Canopy/ FOB | Canopy Available / FOB Not Available |
| 6 | Admin Building | Available |
| 7 | Availibility of Tunnel | Available |

| S. No. | Particulars | Details of Kaza Toll Plaza |
|---|---|---|
| 8 | Toilets (Gents & Ladies) | 2 |
| 9 | Type of Pavement at Toll Lanes | Rigid |
| 10 | Slow Speed Weigh in Motion Facility | Available (Not Working) |
| 11 | Static Weigh Bridge | 2(1 Not working) |
| 12 | Availability of loading/unloading facilities | Not Available |
| 13 | Storage facility of overloaded material | Not Available |
| 14 | High Mast Light | 4 |
| 15 | Street Lights | 28 |
| 16 | Traffic Aid Post | Available |
| 17 | Medical Aid Post | Available |
| 18 | Control Room | Available |
| 19 | Server Room | Available |
| 20 | UPS & Battery room | Available |
| 21 | Plaza Manager Room | Available |
| 22 | Cash up Room | Available |
| 23 | Room for Cashier | Available |
| 24 | Cantilever/Gantry Board | Available |
| 25 | Electricity Supply | Available |
| 26 | Cash van garage | Available |
| 27 | PRO Office | Available |
| 28 | Meeting Room | Available |
| 29 | Changing room | Available |
| 30 | Lane Configuration | 6 lane |

**Section 02 Chennai Bypass**

| S. No. | Particulars | Details of Vanagram Toll Plaza | Details of Surapattu Toll Plaza |
|---|---|---|---|
| 1 | Toll Plaza Chainage and name | 16+500 | 28+600 |
| 2 | Number of Toll Lanes | 10 | 12 |
| 3 | No of ETC system | 10 | 12 |

| S. No. | Particulars | Details of Vanagram Toll Plaza | Details of Surapattu Toll Plaza |
|---|---|---|---|
| 4 | No of Toll Booths | 9 | 11 |
| 5 | Canopy/ FOB | Canopy Available / FOB Not Available | Canopy Available / FOB Not Available |
| 6 | Admin Building | Not Available | Not Available |
| 7 | Availibility of Tunnel | Not Available | Not Available |
| 8 | Toilets (Gents & Ladies) | Not Available | 2 |
| 9 | Type of Pavement at Toll Lanes | Rigid | Rigid |
| 10 | Medium Speed Weigh in Motion Facility | 0 | 0 |
| 11 | Static Weigh Bridge | 0 | 0 |
| 12 | Availability of loading/unloading facilities | Not Available | Not Available |
| 13 | Storage facility of overloaded material | Not Available | Not Available |
| 14 | High Mast Light | 2 | 2 |
| 15 | Street Lights | 20 | 0 |
| 16 | Traffic Aid Post | Not Available | Not Available |
| 17 | Medical Aid Post | Not Available | Not Available |
| 18 | Control Room | Not Available | Not Available |
| 19 | Server Room | Not Available | Not Available |
| 20 | UPS & Battery room | Not Available | Not Available |
| 21 | Plaza Manager Room | Not Available | Not Available |
| 22 | Cash up Room | Not Available | Not Available |
| 23 | Room for Cashier | Not Available | Not Available |
| 24 | Cantilever/Gantry Board | Available | Available |
| 25 | Electricity Supply | Available | Available |
| 26 | Cash van garage | Available | Available |
| 27 | PRO Office | Not Available | Not Available |
| 28 | Meeting Room | Not Available | Not Available |
| 29 | Changing room | Not Available | Not Available |
| 30 | Lane Configuration | 6-lane | 6-lane |

Note*- The existing toll plazas at Vanagram will be demolished, and new toll plazas at Ch. 6+500, shall be constructed by the Authority. Accordingly, the MLFF will be provided by the Authority and shall be maintained by the TOT/InvIT Concessionaire after the completion of the DLP period.

**Section 03 Chennai Tada**

| S. No. | Particulars | Details of Nallur Toll Plaza |
|---|---|---|
| 1 | Toll Plaza Chainage and name | 21+625 |
| 2 | Number of Toll Lanes | 14 |
| 3 | No of ETC system | 14 |
| 4 | No of Toll Booths | 13 |
| 5 | Canopy/ FOB | Available |
| 6 | Admin Building | Available |
| 7 | Availibility of Tunnel | No |
| 8 | Toilets (Gents & Ladies) | 2 |
| 9 | Type of Pavement at Toll Lanes | Rigid |
| 10 | Medium Speed Weigh in Motion Facility | 0 |
| 11 | Static Weigh Bridge | 0 |
| 12 | Availability of loading/unloading facilities | Not Available |
| 13 | Storage facility of overloaded material | Not Available |
| 14 | High Mast Light | 6 |
| 15 | Traffic Aid Post | Not Available |
| 16 | Medical Aid Post | Available |
| 17 | Control Room | Available |
| 18 | Server Room | Available |
| 19 | UPS & Battery room | Available |
| 20 | Plaza Manager Room | Available |
| 21 | Cash up Room | Available |
| 22 | Room for Cashier | Available |
| 23 | Cantilever/Gantry Board | Available |
| 24 | Electricity Supply | Available |

| S. No. | Particulars | Details of Nallur Toll Plaza |
|---|---|---|
| 25 | Cash van garage | Available |
| 26 | PRO Office | Available |
| 27 | Meeting Room | Not Available |
| 28 | Changing room | Not Available |
| 29 | Lane Configuration | 6-lane |

**Section 04 Neelmangla-Tumkur**

| S. No. | Particulars | Details of Kulumepalya Toll Plaza | Details of Chokkenahalli Toll Plaza |
|---|---|---|---|
| 1 | Toll Plaza Chainage and name | 30+000 | 61+500 |
| 2 | Number of Toll Lanes | 10 | 10 |
| 3 | No of ETC system | 10 | 10 |
| 4 | No of Toll Booths | 9 | 9 |
| 5 | Canopy/ FOB | Canopy Available/ FOB Available | Canopy Available/ FOB Available |
| 6 | Admin Building | Admin building is in FOB | Admin building is in FOB |
| 7 | Availibility of Tunnel | No | No |
| 8 | Toilets (Gents & Ladies) | 2 | 1 |
| 9 | Type of Pavement at Toll Lanes | Rigid | Rigid |
| 10 | Medium Speed Weigh in Motion Facility | 0 | 0 |
| 11 | Static Weigh Bridge | 0 | 0 |
| 12 | Availability of loading/unloading facilities | Not Avaliable | Not Avaliable |
| 13 | Storage facility of overloaded material | Not Avaliable | Not Avaliable |
| 14 | High Mast Light | 2 | 2 |
| 15 | Street Lights | 0 | 0 |
| 16 | Traffic Aid Post | Not Avaliable | Not Avaliable |
| 17 | Medical Aid Post | Not Avaliable | Not Avaliable |
| 18 | Control Room | Available | Available |

| S. No. | Particulars | Details of Kulumepalya Toll Plaza | Details of Chokkenahalli Toll Plaza |
|---|---|---|---|
| 19 | Server Room | Available | Available |
| 20 | UPS & Battery room | Available | Available |
| 21 | Plaza Manager Room | Available | Available |
| 22 | Cash up Room | Available | Available |
| 23 | Room for Cashier | Available | Available |
| 24 | Cantilever/Gantry Board | Available | Available |
| 25 | Electricity Supply | Available | Available |
| 26 | Cash van garage | Available | Available |
| 27 | PRO Office | Available | Available |
| 28 | Meeting Room | Available | Available |
| 29 | Changing room | Available | Available |
| 30 | Lane Configuration | 4-lane | 4&6 Lane |

Note*- The existing two toll plazas at Kulumepalya and Chokkenahalli will be demolished, and New Toll Plaza with MLFF (Multi lane free flow system) shall be provided by Authority at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425), and the same shall be maintained by InvIT Concessionaire. after the completion of the DLP period.

### 6.6.2 Bus bays and Bus Shelter

Locations of bus shelter are presented in the table below:

**Section 01 Vijayawada-Chilakaluripet**







**Section 02 Chennai Bypass**






**Section 03 Chennai Tada**



**Section 04 Neelmangla-Tumkur**



***Figure 6-7 : Bus Bay along the Project Stretch***

***Table 6-24 :* Detail of Bus bay and Bus Shelter**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 1 | 2+358 | LHS | Boppudi | Bus Bay with Shelter |
| 2 | 2+637 | RHS | Boppudi | Bus Bay with Shelter |
| 3 | 4+630 | LHS | Purushottapatnam | Bus Bay with Shelter |
| 4 | 4+905 | RHS | Purushottapatnam | Bus Bay with Shelter |
| 5 | 7+300 | LHS | Guntur | Bus Bay with Shelter |
| 6 | 7+600 | RHS | Guntur | Bus Bay with Shelter |
| 7 | 15+044 | RHS | Thimmapuram | Bus Bay with Shelter |

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 8 | 15+062 | LHS | Thimmapuram | Bus Bay with Shelter |
| 9 | 355+150 | LHS | Tatapudi | Bus Bay with Shelter |
| 10 | 355+800 | RHS | Tatapudi | Bus Bay with Shelter |
| 11 | 374+400 | RHS | Edlapadu | Bus Bay with Shelter |
| 12 | 378+809 | RHS | Boyapalem | Bus Bay with Shelter |
| 13 | 378+812 | LHS | Boyapalem | Bus Bay with Shelter |
| 14 | 384+200 | RHS | Kondrupadu | Bus Bay with Shelter |
| 15 | 384+350 | LHS | Kondrupadu | Bus Bay with Shelter |
| 16 | 385+515 | LHS | Chinakondrupadu | Bus Shelter |
| 17 | 389+270 | LHS | Chodavaram | Bus bay |
| 18 | 389+706 | RHS | Chodavaram | Bus Bay with Shelter |
| 19 | 419+500 | LHS | Namburu | Bus Shelter |
| 20 | 421+995 | RHS | Kaza | Bus Bay with Shelter |
| 21 | 422+304 | LHS | Kaza | Bus Bay with Shelter |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 1 | 21+720 | RHS | Mogappair West | Bus Shelter |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 1 | 22+100 | LHS | Vijayanallur | Bus Shelter |
| 2 | 22+505 | RHS | Cholavaram | Bus Bay without Shelter |
| 3 | 27+100 | RHS | Jaganathapuram | Bus Shelter |
| 4 | 27+375 | LHS | Janappanchatram | Bus Shelter |
| 5 | 27+580 | RHS | Janappanchatram | Bus Bay without Shelter |
| 6 | 30+200 | LHS | Penneri | Bus Bay with Shelter |
| 7 | 30+200 | RHS | Panjetty | Bus Bay with Shelter |
| 8 | 31+060 | RHS | Ponneri | Bus Shelter |
| 9 | 31+225 | LHS | Thatchoor | Bus Shelter |
| 10 | 31+280 | RHS | Thatchoor | Bus Shelter |

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 11 | 31+750 | LHS | Thatchoor | Bus Bay with Shelter |
| 12 | 32+210 | RHS | Peravallur | Bus Bay with Shelter |
| 13 | 32+785 | LHS | Peravallur | Bus Bay with Shelter |
| 14 | 33+080 | RHS | Peravallur | Bus Bay with Shelter |
| 15 | 33+900 | LHS | Ponneri | Bus Bay with Shelter |
| 16 | 33+900 | RHS | Ponneri | Bus Bay with Shelter |
| 17 | 35+210 | LHS | Kollumedu | Bus Shelter |
| 18 | 35+790 | LHS | Peruvaili | Bus Bay with Shelter |
| 19 | 36+230 | LHS | Peruvaili | Bus Bay with Shelter |
| 20 | 36+305 | RHS | Peruvaili | Bus Bay with Shelter |
| 21 | 37+870 | RHS | RSM Nagar | Bus Bay with Shelter |
| 22 | 40+010 | RHS | Panpakkam | Bus Bay with Shelter |
| 23 | 40+015 | LHS | Panpakkam | Bus Bay with Shelter |
| 24 | 41+400 | RHS | Panpakkam | Bus Bay with Shelter |
| 25 | 44+435 | LHS | Sipcot Phase II | Bus Bay with Shelter |
| 26 | 44+925 | RHS | Sipcot | Bus Bay with Shelter |
| 27 | 46+405 | RHS | Kayalarmedu | Bus Bay with Shelter |
| 28 | 46+520 | LHS | Kayalarmedu | Bus Bay with Shelter |
| 29 | 47+920 | LHS | Peddikuppam | Bus Bay with Shelter |
| 30 | 47+930 | RHS | Peddikuppam | Bus Bay with Shelter |
| 31 | 48+800 | LHS | Chinnaobulapuram | Bus Bay with Shelter |
| 32 | 49+325 | RHS | Gummidipoondi | Bus Bay with Shelter |
| 33 | 51+210 | RHS | Gummidipoondi | Bus bay |
| 34 | 51+325 | LHS | Elavur | Bus Bay with Shelter |
| 35 | 52+240 | RHS | Elavur | Bus Bay with Shelter |
| 36 | 53+175 | LHS | Gumpli | Bus Bay with Shelter |

## Section 04 Neelmangla-Tumkur

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 1* | 30+650 | LHS | Bommanahalli | Bus Shelter |
| 2* | 32+485 | BHS | Budhihal | Bus Shelter |
| 3* | 34+100 | LHS | Tonachinnakuppe | Bus Shelter |
| 4* | 34+300 | RHS | Tonachinnakuppe | Bus Shelter |

| S. No. | Chainage Km | Side | Name of Habitation | Type |
|---|---|---|---|---|
| 5* | 39+500 | BHS | Dodderi | Bus Shelter |
| 6* | 40+650 | LHS | Kuluvanahalli | Bus Shelter |
| 7* | 40+915 | RHS | Kuluvanahalli | Bus Shelter |
| 8* | 44+450 | BHS | Billanakote | Bus Shelter |
| 9* | 46+060 | LHS | Kengalkempohalli | Bus Shelter |
| 10* | 46+380 | RHS | Kengalkempohalli | Bus Shelter |
| 11* | 47+450 | LHS | Sompura Industrial Area and Yedehalli | Bus Shelter |
| 12* | 47+550 | RHS | | Bus Shelter |
| 13 | 54+275 | LHS | Nandihalli | Bus Bay without Shelter |
| 14 | 54+435 | RHS | Nandihalli | Bus Bay without Shelter |
| 15 | 55+385 | LHS | Nandihalli | Bus Bay without Shelter |
| 16 | 55+990 | LHS | Pemmanahalli | Bus Bay with Shelter |
| 17 | 56+050 | RHS | Pemmanahalli | Bus Shelter |
| 18 | 56+955 | RHS | Chikkahalli | Bus Bay without Shelter |
| 19 | 59+375 | RHS | Kondanayakanahalli | Bus Bay without Shelter |
| 20* | 63+862 | BHS | Kyatsandra | Bus Shelter |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

### 6.6.3 Truck lay bye

Locations of Truck lay bye are presented in table below:

***Table 6-25 :*** **Detail of Truck lay bye**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage Km | Side | Name of Habitation |
|---|---|---|---|
| 1 | 395+950 | RHS | Ankireddypalem |

**Section 02 Chennai Bypass**

| S. No. | Chainage Km | Side | Name of Habitation |
|---|---|---|---|
| Nil | | | |

**Section 03 Chennai Tada**

| S. No. | Chainage Km | Side | Name of Habitation |
|---|---|---|---|
| Nil | | | |

**Section 04 Neelmangla-Tumkur**

| S. No. | Chainage Km | Side | Name of Habitation |
|---|---|---|---|
| 1* | 46+950 | LHS | Yadehalli |

**For Section-04 Neelmangla Tumkur**

a) *Under construction locations these details are tentative these may varies as per site and same shall be maintained by TOT concessionaire after end of DLP period.

b) Other than the (*) locations, the remaining stretches fall within the ongoing DPR section. Hence, these details may vary as per site conditions and shall be maintained by the TOT concessionaire after the completion of the DLP period.

## 6.7 Road Furniture

Details of various road furniture like streetlight, safety barrier, sign board etc. are presented in sections below.

### 6.7.1 Crash Barrier

Various types of safety barriers are presented in table below:

**Table 6-26 : Location of W-Beam Crash Barrier**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 355+200 | 355+460 | 260 | LHS | Separator |
| 2 | 355+240 | 355+460 | 220 | RHS | Separator |
| 3 | 355+510 | 355+700 | 190 | LHS | Separator |
| 4 | 355+510 | 355+700 | 190 | RHS | Separator |
| 5 | 357+100 | 357+285 | 185 | LHS | Separator |
| 6 | 357+100 | 357+285 | 185 | RHS | Separator |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 7 | 357+315 | 357+342 | 27 | LHS | Separator |
| 8 | 357+315 | 357+342 | 27 | RHS | Separator |
| 9 | 372+038 | 372+335 | 297 | LHS | Shoulder |
| 10 | 372+038 | 372+335 | 297 | RHS | Shoulder |
| 11 | 372+405 | 372+710 | 305 | LHS | Shoulder |
| 12 | 372+410 | 372+710 | 300 | RHS | Shoulder |
| 13 | 372+880 | 373+010 | 130 | LHS | Separator |
| 14 | 372+920 | 373+010 | 90 | RHS | Separator |
| 15 | 373+030 | 373+100 | 70 | LHS | Separator |
| 16 | 373+030 | 373+100 | 70 | RHS | Separator |
| 17 | 373+370 | 373+590 | 220 | RHS | Shoulder |
| 18 | 373+370 | 373+590 | 220 | LHS | Shoulder |
| 19 | 373+665 | 373+670 | 5 | SR LHS | Shoulder |
| 20 | 373+665 | 373+780 | 115 | RHS | Shoulder |
| 21 | 373+800 | 373+870 | 70 | RHS | Shoulder |
| 22 | 373+800 | 373+900 | 100 | LHS | Shoulder |
| 23 | 373+940 | 374+610 | 670 | LHS | Median |
| 24 | 374+620 | 375+540 | 920 | LHS | Median |
| 25 | 377+200 | 377+250 | 50 | LHS | Separator |
| 26 | 377+200 | 377+250 | 50 | RHS | Separator |
| 27 | 377+270 | 377+320 | 50 | LHS | Separator |
| 28 | 377+270 | 377+320 | 50 | RHS | Separator |
| 29 | 378+100 | 378+750 | 650 | LHS | Median |
| 30 | 380+230 | 380+275 | 45 | LHS | Separator |
| 31 | 380+230 | 380+275 | 45 | RHS | Separator |
| 32 | 380+290 | 380+330 | 40 | LHS | Separator |
| 33 | 380+290 | 380+330 | 40 | RHS | Separator |
| 34 | 381+280 | 381+420 | 140 | LHS | Separator |
| 35 | 381+280 | 381+420 | 140 | RHS | Separator |
| 36 | 381+470 | 381+670 | 200 | LHS | Separator |
| 37 | 381+470 | 381+670 | 200 | RHS | Separator |
| 38 | 382+820 | 382+890 | 70 | LHS | Separator |
| 39 | 382+820 | 382+890 | 70 | RHS | Separator |
| 40 | 382+905 | 382+980 | 75 | LHS | Separator |
| 41 | 382+905 | 382+980 | 75 | RHS | Separator |
| 42 | 383+980 | 384+085 | 105 | LHS | Separator |
| 43 | 383+980 | 384+085 | 105 | RHS | Separator |
| 44 | 384+105 | 384+190 | 85 | LHS | Separator |
| 45 | 384+105 | 384+190 | 85 | RHS | Separator |
| 46 | 384+730 | 384+750 | 20 | RHS | Separator |
| 47 | 385+000 | 385+030 | 30 | LHS | Separator |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 48 | 385+000 | 385+030 | 30 | RHS | Separator |
| 49 | 385+050 | 385+315 | 265 | LHS | Separator |
| 50 | 385+050 | 385+315 | 265 | RHS | Separator |
| 51 | 385+365 | 385+610 | 245 | LHS | Separator |
| 52 | 385+365 | 385+610 | 245 | RHS | Separator |
| 53 | 385+750 | 385+760 | 10 | RHS | Separator |
| 54 | 386+070 | 386+080 | 10 | RHS | Separator |
| 55 | 387+030 | 387+060 | 30 | LHS | Separator |
| 56 | 387+090 | 387+120 | 30 | RHS | Separator |
| 57 | 387+220 | 387+310 | 90 | LHS | Separator |
| 58 | 387+220 | 387+310 | 90 | RHS | Separator |
| 59 | 387+330 | 387+360 | 30 | LHS | Separator |
| 60 | 387+330 | 387+360 | 30 | RHS | Separator |
| 61 | 387+480 | 387+520 | 40 | LHS | Separator |
| 62 | 387+510 | 387+530 | 20 | RHS | Separator |
| 63 | 387+750 | 387+770 | 20 | LHS | Median |
| 64 | 388+160 | 388+315 | 155 | LHS | Separator |
| 65 | 388+160 | 388+315 | 155 | RHS | Separator |
| 66 | 388+350 | 388+550 | 200 | LHS | Separator |
| 67 | 388+350 | 388+550 | 200 | RHS | Separator |
| 68 | 389+240 | 389+400 | 160 | LHS | Separator |
| 69 | 389+240 | 389+400 | 160 | RHS | Separator |
| 70 | 389+420 | 389+480 | 60 | LHS | Separator |
| 71 | 389+420 | 389+480 | 60 | RHS | Separator |
| 72 | 390+400 | 390+410 | 10 | LHS | Separator |
| 73 | 390+560 | 390+610 | 50 | LHS | Separator |
| 74 | 390+560 | 390+610 | 50 | RHS | Separator |
| 75 | 390+630 | 390+770 | 140 | LHS | Separator |
| 76 | 390+630 | 390+770 | 140 | RHS | Separator |
| 77 | 391+050 | 391+260 | 210 | LHS | Separator |
| 78 | 391+050 | 391+260 | 210 | RHS | Separator |
| 79 | 391+310 | 391+500 | 190 | LHS | Separator |
| 80 | 391+310 | 391+500 | 190 | RHS | Separator |
| 81 | 391+530 | 392+040 | 510 | LHS | Separator |
| 82 | 391+530 | 392+040 | 510 | RHS | Separator |
| 83 | 392+060 | 392+190 | 130 | LHS | Separator |
| 84 | 392+060 | 392+190 | 130 | RHS | Separator |
| 85 | 392+500 | 392+520 | 20 | RHS | Separator |
| 86 | 392+930 | 392+950 | 20 | LHS | Separator |
| 87 | 393+110 | 393+150 | 40 | LHS | Separator |
| 88 | 393+110 | 393+150 | 40 | RHS | Separator |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 89 | 393+165 | 393+280 | 115 | LHS | Separator |
| 90 | 393+165 | 393+280 | 115 | RHS | Separator |
| 91 | 393+760 | 393+930 | 170 | LHS | Separator |
| 92 | 393+760 | 393+930 | 170 | RHS | Separator |
| 93 | 393+980 | 394+190 | 210 | LHS | Separator |
| 94 | 393+980 | 394+190 | 210 | RHS | Separator |
| 95 | 395+470 | 395+540 | 70 | LHS | Separator |
| 96 | 395+470 | 395+540 | 70 | RHS | Separator |
| 97 | 395+555 | 395+610 | 55 | LHS | Separator |
| 98 | 395+555 | 395+610 | 55 | RHS | Separator |
| 99 | 396+240 | 396+335 | 95 | LHS | Separator |
| 100 | 396+240 | 396+335 | 95 | RHS | Separator |
| 101 | 396+350 | 396+370 | 20 | LHS | Separator |
| 102 | 396+350 | 396+370 | 20 | RHS | Separator |
| 103 | 396+690 | 397+110 | 420 | LHS | Median |
| 104 | 397+140 | 397+440 | 300 | LHS | Median |
| 105 | 398+280 | 398+390 | 110 | LHS | Separator |
| 106 | 398+280 | 398+390 | 110 | RHS | Separator |
| 107 | 398+400 | 398+450 | 50 | LHS | Separator |
| 108 | 398+400 | 398+450 | 50 | RHS | Separator |
| 109 | 399+050 | 399+185 | 135 | LHS | Separator |
| 110 | 399+050 | 399+185 | 135 | RHS | Separator |
| 111 | 399+215 | 399+380 | 165 | LHS | Separator |
| 112 | 399+215 | 399+380 | 165 | RHS | Separator |
| 113 | 399+450 | 399+720 | 270 | LHS | Separator |
| 114 | 399+450 | 399+720 | 270 | RHS | Separator |
| 115 | 399+750 | 399+890 | 140 | LHS | Separator |
| 116 | 399+750 | 399+890 | 140 | RHS | Separator |
| 117 | 400+270 | 400+650 | 380 | LHS | Median |
| 118 | 400+685 | 401+090 | 405 | LHS | Median |
| 119 | 401+470 | 401+670 | 200 | LHS | Separator |
| 120 | 401+470 | 401+670 | 200 | RHS | Separator |
| 121 | 401+690 | 401+830 | 140 | RHS | Separator |
| 122 | 401+690 | 401+830 | 140 | LHS | Separator |
| 123 | 402+860 | 403+075 | 215 | LHS | Separator |
| 124 | 402+860 | 403+075 | 215 | RHS | Separator |
| 125 | 403+110 | 403+310 | 200 | LHS | Separator |
| 126 | 403+110 | 403+310 | 200 | RHS | Separator |
| 127 | 404+210 | 404+360 | 150 | RHS | Separator |
| 128 | 404+260 | 404+665 | 405 | | Median |
| 129 | 404+700 | 405+080 | 380 | | Median |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 130 | 405+230 | 405+350 | 120 | LHS | Separator |
| 131 | 405+230 | 405+350 | 120 | RHS | Separator |
| 132 | 405+370 | 405+470 | 100 | LHS | Separator |
| 133 | 405+370 | 405+470 | 100 | RHS | Separator |
| 134 | 405+930 | 406+285 | 355 | RHS | Shoulder |
| 135 | 405+950 | 406+285 | 335 | LHS | Shoulder |
| 136 | 406+315 | 406+620 | 305 | LHS | Shoulder |
| 137 | 406+315 | 406+820 | 505 | RHS | Shoulder |
| 138 | 407+170 | 407+480 | 310 | LHS | Separator |
| 139 | 407+170 | 407+480 | 310 | RHS | Separator |
| 140 | 407+535 | 407+840 | 305 | LHS | Separator |
| 141 | 407+535 | 407+840 | 305 | RHS | Separator |
| 142 | 408+760 | 408+790 | 30 | RHS | Separator |
| 143 | 409+140 | 409+220 | 80 | LHS | Separator |
| 144 | 409+140 | 409+220 | 80 | RHS | Separator |
| 145 | 409+250 | 409+350 | 100 | LHS | Separator |
| 146 | 409+250 | 409+350 | 100 | RHS | Separator |
| 147 | 409+830 | 409+980 | 150 | LHS | Separator |
| 148 | 409+830 | 409+980 | 150 | RHS | Separator |
| 149 | 410+010 | 410+190 | 180 | LHS | Separator |
| 150 | 410+010 | 410+190 | 180 | RHS | Separator |
| 151 | 411+010 | 411+100 | 90 | LHS | Separator |
| 152 | 411+010 | 411+100 | 90 | RHS | Separator |
| 153 | 411+125 | 411+250 | 125 | LHS | Separator |
| 154 | 411+125 | 411+250 | 125 | RHS | Separator |
| 155 | 411+480 | 411+820 | 340 | | Median |
| 156 | 411+850 | 414+480 | 2630 | | Median |
| 157 | 412+180 | 412+240 | 60 | LHS | Separator |
| 158 | 412+180 | 412+240 | 60 | RHS | Separator |
| 159 | 413+820 | 414+180 | 360 | SR LHS | Shoulder |
| 160 | 414+505 | 415+070 | 565 | | Median |
| 161 | 415+490 | 416+020 | 530 | LHS | Median |
| 162 | 415+490 | 415+570 | 80 | RHS | Separator |
| 163 | 415+585 | 416+080 | 495 | RHS | Separator |
| 164 | 416+130 | 416+430 | 300 | LHS | Median |
| 165 | 416+130 | 416+430 | 300 | RHS | Separator |
| 166 | 416+710 | 416+970 | 260 | LHS | Median |
| 167 | 416+710 | 416+840 | 130 | RHS | Separator |
| 168 | 416+865 | 416+970 | 105 | RHS | Separator |
| 169 | 417+800 | 418+210 | 410 | LHS | Separator |
| 170 | 417+840 | 418+080 | 240 | RHS | Separator |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 171 | 418+300 | 418+580 | 280 | LHS | Separator |
| 172 | 418+300 | 418+580 | 280 | RHS | Separator |
| 173 | 419+110 | 419+140 | 30 | RHS | Separator |
| 174 | 419+260 | 419+450 | 190 | LHS | Separator |
| 175 | 419+260 | 419+450 | 190 | RHS | Separator |
| 176 | 419+480 | 419+690 | 210 | LHS | Separator |
| 177 | 419+480 | 419+690 | 210 | RHS | Separator |
| 178 | 421+250 | 421+320 | 70 | LHS | Separator |
| 179 | 421+330 | 421+360 | 30 | LHS | Separator |
| 180 | 421+330 | 421+360 | 30 | RHS | Separator |
| 181 | 421+380 | 421+780 | 400 | SR LHS | Shoulder |
| 182 | 421+690 | 421+800 | 110 | RHS | Separator |
| 183 | 421+815 | 422+145 | 330 | RHS | Separator |
| 184 | 421+860 | 422+145 | 285 | LHS | Separator |
| 185 | 422+190 | 422+440 | 250 | LHS | Separator |
| 186 | 422+190 | 422+440 | 250 | RHS | Separator |
| 187 | 422+370 | 422+580 | 210 | | Median |

**Section -2 Chennai Bypass**

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 0+000 | 0+360 | 360 | LHS | Seperator |
| 2 | 0+030 | 0+380 | 350 | | Median |
| 3 | 0+390 | 1+250 | 860 | LHS | Seperator |
| 4 | 0+410 | 0+420 | 10 | | Median |
| 5 | 1+270 | 1+530 | 260 | LHS | Seperator |
| 6 | 1+550 | 2+500 | 950 | LHS | Seperator |
| 7 | 2+520 | 5+220 | 2700 | LHS | Seperator |
| 8 | 5+240 | 5+990 | 750 | LHS | Seperator |
| 9 | 6+020 | 7+060 | 1040 | LHS | Seperator |
| 10 | 7+090 | 7+520 | 430 | LHS | Seperator |
| 11 | 7+530 | 9+000 | 1470 | LHS | Seperator |
| 12 | 9+230 | 10+360 | 1130 | LHS | Seperator |
| 13 | 10+380 | 12+070 | 1690 | LHS | Seperator |
| 14 | 12+090 | 13+490 | 1400 | LHS | Seperator |
| 15 | 13+530 | 14+090 | 560 | LHS | Seperator |
| 16 | 14+110 | 15+380 | 1270 | LHS | Seperator |
| 17 | 15+850 | 16+580 | 730 | LHS | Seperator |
| 18 | 16+700 | 16+910 | 210 | LHS | Seperator |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 19 | 16+950 | 18+020 | 1070 | LHS | Seperator |
| 20 | 18+030 | 18+825 | 795 | LHS | Seperator |
| 21 | 18+915 | 19+085 | 170 | LHS | Seperator |
| 22 | 19+670 | 21+320 | 1650 | LHS | Seperator |
| 23 | 21+340 | 21+710 | 370 | LHS | Seperator |
| 24 | 21+760 | 21+940 | 180 | LHS | Seperator |
| 25 | 25+550 | 25+940 | 390 | LHS | Seperator |
| 26 | 25+960 | 27+230 | 1270 | LHS | Seperator |
| 27 | 27+270 | 28+160 | 890 | LHS | Seperator |
| 28 | 28+200 | 28+780 | 580 | LHS | Seperator |
| 29 | 28+820 | 29+060 | 240 | LHS | Seperator |
| 30 | 29+080 | 29+770 | 690 | LHS | Seperator |
| 31 | 29+780 | 30+170 | 390 | LHS | Seperator |
| 32 | 30+190 | 31+390 | 1200 | LHS | Seperator |
| 33 | 31+420 | 32+060 | 640 | LHS | Seperator |
| 34 | 32+550 | 32+600 | 50 | LHS | Seperator |
| 35 | 32+600 | 32+285 | 315 | RHS | Seperator |
| 36 | 32+060 | 31+380 | 680 | RHS | Seperator |
| 37 | 31+350 | 30+190 | 1160 | RHS | Seperator |
| 38 | 30+170 | 29+750 | 420 | RHS | Seperator |
| 39 | 29+740 | 29+080 | 660 | RHS | Seperator |
| 40 | 29+060 | 28+340 | 720 | RHS | Seperator |
| 41 | 28+280 | 28+140 | 140 | RHS | Seperator |
| 42 | 28+110 | 27+270 | 840 | RHS | Seperator |
| 43 | 27+240 | 25+970 | 1270 | RHS | Seperator |
| 44 | 25+950 | 25+540 | 410 | RHS | Seperator |
| 45 | 21+950 | 21+740 | 210 | RHS | Seperator |
| 46 | 21+690 | 21+350 | 340 | RHS | Seperator |
| 47 | 21+330 | 19+680 | 1650 | RHS | Seperator |
| 48 | 19+090 | 18+910 | 180 | RHS | Seperator |
| 49 | 18+840 | 18+020 | 820 | RHS | Seperator |
| 50 | 18+010 | 16+950 | 1060 | RHS | Seperator |
| 51 | 16+645 | 16+610 | 35 | | Median |
| 52 | 16+560 | 15+880 | 680 | RHS | Shoulder |
| 53 | 15+410 | 14+150 | 1260 | RHS | Shoulder |
| 54 | 14+130 | 13+580 | 550 | RHS | Shoulder |
| 55 | 13+550 | 12+130 | 1420 | RHS | Shoulder |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 56 | 12+110 | 10+370 | 1740 | RHS | Shoulder |
| 57 | 10+350 | 9+250 | 1100 | RHS | Shoulder |
| 58 | 9+020 | 7+550 | 1470 | RHS | Shoulder |
| 59 | 7+540 | 7+120 | 420 | RHS | Shoulder |
| 60 | 7+100 | 6+700 | 400 | RHS | Shoulder |
| 61 | 6+620 | 6+540 | 80 | RHS | Shoulder |
| 62 | 6+430 | 6+010 | 420 | RHS | Shoulder |
| 63 | 5+990 | 5+230 | 760 | RHS | Shoulder |
| 64 | 5+210 | 3+920 | 1290 | RHS | Shoulder |
| 65 | 3+880 | 3+780 | 100 | RHS | Shoulder |
| 66 | 3+750 | 2+530 | 1220 | RHS | Shoulder |
| 67 | 2+510 | 1+540 | 970 | RHS | Shoulder |
| 68 | 1+520 | 1+310 | 210 | RHS | Shoulder |
| 69 | 1+260 | 0+440 | 820 | RHS | Shoulder |
| 70 | 0+470 | 0+430 | 40 | | Median |
| 71 | 0+410 | 0+200 | 210 | | MEDIAN |
| 72 | 0+350 | 0+200 | 150 | RHS | Seperator |
| 73 | 0+130 | 0+000 | 130 | RHS | Seperator |
| 74 | 0+130 | 0+000 | 130 | | Median |

**Section-03 Chennai Tada**

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 21+900 | 21+990 | 90 | W Beam Crash Barrier | LHS | Seperator |
| 22+030 | 24+650 | 2620 | W Beam Crash Barrier | LHS | Seperator |
| 24+710 | 25+660 | 950 | W Beam Crash Barrier | LHS | Seperator |
| 25+700 | 25+840 | 140 | W Beam Crash Barrier | LHS | Seperator |
| 26+300 | 26+450 | 150 | W Beam Crash Barrier | LHS | Seperator |
| 26+450 | 26+890 | 440 | W Beam Crash Barrier | LHS | Median |
| 26+890 | 27+010 | 120 | W Beam Crash Barrier | LHS | Seperator |
| 27+540 | 27+760 | 220 | W Beam Crash Barrier | LHS | Seperator |
| 27+770 | 27+870 | 100 | W Beam Crash Barrier | LHS | Seperator |
| 27+880 | 28+100 | 220 | W Beam Crash Barrier | LHS | Seperator |
| 28+910 | 29+960 | 1050 | W Beam Crash Barrier | LHS | Seperator |
| 29+990 | 30+460 | 470 | W Beam Crash Barrier | LHS | Seperator |
| 31+330 | 31+480 | 150 | W Beam Crash Barrier | LHS | Seperator |
| 31+530 | 31+940 | 410 | W Beam Crash Barrier | LHS | Seperator |
| 31+970 | 33+200 | 1230 | W Beam Crash Barrier | LHS | Seperator |

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 33+230 | 33+540 | 310 | W Beam Crash Barrier | LHS | Seperator |
| 33+780 | 34+000 | 220 | W Beam Crash Barrier | LHS | Seperator |
| 34+015 | 34+020 | 5 | W Beam Crash Barrier | LHS | Seperator |
| 34+040 | 34+330 | 290 | W Beam Crash Barrier | LHS | Seperator |
| 34+330 | 34+750 | 420 | W Beam Crash Barrier | LHS | Seperator |
| 35+320 | 35+385 | 65 | W Beam Crash Barrier | LHS | Seperator |
| 35+385 | 35+480 | 95 | W Beam Crash Barrier | LHS | Seperator |
| 35+650 | 36+100 | 450 | W Beam Crash Barrier | LHS | Seperator |
| 36+100 | 36+300 | 200 | W Beam Crash Barrier | LHS | Seperator |
| 36+320 | 37+090 | 770 | W Beam Crash Barrier | LHS | Seperator |
| 37+150 | 37+350 | 200 | W Beam Crash Barrier | LHS | Seperator |
| 39+140 | 39+290 | 150 | W Beam Crash Barrier | LHS | Seperator |
| 39+320 | 39+860 | 540 | W Beam Crash Barrier | LHS | Seperator |
| 40+090 | 40+530 | 440 | W Beam Crash Barrier | LHS | Seperator |
| 40+550 | 40+800 | 250 | W Beam Crash Barrier | LHS | Seperator |
| 40+830 | 41+030 | 200 | W Beam Crash Barrier | LHS | Seperator |
| 41+040 | 41+310 | 270 | W Beam Crash Barrier | LHS | Seperator |
| 41+320 | 41+590 | 270 | W Beam Crash Barrier | LHS | Seperator |
| 41+620 | 41+900 | 280 | W Beam Crash Barrier | LHS | Seperator |
| 42+500 | 43+450 | 950 | W Beam Crash Barrier | LHS | Seperator |
| 43+460 | 43+470 | 10 | W Beam Crash Barrier | LHS | Seperator |
| 43+490 | 43+590 | 100 | W Beam Crash Barrier | LHS | Seperator |
| 43+880 | 44+120 | 240 | W Beam Crash Barrier | LHS | Seperator |
| 44+150 | 44+370 | 220 | W Beam Crash Barrier | LHS | Seperator |
| 45+070 | 45+970 | 900 | W Beam Crash Barrier | LHS | Seperator |
| 45+950 | 46+050 | 100 | W Beam Crash Barrier | LHS | Seperator |
| 46+080 | 46+240 | 160 | W Beam Crash Barrier | LHS | Seperator |
| 46+690 | 47+050 | 360 | W Beam Crash Barrier | LHS | Seperator |
| 47+050 | 47+140 | 90 | W Beam Crash Barrier | LHS | Seperator |
| 47+170 | 47+390 | 220 | W Beam Crash Barrier | LHS | Seperator |
| 48+000 | 48+270 | 270 | W Beam Crash Barrier | LHS | Seperator |
| 48+300 | 49+050 | 750 | W Beam Crash Barrier | LHS | Seperator |
| 49+290 | 49+550 | 260 | W Beam Crash Barrier | LHS | Seperator |
| 49+600 | 49+790 | 190 | W Beam Crash Barrier | LHS | Seperator |
| 49+980 | 50+060 | 80 | W Beam Crash Barrier | LHS | Seperator |
| 50+270 | 50+350 | 80 | W Beam Crash Barrier | LHS | Seperator |
| 50+750 | 50+870 | 120 | W Beam Crash Barrier | LHS | Seperator |

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 50+890 | 50+960 | 70 | W Beam Crash Barrier | LHS | Seperator |
| 51+030 | 51+070 | 40 | W Beam Crash Barrier | LHS | Seperator |
| 51+100 | 51+280 | 180 | W Beam Crash Barrier | LHS | Seperator |
| 51+300 | 51+660 | 360 | W Beam Crash Barrier | LHS | Seperator |
| 52+270 | 52+330 | 60 | W Beam Crash Barrier | LHS | Seperator |
| 52+370 | 52+580 | 210 | W Beam Crash Barrier | LHS | Seperator |
| 52+770 | 52+940 | 170 | W Beam Crash Barrier | LHS | Seperator |
| 52+940 | 53+650 | 710 | W Beam Crash Barrier | LHS | Seperator |
| 53+670 | 53+760 | 90 | W Beam Crash Barrier | LHS | Seperator |
| 53+810 | 53+960 | 150 | W Beam Crash Barrier | LHS | Seperator |
| 53+930 | 54+360 | 430 | W Beam Crash Barrier | LHS | Seperator |
| 54+400 | 54+080 | 320 | W Beam Crash Barrier | RHS | Shoulder |
| 53+760 | 52+800 | 960 | W Beam Crash Barrier | RHS | Seperator |
| 52+590 | 52+510 | 80 | W Beam Crash Barrier | RHS | Seperator |
| 52+450 | 52+240 | 210 | W Beam Crash Barrier | RHS | Seperator |
| 51+670 | 50+810 | 860 | W Beam Crash Barrier | RHS | Seperator |
| 50+690 | 50+630 | 60 | W Beam Crash Barrier | RHS | Seperator |
| 50+400 | 50+250 | 150 | W Beam Crash Barrier | RHS | Seperator |
| 50+020 | 49+980 | 40 | W Beam Crash Barrier | RHS | Seperator |
| 49+850 | 49+560 | 290 | W Beam Crash Barrier | RHS | Seperator |
| 49+520 | 49+320 | 200 | W Beam Crash Barrier | RHS | Seperator |
| 49+060 | 48+500 | 560 | W Beam Crash Barrier | RHS | Seperator |
| 48+460 | 48+320 | 140 | W Beam Crash Barrier | RHS | Seperator |
| 48+300 | 48+070 | 230 | W Beam Crash Barrier | RHS | Seperator |
| 47+310 | 47+210 | 100 | W Beam Crash Barrier | RHS | Seperator |
| 47+190 | 46+700 | 490 | W Beam Crash Barrier | RHS | Seperator |
| 46+240 | 45+380 | 860 | W Beam Crash Barrier | RHS | Seperator |
| 45+350 | 45+020 | 330 | W Beam Crash Barrier | RHS | Seperator |
| 44+370 | 44+240 | 130 | W Beam Crash Barrier | RHS | Seperator |
| 44+210 | 43+950 | 260 | W Beam Crash Barrier | RHS | Seperator |
| 43+620 | 43+530 | 90 | W Beam Crash Barrier | RHS | Seperator |
| 42+690 | 42+500 | 190 | W Beam Crash Barrier | RHS | Seperator |
| 41+940 | 40+860 | 1080 | W Beam Crash Barrier | RHS | Seperator |
| 40+830 | 40+580 | 250 | W Beam Crash Barrier | RHS | Seperator |
| 40+560 | 40+130 | 430 | W Beam Crash Barrier | RHS | Seperator |
| 39+880 | 39+500 | 380 | W Beam Crash Barrier | RHS | Seperator |
| 39+450 | 39+370 | 80 | W Beam Crash Barrier | RHS | Seperator |

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 39+320 | 39+190 | 130 | W Beam Crash Barrier | RHS | Seperator |
| 37+360 | 37+220 | 140 | W Beam Crash Barrier | RHS | Seperator |
| 37+120 | 36+100 | 1020 | W Beam Crash Barrier | RHS | Seperator |
| 36+140 | 35+710 | 430 | W Beam Crash Barrier | RHS | Seperator |
| 35+500 | 35+350 | 150 | W Beam Crash Barrier | RHS | Seperator |
| 34+790 | 34+570 | 220 | W Beam Crash Barrier | RHS | Seperator |
| 34+550 | 34+020 | 530 | W Beam Crash Barrier | RHS | Seperator |
| 34+000 | 33+790 | 210 | W Beam Crash Barrier | RHS | Seperator |
| 33+540 | 33+220 | 320 | W Beam Crash Barrier | RHS | Seperator |
| 33+200 | 31+620 | 1580 | W Beam Crash Barrier | RHS | Seperator |
| 31+590 | 31+540 | 50 | W Beam Crash Barrier | RHS | Seperator |
| 31+480 | 31+320 | 160 | W Beam Crash Barrier | RHS | Seperator |
| 30+460 | 30+000 | 460 | W Beam Crash Barrier | RHS | Seperator |
| 29+980 | 29+240 | 740 | W Beam Crash Barrier | RHS | Seperator |
| 29+200 | 28+900 | 300 | W Beam Crash Barrier | RHS | Seperator |
| 28+120 | 27+510 | 610 | W Beam Crash Barrier | RHS | Seperator |
| 26+970 | 26+880 | 90 | W Beam Crash Barrier | RHS | Seperator |
| 26+430 | 26+340 | 90 | W Beam Crash Barrier | RHS | Seperator |
| 25+830 | 25+730 | 100 | W Beam Crash Barrier | RHS | Seperator |
| 25+710 | 24+720 | 990 | W Beam Crash Barrier | RHS | Seperator |
| 24+640 | 22+810 | 1830 | W Beam Crash Barrier | RHS | Seperator |
| 22+780 | 22+190 | 590 | W Beam Crash Barrier | RHS | Seperator |

**Table 6-27 : Location of RCC Crash Barrier**

**Section 01 Vijayawada-Chilakaluripet**

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 355+460 | 355+510 | 50 | LHS | Structure |
| 2 | 355+460 | 355+510 | 50 | RHS | Structure |
| 3 | 355+470 | 355+500 | 30 | Median | Structure |
| 4 | 356+045 | 356+080 | 35 | LHS | Structure |
| 5 | 356+045 | 356+080 | 35 | RHS | Structure |
| 6 | 356+050 | 356+075 | 25 | LHS | Structure |
| 7 | 356+050 | 356+075 | 25 | RHS | Structure |
| 8 | 357+285 | 357+315 | 30 | LHS | Structure |
| 9 | 357+285 | 357+315 | 30 | RHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 10 | 372+335 | 372+410 | 75 | Median | Structure |
| 11 | 372+335 | 372+410 | 75 | RHS | Structure |
| 12 | 372+340 | 372+405 | 65 | LHS | Structure |
| 13 | 373+010 | 373+030 | 20 | LHS | Structure |
| 14 | 373+010 | 373+030 | 20 | RHS | Structure |
| 15 | 373+590 | 373+665 | 75 | LHS | Structure |
| 16 | 373+590 | 373+665 | 75 | RHS | Structure |
| 17 | 373+760 | 373+790 | 30 | LHS | Structure |
| 18 | 373+790 | 374+530 | 740 | LHS | Structure Approach |
| 19 | 373+830 | 374+530 | 700 | RHS | Structure Approach |
| 20 | 374+600 | 374+630 | 30 | LHS | Structure |
| 21 | 374+600 | 374+630 | 30 | RHS | Structure |
| 22 | 374+610 | 374+620 | 10 | Median | Structure |
| 23 | 375+240 | 376+005 | 765 | LHS | Structure Approach |
| 24 | 375+240 | 376+005 | 765 | RHS | Structure Approach |
| 25 | 375+640 | 375+665 | 25 | Median | Structure |
| 26 | 375+940 | 375+960 | 20 | LHS | Structure |
| 27 | 375+940 | 375+960 | 20 | RHS | Structure |
| 28 | 375+950 | 375+955 | 5 | LHS | Structure |
| 29 | 375+950 | 375+955 | 5 | RHS | Structure |
| 30 | 376+670 | 376+680 | 10 | RHS | Structure |
| 31 | 376+680 | 376+685 | 5 | RHS | Structure |
| 32 | 376+705 | 376+710 | 5 | LHS | Structure |
| 33 | 376+720 | 376+730 | 10 | LHS | Structure |
| 34 | 377+250 | 377+270 | 20 | LHS | Structure |
| 35 | 377+250 | 377+270 | 20 | RHS | Structure |
| 36 | 377+775 | 377+800 | 25 | LHS | Structure |
| 37 | 377+775 | 377+800 | 25 | LHS | Structure |
| 38 | 377+780 | 377+795 | 15 | Median | Structure |
| 39 | 377+775 | 377+800 | 25 | RHS | Structure |
| 40 | 377+775 | 377+800 | 25 | RHS | Structure |
| 41 | 378+270 | 378+735 | 465 | LHS | Structure Approach |
| 42 | 378+310 | 378+735 | 425 | RHS | Structure Approach |
| 43 | 378+770 | 378+940 | 170 | Median | |
| 44 | 379+020 | 379+035 | 15 | LHS | Structure |
| 45 | 379+020 | 379+035 | 15 | RHS | Structure |
| 46 | 379+025 | 379+030 | 5 | LHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 47 | 379+025 | 379+030 | 5 | RHS | Structure |
| 48 | 379+375 | 379+390 | 15 | LHS | Structure |
| 49 | 379+375 | 379+390 | 15 | RHS | Structure |
| 50 | 379+380 | 379+385 | 5 | LHS | Structure |
| 51 | 379+380 | 379+385 | 5 | RHS | Structure |
| 52 | 379+710 | 379+720 | 10 | LHS | Structure |
| 53 | 379+710 | 379+720 | 10 | RHS | Structure |
| 54 | 379+713 | 379+718 | 5 | LHS | Structure |
| 55 | 379+713 | 379+718 | 5 | RHS | Structure |
| 56 | 379+935 | 379+955 | 20 | LHS | Structure |
| 57 | 379+935 | 379+955 | 20 | RHS | Structure |
| 58 | 379+940 | 379+945 | 5 | LHS | Structure |
| 59 | 379+940 | 379+945 | 5 | RHS | Structure |
| 60 | 380+275 | 380+290 | 15 | LHS | Structure |
| 61 | 380+275 | 380+290 | 15 | RHS | Structure |
| 62 | 380+520 | 380+560 | 40 | LHS | Structure |
| 63 | 380+520 | 380+560 | 40 | RHS | Structure |
| 64 | 380+520 | 380+560 | 40 | LHS | Structure |
| 65 | 380+520 | 380+560 | 40 | RHS | Structure |
| 66 | 380+530 | 380+555 | 25 | Median | Structure |
| 67 | 380+970 | 380+990 | 20 | LHS | Structure |
| 68 | 380+970 | 380+990 | 20 | RHS | Structure |
| 69 | 380+975 | 380+980 | 5 | LHS | Structure |
| 70 | 380+975 | 380+980 | 5 | RHS | Structure |
| 71 | 381+420 | 381+470 | 50 | LHS | Structure |
| 72 | 381+420 | 381+470 | 50 | RHS | Structure |
| 73 | 381+430 | 381+455 | 25 | Median | Structure |
| 74 | 381+560 | 381+575 | 15 | LHS | Structure |
| 75 | 381+560 | 381+575 | 15 | RHS | Structure |
| 76 | 381+565 | 381+570 | 5 | LHS | Structure |
| 77 | 381+565 | 381+570 | 5 | RHS | Structure |
| 78 | 381+920 | 381+940 | 20 | LHS | Structure |
| 79 | 381+920 | 381+940 | 20 | RHS | Structure |
| 80 | 381+930 | 381+935 | 5 | LHS | Structure |
| 81 | 381+930 | 381+935 | 5 | RHS | Structure |
| 82 | 382+590 | 382+605 | 15 | LHS | Structure |
| 83 | 382+590 | 382+605 | 15 | RHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 84 | 382+595 | 382+600 | 5 | LHS | Structure |
| 85 | 382+595 | 382+600 | 5 | RHS | Structure |
| 86 | 382+890 | 382+905 | 15 | LHS | Structure |
| 87 | 382+890 | 382+905 | 15 | RHS | Structure |
| 88 | 383+500 | 383+520 | 20 | LHS | Structure |
| 89 | 383+500 | 383+520 | 20 | RHS | Structure |
| 90 | 383+510 | 383+515 | 5 | LHS | Structure |
| 91 | 383+510 | 383+515 | 5 | RHS | Structure |
| 92 | 384+030 | 384+045 | 15 | LHS | Structure |
| 93 | 384+030 | 384+045 | 15 | RHS | Structure |
| 94 | 384+035 | 384+040 | 5 | LHS | Structure |
| 95 | 384+035 | 384+040 | 5 | RHS | Structure |
| 96 | 384+085 | 384+105 | 20 | LHS | Structure |
| 97 | 384+085 | 384+105 | 20 | RHS | Structure |
| 98 | 384+690 | 384+730 | 40 | LHS | Structure |
| 99 | 384+690 | 384+730 | 40 | RHS | Structure |
| 100 | 384+695 | 384+725 | 30 | LHS | Structure |
| 101 | 384+695 | 384+725 | 30 | RHS | Structure |
| 102 | 384+995 | 385+010 | 15 | LHS | Structure |
| 103 | 384+995 | 385+010 | 15 | RHS | Structure |
| 104 | 385+000 | 385+005 | 5 | LHS | Structure |
| 105 | 385+000 | 385+005 | 5 | RHS | Structure |
| 106 | 385+030 | 385+050 | 20 | LHS | Structure |
| 107 | 385+030 | 385+050 | 20 | RHS | Structure |
| 108 | 385+220 | 385+225 | 5 | LHS | Structure |
| 109 | 385+210 | 385+230 | 20 | RHS | Structure |
| 110 | 385+220 | 385+225 | 5 | LHS | Structure |
| 111 | 385+220 | 385+225 | 5 | RHS | Structure |
| 112 | 385+315 | 385+365 | 50 | LHS | Structure |
| 113 | 385+315 | 385+365 | 50 | RHS | Structure |
| 114 | 385+325 | 385+355 | 30 | Median | Structure |
| 115 | 385+735 | 385+755 | 20 | LHS | Structure |
| 116 | 385+735 | 385+755 | 20 | RHS | Structure |
| 117 | 385+745 | 385+750 | 5 | LHS | Structure |
| 118 | 385+745 | 385+750 | 5 | RHS | Structure |
| 119 | 386+050 | 386+075 | 25 | LHS | Structure |
| 120 | 386+050 | 386+075 | 25 | RHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 121 | 386+060 | 386+070 | 10 | LHS | Structure |
| 122 | 386+060 | 386+070 | 10 | RHS | Structure |
| 123 | 387+050 | 387+075 | 25 | LHS | Structure |
| 124 | 387+070 | 387+100 | 30 | RHS | Structure |
| 125 | 387+060 | 387+080 | 20 | LHS | Structure |
| 126 | 387+070 | 387+095 | 25 | RHS | Structure |
| 127 | 387+065 | 387+085 | 20 | Median | Structure |
| 128 | 387+310 | 387+330 | 20 | LHS | Structure |
| 129 | 387+310 | 387+330 | 20 | RHS | Structure |
| 130 | 387+500 | 387+515 | 15 | LHS | Structure |
| 131 | 387+500 | 387+520 | 20 | RHS | Structure |
| 132 | 387+510 | 387+515 | 5 | LHS | Structure |
| 133 | 387+510 | 387+515 | 5 | RHS | Structure |
| 134 | 387+985 | 388+020 | 35 | LHS | Structure |
| 135 | 387+985 | 388+020 | 35 | RHS | Structure |
| 136 | 387+990 | 388+015 | 25 | LHS | Structure |
| 137 | 387+990 | 388+015 | 25 | RHS | Structure |
| 138 | 387+995 | 388+010 | 15 | Median | Structure |
| 139 | 388+315 | 388+350 | 35 | LHS | Structure |
| 140 | 388+315 | 388+350 | 35 | RHS | Structure |
| 141 | 388+850 | 388+890 | 40 | LHS | Structure |
| 142 | 388+850 | 388+890 | 40 | RHS | Structure |
| 143 | 388+855 | 388+885 | 30 | LHS | Structure |
| 144 | 388+855 | 388+885 | 30 | RHS | Structure |
| 145 | 389+400 | 389+420 | 20 | LHS | Structure |
| 146 | 389+400 | 389+420 | 20 | RHS | Structure |
| 147 | 389+765 | 389+800 | 35 | LHS | Structure |
| 148 | 389+765 | 389+800 | 35 | RHS | Structure |
| 149 | 389+770 | 389+795 | 25 | LHS | Structure |
| 150 | 389+770 | 389+795 | 25 | RHS | Structure |
| 151 | 389+775 | 389+790 | 15 | Median | Structure |
| 152 | 390+425 | 390+445 | 20 | LHS | Structure |
| 153 | 390+425 | 390+445 | 20 | RHS | Structure |
| 154 | 390+430 | 390+440 | 10 | LHS | Structure |
| 155 | 390+430 | 390+440 | 10 | RHS | Structure |
| 156 | 390+610 | 390+630 | 20 | LHS | Structure |
| 157 | 390+610 | 390+630 | 20 | RHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 158 | 391+260 | 391+310 | 50 | LHS | Structure |
| 159 | 391+260 | 391+310 | 50 | RHS | Structure |
| 160 | 391+270 | 391+300 | 30 | Median | Structure |
| 161 | 391+500 | 391+530 | 30 | LHS | Structure |
| 162 | 391+500 | 391+530 | 30 | RHS | Structure |
| 163 | 391+500 | 391+530 | 30 | LHS | Structure |
| 164 | 391+500 | 391+530 | 30 | RHS | Structure |
| 165 | 391+800 | 391+830 | 30 | LHS | Structure |
| 166 | 391+800 | 391+830 | 30 | RHS | Structure |
| 167 | 391+800 | 391+830 | 30 | LHS | Structure |
| 168 | 391+800 | 391+830 | 30 | RHS | Structure |
| 169 | 392+040 | 392+060 | 20 | LHS | Structure |
| 170 | 392+040 | 392+060 | 20 | RHS | Structure |
| 171 | 392+950 | 392+985 | 35 | LHS | Structure |
| 172 | 392+950 | 392+985 | 35 | RHS | Structure |
| 173 | 392+955 | 392+980 | 25 | LHS | Structure |
| 174 | 392+955 | 392+980 | 25 | RHS | Structure |
| 175 | 392+960 | 392+975 | 15 | Median | Structure |
| 176 | 393+150 | 393+165 | 15 | LHS | Structure |
| 177 | 393+150 | 393+165 | 15 | RHS | Structure |
| 178 | 393+530 | 393+570 | 40 | LHS | Structure |
| 179 | 393+530 | 393+570 | 40 | RHS | Structure |
| 180 | 393+540 | 393+560 | 20 | LHS | Structure |
| 181 | 393+540 | 393+560 | 20 | RHS | Structure |
| 182 | 393+540 | 393+560 | 20 | Median | Structure |
| 183 | 393+930 | 393+980 | 50 | LHS | Structure |
| 184 | 393+930 | 393+980 | 50 | RHS | Structure |
| 185 | 393+950 | 393+970 | 20 | Median | Structure |
| 186 | 394+960 | 395+000 | 40 | LHS | Structure |
| 187 | 394+960 | 395+000 | 40 | RHS | Structure |
| 188 | 394+965 | 394+990 | 25 | LHS | Structure |
| 189 | 394+965 | 394+990 | 25 | RHS | Structure |
| 190 | 394+970 | 394+985 | 15 | Median | Structure |
| 191 | 395+330 | 395+355 | 25 | LHS | Structure |
| 192 | 395+330 | 395+355 | 25 | RHS | Structure |
| 193 | 395+340 | 395+345 | 5 | LHS | Structure |
| 194 | 395+340 | 395+345 | 5 | RHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 195 | 395+540 | 395+555 | 15 | LHS | Structure |
| 196 | 395+540 | 395+555 | 15 | RHS | Structure |
| 197 | 396+335 | 396+350 | 15 | LHS | Structure |
| 198 | 396+335 | 396+350 | 15 | RHS | Structure |
| 199 | 396+520 | 396+545 | 25 | LHS | Structure |
| 200 | 396+520 | 396+545 | 25 | RHS | Structure |
| 201 | 396+525 | 396+540 | 15 | LHS | Structure |
| 202 | 396+525 | 396+540 | 15 | RHS | Structure |
| 203 | 396+525 | 396+535 | 10 | Median | Structure |
| 204 | 396+750 | 397+420 | 670 | LHS | Structure Approach |
| 205 | 396+750 | 397+420 | 670 | RHS | Structure Approach |
| 206 | 397+110 | 397+140 | 30 | Median | Structure |
| 207 | 398+390 | 398+400 | 10 | LHS | Structure |
| 208 | 398+390 | 398+400 | 10 | RHS | Structure |
| 209 | 399+185 | 399+215 | 30 | LHS | Structure |
| 210 | 399+185 | 399+215 | 30 | RHS | Structure |
| 211 | 399+720 | 399+750 | 30 | LHS | Structure |
| 212 | 399+720 | 399+750 | 30 | RHS | Structure |
| 213 | 400+300 | 401+020 | 720 | LHS | Structure Approach |
| 214 | 400+220 | 401+050 | 830 | RHS | Structure Approach |
| 215 | 400+650 | 400+685 | 35 | Median | Structure |
| 216 | 401+670 | 401+690 | 20 | LHS | Structure |
| 217 | 401+670 | 401+690 | 20 | RHS | Structure |
| 218 | 403+075 | 403+110 | 35 | LHS | Structure |
| 219 | 403+075 | 403+110 | 35 | RHS | Structure |
| 220 | 403+950 | 403+975 | 25 | LHS | Structure |
| 221 | 403+950 | 403+975 | 25 | RHS | Structure |
| 222 | 403+950 | 403+975 | 25 | LHS | Structure |
| 223 | 403+950 | 403+975 | 25 | RHS | Structure |
| 224 | 404+250 | 405+120 | 870 | LHS | Structure Approach |
| 225 | 404+380 | 405+000 | 620 | RHS | Structure Approach |
| 226 | 404+625 | 404+635 | 10 | LHS | Structure |
| 227 | 404+625 | 404+635 | 10 | RHS | Structure |
| 228 | 404+625 | 404+635 | 10 | LHS | Structure |
| 229 | 404+625 | 404+635 | 10 | RHS | Structure |
| 230 | 404+665 | 404+700 | 35 | Median | Structure |
| 231 | 405+350 | 405+370 | 20 | LHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 232 | 405+350 | 405+370 | 20 | RHS | Structure |
| 233 | 406+285 | 406+315 | 30 | LHS | Structure |
| 234 | 406+285 | 406+315 | 30 | RHS | Structure |
| 235 | 406+290 | 406+305 | 15 | Median | Structure |
| 236 | 407+480 | 407+535 | 55 | LHS | Structure |
| 237 | 407+480 | 407+535 | 55 | RHS | Structure |
| 238 | 407+500 | 407+520 | 20 | Median | Structure |
| 239 | 409+220 | 409+250 | 30 | LHS | Structure |
| 240 | 409+220 | 409+250 | 30 | RHS | Structure |
| 241 | 409+980 | 410+010 | 30 | LHS | Structure |
| 242 | 409+980 | 410+010 | 30 | RHS | Structure |
| 243 | 410+325 | 410+365 | 40 | LHS | Structure |
| 244 | 410+325 | 410+365 | 40 | RHS | Structure |
| 245 | 410+325 | 410+365 | 40 | LHS | Structure |
| 246 | 410+325 | 410+365 | 40 | RHS | Structure |
| 247 | 411+100 | 411+125 | 25 | LHS | Structure |
| 248 | 411+100 | 411+125 | 25 | RHS | Structure |
| 249 | 411+360 | 411+380 | 20 | LHS | Structure |
| 250 | 411+360 | 411+380 | 20 | RHS | Structure |
| 251 | 411+360 | 411+380 | 20 | LHS | Structure |
| 252 | 411+360 | 411+380 | 20 | RHS | Structure |
| 253 | 411+360 | 411+380 | 20 | Median | Structure |
| 254 | 411+450 | 412+180 | 730 | LHS | Structure Approach |
| 255 | 411+470 | 412+180 | 710 | RHS | Structure Approach |
| 256 | 411+820 | 411+850 | 30 | Median | Structure |
| 257 | 412+500 | 413+000 | 500 | LHS | Structure Approach |
| 258 | 412+550 | 413+000 | 450 | RHS | Structure Approach |
| 259 | 413+110 | 413+850 | 740 | LHS | Structure Approach |
| 260 | 413+110 | 413+850 | 740 | RHS | Structure Approach |
| 261 | 414+180 | 414+800 | 620 | LHS | Structure Approach |
| 262 | 414+180 | 414+800 | 620 | RHS | Structure Approach |
| 263 | 414+480 | 414+505 | 25 | Median | Structure |
| 264 | 414+515 | 414+530 | 15 | LHS | Structure |
| 265 | 414+550 | 414+570 | 20 | RHS | Structure |
| 266 | 415+570 | 415+585 | 15 | RHS | Structure |
| 267 | 416+020 | 416+130 | 110 | LHS | Structure |
| 268 | 416+080 | 416+130 | 50 | RHS | Structure |

| S.no | Chainage | | Length | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 269 | 416+090 | 416+120 | 30 | Median | Structure |
| 270 | 416+730 | 416+750 | 20 | LHS | Structure |
| 271 | 416+730 | 416+750 | 20 | RHS | Structure |
| 272 | 416+740 | 416+745 | 5 | LHS | Structure |
| 273 | 416+740 | 416+745 | 5 | RHS | Structure |
| 274 | 416+840 | 416+865 | 25 | RHS | Structure |
| 275 | 417+600 | 417+620 | 20 | LHS | Structure |
| 276 | 417+600 | 417+620 | 20 | RHS | Structure |
| 277 | 417+610 | 417+615 | 5 | LHS | Structure |
| 278 | 417+610 | 417+615 | 5 | RHS | Structure |
| 279 | 418+080 | 418+300 | 220 | RHS | Structure |
| 280 | 418+210 | 418+300 | 90 | LHS | Structure |
| 281 | 418+225 | 418+250 | 25 | Median | Structure |
| 282 | 419+450 | 419+480 | 30 | LHS | Structure |
| 283 | 419+450 | 419+480 | 30 | RHS | Structure |
| 284 | 420+815 | 420+830 | 15 | LHS | Structure |
| 285 | 420+800 | 420+830 | 30 | RHS | Structure |
| 286 | 421+140 | 421+330 | 190 | RHS | Structure |
| 287 | 421+320 | 421+330 | 10 | LHS | Structure |
| 288 | 421+790 | 421+820 | 30 | LHS | Structure |
| 289 | 421+790 | 421+820 | 30 | RHS | Structure |
| 290 | 421+800 | 421+815 | 15 | LHS | Structure |
| 291 | 421+800 | 421+815 | 15 | RHS | Structure |
| 292 | 421+800 | 421+815 | 15 | Median | Structure |
| 293 | 422+145 | 422+190 | 45 | LHS | Structure |
| 294 | 422+145 | 422+190 | 45 | RHS | Structure |
| 295 | 422+150 | 422+175 | 25 | Median | Structure |

**Section -2 Chennai Bypass**

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 0+360 | 0+390 | 30 | LHS | Seperator |
| 2 | 0+380 | 0+410 | 30 | LHS | Median |
| 3 | 1+250 | 1+270 | 20 | LHS | Seperator |
| 4 | 1+250 | 1+280 | 30 | | Median |
| 5 | 1+530 | 1+550 | 20 | LHS | Seperator |
| 6 | 1+530 | 1+550 | 20 | | Median |
| 7 | 2+500 | 2+520 | 20 | LHS | Seperator |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 8 | 2+500 | 2+520 | 20 | | Median |
| 9 | 5+210 | 5+230 | 20 | | Median |
| 10 | 5+220 | 5+240 | 20 | LHS | Seperator |
| 11 | 5+980 | 6+000 | 20 | | Median |
| 12 | 5+990 | 6+020 | 30 | LHS | Seperator |
| 13 | 7+060 | 7+090 | 30 | LHS | Seperator |
| 14 | 7+060 | 7+090 | 30 | | Median |
| 15 | 7+510 | 7+520 | 10 | | Median |
| 16 | 7+520 | 7+530 | 10 | LHS | Seperator |
| 17 | 9+000 | 9+230 | 230 | LHS | Shoulder |
| 18 | 9+010 | 9+220 | 210 | | Median |
| 19 | 10+350 | 10+370 | 20 | | Median |
| 20 | 10+360 | 10+380 | 20 | LHS | Seperator |
| 21 | 12+070 | 12+090 | 20 | LHS | Seperator |
| 22 | 12+070 | 12+090 | 20 | | Median |
| 23 | 13+490 | 13+530 | 40 | LHS | Seperator |
| 24 | 13+510 | 13+540 | 30 | | Median |
| 25 | 14+090 | 14+110 | 20 | LHS | Seperator |
| 26 | 15+380 | 15+850 | 470 | LHS | Shoulder |
| 27 | 15+380 | 15+850 | 470 | | Median |
| 28 | 16+580 | 16+700 | 120 | LHS | Seperator |
| 29 | 18+010 | 18+020 | 10 | | Median |
| 30 | 18+020 | 18+030 | 10 | LHS | Seperator |
| 31 | 19+085 | 19+670 | 585 | LHS | Seperator |
| 32 | 19+085 | 19+670 | 585 | | Median |
| 33 | 21+320 | 21+340 | 20 | LHS | Seperator |
| 34 | 21+940 | 25+550 | 3610 | LHS | Shoulder |
| 35 | 22+140 | 25+180 | 3040 | | Median |
| 36 | 25+180 | 25+250 | 70 | | Median |
| 37 | 25+940 | 25+960 | 20 | LHS | Seperator |
| 38 | 27+230 | 27+270 | 40 | LHS | Seperator |
| 39 | 28+160 | 28+200 | 40 | LHS | Seperator |
| 40 | 29+060 | 29+080 | 20 | LHS | Seperator |
| 41 | 29+770 | 29+780 | 10 | LHS | Seperator |
| 42 | 30+170 | 30+190 | 20 | LHS | Seperator |
| 43 | 31+390 | 31+420 | 30 | LHS | Seperator |
| 44 | 32+060 | 32+500 | 440 | LHS | Shoulder |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 45 | 32+240 | 32+280 | 40 | | Median |
| 46 | 32+285 | 32+060 | 225 | RHS | Shoulder |
| 47 | 31+380 | 31+350 | 30 | RHS | Seperator |
| 48 | 30+190 | 30+170 | 20 | RHS | Seperator |
| 49 | 29+750 | 29+740 | 10 | RHS | Seperator |
| 50 | 29+080 | 29+060 | 20 | RHS | Seperator |
| 51 | 28+140 | 28+110 | 30 | RHS | Seperator |
| 52 | 27+270 | 27+240 | 30 | RHS | Seperator |
| 53 | 25+970 | 25+950 | 20 | RHS | Seperator |
| 54 | 25+540 | 21+950 | 3590 | RHS | Shoulder |
| 55 | 25+190 | 22+130 | 3060 | | Median |
| 56 | 21+350 | 21+330 | 20 | RHS | Seperator |
| 57 | 19+680 | 19+390 | 290 | RHS | Seperator |
| 58 | 19+370 | 19+320 | 50 | RHS | Seperator |
| 59 | 19+300 | 19+150 | 150 | RHS | Seperator |
| 60 | 19+130 | 19+090 | 40 | RHS | Seperator |
| 61 | 18+020 | 18+010 | 10 | RHS | Seperator |
| 62 | 15+880 | 15+410 | 470 | RHS | Shoulder |
| 63 | 14+150 | 14+130 | 20 | RHS | Shoulder |
| 64 | 13+580 | 13+550 | 30 | RHS | Shoulder |
| 65 | 12+130 | 12+110 | 20 | RHS | Shoulder |
| 66 | 10+370 | 10+350 | 20 | RHS | Shoulder |
| 67 | 9+250 | 9+020 | 230 | RHS | Shoulder |
| 68 | 7+550 | 7+540 | 10 | RHS | Shoulder |
| 69 | 7+120 | 7+100 | 20 | RHS | Shoulder |
| 70 | 6+010 | 5+990 | 20 | RHS | Shoulder |
| 71 | 5+230 | 5+210 | 20 | RHS | Shoulder |
| 72 | 2+530 | 2+510 | 20 | RHS | Shoulder |
| 73 | 1+540 | 1+520 | 20 | RHS | Shoulder |
| 74 | 1+300 | 1+260 | 40 | RHS | Shoulder |
| 75 | 0+440 | 0+420 | 20 | RHS | Shoulder |
| 76 | 0+430 | 0+410 | 20 | | Median |
| 77 | 0+200 | 0+130 | 70 | RHS | Shoulder |
| 78 | 0+200 | 0+130 | 70 | RHS | Median |

## Section -3 Chennai tada

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 21+540 | 21+630 | 90 | New Jersey | LHS | Median |
| 21+700 | 21+780 | 80 | New Jersey | LHS | Median |
| 24+650 | 24+710 | 60 | RCC | LHS | Seperator |
| 25+530 | 25+750 | 220 | RCC | LHS | Median |
| 25+750 | 26+100 | 350 | New Jersey | LHS | Median |
| 25+840 | 26+300 | 460 | RCC | LHS | Seperator |
| 26+100 | 26+130 | 30 | RCC | BHS | Median |
| 26+130 | 26+400 | 270 | New Jersey | LHS | Median |
| 26+450 | 26+890 | 440 | New Jersey | LHS | Seperator |
| 26+450 | 26+890 | 440 | RCC Railing | LHS | Median |
| 27+000 | 27+190 | 190 | New Jersey | LHS | Median |
| 27+190 | 27+250 | 60 | RCC | BHS | Median |
| 27+250 | 27+600 | 350 | New Jersey | LHS | Median |
| 27+010 | 27+540 | 530 | RCC | LHS | Seperator |
| 28+070 | 28+450 | 380 | New Jersey | LHS | Median |
| 28+450 | 28+490 | 40 | RCC | BHS | Median |
| 28+490 | 31+390 | 2900 | New Jersey | LHS | Median |
| 28+100 | 28+910 | 810 | RCC | LHS | Seperator |
| 30+460 | 31+330 | 870 | RCC | LHS | Seperator |
| 31+480 | 31+530 | 50 | RCC | LHS | Median |
| 31+480 | 31+530 | 50 | RCC | LHS | Seperator |
| 33+200 | 33+230 | 30 | RCC | LHS | Median |
| 33+200 | 33+230 | 30 | RCC | LHS | Seperator |
| 33+320 | 33+920 | 600 | New Jersey | LHS | Median |
| 33+540 | 33+780 | 240 | RCC | LHS | Seperator |
| 34+000 | 34+015 | 15 | RCC | LHS | Median |
| 34+000 | 34+015 | 15 | RCC | LHS | Seperator |
| 34+020 | 34+040 | 20 | New Jersey | LHS | Seperator |
| 34+700 | 35+100 | 400 | New Jersey | LHS | Median |
| 34+750 | 35+330 | 580 | RCC | LHS | Seperator |
| 35+100 | 35+150 | 50 | RCC | BHS | Median |
| 35+150 | 35+380 | 230 | New Jersey | LHS | Median |
| 35+480 | 35+620 | 140 | RCC | LHS | Median |
| 35+480 | 35+650 | 170 | RCC | LHS | Seperator |
| 35+640 | 35+800 | 160 | New Jersey | LHS | Median |
| 36+280 | 36+300 | 20 | New Jersey | LHS | Median |

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 36+300 | 36+320 | 20 | New Jersey | LHS | Seperator |
| 37+090 | 37+110 | 20 | RCC | LHS | Median |
| 37+090 | 37+110 | 20 | RCC | LHS | Seperator |
| 37+200 | 37+620 | 420 | New Jersey | LHS | Median |
| 37+620 | 37+660 | 40 | RCC | BHS | Median |
| 37+660 | 38+060 | 400 | New Jersey | LHS | Median |
| 38+060 | 38+090 | 30 | RCC | BHS | Median |
| 38+090 | 38+840 | 750 | New Jersey | LHS | Median |
| 38+840 | 38+930 | 90 | RCC | BHS | Median |
| 38+930 | 39+290 | 360 | New Jersey | LHS | Median |
| 37+350 | 39+140 | 1790 | RCC | LHS | Seperator |
| 39+300 | 39+320 | 20 | New Jersey | LHS | Median |
| 39+680 | 40+250 | 570 | New Jersey | LHS | Median |
| 39+860 | 40+090 | 230 | RCC | LHS | Seperator |
| 40+530 | 40+550 | 20 | RCC | LHS | Median |
| 40+530 | 40+550 | 20 | RCC | LHS | Seperator |
| 40+800 | 40+830 | 30 | RCC | LHS | Median |
| 40+800 | 40+830 | 30 | RCC | LHS | Seperator |
| 41+030 | 41+040 | 10 | New Jersey | LHS | Median |
| 41+750 | 42+150 | 400 | New Jersey | LHS | Median |
| 42+150 | 42+260 | 110 | RCC | BHS | Median |
| 42+260 | 42+620 | 360 | New Jersey | LHS | Median |
| 41+900 | 42+500 | 600 | RCC | LHS | Seperator |
| 43+470 | 43+490 | 20 | RCC | LHS | Median |
| 43+470 | 43+490 | 20 | RCC | LHS | Seperator |
| 43+570 | 43+610 | 40 | New Jersey | LHS | Median |
| 43+610 | 43+630 | 20 | RCC | BHS | Median |
| 43+630 | 44+200 | 570 | New Jersey | LHS | Median |
| 44+200 | 44+220 | 20 | New Jersey | LHS | Median |
| 44+220 | 45+140 | 920 | New Jersey | LHS | Median |
| 43+590 | 43+880 | 290 | RCC | LHS | Seperator |
| 44+370 | 45+070 | 700 | RCC | LHS | Seperator |
| 45+200 | 45+280 | 80 | New Jersey | LHS | Median |
| 45+280 | 45+310 | 30 | New Jersey | LHS | Median |
| 45+310 | 46+050 | 740 | New Jersey | LHS | Median |
| 46+110 | 46+400 | 290 | New Jersey | LHS | Median |
| 46+400 | 46+420 | 20 | RCC | BHS | Median |

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 46+420 | 46+770 | 350 | New Jersey | LHS | Median |
| 46+240 | 46+690 | 450 | RCC | LHS | Seperator |
| 47+140 | 47+170 | 30 | New Jersey | LHS | Seperator |
| 47+170 | 48+140 | 970 | New Jersey | LHS | Median |
| 47+390 | 48+000 | 610 | RCC | LHS | Seperator |
| 48+980 | 49+350 | 370 | New Jersey | LHS | Median |
| 49+050 | 49+290 | 240 | RCC | LHS | Seperator |
| 49+550 | 49+570 | 20 | New Jersey | LHS | Seperator |
| 49+950 | 50+750 | 800 | New Jersey | LHS | Median |
| 50+060 | 50+270 | 210 | RCC | LHS | Seperator |
| 51+590 | 51+880 | 290 | New Jersey | LHS | Median |
| 51+880 | 51+920 | 40 | RCC | BHS | Median |
| 51+920 | 52+310 | 390 | New Jersey | LHS | Median |
| 51+660 | 52+270 | 610 | RCC | LHS | Seperator |
| 52+580 | 52+700 | 120 | RCC | LHS | Median |
| 52+580 | 52+700 | 120 | RCC | LHS | Seperator |
| 53+760 | 53+810 | 50 | RCC | LHS | Median |
| 53+760 | 53+810 | 50 | RCC | LHS | Seperator |
| 54+000 | 53+760 | 240 | RCC | RHS | Median |
| 54+000 | 53+760 | 240 | RCC | RHS | Seperator |
| 52+700 | 52+590 | 110 | RCC | RHS | Median |
| 52+700 | 52+590 | 110 | RCC | RHS | Seperator |
| 52+240 | 51+670 | 570 | RCC | RHS | Seperator |
| 50+250 | 50+020 | 230 | RCC | RHS | Seperator |
| 49+320 | 49+060 | 260 | RCC | RHS | Seperator |
| 48+070 | 47+310 | 760 | RCC | RHS | Seperator |
| 46+700 | 46+240 | 460 | RCC | RHS | Seperator |
| 45+380 | 45+350 | 30 | New Jersey | RHS | Seperator |
| 45+020 | 44+370 | 650 | RCC | RHS | Seperator |
| 43+950 | 43+620 | 330 | RCC | RHS | Seperator |
| 43+530 | 43+500 | 30 | RCC | RHS | Median |
| 43+530 | 43+500 | 30 | RCC | RHS | Seperator |
| 42+500 | 41+940 | 560 | RCC | RHS | Seperator |
| 41+060 | 41+040 | 20 | New Jersey | RHS | Median |
| 40+860 | 40+830 | 30 | RCC | RHS | Median |
| 40+860 | 40+830 | 30 | RCC | RHS | Seperator |
| 40+580 | 40+560 | 20 | RCC | RHS | Median |

| Chainage (Km) | | Length (m) | Type | Side | Location |
|---|---|---|---|---|---|
| From | To | | | | |
| 40+580 | 40+560 | 20 | RCC | RHS | Seperator |
| 40+130 | 39+880 | 250 | RCC | RHS | Seperator |
| 39+500 | 39+450 | 50 | New Jersey | RHS | Seperator |
| 39+350 | 39+320 | 30 | New Jersey | RHS | Seperator |
| 39+190 | 37+360 | 1830 | RCC | RHS | Seperator |
| 37+150 | 37+120 | 30 | RCC | RHS | Median |
| 37+150 | 37+120 | 30 | RCC | RHS | Seperator |
| 36+310 | 36+290 | 20 | New Jersey | RHS | Median |
| 35+650 | 35+500 | 150 | RCC | RHS | Median |
| 35+650 | 35+500 | 150 | RCC | RHS | Seperator |
| 35+350 | 34+790 | 560 | RCC | RHS | Seperator |
| 34+020 | 34+000 | 20 | RCC | RHS | Median |
| 34+020 | 34+000 | 20 | RCC | RHS | Seperator |
| 33+790 | 33+540 | 250 | RCC | RHS | Seperator |
| 33+220 | 33+200 | 20 | RCC | RHS | Median |
| 33+220 | 33+200 | 20 | RCC | RHS | Seperator |
| 31+540 | 31+480 | 60 | RCC | RHS | Median |
| 31+540 | 31+480 | 60 | RCC | RHS | Seperator |
| 31+320 | 30+460 | 860 | RCC | RHS | Seperator |
| 28+900 | 28+120 | 780 | RCC | RHS | Seperator |
| 27+510 | 26+970 | 540 | RCC | RHS | Seperator |
| 26+880 | 26+430 | 450 | RCC | RHS | Median |
| 26+880 | 26+430 | 450 | RCC | RHS | Seperator |
| 26+880 | 26+430 | 450 | RCC Railing | RHS | Seperator |
| 26+340 | 25+830 | 510 | RCC | RHS | Seperator |
| 24+720 | 24+640 | 80 | RCC | RHS | Seperator |

### 6.7.2 Street Light

Locations of Lighting are presented in table below:

**Table 6-28 : Location of Street Light**

**Section 01 Vijayawada Chilakaluripet**

| S. No | Chainage | | Length | Side | Location | Numbers | Type |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 355+100 | 355+800 | 700 | | Median | 18 | Double Arm |
| 2 | 355+100 | 355+300 | 200 | LHS | Service Road | 6 | Single Arm |
| 3 | 355+100 | 355+300 | 200 | RHS | Service Road | 6 | Single Arm |
| 4 | 355+400 | 355+550 | 150 | LHS | Seperator | 6 | Single Arm |

| S. No | Chainage | | Length | Side | Location | Numbers | Type |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 5 | 355+400 | 355+550 | 150 | RHS | Seperator | 6 | Single Arm |
| 6 | 355+750 | 355+800 | 50 | RHS | Service Road | 4 | Single Arm |
| 7 | 357+200 | 357+342 | 142 | RHS | Seperator | 5 | Single Arm |
| 8 | 357+200 | 357+342 | 142 | LHS | Service Road | 6 | Single Arm |
| 9 | 372+550 | 372+770 | 220 | LHS | Service Road | 6 | Single Arm |
| 10 | 372+550 | 372+770 | 220 | RHS | Service Road | 6 | Single Arm |
| 11 | 373+300 | 373+480 | 180 | LHS | Service Road | 5 | Single Arm |
| 12 | 373+300 | 373+480 | 180 | RHS | Service Road | 6 | Single Arm |
| 13 | 373+720 | 373+920 | 200 | RHS | Service Road | 6 | Single Arm |
| 14 | 373+950 | 374+550 | 600 | | Median | 15 | Double Arm |
| 15 | 374+168 | 375+600 | 1400 | RHS | Service Road | 46 | Single Arm |
| 16 | 374+168 | 374+460 | 260 | LHS | Service Road | 6 | Single Arm |
| 17 | 374+350 | 374+400 | 50 | RHS | Service Road | 4 | Single Arm |
| 18 | 374+270 | | | LHS | Service Road | 1 | Double arm |
| 19 | 374+700 | 374+900 | 200 | LHS | Service Road | 6 | Single Arm |
| 20 | 375+350 | 376+000 | 650 | | Median | 14 | Double arm |
| 21 | 375+560 | 375+740 | 180 | LHS | Seperator | 6 | Single Arm |
| 22 | 375+600 | 375+770 | 170 | RHS | Seperator | 6 | Single Arm |
| 23 | 376+100 | 376+350 | 250 | LHS | Seperator | 12 | Single Arm |
| 24 | 376+100 | 376+350 | 250 | RHS | Seperator | 9 | Single Arm |
| 25 | 376+850 | 377+550 | 700 | | Median | 17 | Double Arm |
| 26 | 377+190 | 377+380 | 190 | LHS | Service Road | 6 | Single Arm |
| 27 | 377+190 | 377+380 | 190 | RHS | Service Road | 6 | Single Arm |
| 28 | 377+840 | 378+100 | 260 | LHS | Seperator | 5 | Single Arm |
| 29 | 377+840 | 378+750 | 910 | LHS | Service Road | 21 | Single Arm |
| 30 | 377+840 | 378+100 | 260 | RHS | Seperator | 10 | Single Arm |
| 31 | 378+100 | 378+750 | 650 | RHS | Service Road | 13 | Single Arm |
| 32 | 378+130 | 378+900 | 770 | | Median | 18 | Double Arm |
| 33 | 378+750 | 378+900 | 150 | LHS | Service Road | 4 | Single Arm |
| 34 | 378+750 | 378+900 | 150 | RHS | Service Road | 4 | Single Arm |
| 35 | 379+450 | 379+670 | 220 | LHS | Service Road | 6 | Single Arm |
| 36 | 379+450 | 379+670 | 220 | LHS | Seperator | 6 | Single Arm |
| 37 | 379+450 | 379+670 | 220 | RHS | Service Road | 6 | Single Arm |
| 38 | 379+450 | 379+670 | 220 | RHS | Seperator | 6 | Single Arm |
| 39 | 380+200 | 380+400 | 200 | LHS | Service Road | 6 | Single Arm |
| 40 | 380+200 | 380+400 | 200 | RHS | Service Road | 5 | Single Arm |
| 41 | 381+100 | 381+770 | 670 | | Median | 16 | Double Arm |
| 42 | 381+350 | 381+600 | 250 | LHS | Seperator | 6 | Single Arm |
| 43 | 381+350 | 381+600 | 250 | RHS | Seperator | 6 | Single Arm |
| 44 | 382+850 | 383+000 | 150 | LHS | Service Road | 6 | Single Arm |
| 45 | 382+850 | 383+000 | 150 | RHS | Service Road | 6 | Single Arm |
| 46 | 383+180 | 383+450 | 270 | LHS | Service Road | 6 | Single Arm |
| 47 | 383+180 | 383+450 | 270 | RHS | Seperator | 9 | Single Arm |

| S. No | Chainage | | Length | Side | Location | Numbers | Type |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 48 | 383+180 | 383+450 | 270 | LHS | Seperator | 7 | Single Arm |
| 49 | 383+800 | 384+440 | 640 | | Median | 15 | Double Arm |
| 50 | 384+000 | 384+200 | 200 | LHS | Service Road | 6 | Single Arm |
| 51 | 384+000 | 384+200 | 200 | RHS | Service Road | 6 | Single Arm |
| 52 | 384+200 | 384+300 | 100 | RHS | Service Road | 4 | Single Arm |
| 53 | 384+350 | 384+600 | 250 | LHS | Seperator | 12 | Single Arm |
| 54 | 384+350 | 384+450 | 100 | LHS | Service Road | 4 | Single Arm |
| 55 | 384+350 | 384+600 | 250 | RHS | Seperator | 8 | Single Arm |
| 56 | 384+950 | 385+150 | 200 | LHS | Seperator | 6 | Single Arm |
| 57 | 384+950 | 385+150 | 200 | RHS | Seperator | 6 | Single Arm |
| 58 | 385+250 | 385+450 | 200 | LHS | Seperator | 6 | Single Arm |
| 59 | 385+250 | 385+450 | 200 | RHS | Seperator | 6 | Single Arm |
| 60 | 385+250 | 385+900 | 650 | | Median | 15 | Double Arm |
| 61 | 387+050 | 388+520 | 1470 | | Median | 33 | Double Arm |
| 62 | 387+250 | 387+450 | 200 | LHS | Service Road | 6 | Single Arm |
| 63 | 387+250 | 387+450 | 200 | RHS | Service Road | 6 | Single Arm |
| 64 | 387+550 | 387+750 | 200 | LHS | Service Road | 6 | Single Arm |
| 65 | 387+550 | 387+750 | 200 | RHS | Seperator | 10 | Single Arm |
| 66 | 387+550 | 387+750 | 200 | LHS | Seperator | 5 | Single Arm |
| 67 | 388+250 | 388+450 | 200 | LHS | Seperator | 6 | Single Arm |
| 68 | 388+250 | 388+450 | 200 | RHS | Seperator | 6 | Single Arm |
| 69 | 388+950 | 389+600 | 650 | | Median | 16 | Double Arm |
| 70 | 389+350 | 389+500 | 150 | LHS | Service Road | 6 | Single Arm |
| 71 | 389+300 | 389+500 | 200 | RHS | Service Road | 6 | Single Arm |
| 72 | 389+700 | 389+750 | 50 | RHS | Service Road | 4 | Single Arm |
| 73 | 390+050 | 390+250 | 200 | LHS | Seperator | 12 | Single Arm |
| 74 | 390+050 | 390+250 | 200 | RHS | Seperator | 11 | Single Arm |
| 75 | 390+500 | 390+700 | 200 | LHS | Service Road | 6 | Single Arm |
| 76 | 390+500 | 390+700 | 200 | RHS | Service Road | 6 | Single Arm |
| 77 | 390+900 | 391+620 | 720 | | Median | 17 | Double Arm |
| 78 | 391+200 | 391+400 | 200 | LHS | Seperator | 6 | Single Arm |
| 79 | 391+200 | 391+400 | 200 | RHS | Seperator | 6 | Single Arm |
| 80 | 391+950 | 392+150 | 200 | LHS | Service Road | 6 | Single Arm |
| 81 | 391+950 | 392+150 | 200 | RHS | Service Road | 6 | Single Arm |
| 82 | 393+050 | 393+250 | 200 | LHS | Seperator | 6 | Single Arm |
| 83 | 393+050 | 393+250 | 200 | RHS | Seperator | 6 | Single Arm |
| 84 | 393+500 | 394+150 | 650 | | Median | 16 | Double Arm |
| 85 | 393+850 | 394+050 | 200 | LHS | Seperator | 6 | Single Arm |
| 86 | 393+850 | 394+050 | 200 | RHS | Seperator | 6 | Single Arm |
| 87 | 394+250 | 394+450 | 200 | LHS | Seperator | 10 | Single Arm |
| 88 | 394+250 | 394+450 | 200 | RHS | Seperator | 5 | Single Arm |
| 89 | 394+250 | 394+450 | 200 | RHS | Service Road | 6 | Single Arm |
| 90 | 395+150 | 413+900 | 18750 | | Median | 530 | Double Arm |

| S. No | Chainage | | Length | Side | Location | Numbers | Type |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 91 | 395+450 | 395+650 | 200 | LHS | Service Road | 6 | Single Arm |
| 92 | 395+450 | 395+650 | 200 | RHS | Service Road | 6 | Single Arm |
| 93 | 395+850 | 396+050 | 200 | RHS | Truck Lay Bye | 7 | Single Arm |
| 94 | 396+250 | 396+450 | 200 | LHS | Service Road | 6 | Single Arm |
| 95 | 396+250 | 396+450 | 200 | RHS | Service Road | 6 | Single Arm |
| 96 | 396+550 | 396+750 | 200 | LHS | Service Road | 4 | Single Arm |
| 97 | 396+550 | 396+750 | 200 | RHS | Seperator | 9 | Single Arm |
| 98 | 396+550 | 396+750 | 200 | LHS | Seperator | 5 | Single Arm |
| 99 | 397+050 | | | LHS | Service Road | 1 | High-mast |
| 100 | 397+000 | 397+230 | 230 | RHS | Seperator | 6 | Single Arm |
| 101 | 397+650 | 397+850 | 200 | LHS | Seperator | 10 | Single Arm |
| 102 | 397+650 | 397+850 | 200 | RHS | Seperator | 9 | Single Arm |
| 103 | 398+300 | 398+500 | 200 | LHS | Seperator | 5 | Single Arm |
| 104 | 398+300 | 398+500 | 200 | RHS | Seperator | 6 | Single Arm |
| 105 | 399+100 | 399+300 | 200 | LHS | Seperator | 6 | Single Arm |
| 106 | 399+100 | 399+300 | 200 | RHS | Seperator | 6 | Single Arm |
| 107 | 399+650 | 399+800 | 150 | LHS | Seperator | 6 | Single Arm |
| 108 | 399+650 | 399+800 | 150 | RHS | Seperator | 6 | Single Arm |
| 109 | 400+100 | 400+300 | 200 | LHS | Seperator | 8 | Single Arm |
| 110 | 400+100 | 400+300 | 200 | RHS | Seperator | 7 | Single Arm |
| 111 | 400+600 | 400+800 | 200 | LHS | Seperator | 6 | Single Arm |
| 112 | 400+600 | 400+800 | 200 | RHS | Seperator | 6 | Single Arm |
| 113 | 401+100 | 401+300 | 200 | LHS | Service Road | 6 | Single Arm |
| 114 | 401+100 | 401+300 | 200 | RHS | Seperator | 6 | Single Arm |
| 115 | 401+100 | 401+300 | 200 | LHS | Seperator | 6 | Single Arm |
| 116 | 401+600 | 401+650 | 50 | LHS | Service Road | 5 | Single Arm |
| 117 | 401+600 | 401+650 | 50 | RHS | Service Road | 6 | Single Arm |
| 118 | 403+000 | 403+200 | 200 | LHS | Seperator | 6 | Single Arm |
| 119 | 403+000 | 403+200 | 200 | RHS | Seperator | 6 | Single Arm |
| 120 | 404+050 | 404+250 | 200 | LHS | Seperator | 10 | Single Arm |
| 121 | 404+050 | 404+250 | 200 | RHS | Seperator | 9 | Single Arm |
| 122 | 404+450 | 404+650 | 200 | LHS | Service Road | 6 | Single Arm |
| 123 | 404+450 | 404+650 | 200 | RHS | Service Road | 6 | Single Arm |
| 124 | 404+650 | 404+750 | 100 | LHS | Seperator | 4 | Single Arm |
| 125 | 404+650 | 404+750 | 100 | RHS | Seperator | 4 | Single Arm |
| 126 | 405+250 | 405+450 | 200 | LHS | Service Road | 6 | Single Arm |
| 127 | 405+250 | 405+450 | 200 | RHS | Service Road | 6 | Single Arm |
| 128 | 405+600 | 405+800 | 200 | LHS | Service Road | 6 | Single Arm |
| 129 | 405+600 | 405+800 | 200 | RHS | Service Road | 6 | Single Arm |
| 130 | 406+800 | 406+950 | 150 | LHS | Service Road | 5 | Single Arm |
| 131 | 406+800 | 406+950 | 150 | RHS | Service Road | 5 | Single Arm |
| 132 | 407+000 | 407+600 | 600 | LHS | Service Road | 17 | Single Arm |
| 133 | 407+000 | 407+600 | 600 | RHS | Service Road | 17 | Single Arm |

| S. No | Chainage | | Length | Side | Location | Numbers | Type |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 134 | 409+150 | 409+350 | 200 | LHS | Service Road | 6 | Single Arm |
| 135 | 409+150 | 409+350 | 200 | RHS | Service Road | 6 | Single Arm |
| 136 | 409+500 | 409+700 | 200 | LHS | Service Road | 5 | Single Arm |
| 137 | 409+500 | 409+700 | 200 | RHS | Service Road | 5 | Single Arm |
| 138 | 409+500 | 409+700 | 200 | LHS | Seperator | 6 | Single Arm |
| 139 | 409+500 | 409+700 | 200 | RHS | Seperator | 6 | Single Arm |
| 140 | 409+900 | 410+100 | 200 | LHS | Seperator | 6 | Single Arm |
| 141 | 409+900 | 410+100 | 200 | RHS | Seperator | 6 | Single Arm |
| 142 | 410+450 | 410+650 | 200 | LHS | Seperator | 6 | Single Arm |
| 143 | 410+450 | 410+650 | 200 | RHS | Seperator | 6 | Single Arm |
| 144 | 410+450 | 410+650 | 200 | RHS | Service Road | 5 | Single Arm |
| 145 | 411+050 | 411+200 | 150 | LHS | Service Road | 6 | Single Arm |
| 146 | 411+050 | 411+200 | 150 | RHS | Service Road | 5 | Single Arm |
| 147 | 411+750 | 411+950 | 200 | RHS | Seperator | 6 | Single Arm |
| 148 | 411+800 | | | LHS | Service Road | 1 | High-mast |
| 149 | 412+150 | 412+420 | 270 | LHS | Service Road | 8 | Single Arm |
| 150 | 412+150 | 412+420 | 270 | RHS | Service Road | 8 | Single Arm |
| 151 | 413+450 | | | RHS | Service Road | 2 | High-mast |
| 152 | 413+850 | 414+200 | 350 | LHS | Service Road | 11 | Single Arm |
| 153 | 413+520 | 414+000 | 480 | RHS | Service Road | 17 | Single Arm |
| 154 | 415+150 | 415+350 | 200 | RHS | Seperator | 6 | Single Arm |
| 155 | 415+500 | 415+700 | 200 | LHS | Service Road | 6 | Single Arm |
| 156 | 415+500 | 415+700 | 200 | RHS | Service Road | 6 | Single Arm |
| 157 | 415+550 | 416+270 | 720 | | Median | 16 | Double arm |
| 158 | 416+000 | 416+200 | 200 | LHS | Seperator | 6 | Single Arm |
| 159 | 416+000 | 416+200 | 200 | RHS | Seperator | 6 | Single Arm |
| 160 | 416+750 | 416+950 | 200 | LHS | Service Road | 4 | Single Arm |
| 161 | 416+750 | 416+950 | 200 | RHS | Service Road | 6 | Single Arm |
| 162 | 417+250 | 417+450 | 200 | RHS | Seperator | 6 | Single Arm |
| 163 | 417+250 | 417+450 | 200 | RHS | Service Road | 6 | Single Arm |
| 164 | 417+850 | 418+600 | 750 | | Median | 17 | Double arm |
| 165 | 418+150 | 418+350 | 200 | LHS | Seperator | 6 | Single Arm |
| 166 | 418+150 | 418+350 | 200 | RHS | Seperator | 6 | Single Arm |
| 167 | 419+400 | 419+600 | 200 | LHS | Seperator | 6 | Single Arm |
| 168 | 419+400 | 419+600 | 200 | RHS | Seperator | 6 | Single Arm |
| 169 | 419+730 | 420+200 | 470 | | Median | 12 | Double arm |
| 170 | 420+200 | 420+400 | 200 | LHS | Toll Plaza | 8 | Single Arm |
| 171 | 420+200 | 420+300 | 100 | RHS | Toll Plaza | 4 | Single Arm |
| 172 | 420+300 | 420+350 | 50 | RHS | Toll Plaza | 2 | Double arm |
| 173 | 420+350 | 420+700 | 350 | | Toll Plaza | 4 | High-mast |
| 174 | 420+600 | 420+800 | 200 | RHS | Toll Plaza | 8 | Single Arm |
| 175 | 420+700 | 420+800 | 100 | LHS | Toll Plaza | 6 | Single Arm |
| 176 | 420+800 | 421+900 | 1100 | | Median | 26 | Double arm |

| S. No | Chainage | | Length | Side | Location | Numbers | Type |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 177 | 421+950 | 422+000 | 50 | RHS | Service Road | 4 | Single Arm |
| 178 | 422+000 | 422+300 | 300 | RHS | Service Road | 7 | Single Arm |
| 179 | 422+050 | 422+300 | 250 | LHS | Seperator | 6 | Single Arm |
| 180 | 422+250 | 422+350 | 100 | LHS | Service Road | 4 | Single Arm |
| 181 | 422+450 | 422+600 | 150 | RHS | Seperator | 5 | Single Arm |
| 182 | 422+450 | 422+600 | 150 | RHS | Service Road | 4 | Single Arm |

**Section-2 Chennai Bypass**

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Numbers |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 0+080 | 0+430 | 350 | Median | LHS | Single Arm | 14 |
| 2 | 0+080 | 0+220 | 140 | Shoulder | LHS | Double Arm | 7 |
| 3 | 0+100 | 0+000 | 100 | Shoulder | RHS | Double Arm | 6 |
| 4 | 0+330 | 0+170 | 160 | Shoulder | RHS | Double Arm | 5 |
| 5 | 0+340 | 0+300 | 40 | Shoulder | RHS | Single Arm | 2 |
| 6 | 0+370 | 0+000 | 370 | Median | RHS | Single Arm | 18 |
| 7 | 0+400 | 1+200 | 800 | SR Separator | LHS | Single Arm | 32 |
| 8 | 0+450 | | | Median | LHS | High Mast | 1 |
| 9 | 0+490 | 1+000 | 510 | | LHS | Double Arm | 19 |
| 10 | 1+050 | 9+000 | 7950 | Median | LHS | Double Arm | 295 |
| 11 | 1+200 | 1+250 | 50 | SR Separator | LHS | Single Arm | 3 |
| 12 | 1+300 | 9+060 | 7760 | SR Separator | LHS | Single Arm | 293 |
| 13 | 9+000 | 9+230 | 230 | Median | LHS | Single Arm | 8 |
| 14 | 9+200 | 9+000 | 200 | Median | RHS | Single Arm | 8 |
| 15 | 9+230 | 15+370 | 6140 | Median | LHS | Double Arm | 226 |
| 16 | 9+350 | 12+060 | 2710 | SR Separator | LHS | Single Arm | 103 |
| 17 | 12+100 | 13+490 | 1390 | SR Separator | LHS | Single Arm | 51 |
| 18 | 15+370 | 15+850 | 480 | Median | LHS | Single Arm | 18 |
| 19 | 15+850 | 16+470 | 620 | Median | LHS | Double Arm | 23 |
| 20 | 15+850 | 15+370 | 480 | Median | RHS | Single Arm | 18 |
| 21 | 15+900 | 16+180 | 280 | SR Separator | LHS | Single Arm | 10 |
| 22 | 16+210 | 16+440 | 230 | Separator | LHS | Double Arm | 10 |
| 23 | 16+470 | 16+670 | 200 | Median | LHS | High Mast | 2 |
| 24 | 16+670 | 16+780 | 110 | Median | LHS | Double Arm | 4 |
| 25 | 16+770 | 16+940 | 170 | SR Separator | LHS | Double Arm | 8 |
| 26 | 16+830 | 16+910 | 80 | Median | LHS | Double Arm | 4 |
| 27 | 16+950 | | | SR Separator | LHS | Double Arm | 1 |
| 28 | 16+960 | 18+840 | 1880 | SR Separator | LHS | Single Arm | 75 |
| 29 | 17+020 | 19+050 | 2030 | Median | LHS | Double Arm | 72 |

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Numbers |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 30 | 18+770 | 16+880 | 1890 | SR Separator | RHS | Single Arm | 75 |
| 31 | 18+840 | 18+930 | 90 | SR Separator | LHS | Double Arm | 3 |
| 32 | 19+040 | | | SR Separator | RHS | Double Arm | 1 |
| 33 | 19+050 | 19+640 | 590 | Median | LHS | Single Arm | 22 |
| 34 | 19+070 | 19+160 | 90 | Between SR and Ramp | LHS | Double Arm | 4 |
| 35 | 19+420 | | | SR Shoulder | LHS | Double Arm | 1 |
| 36 | 19+520 | 21+290 | 1770 | SR Separator | LHS | Single Arm | 62 |
| 37 | 19+550 | 19+680 | 130 | SR Shoulder | LHS | Single Arm | 3 |
| 38 | 19+590 | | | SR Shoulder | RHS | Low Mast | 1 |
| 39 | 19+640 | 21+890 | 2250 | Median | LHS | Double Arm | 81 |
| 40 | 19+650 | 19+060 | 590 | Median | RHS | Single Arm | 22 |
| 41 | 21+290 | 22+100 | 810 | SR Shoulder | LHS | Single Arm | 32 |
| 42 | 21+350 | 19+590 | 1760 | SR Shoulder | RHS | Single Arm | 64 |
| 43 | 21+610 | 21+350 | 260 | SR Shoulder | RHS | Single Arm | 8 |
| 44 | 21+720 | 21+610 | 110 | SR Separator | RHS | Single Arm | 4 |
| 45 | 21+890 | 22+130 | 240 | Median | LHS | Single Arm | 7 |
| 46 | 22+090 | 21+930 | 160 | Median | RHS | Single Arm | 6 |
| 47 | 22+120 | 23+570 | 1450 | Median | LHS | Double Arm | 56 |
| 48 | 22+130 | 24+950 | 2820 | Separator | LHS | Single Arm | 107 |
| 49 | 22+140 | 21+720 | 420 | SR Shoulder | RHS | Single Arm | 13 |
| 50 | 22+890 | | | Median | LHS | High Mast | 1 |
| 51 | 22+940 | | | Median | LHS | Low Mast | 1 |
| 52 | 23+650 | | | Median | LHS | High Mast | 1 |
| 53 | 23+670 | 25+260 | 1590 | Median | LHS | Double Arm | 58 |
| 54 | 24+540 | | | Median | LHS | High Mast | 1 |
| 55 | 24+660 | 24+860 | 200 | SR Shoulder | LHS | Single Arm | 6 |
| 56 | 24+920 | 25+040 | 120 | SR Shoulder | LHS | Double Arm | 4 |
| 57 | 25+000 | 25+200 | 200 | Shoulder | LHS | Single Arm | 7 |
| 58 | 25+000 | 22+090 | 2910 | Separator | RHS | Single Arm | 107 |
| 59 | 25+100 | 24+680 | 420 | SR Shoulder | RHS | Single Arm | 9 |
| 60 | 25+170 | 25+000 | 170 | Shoulder | RHS | Single Arm | 7 |
| 61 | 25+220 | 28+220 | 3000 | SR Separator | LHS | Single Arm | 118 |
| 62 | 25+240 | 28+320 | 3080 | Median | LHS | Double Arm | 125 |
| 63 | 27+250 | 25+190 | 2060 | SR Separator | RHS | Single Arm | 87 |
| 64 | 28+250 | 28+610 | 360 | SR Separator | LHS | Only Pole | 16 |
| 65 | 28+310 | 28+270 | 40 | SR Shoulder | RHS | Double Arm | 2 |

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Numbers |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 66 | 28+320 | 28+400 | 80 | Median | LHS | Double Arm | 4 |
| 67 | 28+480 | 28+650 | 170 | Shoulder | LHS | High Mast | 2 |
| 68 | 28+610 | 28+850 | 240 | SR Separator | LHS | Single Arm | 10 |
| 69 | 28+640 | 28+560 | 80 | Shoulder | RHS | High Mast | 1 |
| 70 | 28+650 | 32+160 | 3510 | Median | LHS | Double Arm | 132 |
| 71 | 28+850 | 29+300 | 450 | SR Separator | LHS | Only Pole | 19 |
| 72 | 29+300 | 31+360 | 2060 | SR Separator | LHS | Single Arm | 84 |
| 73 | 30+000 | 27+300 | 2700 | SR Separator | RHS | Single Arm | 110 |
| 74 | 31+550 | 31+610 | 60 | Median | LHS | Double Arm | 3 |
| 75 | 31+640 | 30+390 | 1250 | SR Separator | RHS | Single Arm | 60 |
| 76 | 31+800 | 32+280 | 480 | SR Shoulder | LHS | Single Arm | 20 |
| 77 | 31+910 | 31+640 | 270 | SR Separator | RHS | Single Arm | 11 |
| 78 | 32+160 | 32+220 | 60 | Median | LHS | Single Arm | 2 |
| 79 | 32+200 | 31+910 | 290 | SR Shoulder | RHS | Single Arm | 10 |
| 80 | 32+220 | 32+450 | 230 | Median | LHS | Double Arm | 7 |
| 81 | 32+250 | 32+190 | 60 | Median | RHS | Single Arm | 2 |
| 82 | 32+400 | 32+600 | 200 | Median | LHS | Double Arm | 7 |
| 83 | 32+530 | 32+430 | 100 | Median | RHS | Single Arm | 4 |
| | | | | | **Total** | | **2936** |

**Section-3 Chennai Tada**

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Quantity |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 1 | 21+410 | 21+850 | 440 | Shoulder | LHS | High Mast | 6 |
| 2 | 24+320 | 25+020 | 700 | Separator | LHS | Single arm | 23 |
| 3 | 25+720 | 26+340 | 620 | Separator | LHS | Double Arm | 18 |
| 4 | 26+490 | 27+570 | 1080 | Separator | LHS | Double Arm | 26 |
| 5 | 28+050 | 29+000 | 950 | Separator | LHS | Double Arm | 28 |
| 6 | 29+080 | 30+190 | 1110 | Median | LHS | Double Arm | 35 |
| 7 | 29+050 | 29+990 | 940 | Separator | LHS | Single arm | 29 |
| 8 | 30+210 | 30+290 | 80 | Separator | LHS | Single arm | 3 |
| 9 | 34+720 | 35+420 | 700 | Separator | LHS | Double Arm | 20 |
| 10 | 35+535 | 35+605 | 70 | Separator | LHS | Single arm | 3 |
| 11 | 35+680 | | | Median | LHS | High Mast | 1 |
| 12 | 37+320 | 39+280 | 1960 | Separator | LHS | Double Arm | 54 |
| 13 | 42+640 | 43+200 | 560 | Separator | LHS | Single arm | 15 |
| 14 | 43+500 | 43+940 | 440 | Separator | LHS | Double Arm | 13 |
| 15 | 44+025 | | | Median | LHS | Double Arm | 1 |
| 16 | 45+240 | 45+880 | 640 | Median | LHS | Double Arm | 22 |

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Quantity |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 17 | 45+200 | 45+940 | 740 | Separator | LHS | Single arm | 25 |
| 18 | 46+150 | 46+790 | 640 | Separator | LHS | Double Arm | 19 |
| 19 | 46+840 | 46+970 | 130 | Separator | LHS | Single arm | 5 |
| 20 | 47+270 | 48+130 | 860 | Separator | LHS | Double Arm | 26 |
| 21 | 48+130 | 48+560 | 430 | Separator | LHS | Single arm | 13 |
| 22 | 49+990 | 50+320 | 330 | Separator | LHS | Double Arm | 9 |
| 23 | 51+520 | 52+350 | 830 | Separator | LHS | Double Arm | 24 |
| 24 | 52+350 | | | Separator | LHS | High Mast | 1 |
| 25 | 52+740 | | | Median | LHS | High Mast | 1 |
| 26 | 52+940 | | | Separator | LHS | High Mast | 1 |
| 27 | 53+965 | | | Median | LHS | Single arm | 1 |
| 28 | 15+060 | | | SR Shoulder | LHS | High Mast | 1 |
| 29 | 22+080 | 22+190 | 110 | SR Shoulder | LHS | Single arm | 2 |
| 30 | 22+010 | | | Separator | LHS | High Mast | 1 |
| 31 | 22+750 | | | SR Shoulder | LHS | High Mast | 1 |
| 32 | 27+165 | | | SR Shoulder | LHS | High Mast | 1 |
| 33 | 27+370 | 27+410 | 40 | SR Shoulder | LHS | Single arm | 2 |
| 34 | 29+960 | | | SR Shoulder | LHS | High Mast | 1 |
| 35 | 30+180 | 30+210 | 30 | SR Shoulder | LHS | Single arm | 2 |
| 36 | 30+300 | 30+700 | 400 | SR Shoulder | LHS | Single arm | 12 |
| 37 | 30+720 | 31+510 | 790 | Separator | LHS | Single arm | 23 |
| 38 | 31+970 | | | SR Shoulder | LHS | High Mast | 1 |
| 39 | 33+650 | | | SR Shoulder | LHS | High Mast | 1 |
| 40 | 33+880 | 33+920 | 40 | SR Shoulder | LHS | Double Arm | 2 |
| 41 | 35+200 | 35+240 | 40 | SR Shoulder | LHS | Single arm | 2 |
| 42 | 35+360 | | | SR Shoulder | LHS | High Mast | 1 |
| 43 | 35+800 | 35+860 | 60 | SR Shoulder | LHS | Single arm | 2 |
| 44 | 36+240 | 36+280 | 40 | SR Shoulder | LHS | Single arm | 2 |
| 45 | 36+335 | | | SR Shoulder | LHS | High Mast | 1 |
| 46 | 37+670 | | | SR Shoulder | LHS | High Mast | 1 |
| 47 | 40+010 | 40+040 | 30 | SR Shoulder | LHS | Single arm | 2 |
| 48 | 42+165 | 42+255 | 90 | SR Shoulder | LHS | Single arm | 4 |
| 49 | 43+600 | | | SR Shoulder | LHS | High Mast | 1 |
| 50 | 44+200 | 44+500 | 300 | SR Shoulder | LHS | Single arm | 8 |
| 51 | 44+665 | | | Separator | LHS | High Mast | 1 |
| 52 | 44+760 | 45+080 | 320 | SR Shoulder | LHS | Single arm | 9 |
| 53 | 46+050 | | | SR Shoulder | LHS | High Mast | 1 |
| 54 | 46+515 | 46+545 | 30 | SR Shoulder | LHS | Single arm | 2 |
| 55 | 47+030 | | | Separator | LHS | High Mast | 1 |
| 56 | 51+320 | 51+350 | 30 | SR Shoulder | LHS | Single arm | 2 |
| 57 | 53+180 | 53+210 | 30 | SR Shoulder | LHS | Single arm | 2 |

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Quantity |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 58 | 53+600 | 53+700 | 100 | SR Shoulder | LHS | Single arm | 3 |
| 59 | 53+870 | 53+730 | 140 | SR Shoulder | RHS | Double Arm | 5 |
| 60 | 52+380 | 51+550 | 830 | Separator | RHS | Double Arm | 23 |
| 61 | 52+350 | | | Separator | RHS | High Mast | 1 |
| 62 | 51+010 | 50+810 | 200 | Separator | RHS | Single Arm | 7 |
| 63 | 50+370 | 50+000 | 370 | Separator | RHS | Double Arm | 10 |
| 64 | 48+270 | 48+160 | 110 | Separator | RHS | Single Arm | 4 |
| 65 | 48+160 | 47+240 | 920 | Separator | RHS | Double Arm | 26 |
| 66 | 47+140 | 46+850 | 290 | Separator | RHS | Single Arm | 9 |
| 67 | 46+770 | 46+110 | 660 | Separator | RHS | Double Arm | 20 |
| 68 | 45+910 | 45+240 | 670 | Separator | RHS | Single arm | 20 |
| 69 | 44+000 | 43+530 | 470 | Separator | RHS | Double Arm | 13 |
| 70 | 39+300 | 37+320 | 1980 | Separator | RHS | Double Arm | 53 |
| 71 | 35+620 | 35+530 | 90 | Separator | RHS | Single arm | 3 |
| 72 | 35+430 | 34+710 | 720 | Separator | RHS | Double Arm | 21 |
| 73 | 31+470 | 29+020 | 2450 | Separator | RHS | Single arm | 67 |
| 74 | 29+020 | 28+040 | 980 | Separator | RHS | Double Arm | 27 |
| 75 | 27+610 | 26+920 | 690 | Separator | RHS | Double Arm | 20 |
| 76 | 26+840 | 26+630 | 210 | Median | RHS | Single arm | 6 |
| 77 | 26+530 | 26+420 | 110 | Median | RHS | Single arm | 4 |
| 78 | 26+380 | 25+730 | 650 | Separator | RHS | Double Arm | 18 |
| 79 | 25+000 | 24+340 | 660 | Separator | RHS | Single arm | 20 |
| 80 | 53+830 | 53+690 | 140 | SR Shoulder | RHS | Double Arm | 5 |
| 81 | 52+950 | | | SR Shoulder | RHS | High Mast | 1 |
| 82 | 52+230 | 52+200 | 30 | SR Shoulder | RHS | Single arm | 2 |
| 83 | 51+900 | | | SR Shoulder | RHS | High Mast | 1 |
| 84 | 50+950 | | | SR Shoulder | RHS | High Mast | 1 |
| 85 | 49+570 | | | SR Shoulder | RHS | High Mast | 1 |
| 86 | 49+310 | 49+280 | 30 | SR Shoulder | RHS | Double Arm | 2 |
| 87 | 49+240 | | | SR Shoulder | RHS | Lowmast | 1 |
| 88 | 47+930 | 47+890 | 40 | SR Shoulder | RHS | Single arm | 2 |
| 89 | 47+710 | | | SR Shoulder | RHS | High Mast | 1 |
| 90 | 46+420 | 46+390 | 30 | SR Shoulder | RHS | Single arm | 2 |
| 91 | 46+400 | | | SR Shoulder | RHS | High Mast | 1 |
| 92 | 45+150 | 44+320 | 830 | SR Shoulder | RHS | Single arm | 20 |
| 93 | 43+860 | | | SR Shoulder | RHS | Lowmast | 1 |
| 94 | 43+630 | | | Separator | RHS | Lowmast | 1 |
| 95 | 42+240 | | | SR Shoulder | RHS | High Mast | 1 |
| 96 | 40+060 | 40+020 | 40 | SR Shoulder | RHS | Single arm | 2 |
| 97 | 40+010 | | | SR Shoulder | RHS | High Mast | 1 |
| 98 | 38+880 | | | SR Shoulder | RHS | High Mast | 1 |

| S. No. | Chainage (Km) | | Length (m) | Location | Side | Type | Quantity |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| 99 | 37+890 | 37+860 | 30 | SR Shoulder | RHS | Single arm | 2 |
| 100 | 36+340 | 36+300 | 40 | SR Shoulder | RHS | Double Arm | 2 |
| 101 | 35+050 | | | SR Shoulder | RHS | High Mast | 1 |
| 102 | 34+580 | | | Separator | RHS | High Mast | 1 |
| 103 | 33+910 | 33+870 | 40 | SR Shoulder | RHS | Double Arm | 2 |
| 104 | 33+090 | 33+060 | 30 | SR Shoulder | RHS | Double Arm | 2 |
| 105 | 32+200 | | | SR Shoulder | RHS | Double Arm | 1 |
| 106 | 31+080 | | | SR Shoulder | RHS | High Mast | 1 |
| 107 | 30+190 | 30+150 | 40 | SR Shoulder | RHS | Single arm | 2 |
| 108 | 28+510 | | | SR Shoulder | RHS | High Mast | 1 |
| 109 | 27+100 | 27+070 | 30 | SR Shoulder | RHS | Single arm | 2 |
| 110 | 26+840 | 26+420 | 420 | SR Shoulder | RHS | Single arm | 15 |
| 111 | 26+210 | | | SR Shoulder | RHS | High Mast | 1 |
| 112 | 25+700 | | | SR Shoulder | RHS | High Mast | 1 |
| 113 | 22+800 | | | SR Shoulder | RHS | High Mast | 1 |
| 114 | 22+530 | 22+500 | 30 | SR Shoulder | RHS | Single arm | 2 |

### 6.7.3 Solar Blinker

Locations of Solar Blinker are presented in table below:

**Table 6-29 : Location of Solar Blinker**

**Section 01 Vijayawada Chilakaluripet**

| S. No. | Chainage (Km) | Quantity (Nos.) | Side | location |
|---|---|---|---|---|
| 1 | 376+320 | 1 | LHS SR | Separator |
| 2 | 376+320 | 1 | RHS SR | Separator |
| 3 | 378+010 | 1 | LHS SR | Separator |
| 4 | 378+010 | 1 | RHS SR | Separator |
| 5 | 379+500 | 1 | LHS SR | Separator |
| 6 | 379+500 | 1 | RHS SR | Separator |
| 7 | 383+300 | 2 | RHS SR | Separator |
| 8 | 383+360 | 1 | LHS SR | Separator |
| 9 | 384+475 | 1 | LHS SR | Separator |
| 10 | 384+475 | 1 | RHS SR | Separator |
| 11 | 387+700 | 1 | RHS SR | Separator |
| 12 | 387+765 | 1 | LHS SR | Separator |
| 13 | 390+140 | 1 | LHS SR | Separator |
| 14 | 390+140 | 1 | RHS SR | Separator |

| S. No. | Chainage (Km) | Quantity (Nos.) | Side | location |
|---|---|---|---|---|
| 15 | 394+340 | 1 | LHS SR | Separator |
| 16 | 394+340 | 1 | RHS SR | Separator |
| 17 | 396+685 | 1 | LHS SR | Separator |
| 18 | 396+685 | 1 | RHS SR | Separator |
| 19 | 397+750 | 1 | LHS SR | Separator |
| 20 | 397+750 | 1 | RHS SR | Separator |
| 21 | 400+210 | 2 | RHS SR | Separator |
| 22 | 400+240 | 1 | LHS SR | Separator |
| 23 | 401+195 | 1 | LHS SR | Separator |
| 24 | 401+205 | 2 | RHS SR | Separator |
| 25 | 404+170 | 1 | LHS SR | Separator |
| 26 | 404+190 | 2 | RHS SR | Separator |
| 27 | 409+560 | 2 | LHS SR | Separator |
| 28 | 409+590 | 1 | RHS SR | Separator |
| 29 | 410+555 | 1 | LHS SR | Separator |
| 30 | 410+590 | 2 | LHS SR | Separator |
| 31 | 411+480 | 2 | RHS | Separator |
| 32 | 411+460 | 2 | LHS | Separator |
| 33 | 415+235 | 1 | RHS | Separator |
| 34 | 417+360 | 1 | RHS | Separator |
| 35 | 420+460 | 10 | LHS | Toll |
| 36 | 420+530 | 12 | RHS | Toll |

**Section-2 Chennai Bypass**

| S. No. | Chainage (Km) | Side | location |
|---|---|---|---|
| 1 | 0+070 | LHS | Median |
| 2 | 1+030 | LHS | Median |
| 3 | 3+470 | LHS | Median |
| 4 | 4+140 | LHS | Median |
| 5 | 15+010 | LHS | Median |
| 6 | 17+610 | LHS | Median |
| 7 | 18+715 | LHS | Median |
| 8 | 21+700 | LHS | Seperator |
| 9 | 21+750 | LHS | Seperator |
| 10 | 31+670 | LHS | Seperator |
| 11 | 32+200 | LHS | Median |
| 12 | 30+900 | RHS | Median |

| S. No. | Chainage (Km) | Side | location |
|---|---|---|---|
| 13 | 28+400 | RHS | Sholder |
| 14 | 25+450 | RHS | Median |
| 15 | 25+380 | RHS | Median |
| 16 | 25+310 | RHS | Median |
| 17 | 35+280 | RHS | Median |
| 18 | 25+260 | RHS | Median |
| 19 | 25+190 | RHS | Separator |
| 20 | 21+690 | RHS | Separator |
| 21 | 19+000 | RHS | Median |
| 22 | 16+380 | RHS | Median |
| 23 | 7+620 | RHS | Median |
| 24 | 7+530 | RHS | Median |
| 25 | 5+790 | RHS | Median |
| 26 | 4+460 | RHS | Median |
| 27 | 3+960 | RHS | Shoulder |
| 28 | 0+630 | RHS | Median |
| 29 | 0+360 | RHS | Separator |
| 30 | 0+340 | RHS | Separator |

**Section-3 Chennai Tada**

| S. No. | Chainage (Km) | Quantity (Nos.) | Side | location |
|---|---|---|---|---|
| 21 | 22+690 | 1 | LHS | Median |
| 22 | 22+710 | 1 | LHS | Median |
| 23 | 23+370 | 1 | LHS | Seperator |
| 24 | 23+430 | 1 | LHS | Seperator |
| 25 | 25+540 | 1 | LHS | Seperator |
| 26 | 25+655 | 1 | LHS | Seperator |
| 27 | 25+660 | 1 | LHS | Seperator |
| 28 | 25+670 | 1 | LHS | Seperator |
| 29 | 27+730 | 1 | LHS | Seperator |
| 30 | 29+920 | 1 | LHS | Seperator |
| 31 | 29+940 | 1 | LHS | Seperator |
| 32 | 29+960 | 1 | LHS | Seperator |
| 33 | 31+930 | 1 | LHS | Seperator |
| 34 | 31+970 | 1 | LHS | Seperator |
| 35 | 34+680 | 1 | LHS | Seperator |
| 36 | 35+650 | 1 | LHS | Seperator |

| S. No. | Chainage (Km) | Quantity (Nos.) | Side | location |
|---|---|---|---|---|
| 37 | 35+670 | 1 | LHS | Seperator |
| 38 | 35+700 | 1 | LHS | Seperator |
| 39 | 36+200 | 1 | LHS | Seperator |
| 40 | 36+250 | 1 | LHS | Median |
| 41 | 36+270 | 1 | LHS | Median |
| 42 | 41+000 | 5 | LHS | Median |
| 43 | 44+150 | 1 | LHS | Median |
| 44 | 50+680 | 1 | LHS | Median |
| 45 | 50+700 | 2 | LHS | Median |
| 46 | 50+710 | 1 | LHS | Median |
| 47 | 50+720 | 1 | LHS | Median |
| 48 | 50+750 | 1 | LHS | Median |
| 49 | 50+750 | 1 | LHS | Median |
| 50 | 52+700 | 1 | LHS | Seperator |
| 51 | 52+700 | 1 | LHS | Seperator |
| 52 | 52+710 | 1 | LHS | Median |
| 53 | 53+700 | 1 | RHS | Median |
| 54 | 50+790 | 1 | RHS | Median |
| 55 | 50+760 | 3 | RHS | Median |
| 56 | 50+760 | 1 | RHS | Seperator |
| 57 | 44+210 | 1 | RHS | Seperator |
| 58 | 41+120 | 6 | RHS | Median |
| 59 | 36+420 | 1 | RHS | Seperator |
| 60 | 36+340 | 1 | RHS | Seperator |
| 61 | 36+220 | 1 | RHS | Seperator |
| 62 | 35+710 | 1 | RHS | Median |
| 63 | 32+950 | 1 | RHS | Seperator |
| 64 | 31+670 | 1 | RHS | Median |
| 65 | 30+040 | 1 | RHS | Seperator |
| 66 | 30+020 | 1 | RHS | Seperator |
| 67 | 30+000 | 1 | RHS | Seperator |
| 68 | 29+200 | 1 | RHS | Seperator |
| 69 | 27+620 | 1 | RHS | Median |
| 70 | 25+770 | 1 | RHS | Seperator |
| 71 | 25+750 | 1 | RHS | Seperator |
| 72 | 22+910 | 1 | RHS | Seperator |
| 73 | 22+850 | 1 | RHS | Seperator |

| S. No. | Chainage (Km) | Quantity (Nos.) | Side | location |
|---|---|---|---|---|
| 74 | 22+830 | 1 | RHS | Median |
| 75 | 22+820 | 1 | RHS | Median |
| 76 | 22+810 | 1 | RHS | Median |

### 6.7.4 Pedestrian Guard Rails

Locations of Pedestrian Guard Rail are presented in table below:

**Table 6-30 : Location of PGR**

**Section 01 Vijayawada-Chilakaluripet**

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 355+100 | 355+200 | 100 | LHS SR | Bus Bay |
| 2 | 355+716 | 355+816 | 100 | RHS SR | Bus Bay |
| 1 | 373+650 | 373+835 | 185 | | Median |
| 2 | 373+830 | 373+850 | 20 | RHS | Separator |
| 3 | 374+365 | 374+400 | 35 | RHS SR | Bus Bay |
| 4 | 374+500 | 375+220 | 720 | LHS | Separator |
| 5 | 374+540 | 375+250 | 710 | RHS | Separator |
| 6 | 378+080 | 378+270 | 190 | LHS | Separator |
| 7 | 378+100 | 378+270 | 170 | RHS | Separator |
| 8 | 378+700 | 378+840 | 140 | LHS | Separator |
| 9 | 378+740 | 378+910 | 170 | RHS | Separator |
| 10 | 378+785 | 378+825 | 40 | RHS SR | Bus Bay |
| 11 | 378+790 | 378+855 | 65 | LHS SR | Bus Bay |
| 12 | 384+170 | 384+260 | 90 | RHS SR | Bus Bay |
| 13 | 384+310 | 384+415 | 105 | LHS SR | Bus Bay |
| 14 | 389+655 | 389+755 | 100 | RHS SR | Bus Bay |
| 15 | 395+890 | 396+050 | 160 | RHS | Truck lay by island |
| 16 | 412+200 | 412+460 | 260 | LHS | Separator |
| 17 | 412+250 | 412+540 | 290 | RHS | Separator |
| 18 | 412+950 | 413+060 | 110 | LHS | Separator |
| 19 | 412+990 | 413+120 | 130 | RHS | Separator |
| 20 | 413+810 | 413+840 | 30 | LHS | Separator |
| 21 | 413+850 | 414+180 | 330 | RHS | Separator |
| 22 | 414+760 | 415+130 | 370 | LHS | Separator |
| 23 | 414+810 | 415+100 | 290 | RHS | Separator |
| 24 | 421+360 | 421+490 | 130 | RHS | Separator |
| 25 | 421+510 | 421+540 | 30 | RHS | Separator |
| 26 | 421+955 | 422+005 | 50 | RHS SR | Bus Bay |
| 27 | 422+255 | 422+355 | 100 | LHS SR | Bus Bay |

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 28 | 422+370 | 422+580 | 210 | | Median |

**Section-2 Chennai Bypass**

| S. No. | Chainage (Km) | | Length (m) | Location |
|---|---|---|---|---|
| | From | To | | |
| 1 | 7+540 | 7+390 | 150 | Median |
| 2 | 11+600 | 11+420 | 180 | Median |
| 3 | 16+730 | 16+850 | 120 | Median |
| 4 | 16+870 | 17+050 | 180 | Median |
| 5 | 21+950 | 21+920 | 30 | Median |
| 6 | 25+590 | 25+660 | 70 | Median |

**Section-3 Chennai Tada**

| S. No. | Chainage (Km) | | Length (m) | Side | Location |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 23+390 | 23+600 | 210 | LHS | Seperator |
| 2 | 35+380 | 35+480 | 100 | LHS | Median |

### 6.7.5 Road Signage

Locations of Road Signage are presented in table below:

**Table 6-31 : Location of Road Signs**

**Section 01 Vijayawada Chilakaluripet**

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1 | 355+030 | Informatory | LHS | Shoulder |
| 2 | 355+050 | Bus Stop | LHS | Shoulder |
| 3 | 355+090 | Pass Either | LHS | Island |
| 4 | 355+090 | Hazard Marker | LHS | Island |
| 5 | 355+140 | Pass Either | LHS | Separator |
| 6 | 355+140 | Hazard Marker | LHS | Separator |
| 7 | 355+160 | Route Marker | LHS | Separator |
| 8 | 355+170 | Informatory | LHS | Median |
| 9 | 355+200 | Hazard Marker | LHS | Separator |
| 10 | 355+210 | Informatory | RHS SR | Shoulder |
| 11 | 355+270 | Rumble Strip | RHS SR | Shoulder |
| 12 | 355+310 | Route Marker | LHS | Separator |
| 13 | 355+310 | Speed Limit | SR LHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 14 | 355+360 | Informatory | SR LHS | Shoulder |
| 15 | 355+390 | Cross Road | SR LHS | Shoulder |
| 16 | 355+400 | Route Marker | RHS | Separator |
| 17 | 355+420 | Hazard Marker | LHS | Median |
| 18 | 355+420 | Cross Road | RHS SR | Separator |
| 19 | 355+450 | Informatory | RHS SR | Separator |
| 20 | 355+490 | Cross Road | SR LHS | Separator |
| 21 | 355+530 | Informatory | RHS SR | Shoulder |
| 22 | 355+560 | Informatory | SR LHS | Separator |
| 23 | 355+570 | Cross Road | RHS SR | Shoulder |
| 24 | 355+710 | Hazard Marker | RHS | Separator |
| 25 | 355+710 | Hazard Marker | RHS | Median |
| 26 | 355+800 | Hazard Marker | RHS SR | Island |
| 27 | 355+800 | Pass Either | RHS SR | Island |
| 28 | 355+840 | Bus Stop | RHS SR | Shoulder |
| 29 | 356+010 | Hazard Marker | SR LHS | Separator |
| 30 | 356+010 | Hazard Marker | SR LHS | Shouder |
| 31 | 356+020 | Hazard Marker | LHS | Median |
| 32 | 356+020 | Hazard Marker | LHS | Separator |
| 33 | 356+060 | Hazard Marker | RHS SR | Shoulder |
| 34 | 356+060 | Hazard Marker | RHS SR | Separator |
| 35 | 356+060 | Hazard Marker | RHS SR | Shoulder |
| 36 | 356+060 | Hazard Marker | RHS SR | Separator |
| 37 | 356+560 | Emergency Contact | LHS | Shoulder |
| 38 | 356+700 | Route Marker | RHS | Separator |
| 39 | 357+060 | Hazard Marker | LHS | Separator |
| 40 | 357+150 | Height Limit | SR LHS | Shouder |
| 41 | 357+210 | Side Road Left | SR LHS | Shouder |
| 42 | 357+220 | Informatory | RHS SR | Separator |
| 43 | 357+230 | Informatory | LHS | Separator |
| 44 | 357+230 | Informatory | SR LHS | Shouder |
| 45 | 357+250 | Height Limit | RHS SR | Separator |
| 46 | 357+250 | Turn Left | RHS SR | Separator |
| 47 | 357+280 | Side Road Left | RHS SR | Separator |
| 48 | 357+280 | Route Marker | RHS | Separator |
| 49 | 357+290 | Height Limit | SR LHS | Separator |
| 50 | 372+120 | Overhead Cables | RHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 51 | 372+200 | Informatory | RHS | Shoulder |
| 52 | 372+250 | Speed Limit | RHS | Shoulder |
| 53 | 372+300 | Speed Limit | RHS | Shoulder |
| 54 | 372+310 | Informatory | LHS | Median |
| 55 | 372+330 | Hazard Marker | LHS | Shoulder |
| 56 | 372+360 | Informatory | RHS | Median |
| 57 | 372+490 | Route Marker | RHS | Shoulder |
| 58 | 372+580 | Informatory | LHS | Separator |
| 59 | 372+670 | Pass Either | LHS | Separator |
| 60 | 372+670 | Two way Hazard | LHS | Separator |
| 61 | 372+760 | Informatory | RHS SR | Shoulder |
| 62 | 372+770 | Speed Limit | SR LHS | Shoulder |
| 63 | 372+810 | Rumble Strip | RHS SR | Shoulder |
| 64 | 372+880 | Hazard Marker | LHS | Separator |
| 65 | 372+970 | Cattle Crossing | SR LHS | Shoulder |
| 66 | 372+970 | Cattle Crossing | RHS SR | Separator |
| 67 | 372+990 | Pedestrian Crossing | RHS SR | Separator |
| 68 | 373+040 | Cattle Crossing | SR LHS | Separator |
| 69 | 373+040 | Pedestrian Crossing | RHS SR | Shoulder |
| 70 | 373+060 | Cattle Crossing | RHS SR | Shoulder |
| 71 | 373+090 | Pedestrain crossing | SR LHS | Separator |
| 72 | 373+180 | Emergency Contact | LHS | Shoulder |
| 73 | 373+280 | Merging Ahead | LHS | Separator |
| 74 | 373+280 | Rumble Strip | SR LHS | Shoulder |
| 75 | 373+320 | Informatory | SR LHS | Shoulder |
| 76 | 373+320 | Speed Breaker | RHS SR | Shoulder |
| 77 | 373+410 | Informatory | LHS | Shoulder |
| 78 | 373+410 | Pass Either | RHS | Separator |
| 79 | 373+420 | Speed Limit | LHS | Shoulder |
| 80 | 373+460 | Informatory | RHS | Shoulder |
| 81 | 373+540 | Informatory | LHS | Shoulder |
| 82 | 373+580 | Hazard Marker | LHS | Separator |
| 83 | 373+580 | Hazard Marker | LHS | Median |
| 84 | 373+610 | Speed Limit | RHS | Shoulder |
| 85 | 373+650 | Informatory | LHS | Shoulder |
| 86 | 373+690 | Hazard Marker | RHS | Median |
| 87 | 373+690 | Hazard Marker | RHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 88 | 373+760 | Two way Hazard | LHS | Separator |
| 89 | 373+760 | Pass Either | LHS | Separator |
| 90 | 373+820 | Speed Limit | SR LHS | Shoulder |
| 91 | 373+850 | Speed Breaker | SR LHS | Shoulder |
| 92 | 373+850 | Hazard Marker | RHS SR | Shoulder |
| 93 | 373+860 | Informatory | RHS SR | Shoulder |
| 94 | 373+890 | No Overtaking | SR LHS | Shoulder |
| 95 | 373+940 | Chevron | LHS | Separator |
| 96 | 373+940 | Rumble Strip | RHS SR | Shoulder |
| 97 | 373+990 | Chevron | LHS | Separator |
| 98 | 373+990 | Chevron | RHS | Median |
| 99 | 374+020 | Chevron | RHS | Median |
| 100 | 374+040 | Chevron | LHS | Separator |
| 101 | 374+070 | Chevron | RHS | Median |
| 102 | 374+220 | Chevron | LHS | Median |
| 103 | 374+270 | Chevron | LHS | Median |
| 104 | 374+310 | Chevron | RHS | Separator |
| 105 | 374+320 | Chevron | LHS | Median |
| 106 | 374+370 | Chevron | RHS | Separator |
| 107 | 374+450 | Chevron | RHS | Separator |
| 108 | 374+550 | Chevron | RHS | Separator |
| 109 | 374+610 | Hazard Marker | RHS SR | Shoulder |
| 110 | 374+610 | Hazard Marker | RHS SR | Shoulder |
| 111 | 375+350 | Chevron | LHS | Separator |
| 112 | 375+440 | Chevron | LHS | Separator |
| 113 | 375+550 | Side Road Right | SR LHS | Shoulder |
| 114 | 375+580 | Side Road Left | RHS SR | Separator |
| 115 | 375+580 | Hazard Marker | RHS | Median |
| 116 | 375+600 | Informatory | SR LHS | Shoulder |
| 117 | 375+610 | Informatory | RHS SR | Separator |
| 118 | 375+610 | Hazard Marker | RHS SR | Shoulder |
| 119 | 375+620 | Hazard Marker | LHS | Median |
| 120 | 375+690 | Hazard Marker | RHS | Median |
| 121 | 375+700 | Informatory | SR LHS | Separator |
| 122 | 375+710 | Informatory | RHS SR | Shoulder |
| 123 | 375+740 | Side Road Left | SR LHS | Separator |
| 124 | 375+740 | Side Road Right | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 125 | 375+940 | Hazard Marker | SR LHS | Shoulder |
| 126 | 375+940 | Hazard Marker | SR LHS | Separator |
| 127 | 375+950 | Hazard Marker | SR LHS | Separator |
| 128 | 375+950 | Hazard Marker | SR LHS | Shoulder |
| 129 | 375+950 | Hazard Marker | RHS SR | Shoulder |
| 130 | 375+950 | Hazard Marker | RHS SR | Separator |
| 131 | 375+950 | Hazard Marker | RHS SR | Shoulder |
| 132 | 375+950 | Hazard Marker | RHS SR | Separator |
| 133 | 375+990 | Speed Limit | LHS | Separator |
| 134 | 376+010 | Informatory | LHS | Separator |
| 135 | 376+030 | Hazard Marker | RHS | Separator |
| 136 | 376+040 | Merging Ahead | LHS | Separator |
| 137 | 376+040 | Informatory | SR LHS | Shoulder |
| 138 | 376+040 | Emergency Contact | RHS | Separator |
| 139 | 376+070 | No Turn Left | LHS | Separator |
| 140 | 376+070 | Rumble Strip | RHS SR | Separator |
| 141 | 376+080 | Informatory | SR LHS | Shoulder |
| 142 | 376+110 | Rumble Strip | SR LHS | Shoulder |
| 143 | 376+110 | Ahead Complusory | RHS SR | Separator |
| 144 | 376+140 | Give Way | RHS SR | Separator |
| 145 | 376+160 | Keep Right | LHS | Separator |
| 146 | 376+160 | No Entry | RHS SR | Separator |
| 147 | 376+170 | Rumble Strip | SR LHS | Separator |
| 148 | 376+170 | Hazard Marker | SR LHS | Separator |
| 149 | 376+170 | Pass Either | SR LHS | Separator |
| 150 | 376+180 | Hazard Marker | SR LHS | Separator |
| 151 | 376+180 | Pass Either | SR LHS | Separator |
| 152 | 376+190 | Hazard Marker | RHS SR | Separator |
| 153 | 376+190 | Keep Right | RHS SR | Separator |
| 154 | 376+200 | Hazard Marker | RHS SR | Separator |
| 155 | 376+200 | Pass Either | RHS SR | Separator |
| 156 | 376+200 | Rumble Strip | RHS SR | Separator |
| 157 | 376+230 | Ahead Complusory | RHS SR | Shoulder |
| 158 | 376+250 | Rumble Strip | RHS SR | Shoulder |
| 159 | 376+270 | Speed Limit | RHS | Separator |
| 160 | 376+280 | Right Turn Probhited | RHS SR | Shoulder |
| 161 | 376+330 | Speed Limit | RHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 162 | 376+350 | Restriction End | LHS | Separator |
| 163 | 376+400 | Informatory | RHS SR | Shoulder |
| 164 | 376+410 | Informatory | RHS | Separator |
| 165 | 376+470 | Informatory | RHS | Separator |
| 166 | 376+590 | Route Marker | LHS | Separator |
| 167 | 376+600 | Speed Limit | RHS | Separator |
| 168 | 376+670 | Hazard Marker | RHS SR | Separator |
| 169 | 376+670 | Hazard Marker | RHS SR | Shoulder |
| 170 | 376+670 | Hazard Marker | RHS SR | Separator |
| 171 | 376+680 | Speed Limit | LHS | Separator |
| 172 | 376+680 | Hazard Marker | LHS | Separator |
| 173 | 376+690 | Hazard Marker | RHS | Separator |
| 174 | 376+710 | Hazard Marker | SR LHS | Separator |
| 175 | 376+710 | Hazard Marker | SR LHS | Shoulder |
| 176 | 376+720 | Hazard Marker | SR LHS | Separator |
| 177 | 376+720 | Hazard Marker | SR LHS | Shoulder |
| 178 | 376+730 | Informatory | RHS SR | Shoulder |
| 179 | 377+150 | Informatory | RHS SR | Separator |
| 180 | 377+160 | Pedestrain crossing | SR LHS | Shoulder |
| 181 | 377+190 | Pedestrian Crossing | RHS SR | Separator |
| 182 | 377+200 | Informatory | SR LHS | Shoulder |
| 183 | 377+220 | Cattle Crossing | SR LHS | Shoulder |
| 184 | 377+230 | Cattle Crossing | RHS SR | Separator |
| 185 | 377+280 | Cattle Crossing | SR LHS | Separator |
| 186 | 377+290 | Informatory | SR LHS | Separator |
| 187 | 377+300 | Cattle Crossing | RHS SR | Shoulder |
| 188 | 377+310 | Pedestrain crossing | SR LHS | Separator |
| 189 | 377+320 | Pedestrian Crossing | RHS SR | Shoulder |
| 190 | 377+350 | Informatory | RHS SR | Shoulder |
| 191 | 377+370 | Speed Limit | LHS | Separator |
| 192 | 377+530 | Speed Limit | RHS | Separator |
| 193 | 377+620 | Speed Limit | LHS | Separator |
| 194 | 377+660 | Informatory | LHS | Separator |
| 195 | 377+730 | Informatory | LHS | Separator |
| 196 | 377+730 | Hazard Marker | LHS | Separator |
| 197 | 377+730 | Hazard Marker | LHS | Median |
| 198 | 377+770 | Hazard Marker | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 199 | 377+770 | Hazard Marker | SR LHS | Shoulder |
| 200 | 377+770 | Hazard Marker | RHS SR | Shoulder |
| 201 | 377+770 | Hazard Marker | RHS SR | Separator |
| 202 | 377+770 | Hazard Marker | RHS SR | Shoulder |
| 203 | 377+770 | Hazard Marker | RHS SR | Separator |
| 204 | 377+780 | Informatory | LHS | Separator |
| 205 | 377+780 | Hazard Marker | SR LHS | Separator |
| 206 | 377+780 | Hazard Marker | SR LHS | Shoulder |
| 207 | 377+820 | Hazard Marker | RHS | Separator |
| 208 | 377+820 | Hazard Marker | RHS | Median |
| 209 | 377+840 | Restriction End | RHS | Separator |
| 210 | 377+900 | No Turn Right | SR LHS | Shoulder |
| 211 | 377+920 | Rumble Strip | RHS SR | Separator |
| 212 | 377+950 | Complusory Ahead | SR LHS | Shoulder |
| 213 | 377+950 | Informatory | RHS SR | Separator |
| 214 | 377+990 | Hazard Marker | SR LHS | Separator |
| 215 | 377+990 | Pass Either | SR LHS | Separator |
| 216 | 377+990 | Rumble Strip | SR LHS | Separator |
| 217 | 377+990 | Hazard Marker | SR LHS | Separator |
| 218 | 377+990 | Pass Either | SR LHS | Separator |
| 219 | 378+000 | Informatory | LHS | Separator |
| 220 | 378+000 | Hazard Marker | RHS SR | Separator |
| 221 | 378+000 | Pass Either | RHS SR | Separator |
| 222 | 378+010 | No Entry | SR LHS | Separator |
| 223 | 378+010 | Hazard Marker | RHS SR | Separator |
| 224 | 378+010 | Pass Either | RHS SR | Separator |
| 225 | 378+010 | Rumble Strip | RHS SR | Separator |
| 226 | 378+040 | Give way | SR LHS | Separator |
| 227 | 378+050 | Complusory Ahead | SR LHS | Separator |
| 228 | 378+060 | Rumble Strip | SR LHS | Separator |
| 229 | 378+080 | Restriction End | LHS | Separator |
| 230 | 378+080 | Left Turn Prohibhited | RHS | Separator |
| 231 | 378+090 | Hazard Marker | LHS | Median |
| 232 | 378+090 | Informatory | SR LHS | Shoulder |
| 233 | 378+100 | Informatory | RHS SR | Shoulder |
| 234 | 378+120 | Merging Ahead | RHS | Separator |
| 235 | 378+280 | Speed Limit | RHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 236 | 378+430 | School Ahead | RHS SR | Shoulder |
| 237 | 378+750 | Speed Limit | SR LHS | Shoulder |
| 238 | 378+760 | Informatory | LHS | Separator |
| 239 | 378+770 | Bus Bay | SR LHS | Shoulder |
| 240 | 378+850 | Informatory | LHS | Separator |
| 241 | 378+850 | School Ahead | RHS SR | Shoulder |
| 242 | 378+850 | Bus Stop | RHS SR | Shoulder |
| 243 | 378+890 | No Turn Left | SR LHS | Separator |
| 244 | 378+930 | Hazard Marker | RHS | Separator |
| 245 | 378+960 | Hazard Marker | RHS | Median |
| 246 | 378+990 | Hazard Marker | LHS | Separator |
| 247 | 379+000 | Hazard Marker | SR LHS | Shoulder |
| 248 | 379+000 | Hazard Marker | SR LHS | Separator |
| 249 | 379+000 | Hazard Marker | SR LHS | Shoulder |
| 250 | 379+000 | Hazard Marker | SR LHS | Separator |
| 251 | 379+010 | Hazard Marker | RHS SR | Shoulder |
| 252 | 379+010 | Hazard Marker | RHS SR | Separator |
| 253 | 379+010 | Hazard Marker | RHS SR | Shoulder |
| 254 | 379+010 | Hazard Marker | RHS SR | Separator |
| 255 | 379+050 | Hazard Marker | RHS | Separator |
| 256 | 379+100 | Informatory | LHS | Median |
| 257 | 379+130 | No Parking | RHS | Separator |
| 258 | 379+270 | Informatory | SR LHS | Shoulder |
| 259 | 379+280 | Informatory | RHS SR | Shoulder |
| 260 | 379+290 | Speed Limit | LHS | Separator |
| 261 | 379+350 | Hazard Marker | LHS | Separator |
| 262 | 379+370 | Hazard Marker | SR LHS | Shoulder |
| 263 | 379+370 | Hazard Marker | SR LHS | Separator |
| 264 | 379+370 | Hazard Marker | SR LHS | Shoulder |
| 265 | 379+370 | Hazard Marker | SR LHS | Separator |
| 266 | 379+370 | Hazard Marker | RHS SR | Separator |
| 267 | 379+370 | Hazard Marker | RHS SR | Shoulder |
| 268 | 379+370 | Hazard Marker | RHS SR | Separator |
| 269 | 379+380 | Rumble Strip | SR LHS | Shoulder |
| 270 | 379+410 | Informatory | SR LHS | Shoulder |
| 271 | 379+420 | Hazard Marker | RHS | Separator |
| 272 | 379+430 | No Turn Left | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 273 | 379+430 | Ahead Complusory | RHS SR | Separator |
| 274 | 379+470 | Pass Either | SR LHS | Separator |
| 275 | 379+470 | Rumble Strip | SR LHS | Separator |
| 276 | 379+470 | Hazard Marker | SR LHS | Separator |
| 277 | 379+470 | Pass Either | SR LHS | Separator |
| 278 | 379+470 | Give Way | RHS SR | Separator |
| 279 | 379+480 | No Entry | RHS SR | Separator |
| 280 | 379+490 | Hazard Marker | RHS SR | Separator |
| 281 | 379+490 | Pass Either | RHS SR | Separator |
| 282 | 379+500 | Hazard Marker | RHS SR | Separator |
| 283 | 379+500 | Keep Right | RHS SR | Separator |
| 284 | 379+500 | Rumble Strip | RHS SR | Separator |
| 285 | 379+530 | Ahead Complusory | RHS SR | Shoulder |
| 286 | 379+560 | Rumble Strip | SR LHS | Separator |
| 287 | 379+560 | Right Turn Probhited | RHS SR | Shoulder |
| 288 | 379+620 | Speed Breaker | RHS SR | Shoulder |
| 289 | 379+630 | Speed Limit | RHS | Separator |
| 290 | 379+640 | Informatory | SR LHS | Separator |
| 291 | 379+670 | Restriction End | LHS | Separator |
| 292 | 379+690 | hazard Marker | LHS | Separator |
| 293 | 379+700 | Hazard Marker | SR LHS | Separator |
| 294 | 379+700 | Hazard Marker | SR LHS | Shoulder |
| 295 | 379+700 | Hazard Marker | SR LHS | Separator |
| 296 | 379+700 | Hazard Marker | SR LHS | Shoulder |
| 297 | 379+700 | Speed Limit | RHS | Separator |
| 298 | 379+710 | Hazard Marker | RHS SR | Shoulder |
| 299 | 379+710 | Hazard Marker | RHS SR | Separator |
| 300 | 379+710 | Hazard Marker | RHS SR | Shoulder |
| 301 | 379+710 | Hazard Marker | RHS SR | Separator |
| 302 | 379+750 | Hazard Marker | RHS | Separator |
| 303 | 379+910 | hazard Marker | LHS | Separator |
| 304 | 379+930 | Hazard Marker | SR LHS | Separator |
| 305 | 379+930 | Hazard Marker | SR LHS | Shoulder |
| 306 | 379+930 | Hazard Marker | SR LHS | Separator |
| 307 | 379+930 | Hazard Marker | SR LHS | Shoulder |
| 308 | 379+940 | Hazard Marker | RHS SR | Shoulder |
| 309 | 379+940 | Hazard Marker | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 310 | 379+940 | Hazard Marker | RHS SR | Shoulder |
| 311 | 379+940 | Hazard Marker | RHS SR | Separator |
| 312 | 379+940 | Informatory | RHS | Separator |
| 313 | 379+980 | Hazard Marker | RHS | Separator |
| 314 | 380+030 | Speed Limit | RHS | Separator |
| 315 | 380+050 | Informatory | SR LHS | Shoulder |
| 316 | 380+070 | Emergency Contact | LHS | Separator |
| 317 | 380+200 | Hazard Marker | LHS | Separator |
| 318 | 380+230 | Pedestrain crossing | SR LHS | Separator |
| 319 | 380+230 | Cattle Crossing | RHS SR | Separator |
| 320 | 380+250 | Pedestrian Crossing | RHS SR | Separator |
| 321 | 380+310 | Cattle Crossing | SR LHS | Separator |
| 322 | 380+310 | Pedestrian Crossing | RHS SR | Shoulder |
| 323 | 380+350 | Cattle Crossing | RHS SR | Shoulder |
| 324 | 380+360 | Hazard Marker | RHS | Separator |
| 325 | 380+370 | Speed Limit | LHS | Separator |
| 326 | 380+500 | Hazard Marker | LHS | Median |
| 327 | 380+530 | Hazard Marker | SR LHS | Separator |
| 328 | 380+530 | Hazard Marker | SR LHS | Shoulder |
| 329 | 380+530 | Hazard Marker | SR LHS | Separator |
| 330 | 380+530 | Hazard Marker | SR LHS | Shoulder |
| 331 | 380+530 | Hazard Marker | RHS SR | Shoulder |
| 332 | 380+530 | Hazard Marker | RHS SR | Separator |
| 333 | 380+530 | Hazard Marker | RHS SR | Shoulder |
| 334 | 380+530 | Hazard Marker | RHS SR | Separator |
| 335 | 380+580 | Hazard Marker | RHS | Separator |
| 336 | 380+940 | Hazard Marker | LHS | Separator |
| 337 | 380+960 | Hazard Marker | SR LHS | Separator |
| 338 | 380+960 | Hazard Marker | SR LHS | Shoulder |
| 339 | 380+960 | Hazard Marker | SR LHS | Separator |
| 340 | 380+960 | Hazard Marker | SR LHS | Shoulder |
| 341 | 380+970 | Hazard Marker | RHS SR | Shoulder |
| 342 | 380+970 | Hazard Marker | RHS SR | Separator |
| 343 | 380+970 | Hazard Marker | RHS SR | Shoulder |
| 344 | 380+970 | Hazard Marker | RHS SR | Separator |
| 345 | 381+010 | Hazard Marker | RHS | Separator |
| 346 | 381+150 | Informatory | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 347 | 381+250 | Hazard Marker | LHS | Separator |
| 348 | 381+340 | Informatory | SR LHS | Shoulder |
| 349 | 381+360 | Cross Road | RHS SR | Shoulder |
| 350 | 381+370 | Cross Road | SR LHS | Shoulder |
| 351 | 381+400 | Hazard Marker | LHS | Median |
| 352 | 381+480 | Informatory | SR LHS | Separator |
| 353 | 381+480 | Informatory | RHS SR | Shoulder |
| 354 | 381+480 | Chevron | RHS | Median |
| 355 | 381+490 | Cross Road | SR LHS | Separator |
| 356 | 381+520 | Cross Road | RHS SR | Shoulder |
| 357 | 381+560 | Hazard Marker | SR LHS | Shoulder |
| 358 | 381+560 | Hazard Marker | SR LHS | Separator |
| 359 | 381+560 | Hazard Marker | SR LHS | Shoulder |
| 360 | 381+560 | Hazard Marker | SR LHS | Separator |
| 361 | 381+560 | Hazard Marker | RHS SR | Shoulder |
| 362 | 381+560 | Hazard Marker | RHS SR | Separator |
| 363 | 381+560 | Hazard Marker | RHS SR | Shoulder |
| 364 | 381+560 | Hazard Marker | RHS SR | Separator |
| 365 | 381+620 | Chevron | LHS | Median |
| 366 | 381+680 | Chevron | LHS | Median |
| 367 | 381+680 | Chevron | RHS | Separator |
| 368 | 381+700 | Hazard Marker | RHS | Separator |
| 369 | 381+740 | Chevron | RHS | Separator |
| 370 | 381+900 | Hazard Marker | LHS | Separator |
| 371 | 381+910 | Hazard Marker | SR LHS | Shoulder |
| 372 | 381+910 | Hazard Marker | SR LHS | Separator |
| 373 | 381+910 | Hazard Marker | SR LHS | Shoulder |
| 374 | 381+910 | Hazard Marker | SR LHS | Separator |
| 375 | 381+930 | Hazard Marker | RHS SR | Shoulder |
| 376 | 381+930 | Hazard Marker | RHS SR | Separator |
| 377 | 381+930 | Hazard Marker | RHS SR | Shoulder |
| 378 | 381+930 | Hazard Marker | RHS SR | Separator |
| 379 | 381+970 | Hazard Marker | RHS | Separator |
| 380 | 382+560 | Hazard Marker | LHS | Separator |
| 381 | 382+570 | Hazard Marker | SR LHS | Shoulder |
| 382 | 382+570 | Hazard Marker | SR LHS | Separator |
| 383 | 382+570 | Hazard Marker | SR LHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 384 | 382+570 | Hazard Marker | SR LHS | Separator |
| 385 | 382+590 | Hazard Marker | RHS SR | Shoulder |
| 386 | 382+590 | Hazard Marker | RHS SR | Separator |
| 387 | 382+590 | Hazard Marker | RHS SR | Shoulder |
| 388 | 382+590 | Hazard Marker | RHS SR | Separator |
| 389 | 382+690 | Informatory | LHS | Separator |
| 390 | 382+730 | Speed Limit | RHS | Separator |
| 391 | 382+780 | Hazard Marker | LHS | Separator |
| 392 | 382+820 | Cattle Crossing | SR LHS | Shoulder |
| 393 | 382+840 | Pedestrain crossing | SR LHS | Shoulder |
| 394 | 382+850 | Cattle Crossing | RHS SR | Separator |
| 395 | 382+870 | Pedestrian Crossing | RHS SR | Separator |
| 396 | 382+920 | Pedestrain crossing | SR LHS | Separator |
| 397 | 382+920 | Cattle Crossing | SR LHS | Separator |
| 398 | 382+930 | Pedestrian Crossing | RHS SR | Shoulder |
| 399 | 382+940 | Cattle Crossing | RHS SR | Shoulder |
| 400 | 382+970 | Speed Limit | LHS | Separator |
| 401 | 383+000 | Hazard Marker | RHS | Separator |
| 402 | 383+020 | Accident Prone Area | RHS | Separator |
| 403 | 383+050 | Informatory | LHS | Separator |
| 404 | 383+130 | Restriction End | RHS | Separator |
| 405 | 383+220 | Speed Limit | LHS | Separator |
| 406 | 383+220 | Rumble Strip | SR LHS | shoulder |
| 407 | 383+220 | Rumble Strip | RHS SR | Separator |
| 408 | 383+240 | Ahead Compulsory | SR LHS | shoulder |
| 409 | 383+260 | Informatory | RHS SR | Separator |
| 410 | 383+270 | Informatory | LHS | Separator |
| 411 | 383+300 | Hazard Marker | RHS SR | Separator |
| 412 | 383+310 | Hazard Marker | RHS SR | Separator |
| 413 | 383+310 | Pass Either | RHS SR | Separator |
| 414 | 383+310 | Rumble Strip | RHS SR | Separator |
| 415 | 383+320 | Rumble Strip | SR LHS | Separator |
| 416 | 383+320 | Hazard Marker | SR LHS | Separator |
| 417 | 383+320 | Pass Either | SR LHS | Separator |
| 418 | 383+330 | Hazard Marker | SR LHS | Separator |
| 419 | 383+330 | Keep Right | SR LHS | Separator |
| 420 | 383+330 | No Entry | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 421 | 383+330 | Hazard Marker | RHS | Separator |
| 422 | 383+350 | Give way | SR LHS | Separator |
| 423 | 383+370 | Ahead Compulsory | SR LHS | Separator |
| 424 | 383+370 | Left Turn Prohibhited | RHS | Separator |
| 425 | 383+380 | Informatory | RHS SR | Shoulder |
| 426 | 383+410 | Rumble Strip | RHS SR | Shoulder |
| 427 | 383+420 | Informatory | RHS SR | Shoulder |
| 428 | 383+430 | Merging Ahead | RHS | Separator |
| 429 | 383+440 | Restriction End | LHS | Separator |
| 430 | 383+440 | Informatory | SR LHS | Shoulder |
| 431 | 383+470 | Hazard Marker | LHS | Separator |
| 432 | 383+480 | Hazard Marker | SR LHS | Separator |
| 433 | 383+480 | Hazard Marker | SR LHS | Separator |
| 434 | 383+480 | Hazard Marker | SR LHS | Separator |
| 435 | 383+480 | Hazard Marker | SR LHS | Separator |
| 436 | 383+490 | Informatory | SR LHS | Shoulder |
| 437 | 383+510 | Hazard Marker | RHS SR | Shoulder |
| 438 | 383+510 | Hazard Marker | RHS SR | Separator |
| 439 | 383+510 | Hazard Marker | RHS SR | Shoulder |
| 440 | 383+510 | Hazard Marker | RHS SR | Separator |
| 441 | 383+540 | Informatory | RHS SR | Shoulder |
| 442 | 383+540 | Hazard Marker | RHS | Separator |
| 443 | 383+540 | Speed Limit | RHS | Separator |
| 444 | 383+960 | Informatory | SR LHS | Shoulder |
| 445 | 383+980 | Cattle Crossing | SR LHS | Shoulder |
| 446 | 384+010 | Hazard Marker | SR LHS | Shoulder |
| 447 | 384+010 | Hazard Marker | SR LHS | Separator |
| 448 | 384+010 | Hazard Marker | SR LHS | Shoulder |
| 449 | 384+010 | Hazard Marker | SR LHS | Separator |
| 450 | 384+020 | Pedestrain crossing | SR LHS | Shoulder |
| 451 | 384+020 | Side Road Right | RHS SR | Separator |
| 452 | 384+020 | Informatory | RHS | Median |
| 453 | 384+060 | Hazard Marker | RHS SR | Shoulder |
| 454 | 384+060 | Hazard Marker | RHS SR | Separator |
| 455 | 384+060 | Hazard Marker | RHS SR | Separator |
| 456 | 384+060 | Informatory | RHS SR | Separator |
| 457 | 384+070 | Cattle Crossing | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 458 | 384+090 | Pedestrain crossing | SR LHS | Separator |
| 459 | 384+090 | Pedestrian Crossing | RHS SR | Separator |
| 460 | 384+120 | Informatory | RHS SR | Shoulder |
| 461 | 384+130 | Informatory | SR LHS | Separator |
| 462 | 384+140 | Pedestrian Crossing | RHS SR | Shoulder |
| 463 | 384+160 | Cattle Crossing | SR LHS | Separator |
| 464 | 384+160 | Cattle Crossing | RHS SR | Shoulder |
| 465 | 384+180 | Informatory | SR LHS | Shoulder |
| 466 | 384+180 | Side Road Left | RHS SR | Shoulder |
| 467 | 384+190 | Informatory | RHS SR | Shoulder |
| 468 | 384+230 | Speed Limit | LHS | Separator |
| 469 | 384+260 | Informatory | SR LHS | Shoulder |
| 470 | 384+260 | Restriction End | RHS | Separator |
| 471 | 384+280 | Bus Bay | SR LHS | Bus Bay Island |
| 472 | 384+300 | Bus Stop | RHS SR | Shoulder |
| 473 | 384+320 | Merging Ahead | LHS | Separator |
| 474 | 384+320 | Hazard Marker | SR LHS | Bus Bay Island |
| 475 | 384+320 | Pass Either | SR LHS | Bus Bay Island |
| 476 | 384+390 | No Turn Left | LHS | Separator |
| 477 | 384+390 | Rumble Strip | SR LHS | Shoulder |
| 478 | 384+410 | Rumble Strip | RHS SR | Separator |
| 479 | 384+430 | Hazard Marker | LHS | Separator |
| 480 | 384+430 | Pass Either | LHS | Separator |
| 481 | 384+430 | Hazard Marker | SR LHS | Separator |
| 482 | 384+430 | Pass Either | SR LHS | Separator |
| 483 | 384+440 | Rumble Strip | SR LHS | Separator |
| 484 | 384+440 | Ahead Complusory | RHS SR | Separator |
| 485 | 384+460 | Give Way | RHS SR | Separator |
| 486 | 384+480 | No Entry | RHS SR | Separator |
| 487 | 384+490 | Hazard Marker | RHS SR | Separator |
| 488 | 384+490 | Keep Right | RHS SR | Separator |
| 489 | 384+500 | Hazard Marker | RHS SR | Separator |
| 490 | 384+500 | Pass Either | RHS SR | Separator |
| 491 | 384+500 | Rumble Strip | RHS SR | Separator |
| 492 | 384+530 | Rumble Strip | SR LHS | Separator |
| 493 | 384+540 | Hazard Marker | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 494 | 384+540 | Hazard Marker | RHS SR | Separator |
| 495 | 384+540 | Hazard Marker | RHS SR | Shoulder |
| 496 | 384+540 | Hazard Marker | RHS SR | Separator |
| 497 | 384+550 | Right Turn Probhited | RHS SR | Shoulder |
| 498 | 384+580 | Ahead Complusory | RHS SR | Shoulder |
| 499 | 384+580 | Speed Limit | RHS | Separator |
| 500 | 384+600 | Rumble Strip | RHS SR | Shoulder |
| 501 | 384+610 | Restriction End | LHS | Separator |
| 502 | 384+640 | Speed Limit | RHS | Separator |
| 503 | 384+650 | Informatory | SR LHS | Separator |
| 504 | 384+660 | Hazard Marker | LHS | Separator |
| 505 | 384+660 | Hazard Marker | LHS | Median |
| 506 | 384+660 | Informatory | RHS | Separator |
| 507 | 384+680 | Informatory | RHS | Separator |
| 508 | 384+700 | Hazard Marker | SR LHS | Shoulder |
| 509 | 384+700 | Hazard Marker | SR LHS | Separator |
| 510 | 384+700 | Hazard Marker | SR LHS | Shoulder |
| 511 | 384+700 | Hazard Marker | SR LHS | Separator |
| 512 | 384+720 | Hazard Marker | RHS SR | Shoulder |
| 513 | 384+720 | Hazard Marker | RHS SR | Separator |
| 514 | 384+720 | Hazard Marker | RHS SR | Shoulder |
| 515 | 384+720 | Hazard Marker | RHS SR | Separator |
| 516 | 384+740 | Hazard Marker | RHS | Median |
| 517 | 384+820 | Informatory | RHS | Separator |
| 518 | 384+860 | Emergency Contact | LHS | Separator |
| 519 | 384+910 | Speed Limit | RHS | Separator |
| 520 | 384+940 | Cattle Crossing | SR LHS | Shoulder |
| 521 | 384+960 | Hazard Marker | LHS | Separator |
| 522 | 384+970 | Hazard Marker | SR LHS | Shoulder |
| 523 | 384+970 | Hazard Marker | SR LHS | Separator |
| 524 | 384+970 | Hazard Marker | SR LHS | Shoulder |
| 525 | 384+970 | Hazard Marker | SR LHS | Separator |
| 526 | 384+980 | Pedestrain crossing | SR LHS | Shoulder |
| 527 | 385+000 | Cattle Crossing | RHS SR | Separator |
| 528 | 385+000 | Informatory | RHS | Separator |
| 529 | 385+030 | Cattle Crossing | SR LHS | Separator |
| 530 | 385+030 | Pedestrian Crossing | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 531 | 385+030 | Hazard Marker | RHS SR | Shoulder |
| 532 | 385+030 | Hazard Marker | RHS SR | Separator |
| 533 | 385+030 | Hazard Marker | RHS SR | Shoulder |
| 534 | 385+030 | Hazard Marker | RHS SR | Separator |
| 535 | 385+060 | Speed Limit | LHS | Separator |
| 536 | 385+060 | Pedestrain crossing | SR LHS | Separator |
| 537 | 385+100 | Cattle Crossing | RHS SR | Shoulder |
| 538 | 385+120 | Pedestrian Crossing | RHS SR | Shoulder |
| 539 | 385+190 | Hazard Marker | SR LHS | Shoulder |
| 540 | 385+190 | Hazard Marker | SR LHS | Separator |
| 541 | 385+190 | Hazard Marker | SR LHS | Shoulder |
| 542 | 385+190 | Hazard Marker | SR LHS | Separator |
| 543 | 385+240 | Hazard Marker | RHS SR | Shoulder |
| 544 | 385+240 | Hazard Marker | RHS SR | Separator |
| 545 | 385+240 | Hazard Marker | RHS SR | Shoulder |
| 546 | 385+240 | Hazard Marker | RHS SR | Separator |
| 547 | 385+290 | Speed Limit | LHS | Median |
| 548 | 385+370 | Hazard Marker | RHS | Median |
| 549 | 385+630 | Hazard Marker | RHS | Separator |
| 550 | 385+700 | Hazard Marker | LHS | Separator |
| 551 | 385+730 | Hazard Marker | SR LHS | Shoulder |
| 552 | 385+730 | Hazard Marker | SR LHS | Separator |
| 553 | 385+730 | Hazard Marker | SR LHS | Shoulder |
| 554 | 385+730 | Hazard Marker | SR LHS | Separator |
| 555 | 385+770 | Hazard Marker | RHS SR | Shoulder |
| 556 | 385+770 | Hazard Marker | RHS SR | Separator |
| 557 | 385+780 | Hazard Marker | RHS | Separator |
| 558 | 385+800 | Speed Limit | RHS | Separator |
| 559 | 386+020 | Hazard Marker | LHS | Separator |
| 560 | 386+040 | Hazard Marker | SR LHS | Shoulder |
| 561 | 386+040 | Hazard Marker | SR LHS | Separator |
| 562 | 386+040 | Hazard Marker | SR LHS | Shoulder |
| 563 | 386+040 | Hazard Marker | SR LHS | Separator |
| 564 | 386+060 | Hazard Marker | RHS SR | Shoulder |
| 565 | 386+060 | Hazard Marker | RHS SR | Separator |
| 566 | 386+060 | Hazard Marker | RHS SR | Shoulder |
| 567 | 386+060 | Hazard Marker | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 568 | 386+160 | Informatory | SR LHS | Shoulder |
| 569 | 387+000 | Hazard Marker | LHS | Median |
| 570 | 387+020 | Hazard Marker | LHS | Separator |
| 571 | 387+030 | Speed Limit | RHS | Separator |
| 572 | 387+050 | Hazard Marker | SR LHS | Shoulder |
| 573 | 387+050 | Hazard Marker | SR LHS | Separator |
| 574 | 387+050 | Hazard Marker | SR LHS | Shoulder |
| 575 | 387+050 | Hazard Marker | SR LHS | Separator |
| 576 | 387+080 | Informatory | RHS SR | Shoulder |
| 577 | 387+100 | Hazard Marker | RHS SR | Shoulder |
| 578 | 387+100 | Hazard Marker | RHS SR | Separator |
| 579 | 387+100 | Hazard Marker | RHS SR | Shoulder |
| 580 | 387+100 | Hazard Marker | RHS SR | Separator |
| 581 | 387+140 | Hazard Marker | RHS | Separator |
| 582 | 387+140 | Hazard Marker | RHS | Median |
| 583 | 387+160 | Informatory | SR LHS | Shoulder |
| 584 | 387+160 | Cattle Crossing | SR LHS | Shoulder |
| 585 | 387+180 | Hazard Marker | LHS | Separator |
| 586 | 387+260 | Pedestrain crossing | SR LHS | Shoulder |
| 587 | 387+280 | Cattle Crossing | RHS SR | Separator |
| 588 | 387+290 | Chevron | RHS | Separator |
| 589 | 387+300 | Pedestrain crossing | SR LHS | Separator |
| 590 | 387+310 | Pedestrian Crossing | RHS SR | Separator |
| 591 | 387+320 | Informatory | RHS SR | Separator |
| 592 | 387+330 | Chevron | RHS | Separator |
| 593 | 387+340 | Cattle Crossing | SR LHS | Separator |
| 594 | 387+360 | Speed Limit | LHS | Separator |
| 595 | 387+370 | Pedestrian Crossing | RHS SR | Shoulder |
| 596 | 387+390 | Cattle Crossing | RHS SR | Shoulder |
| 597 | 387+390 | Hazard Marker | RHS | Separator |
| 598 | 387+410 | Informatory | LHS | Separator |
| 599 | 387+410 | Chevron | LHS | Median |
| 600 | 387+420 | Informatory | RHS SR | Shoulder |
| 601 | 387+450 | Hazard Marker | LHS | Separator |
| 602 | 387+470 | Chevron | LHS | Median |
| 603 | 387+490 | Hazard Marker | SR LHS | Shoulder |
| 604 | 387+490 | Hazard Marker | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 605 | 387+490 | Hazard Marker | SR LHS | Shoulder |
| 606 | 387+490 | Hazard Marker | SR LHS | Separator |
| 607 | 387+500 | Restriction End | RHS | Separator |
| 608 | 387+520 | Chevron | LHS | Median |
| 609 | 387+530 | Speed Limit | LHS | Separator |
| 610 | 387+530 | Chevron | RHS | Separator |
| 611 | 387+540 | Hazard Marker | RHS SR | Shoulder |
| 612 | 387+540 | Hazard Marker | RHS SR | Separator |
| 613 | 387+540 | Hazard Marker | RHS SR | Shoulder |
| 614 | 387+540 | Hazard Marker | RHS SR | Separator |
| 615 | 387+560 | Hazard Marker | RHS | Separator |
| 616 | 387+590 | Chevron | LHS | Median |
| 617 | 387+600 | Rumble Strip | RHS SR | Separator |
| 618 | 387+610 | Rumble Strip | SR LHS | Shoulder |
| 619 | 387+650 | Ahead Compulsory | SR LHS | Shoulder |
| 620 | 387+650 | Informatory | RHS SR | Separator |
| 621 | 387+650 | Chevron | RHS | Separator |
| 622 | 387+680 | No Turn Right | SR LHS | Shoulder |
| 623 | 387+700 | Hazard Marker | SR LHS | Separator |
| 624 | 387+710 | Hazard Marker | SR LHS | Separator |
| 625 | 387+710 | Pass Either | SR LHS | Separator |
| 626 | 387+720 | Rumble Strip | SR LHS | Separator |
| 627 | 387+720 | Hazard Marker | SR LHS | Separator |
| 628 | 387+720 | Keep Right | SR LHS | Separator |
| 629 | 387+730 | Hazard Marker | RHS SR | Separator |
| 630 | 387+730 | Hazard Marker | RHS | Separator |
| 631 | 387+730 | Keep Right | RHS | Separator |
| 632 | 387+740 | Hazard Marker | LHS | Median |
| 633 | 387+750 | Hazard Marker | RHS SR | Separator |
| 634 | 387+750 | Pass Either | RHS SR | Separator |
| 635 | 387+750 | Rumble Strip | RHS SR | Separator |
| 636 | 387+760 | Give way | SR LHS | Separator |
| 637 | 387+780 | Left Turn Prohibhited | RHS | Separator |
| 638 | 387+790 | Ahead Compulsory | SR LHS | Separator |
| 639 | 387+810 | Hazard Marker | RHS | Median |
| 640 | 387+820 | Restriction End | LHS | Separator |
| 641 | 387+820 | Rumble Strip | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 642 | 387+890 | Informatory | RHS SR | Shoulder |
| 643 | 387+890 | Rumble Strip | RHS SR | Shoulder |
| 644 | 387+950 | Hazard Marker | LHS | Separator |
| 645 | 387+950 | Hazard Marker | LHS | Median |
| 646 | 387+950 | Informatory | RHS SR | Shoulder |
| 647 | 387+980 | Hazard Marker | SR LHS | Separator |
| 648 | 387+980 | Hazard Marker | SR LHS | Shoulder |
| 649 | 387+980 | Hazard Marker | SR LHS | Separator |
| 650 | 387+980 | Hazard Marker | SR LHS | Shoulder |
| 651 | 387+990 | Speed Limit | RHS | Separator |
| 652 | 388+030 | Hazard Marker | RHS SR | Shoulder |
| 653 | 388+030 | Hazard Marker | RHS SR | Separator |
| 654 | 388+030 | Hazard Marker | RHS SR | Shoulder |
| 655 | 388+030 | Hazard Marker | RHS SR | Separator |
| 656 | 388+030 | Hazard Marker | RHS | Median |
| 657 | 388+030 | Hazard Marker | RHS | Separator |
| 658 | 388+050 | Speed Limit | LHS | Separator |
| 659 | 388+120 | Hazard Marker | LHS | Separator |
| 660 | 388+140 | Speed Limit | RHS | Separator |
| 661 | 388+180 | Informatory | SR LHS | Shoulder |
| 662 | 388+200 | Cross Road | SR LHS | Shoulder |
| 663 | 388+250 | Height Limit | SR LHS | Shoulder |
| 664 | 388+250 | Turn Right | SR LHS | Shoulder |
| 665 | 388+300 | Cross Road | RHS SR | Separator |
| 666 | 388+320 | Turn Left | SR LHS | Separator |
| 667 | 388+320 | Height Limit | SR LHS | Separator |
| 668 | 388+340 | Cross Road | SR LHS | Separator |
| 669 | 388+340 | Turn Left | RHS SR | Separator |
| 670 | 388+340 | Height Limit | RHS SR | Separator |
| 671 | 388+350 | Informatory | RHS SR | Separator |
| 672 | 388+370 | Informatory | SR LHS | Separator |
| 673 | 388+390 | Turn Right | RHS SR | Shoulder |
| 674 | 388+390 | Height Limit | RHS SR | Shoulder |
| 675 | 388+430 | Cross Road | RHS SR | Shoulder |
| 676 | 388+490 | Informatory | RHS SR | Shoulder |
| 677 | 388+570 | Hazard Marker | RHS | Separator |
| 678 | 388+820 | Hazard Marker | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 679 | 388+820 | Hazard Marker | LHS | Median |
| 680 | 388+850 | Hazard Marker | SR LHS | Shoulder |
| 681 | 388+850 | Hazard Marker | SR LHS | Shoulder |
| 682 | 388+890 | Hazard Marker | RHS SR | Shoulder |
| 683 | 388+890 | Hazard Marker | RHS SR | Separator |
| 684 | 388+890 | Hazard Marker | RHS SR | Shoulder |
| 685 | 388+890 | Hazard Marker | RHS SR | Separator |
| 686 | 388+890 | Hazard Marker | RHS | Median |
| 687 | 388+890 | Hazard Marker | RHS | Separator |
| 688 | 388+990 | Informatory | LHS | Median |
| 689 | 389+050 | Informatory | RHS | Median |
| 690 | 389+220 | Speed Limit | RHS | Separator |
| 691 | 389+310 | Informatory | SR LHS | Shoulder |
| 692 | 389+320 | Cattle Crossing | SR LHS | Shoulder |
| 693 | 389+340 | Cattle Crossing | SR LHS | Shoulder |
| 694 | 389+340 | Informatory | RHS SR | Separator |
| 695 | 389+390 | Side Road Right | RHS SR | Separator |
| 696 | 389+410 | Pedestrain crossing | SR LHS | Separator |
| 697 | 389+410 | Cattle Crossing | RHS SR | Separator |
| 698 | 389+420 | Pedestrian Crossing | RHS SR | Separator |
| 699 | 389+430 | Cattle Crossing | SR LHS | Separator |
| 700 | 389+440 | Side Road Right | SR LHS | Separator |
| 701 | 389+450 | Chevron | LHS | Separator |
| 702 | 389+470 | Pedestrian Crossing | RHS SR | Shoulder |
| 703 | 389+490 | Chevron | LHS | Separator |
| 704 | 389+500 | Cattle Crossing | RHS SR | Shoulder |
| 705 | 389+500 | Hazard Marker | RHS | Separator |
| 706 | 389+540 | Chevron | LHS | Separator |
| 707 | 389+540 | Informatory | RHS SR | Shoulder |
| 708 | 389+700 | Chevron | LHS | Separator |
| 709 | 389+740 | Hazard Marker | RHS SR | Island |
| 710 | 389+740 | Pass Either | RHS SR | Island |
| 711 | 389+750 | Hazard Marker | LHS | Separator |
| 712 | 389+760 | Bus Stop | RHS SR | Shoulder |
| 713 | 389+770 | Hazard Marker | SR LHS | Shoulder |
| 714 | 389+770 | Hazard Marker | SR LHS | Separator |
| 715 | 389+770 | Hazard Marker | SR LHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 716 | 389+770 | Hazard Marker | SR LHS | Separator |
| 717 | 389+790 | Hazard Marker | RHS SR | Shoulder |
| 718 | 389+790 | Hazard Marker | RHS SR | Separator |
| 719 | 389+790 | Hazard Marker | RHS SR | Shoulder |
| 720 | 389+790 | Hazard Marker | RHS SR | Separator |
| 721 | 389+810 | Emergency Contact | LHS | Separator |
| 722 | 389+810 | Hazard Marker | RHS | Median |
| 723 | 389+820 | Hazard Marker | RHS | Separator |
| 724 | 389+920 | Hazard Marker | LHS | Separator |
| 725 | 389+930 | Speed Limit | LHS | Separator |
| 726 | 389+940 | Informatory | SR LHS | shoulder |
| 727 | 389+970 | Merging Ahead | LHS | Separator |
| 728 | 389+990 | Informatory | SR LHS | shoulder |
| 729 | 390+010 | No Turn Left | LHS | Separator |
| 730 | 390+010 | Restriction End | RHS | Separator |
| 731 | 390+020 | Rumble Strip | SR LHS | shoulder |
| 732 | 390+040 | Rumble Strip | RHS SR | Separator |
| 733 | 390+080 | Ahead Complusory | RHS SR | Separator |
| 734 | 390+100 | Hazard Marker | SR LHS | Separator |
| 735 | 390+100 | Pass Either | SR LHS | Separator |
| 736 | 390+100 | Rumble Strip | SR LHS | Separator |
| 737 | 390+110 | Hazard Marker | SR LHS | Separator |
| 738 | 390+110 | Pass Either | SR LHS | Separator |
| 739 | 390+110 | Give Way | RHS SR | Separator |
| 740 | 390+140 | No Entry | RHS SR | Separator |
| 741 | 390+150 | Hazard Marker | RHS SR | Separator |
| 742 | 390+150 | Keep Right | RHS SR | Separator |
| 743 | 390+160 | Hazard Marker | RHS SR | Separator |
| 744 | 390+160 | Pass Either | RHS SR | Separator |
| 745 | 390+160 | Rumble Strip | RHS SR | Separator |
| 746 | 390+210 | Ahead Complusory | RHS SR | Shoulder |
| 747 | 390+220 | Overhead Cable | LHS | Separator |
| 748 | 390+220 | Rumble Strip | SR LHS | Separator |
| 749 | 390+240 | Rumble Strip | RHS SR | Shoulder |
| 750 | 390+270 | Right Turn Probhited | RHS SR | Shoulder |
| 751 | 390+280 | Speed Limit | RHS | Separator |
| 752 | 390+320 | Restriction End | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 753 | 390+380 | Speed Limit | RHS | Separator |
| 754 | 390+400 | Hazard Marker | LHS | Separator |
| 755 | 390+410 | Hazard Marker | SR LHS | Separator |
| 756 | 390+410 | Hazard Marker | SR LHS | Shoulder |
| 757 | 390+410 | Hazard Marker | SR LHS | Separator |
| 758 | 390+450 | Hazard Marker | RHS SR | Shoulder |
| 759 | 390+450 | Hazard Marker | RHS SR | Separator |
| 760 | 390+450 | Hazard Marker | RHS SR | Shoulder |
| 761 | 390+450 | Hazard Marker | RHS SR | Separator |
| 762 | 390+450 | Hazard Marker | RHS | Separator |
| 763 | 390+470 | Informatory | RHS | Separator |
| 764 | 390+530 | Hazard Marker | LHS | Separator |
| 765 | 390+540 | Cattle Crossing | SR LHS | Shoulder |
| 766 | 390+560 | Pedestrain crossing | SR LHS | Shoulder |
| 767 | 390+600 | Cattle Crossing | RHS SR | Separator |
| 768 | 390+610 | Pedestrain crossing | SR LHS | Separator |
| 769 | 390+610 | Pedestrian Crossing | RHS SR | Separator |
| 770 | 390+610 | Informatory | RHS | Separator |
| 771 | 390+630 | Cattle Crossing | SR LHS | Separator |
| 772 | 390+710 | Pedestrian Crossing | RHS SR | Shoulder |
| 773 | 390+770 | Speed Limit | LHS | Separator |
| 774 | 390+790 | Hazard Marker | RHS | Separator |
| 775 | 391+010 | School Ahead | SR LHS | Shoulder |
| 776 | 391+030 | Hazard Marker | LHS | Separator |
| 777 | 391+150 | Informatory | SR LHS | Shoulder |
| 778 | 391+170 | Side Road Left | SR LHS | Shoulder |
| 779 | 391+200 | Side Road left | RHS SR | Separator |
| 780 | 391+250 | Hazard Marker | LHS | Median |
| 781 | 391+250 | School Ahead | SR LHS | Shoulder |
| 782 | 391+250 | Informatory | RHS SR | Separator |
| 783 | 391+290 | Informatory | SR LHS | Separator |
| 784 | 391+300 | Overhead Cables | SR LHS | Shoulder |
| 785 | 391+310 | Hazard Marker | RHS | Median |
| 786 | 391+320 | Side Road Right | SR LHS | Separator |
| 787 | 391+420 | School Ahead | SR LHS | Shoulder |
| 788 | 391+450 | Side Road Right | RHS SR | Shoulder |
| 789 | 391+490 | Overhead Cable | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 790 | 391+490 | Overhead Cables | RHS | Separator |
| 791 | 391+510 | Hazard Marker | SR LHS | Separator |
| 792 | 391+510 | Hazard Marker | SR LHS | Shoulder |
| 793 | 391+510 | Hazard Marker | SR LHS | Separator |
| 794 | 391+510 | Hazard Marker | SR LHS | Shoulder |
| 795 | 391+520 | Hazard Marker | RHS SR | Shoulder |
| 796 | 391+520 | Hazard Marker | RHS SR | Separator |
| 797 | 391+520 | Hazard Marker | RHS SR | Shoulder |
| 798 | 391+520 | Hazard Marker | RHS SR | Separator |
| 799 | 391+670 | Cattle Crossing | RHS SR | Shoulder |
| 800 | 391+780 | School Ahead | SR LHS | Separator |
| 801 | 391+810 | Hazard Marker | SR LHS | Shoulder |
| 802 | 391+810 | Hazard Marker | SR LHS | Separator |
| 803 | 391+810 | Hazard Marker | SR LHS | Shoulder |
| 804 | 391+810 | Hazard Marker | SR LHS | Separator |
| 805 | 391+820 | Hazard Marker | RHS SR | Shoulder |
| 806 | 391+820 | Hazard Marker | RHS SR | Separator |
| 807 | 391+820 | Hazard Marker | RHS SR | Shoulder |
| 808 | 391+820 | Hazard Marker | RHS SR | Separator |
| 809 | 391+840 | School Ahead | RHS SR | Separator |
| 810 | 391+870 | Informatory | SR LHS | shoulder |
| 811 | 391+940 | Cattle Crossing | SR LHS | shoulder |
| 812 | 391+960 | Pedestrain crossing | SR LHS | shoulder |
| 813 | 391+970 | Informatory | RHS SR | Separator |
| 814 | 392+000 | Side Road Right | RHS SR | Separator |
| 815 | 392+030 | Cattle Crossing | RHS SR | Separator |
| 816 | 392+040 | Pedestrian Crossing | RHS SR | Separator |
| 817 | 392+060 | Pedestrain crossing | SR LHS | Separator |
| 818 | 392+080 | Cattle Crossing | SR LHS | Separator |
| 819 | 392+100 | Pedestrian Crossing | RHS SR | Shoulder |
| 820 | 392+110 | Informatory | SR LHS | Separator |
| 821 | 392+130 | Cattle Crossing | RHS SR | Shoulder |
| 822 | 392+150 | Side Road Left | RHS SR | Shoulder |
| 823 | 392+190 | Informatory | RHS SR | Shoulder |
| 824 | 392+210 | Hazard Marker | RHS | Separator |
| 825 | 392+270 | School Ahead | RHS SR | Separator |
| 826 | 392+380 | School Ahead | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 827 | 392+530 | Hazard Marker | RHS | Separator |
| 828 | 392+910 | No Parking | RHS | Separator |
| 829 | 392+930 | Hazard Marker | LHS | Median |
| 830 | 392+960 | Hazard Marker | SR LHS | shoulder |
| 831 | 392+960 | Hazard Marker | SR LHS | Separator |
| 832 | 392+960 | Hazard Marker | SR LHS | shoulder |
| 833 | 392+960 | Hazard Marker | SR LHS | Separator |
| 834 | 392+960 | School Ahead | RHS SR | Shoulder |
| 835 | 392+970 | Hazard Marker | RHS SR | Shoulder |
| 836 | 392+970 | Hazard Marker | RHS SR | Separator |
| 837 | 392+970 | Hazard Marker | RHS SR | Shoulder |
| 838 | 392+970 | Hazard Marker | RHS SR | Separator |
| 839 | 392+990 | Hazard Marker | RHS | Separator |
| 840 | 392+990 | Hazard Marker | RHS | Median |
| 841 | 393+070 | Pedestrain crossing | SR LHS | Shoulder |
| 842 | 393+080 | Hazard Marker | LHS | Separator |
| 843 | 393+100 | Cattle Crossing | SR LHS | Shoulder |
| 844 | 393+130 | Cattle Crossing | RHS SR | Separator |
| 845 | 393+130 | Informatory | RHS SR | Shoulder |
| 846 | 393+140 | Pedestrian Crossing | RHS SR | Separator |
| 847 | 393+170 | Pedestrain crossing | SR LHS | Shoulder |
| 848 | 393+190 | Cattle Crossing | SR LHS | Shoulder |
| 849 | 393+200 | Pedestrian Crossing | RHS SR | Shoulder |
| 850 | 393+240 | Cattle Crossing | RHS SR | Shoulder |
| 851 | 393+250 | Cross Road | SR LHS | Separator |
| 852 | 393+280 | Hazard Marker | RHS | Separator |
| 853 | 393+360 | Speed Limit | LHS | Separator |
| 854 | 393+500 | Hazard Marker | LHS | Separator |
| 855 | 393+500 | Hazard Marker | LHS | Median |
| 856 | 393+550 | Hazard Marker | SR LHS | shoulder |
| 857 | 393+550 | Hazard Marker | SR LHS | Separator |
| 858 | 393+550 | Hazard Marker | SR LHS | shoulder |
| 859 | 393+550 | Hazard Marker | SR LHS | Separator |
| 860 | 393+550 | Hazard Marker | RHS SR | Shoulder |
| 861 | 393+550 | Hazard Marker | RHS SR | Separator |
| 862 | 393+550 | Hazard Marker | RHS SR | Shoulder |
| 863 | 393+550 | Hazard Marker | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 864 | 393+570 | Hazard Marker | RHS | Separator |
| 865 | 393+570 | Hazard Marker | RHS | Median |
| 866 | 393+700 | Speed Limit | RHS | Separator |
| 867 | 393+730 | Hazard Marker | LHS | Separator |
| 868 | 393+810 | Side Road Left | SR LHS | shoulder |
| 869 | 393+810 | T Intersection | SR LHS | shoulder |
| 870 | 393+840 | Informatory | SR LHS | shoulder |
| 871 | 393+870 | Informatory | RHS SR | Separator |
| 872 | 393+900 | Side Road Left | RHS SR | Separator |
| 873 | 393+910 | Hazard Marker | LHS | Median |
| 874 | 393+920 | Hazard Marker | RHS SR | Shoulder |
| 875 | 393+960 | Informatory | SR LHS | Separator |
| 876 | 393+990 | Side Road Right | SR LHS | Separator |
| 877 | 394+010 | Informatory | RHS | Median |
| 878 | 394+030 | Informatory | RHS SR | Shoulder |
| 879 | 394+040 | Side Road Right | RHS SR | Shoulder |
| 880 | 394+160 | Speed Limit | LHS | Separator |
| 881 | 394+170 | Informatory | SR LHS | Shoulder |
| 882 | 394+190 | Restriction End | RHS | Separator |
| 883 | 394+200 | Rumble Strip | SR LHS | Shoulder |
| 884 | 394+200 | Hazard Marker | RHS | Separator |
| 885 | 394+220 | Informatory | SR LHS | Shoulder |
| 886 | 394+230 | Merging Ahead | LHS | Separator |
| 887 | 394+250 | Rumble Strip | RHS SR | Separator |
| 888 | 394+260 | No Turn Left | LHS | Separator |
| 889 | 394+270 | Ahead Complusory | RHS SR | Separator |
| 890 | 394+290 | Give Way | RHS SR | Separator |
| 891 | 394+300 | Hazard Marker | LHS | Separator |
| 892 | 394+300 | Keep Right | LHS | Separator |
| 893 | 394+300 | Hazard Marker | SR LHS | Separator |
| 894 | 394+300 | Pass Either | SR LHS | Separator |
| 895 | 394+300 | Rumble Strip | SR LHS | Separator |
| 896 | 394+310 | Hazard Marker | SR LHS | Separator |
| 897 | 394+310 | Pass Either | SR LHS | Separator |
| 898 | 394+340 | Rumble Strip | RHS SR | Separator |
| 899 | 394+340 | Hazard Marker | RHS SR | Separator |
| 900 | 394+340 | Keep Right | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 901 | 394+350 | Hazard Marker | RHS SR | Separator |
| 902 | 394+350 | Pass Either | RHS SR | Separator |
| 903 | 394+390 | Rumble Strip | SR LHS | Separator |
| 904 | 394+390 | Right Turn Probhited | RHS SR | Shoulder |
| 905 | 394+390 | Ahead Complusory | RHS SR | Shoulder |
| 906 | 394+430 | Rumble Strip | RHS SR | Shoulder |
| 907 | 394+440 | Speed Limit | RHS | Separator |
| 908 | 394+470 | Informatory | SR LHS | Separator |
| 909 | 394+490 | Speed Limit | RHS | Separator |
| 910 | 394+500 | Restriction End | LHS | Separator |
| 911 | 394+670 | Informatory | RHS | Separator |
| 912 | 394+750 | Speed Limit | RHS | Separator |
| 913 | 394+770 | No Parking | LHS | Separator |
| 914 | 394+930 | Hazard Marker | LHS | Median |
| 915 | 394+930 | Hazard Marker | LHS | Separator |
| 916 | 394+970 | Hazard Marker | SR LHS | Separator |
| 917 | 394+970 | Hazard Marker | SR LHS | Separator |
| 918 | 394+970 | Hazard Marker | SR LHS | Separator |
| 919 | 394+970 | Hazard Marker | SR LHS | Separator |
| 920 | 394+980 | Hazard Marker | RHS SR | Shoulder |
| 921 | 394+980 | Hazard Marker | RHS SR | Separator |
| 922 | 394+980 | Hazard Marker | RHS SR | Shoulder |
| 923 | 394+980 | Hazard Marker | RHS SR | Separator |
| 924 | 395+000 | Hazard Marker | RHS | Separator |
| 925 | 395+000 | Hazard Marker | RHS | Median |
| 926 | 395+280 | Overhead Cables | SR LHS | Shoulder |
| 927 | 395+330 | Hazard Marker | SR LHS | Shoulder |
| 928 | 395+330 | Hazard Marker | SR LHS | Separator |
| 929 | 395+330 | Hazard Marker | SR LHS | Shoulder |
| 930 | 395+330 | Hazard Marker | SR LHS | Separator |
| 931 | 395+350 | Hazard Marker | RHS SR | Shoulder |
| 932 | 395+350 | Hazard Marker | RHS SR | Separator |
| 933 | 395+350 | Hazard Marker | RHS SR | Shoulder |
| 934 | 395+350 | Hazard Marker | RHS SR | Separator |
| 935 | 395+360 | Hazard Marker | RHS | Separator |
| 936 | 395+430 | Overhead Cable | RHS SR | Shoulder |
| 937 | 395+440 | Hazard Marker | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 938 | 395+460 | Overhead Cables | RHS | Separator |
| 939 | 395+480 | Cattle Crossing | SR LHS | Separator |
| 940 | 395+500 | Pedestrain crossing | SR LHS | Separator |
| 941 | 395+510 | Cattle Crossing | RHS SR | Separator |
| 942 | 395+530 | Pedestrian Crossing | RHS SR | Separator |
| 943 | 395+560 | Pedestrain crossing | SR LHS | Separator |
| 944 | 395+580 | Cattle Crossing | SR LHS | Separator |
| 945 | 395+580 | Emergency Contact | RHS | Separator |
| 946 | 395+600 | Pedestrian Crossing | RHS SR | Shoulder |
| 947 | 395+620 | Hazard Marker | RHS | Separator |
| 948 | 395+630 | Cattle Crossing | RHS SR | Shoulder |
| 949 | 395+660 | Overhead Cable | LHS | Separator |
| 950 | 395+680 | Overhead Cables | SR LHS | Shoulder |
| 951 | 395+860 | Overhead Cables | RHS | Separator |
| 952 | 395+900 | Overhead Cable | RHS SR | Island |
| 953 | 396+030 | Hazard Marker | RHS SR | Island |
| 954 | 396+030 | Pass Either | RHS SR | Island |
| 955 | 396+120 | Speed Limit | RHS | Separator |
| 956 | 396+130 | Truck Lay by | RHS SR | Shoulder |
| 957 | 396+170 | Informatory | SR LHS | Shoulder |
| 958 | 396+190 | Speed Limit | LHS | Separator |
| 959 | 396+200 | Hazard Marker | LHS | Separator |
| 960 | 396+230 | Pedestrain crossing | SR LHS | Shoulder |
| 961 | 396+230 | Informatory | RHS SR | Separator |
| 962 | 396+260 | Side Road Right | RHS SR | Separator |
| 963 | 396+270 | Route Marker | RHS | Separator |
| 964 | 396+280 | Cattle Crossing | SR LHS | Shoulder |
| 965 | 396+280 | Cattle Crossing | RHS SR | Separator |
| 966 | 396+310 | Pedestrian Crossing | RHS SR | Separator |
| 967 | 396+320 | Speed Limit | LHS | Separator |
| 968 | 396+320 | Informatory | LHS | Separator |
| 969 | 396+350 | Cattle Crossing | SR LHS | Separator |
| 970 | 396+360 | Pedestrian Crossing | RHS SR | Shoulder |
| 971 | 396+370 | Pedestrain crossing | SR LHS | Separator |
| 972 | 396+380 | Informatory | RHS SR | Shoulder |
| 973 | 396+390 | Informatory | SR LHS | Separator |
| 974 | 396+410 | Cattle Crossing | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 975 | 396+410 | Hazard Marker | RHS | Separator |
| 976 | 396+480 | Restriction End | RHS | Separator |
| 977 | 396+490 | Hazard Marker | LHS | Separator |
| 978 | 396+490 | Hazard Marker | LHS | Separator |
| 979 | 396+510 | Speed Limit | LHS | Separator |
| 980 | 396+510 | Hazard Marker | SR LHS | Shoulder |
| 981 | 396+510 | Hazard Marker | SR LHS | Separator |
| 982 | 396+510 | Hazard Marker | SR LHS | Shoulder |
| 983 | 396+510 | Hazard Marker | SR LHS | Separator |
| 984 | 396+520 | Restriction End | RHS SR | Shoulder |
| 985 | 396+530 | Hazard Marker | RHS SR | Shoulder |
| 986 | 396+530 | Hazard Marker | RHS SR | Separator |
| 987 | 396+530 | Hazard Marker | RHS SR | Shoulder |
| 988 | 396+530 | Hazard Marker | RHS SR | Separator |
| 989 | 396+550 | Hazard Marker | RHS | Separator |
| 990 | 396+550 | Hazard Marker | RHS | Median |
| 991 | 396+560 | Informatory | LHS | Separator |
| 992 | 396+570 | Ahead Compulsory | SR LHS | Shoulder |
| 993 | 396+580 | Restriction End | RHS SR | Shoulder |
| 994 | 396+600 | No Turn Right | SR LHS | Shoulder |
| 995 | 396+620 | Rumble Strip | RHS SR | Separator |
| 996 | 396+650 | Hazard Marker | SR LHS | Separator |
| 997 | 396+650 | Pass Either | SR LHS | Separator |
| 998 | 396+650 | Rumble Strip | SR LHS | Separator |
| 999 | 396+660 | Hazard Marker | SR LHS | Separator |
| 1000 | 396+660 | Keep Right | SR LHS | Separator |
| 1001 | 396+660 | No Entry | SR LHS | Separator |
| 1002 | 396+670 | Informatory | RHS SR | Separator |
| 1003 | 396+680 | Hazard Marker | LHS | Median |
| 1004 | 396+690 | Give way | SR LHS | Separator |
| 1005 | 396+690 | Hazard Marker | RHS SR | Separator |
| 1006 | 396+690 | Pass Either | RHS SR | Separator |
| 1007 | 396+700 | Hazard Marker | RHS SR | Separator |
| 1008 | 396+700 | Pass Either | RHS SR | Separator |
| 1009 | 396+700 | Rumble Strip | RHS SR | Separator |
| 1010 | 396+710 | hazard Marker | LHS | Separator |
| 1011 | 396+710 | Restriction End | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1012 | 396+740 | Left Turn Prohibhited | RHS | Separator |
| 1013 | 396+760 | Informatory | RHS SR | Shoulder |
| 1014 | 396+770 | Rumble Strip | SR LHS | Separator |
| 1015 | 396+770 | Merging Ahead | RHS | Separator |
| 1016 | 396+790 | Rumble Strip | RHS SR | Shoulder |
| 1017 | 396+870 | Informatory | SR LHS | Separator |
| 1018 | 396+890 | Informatory | RHS SR | Shoulder |
| 1019 | 396+900 | Chevron | LHS | Separator |
| 1020 | 396+950 | Chevron | LHS | Separator |
| 1021 | 397+000 | side road left | SR LHS | shoulder |
| 1022 | 397+000 | Chevron | RHS | Median |
| 1023 | 397+030 | Informatory | RHS SR | Separator |
| 1024 | 397+050 | Hazard Marker | SR LHS | Junction Island |
| 1025 | 397+050 | Pass Either | SR LHS | Junction Island |
| 1026 | 397+050 | Chevron | RHS | Median |
| 1027 | 397+080 | Pass Either | SR LHS | Junction Island |
| 1028 | 397+080 | U-Turn | RHS SR | Separator |
| 1029 | 397+130 | Side Road Right | SR LHS | Separator |
| 1030 | 397+160 | Chevron | RHS | Median |
| 1031 | 397+200 | Informatory | SR LHS | Separator |
| 1032 | 397+200 | Side Road Left | RHS SR | Shoulder |
| 1033 | 397+220 | Chevron | RHS | Median |
| 1034 | 397+230 | Informatory | RHS SR | Shoulder |
| 1035 | 397+260 | Chevron | RHS | Median |
| 1036 | 397+270 | U-Turn | RHS SR | Shoulder |
| 1037 | 397+440 | Hazard Marker | RHS | Separator |
| 1038 | 397+480 | Hazard Marker | RHS | Median |
| 1039 | 397+540 | Restriction End | RHS | Separator |
| 1040 | 397+590 | Informatory | SR LHS | Shoulder |
| 1041 | 397+680 | No Turn Left | LHS | Separator |
| 1042 | 397+680 | Rumble Strip | SR LHS | Shoulder |
| 1043 | 397+680 | Ahead Complusory | RHS SR | Separator |
| 1044 | 397+700 | Give Way | RHS SR | Separator |
| 1045 | 397+720 | No Entry | RHS SR | Separator |
| 1046 | 397+730 | Rumble Strip | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1047 | 397+730 | Hazard Marker | RHS SR | Separator |
| 1048 | 397+730 | Keep Right | RHS SR | Separator |
| 1049 | 397+740 | Rumble Strip | RHS SR | Separator |
| 1050 | 397+760 | Ahead Complusory | RHS SR | Separator |
| 1051 | 397+830 | Rumble Strip | RHS SR | Shoulder |
| 1052 | 397+870 | Informatory | RHS | Separator |
| 1053 | 397+890 | Restriction End | LHS | Separator |
| 1054 | 397+920 | Speed Limit | RHS | Separator |
| 1055 | 397+940 | Route Marker | LHS | Separator |
| 1056 | 398+050 | Informatory | RHS | Separator |
| 1057 | 398+150 | Speed Limit | LHS | Separator |
| 1058 | 398+180 | Speed Limit | RHS | Separator |
| 1059 | 398+260 | Hazard Marker | LHS | Separator |
| 1060 | 398+270 | Informatory | SR LHS | Shoulder |
| 1061 | 398+310 | Side Road Left | SR LHS | Shoulder |
| 1062 | 398+330 | Cattle Crossing | SR LHS | Shoulder |
| 1063 | 398+330 | Cattle Crossing | RHS SR | Separator |
| 1064 | 398+350 | Pedestrian Crossing | RHS SR | Separator |
| 1065 | 398+360 | Pedestrain crossing | SR LHS | Shoulder |
| 1066 | 398+420 | Pedestrain crossing | SR LHS | Separator |
| 1067 | 398+430 | Cattle Crossing | SR LHS | Separator |
| 1068 | 398+450 | Side Road Right | SR LHS | Separator |
| 1069 | 398+450 | Cattle Crossing | RHS SR | Shoulder |
| 1070 | 398+480 | Informatory | SR LHS | Separator |
| 1071 | 398+620 | Speed Limit | LHS | Separator |
| 1072 | 398+970 | informatory | LHS | Median |
| 1073 | 399+020 | Informatory | RHS | Median |
| 1074 | 399+050 | Informatory | RHS SR | Separator |
| 1075 | 399+110 | Informatory | SR LHS | Shoulder |
| 1076 | 399+110 | Cross Road | RHS SR | Separator |
| 1077 | 399+120 | Cross Road | SR LHS | Shoulder |
| 1078 | 399+160 | Height Limit | SR LHS | Shoulder |
| 1079 | 399+160 | Turn Right | SR LHS | Shoulder |
| 1080 | 399+160 | Turn Left | RHS SR | Separator |
| 1081 | 399+160 | Height Limit | RHS SR | Separator |
| 1082 | 399+220 | Turn Right | RHS SR | Shoulder |
| 1083 | 399+220 | Height Limit | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1084 | 399+230 | Height Limit | SR LHS | Separator |
| 1085 | 399+230 | Turn Left | SR LHS | Separator |
| 1086 | 399+240 | Accident Prone Area | RHS | Separator |
| 1087 | 399+250 | Cross Road | RHS SR | Shoulder |
| 1088 | 399+290 | Informatory | SR LHS | Separator |
| 1089 | 399+290 | Informatory | RHS SR | Shoulder |
| 1090 | 399+390 | Speed Limit | RHS | Separator |
| 1091 | 399+630 | Informatory | RHS SR | Separator |
| 1092 | 399+650 | Cross Road | SR LHS | Shoulder |
| 1093 | 399+650 | Cross Road | RHS SR | Separator |
| 1094 | 399+690 | Height Limit | RHS SR | Separator |
| 1095 | 399+690 | Turn Left | RHS SR | Separator |
| 1096 | 399+700 | Height Limit | SR LHS | Shoulder |
| 1097 | 399+700 | Turn Right | SR LHS | Shoulder |
| 1098 | 399+750 | Turn Left | SR LHS | Separator |
| 1099 | 399+750 | Height Limit | SR LHS | Separator |
| 1100 | 399+770 | Cross Road | SR LHS | Separator |
| 1101 | 399+770 | Informatory | RHS SR | Shoulder |
| 1102 | 399+770 | Emergency Contact | RHS | Separator |
| 1103 | 399+780 | Speed Limit | LHS | Separator |
| 1104 | 399+800 | Cross Road | RHS SR | Shoulder |
| 1105 | 399+800 | Route Marker | RHS | Separator |
| 1106 | 399+810 | Informatory | SR LHS | Separator |
| 1107 | 399+870 | Informatory | LHS | Separator |
| 1108 | 399+930 | Route Marker | RHS | Separator |
| 1109 | 399+930 | Hazard Marker | RHS | Separator |
| 1110 | 400+010 | Speed Limit | LHS | Separator |
| 1111 | 400+010 | Restriction End | RHS | Separator |
| 1112 | 400+050 | Informatory | LHS | Separator |
| 1113 | 400+080 | Informatory | RHS SR | Separator |
| 1114 | 400+090 | Speed Limit | LHS | Separator |
| 1115 | 400+130 | Rumble Strip | SR LHS | shoulder |
| 1116 | 400+140 | Rumble Strip | RHS SR | Separator |
| 1117 | 400+160 | No Turn Right | SR LHS | shoulder |
| 1118 | 400+170 | Give Way | RHS SR | Separator |
| 1119 | 400+180 | Complusory Ahead | SR LHS | shoulder |
| 1120 | 400+190 | Rumble Strip | SR LHS | shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1121 | 400+190 | Hazard Marker | RHS SR | Separator |
| 1122 | 400+190 | Pass Either | RHS SR | Separator |
| 1123 | 400+200 | Hazard Marker | RHS SR | Separator |
| 1124 | 400+200 | Pass Either | RHS SR | Separator |
| 1125 | 400+200 | Rumble Strip | RHS SR | Separator |
| 1126 | 400+210 | Keep Right | RHS | Separator |
| 1127 | 400+210 | Hazard Marker | RHS | Separator |
| 1128 | 400+230 | Hazard Marker | SR LHS | Separator |
| 1129 | 400+230 | Pass Either | SR LHS | Separator |
| 1130 | 400+230 | Merging Ahead | RHS | Separator |
| 1131 | 400+240 | No Entry | SR LHS | Separator |
| 1132 | 400+240 | Hazard Marker | SR LHS | Separator |
| 1133 | 400+240 | Keep Right | SR LHS | Separator |
| 1134 | 400+240 | Informatory | RHS SR | Separator |
| 1135 | 400+280 | Rumble Strip | RHS SR | Shoulder |
| 1136 | 400+290 | Restriction End | LHS | Separator |
| 1137 | 400+290 | Hazard Marker | LHS | Separator |
| 1138 | 400+310 | Give way | SR LHS | Separator |
| 1139 | 400+350 | Rumble Strip | SR LHS | Separator |
| 1140 | 400+520 | Informatory | SR LHS | Shoulder |
| 1141 | 400+550 | Cross Road | SR LHS | Shoulder |
| 1142 | 400+570 | Informatory | RHS SR | Separator |
| 1143 | 400+590 | Informatory | RHS SR | Separator |
| 1144 | 400+620 | Hazard Marker | SR LHS | Shoulder |
| 1145 | 400+620 | Hazard Marker | SR LHS | Separator |
| 1146 | 400+620 | Hazard Marker | SR LHS | Shoulder |
| 1147 | 400+620 | Hazard Marker | SR LHS | Separator |
| 1148 | 400+620 | Left Hand Curve | RHS SR | Separator |
| 1149 | 400+670 | Speed Limit | RHS SR | Separator |
| 1150 | 400+690 | No Overtaking | RHS SR | Separator |
| 1151 | 400+710 | U-Turn | SR LHS | Separator |
| 1152 | 400+720 | Informatory | RHS SR | Separator |
| 1153 | 400+730 | Cross Road | SR LHS | Separator |
| 1154 | 400+750 | Informatory | SR LHS | Separator |
| 1155 | 400+780 | Cross Road | RHS SR | Shoulder |
| 1156 | 400+820 | No Overtaking | RHS SR | Shoulder |
| 1157 | 400+830 | Speed Limit | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1158 | 400+850 | Left Hand Curve | RHS SR | Shoulder |
| 1159 | 400+920 | Pedestrian Crossing | RHS SR | Shoulder |
| 1160 | 401+000 | Informatory | SR LHS | Separator |
| 1161 | 401+010 | Informatory | SR LHS | shoulder |
| 1162 | 401+030 | Merging Ahead | LHS | Separator |
| 1163 | 401+060 | Rumble Strip | SR LHS | shoulder |
| 1164 | 401+060 | One Way | SR LHS | shoulder |
| 1165 | 401+080 | No Entry | SR LHS | shoulder |
| 1166 | 401+090 | Rumble Strip | RHS SR | Separator |
| 1167 | 401+110 | Hazard Marker | RHS | Median |
| 1168 | 401+120 | Informatory | SR LHS | shoulder |
| 1169 | 401+130 | Ahead Complusory | RHS SR | Separator |
| 1170 | 401+140 | Left Turn Prohibhited | LHS | Separator |
| 1171 | 401+150 | Informatory | SR LHS | shoulder |
| 1172 | 401+160 | Hazard Marker | SR LHS | Separator |
| 1173 | 401+160 | Pass Either | SR LHS | Separator |
| 1174 | 401+160 | Give Way | RHS SR | Separator |
| 1175 | 401+180 | Hazard Marker | LHS | Separator |
| 1176 | 401+180 | No Entry | RHS SR | Separator |
| 1177 | 401+190 | Hazard Marker | RHS SR | Separator |
| 1178 | 401+190 | Keep Right | RHS SR | Separator |
| 1179 | 401+200 | Hazard Marker | RHS SR | Separator |
| 1180 | 401+200 | Pass Either | RHS SR | Separator |
| 1181 | 401+200 | Rumble Strip | RHS SR | Separator |
| 1182 | 401+280 | Right Turn Probhited | RHS SR | Shoulder |
| 1183 | 401+310 | Rumble Strip | RHS SR | Shoulder |
| 1184 | 401+320 | Speed Limit | RHS | Separator |
| 1185 | 401+340 | Chevron | LHS | Median |
| 1186 | 401+350 | Informatory | RHS | Separator |
| 1187 | 401+380 | Restriction End | LHS | Separator |
| 1188 | 401+390 | Chevron | LHS | Median |
| 1189 | 401+390 | Chevron | RHS | Separator |
| 1190 | 401+430 | Chevron | LHS | Median |
| 1191 | 401+430 | Speed Limit | RHS | Separator |
| 1192 | 401+450 | Chevron | RHS | Separator |
| 1193 | 401+470 | Informatory | RHS | Separator |
| 1194 | 401+480 | Hazard Marker | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1195 | 401+560 | Side Road Left | SR LHS | Shoulder |
| 1196 | 401+600 | Speed Limit | RHS | Separator |
| 1197 | 401+610 | Informatory | SR LHS | Shoulder |
| 1198 | 401+620 | Cattle Crossing | RHS SR | Separator |
| 1199 | 401+640 | Pedestrain crossing | SR LHS | Shoulder |
| 1200 | 401+640 | Pedestrian Crossing | RHS SR | Separator |
| 1201 | 401+690 | Pedestrain crossing | SR LHS | Separator |
| 1202 | 401+690 | Pedestrian Crossing | RHS SR | Shoulder |
| 1203 | 401+700 | Hazard Marker | RHS | Separator |
| 1204 | 401+710 | Cattle Crossing | SR LHS | Separator |
| 1205 | 401+720 | Informatory | SR LHS | Separator |
| 1206 | 401+720 | Cattle Crossing | RHS SR | Shoulder |
| 1207 | 401+790 | Overhead Cable | LHS | Separator |
| 1208 | 401+800 | Overhead Cables | SR LHS | Shoulder |
| 1209 | 401+860 | Hazard Marker | RHS | Separator |
| 1210 | 401+900 | Speed Limit | LHS | Separator |
| 1211 | 401+950 | Overhead Cable | RHS SR | Shoulder |
| 1212 | 401+990 | Overhead Cables | RHS | Separator |
| 1213 | 402+271 | Overhead Cable | LHS | Separator |
| 1214 | 402+750 | Overhead Cables | SR LHS | Shoulder |
| 1215 | 402+810 | Overhead Cable | RHS SR | Shoulder |
| 1216 | 402+860 | Hazard Marker | LHS | Separator |
| 1217 | 402+880 | Overhead Cables | RHS | Separator |
| 1218 | 402+990 | Informatory | RHS SR | Separator |
| 1219 | 403+000 | Informatory | SR LHS | Shoulder |
| 1220 | 403+020 | Cross Road | SR LHS | Shoulder |
| 1221 | 403+020 | Cross Road | RHS SR | Separator |
| 1222 | 403+050 | Turn Right | SR LHS | Shoulder |
| 1223 | 403+050 | Height Limit | SR LHS | Shoulder |
| 1224 | 403+050 | Turn Right | RHS SR | Separator |
| 1225 | 403+050 | Height Limit | RHS SR | Separator |
| 1226 | 403+100 | Turn Right | SR LHS | Separator |
| 1227 | 403+100 | Height Limit | SR LHS | Separator |
| 1228 | 403+110 | Hazard Marker | SR LHS | Shoulder |
| 1229 | 403+110 | Hazard Marker | SR LHS | Separator |
| 1230 | 403+110 | Hazard Marker | SR LHS | Shoulder |
| 1231 | 403+110 | Hazard Marker | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1232 | 403+120 | Turn Right | RHS SR | Shoulder |
| 1233 | 403+120 | Height Limit | RHS SR | Shoulder |
| 1234 | 403+130 | Informatory | SR LHS | Separator |
| 1235 | 403+140 | Cross Road | RHS SR | Shoulder |
| 1236 | 403+150 | side road left | SR LHS | Separator |
| 1237 | 403+180 | Informatory | RHS SR | Shoulder |
| 1238 | 403+420 | Speed Limit | RHS | Separator |
| 1239 | 403+440 | Chevron | LHS | Median |
| 1240 | 403+460 | Speed Limit | LHS | Separator |
| 1241 | 403+520 | Chevron | LHS | Median |
| 1242 | 403+540 | Chevron | RHS | Separator |
| 1243 | 403+610 | Chevron | RHS | Separator |
| 1244 | 403+690 | Chevron | RHS | Separator |
| 1245 | 403+780 | Speed Limit | LHS | Separator |
| 1246 | 403+810 | Route Marker | RHS | Separator |
| 1247 | 403+880 | Informatory | LHS | Separator |
| 1248 | 403+910 | Route Marker | RHS | Separator |
| 1249 | 403+930 | Hazard Marker | LHS | Separator |
| 1250 | 403+940 | Hazard Marker | SR LHS | Shoulder |
| 1251 | 403+940 | Hazard Marker | SR LHS | Separator |
| 1252 | 403+940 | Hazard Marker | SR LHS | Shoulder |
| 1253 | 403+940 | Hazard Marker | SR LHS | Separator |
| 1254 | 403+950 | Hazard Marker | RHS SR | Shoulder |
| 1255 | 403+950 | Hazard Marker | RHS SR | Shoulder |
| 1256 | 403+980 | Informatory | LHS | Median |
| 1257 | 403+980 | Hazard Marker | RHS | Separator |
| 1258 | 403+990 | Hazard Marker | RHS | Separator |
| 1259 | 404+000 | Informatory | RHS | Median |
| 1260 | 404+020 | Speed Limit | LHS | Separator |
| 1261 | 404+020 | Restriction End | RHS | Separator |
| 1262 | 404+040 | Informatory | LHS | Separator |
| 1263 | 404+040 | Rumble Strip | SR LHS | Shoulder |
| 1264 | 404+080 | Speed Limit | LHS | Separator |
| 1265 | 404+100 | Complusory Ahead | SR LHS | Shoulder |
| 1266 | 404+130 | Hazard Marker | SR LHS | Separator |
| 1267 | 404+130 | Pass Either | SR LHS | Separator |
| 1268 | 404+130 | Rumble Strip | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1269 | 404+140 | Hazard Marker | SR LHS | Separator |
| 1270 | 404+140 | Keep Right | SR LHS | Separator |
| 1271 | 404+160 | No Entry | SR LHS | Separator |
| 1272 | 404+170 | Give way | SR LHS | Separator |
| 1273 | 404+180 | Hazard Marker | RHS SR | Separator |
| 1274 | 404+180 | Pass Either | RHS SR | Separator |
| 1275 | 404+190 | Hazard Marker | RHS SR | Separator |
| 1276 | 404+190 | Pass Either | RHS SR | Separator |
| 1277 | 404+190 | Rumble Strip | RHS SR | Separator |
| 1278 | 404+210 | Complusory Ahead | SR LHS | Separator |
| 1279 | 404+210 | Hazard Marker | RHS | Separator |
| 1280 | 404+210 | Keep Right | RHS | Separator |
| 1281 | 404+220 | Rumble Strip | RHS SR | Shoulder |
| 1282 | 404+230 | Hazard Marker | LHS | Separator |
| 1283 | 404+230 | Restriction End | LHS | Median |
| 1284 | 404+250 | Rumble Strip | SR LHS | Separator |
| 1285 | 404+270 | Hazard Marker | LHS | Median |
| 1286 | 404+270 | Left Turn Prohibhited | RHS | Separator |
| 1287 | 404+280 | Informatory | RHS SR | Shoulder |
| 1288 | 404+290 | Merging Ahead | RHS | Separator |
| 1289 | 404+350 | Informatory | RHS SR | Shoulder |
| 1290 | 404+390 | Speed Limit | RHS | Separator |
| 1291 | 404+460 | Chevron | LHS | Median |
| 1292 | 404+470 | Cattle Crossing | SR LHS | shoulder |
| 1293 | 404+490 | Chevron | LHS | Median |
| 1294 | 404+490 | Pedestrain crossing | SR LHS | shoulder |
| 1295 | 404+490 | Cattle Crossing | RHS SR | Separator |
| 1296 | 404+490 | Chevron | RHS | Separator |
| 1297 | 404+520 | Pedestrian Crossing | RHS SR | Separator |
| 1298 | 404+530 | Cross Road | SR LHS | shoulder |
| 1299 | 404+560 | Informatory | SR LHS | shoulder |
| 1300 | 404+560 | Cattle Crossing | SR LHS | Separator |
| 1301 | 404+570 | Chevron | RHS | Separator |
| 1302 | 404+580 | Pedestrain crossing | SR LHS | Separator |
| 1303 | 404+590 | Hazard Marker | SR LHS | shoulder |
| 1304 | 404+590 | Hazard Marker | SR LHS | Separator |
| 1305 | 404+590 | Hazard Marker | SR LHS | shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1306 | 404+590 | Cross Road | RHS SR | Separator |
| 1307 | 404+600 | Pedestrian Crossing | RHS SR | Shoulder |
| 1308 | 404+620 | Cattle Crossing | RHS SR | Shoulder |
| 1309 | 404+630 | U-Turn | RHS SR | Separator |
| 1310 | 404+640 | Hazard Marker | RHS SR | Separator |
| 1311 | 404+640 | Hazard Marker | RHS SR | Shoulder |
| 1312 | 404+640 | Hazard Marker | RHS SR | Separator |
| 1313 | 404+730 | Overhead Cables | RHS | Median |
| 1314 | 404+750 | Cross Road | SR LHS | Separator |
| 1315 | 404+810 | Informatory | RHS SR | Shoulder |
| 1316 | 404+880 | U-Turn | RHS SR | Shoulder |
| 1317 | 404+900 | Overhead Cable | RHS SR | Shoulder |
| 1318 | 405+110 | Hazard Marker | RHS | Median |
| 1319 | 405+110 | Emergency Contact | RHS | Separator |
| 1320 | 405+210 | Hazard Marker | LHS | Separator |
| 1321 | 405+260 | Cattle Crossing | SR LHS | shoulder |
| 1322 | 405+290 | Pedestrain crossing | SR LHS | shoulder |
| 1323 | 405+310 | Cattle Crossing | RHS SR | Separator |
| 1324 | 405+330 | Pedestrian Crossing | RHS SR | Separator |
| 1325 | 405+350 | Pedestrain crossing | SR LHS | Separator |
| 1326 | 405+380 | Pedestrian Crossing | RHS SR | Shoulder |
| 1327 | 405+390 | Cattle Crossing | SR LHS | Separator |
| 1328 | 405+420 | Cattle Crossing | RHS SR | Shoulder |
| 1329 | 405+450 | Emergency Contact | LHS | Separator |
| 1330 | 405+490 | Hazard Marker | RHS | Separator |
| 1331 | 405+510 | Speed Limit | RHS | Separator |
| 1332 | 405+620 | Merging Ahead | LHS | Separator |
| 1333 | 405+640 | Route Marker | RHS | Separator |
| 1334 | 405+670 | Speed Limit | RHS SR | Shoulder |
| 1335 | 405+710 | No Entry | RHS SR | Separator |
| 1336 | 405+730 | Hazard Marker | RHS | Separator |
| 1337 | 405+730 | Pass Either | RHS | Separator |
| 1338 | 405+760 | Informatory | RHS | Shoulder |
| 1339 | 405+820 | No Parking | LHS | Shoulder |
| 1340 | 405+860 | Narrow Road Ahead | LHS | Shoulder |
| 1341 | 405+860 | Informatory | RHS | Shoulder |
| 1342 | 406+010 | Chevron | LHS | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1343 | 406+020 | Speed Limit | LHS | Shoulder |
| 1344 | 406+050 | Informatory | RHS | Shoulder |
| 1345 | 406+090 | No Overtaking | LHS | Shoulder |
| 1346 | 406+130 | Chevron | RHS | Shoulder |
| 1347 | 406+140 | Narrow Bridge Ahead | LHS | Shoulder |
| 1348 | 406+180 | Chevron | LHS | Median |
| 1349 | 406+220 | Chevron | RHS | Shoulder |
| 1350 | 406+250 | Chevron | LHS | Median |
| 1351 | 406+260 | Hazard Marker | LHS | Median |
| 1352 | 406+290 | Chevron | RHS | Shoulder |
| 1353 | 406+310 | Hazard Marker | RHS | Median |
| 1354 | 406+360 | Road Widen | LHS | Shoulder |
| 1355 | 406+430 | Chevron | LHS | Median |
| 1356 | 406+450 | Chevron | RHS | Shoulder |
| 1357 | 406+500 | Chevron | LHS | Median |
| 1358 | 406+500 | Chevron | RHS | Shoulder |
| 1359 | 406+540 | Chevron | RHS | Shoulder |
| 1360 | 406+580 | Chevron | RHS | Shoulder |
| 1361 | 406+610 | Chevron | RHS | Shoulder |
| 1362 | 406+620 | Chevron | LHS | Median |
| 1363 | 406+650 | Chevron | RHS | Shoulder |
| 1364 | 406+670 | Chevron | RHS | Shoulder |
| 1365 | 406+680 | Chevron | LHS | Median |
| 1366 | 406+680 | Informatory | LHS | Separator |
| 1367 | 406+710 | Informatory | LHS | Median |
| 1368 | 406+720 | Chevron | RHS | Shoulder |
| 1369 | 406+800 | Chevron | RHS | Shoulder |
| 1370 | 406+830 | Informatory | LHS | Shoulder |
| 1371 | 406+860 | Hazard Marker | LHS | Separator |
| 1372 | 406+860 | Emergency Contact | LHS | Separator |
| 1373 | 406+860 | Speed Limit | RHS | Separator |
| 1374 | 406+900 | Informatory | SR LHS | Shoulder |
| 1375 | 406+920 | No Entry | SR LHS | Separator |
| 1376 | 406+950 | Speed Limit | SR LHS | Shoulder |
| 1377 | 406+960 | Speed Limit | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1378 | 407+020 | Route Marker | LHS | Separator |
| 1379 | 407+020 | Informatory | RHS SR | Shoulder |
| 1380 | 407+040 | Rumble Strip | RHS SR | Shoulder |
| 1381 | 407+130 | Hazard Marker | LHS | Separator |
| 1382 | 407+460 | Hazard Marker | LHS | Median |
| 1383 | 407+540 | Hazard Marker | RHS | Median |
| 1384 | 407+570 | Informatory | SR LHS | Shoulder |
| 1385 | 407+850 | Hazard Marker | RHS | Separator |
| 1386 | 408+600 | Height Limit | LHS | Separator |
| 1387 | 408+600 | Side Road Left | SR LHS | Shoulder |
| 1388 | 408+640 | Informatory | SR LHS | Shoulder |
| 1389 | 408+650 | Route Marker | RHS | Separator |
| 1390 | 408+690 | Side Road Right | RHS SR | Separator |
| 1391 | 408+720 | Hazard Marker | LHS | Separator |
| 1392 | 408+730 | Informatory | RHS SR | Separator |
| 1393 | 408+780 | Hazard Marker | RHS | Separator |
| 1394 | 408+810 | Informatory | SR LHS | Separator |
| 1395 | 408+860 | Informatory | RHS SR | Shoulder |
| 1396 | 408+860 | Height Limit | RHS | Separator |
| 1397 | 408+880 | Speed Breaker | RHS SR | Shoulder |
| 1398 | 408+920 | Side Road Left | RHS SR | Shoulder |
| 1399 | 408+970 | Informatory | LHS | Median |
| 1400 | 409+030 | Informatory | RHS | Median |
| 1401 | 409+090 | Hazard Marker | LHS | Separator |
| 1402 | 409+170 | Cattle Crossing | SR LHS | Shoulder |
| 1403 | 409+200 | Pedestrain crossing | SR LHS | Shoulder |
| 1404 | 409+200 | Cattle Crossing | RHS SR | Separator |
| 1405 | 409+220 | Pedestrian Crossing | RHS SR | Separator |
| 1406 | 409+260 | Pedestrain crossing | SR LHS | Separator |
| 1407 | 409+290 | Cattle Crossing | SR LHS | Separator |
| 1408 | 409+310 | Pedestrian Crossing | RHS SR | Shoulder |
| 1409 | 409+340 | Cattle Crossing | RHS SR | Shoulder |
| 1410 | 409+360 | Speed Limit | LHS | Separator |
| 1411 | 409+380 | Hazard Marker | RHS | Separator |
| 1412 | 409+390 | Restriction End | RHS | Separator |
| 1413 | 409+420 | Merging Ahead | LHS | Separator |
| 1414 | 409+420 | Speed Breaker | SR LHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1415 | 409+420 | Speed Limit | RHS | Separator |
| 1416 | 409+480 | No Turn Left | LHS | Separator |
| 1417 | 409+540 | Pass Either | SR LHS | Separator |
| 1418 | 409+540 | Rumble Strip | SR LHS | Separator |
| 1419 | 409+540 | Rumble Strip | RHS SR | Separator |
| 1420 | 409+550 | Hazard Marker | SR LHS | Separator |
| 1421 | 409+550 | Pass Either | SR LHS | Separator |
| 1422 | 409+580 | Left Turn Prohibited | RHS SR | Separator |
| 1423 | 409+590 | Informatory | SR LHS | Separator |
| 1424 | 409+610 | Give Way | RHS SR | Separator |
| 1425 | 409+620 | Rumble Strip | SR LHS | Separator |
| 1426 | 409+630 | Hazard Marker | RHS SR | Separator |
| 1427 | 409+630 | Keep Right | RHS SR | Separator |
| 1428 | 409+630 | No Entry | RHS SR | Separator |
| 1429 | 409+640 | Hazard Marker | RHS SR | Separator |
| 1430 | 409+640 | Pass Either | RHS SR | Separator |
| 1431 | 409+640 | Rumble Strip | RHS SR | Separator |
| 1432 | 409+650 | Pass Either | RHS | Separator |
| 1433 | 409+650 | Hazard Marker | RHS | Separator |
| 1434 | 409+680 | Ahead Complusory | RHS SR | Shoulder |
| 1435 | 409+700 | Rumble Strip | RHS SR | Shoulder |
| 1436 | 409+720 | No Turn Right | RHS | Separator |
| 1437 | 409+730 | Restriction End | LHS | Separator |
| 1438 | 409+730 | Speed Limit | RHS | Separator |
| 1439 | 409+780 | Hazard Marker | LHS | Separator |
| 1440 | 409+780 | Speed Limit | RHS | Separator |
| 1441 | 409+820 | Route Marker | LHS | Separator |
| 1442 | 409+840 | Informatory | RHS | Separator |
| 1443 | 409+910 | Height Limit | SR LHS | shoulder |
| 1444 | 409+910 | Turn Right | SR LHS | shoulder |
| 1445 | 409+920 | Chevron | RHS | Median |
| 1446 | 409+930 | Overhead Cables | RHS | Separator |
| 1447 | 409+950 | Height Limit | RHS SR | Separator |
| 1448 | 409+960 | Speed Limit | RHS | Separator |
| 1449 | 409+980 | Overhead Cable | RHS SR | Shoulder |
| 1450 | 410+020 | No Turn Right | SR LHS | shoulder |
| 1451 | 410+040 | Height Limit | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1452 | 410+040 | Turn Right | SR LHS | Separator |
| 1453 | 410+040 | Chevron | RHS | Median |
| 1454 | 410+080 | Speed Limit | RHS | Separator |
| 1455 | 410+140 | Side Road Right | RHS SR | Separator |
| 1456 | 410+150 | Chevron | RHS | Median |
| 1457 | 410+160 | Informatory | SR LHS | shoulder |
| 1458 | 410+160 | Turn Right | RHS SR | Shoulder |
| 1459 | 410+160 | Height Limit | RHS SR | Shoulder |
| 1460 | 410+170 | Informatory | RHS SR | Separator |
| 1461 | 410+180 | Hazard Marker | RHS | Separator |
| 1462 | 410+210 | Speed Limit | LHS | Separator |
| 1463 | 410+240 | Chevron | RHS | Median |
| 1464 | 410+280 | Informatory | LHS | Separator |
| 1465 | 410+280 | Hazard Marker | LHS | Separator |
| 1466 | 410+290 | Side Road Left | RHS SR | Shoulder |
| 1467 | 410+290 | Chevron | RHS | Median |
| 1468 | 410+300 | Hazard Marker | LHS | Median |
| 1469 | 410+320 | Route Marker | RHS | Separator |
| 1470 | 410+330 | Informatory | RHS SR | Shoulder |
| 1471 | 410+330 | Chevron | RHS | Median |
| 1472 | 410+360 | Speed Limit | LHS | Separator |
| 1473 | 410+360 | Hazard Marker | SR LHS | shoulder |
| 1474 | 410+360 | Hazard Marker | SR LHS | Separator |
| 1475 | 410+360 | Hazard Marker | SR LHS | shoulder |
| 1476 | 410+360 | Hazard Marker | SR LHS | Separator |
| 1477 | 410+360 | Informatory | SR LHS | Shoulder |
| 1478 | 410+370 | Hazard Marker | RHS SR | Shoulder |
| 1479 | 410+370 | Hazard Marker | RHS SR | Separator |
| 1480 | 410+370 | Hazard Marker | RHS | Median |
| 1481 | 410+370 | Hazard Marker | RHS | Separator |
| 1482 | 410+410 | Chevron | RHS | Median |
| 1483 | 410+440 | Speed Limit | LHS | Separator |
| 1484 | 410+470 | Complusory Ahead | SR LHS | Shoulder |
| 1485 | 410+540 | Hazard Marker | SR LHS | Separator |
| 1486 | 410+540 | Pass Either | SR LHS | Separator |
| 1487 | 410+550 | Hazard Marker | SR LHS | Separator |
| 1488 | 410+550 | Keep Right | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1489 | 410+560 | No Entry | SR LHS | Separator |
| 1490 | 410+570 | Give way | SR LHS | Separator |
| 1491 | 410+580 | Rumble Strip | RHS SR | Shoulder |
| 1492 | 410+610 | Keep Right | RHS | Separator |
| 1493 | 410+610 | Hazard Marker | RHS | Separator |
| 1494 | 410+630 | Hazard Marker | RHS SR | Separator |
| 1495 | 410+630 | Pass Either | RHS SR | Separator |
| 1496 | 410+640 | Hazard Marker | RHS SR | Separator |
| 1497 | 410+640 | Pass Either | RHS SR | Separator |
| 1498 | 410+640 | Rumble Strip | RHS SR | Separator |
| 1499 | 410+660 | Left Turn Prohibhited | RHS | Separator |
| 1500 | 410+710 | Informatory | RHS SR | Shoulder |
| 1501 | 410+780 | Informatory | RHS SR | Shoulder |
| 1502 | 410+790 | Informatory | RHS SR | Shoulder |
| 1503 | 410+930 | Informatory | RHS SR | Shoulder |
| 1504 | 410+960 | Hazard Marker | LHS | Separator |
| 1505 | 411+040 | Side Road Left | SR LHS | Shoulder |
| 1506 | 411+100 | Cattle Crossing | RHS SR | Separator |
| 1507 | 411+130 | Pedestrian Crossing | RHS SR | Separator |
| 1508 | 411+160 | Informatory | SR LHS | Separator |
| 1509 | 411+170 | Cattle Crossing | SR LHS | Separator |
| 1510 | 411+180 | Pedestrian Crossing | RHS SR | Shoulder |
| 1511 | 411+220 | Pedestrain crossing | SR LHS | Separator |
| 1512 | 411+220 | Cattle Crossing | RHS SR | Shoulder |
| 1513 | 411+260 | Side Road Right | SR LHS | Separator |
| 1514 | 411+260 | Hazard Marker | RHS | Separator |
| 1515 | 411+270 | Accident Prone Area | LHS | Separator |
| 1516 | 411+320 | Hazard Marker | LHS | Separator |
| 1517 | 411+320 | Hazard Marker | LHS | Median |
| 1518 | 411+350 | Rumble Strip | SR LHS | shoulder |
| 1519 | 411+380 | Hazard Marker | SR LHS | shoulder |
| 1520 | 411+380 | Hazard Marker | SR LHS | shoulder |
| 1521 | 411+380 | Hazard Marker | SR LHS | Separator |
| 1522 | 411+390 | Hazard Marker | RHS | Separator |
| 1523 | 411+390 | Hazard Marker | RHS | Median |
| 1524 | 411+410 | Hazard Marker | LHS | Separator |
| 1525 | 411+410 | Pass Either | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1526 | 411+410 | Hazard Marker | RHS SR | Separator |
| 1527 | 411+410 | Hazard Marker | RHS SR | Shoulder |
| 1528 | 411+410 | Hazard Marker | RHS SR | Separator |
| 1529 | 411+410 | Hazard Marker | RHS SR | Shoulder |
| 1530 | 411+470 | Hazard Marker | LHS | Median |
| 1531 | 411+530 | Rumble Strip | SR LHS | Separator |
| 1532 | 411+580 | Rumble Strip | RHS SR | Shoulder |
| 1533 | 411+580 | Accident Prone Area | RHS | Median |
| 1534 | 411+760 | U-Turn | RHS SR | Separator |
| 1535 | 411+770 | Informatory | SR LHS | shoulder |
| 1536 | 411+800 | Speed Breaker | RHS SR | Separator |
| 1537 | 411+820 | Informatory | RHS SR | Separator |
| 1538 | 411+850 | Chevron | LHS | Separator |
| 1539 | 411+860 | Cross Road | SR LHS | Separator |
| 1540 | 411+900 | Chevron | RHS | Median |
| 1541 | 411+930 | Chevron | LHS | Separator |
| 1542 | 411+940 | Informatory | RHS SR | Shoulder |
| 1543 | 411+960 | Side Road Right | RHS SR | Shoulder |
| 1544 | 411+970 | Informatory | SR LHS | Separator |
| 1545 | 411+970 | Side Road Left | RHS SR | Shoulder |
| 1546 | 411+980 | Cross Road | SR LHS | Separator |
| 1547 | 411+980 | Chevron | RHS | Median |
| 1548 | 412+000 | U-Turn | RHS SR | Shoulder |
| 1549 | 412+030 | Chevron | LHS | Separator |
| 1550 | 412+070 | Chevron | RHS | Median |
| 1551 | 412+170 | Chevron | LHS | Separator |
| 1552 | 412+220 | Chevron | LHS | Separator |
| 1553 | 412+240 | Chevron | LHS | Separator |
| 1554 | 412+350 | School Ahead | RHS SR | Shoulder |
| 1555 | 412+390 | Hazard Marker | RHS SR | Shoulder |
| 1556 | 412+670 | Rumble Strip | SR LHS | shoulder |
| 1557 | 412+710 | Chevron | LHS | Median |
| 1558 | 412+770 | Pedestrian Crossing | RHS SR | Shoulder |
| 1559 | 412+800 | Pedestrian Crossing | RHS SR | Shoulder |
| 1560 | 412+810 | School Ahead | SR LHS | shoulder |
| 1561 | 412+860 | Cattle Crossing | RHS SR | Shoulder |
| 1562 | 412+870 | Speed Breaker | RHS SR | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1563 | 413+330 | Hazard Marker | SR LHS | SR island |
| 1564 | 413+330 | Pass Either | SR LHS | SR island |
| 1565 | 413+470 | Pass Either | RHS SR | Island |
| 1566 | 413+470 | Hazard Marker | RHS SR | Island |
| 1567 | 413+520 | Height Limit | RHS SR | Separator |
| 1568 | 413+560 | Cross Road | RHS SR | Separator |
| 1569 | 413+720 | Cattle Crossing | SR LHS | Shoulder |
| 1570 | 413+770 | Cattle Crossing | RHS SR | Shoulder |
| 1571 | 413+790 | Rumble Strip | SR LHS | Shoulder |
| 1572 | 413+810 | Chevron | RHS | Median |
| 1573 | 413+820 | Hazard Marker | SR LHS | Shoulder |
| 1574 | 413+820 | Cattle Crossing | RHS SR | Shoulder |
| 1575 | 413+830 | Chevron | RHS | Median |
| 1576 | 413+850 | Chevron | RHS | Median |
| 1577 | 413+860 | Informatory | SR LHS | Shoulder |
| 1578 | 413+870 | Speed Breaker | RHS SR | Shoulder |
| 1579 | 413+870 | Chevron | RHS | Median |
| 1580 | 413+900 | informatory | LHS | Shoulder |
| 1581 | 413+900 | Speed Limit | LHS | Shoulder |
| 1582 | 413+900 | Chevron | RHS | Median |
| 1583 | 413+960 | informatory | LHS | Shoulder |
| 1584 | 414+010 | informatory | LHS | Shoulder |
| 1585 | 414+030 | Chevron | RHS | Separator |
| 1586 | 414+130 | Hazard Marker | LHS | Separator |
| 1587 | 414+130 | Pass Either | LHS | Separator |
| 1588 | 414+250 | Speed Limit | SR LHS | Shoulder |
| 1589 | 414+380 | Informatory | SR LHS | Shoulder |
| 1590 | 414+530 | Hazard Marker | SR LHS | Shoulder |
| 1591 | 414+560 | Chevron | LHS | Separator |
| 1592 | 414+590 | Speed Breaker | RHS SR | Shoulder |
| 1593 | 414+610 | Hazard Marker | RHS SR | Shoulder |
| 1594 | 414+620 | Informatory | RHS SR | Shoulder |
| 1595 | 414+630 | Chevron | RHS | Median |
| 1596 | 414+710 | Chevron | RHS | Median |
| 1597 | 414+760 | Chevron | RHS | Median |
| 1598 | 414+840 | Chevron | RHS | Median |
| 1599 | 414+880 | Chevron | RHS | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1600 | 415+160 | Informatory | RHS | Median |
| 1601 | 415+190 | Rumble Strip | RHS SR | Separator |
| 1602 | 415+220 | Ahead Complusory | RHS SR | Separator |
| 1603 | 415+240 | Give Way | RHS SR | Separator |
| 1604 | 415+250 | No Entry | RHS SR | Separator |
| 1605 | 415+260 | Hazard Marker | RHS SR | Separator |
| 1606 | 415+260 | Keep Right | RHS SR | Separator |
| 1607 | 415+270 | Hazard Marker | RHS SR | Separator |
| 1608 | 415+270 | Pass Either | RHS SR | Separator |
| 1609 | 415+270 | Rumble Strip | RHS SR | Separator |
| 1610 | 415+300 | Ahead Complusory | RHS SR | Shoulder |
| 1611 | 415+300 | Hazard Marker | RHS | Separator |
| 1612 | 415+300 | Pass Either | RHS | Separator |
| 1613 | 415+320 | Right Turn Probhited | RHS SR | Shoulder |
| 1614 | 415+350 | Rumble Strip | RHS SR | Shoulder |
| 1615 | 415+430 | Speed Limit | RHS | Separator |
| 1616 | 415+450 | Hazard Marker | LHS | Separator |
| 1617 | 415+470 | Informatory | RHS | Separator |
| 1618 | 415+490 | Informatory | RHS | Separator |
| 1619 | 415+510 | Cattle Crossing | SR LHS | Shoulder |
| 1620 | 415+540 | Pedestrain crossing | SR LHS | Shoulder |
| 1621 | 415+560 | Cattle Crossing | RHS SR | Separator |
| 1622 | 415+570 | Speed Limit | RHS | Separator |
| 1623 | 415+580 | Pedestrian Crossing | RHS SR | Separator |
| 1624 | 415+600 | Chevron | RHS | Median |
| 1625 | 415+610 | Pedestrain crossing | SR LHS | Separator |
| 1626 | 415+620 | Cattle Crossing | SR LHS | Separator |
| 1627 | 415+640 | Pedestrian Crossing | RHS SR | Shoulder |
| 1628 | 415+660 | Cattle Crossing | RHS SR | Shoulder |
| 1629 | 415+690 | Chevron | LHS | Median |
| 1630 | 415+720 | Chevron | LHS | Median |
| 1631 | 415+720 | Chevron | RHS | Separator |
| 1632 | 415+750 | Chevron | RHS | Separator |
| 1633 | 415+780 | Chevron | RHS | Separator |
| 1634 | 415+900 | Chevron | RHS | Median |
| 1635 | 415+910 | Speed Limit | SR LHS | Shoulder |
| 1636 | 415+940 | Right Hand Curve | SR LHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1637 | 415+980 | Hazard Marker | SR LHS | Shoulder |
| 1638 | 415+980 | Hazard Marker | SR LHS | Separator |
| 1639 | 415+980 | Hazard Marker | SR LHS | Shoulder |
| 1640 | 415+980 | Hazard Marker | SR LHS | Separator |
| 1641 | 415+980 | No Overtaking | SR LHS | Shoulder |
| 1642 | 415+980 | Chevron | RHS | Median |
| 1643 | 416+000 | Hazard Marker | RHS SR | Shoulder |
| 1644 | 416+000 | Hazard Marker | RHS SR | Separator |
| 1645 | 416+000 | Hazard Marker | RHS SR | Shoulder |
| 1646 | 416+010 | Side Road Right | SR LHS | Separator |
| 1647 | 416+050 | Informatory | SR LHS | Shoulder |
| 1648 | 416+060 | Hazard Marker | LHS | Median |
| 1649 | 416+060 | Side Road Right | RHS SR | Separator |
| 1650 | 416+080 | Chevron | RHS | Median |
| 1651 | 416+110 | Informatory | RHS SR | Separator |
| 1652 | 416+120 | Hazard Marker | RHS | Median |
| 1653 | 416+140 | Informatory | SR LHS | Separator |
| 1654 | 416+180 | No Overtaking | SR LHS | Separator |
| 1655 | 416+190 | Side Road Left | SR LHS | Separator |
| 1656 | 416+200 | Informatory | RHS SR | Shoulder |
| 1657 | 416+210 | speed Limit | SR LHS | Separator |
| 1658 | 416+220 | Left Hand Curve | SR LHS | Separator |
| 1659 | 416+220 | Side Road Left | RHS SR | Shoulder |
| 1660 | 416+230 | Chevron | RHS | Median |
| 1661 | 416+430 | Hazard Marker | RHS | Separator |
| 1662 | 416+470 | Speed Limit | LHS | Separator |
| 1663 | 416+590 | Chevron | LHS | Separator |
| 1664 | 416+740 | Chevron | LHS | Separator |
| 1665 | 416+760 | Hazard Marker | SR LHS | shoulder |
| 1666 | 416+760 | Hazard Marker | SR LHS | Shoulder |
| 1667 | 416+760 | Hazard Marker | SR LHS | Separator |
| 1668 | 416+760 | Hazard Marker | RHS SR | Shoulder |
| 1669 | 416+760 | Hazard Marker | RHS SR | Shoulder |
| 1670 | 416+760 | Hazard Marker | RHS SR | Separator |
| 1671 | 416+790 | Chevron | RHS | Median |
| 1672 | 416+820 | Cattle Crossing | SR LHS | shoulder |
| 1673 | 416+830 | Chevron | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1674 | 416+830 | Pedestrian Crossing | RHS SR | Separator |
| 1675 | 416+850 | Pedestrain crossing | SR LHS | shoulder |
| 1676 | 416+850 | Cattle Crossing | RHS SR | Separator |
| 1677 | 416+890 | Cattle Crossing | SR LHS | Separator |
| 1678 | 416+890 | Speed Limit | RHS | Separator |
| 1679 | 416+900 | Cattle Crossing | RHS SR | Shoulder |
| 1680 | 416+910 | Chevron | LHS | Separator |
| 1681 | 416+910 | Pedestrain crossing | SR LHS | Separator |
| 1682 | 416+920 | Pedestrian Crossing | RHS SR | Shoulder |
| 1683 | 416+930 | Chevron | RHS | Median |
| 1684 | 416+990 | Hazard Marker | RHS | Separator |
| 1685 | 417+160 | Restriction End | RHS | Separator |
| 1686 | 417+210 | Informatory | RHS SR | Separator |
| 1687 | 417+310 | Rumble Strip | RHS SR | Separator |
| 1688 | 417+360 | Hazard Marker | RHS | Separator |
| 1689 | 417+360 | Keep Left | RHS | Separator |
| 1690 | 417+370 | Hazard Marker | RHS SR | Separator |
| 1691 | 417+370 | Pass Either | RHS SR | Separator |
| 1692 | 417+380 | Hazard Marker | RHS SR | Separator |
| 1693 | 417+380 | Pass Either | RHS SR | Separator |
| 1694 | 417+380 | Rumble Strip | RHS SR | Separator |
| 1695 | 417+410 | Left Turn Prohibhited | RHS | Separator |
| 1696 | 417+430 | Chevron | RHS | Separator |
| 1697 | 417+440 | Rumble Strip | RHS SR | Shoulder |
| 1698 | 417+470 | Informatory | RHS SR | Shoulder |
| 1699 | 417+480 | Merging Ahead | RHS | Separator |
| 1700 | 417+510 | Chevron | LHS | Median |
| 1701 | 417+530 | Informatory | RHS SR | Shoulder |
| 1702 | 417+540 | Chevron | RHS | Separator |
| 1703 | 417+580 | Speed Limit | RHS | Separator |
| 1704 | 417+590 | Hazard Marker | LHS | Separator |
| 1705 | 417+600 | Side Road Left | SR LHS | shoulder |
| 1706 | 417+610 | Chevron | RHS | Separator |
| 1707 | 417+620 | Hazard Marker | RHS SR | Shoulder |
| 1708 | 417+620 | Hazard Marker | RHS SR | Separator |
| 1709 | 417+620 | Hazard Marker | RHS SR | Shoulder |
| 1710 | 417+620 | Hazard Marker | RHS SR | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1711 | 417+630 | Hazard Marker | SR LHS | Shoulder |
| 1712 | 417+630 | Hazard Marker | SR LHS | Separator |
| 1713 | 417+630 | Hazard Marker | SR LHS | Shoulder |
| 1714 | 417+630 | Hazard Marker | SR LHS | Separator |
| 1715 | 417+630 | Hazard Marker | RHS | Separator |
| 1716 | 417+720 | Side Road Right | SR LHS | Separator |
| 1717 | 417+790 | Hazard Marker | LHS | Separator |
| 1718 | 417+790 | Chevron | LHS | Separator |
| 1719 | 417+870 | Chevron | LHS | Separator |
| 1720 | 418+100 | Informatory | SR LHS | shoulder |
| 1721 | 418+150 | Informatory | SR LHS | shoulder |
| 1722 | 418+190 | Cross Road | SR LHS | shoulder |
| 1723 | 418+190 | Informatory | RHS SR | Separator |
| 1724 | 418+200 | Hazard Marker | LHS | Median |
| 1725 | 418+210 | Informatory | SR LHS | shoulder |
| 1726 | 418+210 | Cross Road | RHS SR | Separator |
| 1727 | 418+250 | Hazard Marker | RHS | Median |
| 1728 | 418+280 | Chevron | LHS | Separator |
| 1729 | 418+290 | Informatory | SR LHS | Separator |
| 1730 | 418+320 | Cross Road | RHS SR | Shoulder |
| 1731 | 418+330 | Cross Road | SR LHS | Separator |
| 1732 | 418+360 | Informatory | RHS SR | Shoulder |
| 1733 | 418+390 | Chevron | LHS | Separator |
| 1734 | 418+390 | Informatory | RHS SR | Shoulder |
| 1735 | 418+410 | Side Road Left | SR LHS | shoulder |
| 1736 | 418+470 | No Standing | SR LHS | shoulder |
| 1737 | 418+560 | Chevron | LHS | Median |
| 1738 | 418+570 | Speed Breaker | SR LHS | Separator |
| 1739 | 418+580 | Hazard Marker | RHS | Separator |
| 1740 | 418+650 | Chevron | LHS | Median |
| 1741 | 418+730 | Chevron | LHS | Median |
| 1742 | 419+140 | Chevron | RHS | Separator |
| 1743 | 419+190 | Chevron | RHS | Separator |
| 1744 | 419+250 | Chevron | RHS | Separator |
| 1745 | 419+310 | Cross Road | SR LHS | Shoulder |
| 1746 | 419+390 | informatory | SR LHS | Shoulder |
| 1747 | 419+400 | Speed Breaker | SR LHS | Shoulder |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1748 | 419+400 | Speed Breaker | RHS SR | Separator |
| 1749 | 419+420 | Turn Right | SR LHS | Shoulder |
| 1750 | 419+420 | Height Limit | SR LHS | Shoulder |
| 1751 | 419+420 | Cross Road | RHS SR | Separator |
| 1752 | 419+440 | Informatory | RHS SR | Separator |
| 1753 | 419+460 | Height Limit | RHS SR | Separator |
| 1754 | 419+460 | Turn Left | RHS SR | Separator |
| 1755 | 419+500 | Turn Left | SR LHS | Shoulder |
| 1756 | 419+500 | Height Limit | SR LHS | Separator |
| 1757 | 419+530 | Informatory | SR LHS | Separator |
| 1758 | 419+540 | Cross Road | SR LHS | Separator |
| 1759 | 419+540 | Informatory | RHS SR | Shoulder |
| 1760 | 419+550 | Cross Road | RHS SR | Shoulder |
| 1761 | 419+580 | Speed Breaker | RHS SR | Shoulder |
| 1762 | 419+600 | Speed Limit | RHS | Separator |
| 1763 | 419+610 | Chevron | LHS | Separator |
| 1764 | 419+630 | Chevron | RHS | Median |
| 1765 | 419+700 | Hazard Marker | RHS | Separator |
| 1766 | 419+710 | Emergency Contact | RHS | Separator |
| 1767 | 419+800 | Route Marker | RHS | Separator |
| 1768 | 419+840 | Give way | SR LHS | Shoulder |
| 1769 | 419+850 | Side Road Left | SR LHS | Shoulder |
| 1770 | 419+890 | Chevron | LHS | Median |
| 1771 | 419+910 | No Turn Right | SR LHS | Shoulder |
| 1772 | 419+910 | Speed Limit | RHS SR | Shoulder |
| 1773 | 419+930 | Rumble Strip | SR LHS | Shoulder |
| 1774 | 419+930 | Chevron | RHS | Separator |
| 1775 | 419+950 | Rumble Strip | SR LHS | Shoulder |
| 1776 | 419+950 | No Entry | RHS SR | Separator |
| 1777 | 419+970 | Chevron | LHS | Median |
| 1778 | 420+010 | Hazard Marker | RHS | Separator |
| 1779 | 420+010 | Pass Either | RHS | Separator |
| 1780 | 420+040 | Informatory | LHS | Shoulder |
| 1781 | 420+050 | Chevron | LHS | Median |
| 1782 | 420+090 | Informatory | LHS | Shoulder |
| 1783 | 420+110 | Informatory | RHS | Shoulder |
| 1784 | 420+130 | Chevron | LHS | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1785 | 420+130 | Informatory | LHS | Shoulder |
| 1786 | 420+140 | Speed Limit | LHS | Median |
| 1787 | 420+150 | Informatory | RHS | Shoulder |
| 1788 | 420+170 | Informatory | LHS | Shoulder |
| 1789 | 420+200 | Hazard Marker | RHS | Median |
| 1790 | 420+200 | Keep Left | RHS | Median |
| 1791 | 420+220 | Informatory | LHS | Shoulder |
| 1792 | 420+760 | Informatory | RHS | Shoulder |
| 1793 | 420+770 | Hazard Marker | LHS | Median |
| 1794 | 420+770 | No Stoping No Standing | RHS | Shoulder |
| 1795 | 420+780 | Hazard Marker | LHS | Shoulder |
| 1796 | 420+780 | Hazard Marker | LHS | Shoulder |
| 1797 | 420+800 | Informatory | RHS | Shoulder |
| 1798 | 420+880 | Informatory | RHS | Shoulder |
| 1799 | 420+890 | Informatory | LHS | Shoulder |
| 1800 | 420+940 | Informatory | RHS | Shoulder |
| 1801 | 420+970 | Informatory | LHS | Shoulder |
| 1802 | 421+000 | Informatory | RHS | Shoulder |
| 1803 | 421+020 | Chevron | RHS | Median |
| 1804 | 421+100 | Hazard Marker | LHS | Separator |
| 1805 | 421+100 | Pass Either | LHS | Separator |
| 1806 | 421+100 | Chevron | RHS | Median |
| 1807 | 421+170 | Informatory | RHS SR | Shoulder |
| 1808 | 421+180 | Chevron | RHS | Median |
| 1809 | 421+190 | Speed Limit | SR LHS | Shoulder |
| 1810 | 421+220 | Chevron | RHS | Median |
| 1811 | 421+240 | No Entry | SR LHS | Separator |
| 1812 | 421+260 | Speed Limit | LHS | Separator |
| 1813 | 421+260 | Cattle Crossing | SR LHS | shoulder |
| 1814 | 421+260 | Chevron | RHS | Median |
| 1815 | 421+300 | Cattle Crossing | RHS SR | Separator |
| 1816 | 421+300 | Chevron | RHS | Median |
| 1817 | 421+340 | Chevron | RHS | Median |
| 1818 | 421+370 | Hazard Marker | RHS | Separator |
| 1819 | 421+380 | Cattle Crossing | SR LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1820 | 421+450 | Chevron | RHS | Median |
| 1821 | 421+530 | Chevron | RHS | Median |
| 1822 | 421+630 | Chevron | RHS | Median |
| 1823 | 421+660 | Side Road Right | RHS SR | Separator |
| 1824 | 421+670 | Left Turn Prohibhited | RHS | Separator |
| 1825 | 421+680 | Informatory | SR LHS | shoulder |
| 1826 | 421+700 | Chevron | LHS | Median |
| 1827 | 421+710 | Side Road Left | SR LHS | shoulder |
| 1828 | 421+710 | Merging Ahead | RHS | Separator |
| 1829 | 421+710 | Hazard Marker | RHS | Separator |
| 1830 | 421+760 | Hazard Marker | LHS | Median |
| 1831 | 421+780 | Hazard Marker | LHS | Separator |
| 1832 | 421+790 | Chevron | LHS | Median |
| 1833 | 421+790 | Hazard Marker | RHS SR | Shoulder |
| 1834 | 421+790 | Hazard Marker | RHS SR | Separator |
| 1835 | 421+790 | Hazard Marker | RHS SR | Separator |
| 1836 | 421+820 | Hazard Marker | SR LHS | shoulder |
| 1837 | 421+820 | Hazard Marker | SR LHS | Separator |
| 1838 | 421+820 | Hazard Marker | SR LHS | shoulder |
| 1839 | 421+820 | Hazard Marker | SR LHS | Separator |
| 1840 | 421+830 | Hazard Marker | LHS | Median |
| 1841 | 421+830 | Informatory | SR LHS | Separator |
| 1842 | 421+850 | Side Road Right | SR LHS | Separator |
| 1843 | 421+860 | Hazard Marker | LHS | Separator |
| 1844 | 421+890 | Hazard Marker | RHS | Median |
| 1845 | 421+930 | Side Road Left | RHS SR | Shoulder |
| 1846 | 421+980 | Hazard Marker | RHS SR | Island |
| 1847 | 421+980 | Pass Either | RHS SR | Island |
| 1848 | 421+990 | Speed Limit | LHS | Separator |
| 1849 | 422+010 | Bus Stop | RHS SR | Shoulder |
| 1850 | 422+060 | Speed Limit | LHS | Separator |
| 1851 | 422+100 | Speed Limit | LHS | Separator |
| 1852 | 422+120 | Hazard Marker | LHS | Median |
| 1853 | 422+190 | Hazard Marker | RHS | Median |
| 1854 | 422+200 | Chevron | LHS | Separator |
| 1855 | 422+220 | Bus Bay | SR LHS | shoulder |
| 1856 | 422+230 | No Overtaking | LHS | Separator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1857 | 422+240 | Chevron | LHS | Separator |
| 1858 | 422+240 | Chevron | RHS | Median |
| 1859 | 422+280 | Chevron | LHS | Separator |
| 1860 | 422+280 | Speed Limit | LHS | Separator |
| 1861 | 422+280 | Hazard Marker | SR LHS | Bus Bay Island |
| 1862 | 422+280 | Pass Either | SR LHS | Bus Bay Island |
| 1863 | 422+310 | Speed Limit | LHS | Separator |
| 1864 | 422+320 | Chevron | RHS | Median |
| 1865 | 422+340 | Chevron | LHS | Separator |
| 1866 | 422+340 | Speed Limit | SR LHS | Separator |
| 1867 | 422+360 | Speed Limit | LHS | Separator |
| 1868 | 422+380 | Turn Right | LHS | Separator |
| 1869 | 422+410 | Informatory | SR LHS | Shoulder |
| 1870 | 422+420 | Chevron | RHS | Median |
| 1871 | 422+430 | Hazard Marker | RHS | Separator |
| 1872 | 422+450 | Restriction End | RHS | Separator |
| 1873 | 422+460 | School Ahead | SR LHS | Shoulder |
| 1874 | 422+490 | Men at Work | LHS | Separator |
| 1875 | 422+510 | Informatory | SR LHS | Shoulder |
| 1876 | 422+530 | No Turn Left | LHS | Separator |
| 1877 | 422+530 | No Parking | RHS | Separator |
| 1878 | 422+550 | Go Slow | LHS | Separator |
| 1879 | 422+550 | Rumble Strip | SR LHS | Shoulder |
| 1880 | 422+620 | Hazard Marker | SR LHS | Separator |
| 1881 | 422+620 | Pass Either | SR LHS | Separator |

**Section-2 Chennai Bypass**

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 1 | 0+050 | Speed Limit | LHS | Seperator |
| 2 | 0+065 | Informatry | | Median |
| 3 | 0+070 | Informatry | | Median |
| 4 | 0+100 | Traffic Merge | | Median |
| 5 | 0+250 | No Parking | LHS | Seperator |
| 6 | 0+380 | Hazard Marking | LHS | Seperator |
| 7 | 1+100 | Accidet Prone zone | | Median |
| 8 | 1+250 | Hazard Marking | LHS | Seperator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 9 | 2+440 | Curve Ahead | LHS | Seperator |
| 10 | 2+490 | Chevron | LHS | Seperator |
| 11 | 2+500 | Hazard Marking | LHS | Seperator |
| 12 | 2+620 | Chevron | LHS | Seperator |
| 13 | 2+660 | Chevron | LHS | Seperator |
| 14 | 2+740 | Chevron | LHS | Seperator |
| 15 | 2+790 | Chevron | LHS | Seperator |
| 16 | 2+840 | Chevron | LHS | Seperator |
| 17 | 2+940 | Chevron | LHS | Seperator |
| 18 | 2+990 | Chevron | LHS | Seperator |
| 19 | 3+040 | Chevron | LHS | Seperator |
| 20 | 3+420 | Chevron | LHS | Median |
| 21 | 3+460 | Chevron | LHS | Median |
| 22 | 3+510 | Chevron | LHS | Median |
| 23 | 3+570 | Chevron | LHS | Median |
| 24 | 3+950 | Accidet Prone zone | | Median |
| 25 | 4+080 | Curve Ahead | LHS | Seperator |
| 26 | 4+090 | Chevron | LHS | Seperator |
| 27 | 4+150 | Chevron | LHS | Seperator |
| 28 | 4+200 | Chevron | LHS | Seperator |
| 29 | 4+240 | Chevron | LHS | Seperator |
| 30 | 4+300 | Chevron | LHS | Seperator |
| 31 | 4+350 | Chevron | LHS | Seperator |
| 32 | 4+400 | Chevron | LHS | Seperator |
| 33 | 5+200 | Chevron | LHS | Median |
| 34 | 5+330 | Chevron | LHS | Median |
| 35 | 5+430 | Chevron | LHS | Median |
| 36 | 5+480 | Chevron | LHS | Median |
| 37 | 5+520 | Chevron | LHS | Median |
| 38 | 5+580 | Chevron | LHS | Median |
| 39 | 5+990 | Hazard Marking | LHS | Seperator |
| 40 | 6+780 | Steep Ascent | LHS | Seperator |
| 41 | 6+900 | Accident Prone Area | LHS | Seperator |
| 42 | 6+940 | Hump | LHS | Seperator |
| 43 | 10+860 | Chevron | LHS | Median |
| 44 | 10+920 | Chevron | LHS | Median |
| 45 | 10+960 | Chevron | LHS | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 46 | 11+010 | Chevron | LHS | Median |
| 47 | 11+070 | Chevron | LHS | Median |
| 48 | 11+120 | Chevron | LHS | Median |
| 49 | 11+160 | Chevron | LHS | Median |
| 50 | 11+220 | Chevron | LHS | Median |
| 51 | 12+200 | Chevron | LHS | Seperator |
| 52 | 12+320 | Chevron | LHS | Seperator |
| 53 | 12+420 | Chevron | LHS | Seperator |
| 54 | 13+080 | Steep Ascent | LHS | Seperator |
| 55 | 13+690 | Go Slow | | Median |
| 56 | 13+970 | Go Slow | LHS | Shoulder |
| 57 | 14+130 | Go Slow | LHS | Shoulder |
| 58 | 14+600 | Go Slow | | Median |
| 59 | 14+830 | Chevron | LHS | Median |
| 60 | 14+980 | Chevron | LHS | Median |
| 61 | 15+020 | Chevron | LHS | Median |
| 62 | 15+100 | Chevron | LHS | Median |
| 63 | 15+140 | Chevron | LHS | Median |
| 64 | 15+200 | Chevron | LHS | Median |
| 65 | 15+260 | Chevron | LHS | Median |
| 66 | 15+350 | Go Slow | | Median |
| 67 | 15+370 | Chevron | LHS | Median |
| 68 | 16+190 | fuel | LHS | Seperator |
| 69 | 16+200 | Informatry | LHS | Seperator |
| 70 | 16+210 | Go Slow | LHS | Seperator |
| 71 | 16+230 | Median Opening | | Median |
| 72 | 16+460 | Informatry | | Median |
| 73 | 16+725 | U Turn | | Median |
| 74 | 16+820 | Traffic Merge | LHS | Seperator |
| 75 | 16+825 | Restricted Parking | LHS | Seperator |
| 76 | 16+850 | Junction | LHS | Seperator |
| 77 | 16+950 | Hazard Marking | LHS | Seperator |
| 78 | 17+240 | Curve Ahead | LHS | Seperator |
| 79 | 17+350 | Chevron | LHS | Seperator |
| 80 | 17+390 | Chevron | LHS | Seperator |
| 81 | 17+480 | Chevron | LHS | Seperator |
| 82 | 17+500 | Accidet Prone zone | LHS | Seperator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 83 | 17+510 | Chevron | LHS | Seperator |
| 84 | 17+530 | Go Slow | LHS | Seperator |
| 85 | 17+550 | Chevron | LHS | Seperator |
| 86 | 17+570 | Go Slow | | Median |
| 87 | 17+590 | Accident Zone | | Median |
| 88 | 17+610 | Chevron | LHS | Seperator |
| 89 | 18+715 | Curve Ahead | LHS | Median |
| 90 | 18+775 | Accidet Prone zone | | Median |
| 91 | 18+875 | Curve Ahead | LHS | Median |
| 92 | 19+265 | Informatry | LHS | Seperator |
| 93 | 19+730 | Speed Limit | LHS | Seperator |
| 94 | 19+800 | Accidet Prone zone | LHS | Seperator |
| 95 | 19+880 | Hump | LHS | Seperator |
| 96 | 19+920 | No Parking | LHS | Seperator |
| 97 | 20+060 | Accident Black Spot | LHS | Seperator |
| 98 | 21+050 | Steep Ascent | LHS | Seperator |
| 99 | 21+320 | Hazard Marking | LHS | Seperator |
| 100 | 21+320 | Informatry | | Median |
| 101 | 21+460 | Hazard Marking | LHS | Seperator |
| 102 | 21+570 | Junction | LHS | Seperator |
| 103 | 21+590 | Rumle Strip | LHS | Seperator |
| 104 | 21+640 | Junction | LHS | Seperator |
| 105 | 21+680 | Curve Ahead | LHS | Seperator |
| 106 | 21+750 | Hazard Marking | LHS | Seperator |
| 107 | 21+820 | Chevron | LHS | Median |
| 108 | 21+860 | Chevron | LHS | Median |
| 109 | 22+100 | Chevron | LHS | Seperator |
| 110 | 22+170 | Chevron | LHS | Seperator |
| 111 | 23+790 | Chevron | LHS | Seperator |
| 112 | 26+280 | Informatry | LHS | Seperator |
| 113 | 26+940 | Steep Ascent | LHS | Seperator |
| 114 | 27+620 | Chevron | LHS | Seperator |
| 115 | 27+630 | Curve Ahead | LHS | Seperator |
| 116 | 27+750 | Chevron | LHS | Seperator |
| 117 | 27+780 | Steep Ascent | LHS | Seperator |
| 118 | 27+790 | Chevron | LHS | Seperator |
| 119 | 27+840 | Chevron | LHS | Seperator |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 120 | 27+870 | Chevron | LHS | Seperator |
| 121 | 27+910 | Chevron | LHS | Seperator |
| 122 | 27+960 | Chevron | LHS | Seperator |
| 123 | 28+050 | Curve Ahead | LHS | Seperator |
| 124 | 28+070 | Chevron | LHS | Seperator |
| 125 | 28+120 | Chevron | LHS | Seperator |
| 126 | 28+290 | toilet block | LHS | Seperator |
| 127 | 28+460 | Informatry | LHS | Median |
| 128 | 28+870 | Informatry | LHS | Median |
| 129 | 28+880 | Informatry | LHS | Median |
| 130 | 29+360 | Hazard Marking | LHS | Seperator |
| 131 | 29+450 | Informatry | LHS | Seperator |
| 132 | 29+490 | Steep Ascent | LHS | Seperator |
| 133 | 29+770 | Hazard Marking | LHS | Seperator |
| 134 | 29+990 | Curve Ahead | LHS | Median |
| 135 | 30+170 | Hazard Marking | LHS | Seperator |
| 136 | 30+510 | Chevron | LHS | Seperator |
| 137 | 30+550 | Chevron | LHS | Seperator |
| 138 | 30+590 | Chevron | LHS | Seperator |
| 139 | 30+620 | Chevron | LHS | Seperator |
| 140 | 30+750 | Chevron | LHS | Seperator |
| 141 | 30+790 | Chevron | LHS | Seperator |
| 142 | 30+830 | Chevron | LHS | Seperator |
| 143 | 30+860 | Chevron | LHS | Seperator |
| 144 | 30+890 | Chevron | LHS | Seperator |
| 145 | 30+930 | Chevron | LHS | Seperator |
| 146 | 30+970 | Chevron | LHS | Seperator |
| 147 | 31+390 | Hazard Marking | LHS | Seperator |
| 148 | 31+510 | Chevron | LHS | Median |
| 149 | 31+530 | Junction | | Median |
| 150 | 31+670 | Chevron | LHS | Median |
| 151 | 31+700 | Chevron | LHS | Median |
| 152 | 31+770 | Chevron | LHS | Median |
| 153 | 31+790 | Chevron | LHS | Median |
| 154 | 31+890 | Chevron | LHS | Median |
| 155 | 31+920 | Chevron | LHS | Median |
| 156 | 31+950 | Chevron | LHS | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 157 | 32+100 | Go Slow | | Median |
| 158 | 32+110 | Speed Limit | | Median |
| 159 | 32+280 | Steep Ascent | | Median |
| 160 | 32+310 | Go Slow | | Median |
| 161 | 32+010 | Chevron | RHS | Seperator |
| 162 | 31+910 | Chevron | RHS | Seperator |
| 163 | 31+870 | Chevron | RHS | Seperator |
| 164 | 31+770 | Chevron | RHS | Seperator |
| 165 | 31+560 | Go Slow | RHS | Seperator |
| 166 | 31+520 | Steep Ascent | RHS | Seperator |
| 167 | 31+430 | Speed Limit | RHS | Seperator |
| 168 | 31+230 | Speed Limit | | Median |
| 169 | 31+090 | Curve Ahead | | Median |
| 170 | 31+020 | Chevron | | Median |
| 171 | 31+960 | Chevron | | Median |
| 172 | 30+920 | Chevron | | Median |
| 173 | 30+880 | Chevron | | Median |
| 174 | 30+830 | Curve Ahead | | Median |
| 175 | 30+800 | Chevron | | Median |
| 176 | 30+390 | Chevron | RHS | Seperator |
| 177 | 29+960 | Steep Ascent | RHS | Seperator |
| 178 | 29+350 | Hazard Marking | RHS | Seperator |
| 179 | 29+040 | Go Slow | | Median |
| 180 | 28+960 | toilet block | RHS | Seperator |
| 181 | 28+960 | Go Slow | RHS | Median |
| 182 | 28+950 | Go Slow | RHS | Seperator |
| 183 | 28+890 | Informatry | | Median |
| 184 | 28+885 | U TURN | | Median |
| 185 | 28+880 | Informatry | RHS | Median |
| 186 | 28+380 | Steep Ascent | | Median |
| 187 | 28+250 | Go Slow | RHS | Seperator |
| 188 | 28+110 | Chevron | | Median |
| 189 | 28+070 | Chevron | | Median |
| 190 | 28+030 | Chevron | | Median |
| 191 | 27+970 | Chevron | | Median |
| 192 | 27+900 | Curve Ahead | | Median |
| 193 | 27+850 | Chevron | | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 194 | 27+800 | Chevron | | Median |
| 195 | 27+770 | Chevron | | Median |
| 196 | 27+740 | Chevron | | Median |
| 197 | 27+440 | Steep Ascent | RHS | Seperator |
| 198 | 26+250 | Steep Ascent | RHS | Seperator |
| 199 | 25+950 | Steep Ascent | | Median |
| 200 | 25+650 | Steep Ascent | RHS | Seperator |
| 201 | 25+590 | Curve Ahead | RHS | Seperator |
| 202 | 25+540 | Hazard Marking | RHS | Seperator |
| 203 | 25+510 | Chevron | RHS | Seperator |
| 204 | 21+960 | Go Slow | | Median |
| 205 | 21+820 | Rumle Strip | RHS | Seperator |
| 206 | 21+690 | Hazard Marking | RHS | Seperator |
| 207 | 21+470 | Hazard Marking | RHS | Seperator |
| 208 | 21+350 | Hazard Marking | RHS | Seperator |
| 209 | 20+980 | Informatry | RHS | Seperator |
| 210 | 19+685 | Curve Ahead | RHS | Seperator |
| 211 | 19+410 | Informatry | RHS | Seperator |
| 212 | 19+370 | Hazard Marking | RHS | Seperator |
| 213 | 19+000 | Junction | RHS | Seperator |
| 214 | 18+920 | Go Slow | RHS | Seperator |
| 215 | 18+250 | Curve Ahead | RHS | Seperator |
| 216 | 17+850 | Curve Ahead | RHS | Seperator |
| 217 | 17+490 | Curve Ahead | | Median |
| 218 | 17+440 | Chevron | | Median |
| 219 | 17+390 | NO U Turn | | Median |
| 220 | 17+380 | Accident Prone Area | | Median |
| 221 | 16+930 | Informatry | | Median |
| 222 | 16+430 | Speed Limit | | Median |
| 223 | 16+280 | Informatry | RHS | Shoulder |
| 224 | 15+410 | Hazard Marking | RHS | Median |
| 225 | 15+160 | Chevron | RHS | Shoulder |
| 226 | 15+090 | Chevron | RHS | Shoulder |
| 227 | 14+150 | Hazard Marking | RHS | Shoulder |
| 228 | 12+630 | Chevron | | Median |
| 229 | 12+580 | Chevron | | Median |
| 230 | 12+480 | Chevron | | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 231 | 12+440 | Chevron | | Median |
| 232 | 12+390 | Chevron | | Median |
| 233 | 12+330 | Chevron | | Median |
| 234 | 12+290 | Chevron | | Median |
| 235 | 12+240 | Chevron | | Median |
| 236 | 12+190 | Chevron | | Median |
| 237 | 12+140 | Chevron | | Median |
| 238 | 12+090 | Chevron | | Median |
| 239 | 10+400 | Hazard Marking | | Median |
| 240 | 10+210 | Chevron | | Median |
| 241 | 10+160 | Chevron | | Median |
| 242 | 10+110 | Chevron | | Median |
| 243 | 8+520 | Curve Ahead | RHS | Shoulder |
| 244 | 8+510 | Chevron | RHS | Shoulder |
| 245 | 8+450 | Chevron | RHS | Shoulder |
| 246 | 7+690 | Chevron | | Median |
| 247 | 7+630 | Chevron | | Median |
| 248 | 7+580 | Chevron | | Median |
| 249 | 7+550 | Hazard Marking | RHS | Shoulder |
| 250 | 7+320 | Informatry | RHS | Shoulder |
| 251 | 6+620 | Hazard Marking | RHS | Seperator |
| 252 | 5+820 | Chevron | RHS | Shoulder |
| 253 | 5+810 | Curve Ahead | RHS | Shoulder |
| 254 | 5+770 | Chevron | RHS | Shoulder |
| 255 | 5+720 | Chevron | RHS | Shoulder |
| 256 | 5+680 | Chevron | RHS | Shoulder |
| 257 | 5+620 | Chevron | RHS | Shoulder |
| 258 | 5+570 | Chevron | RHS | Shoulder |
| 259 | 5+480 | Chevron | RHS | Shoulder |
| 260 | 5+430 | Chevron | RHS | Shoulder |
| 261 | 5+410 | Curve Ahead | RHS | Shoulder |
| 262 | 5+380 | Chevron | RHS | Shoulder |
| 263 | 5+320 | Chevron | RHS | Shoulder |
| 264 | 5+270 | Chevron | RHS | Shoulder |
| 265 | 5+230 | Chevron | RHS | Shoulder |
| 266 | 4+830 | Speed Limit | | Median |
| 267 | 4+580 | Chevron | | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 268 | 4+540 | Chevron | | Median |
| 269 | 4+480 | Chevron | | Median |
| 270 | 4+430 | Chevron | | Median |
| 271 | 4+370 | Chevron | | Median |
| 272 | 4+330 | Chevron | | Median |
| 273 | 4+280 | Chevron | | Median |
| 274 | 4+180 | Chevron | | Median |
| 275 | 4+130 | Chevron | | Median |
| 276 | 4+070 | Chevron | | Median |
| 277 | 4+030 | Chevron | | Median |
| 278 | 4+000 | Accident Prone Area | RHS | Shoulder |
| 279 | 3+950 | STOP | RHS | Shoulder |
| 280 | 3+830 | Speed Limit | RHS | Shoulder |
| 281 | 3+140 | Chevron | | Median |
| 282 | 3+090 | Chevron | | Median |
| 283 | 3+040 | Chevron | | Median |
| 284 | 2+980 | Chevron | | Median |
| 285 | 2+890 | Chevron | | Median |
| 286 | 2+830 | Chevron | | Median |
| 287 | 2+190 | Chevron | | Median |
| 288 | 2+750 | Chevron | | Median |
| 289 | 2+680 | Chevron | | Median |
| 290 | 2+640 | Chevron | | Median |
| 291 | 2+590 | Chevron | | Median |
| 292 | 2+540 | Chevron | | Median |
| 293 | 1+510 | Speed Limit | | Median |
| 294 | 0+900 | Speed Limit | | Median |
| 295 | 0+770 | Go Slow | | Median |
| 296 | 0+630 | Accident Prone Area | | Median |
| 297 | 0+610 | Accident Prone Area | | Median |
| 298 | 0+550 | Junction | RHS | Shoulder |
| 299 | 0+500 | Informatry | RHS | Shoulder |
| 300 | 0+400 | Chevron | | Median |
| 301 | 0+390 | Chevron | | Median |
| 302 | 0+370 | Chevron | | Median |
| 303 | 0+360 | Chevron | | Median |
| 304 | 0+350 | Speed Limit | | Median |

| S.No | Chainage (km) | Type of Sign | Side | Location |
|---|---|---|---|---|
| 305 | 0+340 | Chevron | RHS | Seperator |
| 306 | 0+340 | Informatry | RHS | Seperator |
| 307 | 0+340 | Chevron | | Median |
| 308 | 0+320 | Accident Prone Area | RHS | Seperator |
| 309 | 0+300 | NO Overtake | | Median |
| 310 | 0+300 | Chevron | RHS | Shoulder |
| 311 | 0+270 | Speed Limit | RHS | Shoulder |
| 312 | 0+260 | Chevron | RHS | Shoulder |
| 313 | 0+250 | Curve Ahead | RHS | Shoulder |
| 314 | 0+200 | Chevron | RHS | Shoulder |
| 315 | 0+130 | Chevron | RHS | Shoulder |
| 316 | 0+110 | Chevron | RHS | Shoulder |
| 317 | 0+090 | Chevron | RHS | Shoulder |
| 318 | 0+070 | Chevron | RHS | Shoulder |
| 319 | 0+050 | Chevron | RHS | Shoulder |
| 320 | 0+030 | Chevron | RHS | Shoulder |
| 321 | 0+010 | Stop | RHS | Shoulder |
| 322 | 0+000 | keep left | RHS | Shoulder |

**Section 03 Chennai Tada**

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 1 | 21+420 | LHS | Median | Accident Prone Area |
| 2 | 21+425 | LHS | Median | Informatry |
| 3 | 21+440 | LHS | Median | U turn |
| 4 | 21+450 | LHS | Median | Informatry |
| 6 | 21+790 | LHS | Median | Hazard |
| 7 | 21+870 | LHS | Median | Speed Limit |
| 8 | 22+210 | LHS | Median | Overtaking Prohibited |
| 9 | 22+215 | LHS | Median | Informatry |
| 10 | 22+420 | LHS | Median | Chevron |
| 11 | 22+420 | LHS | Seperator | Give way |
| 12 | 22+470 | LHS | Median | Chevron |
| 13 | 22+480 | LHS | Seperator | Merging Ahead |
| 14 | 22+520 | LHS | Median | Chevron |
| 15 | 22+560 | LHS | Median | Chevron |
| 16 | 22+570 | LHS | Median | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 17 | 22+580 | LHS | Median | Speed Limit |
| 18 | 22+630 | LHS | Median | Chevron |
| 19 | 22+640 | LHS | Median | Chevron |
| 20 | 22+660 | LHS | Median | Chevron |
| 21 | 22+670 | LHS | Median | Gap in Median |
| 22 | 22+700 | LHS | Median | Chevron |
| 23 | 22+710 | LHS | Median | Chevron |
| 24 | 22+720 | LHS | Median | Go Slow |
| 25 | 22+730 | LHS | Median | Chevron |
| 26 | 22+760 | LHS | Seperator | Merging Ahead |
| 27 | 22+780 | LHS | Median | Stop Sign |
| 28 | 22+800 | LHS | Median | Chevron |
| 29 | 22+800 | LHS | Seperator | Speed Breaker |
| 30 | 22+910 | LHS | Median | Chevron |
| 31 | 23+080 | LHS | Seperator | Chevron |
| 32 | 23+230 | LHS | Seperator | Chevron |
| 33 | 23+260 | LHS | Seperator | Chevron |
| 34 | 23+300 | LHS | Seperator | Chevron |
| 35 | 23+330 | LHS | Seperator | Chevron |
| 36 | 23+370 | LHS | Seperator | Go Slow |
| 37 | 23+390 | LHS | Seperator | Accident Prone Area |
| 38 | 23+420 | LHS | Seperator | Chevron |
| 39 | 23+430 | LHS | Seperator | No Parking |
| 40 | 23+450 | LHS | Seperator | No Stopping |
| 41 | 23+500 | LHS | Seperator | |
| 42 | 23+520 | LHS | Seperator | No Stopping |
| 43 | 23+550 | LHS | Seperator | No Parking |
| 44 | 24+410 | LHS | Seperator | Overtaking Prohibited |
| 45 | 25+400 | LHS | Seperator | Chevron |
| 46 | 25+480 | LHS | Seperator | Chevron |
| 47 | 25+560 | LHS | Seperator | Accident Prone Area |
| 48 | 25+600 | LHS | Seperator | Speed Limit |
| 49 | 25+620 | LHS | Seperator | Chevron |
| 50 | 25+630 | LHS | Seperator | Accident Prone Area |
| 51 | 25+700 | LHS | Seperator | Hazard |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 52 | 25+710 | LHS | Seperator | Chevron |
| 53 | 25+770 | LHS | Seperator | Restriction End |
| 54 | 25+820 | LHS | Seperator | Start of Dual Carriageway |
| 55 | 25+840 | LHS | Seperator | Chevron |
| 56 | 25+900 | LHS | Seperator | Chevron |
| 57 | 25+970 | LHS | Seperator | Chevron |
| 58 | 26+060 | LHS | Median | Chevron |
| 59 | 26+130 | LHS | Median | Chevron |
| 60 | 26+210 | LHS | Median | Chevron |
| 61 | 26+350 | LHS | Median | Chevron |
| 62 | 26+380 | LHS | Median | Stop Sign |
| 63 | 26+380 | LHS | Median | Chevron |
| 64 | 26+890 | LHS | Median | Chevron |
| 65 | 27+160 | LHS | Median | Chevron |
| 66 | 27+180 | LHS | Median | Hazard |
| 67 | 27+610 | LHS | Seperator | No Stopping |
| 68 | 27+630 | LHS | Seperator | Restriction End |
| 69 | 28+620 | LHS | Seperator | Chevron |
| 70 | 28+680 | LHS | Seperator | Chevron |
| 71 | 28+760 | LHS | Seperator | Chevron |
| 72 | 28+820 | LHS | Seperator | Chevron |
| 73 | 28+900 | LHS | Seperator | Chevron |
| 74 | 29+980 | LHS | Seperator | Hazard |
| 75 | 29+995 | LHS | Seperator | Man at Work |
| 76 | 30+460 | LHS | Seperator | Hazard |
| 77 | 31+450 | LHS | Seperator | No Stopping |
| 78 | 31+480 | LHS | Seperator | Hazard |
| 79 | 31+480 | LHS | Median | Hazard |
| 80 | 31+600 | LHS | Seperator | NH Route Marker |
| 81 | 31+940 | LHS | Seperator | Pass Either Side |
| 82 | 32+190 | LHS | Seperator | Fuel Station |
| 83 | 33+200 | LHS | Seperator | Hazard |
| 84 | 33+320 | LHS | Median | Hazard |
| 85 | 33+540 | LHS | Seperator | Hazard |
| 86 | 33+900 | LHS | Seperator | No Stopping |
| 87 | 33+920 | LHS | Seperator | Restriction End |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 88 | 34+000 | LHS | Median | Hazard |
| 89 | 34+000 | LHS | Seperator | Hazard |
| 90 | 34+300 | LHS | Seperator | Give way |
| 91 | 34+680 | LHS | Seperator | Accident Prone Area |
| 92 | 35+190 | LHS | Seperator | Chevron |
| 93 | 35+260 | LHS | Seperator | Chevron |
| 94 | 35+290 | LHS | Seperator | Man at Work |
| 95 | 35+310 | LHS | Seperator | Speed Limit |
| 96 | 35+340 | LHS | Seperator | Speed Limit |
| 97 | 35+350 | LHS | Seperator | Accident Prone Area |
| 98 | 35+385 | LHS | Seperator | No Stopping |
| 99 | 35+390 | LHS | Seperator | Crossing Prohibited |
| 100 | 35+410 | LHS | Seperator | Chevron |
| 101 | 35+420 | LHS | Seperator | Restriction End |
| 102 | 35+480 | LHS | Seperator | Chevron |
| 103 | 35+480 | LHS | Median | Hazard |
| 104 | 35+480 | LHS | Seperator | Hazard |
| 105 | 35+620 | LHS | Seperator | Informatry |
| 106 | 35+640 | LHS | Seperator | Chevron |
| 107 | 35+680 | LHS | Seperator | Chevron |
| 108 | 35+750 | LHS | Seperator | Hazard |
| 109 | 35+760 | LHS | Seperator | Chevron |
| 110 | 35+840 | LHS | Seperator | Chevron |
| 111 | 35+840 | LHS | Median | Chevron |
| 112 | 35+860 | LHS | Seperator | Merging Ahead |
| 113 | 36+100 | LHS | Median | Chevron |
| 114 | 36+100 | LHS | Seperator | Hazard |
| 115 | 36+100 | LHS | Seperator | Give way |
| 116 | 36+200 | LHS | Median | Chevron |
| 117 | 36+220 | LHS | Median | Chevron |
| 118 | 36+240 | LHS | Seperator | Accident Prone Area |
| 119 | 36+360 | LHS | Median | Chevron |
| 120 | 36+420 | LHS | Median | Chevron |
| 121 | 36+480 | LHS | Median | Chevron |
| 122 | 36+600 | LHS | Median | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 123 | 36+870 | LHS | Median | Go Slow |
| 124 | 37+020 | LHS | Median | Man at Work |
| 125 | 37+070 | LHS | Median | Speed Limit |
| 126 | 37+090 | LHS | Seperator | Hazard |
| 127 | 37+090 | LHS | Median | Hazard |
| 128 | 37+120 | LHS | Median | Keep Left |
| 129 | 39+680 | LHS | Seperator | Overtaking Prohibited |
| 130 | 40+230 | LHS | Seperator | Bus Stop |
| 131 | 40+250 | LHS | Seperator | Restriction End |
| 132 | 40+530 | LHS | Seperator | Hazard |
| 133 | 40+530 | LHS | Median | Hazard |
| 134 | 40+800 | LHS | Seperator | Hazard |
| 135 | 40+800 | LHS | Median | Hazard |
| 136 | 40+800 | LHS | Median | Informatry |
| 137 | 41+370 | LHS | Seperator | Bus Stop |
| 138 | 41+580 | LHS | Median | |
| 139 | 41+580 | LHS | Seperator | Informatry |
| 140 | 41+750 | LHS | Median | Hazard |
| 141 | 42+050 | LHS | Median | Chevron |
| 142 | 42+270 | LHS | Median | Chevron |
| 143 | 42+360 | LHS | Median | Chevron |
| 144 | 42+450 | LHS | Median | Chevron |
| 145 | 42+590 | LHS | Median | Chevron |
| 146 | 42+620 | LHS | Seperator | Restriction End |
| 147 | 42+660 | LHS | Median | Chevron |
| 148 | 42+730 | LHS | Median | Chevron |
| 149 | 42+850 | LHS | Median | Chevron |
| 150 | 43+280 | LHS | Seperator | Chevron |
| 151 | 43+350 | LHS | Seperator | Chevron |
| 152 | 43+430 | LHS | Seperator | Chevron |
| 153 | 43+470 | LHS | Median | Hazard |
| 154 | 43+470 | LHS | Seperator | Hazard |
| 155 | 43+470 | LHS | Seperator | Overtaking Prohibited |
| 156 | 43+490 | LHS | Seperator | Chevron |
| 157 | 43+530 | LHS | Seperator | Pedestrian Crossing |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 158 | 43+790 | LHS | Median | Chevron |
| 159 | 43+880 | LHS | Median | Chevron |
| 160 | 43+950 | LHS | Median | Chevron |
| 161 | 44+400 | LHS | Seperator | Chevron |
| 162 | 44+490 | LHS | Seperator | Chevron |
| 163 | 44+590 | LHS | Seperator | Chevron |
| 164 | 44+670 | LHS | Seperator | Chevron |
| 165 | 44+730 | LHS | Seperator | Chevron |
| 166 | 44+800 | LHS | Seperator | Chevron |
| 167 | 44+900 | LHS | Seperator | Chevron |
| 168 | 44+960 | LHS | Seperator | Chevron |
| 169 | 45+030 | LHS | Seperator | Chevron |
| 170 | 45+160 | LHS | Seperator | Chevron |
| 171 | 45+170 | LHS | Seperator | Chevron |
| 172 | 45+210 | LHS | Median | Hazard |
| 173 | 45+800 | LHS | Seperator | Merging Ahead |
| 174 | 45+910 | LHS | Seperator | Give way |
| 175 | 45+950 | LHS | Seperator | Hazard |
| 176 | 46+080 | LHS | Seperator | Hazard |
| 177 | 46+100 | LHS | Seperator | Overtaking Prohibited |
| 178 | 46+480 | LHS | Seperator | Chevron |
| 179 | 46+540 | LHS | Seperator | Chevron |
| 180 | 46+630 | LHS | Seperator | Chevron |
| 181 | 46+750 | LHS | Seperator | Restriction End |
| 182 | 46+780 | LHS | Seperator | Chevron |
| 183 | 46+920 | LHS | Seperator | Chevron |
| 184 | 47+000 | LHS | Seperator | Chevron |
| 185 | 47+020 | LHS | Seperator | Chevron |
| 186 | 47+070 | LHS | Seperator | Chevron |
| 187 | 47+090 | LHS | Seperator | Restriction End |
| 188 | 47+170 | LHS | Seperator | Chevron |
| 189 | 47+170 | LHS | Median | Chevron |
| 190 | 47+230 | LHS | Seperator | Chevron |
| 191 | 47+300 | LHS | Seperator | Overtaking Prohibited |
| 192 | 47+300 | LHS | Median | Chevron |
| 193 | 47+350 | LHS | Median | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 194 | 47+400 | LHS | Median | Chevron |
| 195 | 47+460 | LHS | Median | Chevron |
| 196 | 47+530 | LHS | Median | Chevron |
| 197 | 47+590 | LHS | Median | Chevron |
| 198 | 47+640 | LHS | Median | Chevron |
| 199 | 47+690 | LHS | Median | Chevron |
| 200 | 47+730 | LHS | Median | Chevron |
| 201 | 47+830 | LHS | Median | Chevron |
| 202 | 47+910 | LHS | Median | Chevron |
| 203 | 47+960 | LHS | Median | Chevron |
| 204 | 48+140 | LHS | Median | Chevron |
| 205 | 48+310 | LHS | Seperator | Chevron |
| 206 | 48+320 | LHS | Seperator | Curve Ahead |
| 207 | 48+350 | LHS | Seperator | Chevron |
| 208 | 48+360 | LHS | Seperator | Chevron |
| 209 | 48+410 | LHS | Seperator | Chevron |
| 210 | 48+450 | LHS | Seperator | Chevron |
| 211 | 48+460 | LHS | Seperator | Chevron |
| 212 | 48+500 | LHS | Seperator | Chevron |
| 213 | 48+520 | LHS | Seperator | Chevron |
| 214 | 48+560 | LHS | Seperator | Chevron |
| 215 | 48+890 | LHS | Seperator | |
| 216 | 48+980 | LHS | Seperator | Hazard |
| 217 | 49+420 | LHS | Seperator | Restriction End |
| 218 | 51+300 | LHS | Seperator | Hazard |
| 219 | 52+580 | LHS | Seperator | Hazard |
| 220 | 52+580 | LHS | Median | Gap in Median |
| 221 | 52+700 | LHS | Seperator | Merging Ahead |
| 222 | 52+720 | LHS | Median | Hazard |
| 223 | 52+730 | LHS | Seperator | Speed Limit |
| 224 | 52+930 | LHS | Seperator | Two Way Hazard |
| 225 | 52+940 | LHS | Seperator | Keep Left |
| 226 | 52+950 | LHS | Sr Shoulder | Two Way Hazard |
| 227 | 52+950 | LHS | Sr Shoulder | Pass Either Side |
| 228 | 53+100 | LHS | Seperator | Pedestrian Crossing |
| 229 | 53+110 | LHS | Seperator | Bus Stop |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 230 | 53+410 | LHS | Seperator | Merging Ahead |
| 231 | 53+760 | LHS | Seperator | Hazard |
| 232 | 53+760 | LHS | Median | Hazard |
| 233 | 54+100 | LHS | Shoulder | Chevron |
| 234 | 54+150 | LHS | Shoulder | Chevron |
| 235 | 54+250 | RHS | Median | Informatry |
| 236 | 54+190 | RHS | Median | Chevron |
| 237 | 54+130 | RHS | Median | Chevron |
| 238 | 53+810 | RHS | Median | Hazard |
| 239 | 53+810 | RHS | Seperator | Hazard |
| 240 | 53+700 | RHS | Shoulder | |
| 241 | 52+710 | RHS | Median | Accident Prone Area |
| 242 | 52+320 | RHS | Seperator | Overtaking Prohibited |
| 243 | 51+910 | RHS | Median | Hazard |
| 244 | 51+560 | RHS | Seperator | Restriction End |
| 245 | 51+080 | RHS | Seperator | Speed Breaker |
| 246 | 51+070 | RHS | Seperator | T-Junction |
| 247 | 51+050 | RHS | Seperator | Accident Prone Area |
| 248 | 50+840 | RHS | Seperator | Curve Ahead |
| 249 | 49+910 | RHS | Seperator | No Stopping |
| 250 | 49+670 | RHS | Seperator | Merging Ahead |
| 251 | 49+460 | RHS | Seperator | Overtaking Prohibited |
| 252 | 49+360 | RHS | Median | Hazard |
| 253 | 48+830 | RHS | Seperator | No Stopping |
| 254 | 48+750 | RHS | Median | Chevron |
| 255 | 48+600 | RHS | Median | Chevron |
| 256 | 48+530 | RHS | Median | Chevron |
| 257 | 48+500 | RHS | Median | Chevron |
| 258 | 48+450 | RHS | Median | Chevron |
| 259 | 48+400 | RHS | Median | Chevron |
| 260 | 48+390 | RHS | Seperator | Informatry |
| 261 | 48+320 | RHS | Median | Chevron |
| 262 | 48+300 | RHS | Seperator | Informatry |
| 263 | 48+160 | RHS | Seperator | Chevron |
| 264 | 47+980 | RHS | Seperator | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 265 | 47+910 | RHS | Seperator | Chevron |
| 266 | 47+850 | RHS | Seperator | Chevron |
| 267 | 47+790 | RHS | Seperator | Chevron |
| 268 | 47+720 | RHS | Seperator | Chevron |
| 269 | 47+660 | RHS | Seperator | Chevron |
| 270 | 47+600 | RHS | Seperator | Chevron |
| 271 | 47+540 | RHS | Seperator | Chevron |
| 272 | 47+480 | RHS | Seperator | Chevron |
| 273 | 47+420 | RHS | Seperator | Chevron |
| 274 | 47+370 | RHS | Seperator | Chevron |
| 275 | 47+310 | RHS | Seperator | Chevron |
| 276 | 47+240 | RHS | Seperator | Chevron |
| 277 | 47+240 | RHS | Seperator | Restriction End |
| 278 | 47+190 | RHS | Seperator | Hazard |
| 279 | 47+180 | RHS | Median | Chevron |
| 280 | 47+020 | RHS | Median | Chevron |
| 281 | 46+990 | RHS | Median | Chevron |
| 282 | 46+930 | RHS | Median | Chevron |
| 283 | 46+860 | RHS | Median | Chevron |
| 284 | 46+800 | RHS | Median | Chevron |
| 285 | 46+780 | RHS | Seperator | Overtaking Prohibited |
| 286 | 46+720 | RHS | Median | Chevron |
| 287 | 46+500 | RHS | Median | Chevron |
| 288 | 46+140 | RHS | Seperator | Restriction End |
| 289 | 46+090 | RHS | Median | Hazard |
| 290 | 46+200 | RHS | Seperator | Hazard |
| 291 | 45+160 | RHS | Median | Hazard |
| 292 | 45+150 | RHS | Seperator | Overtaking Prohibited |
| 293 | 45+150 | RHS | Median | Chevron |
| 294 | 45+050 | RHS | Median | Chevron |
| 295 | 44+980 | RHS | Median | Chevron |
| 296 | 44+830 | RHS | Median | Chevron |
| 297 | 44+690 | RHS | Median | Chevron |
| 298 | 44+600 | RHS | Median | Chevron |
| 299 | 44+510 | RHS | Median | Chevron |
| 300 | 44+420 | RHS | Median | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 301 | 44+270 | RHS | Median | Restriction End |
| 302 | 44+020 | RHS | Seperator | Overtaking Prohibited |
| 303 | 43+920 | RHS | Seperator | Chevron |
| 304 | 43+830 | RHS | Seperator | Chevron |
| 305 | 43+760 | RHS | Seperator | Chevron |
| 306 | 43+690 | RHS | Seperator | Chevron |
| 307 | 43+620 | RHS | Seperator | Chevron |
| 308 | 43+530 | RHS | Median | Chevron |
| 309 | 43+525 | RHS | Median | Hazard |
| 310 | 43+500 | RHS | Seperator | Restriction End |
| 311 | 43+450 | RHS | Median | Chevron |
| 312 | 43+380 | RHS | Median | Chevron |
| 313 | 43+300 | RHS | Median | Chevron |
| 314 | 42+830 | RHS | Shoulder | Chevron |
| 315 | 42+770 | RHS | Shoulder | Chevron |
| 316 | 42+690 | RHS | Seperator | Chevron |
| 317 | 42+640 | RHS | Median | Hazard |
| 318 | 42+620 | RHS | Seperator | Chevron |
| 319 | 42+610 | RHS | Seperator | Overtaking Prohibited |
| 320 | 42+480 | RHS | Seperator | Chevron |
| 321 | 42+390 | RHS | Seperator | Chevron |
| 322 | 42+300 | RHS | Seperator | Chevron |
| 323 | 41+030 | RHS | Seperator | Informatry |
| 324 | 40+860 | RHS | Seperator | Hazard |
| 325 | 40+580 | RHS | Seperator | Hazard |
| 326 | 40+300 | RHS | Seperator | Overtaking Prohibited |
| 327 | 40+260 | RHS | Median | Hazard |
| 328 | 39+810 | RHS | Seperator | Restriction End |
| 329 | 39+600 | RHS | Median | Go Slow |
| 330 | 39+560 | RHS | Median | Overtaking Prohibited |
| 331 | 39+560 | RHS | Seperator | Speed Limit |
| 332 | 39+500 | RHS | Median | Overtaking Prohibited |
| 333 | 37+120 | RHS | Seperator | |
| 334 | 36+730 | RHS | Median | Curve Ahead |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 335 | 36+630 | RHS | Seperator | Chevron |
| 336 | 36+520 | RHS | Seperator | Chevron |
| 337 | 36+460 | RHS | Seperator | Chevron |
| 338 | 36+420 | RHS | Seperator | Chevron |
| 339 | 36+400 | RHS | Seperator | Speed Limit |
| 340 | 36+390 | RHS | Seperator | Chevron |
| 341 | 36+350 | RHS | Seperator | Accident Prone Area |
| 342 | 36+320 | RHS | Seperator | Chevron |
| 343 | 36+300 | RHS | Seperator | Restriction End |
| 344 | 36+290 | RHS | Median | Hazard |
| 345 | 36+270 | RHS | Seperator | Merging Ahead |
| 346 | 36+240 | RHS | Seperator | Speed Breaker |
| 347 | 36+235 | RHS | Seperator | Chevron |
| 348 | 36+210 | RHS | Seperator | Chevron |
| 349 | 35+850 | RHS | Median | Chevron |
| 350 | 35+760 | RHS | Median | Chevron |
| 351 | 35+650 | RHS | Median | Chevron |
| 352 | 35+640 | RHS | Seperator | Hazard |
| 353 | 35+640 | RHS | Median | Hazard |
| 354 | 35+500 | RHS | Seperator | Accident Prone Area |
| 355 | 35+490 | RHS | Median | Chevron |
| 356 | 35+440 | RHS | Seperator | Overtaking Prohibited |
| 357 | 35+430 | RHS | Seperator | Speed Limit |
| 358 | 35+420 | RHS | Seperator | Overtaking Prohibited |
| 359 | 35+420 | RHS | Median | Chevron |
| 360 | 35+410 | RHS | Seperator | No Stopping |
| 361 | 35+260 | RHS | Median | Chevron |
| 362 | 35+200 | RHS | Median | Chevron |
| 363 | 34+700 | RHS | Seperator | Restriction End |
| 364 | 34+690 | RHS | Seperator | Merging Traffic Ahead |
| 365 | 34+640 | RHS | Median | Informatry |
| 366 | 34+630 | RHS | Seperator | Restriction End |
| 367 | 33+890 | RHS | Median | Hazard |
| 368 | 33+790 | RHS | Seperator | Hazard |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 369 | 33+380 | RHS | Seperator | Restriction End |
| 370 | 33+220 | RHS | Seperator | Hazard |
| 371 | 33+220 | RHS | Median | Hazard |
| 372 | 33+110 | RHS | Seperator | Informatry |
| 373 | 32+950 | RHS | Median | Hazard |
| 374 | 31+900 | RHS | Median | Informatry |
| 375 | 31+540 | RHS | Seperator | Hazard |
| 376 | 31+540 | RHS | Median | Hazard |
| 377 | 31+380 | RHS | Median | Hazard |
| 378 | 31+320 | RHS | Seperator | Hazard |
| 379 | 27+630 | RHS | Seperator | Overtaking Prohibited |
| 380 | 27+240 | RHS | Seperator | Chevron |
| 381 | 27+140 | RHS | Seperator | Chevron |
| 382 | 27+090 | RHS | Seperator | Chevron |
| 383 | 27+000 | RHS | Seperator | Chevron |
| 384 | 26+940 | RHS | Seperator | Chevron |
| 385 | 26+940 | RHS | Seperator | Restriction End |
| 386 | 26+940 | RHS | Seperator | No Stopping |
| 387 | 26+880 | RHS | Seperator | Chevron |
| 388 | 26+380 | RHS | Seperator | Chevron |
| 389 | 26+340 | RHS | Seperator | Chevron |
| 390 | 26+270 | RHS | Seperator | Chevron |
| 391 | 26+180 | RHS | Seperator | Chevron |
| 392 | 26+110 | RHS | Seperator | Chevron |
| 393 | 26+040 | RHS | Seperator | Chevron |
| 394 | 25+690 | RHS | Median | Chevron |
| 395 | 25+810 | RHS | Seperator | Accident Prone Area |
| 396 | 25+780 | RHS | Median | Chevron |
| 397 | 25+770 | RHS | Seperator | Speed Limit |
| 398 | 25+760 | RHS | Seperator | No Stopping |
| 399 | 25+750 | RHS | Seperator | Accident Prone Area |
| 400 | 25+730 | RHS | Seperator | Hazard |
| 401 | 25+710 | RHS | Seperator | Hazard |
| 402 | 25+610 | RHS | Seperator | Chevron |
| 403 | 25+560 | RHS | Seperator | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 404 | 25+560 | RHS | Seperator | Restriction End |
| 405 | 25+480 | RHS | Seperator | Chevron |
| 406 | 25+410 | RHS | Seperator | Chevron |
| 407 | 24+720 | RHS | Seperator | Hazard |
| 408 | 23+660 | RHS | Median | Speed Limit |
| 409 | 23+630 | RHS | Median | Chevron |
| 410 | 23+480 | RHS | Median | Chevron |
| 411 | 23+410 | RHS | Median | Chevron |
| 412 | 23+340 | RHS | Median | Chevron |
| 413 | 23+300 | RHS | Median | Chevron |
| 414 | 23+270 | RHS | Median | Chevron |
| 415 | 23+260 | RHS | Median | Chevron |
| 416 | 23+240 | RHS | Median | Chevron |
| 417 | 23+210 | RHS | Median | Chevron |
| 418 | 23+170 | RHS | Median | Informatry |
| 419 | 23+150 | RHS | Median | Chevron |
| 420 | 23+010 | RHS | Median | Chevron |
| 421 | 23+940 | RHS | Seperator | Chevron |
| 422 | 23+940 | RHS | Median | Gap in Median |
| 423 | 22+935 | RHS | Median | Chevron |
| 424 | 22+910 | RHS | Seperator | Chevron |
| 425 | 22+890 | RHS | Median | Go Slow |
| 426 | 22+880 | RHS | Median | Chevron |
| 427 | 22+880 | RHS | Seperator | Chevron |
| 428 | 22+840 | RHS | Seperator | Chevron |
| 429 | 22+820 | RHS | Median | Chevron |
| 430 | 22+820 | RHS | Seperator | Chevron |
| 431 | 22+810 | RHS | Seperator | Stop Sign |
| 432 | 22+780 | RHS | Seperator | Chevron |
| 433 | 22+730 | RHS | Seperator | Chevron |
| 434 | 22+700 | RHS | Seperator | Chevron |
| 435 | 22+680 | RHS | Median | Informatry |
| 436 | 22+660 | RHS | Seperator | Chevron |
| 437 | 22+630 | RHS | Seperator | Chevron |
| 438 | 22+630 | RHS | Median | Chevron |
| 439 | 22+560 | RHS | Seperator | Chevron |
| 440 | 22+560 | RHS | Median | Chevron |

| S. No. | Chainage (Km) | Side | Location | Type |
|---|---|---|---|---|
| 441 | 22+510 | RHS | Seperator | Chevron |
| 442 | 22+470 | RHS | Median | Informatry |
| 443 | 22+460 | RHS | Median | Chevron |
| 444 | 22+460 | RHS | Seperator | Chevron |
| 445 | 22+450 | RHS | Seperator | Merging Traffic Ahead |
| 446 | 22+420 | RHS | Median | Informatry |
| 447 | 22+420 | RHS | Seperator | Chevron |
| 448 | 22+370 | RHS | Median | Informatry |
| 449 | 22+250 | RHS | Median | Chevron |
| 450 | 22+240 | RHS | Seperator | Speed Limit |
| 451 | 22+200 | RHS | Seperator | Overtaking Prohibited |
| 452 | 22+190 | RHS | Median | Chevron |
| 453 | 22+180 | RHS | Median | Informatry |
| 454 | 22+130 | RHS | Median | Informatry |
| 455 | 22+110 | RHS | Median | Informatry |
| 456 | 22+070 | RHS | Median | Informatry |
| 457 | 22+000 | RHS | Median | Speed Limit |
| 458 | 21+950 | RHS | Median | Informatry |
| 459 | 21+920 | RHS | Median | Informatry |
| 460 | 21+910 | RHS | Median | Speed Limit |
| 461 | 21+890 | RHS | Median | Informatry |
| 462 | 21+870 | RHS | Seperator | Accident Prone Area |
| 463 | 21+850 | RHS | Median | U Turn |
| 464 | 21+820 | RHS | Median | Gap in Median |
| 465 | 21+790 | RHS | Median | U Turn |

# CHAPTER 7

# CONDITION ASSESSMENT OF EXISTING PAVEMENT AND FUTURE MAINTENANCE REQUIREMENT

## 7.1 General

Highway pavements are layered structures comprising of combination of materials to carry traffic load in given climate for a specified time interval. The pavement structure is designed in such a way that the transmitted stresses due to wheel load are sufficiently reduced, so that they will not exceed bearing capacity of the sub-grade. It should also be able to provide a surface of acceptable riding quality under all weather conditions with the highest possible degree of safety.

The performance of any highway pavement is measured by two indicators, namely Functional Performance and Structural Performance. The functional performance includes aspects such as riding quality, surface distress and skid resistance. Whilst recognising these functional requirements, the pavement should also have adequate strength has a load be a ring structure that is required to carry the traffic load under the prevailing environmental conditions (structural performance).

| Performance Type | Performance Indicator |
|---|---|
| Functional | Riding Quality (Roughness and Rutting) Surface Distress (Cracking, Potholes, and Ravelling etc.) Skid Resistance |
| Structural | Deflection, Elastic Modulus of Pavement layers and Remaining Life |

Information about pavement condition and performance is critical to the decision-making process for successful management of highway pavements. The objective of condition assessment of the pavement is to collect accurate and timely data, analyse the level of deterioration, identify maintenance and reconstruction needs, and determine maintenance costs both routine as well as periodic (major maintenance). In this context, series of investigations and assessments was undertaken using a combination of state of the art, technology driven fully automated and semi-automated processes with high speed of data collection in field. The methodology and data collection involved in the above-mentioned surveys are elaborated in the Chapter 3. After collecting the pavement condition data from

these tests, the data is analysed to evaluate the pavement performance or condition which included the following aspects.

- Assessment of Lane Choice Behaviour
- Axle load Survey and estimation of Vehicle Damage Factor(VDF)
- Analysis of Riding Quality in terms of Roughness and Rutting parameters
- Analysis of Surface Distresses and evaluation of Pavement Condition Index (PCI)
- Test Pit Sand Evaluation of pavement Material Properties
- Structural Condition Assessment of the Pavement and Remaining Life Analysis

Based on the visual condition survey, the type of distress, its quantity and severity for each stretch is obtained. The same is used to evaluate, the present condition of the pavement in terms of PCI (Pavement Condition Index), which classifies condition of the pavement ranging from ’Poor’ to ‘Good’. The procedure for evaluating the same is described in the Section.

The remaining life of the pavement (in terms of the residual traffic load in MSA (Million Standard Axles) that the pavement can sustain) is evaluated using the results obtained from Falling Weight Deflectometer (FWD) survey and Test-pit survey results. The design traffic in terms of MSA for each financial year a head is calculated based on the VDF obtained from axle load data, and traffic projections. Strip chart indicating the performance rating for each stretch is then prepared using the above results. There habitation measures that needs to be provided is decided by comparing the results with the performance requirements out lined in the Standards and Specifications. In this regard, the pavement sections were identified for two cases, it includes the section with overlay requirement and the sections with good condition.

The steps involved areas follows

- Data collected from surveys is analysed for estimating different parameters like Remaining life of Pavement, PCI and projected MSA.
- The Remaining Life of the pavement is evaluated using the FWD and Test-p it surveys results.
- The traffic projections (MSA) are obtained from the combined results of axle load and traffic survey.

- The PCI of the existing pavement is calculated from the NSV data.
- Each stretch is divided into smaller sections and all the above parameters are listed for each section and strip chart is prepared.
- The sections with remaining life less than the design life (10 years in this study) are proposed for overlay.
- The sections with remaining life more than the design life but poor in either of the parameters like IRI, Rut depth and PCI are also considered for the overlay.
- Sections which satisfy both the functional parameters as well have a design life of more than 10 years are considered for routine maintenance only.

## 7.2 Lane Choice Behaviour

The lane choice behaviour of the carriageway describes the preferred lane by the commercial traffic moving along the Project Stretch. This in turn has effect on the pavement structure in terms of distress caused due to movement of heavy commercial traffic on the same preferred lane. The lane choice behaviour as observed in the Project Stretch is presented in the figure below:




**Figure 7-1 : Lane Choice Behaviour along the Project Stretch**

It was observed that the preferred lane by the commercial traffic is Inner lane on both LHS and RHS carriageways.

## 7.3 Analysis of NSV Data-Pavement Condition

The analysis of various performance parameter data as collected during NSV survey is presented in this section.

### 7.3.1 Roughness

Roughness is one of the important parameters for determining the functional characteristics of pavements. According to American Society for Testing and Materials (ASTM), roughness is defined as "the deviations of a pavement surface from a true planar surface with characteristic dimensions that affect vehicle dynamics, ride quality, dynamic loads, and drainage, for example, longitudinal profile, transverse profile and cross slope". The International Roughness Index (IRI), Bump Integrator Roughness (BI) is used to define the characteristics of a longitudinal road profile and constitutes a standardized roughness measurement.

IRI, BI is measured in metres per kilometre (m/km) or millimetres per metre (mm/m). The roughness of road surfaces is measured using different equipment/techniques such as rod and level survey; dip stick profiler, profile graphs, response type road roughness meters and profiling devices.

In India, the roughness is measured using fifth wheel bump integrator (developed by CRRI) and is reported as Unevenness Index (UI) in mm/km.

However, National Highway Authority of India (NHAI), via letterno.11041/218/2007–Admndated03.11.2009 on POLICYMATTERS–TECHNICAL (37/2009) has approved the use of Laser Profiling devices for NHAI works.

**Correlation between Bump Integrator Roughness and International Roughness Index (IRI)**

The accepted world standard is the International Roughness Index (IRI) for roughness. The IRI was an outcome of the International Road Roughness Experiment conducted in Brazil (Sayersetal, 1986a) and is reproducible, portable and stable with time. The equipment is included with software to

calculate and print various profile statistics including the IRI as well as the individual point elevation and local surface curvatures. For correlation with BI values the following relation should be used:

$BI=630*(IRI)^{1.12}$

Where, BI= Bump Integrator Roughness or Unevenness Index in mm/km

IRI= International Roughness Index

Roughness condition details length wise for both the direction given in table below

***Table 7-1 :*** **Roughness Summary**

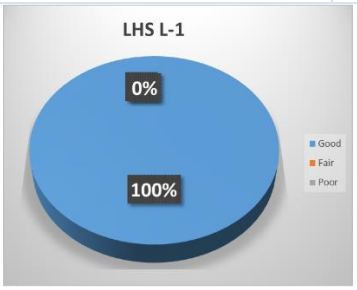
**Vijayawada-Chilakaluripet (Km 355+000 to Km 422+605)**

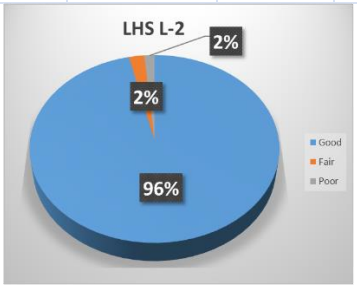
**LHS**

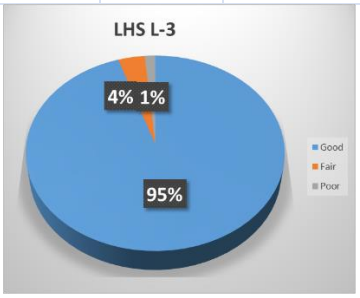
| Criteria IRI (m/km) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 69.41 | 100.00% | 66.91 | 96.40% | 65.51 | 94.93% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 1.50 | 2.16% | 2.50 | 3.62% |
| More than 3.301 | Poor | 0.00 | 0.00% | 1.00 | 1.44% | 1.00 | 1.45% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.408 | 100% |

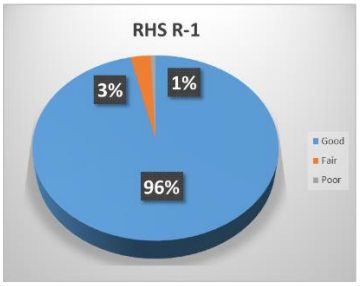
**RHS**

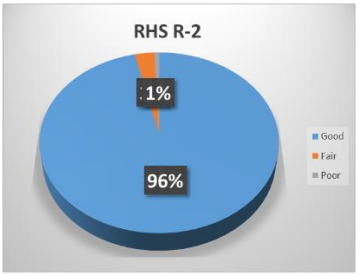
| Criteria IRI (m/km) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 66.91 | 96.40% | 66.91 | 96.40% | 67.41 | 97.12% |
| 2.81 to 3.301 | Fair | 2.00 | 2.88% | 2.00 | 2.88% | 2.00 | 2.88% |
| More than 3.301 | Poor | 0.50 | 0.72% | 0.50 | 0.72% | 0.00 | 0.00% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.408 | 100% |

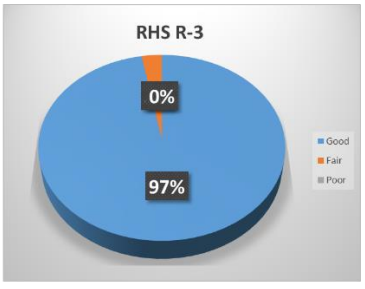


**In LHS**, 97.11% of the Project Stretch has a Roughness value in Good condition, whereas 1.93% of the Project Stretch is in Fair condition. And 0.96% of the project stretch is in Poor condition.

**In RHS**, 96.64% of the Project Stretch has a Roughness value in Good condition, whereas 2.88% of the Project Stretch is in Fair condition. And 0.48% of the project stretch is in Poor condition.

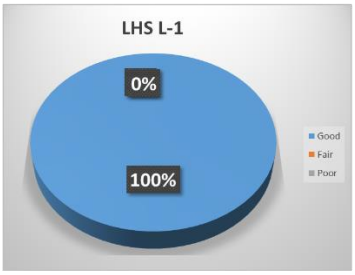
**Chennai Bypass (Km 0+000 to Km 32+600)**

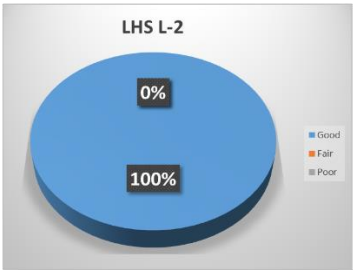
**LHS**

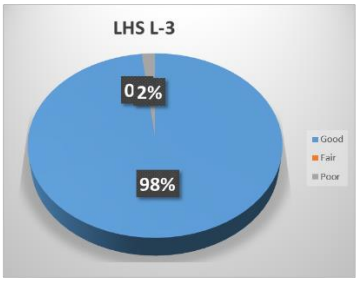
| Criteria IRI (m/km) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 32.60 | 100.00% | 32.60 | 100.00% | 32.00 | 98.16% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.60 | 1.84% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |

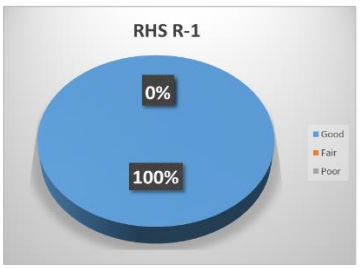
**RHS**

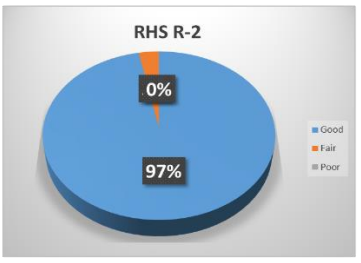
| Criteria IRI (m/km) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 32.60 | 100.00% | 31.60 | 96.93% | 32.60 | 100.00% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 1.00 | 3.07% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |

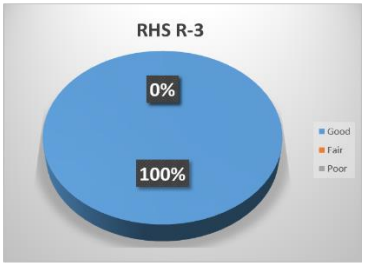


**In LHS**,99.39% of the Project Stretch has a Roughness value in Good condition, whereas 0% of the Project Stretch is in Fair condition. And 0.61% of the project stretch is in Poor condition.

**In RHS**, 98.98% of the Project Stretch has a Roughness value in Good condition, whereas 1.02% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

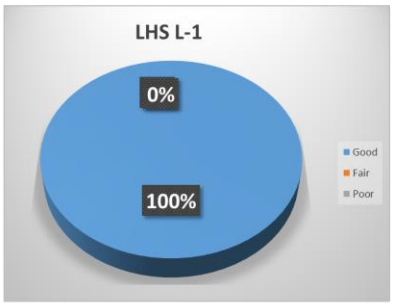
**Chennai Tada (Km 21+400 to Km 54+400)**

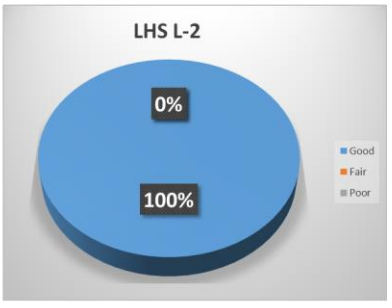
**LHS**

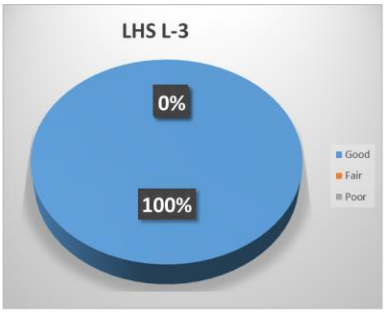
| Criteria IRI (m/km) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 33.00 | 100.00% | 33.00 | 100.00% | 33.00 | 100.00% |
| 2.81 to 3.301 | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 33.000 | 100% | 33.000 | 100% | 33.000 | 100% |

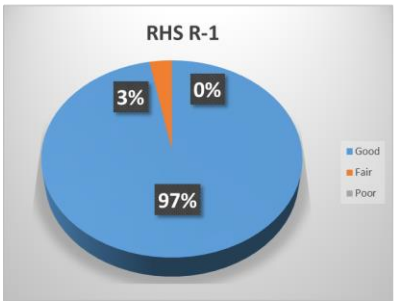
**RHS**

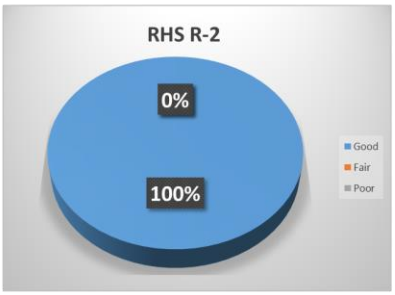
| Criteria IRI (m/km) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 2.81 | Good | 32.00 | 96.97% | 33.00 | 100.00% | 33.00 | 100.00% |
| 2.81 to 3.301 | Fair | 1.00 | 3.03% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 3.301 | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 33.00 | 100% | 33.000 | 100% | 33.000 | 100% |

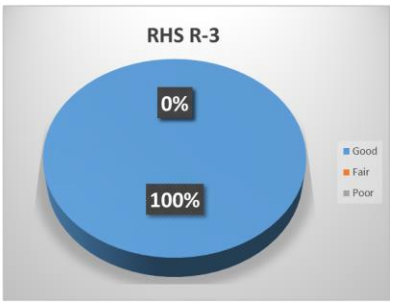


**In LHS**, 100 % of the Project Stretch has a Roughness value in Good condition, whereas 0% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

**In RHS**, 98.99 % of the Project Stretch has a Roughness value in Good condition, whereas 1.01% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

### 7.3.2 Rutting

Rutting is one of the important factors which determine the functional performance of pavement. Rutting is characterized by permanent deformation of the pavement in wheel path due to heavy load vehicles. It is one of the main modes of failure in asphalt mixes.

| Criteria Rut Depth (mm) | Condition |
|---|---|
| < 5 mm | Good |
| 5mm to 10 mm | Fair |
| > 10 mm | Poor |

The rut depths observed for all 4 lanes (2-LHS and 2- RHS) are presented in the table shown below.

***Table 7-2 : Rut Depth Summary***

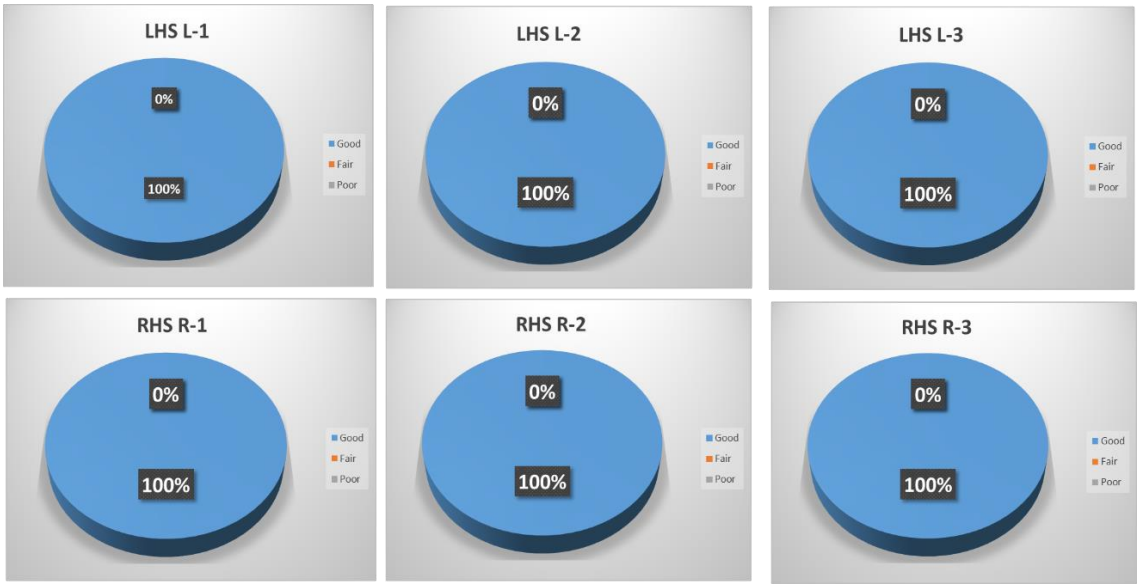
**Vijayawada-Chilakaluripet (Km 355+000 to Km 437+500)**

**LHS**

| Criteria Rutting (mm) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 69.41 | 100.00% | 69.41 | 100.00% | 69.41 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.408 | 100% |

**RHS**

| Criteria Rutting (mm) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 69.41 | 100.00% | 69.41 | 100.00% | 69.41 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 69.408 | 100% | 69.408 | 100% | 69.408 | 100% |




**In LHS**, 100% of the Project Stretch has a Rutting value in Good condition, whereas 0.00% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.

**In RHS**, 100.00% of the Project Stretch has a Rutting value in Good condition, whereas 0.00% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.

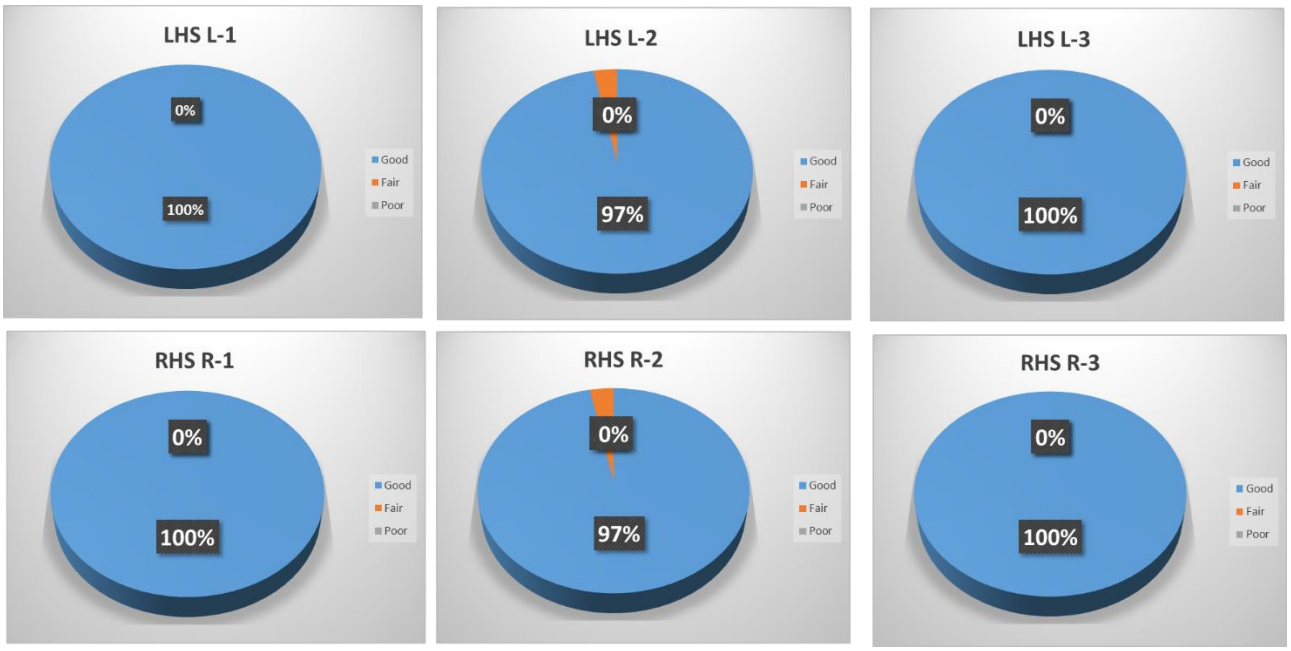
**Chennai Bypass (Km 0+000 to Km 32+600)**

**LHS**

| Criteria Rutting (mm) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 32.60 | 100.00% | 31.60 | 96.93% | 32.60 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 1.00 | 3.07% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |

**RHS**

| Criteria Rutting (mm) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 32.60 | 100.00% | 31.60 | 96.93% | 32.60 | 100.00% |
| 5mm to 10 mm | Fair | 0.00 | 0.00% | 1.00 | 3.07% | 0.00 | 0.00% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 32.600 | 100% | 32.600 | 100% | 32.600 | 100% |




**In LHS**, 98.98% of the Project Stretch has a Rutting value in Good condition, whereas 1.02% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition.

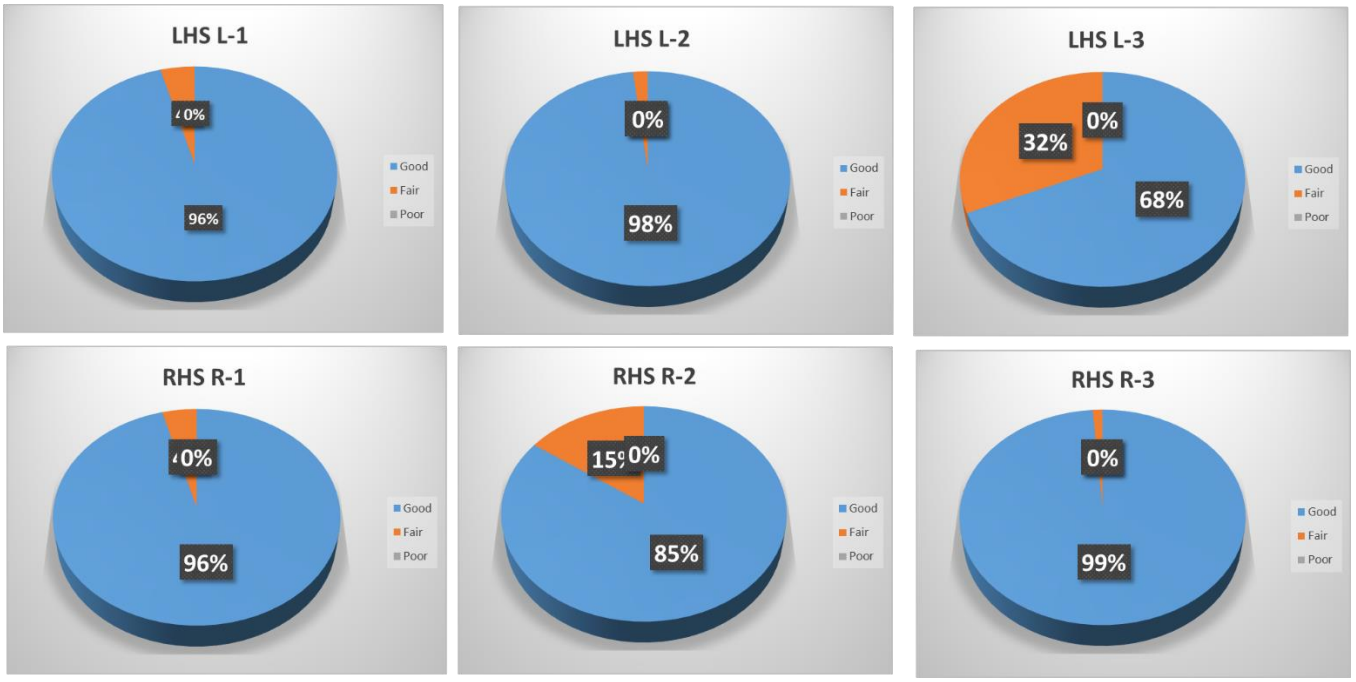
**In RHS**, 98.98% of the Project Stretch has a Rutting value in Good condition, whereas 1.02% of the Project Stretch is in Fair condition. And 0% of the project stretch is in Poor condition. **Chennai Tada (Km 21+400 to Km 54+400)**

**LHS**

| Criteria Rutting(mm) | Condition | LHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | L-1 | | L-2 | | L-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 31.60 | 95.76% | 32.40 | 98.18% | 22.60 | 68.48% |
| 5mm to 10 mm | Fair | 1.40 | 4.24% | 0.60 | 1.82% | 10.40 | 31.52% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 33.00 | 100% | 33.00 | 100% | 33.00 | 100% |

**RHS**

| Criteria Rutting(mm) | Condition | RHS | | | | | |
|---|---|---|---|---|---|---|---|
| | | R-1 | | R-2 | | R-3 | |
| | | Km | % | Km | % | Km | % |
| Less than 5 mm | Good | 31.60 | 95.76% | 28.00 | 84.85% | 32.60 | 98.79% |
| 5mm to 10 mm | Fair | 1.40 | 4.24% | 5.00 | 15.15% | 0.40 | 1.21% |
| More than 10 mm | Poor | 0.00 | 0.00% | 0.00 | 0.00% | 0.00 | 0.00% |
| Total | | 33.00 | 100% | 33.00 | 100% | 33.00 | 100% |




**In LHS**, 87.47 % of the Project Stretch has a Rutting value in Good condition, whereas 12.53% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

**In RHS**, 93.13 % of the Project Stretch has a Rutting value in Good condition, whereas 6.87% of the Project Stretch is in Fair condition. And 0.0% of the project stretch is in Poor condition.

## 7.4 Crust Composition and Evaluation of Pavement Material Properties

Pavements are layered structure comprising of combination of materials to carry traffic in a given climate over the existing soil conditions for a specified time interval. These materials, their associated properties, and their interactions determine properties of the resultant pavement. Therefore, a good understanding of these materials, how they are characterized, and how they perform is fundamental for understanding pavement behaviour and deterioration. As part of soils and materials investigations report preparation, soils and materials investigation was conducted. Also, analysis of sub grade soil properties along the project corridor as well as investigation on sources of available construction materials from quarries/crushers for the proposed construction works was carried out.

The schedule of testing covered the gamut of investigations in lights of Terms of Reference (TOR) includes the following. Investigation for Road Works: The investigations are carried out to assess the suitability (strength characteristics) of the existing sub-grade soil along the proposed project corridor for assessment.

pavement composition for the partial reconstruction & new construction based on good quality of soil and materials available at reasonable cost.

Investigation for Construction Materials: To ascertain the suitability and availability of quarry materials within a reasonable haulage for construction of sub-base, base and top layers (bituminous/concrete) of the designed pavement.

### 7.4.1 Field Investigation-Sampling and Testing

As mentioned earlier, Field tests were conducted and samples of soil / construction materials were collected from sub grade of existing road and pavement layers and stone metal / sand quarries. Table has also been presented for the sampling criteria, tests and testing procedures adopted for various field and laboratory tests.

### 7.4.2 Investigation on Existing Pavement of Subgrade

The Sub grade investigations were carried out to know the strength properties of the existing soil. Visual inspection of the existing pavement condition was carried out prior to commencement of subgrade investigation work. The general testing scheme of existing road will indicate testing of at least three sub grade soil samples for each homogeneous road segment or three samples for each soil type encountered, whichever is more. It was ensured to dig sub grade strength test pits at every 5.0km (or) less on the project alignment, even though same soil strata encountered on lengthy homogeneous
sections, while collecting samples. The various in-situ tests conducted and laboratory tests included in the testing program on soil samples along the alignment as per the project requirements are summarized in Table below. The pavement composition details (pavement course, material type, and thickness) are also recorded at every test pit.

#### Dynamic Cone Penetration Test

Dynamic Cone Penetration (DCP) tests were conducted at sub grade strength test pit locations to assess in-situ California Bearing Ratio (CBR) on existing alignment soil, which will be below subgrade level. The CBR value was calculated based on different

soil layers encountered. The slope change in the graph (Penetration vs Number of Blows) indicates the interface of two layers of different penetration resistance. From the graph, thickness of layer and slope (penetration mm / blow) were

calculated. The following IRC: 37-2012 equation has been used to calculate the layer DCP-CBR value for each layer:

$Log10CBR = 2.465 – 1.12 log10N$

Dynamic Cone Penetration test results showing penetration of cone in cm and number of blows at each pit is plotted; DCP-CBR is calculated and given in Volume-II. The summary is included in Table.

**Table 7-3 : Test Result CBR Value using DCPT**

**Section-01 Vijayawada-Chilakaluripet**

| S. No | Chainage (km) | Side (RHS/LHS) | DCP-CBR (%) |
|---|---|---|---|
| 1 | 3+660 | RHS | 10% |
| 2 | 10+060 | RHS | 20% |
| 3 | 10+900 | RHS | 15% |
| 4 | 13+660 | LHS | 11% |
| 5 | 14+320 | RHS | 20% |
| 6 | 42+100 | LHS | 9% |
| 7 | 355+900 | LHS | 9% |
| 8 | 356+100 | RHS | 11% |
| 9 | 372+800 | RHS | 13% |
| 10 | 373+200 | LHS | 8% |
| 11 | 376+600 | RHS | 11% |
| 12 | 377+700 | LHS | 6% |
| 13 | 379+100 | RHS | 10% |
| 14 | 380+000 | LHS | 8%. |
| 15 | 380+000 | LHS | 18% |
| 16 | 380+600 | RHS | 6% |
| 17 | 381+100 | RHS | 11%. |
| 18 | 382+100 | LHS | 9% |
| 19 | 382+300 | LHS | 6% |
| 20 | 382+620 | RHS | 15% |
| 21 | 383+100 | RHS | 11% |
| 22 | 384+800 | LHS | 6% |
| 23 | 384+900 | LHS | 7% |
| 24 | 386+900 | RHS | 13% |
| 25 | 390+900 | RHS | 30% |
| 26 | 392+900 | LHS | 8% |
| 27 | 393+400 | RHS | 11% |

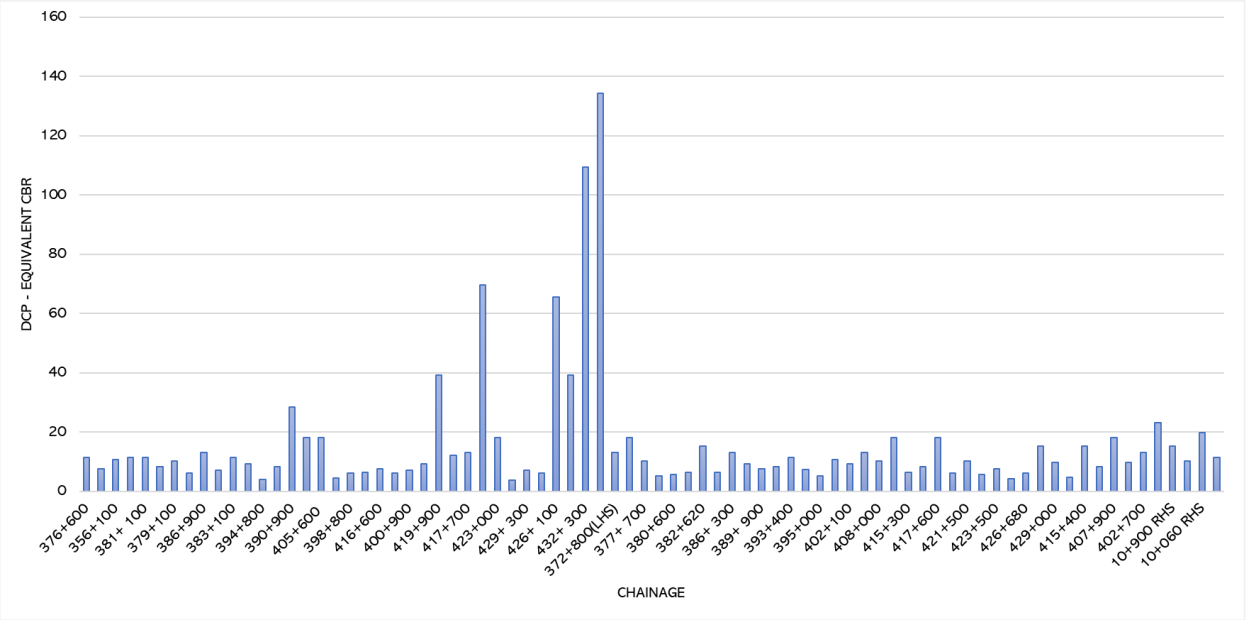
| S. No | Chainage (km) | Side (RHS/LHS) | DCP-CBR (%) |
|---|---|---|---|
| 28 | 394+550 | LHS | 7% |
| 29 | 394+800 | RHS | 4% |
| 30 | 395+000 | RHS | 5% |
| 31 | 396+400 | LHS | 6% |
| 32 | 398+140 | LHS | 10% |
| 33 | 398+800 | RHS | 6% |
| 34 | 400+900 | RHS | 7% |
| 35 | 402+100 | RHS | 9% |
| 36 | 402+700 | RHS | 13% |
| 37 | 403+800 | LHS | 13% |
| 38 | 403+900 | LHS | 4.40% |
| 39 | 405+600 | RHS | 18% |
| 40 | 407+100 | LHS | 10% |
| 41 | 407+900 | RHS | 18% |
| 42 | 408+000 | RHS | 10% |
| 43 | 408+900 | LHS | 18% |
| 44 | 409+500 | LHS | 8% |
| 45 | 410+950 | LHS | 6% |
| 46 | 415+300 | RHS | 6% |
| 47 | 415+400 | RHS | 15% |
| 48 | 416+550 | LHS | 8% |
| 49 | 416+600 | RHS | 8% |
| 50 | 417+600 | RHS | 18% |
| 51 | 417+700 | RHS | 13% |
| 52 | 418+700 | LHS | 6% |
| 53 | 418+750 | LHS | 12% |
| 54 | 419+900 | RHS | 40% |
| 55 | 421+500 | RHS | 10% |
| 56 | 422+500 | LHS | 3.70% |
| 56 | 422+500 | LHS | 6% |

**Section-03 Chennai-Tada**

| S. No | Chainage (km) | Side (RHS/LHS) | DCP-CBR (%) |
|---|---|---|---|
| 1 | 54+350 | LHS | 60% |
| 2 | 54+350 | RHS | 15% |

The field investigation photographs are presented in Figure and the graphical representation of DCP-CBR is presented in Figure.

**Section-01 Vijayawada Chilakaluripet**




**Section-03 Chennai-Tada**

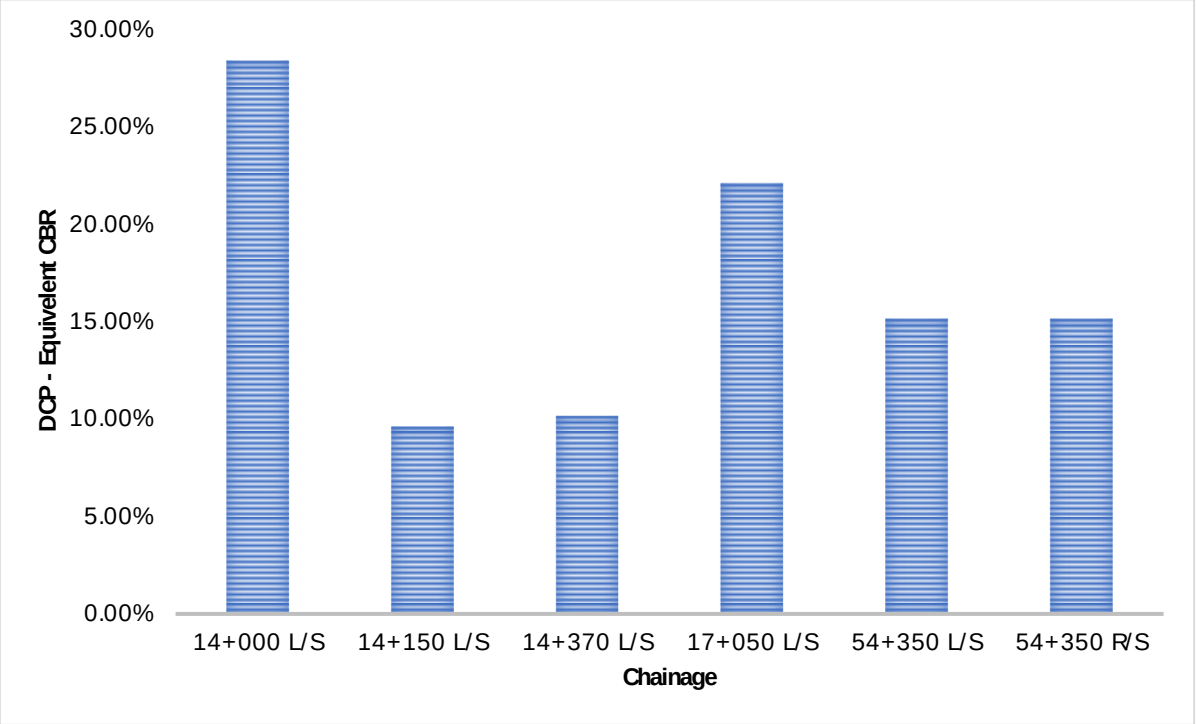



**Figure 7-2 : Illustrative Summary of DCP-CBR**

## Laboratory Tests and Results

The laboratory testing for sub grade includes:

- Characterization (Grain size, Atterberg limits and free Swell Index) at each of the subgrade strength test pit
- Laboratory moisture-density characteristics
- 4-day soaked CBR test

About 50kg of soil sample was collected in damp proof bag (s) from each test pit from each sub grade strength test pit for testing purposes. The details like location / chain age & other identification mark were recorded for the sample bags and double packed with care so that no damage would occur while transporting to the laboratory for conducting the tests as indicated in Table.

**Table 7-4 : Test Results of Soil Layer**

**Section-01 Vijayawada-Chilakaluripet**

| S. No. | Ch. (Km.) | Gradation: Percent by weight passing through the sieve (IS:2720-IV) | | | Clay & Silt Content (%) | Atterberg Limits (IS:2720-Pt-V) | | | Modified Proctor Test (IS: 2720-Pt-VIII) | | In-situ Density | | 4-Days Soaked CBR (%) | Free Swell Index | Degree of Compaction (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gravel (%) | Sand (%) | Clay & Silt Content (%) | | Liquid Limit (LL) (%) | Plastic Limit (PL) (%) | Plasticity Index (PI) | Max. dry density (gm/cc.) | OMC (%) | FDD (gm/cc) | FMC (%) | | | |
| 1 | 3 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 1 | 419+900 | 19.8 | 64.3 | 15.9 | 15.9 | 27.89 | 5.67 | 22.22 | 1.87 | 10.85 | 1.88 | 3 | 9.17 | 11 | 98.95 |
| 2 | 410+950 | 16.8 | 55.7 | 27.5 | 27.5 | 30.86 | 6.42 | 24.44 | 1.91 | 10.78 | 1.89 | 6.5 | 12.33 | 10.5 | 99.47 |
| 3 | 403+900 | 20.9 | 51.7 | 27.4 | 27.4 | 29.26 | 5.45 | 23.81 | 1.93 | 10.71 | 1.85 | 9 | 10.51 | 9 | 97.36 |
| 4 | 394+800 | 15.8 | 46.6 | 37.6 | 37.6 | 27.61 | 3.17 | 24.44 | 1.89 | 10.83 | 1.88 | 12 | 11.86 | 11 | 98.94 |
| 5 | 384+900 | 14.1 | 63.6 | 22.3 | 22.3 | 20.92 | 3.78 | 17.14 | 1.9 | 10.88 | 1.89 | 7 | 9.48 | 9.5 | 99.47 |
| 6 | 372+800 | 8.1 | 57.8 | 34.1 | 34.1 | 20.9 | 2.38 | 18.52 | 1.89 | 10.99 | 1.83 | 4 | 9.01 | 11 | 96.31 |
| 7 | 377+700 | 10.9 | 70.4 | 18.7 | 18.7 | 22.5 | 7.69 | 14.81 | 1.97 | 10.79 | 1.85 | 10 | 12.33 | 13 | 97.36 |
| 8 | 386+300 | 9.9 | 68.7 | 21.4 | 21.4 | 24.82 | 4.73 | 20.09 | 1.96 | 10.8 | 1.88 | 9 | 9.48 | 12.5 | 98.94 |
| 9 | 395+800 | 14.3 | 68.2 | 17.5 | 17.5 | 22.67 | 6.1 | 16.57 | 1.95 | 10.92 | 1.85 | 7 | 9.01 | 13.5 | 97.37 |
| 10 | 408+000 | 9.6 | 59 | 31.4 | 31.4 | 25 | 5.25 | 19.75 | 1.92 | 10.85 | 1.89 | 8 | 9.78 | 9 | 99.47 |
| 11 | 416+550 | 18.8 | 62.6 | 18.6 | 18.6 | 21.82 | 5.43 | 16.39 | 1.88 | 10.87 | 1.87 | 8 | 8.54 | 9.5 | 98.42 |
| 12 | 425+100 | 16.9 | 66.3 | 16.8 | 16.8 | 22.65 | 4.19 | 18.46 | 1.9 | 10.83 | 1.87 | 10 | 9.92 | 10.5 | 98.42 |

**Observations and Conclusions:**

From the above table, the degree of compaction along the project corridor is ranging between 86.84% to 99.47% with an average value of 97.26 % and the 4-days soaked CBR is ranging from 8.54% to 13.28% with an average value of 10.375%.

**Section-03 Chennai-Tada**

| S. No. | Ch. | Gradation: Percent by weight passing through the sieve (IS:2720-IV) | | | Clay & Silt Content | Atterberg Limits (IS:2720-Pt-V) | | | Modified Proctor Test (IS: 2720-Pt-VIII) | | In-situ Density | | 4-Days Soaked CBR (%) | Free Swell Index | Degree of Compaction (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gravel (%) | Sand (%) | Clay & Silt Content (%) | | Liquid Limit (LL) (%) | Plastic Limit (PL) (%) | Plasticity Index (PI) | Max. dry density (gm/cc.) | OMC (%) | FDD (gm/cc) | FMC (%) | | | |
| 1 | 3 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 1 | 54+350 | 17.1 | 55.4 | 27.5 | 27.5 | 28 | 2.34 | 25.66 | 1.93 | 10.73 | 1.89 | 3 | 9.96 | 8.33 | 99.48 |
| 2 | 54+350 | 11.9 | 46.6 | 41.5 | 41.5 | 24.24 | 2.62 | 21.62 | 1.86 | 10.79 | 1.85 | 2 | 10.43 | 20 | 97.36 |

**Observations and Conclusions:**

From the above table, the degree of compaction along the project corridor is ranging between 93.16% to 99.48% with an average value of 97.28 % and the 4-days soaked CBR is ranging from 9.48% to 10.91% with an average value of 10.18%.

### 7.4.3 Existing Pavement Composition and Analysis

Existing pavement composition (pavement course, material type, and thickness) was recorded at every sub grade strength test pit dug at an interval of 500m along the Project Stretch.

The summary of existing pavement crust thickness is presented in following figure and table.

**Table 7-5 : Crust Composition**

**Section-01 Vijayawada-Chilakaluripet**

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 1 | 0+558 | LHS | 150 | 433 |
| 2 | 0+576 | RHS | 165 | 454 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 3 | 1+018 | LHS | 150 | 433 |
| 4 | 1+160 | RHS | 183 | 442 |
| 5 | 1+166 | RHS | 169 | 430 |
| 6 | 1+615 | LHS | 158 | 458 |
| 7 | 1+679 | RHS | 161 | 439 |
| 8 | 1+757 | RHS | 174 | 440 |
| 9 | 2+173 | LHS | 150 | 452 |
| 10 | 2+211 | RHS | 167 | 454 |
| 11 | 2+247 | RHS | 176 | 468 |
| 12 | 2+640 | LHS | 154 | 459 |
| 13 | 2+791 | RHS | 155 | 470 |
| 14 | 2+846 | RHS | 177 | 440 |
| 15 | 3+145 | LHS | 170 | 468 |
| 16 | 3+231 | RHS | 170 | 455 |
| 17 | 3+674 | RHS | 152 | 451 |
| 18 | 3+679 | LHS | 161 | 452 |
| 19 | 4+245 | RHS | 161 | 449 |
| 20 | 4+268 | LHS | 160 | 447 |
| 21 | 4+713 | LHS | 157 | 434 |
| 22 | 4+756 | RHS | 161 | 459 |
| 23 | 5+156 | LHS | 151 | 448 |
| 24 | 5+215 | RHS | 163 | 443 |
| 25 | 5+669 | RHS | 164 | 436 |
| 26 | 5+681 | LHS | 160 | 462 |
| 27 | 6+186 | RHS | 151 | 446 |
| 28 | 6+278 | LHS | 161 | 463 |
| 29 | 6+690 | RHS | 160 | 442 |
| 30 | 6+733 | LHS | 167 | 459 |
| 31 | 7+213 | RHS | 163 | 457 |
| 32 | 7+301 | LHS | 159 | 466 |
| 33 | 7+782 | RHS | 165 | 454 |
| 34 | 7+855 | LHS | 151 | 431 |
| 35 | 8+323 | RHS | 151 | 457 |
| 36 | 8+438 | LHS | 168 | 437 |
| 37 | 8+779 | RHS | 151 | 449 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 38 | 9+001 | LHS | 155 | 454 |
| 39 | 9+265 | RHS | 155 | 436 |
| 40 | 9+452 | LHS | 161 | 470 |
| 41 | 9+803 | RHS | 160 | 461 |
| 42 | 9+984 | LHS | 161 | 466 |
| 43 | 10+295 | RHS | 159 | 457 |
| 44 | 10+524 | LHS | 170 | 454 |
| 45 | 10+820 | RHS | 152 | 456 |
| 46 | 11+033 | LHS | 166 | 460 |
| 47 | 11+321 | RHS | 161 | 468 |
| 48 | 11+600 | LHS | 162 | 464 |
| 49 | 11+853 | RHS | 170 | 457 |
| 50 | 12+041 | LHS | 151 | 459 |
| 51 | 12+440 | RHS | 167 | 433 |
| 52 | 12+596 | LHS | 156 | 445 |
| 53 | 12+917 | RHS | 164 | 457 |
| 54 | 13+124 | LHS | 153 | 451 |
| 55 | 13+372 | RHS | 160 | 468 |
| 56 | 13+689 | LHS | 162 | 469 |
| 57 | 13+888 | RHS | 154 | 455 |
| 58 | 14+260 | LHS | 162 | 439 |
| 59 | 14+383 | RHS | 167 | 430 |
| 60 | 14+846 | LHS | 164 | 437 |
| 61 | 14+914 | RHS | 157 | 469 |
| 62 | 15+343 | LHS | 156 | 455 |
| 63 | 15+415 | RHS | 158 | 432 |
| 64 | 15+919 | LHS | 166 | 462 |
| 65 | 355+000 | LHS | 170 | 469 |
| 66 | 355+000 | RHS | 173 | 438 |
| 67 | 355+452 | LHS | 172 | 444 |
| 68 | 355+995 | LHS | 184 | 431 |
| 69 | 356+462 | LHS | 184 | 437 |
| 70 | 356+927 | LHS | 179 | 434 |
| 71 | 377+200 | LHS | 183 | 463 |
| 72 | 377+200 | RHS | 172 | 437 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 73 | 377+720 | RHS | 184 | 445 |
| 74 | 377+747 | LHS | 173 | 435 |
| 75 | 378+204 | LHS | 177 | 450 |
| 76 | 378+283 | RHS | 179 | 456 |
| 77 | 378+778 | LHS | 183 | 462 |
| 78 | 378+867 | RHS | 189 | 446 |
| 79 | 379+284 | LHS | 189 | 432 |
| 80 | 379+401 | RHS | 179 | 443 |
| 81 | 379+826 | LHS | 174 | 445 |
| 82 | 379+871 | RHS | 185 | 455 |
| 83 | 380+281 | LHS | 185 | 449 |
| 84 | 380+332 | RHS | 176 | 435 |
| 85 | 380+811 | RHS | 189 | 434 |
| 86 | 380+834 | LHS | 180 | 453 |
| 87 | 381+299 | RHS | 177 | 445 |
| 88 | 381+318 | LHS | 173 | 438 |
| 89 | 381+839 | RHS | 176 | 444 |
| 90 | 381+869 | LHS | 176 | 438 |
| 91 | 382+319 | RHS | 188 | 459 |
| 92 | 382+363 | LHS | 190 | 451 |
| 93 | 382+761 | RHS | 188 | 463 |
| 94 | 382+895 | LHS | 190 | 452 |
| 95 | 383+329 | RHS | 179 | 452 |
| 96 | 383+466 | LHS | 181 | 459 |
| 97 | 383+776 | RHS | 190 | 441 |
| 98 | 383+911 | LHS | 185 | 435 |
| 99 | 384+326 | RHS | 172 | 436 |
| 100 | 384+471 | LHS | 180 | 451 |
| 101 | 384+799 | RHS | 181 | 436 |
| 102 | 385+058 | LHS | 187 | 452 |
| 103 | 385+363 | RHS | 170 | 466 |
| 104 | 385+596 | LHS | 176 | 437 |
| 105 | 385+819 | RHS | 181 | 469 |
| 106 | 386+107 | LHS | 177 | 439 |
| 107 | 386+343 | RHS | 188 | 459 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 108 | 386+574 | LHS | 175 | 461 |
| 109 | 386+898 | RHS | 183 | 463 |
| 110 | 387+154 | LHS | 170 | 441 |
| 111 | 387+479 | RHS | 182 | 447 |
| 112 | 387+661 | LHS | 180 | 436 |
| 113 | 388+002 | RHS | 187 | 466 |
| 114 | 388+148 | LHS | 183 | 432 |
| 115 | 388+488 | RHS | 171 | 431 |
| 116 | 388+631 | LHS | 188 | 456 |
| 117 | 389+069 | RHS | 170 | 462 |
| 118 | 389+075 | LHS | 179 | 466 |
| 119 | 389+555 | LHS | 183 | 447 |
| 120 | 389+593 | RHS | 178 | 447 |
| 121 | 390+078 | LHS | 186 | 448 |
| 122 | 390+161 | RHS | 188 | 463 |
| 123 | 390+676 | LHS | 186 | 430 |
| 124 | 390+678 | RHS | 176 | 445 |
| 125 | 391+216 | LHS | 188 | 431 |
| 126 | 391+234 | RHS | 179 | 454 |
| 127 | 391+774 | LHS | 175 | 458 |
| 128 | 391+829 | RHS | 179 | 460 |
| 129 | 392+239 | LHS | 180 | 440 |
| 130 | 392+375 | RHS | 173 | 446 |
| 131 | 392+803 | LHS | 180 | 430 |
| 132 | 392+850 | RHS | 182 | 456 |
| 133 | 393+358 | LHS | 182 | 467 |
| 134 | 393+378 | RHS | 182 | 441 |
| 135 | 393+841 | RHS | 176 | 435 |
| 136 | 393+954 | LHS | 174 | 436 |
| 137 | 394+380 | RHS | 173 | 432 |
| 138 | 394+502 | LHS | 177 | 462 |
| 139 | 394+883 | RHS | 186 | 459 |
| 140 | 394+971 | LHS | 180 | 431 |
| 141 | 395+442 | RHS | 174 | 444 |
| 142 | 395+471 | LHS | 177 | 442 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 143 | 395+913 | RHS | 171 | 451 |
| 144 | 396+054 | LHS | 183 | 470 |
| 145 | 396+422 | RHS | 183 | 432 |
| 146 | 396+583 | LHS | 182 | 445 |
| 147 | 397+007 | RHS | 173 | 445 |
| 148 | 397+160 | LHS | 180 | 446 |
| 149 | 397+541 | RHS | 177 | 434 |
| 150 | 397+724 | LHS | 190 | 466 |
| 151 | 398+043 | RHS | 188 | 455 |
| 152 | 398+309 | LHS | 176 | 459 |
| 153 | 398+626 | RHS | 177 | 437 |
| 154 | 398+774 | LHS | 187 | 438 |
| 155 | 399+225 | RHS | 171 | 435 |
| 156 | 399+302 | LHS | 179 | 448 |
| 157 | 399+795 | RHS | 178 | 463 |
| 158 | 399+801 | LHS | 178 | 454 |
| 159 | 400+303 | RHS | 187 | 452 |
| 160 | 400+400 | LHS | 180 | 461 |
| 161 | 400+805 | RHS | 188 | 461 |
| 162 | 400+931 | LHS | 187 | 439 |
| 163 | 401+289 | RHS | 185 | 437 |
| 164 | 401+407 | LHS | 181 | 458 |
| 165 | 401+744 | RHS | 177 | 460 |
| 166 | 401+880 | LHS | 179 | 430 |
| 167 | 402+321 | RHS | 184 | 457 |
| 168 | 402+342 | LHS | 184 | 457 |
| 169 | 402+791 | RHS | 188 | 461 |
| 170 | 402+829 | LHS | 179 | 465 |
| 171 | 403+365 | RHS | 190 | 438 |
| 172 | 403+397 | LHS | 174 | 449 |
| 173 | 403+853 | LHS | 184 | 450 |
| 174 | 403+923 | RHS | 172 | 463 |
| 175 | 404+407 | RHS | 188 | 444 |
| 176 | 404+424 | LHS | 184 | 432 |
| 177 | 404+934 | RHS | 183 | 459 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 178 | 404+975 | LHS | 180 | 462 |
| 179 | 405+438 | RHS | 182 | 438 |
| 180 | 405+513 | LHS | 183 | 440 |
| 181 | 405+932 | RHS | 179 | 430 |
| 182 | 406+034 | LHS | 183 | 466 |
| 183 | 406+384 | RHS | 181 | 446 |
| 184 | 406+497 | LHS | 179 | 441 |
| 185 | 406+878 | RHS | 189 | 437 |
| 186 | 406+997 | LHS | 180 | 456 |
| 187 | 407+441 | RHS | 189 | 446 |
| 188 | 407+546 | LHS | 171 | 431 |
| 189 | 408+019 | RHS | 174 | 460 |
| 190 | 408+064 | LHS | 188 | 447 |
| 191 | 408+531 | RHS | 183 | 437 |
| 192 | 408+644 | LHS | 174 | 454 |
| 193 | 408+989 | RHS | 176 | 452 |
| 194 | 409+096 | LHS | 187 | 448 |
| 195 | 409+477 | RHS | 177 | 455 |
| 196 | 409+632 | LHS | 177 | 437 |
| 197 | 409+951 | RHS | 185 | 438 |
| 198 | 410+097 | LHS | 189 | 435 |
| 199 | 410+423 | RHS | 172 | 469 |
| 200 | 410+563 | LHS | 188 | 439 |
| 201 | 410+925 | RHS | 185 | 445 |
| 202 | 411+087 | LHS | 190 | 463 |
| 203 | 411+422 | RHS | 177 | 447 |
| 204 | 411+638 | LHS | 178 | 435 |
| 205 | 411+960 | RHS | 179 | 470 |
| 206 | 412+141 | LHS | 178 | 446 |
| 207 | 412+560 | RHS | 178 | 468 |
| 208 | 412+693 | LHS | 172 | 457 |
| 209 | 413+001 | RHS | 178 | 452 |
| 210 | 413+290 | LHS | 182 | 461 |
| 211 | 413+598 | RHS | 180 | 445 |
| 212 | 413+766 | LHS | 174 | 450 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 213 | 414+184 | RHS | 172 | 447 |
| 214 | 414+219 | LHS | 183 | 438 |
| 215 | 414+686 | LHS | 174 | 434 |
| 216 | 414+758 | RHS | 181 | 442 |
| 217 | 415+192 | LHS | 189 | 461 |
| 218 | 415+278 | RHS | 182 | 435 |
| 219 | 415+665 | LHS | 173 | 469 |
| 220 | 415+819 | RHS | 171 | 443 |
| 221 | 416+144 | LHS | 177 | 435 |
| 222 | 416+383 | RHS | 184 | 438 |
| 223 | 416+592 | LHS | 188 | 463 |
| 224 | 416+974 | RHS | 186 | 432 |
| 225 | 417+136 | LHS | 172 | 462 |
| 226 | 417+470 | RHS | 189 | 465 |
| 227 | 417+716 | LHS | 175 | 453 |
| 228 | 418+065 | RHS | 178 | 469 |
| 229 | 418+173 | LHS | 185 | 460 |
| 230 | 418+543 | RHS | 177 | 464 |
| 231 | 418+654 | LHS | 185 | 456 |
| 232 | 419+034 | RHS | 182 | 464 |
| 233 | 419+206 | LHS | 179 | 436 |
| 234 | 419+579 | RHS | 174 | 448 |
| 235 | 419+716 | LHS | 183 | 448 |
| 236 | 420+066 | RHS | 186 | 446 |
| 237 | 420+160 | LHS | 178 | 440 |
| 238 | 420+631 | RHS | 189 | 454 |
| 239 | 420+749 | LHS | 172 | 459 |
| 240 | 421+073 | RHS | 176 | 446 |
| 241 | 421+276 | LHS | 172 | 450 |
| 242 | 421+518 | RHS | 179 | 440 |
| 243 | 421+827 | LHS | 186 | 463 |
| 244 | 422+046 | RHS | 172 | 462 |
| 245 | 422+279 | LHS | 185 | 441 |
| 246 | 422+600 | RHS | 170 | 453 |

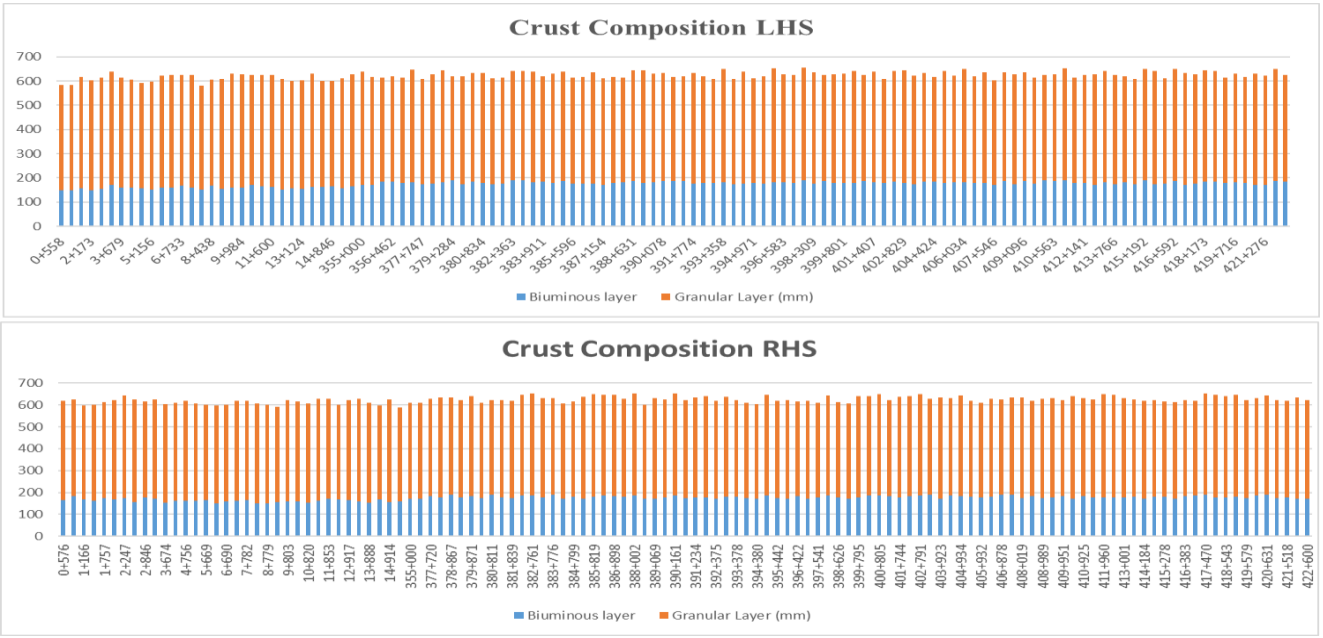



**Figure 7-3 : Existing Crust composition**

The Flexible pavement composition comprises of Bituminous Layer, Granular Layer-I (WMM) and Granular Layer-II (GSB) on subgrade with average of 175 mm thick bituminous layer over 450 mm thick Granular layer

**Crust Composition**

**Section-02 Chennai Bypass**

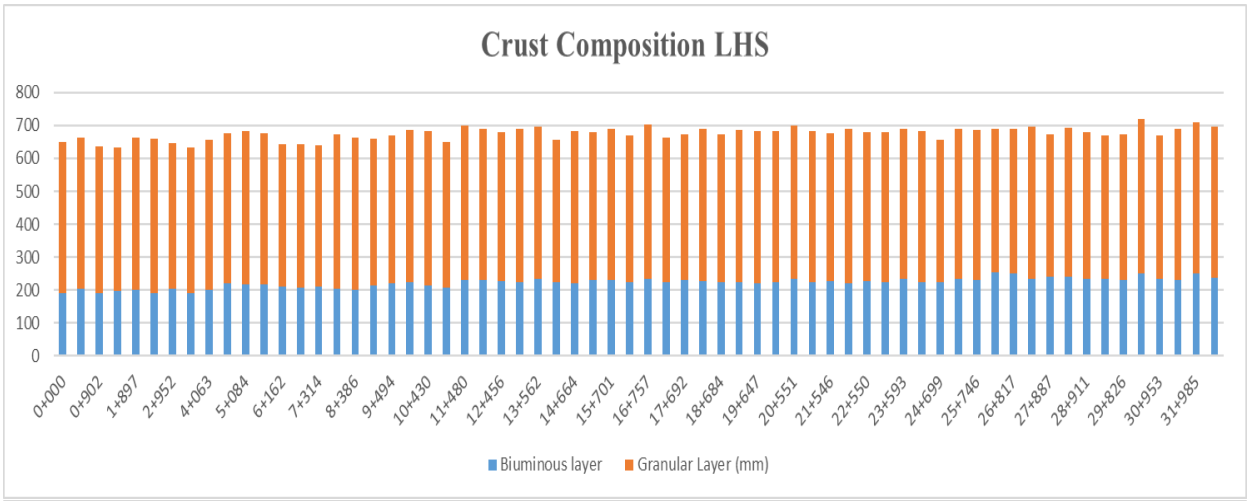
| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 1 | 0+000 | RHS | 186 | 435 |
| 2 | 0+453 | LHS | 203 | 459 |
| 3 | 0+484 | RHS | 192 | 449 |
| 4 | 0+902 | LHS | 192 | 444 |
| 5 | 1+078 | RHS | 196 | 432 |
| 6 | 1+356 | LHS | 198 | 435 |
| 7 | 1+662 | RHS | 204 | 441 |
| 8 | 1+897 | LHS | 200 | 463 |
| 9 | 2+110 | RHS | 199 | 463 |
| 10 | 2+353 | LHS | 192 | 468 |
| 11 | 2+677 | RHS | 204 | 457 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 12 | 2+952 | LHS | 203 | 444 |
| 13 | 3+214 | RHS | 186 | 445 |
| 14 | 3+493 | LHS | 190 | 443 |
| 15 | 3+677 | RHS | 198 | 453 |
| 16 | 4+063 | LHS | 200 | 456 |
| 17 | 4+209 | RHS | 203 | 443 |
| 18 | 4+585 | LHS | 220 | 456 |
| 19 | 4+679 | RHS | 225 | 438 |
| 20 | 5+084 | LHS | 217 | 467 |
| 21 | 5+250 | RHS | 201 | 446 |
| 22 | 5+638 | LHS | 218 | 457 |
| 23 | 5+806 | RHS | 216 | 463 |
| 24 | 6+162 | LHS | 210 | 432 |
| 25 | 6+405 | RHS | 219 | 447 |
| 26 | 6+725 | LHS | 208 | 434 |
| 27 | 6+996 | RHS | 219 | 466 |
| 28 | 7+314 | LHS | 211 | 430 |
| 29 | 7+525 | RHS | 219 | 452 |
| 30 | 7+837 | LHS | 204 | 469 |
| 31 | 8+098 | RHS | 205 | 469 |
| 32 | 8+386 | LHS | 202 | 462 |
| 33 | 8+592 | RHS | 214 | 452 |
| 34 | 8+983 | LHS | 214 | 444 |
| 35 | 9+084 | RHS | 215 | 468 |
| 36 | 9+494 | LHS | 219 | 452 |
| 37 | 9+524 | RHS | 207 | 443 |
| 38 | 9+947 | LHS | 225 | 462 |
| 39 | 10+100 | RHS | 200 | 438 |
| 40 | 10+430 | LHS | 215 | 468 |
| 41 | 10+682 | RHS | 221 | 460 |
| 42 | 10+882 | LHS | 206 | 445 |
| 43 | 11+167 | RHS | 215 | 448 |
| 44 | 11+480 | LHS | 232 | 466 |
| 45 | 11+643 | RHS | 226 | 466 |
| 46 | 12+007 | LHS | 232 | 456 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 47 | 12+189 | RHS | 235 | 455 |
| 48 | 12+456 | LHS | 226 | 455 |
| 49 | 12+721 | RHS | 220 | 445 |
| 50 | 13+029 | LHS | 225 | 463 |
| 51 | 13+177 | RHS | 226 | 441 |
| 52 | 13+562 | LHS | 235 | 462 |
| 53 | 13+728 | RHS | 223 | 452 |
| 54 | 14+075 | LHS | 225 | 432 |
| 55 | 14+218 | RHS | 233 | 447 |
| 56 | 14+664 | LHS | 221 | 462 |
| 57 | 14+788 | RHS | 227 | 439 |
| 58 | 15+109 | LHS | 231 | 448 |
| 59 | 15+386 | RHS | 221 | 465 |
| 60 | 15+701 | LHS | 231 | 458 |
| 61 | 15+917 | RHS | 227 | 448 |
| 62 | 16+187 | LHS | 223 | 448 |
| 63 | 16+401 | RHS | 227 | 435 |
| 64 | 16+757 | LHS | 235 | 468 |
| 65 | 16+906 | RHS | 234 | 465 |
| 66 | 17+225 | LHS | 223 | 441 |
| 67 | 17+371 | RHS | 233 | 454 |
| 68 | 17+692 | LHS | 231 | 442 |
| 69 | 17+841 | RHS | 223 | 459 |
| 70 | 18+133 | LHS | 227 | 464 |
| 71 | 18+441 | RHS | 225 | 450 |
| 72 | 18+684 | LHS | 225 | 447 |
| 73 | 18+927 | RHS | 226 | 454 |
| 74 | 19+187 | LHS | 223 | 462 |
| 75 | 19+522 | RHS | 225 | 441 |
| 76 | 19+647 | LHS | 220 | 464 |
| 77 | 20+028 | RHS | 234 | 464 |
| 78 | 20+110 | LHS | 223 | 461 |
| 79 | 20+551 | LHS | 233 | 468 |
| 80 | 20+557 | RHS | 223 | 469 |
| 81 | 21+002 | LHS | 224 | 460 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 82 | 21+009 | RHS | 229 | 440 |
| 83 | 21+531 | RHS | 231 | 441 |
| 84 | 21+546 | LHS | 228 | 449 |
| 85 | 21+975 | RHS | 233 | 462 |
| 86 | 22+081 | LHS | 220 | 468 |
| 87 | 22+479 | RHS | 229 | 463 |
| 88 | 22+550 | LHS | 226 | 453 |
| 89 | 23+061 | LHS | 224 | 457 |
| 90 | 23+066 | RHS | 220 | 439 |
| 91 | 23+593 | LHS | 235 | 456 |
| 92 | 23+652 | RHS | 226 | 434 |
| 93 | 24+100 | RHS | 235 | 441 |
| 94 | 24+142 | LHS | 224 | 460 |
| 95 | 24+695 | RHS | 233 | 448 |
| 96 | 24+699 | LHS | 223 | 433 |
| 97 | 25+137 | RHS | 229 | 454 |
| 98 | 25+269 | LHS | 233 | 455 |
| 99 | 25+680 | RHS | 245 | 433 |
| 100 | 25+746 | LHS | 231 | 455 |
| 101 | 26+200 | RHS | 246 | 466 |
| 102 | 26+218 | LHS | 254 | 434 |
| 103 | 26+754 | RHS | 246 | 441 |
| 104 | 26+817 | LHS | 250 | 441 |
| 105 | 27+326 | LHS | 234 | 463 |
| 106 | 27+331 | RHS | 232 | 463 |
| 107 | 27+887 | LHS | 239 | 434 |
| 108 | 27+901 | RHS | 248 | 446 |
| 109 | 28+348 | RHS | 243 | 446 |
| 110 | 28+356 | LHS | 241 | 451 |
| 111 | 28+845 | RHS | 239 | 461 |
| 112 | 28+911 | LHS | 233 | 447 |
| 113 | 29+322 | RHS | 252 | 455 |
| 114 | 29+356 | LHS | 233 | 437 |
| 115 | 29+826 | LHS | 230 | 444 |
| 116 | 29+876 | RHS | 237 | 438 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 117 | 30+330 | RHS | 244 | 445 |
| 118 | 30+416 | LHS | 249 | 469 |
| 119 | 30+906 | RHS | 239 | 431 |
| 120 | 30+953 | LHS | 235 | 435 |
| 121 | 31+374 | RHS | 235 | 431 |
| 122 | 31+402 | LHS | 231 | 458 |
| 123 | 31+946 | RHS | 232 | 440 |
| 124 | 31+985 | LHS | 250 | 461 |
| 125 | 32+000 | RHS | 247 | 467 |
| 126 | 32+100 | RHS | 235 | 443 |
| 127 | 32+515 | LHS | 236 | 461 |



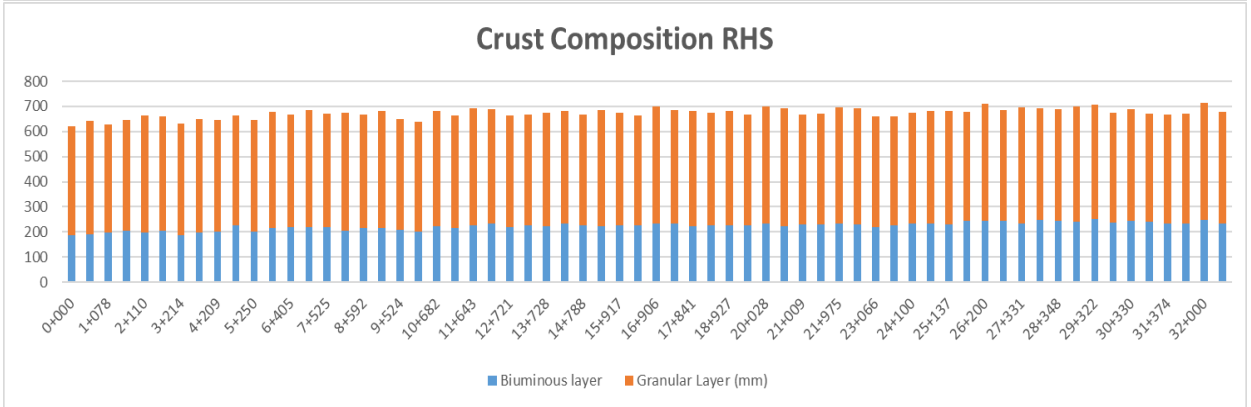




***Figure 7-4 : Existing Crust composition***

The Flexible pavement composition comprises of Bituminous Layer, Granular Layer-I (WMM) and Granular Layer-II (GSB) on subgrade with average of 220 mm thick bituminous layer over 450 mm thick Granular layer

**Crust Composition**

**Section-03 Chennai-Tada**

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 1 | 21+590 | LHS | 179 | 436 |
| 2 | 21+825 | RHS | 188 | 451 |
| 3 | 22+075 | LHS | 179 | 435 |
| 4 | 22+382 | RHS | 187 | 457 |
| 5 | 22+528 | LHS | 176 | 449 |
| 6 | 22+969 | RHS | 187 | 435 |
| 7 | 23+107 | LHS | 179 | 453 |
| 8 | 23+445 | RHS | 178 | 458 |
| 9 | 23+555 | LHS | 183 | 449 |
| 10 | 24+030 | RHS | 172 | 459 |
| 11 | 24+118 | LHS | 177 | 441 |
| 12 | 24+496 | RHS | 188 | 453 |
| 13 | 24+565 | LHS | 183 | 452 |
| 14 | 25+037 | RHS | 170 | 460 |
| 15 | 25+045 | LHS | 177 | 457 |
| 16 | 25+494 | LHS | 170 | 455 |
| 17 | 25+609 | RHS | 187 | 437 |
| 18 | 25+993 | LHS | 185 | 438 |
| 19 | 26+078 | RHS | 186 | 445 |
| 20 | 26+524 | LHS | 181 | 458 |
| 21 | 26+665 | RHS | 179 | 454 |
| 22 | 27+069 | LHS | 182 | 455 |
| 23 | 27+177 | RHS | 188 | 450 |
| 24 | 27+651 | LHS | 184 | 446 |
| 25 | 27+727 | RHS | 184 | 447 |
| 26 | 28+230 | LHS | 173 | 452 |
| 27 | 28+327 | RHS | 175 | 460 |
| 28 | 28+817 | LHS | 184 | 452 |
| 29 | 28+917 | RHS | 181 | 437 |
| 30 | 29+408 | LHS | 170 | 452 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 31 | 29+512 | RHS | 189 | 445 |
| 32 | 29+958 | LHS | 170 | 438 |
| 33 | 29+981 | RHS | 187 | 454 |
| 34 | 30+453 | RHS | 172 | 438 |
| 35 | 30+558 | LHS | 176 | 452 |
| 36 | 30+964 | RHS | 185 | 460 |
| 37 | 31+034 | LHS | 189 | 457 |
| 38 | 31+446 | RHS | 176 | 455 |
| 39 | 31+474 | LHS | 183 | 444 |
| 40 | 31+949 | RHS | 184 | 440 |
| 41 | 31+996 | LHS | 172 | 458 |
| 42 | 32+533 | RHS | 170 | 458 |
| 43 | 32+537 | LHS | 172 | 441 |
| 44 | 32+974 | RHS | 178 | 444 |
| 45 | 33+070 | LHS | 175 | 449 |
| 46 | 33+454 | RHS | 190 | 436 |
| 47 | 33+615 | LHS | 187 | 450 |
| 48 | 33+937 | RHS | 180 | 437 |
| 49 | 34+129 | LHS | 182 | 460 |
| 50 | 34+482 | RHS | 178 | 453 |
| 51 | 34+604 | LHS | 180 | 449 |
| 52 | 35+076 | RHS | 188 | 459 |
| 53 | 35+135 | LHS | 189 | 449 |
| 54 | 35+574 | RHS | 182 | 436 |
| 55 | 35+600 | LHS | 185 | 446 |
| 56 | 36+026 | RHS | 170 | 451 |
| 57 | 36+111 | LHS | 182 | 454 |
| 58 | 36+510 | RHS | 190 | 454 |
| 59 | 36+689 | LHS | 188 | 447 |
| 60 | 37+054 | RHS | 177 | 437 |
| 61 | 37+158 | LHS | 175 | 452 |
| 62 | 37+562 | RHS | 171 | 447 |
| 63 | 37+620 | LHS | 173 | 458 |
| 64 | 38+053 | RHS | 182 | 438 |
| 65 | 38+126 | LHS | 179 | 438 |
| 66 | 38+613 | RHS | 180 | 443 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 67 | 38+626 | LHS | 189 | 435 |
| 68 | 39+071 | RHS | 177 | 446 |
| 69 | 39+189 | LHS | 180 | 449 |
| 70 | 39+550 | RHS | 186 | 436 |
| 71 | 39+782 | LHS | 176 | 451 |
| 72 | 40+033 | RHS | 181 | 446 |
| 73 | 40+312 | LHS | 188 | 460 |
| 74 | 40+616 | RHS | 171 | 458 |
| 75 | 40+809 | LHS | 189 | 455 |
| 76 | 41+080 | RHS | 174 | 444 |
| 77 | 41+302 | LHS | 172 | 458 |
| 78 | 41+565 | RHS | 172 | 455 |
| 79 | 41+814 | LHS | 183 | 452 |
| 80 | 42+020 | RHS | 185 | 451 |
| 81 | 42+350 | LHS | 174 | 449 |
| 82 | 42+505 | RHS | 173 | 459 |
| 83 | 42+928 | LHS | 186 | 450 |
| 84 | 43+002 | RHS | 183 | 455 |
| 85 | 43+450 | RHS | 180 | 457 |
| 86 | 43+525 | LHS | 174 | 449 |
| 87 | 44+013 | RHS | 188 | 448 |
| 88 | 44+124 | LHS | 175 | 440 |
| 89 | 44+611 | RHS | 172 | 458 |
| 90 | 44+635 | LHS | 183 | 445 |
| 91 | 45+128 | RHS | 174 | 444 |
| 92 | 45+164 | LHS | 174 | 452 |
| 93 | 45+681 | RHS | 177 | 435 |
| 94 | 45+698 | LHS | 181 | 438 |
| 95 | 46+134 | RHS | 183 | 459 |
| 96 | 46+259 | LHS | 179 | 445 |
| 97 | 46+589 | RHS | 178 | 442 |
| 98 | 46+817 | LHS | 176 | 446 |
| 99 | 47+057 | RHS | 188 | 449 |
| 100 | 47+368 | LHS | 183 | 460 |
| 101 | 47+629 | RHS | 187 | 445 |
| 102 | 47+830 | LHS | 190 | 440 |

| S.No | Chainage (Km.) | Side (LHS/RHS) | Existing Crust details | |
|---|---|---|---|---|
| | | | Biuminous layer (BC+DBM) (mm) | Granular Layer (mm) |
| 103 | 48+155 | RHS | 185 | 455 |
| 104 | 48+425 | LHS | 175 | 452 |
| 105 | 48+704 | RHS | 186 | 443 |
| 106 | 48+999 | LHS | 186 | 456 |
| 107 | 49+176 | RHS | 182 | 455 |
| 108 | 49+478 | LHS | 171 | 460 |
| 109 | 49+725 | RHS | 184 | 460 |
| 110 | 50+052 | LHS | 172 | 441 |
| 111 | 50+306 | RHS | 180 | 447 |
| 112 | 50+492 | LHS | 190 | 460 |
| 113 | 50+787 | RHS | 173 | 439 |
| 114 | 50+944 | LHS | 176 | 459 |
| 115 | 51+364 | RHS | 171 | 445 |
| 116 | 51+399 | LHS | 174 | 438 |
| 117 | 51+846 | LHS | 189 | 450 |
| 118 | 51+862 | RHS | 190 | 451 |
| 119 | 52+431 | LHS | 182 | 439 |
| 120 | 52+440 | RHS | 177 | 444 |
| 121 | 52+951 | RHS | 171 | 446 |
| 122 | 53+025 | LHS | 185 | 447 |
| 123 | 53+538 | LHS | 174 | 454 |
| 124 | 53+550 | RHS | 176 | 440 |
| 125 | 54+096 | LHS | 170 | 457 |
| 126 | 54+097 | RHS | 175 | 449 |
| 127 | 54+588 | LHS | 172 | 447 |

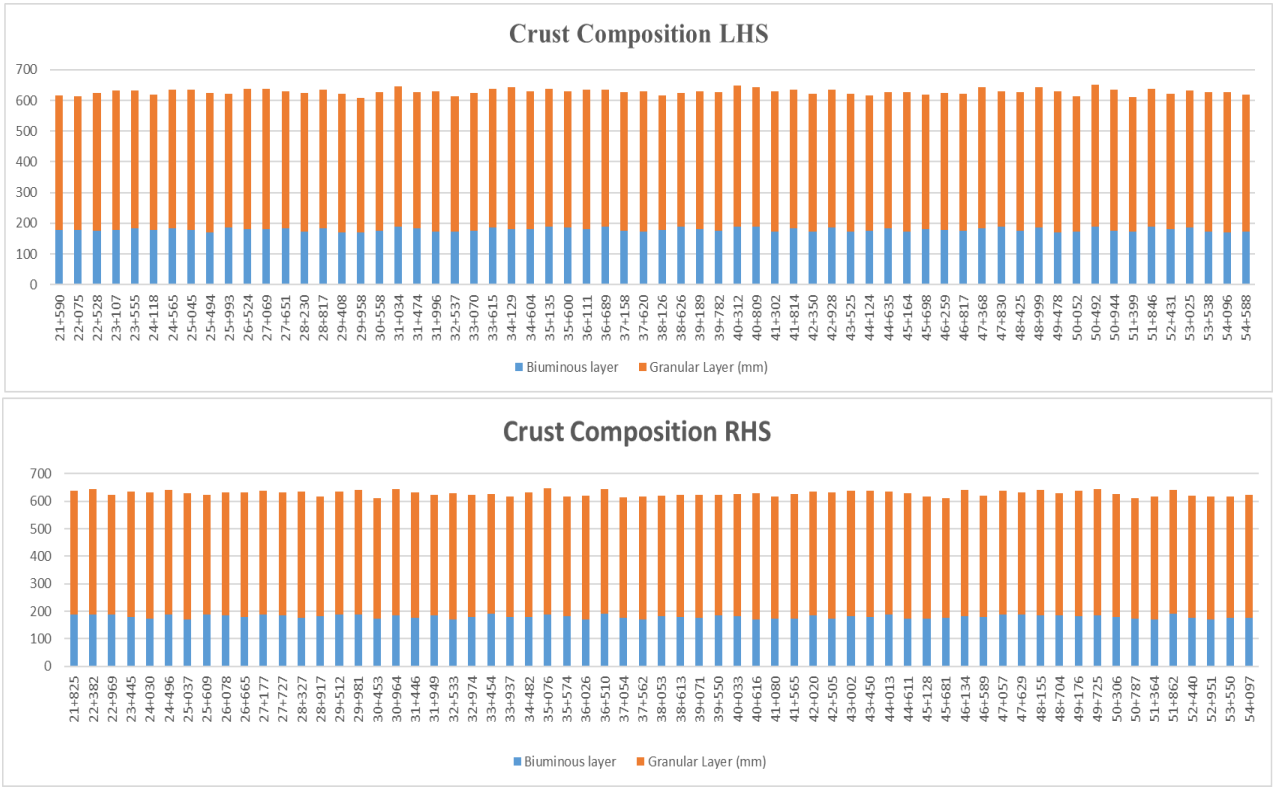



**Figure 7-4 : Existing Crust composition**

The Flexible pavement composition comprises of Bituminous Layer, Granular Layer-I (WMM) and Granular Layer-II (GSB) on subgrade with average of 180 mm thick bituminous layer over 450 mm thick Granular layer

## 7.5 Flexible Pavement

Design of flexible pavement uses the concept of layered system. Based on this, flexible pavement may be constructed in a number of layers and the top layer has to be of best quality to sustain maximum compressive stress, in addition to wear and tear. The lower layers will experience lesser magnitude of stress and low quality material can be used. Flexible pavements are constructed using bituminous materials. These can be either in the form of surface treatments (such as bituminous surface treatments generally found on low volume roads) or, asphalt concrete surface courses (generally used on high volume roads such as national highways). Flexible pavement layers reflect the deformation of the lower layers on to the surface layer (e.g., if there is any undulation in sub-grade then it will be transferred to the surface layer). In the case of flexible pavement, the design is based on overall performance of flexible pavement, and the stresses produced should be kept well below the allowable stresses of each pavement layer.

## Estimation of Axle Load and Vehicle Damage Factor:

Traffic loading on highway pavements is a heterogeneous combination of different types of vehicles, carrying a wide spectrum of wheel loads. It is very much essential to convert this heterogeneous traffic to an equivalent homogenous traffic in terms of a chosen standard vehicle. One way of achieving this objective is the use of Equivalent Standard Axle Load (ESAL) factors like VDF. The VDF is a multiplier for converting the number of commercial vehicles of different axle loads to the number of standard axle load repetitions. Strengthening of existing pavement is based upon the cumulative number of 8.16 tonne Equivalent Standard Axles (ESA) that will pass over during the design period. The classes of traffic which lead to significant axle loads (or damage) to the pavement and accordingly considered for design are: Light Goods Vehicles, Buses, 2/3 axle Trucks and Multi Axle Vehicles (MAV). VDF are calculated in accordance with the guidelines provided in IRC: 37 –2018.

As per Traffic Consultant Report, the VDF is presented in the table below

**Vijayawada-Chilakaluripet (Km 355+000 to Km 437+500)**

**VDF of Kaza Toll Plaza**

| Vehicle Category | Vijayawada to Chilakaluripet | Chilakaluripet to Vijayawada |
|---|---|---|
| Minibus | 0.04 | 0.05 |
| Standard Bus | 1.78 | 1.49 |
| LCV 4 Wheel | 0.06 | 0.06 |
| LCV 6 Wheel | 1.24 | 0.88 |
| 2 Axle Truck | 1.74 | 2.49 |
| 3 Axle truck | 3.86 | 6.13 |
| MAV | 7.34 | 8.88 |

**Chennai Bypass (Km 0+000 to Km 32+600)**

**VDF of Vanagram Toll Plaza**

| Vehicle Category | Tambaram to Madhavaram | Madhavaram to Tambaram |
|---|---|---|
| Minibus | 0.05 | 0.19 |
| Standard Bus | 1.28 | 1.59 |
| LCV 4 Wheel | 0.05 | 0.23 |

| Vehicle Category | Tambaram to Madhavaram | Madhavaram to Tambaram |
|---|---|---|
| LCV 6 Wheel | 0.71 | 0.75 |
| 2 Axle Truck | 1.60 | 2.00 |
| 3 Axle truck | 12.72 | 4.97 |
| MAV | 11.67 | 7.44 |

**VDF of Surapattu Toll Plaza**

| Vehicle Category | Tambaram to Madhavaram | Madhavaram to Tambaram |
|---|---|---|
| Minibus | 0.00 | 0.06 |
| Standard Bus | 0.54 | 0.81 |
| LCV 4 Wheel | 0.11 | 0.33 |
| LCV 6 Wheel | 0.70 | 0.81 |
| 2 Axle Truck | 1.84 | 3.00 |
| 3 Axle truck | 6.83 | 4.38 |
| MAV | 11.02 | 7.49 |

**Chennai-Tada (Km 21+400 to Km 54+400)**

**VDF of Nallur Toll Plaza**

| Vehicle Category | Chennai to Tada | Tada to Chennai |
|---|---|---|
| Minibus | 0.10 | 0.00 |
| Standard Bus | 1.34 | 0.92 |
| LCV 4 Wheel | 0.05 | 0.05 |
| LCV 6 Wheel | 0.54 | 0.87 |
| 2 Axle Truck | 1.31 | 3.18 |
| 3 Axle truck | 2.97 | 3.71 |
| MAV | 5.85 | 9.76 |

**Neelmangla-Tumkur (Km 29+500 to Km 74+168)**

**VDF of Kulumepalya Toll Plaza**

| Vehicle Category | Neelmangla to Tumkur | Tumkur to Neelmangla |
|---|---|---|
| Minibus | 0.18 | 0.00 |
| Standard Bus | 2.47 | 2.96 |
| LCV 4 Wheel | 0.11 | 0.38 |
| LCV 6 Wheel | 0.94 | 0.99 |
| 2 Axle Truck | 2.62 | 2.19 |
| 3 Axle truck | 9.12 | 8.79 |
| MAV | 9.38 | 10.07 |

**VDF of Chokkenahalli Toll Plaza**

| Vehicle Category | Neelmangla to Tumkur | Tumkur to Neelmangla |
|---|---|---|
| Minibus | 0.17 | 0.04 |
| Standard Bus | 1.52 | 1.60 |
| LCV 4 Wheel | 0.05 | 0.15 |
| LCV 6 Wheel | 0.91 | 1.36 |
| 2 Axle Truck | 2.40 | 2.28 |
| 3 Axle truck | 4.22 | 5.49 |
| MAV | 6.75 | 9.40 |

As mentioned earlier, Axle load surveys of commercial vehicles were carried out to establish VDF for use in calculation of traffic loading on the pavement for pavement design and overlay designs. Since, lighter vehicles have a very small equivalent standard axle load value and less damaging effect, these vehicle types are excluded in the axle load survey. To estimate the ESAL of traffic, Axle Load Surveys were carried out at the toll plaza location. The overloaded vehicles have serious adverse impact on performance of pavement. It has been ascertained that the damaging effect of axles on flexible pavement is approximately proportional to the fourth power of the axle load.

## Estimated Design MSA:

The design traffic is considered in terms of the cumulative number of standard axles in both directions of the carriageway during the design life of the road. This can be computed using the following equation:

$$N = \frac{365 \times [(1+r)^n - 1]}{r} \times A \times D \times F$$

where N is the cumulative number of standard axles to be catered for the design in terms of Million Standards Axle (MSA), A is the initial traffic in terms of the number of commercial vehicles per day, D is the lane distribution factors, F is the vehicle damage factor, n is the design life in years, and r is the annual growth rate of commercial vehicles. The traffic in the year of completion is estimated using the following formula:

$$A = P\ (1 + r)\ x$$

Where P is the number of commercial vehicles as per last count, and x is the number of years between the last count and the year of completion between the last count and the year of completion of the project.

As per Traffic Consultant Report, the estimated Design MSA presented in the table below:

**Vijayawada-Chilakaluripet (Km 355+000 to Km 437+500)**

**MSA Calculation of Kaza Toll Plaza**

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.05 | 1.78 | 0.06 | 1.24 | 2.49 | 6.13 | 8.88 | 0.00 | | |
| FY26 | 335 | 2525 | 755 | 1307 | 693 | 1388 | 3164 | 3 | 48,95,376 | 5 |
| FY27 | 351 | 2583 | 790 | 1361 | 721 | 1372 | 3030 | 4 | 47,80,960 | 10 |
| FY28 | 368 | 2643 | 830 | 1416 | 750 | 1344 | 2786 | 4 | 45,63,801 | 14 |
| FY29 | 386 | 2702 | 871 | 1500 | 795 | 1358 | 2944 | 4 | 47,50,311 | 19 |
| FY30 | 406 | 2764 | 916 | 1592 | 844 | 1375 | 3138 | 4 | 49,89,773 | 24 |
| FY31 | 425 | 2823 | 959 | 1685 | 893 | 1391 | 3335 | 4 | 52,31,184 | 29 |
| FY32 | 455 | 2881 | 1025 | 1790 | 949 | 1408 | 3567 | 5 | 55,25,143 | 35 |
| FY33 | 486 | 2948 | 1096 | 1900 | 1007 | 1423 | 3811 | 5 | 58,03,534 | 41 |
| FY34 | 464 | 3007 | 1046 | 1799 | 953 | 1210 | 3156 | 5 | 50,03,306 | 46 |
| FY35 | 434 | 3080 | 979 | 1712 | 907 | 995 | 2424 | 5 | 41,33,544 | 50 |
| FY36 | 464 | 3137 | 1046 | 1683 | 892 | 890 | 2096 | 6 | 37,55,692 | 53 |
| FY37 | 484 | 3192 | 1091 | 1762 | 934 | 897 | 2255 | 6 | 39,39,577 | 57 |
| FY38 | 505 | 3255 | 1138 | 1843 | 976 | 904 | 2424 | 6 | 41,44,112 | 62 |
| FY39 | 525 | 3308 | 1184 | 1925 | 1020 | 911 | 2601 | 6 | 43,55,468 | 66 |
| FY40 | 547 | 3294 | 1233 | 2009 | 1065 | 918 | 2729 | 7 | 45,19,279 | 70 |
| FY41 | 620 | 3316 | 1397 | 2067 | 1095 | 924 | 2887 | 7 | 46,87,734 | 75 |
| FY42 | 647 | 3368 | 1460 | 2157 | 1143 | 931 | 3033 | 7 | 48,70,647 | 80 |
| FY43 | 676 | 3427 | 1524 | 2249 | 1192 | 938 | 3183 | 8 | 50,59,680 | 85 |
| FY44 | 706 | 3480 | 1592 | 2346 | 1243 | 944 | 3341 | 8 | 52,70,557 | 90 |
| FY45 | 738 | 3532 | 1663 | 2446 | 1296 | 951 | 3506 | 8 | 54,62,023 | 96 |
| FY46 | 763 | 3586 | 1721 | 2542 | 1347 | 957 | 3657 | 9 | 56,51,574 | 101 |

**Chennai Bypass (Km 0+000 to Km 32+600)**

**MSA Calculation of Vanagram Toll Plaza**

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.19 | 1.59 | 0.23 | 0.75 | 2.00 | 12.72 | 11.67 | 0.00 | | |
| FY26 | 1302 | 2945 | 747 | 877 | 184 | 551 | 2008 | 7 | 40,64,776 | 4 |
| FY27 | 1335 | 3030 | 766 | 918 | 192 | 555 | 2062 | 7 | 41,63,851 | 8 |
| FY28 | 1370 | 3118 | 786 | 957 | 201 | 564 | 2152 | 7 | 43,26,151 | 13 |
| FY29 | 1407 | 3210 | 808 | 1004 | 211 | 577 | 2223 | 7 | 44,49,234 | 17 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY30 | 1440 | 3294 | 826 | 1026 | 215 | 581 | 2266 | 8 | 45,29,398 | 22 |
| FY31 | 1472 | 3422 | 845 | 1050 | 220 | 585 | 2368 | 8 | 46,93,990 | 26 |
| FY32 | 1505 | 3510 | 864 | 1087 | 228 | 589 | 2437 | 8 | 48,24,266 | 31 |
| FY33 | 1538 | 3599 | 883 | 1132 | 237 | 593 | 2499 | 8 | 49,20,037 | 36 |
| FY34 | 1569 | 3681 | 900 | 1173 | 246 | 597 | 2555 | 8 | 50,18,406 | 41 |
| FY35 | 1603 | 3773 | 920 | 1197 | 251 | 601 | 2664 | 8 | 51,86,473 | 46 |
| FY36 | 1635 | 3904 | 938 | 1242 | 260 | 605 | 2733 | 8 | 53,26,096 | 52 |
| FY37 | 1648 | 3939 | 946 | 1252 | 263 | 606 | 2765 | 8 | 53,62,264 | 57 |
| FY38 | 1657 | 3963 | 951 | 1258 | 264 | 607 | 2785 | 9 | 53,95,833 | 62 |
| FY39 | 1663 | 3980 | 954 | 1267 | 266 | 608 | 2806 | 9 | 54,28,060 | 68 |
| FY40 | 1666 | 3988 | 956 | 1270 | 266 | 608 | 2813 | 9 | 54,54,152 | 73 |
| FY41 | 1669 | 4001 | 958 | 1272 | 267 | 609 | 2820 | 9 | 54,51,862 | 79 |
| FY42 | 1672 | 4009 | 959 | 1276 | 268 | 609 | 2831 | 9 | 54,67,902 | 84 |
| FY43 | 1674 | 4016 | 961 | 1280 | 268 | 609 | 2840 | 9 | 54,81,997 | 90 |
| FY44 | 1677 | 4024 | 962 | 1283 | 269 | 609 | 2848 | 9 | 55,10,788 | 95 |
| FY45 | 1680 | 4032 | 964 | 1287 | 270 | 610 | 2858 | 9 | 55,11,180 | 101 |
| FY46 | 1683 | 4044 | 966 | 1290 | 271 | 610 | 2866 | 9 | 55,23,624 | 106 |

## MSA Calculation of Surapattu Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.06 | 0.81 | 0.33 | 0.81 | 3.00 | 6.83 | 11.02 | 0.00 | | |
| FY26 | 1312 | 265 | 1478 | 1078 | 254 | 1007 | 3765 | 13 | 57,39,547 | 6 |
| FY27 | 1374 | 273 | 1548 | 1114 | 262 | 1015 | 3870 | 13 | 58,86,175 | 12 |
| FY28 | 1440 | 281 | 1623 | 1140 | 269 | 1022 | 4016 | 13 | 60,98,997 | 18 |
| FY29 | 1281 | 289 | 1444 | 982 | 231 | 875 | 3441 | 13 | 52,18,257 | 23 |
| FY30 | 1097 | 297 | 1236 | 805 | 189 | 722 | 2827 | 14 | 42,96,572 | 27 |
| FY31 | 1142 | 308 | 1287 | 816 | 192 | 727 | 2960 | 14 | 44,70,915 | 32 |
| FY32 | 1189 | 316 | 1340 | 836 | 197 | 732 | 3049 | 14 | 46,04,573 | 36 |
| FY33 | 1238 | 324 | 1395 | 861 | 203 | 737 | 3127 | 15 | 47,00,302 | 41 |
| FY34 | 1283 | 332 | 1446 | 883 | 208 | 741 | 3197 | 15 | 47,97,606 | 46 |
| FY35 | 1334 | 340 | 1503 | 895 | 211 | 746 | 3339 | 15 | 49,84,258 | 51 |
| FY36 | 1384 | 352 | 1559 | 918 | 216 | 751 | 3428 | 15 | 51,20,155 | 56 |
| FY37 | 1434 | 360 | 1616 | 930 | 219 | 755 | 3528 | 16 | 52,39,810 | 61 |
| FY38 | 1480 | 367 | 1668 | 940 | 221 | 759 | 3618 | 16 | 53,59,650 | 67 |
| FY39 | 1532 | 375 | 1726 | 964 | 227 | 764 | 3759 | 16 | 55,45,333 | 72 |
| FY40 | 1584 | 383 | 1784 | 978 | 230 | 768 | 3852 | 16 | 56,85,465 | 78 |
| FY41 | 1635 | 395 | 1843 | 989 | 233 | 772 | 3955 | 17 | 58,06,996 | 84 |
| FY42 | 1688 | 403 | 1902 | 1013 | 238 | 776 | 4108 | 17 | 60,08,241 | 90 |
| FY43 | 1735 | 410 | 1955 | 1034 | 244 | 780 | 4248 | 17 | 61,91,876 | 96 |
| FY44 | 1784 | 417 | 2010 | 1053 | 248 | 784 | 4370 | 17 | 63,71,102 | 102 |
| FY45 | 1823 | 423 | 2054 | 1071 | 252 | 787 | 4484 | 17 | 65,03,401 | 109 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY46 | 1857 | 431 | 2093 | 1080 | 254 | 789 | 4556 | 18 | 65,98,712 | 115 |

## Chennai-Tada (Km 21+400 to Km 54+400)

### MSA Calculation of Nallur Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.10 | 1.34 | 0.05 | 0.87 | 3.18 | 3.71 | 9.76 | 0.00 | | |
| FY26 | 2135 | 1048 | 1224 | 1876 | 762 | 1394 | 6099 | 18 | 77,33,099 | 8 |
| FY27 | 2235 | 1079 | 1281 | 1993 | 810 | 1423 | 6538 | 18 | 82,49,830 | 16 |
| FY28 | 2336 | 1111 | 1339 | 2118 | 861 | 1450 | 7014 | 18 | 88,30,779 | 25 |
| FY29 | 2444 | 1145 | 1401 | 2255 | 916 | 1477 | 7567 | 19 | 94,48,473 | 34 |
| FY30 | 2549 | 1178 | 1461 | 2391 | 972 | 1502 | 8123 | 19 | 1,00,93,420 | 44 |
| FY31 | 2618 | 1210 | 1501 | 2476 | 1006 | 1480 | 8443 | 19 | 1,04,52,681 | 55 |
| FY32 | 2688 | 1242 | 1540 | 2567 | 1043 | 1454 | 8815 | 19 | 1,08,97,951 | 66 |
| FY33 | 2791 | 1276 | 1600 | 2704 | 1099 | 1453 | 9296 | 20 | 1,14,22,390 | 77 |
| FY34 | 2901 | 1307 | 1662 | 2853 | 1159 | 1462 | 9837 | 20 | 1,20,47,169 | 89 |
| FY35 | 3018 | 1341 | 1730 | 3016 | 1225 | 1471 | 10475 | 20 | 1,27,80,457 | 102 |
| FY36 | 3134 | 1373 | 1796 | 3177 | 1291 | 1481 | 11085 | 20 | 1,35,19,591 | 115 |
| FY37 | 3248 | 1406 | 1862 | 3344 | 1359 | 1492 | 11719 | 21 | 1,42,11,873 | 130 |
| FY38 | 3358 | 1437 | 1924 | 3506 | 1424 | 1501 | 12336 | 21 | 1,49,21,671 | 145 |
| FY39 | 3473 | 1469 | 1990 | 3677 | 1494 | 1511 | 13001 | 21 | 1,56,84,754 | 160 |
| FY40 | 3590 | 1486 | 2058 | 3854 | 1566 | 1520 | 13692 | 21 | 1,65,20,743 | 177 |
| FY41 | 3707 | 1510 | 2124 | 4031 | 1638 | 1530 | 14461 | 21 | 1,73,50,347 | 194 |
| FY42 | 3755 | 1535 | 2152 | 4104 | 1668 | 1534 | 14781 | 22 | 1,77,16,755 | 212 |
| FY43 | 3799 | 1557 | 2177 | 4173 | 1695 | 1537 | 15084 | 22 | 1,80,62,842 | 230 |
| FY44 | 3823 | 1580 | 2191 | 4210 | 1710 | 1539 | 15246 | 22 | 1,83,00,241 | 248 |
| FY45 | 3835 | 1602 | 2198 | 4228 | 1718 | 1540 | 15329 | 22 | 1,83,46,491 | 267 |
| FY46 | 3840 | 1623 | 2201 | 4237 | 1722 | 1540 | 15370 | 23 | 1,83,96,449 | 285 |

## Neelmangla-Tumkur (Km 29+500 to Km 74+168)

### MSA Calculation of Kulumepalya Toll Plaza

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.18 | 2.96 | 0.38 | 0.99 | 2.62 | 9.12 | 10.07 | 0.00 | | |
| FY26 | 2271 | 3850 | 2481 | 2774 | 890 | 1874 | 4940 | 25 | 94,23,785 | 9 |
| FY27 | 2358 | 3986 | 2577 | 2951 | 947 | 1887 | 5283 | 25 | 99,08,084 | 19 |
| FY28 | 2458 | 4125 | 2686 | 3137 | 1006 | 1909 | 5623 | 26 | 1,04,30,219 | 30 |
| FY29 | 2383 | 4254 | 2604 | 2953 | 948 | 1623 | 4747 | 27 | 91,29,996 | 39 |
| FY30 | 2288 | 4400 | 2500 | 2735 | 877 | 1332 | 3749 | 28 | 77,12,931 | 47 |
| FY31 | 2335 | 4538 | 2551 | 2805 | 900 | 1288 | 3757 | 29 | 77,40,167 | 54 |
| FY32 | 2381 | 4596 | 2602 | 2873 | 922 | 1236 | 3747 | 30 | 77,33,030 | 62 |

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| FY33 | 2468 | 4596 | 2696 | 3015 | 967 | 1238 | 3908 | 31 | 79,28,632 | 70 |
| FY34 | 2551 | 4737 | 2788 | 3186 | 1022 | 1253 | 4151 | 32 | 83,03,057 | 78 |
| FY35 | 2637 | 4881 | 2881 | 3365 | 1079 | 1268 | 4406 | 33 | 86,93,984 | 87 |
| FY36 | 2721 | 5021 | 2973 | 3543 | 1137 | 1282 | 4663 | 33 | 91,09,602 | 96 |
| FY37 | 2814 | 5149 | 3075 | 3729 | 1196 | 1290 | 4930 | 34 | 94,77,938 | 106 |
| FY38 | 2900 | 5291 | 3169 | 3920 | 1258 | 1304 | 5208 | 35 | 98,94,577 | 115 |
| FY39 | 2986 | 5433 | 3263 | 4115 | 1320 | 1318 | 5493 | 36 | 1,03,20,852 | 126 |
| FY40 | 3073 | 5577 | 3358 | 4317 | 1385 | 1332 | 5790 | 37 | 1,07,91,322 | 137 |
| FY41 | 3171 | 5708 | 3465 | 4526 | 1452 | 1346 | 6098 | 38 | 1,12,13,498 | 148 |
| FY42 | 3261 | 5854 | 3564 | 4742 | 1521 | 1353 | 6417 | 39 | 1,16,77,230 | 159 |
| FY43 | 3352 | 6001 | 3662 | 4963 | 1592 | 1366 | 6745 | 40 | 1,21,56,826 | 172 |
| FY44 | 3444 | 6151 | 3764 | 5193 | 1666 | 1380 | 7089 | 41 | 1,26,93,404 | 184 |
| FY45 | 3549 | 6289 | 3878 | 5434 | 1743 | 1394 | 7450 | 42 | 1,31,79,579 | 198 |
| FY46 | 3647 | 6446 | 3986 | 5686 | 1824 | 1407 | 7830 | 43 | 1,37,29,280 | 211 |

**MSA Calculation of Chokkenahalli Toll Plaza**

| Financial Year | Minibus | Standard Bus | LCV-4 | LCV-6 | 2A | 3A | MAV | OSV | Yearly Design ESA | MSA |
|---|---|---|---|---|---|---|---|---|---|---|
| VDF | 0.17 | 1.60 | 0.15 | 1.36 | 2.40 | 5.49 | 9.40 | 0.00 | | |
| FY26 | 2155 | 3610 | 1656 | 2461 | 1181 | 1859 | 5389 | 23 | 83,25,594 | 8 |
| FY27 | 2275 | 3737 | 1748 | 2621 | 1258 | 1874 | 5744 | 24 | 87,86,471 | 17 |
| FY28 | 2401 | 3868 | 1845 | 2788 | 1338 | 1908 | 6120 | 25 | 93,08,588 | 26 |
| FY29 | 2534 | 3989 | 1948 | 2966 | 1424 | 1943 | 6522 | 26 | 98,10,452 | 36 |
| FY30 | 2672 | 4126 | 2054 | 3156 | 1515 | 1983 | 6997 | 27 | 1,04,25,129 | 47 |
| FY31 | 2799 | 4255 | 2151 | 3304 | 1586 | 1991 | 7312 | 27 | 1,08,35,965 | 57 |
| FY32 | 2930 | 4310 | 2252 | 3457 | 1659 | 1970 | 7633 | 28 | 1,12,53,796 | 69 |
| FY33 | 3070 | 4309 | 2359 | 3636 | 1745 | 1992 | 8039 | 29 | 1,17,23,469 | 80 |
| FY34 | 3220 | 4442 | 2475 | 3846 | 1846 | 2028 | 8543 | 30 | 1,23,72,468 | 93 |
| FY35 | 3090 | 4560 | 2375 | 3186 | 1529 | 1573 | 6832 | 31 | 1,00,94,624 | 103 |
| FY36 | 2933 | 4675 | 2254 | 2432 | 1167 | 1100 | 4861 | 32 | 75,19,806 | 110 |
| FY37 | 3065 | 4794 | 2356 | 2561 | 1229 | 1104 | 5142 | 33 | 78,65,041 | 118 |
| FY38 | 3201 | 4926 | 2460 | 2695 | 1293 | 1122 | 5435 | 33 | 82,54,048 | 127 |
| FY39 | 3338 | 5058 | 2566 | 2831 | 1359 | 1141 | 5735 | 34 | 86,53,073 | 135 |
| FY40 | 3480 | 5192 | 2674 | 2972 | 1427 | 1159 | 6048 | 35 | 90,91,686 | 144 |
| FY41 | 3625 | 5314 | 2786 | 3118 | 1497 | 1177 | 6373 | 36 | 94,93,098 | 154 |
| FY42 | 3774 | 5451 | 2901 | 3270 | 1569 | 1181 | 6711 | 37 | 99,28,361 | 164 |
| FY43 | 3925 | 5587 | 3017 | 3424 | 1643 | 1199 | 7057 | 38 | 1,03,81,343 | 174 |
| FY44 | 4082 | 5727 | 3137 | 3585 | 1721 | 1217 | 7420 | 39 | 1,08,86,105 | 185 |
| FY45 | 4245 | 5856 | 3263 | 3754 | 1802 | 1235 | 7802 | 40 | 1,13,51,928 | 196 |
| FY46 | 4415 | 6002 | 3393 | 3931 | 1887 | 1254 | 8204 | 41 | 1,18,74,321 | 208 |

The proposed pavement composition for Main Carriageway is done by, using MSA and CBR value as per IRC 37-2018.

## 7.6 Determination of Structural Strength of Pavement using FWD and Remaining Life in Flexible Pavement

Pavement structure is typically composed of several layers of different material, each of which receives the loads from the above layer, spreads the load, and then passes the load to the layer below. Material layers are usually arranged with in a pavement structure in order of descending load bearing capacity with the highest load bearing capacity material on the top and the lowest load bearing capacity material on the bottom. In general pavements should be designed to perform satisfactorily without developing unacceptable levels of distresses during the design life period. The structural adequacy of the existing pavement is demonstrated based on the study of structural performance of the pavement. If a pavement shows load associated distress like fracture, permanent deformation etc., then it is considered to have failed structurally. To ensure that unacceptable levels of distresses do not occur during design period, the critical strains developed under the load should be less than the limiting strain values corresponding to the design traffic selected. Structural evaluation of pavements involves application of a standard load to the pavement and measuring its response in terms of stress, strain or deflection. Among the equipment available for structural evaluation of pavements, the Falling Weight Deflectometer (FWD) is extensively used world-wide because it stimulates, to a large extent, the actual loading conditions of the pavement. The resulting load-deflection data can be interpreted through appropriate analytical techniques, such as back calculation technique, to estimate the elastic module of the pavement layers. The computed module is, in turn, used for

i. The strength evaluation of different layers of in-service pavements

ii. the estimation of the remaining life of in-service pavement

iii. determination of strengthening requirement, if any and

iv. Evaluation of different rehabilitation alternatives (overlay, recycling, partial reconstruction, etc.).

The guidelines for the test and evaluation of structural condition of in-service pavements are detailed in IRC- 115:2014. The test was carried out using 300mm diameter plate and standard load of 40KN (+/-4KN). The deflections were measured at 7 points, each at a radial distance of 0, 200, 300, 450, 600, 900, and 1200 (all mm). The pavement layer thicknesses of Bituminous and Granular layers were obtained from the test pits as given above.

### 7.6.1 Analysis Methodology

This methodology provides detailed procedure for the evaluation of structural condition of in-service pavements using deflection data from Falling Weight Deflectometer as well as other pavement data as inputs to a back-calculation model for determining the elastic module of pavement layers, and, thereafter, using these modules as inputs to a pavement design model for estimating the overlay requirement.

Accordingly, the sequence of analysis steps as per the IRC: 115-2014 is as follows

**1.** The recorded data will be normalized to a standard load of 40 KN.

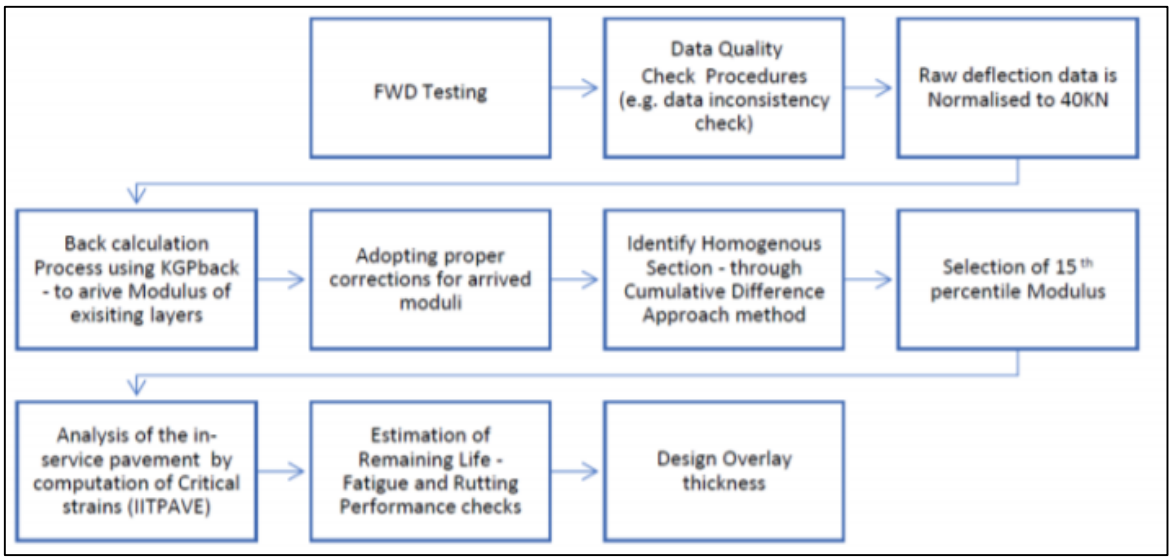
**2.** The normalized deflections will be then processed and back calculated using KGPBACK to obtain Elastic Modulus values of Bituminous, Granular layer and Sub-grade.

**3.** The corrections factors for temperature correction sand seasonal variations will be applied to all layers as suggested in IRC: 115-2014.

**4.** Preparation of Homogenous sections and selecting 15th percentile Module values for the purpose of design.

**5.** Checking the in-service ability of the Pavement layers through Performance criteria-analysing the Remaining life. Sequence of FWD data analysis and snapshot of applications used for analysis are presented in figures below.

Sequence of FWD data analysis and snapshot of applications used for analysis are presented in figures below.



```
!!!!!            PRINT INPUT DATA            !!!!
!!!!!   PL. SEE THE MANUAL SUPPLIED FOR HELP   !!!!

TYPE PEAK FWD LOAD (N), CONTACT PRESSURE (MPa)
Standard Values are 40000  0.56
40000 0.56

HOW MANY DEFLECTIONS WERE MEASURED (4 TO 10)?
7

PRINT RAD.DISTANCES (mm) WHERE DEFLECT. WERE MEASURED
eg: 0, 300, 600, 900, 1200, 1500 is a Typical
    Configuration for six Geophones

0 200 300 450 600 900 1200

PRINT MEASURED DEFLECTIONS IN mm.
0.306 0.255 0.226 0.2 0.161 0.114 0.066
GIVE THE PAVEMENT RELATED INPUTS (3-LAYER SYSTEM)
TYPE EACH LAYER THICKNESS(mm). START FROM TOP
210 490

TYPE POISSON RATIO OF EACH LAYER. START FROM TOP
Suggested values are 0.5 0.4 0.4
0.35 0.35 0.35

INPUT RANGE (lower and upper) FOR EACH LAYER MODULUS
Please note that Backcalculation Results will depend
on the selection of appropriate Ranges. The slection
of Ranges has to be made judiciously on the basis of
of the Pavement Condition

PRINT LOWER AND UPPER BOUND MODULI (MPa) LAYERS
Pl. See the Manual supplied for guidance

750 3000
100 500
46.5 100
```

***Figure 7-5 : Typical KGPBACK Input***

```
#########################################################
#         !!!  THANKS FOR USING KGPBACK  !!!           #
#              THE RESULTS ARE GIVEN BELOW              #
#########################################################

################
#  INPUT DATA  #
################
No.of Layers                              =  3
FWD Load (N)                              = 40000.00
Contact Pressure (MPa)                    =  .56
No.of Deflection points                   =  7
Deflections measured using FWD (mm)       =  .30600   .25500   .22600   .20000   .16100   .11400   .06600
Radial distances from centre of load(mm) =    .0  200.0  300.0  450.0   600.0   900.0  1200.0
Layer thickness (mm)                      = 210.00 490.00
Poisson ratio values                      = .35 .35 .35
Layer Modulus (MPa) Ranges Selected :-
(a) Bituminous Surfacing                  =  750.0   3000.0
(b) Granular Base                         =  100.0   500.0
(c) Subgrade                              =   46.5   100.0


################
# OUTPUT DATA  #
################

Backcalculated Layer Moduli are:
Surface (MPa)  =    2338.0
Base (MPa)     =     226.3
Subgrade (MPa) =     100.0
```

***Figure 7-6 : Typical KGPBACK Output***

### 7.6.2 Procedure

The FWD measurements have been carried out at slow lane and fast lane respectively in the provided stretches.

deflections measured by the FWD equipment are influenced by pavement temperature. Measurements made when the pavement temperature is different than standard temperature has be corrected. The deflection measurements, pavement temperature, subgrade soil & deflection, and other information collected during the deflection study have been recorded.

Following procedure has been followed for measurement of FWD:

- The test location is marked on the field.
- The loading plate along with the deflection sensors have been lowered at the test location
- The target load has been applied and the deflections have been measured for 3 times.
- The first load is considered as a seating load and the values are not considered for analysis.

### 7.6.3 Procedure

The FWD measurements have been carried out at slow lane and fast lane respectively in the provided stretches.

deflections measured by the FWD equipment are influenced by pavement temperature. Measurements made when the pavement temperature is different than standard temperature has be corrected. The deflection measurements, pavement temperature, subgrade soil & deflection, and other information collected during the deflection study have been recorded.

Following procedure has been followed for measurement of FWD:

- The test location is marked on the field.
- The loading plate along with the deflection sensors have been lowered at the test location
- The target load has been applied and the deflections have been measured for 3 times.
- The first load is considered as a seating load and the values are not considered for analysis.

### 7.6.4 Procedure

The FWD measurements have been carried out at slow lane and fast lane respectively in the provided stretches.

deflections measured by the FWD equipment are influenced by pavement temperature. Measurements made when the pavement temperature is different than standard temperature has be corrected. The deflection measurements, pavement temperature, subgrade soil & deflection, and other information collected during the deflection study have been recorded.

Following procedure has been followed for measurement of FWD:

- The test location is marked on the field.
- The loading plate along with the deflection sensors have been lowered at the test location
- The target load has been applied and the deflections have been measured for 3 times.
- The first load is considered as a seating load and the values are not considered for analysis.

**Temperature Measurement & Correction**

The standard temperature for doing the experiment is 350C. Since it is always not possible to conduct the test at the standard temperature, a correction factor has to be applied for the deflection. The correction factor is determined by knowing the temperature at the time of the survey. The pavement temperature during the survey has been measured at every one-hour interval by drilling a hole of 40mm in the pavement and filling it with glycerol and measuring the temperature using digital thermometer. The temperature correction factor applied on bituminous back calculated moduli is calculated as

$ET1 = \prod ET2$

Where,

$\prod$, temperature correction factor, is given as

$$\prod = 1\text{-}0.238 \ln T1 / 1\text{-}0.238 \ln T2$$

Where,

ET1 = back calculated modulus (MPa) at temperature T1 (°C)

ET2 = back calculated modulus (MPa) at temperature T2 (°C)

**Correction for Seasonal Variation**

Moisture content affects the strength of subgrade and granular subbase/base layers. The extent to which the strength is affected will depend on the nature of subgrade soil, gradation and nature of fines in the granular layers, etc. For the purpose of applying these guidelines, it is intended that the pavement layer moduli values should pertain to the period when the subgrade is at its weakest condition. In India, this period occurs during the recession of monsoon. It is, therefore, desirable to conduct deflection measurements during this period. Where the same is not feasible, a correction procedure should be adopted. The correction factor for subgrade and base is as

- **Correction factor for subgrade**

E sub_mon = 3.351* (E sub_win) 0-7688-28.9

E sub_mon = 0.8554*(E sub_sum) - 8.461

where,

E sub_mon = subgrade modulus in monsoon (MPa)

E sub_win = subgrade modulus in winter (MPa)

E sub_sum = subgrade modulus in summer (MPa)

- **Correction factor for granular layers**

E gran_mon = - 0.0003 *(E gran_sum) 2 + 0.9584* (E gran_sum) - 32.989

E gran_mon = 10.5523 *(E gran_win)0.624 – 113.857

where, E gran_mon = granular layer modulus in monsoon (MPa)

E gran_win = granular layer modulus in winter (MPa)

E gran_sum = granular layer modulus in summer (MPa)

### 7.6.5 Back Calculation to Obtain Resilient Modulus of Existing Layers

**Software used:**

KGPBACK – Genetic Algorithm based software for back calculating the layer moduli. Works on three-layer system (Bituminous, Granular & Subgrade).

**Data required:**

- Deflections at various radial distances.
- Existing layer thickness – the existing layer thicknesses of various stretches have been obtained from the test pit.
- Layer moduli range – the layer moduli adopted for the analysis is shown in next section
- Poisson's ratio: BT-0.35, Granular-0.35, Subgrade-0.35 (For Back calculation).

***Table 7-6 : Range of module (MPa)***

| Type of Layer | Lower and Upper Limit (Mpa) | |
|---|---|---|
| | Good to Fair | Fair to Poor |
| **Subgrade** | As per Existing Subgrade 5*CBR to 100 | |
| **Granular** | 100 to 500 | 100 to 500 |
| **Bituminous** | 750 to 3000 | 400 to 1500 |

### 7.6.6 Homogeneous Section

The Identification of homogeneous sections is done on the basis of the peak deflections or peak deflection bowl parameters, subgrade strength, design traffic, layer thicknesses and extent and severity of distress.

Here in this section, Homogeneous Section is divided into Km Wise.

Based on homogeneous section of LHS and RHS carriageway, it is clear that the sections are not the same for both carriageways, based on these homogeneous sections, the overlay calculation was done.

### 7.6.7 Data Analysis

Resilient Moduli of each layer are calculated using KGPBACK for each test point. Details of input parameters are given in Appendix to Main Report. The summary of back calculated and corrected modulus of the all the three layers are presented in the following table for LHS pavement.

**Section-01 Vijayawada-Chilakaluripet**

***Table 7-7 : L.H.S Corrected Back Calculated Module (MPa)***

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 355+000 | 357+342 | 2342.00 | 2645.77 | 364.10 | 75.88 |
| 372+038 | 385+612 | 13574.00 | 2388.12 | 356.45 | 75.88 |
| 385+612 | 405+012 | 19400.40 | 2400.45 | 350.02 | 76.91 |
| 405+012 | 412+001 | 6988.30 | 2536.97 | 362.93 | 76.99 |
| 412+001 | 422+605 | 10604.30 | 2559.82 | 333.66 | 76.99 |

**Chilakaluripet Bypass**

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 0+000 | 3+105 | 3104.813 | 2801.09 | 367.32 | 76.82 |
| 3+105 | 7+006 | 3901.187 | 2804.19 | 368.31 | 76.61 |
| 7+006 | 11+606 | 4599.627 | 2790.22 | 345.85 | 45.81 |
| 11+606 | 13+099 | 1493 | 2807.40 | 367.75 | 76.74 |
| 13+099 | 16+499 | 3400.373 | 2784.53 | 367.32 | 76.31 |

***Table 7-8 : R.H.S Corrected Back Calculated Module (MPa)***

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 355+000 | 357+342 | 2342.00 | 2386.97 | 364.20 | 75.77 |
| 372+038 | 382+258 | 10219.50 | 2388.12 | 363.36 | 75.88 |

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 382+258 | 398+756 | 16498.00 | 2274.45 | 362.40 | 75.88 |
| 398+756 | 407+514 | 8758.00 | 2348.66 | 361.65 | 75.97 |
| 407+514 | 420+000 | 12486.50 | 2408.68 | 351.75 | 76.99 |
| 420+000 | 422+605 | 2605.00 | 2705.54 | 355.88 | 77.08 |

**Chilakaluripet Bypass**

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 0+000 | 2+264 | 2264 | 2714.18 | 368.39 | 76.74 |
| 2+264 | 5+246 | 2982 | 2710.18 | 367.32 | 76.91 |
| 5+246 | 11+013 | 5767 | 2704.18 | 368.43 | 76.74 |
| 11+013 | 16+499 | 5486 | 2697.99 | 367.55 | 76.91 |

**Section-02 Chennai Bypass**

***Table 7-9 : L.H.S Corrected Back Calculated Module (MPa)***

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 0+000 | 3+256 | 3256 | 2801.61 | 350.85 | 76.99 |
| 3+256 | 11+857 | 8601 | 2786.23 | 298.05 | 72.40 |
| 11+857 | 22+095 | 10238 | 2129.78 | 344.56 | 76.99 |
| 25+107 | 32+600 | 7493 | 2105.23 | 365.34 | 76.91 |

***Table 7-10 : R.H.S Corrected Back Calculated Module (MPa)***

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| | | | Bituminous Layer | Granular Layer | Subgarde Layer |
| From | To | | | | |
| 0+000 | 1+771 | 1771 | 2376.34 | 328.73 | 54.93 |
| 1+771 | 7+765 | 5994 | 2316.79 | 365.79 | 76.91 |
| 7+765 | 12+259 | 4494 | 2147.05 | 365.66 | 76.91 |
| 12+259 | 22+090 | 9831 | 2135.91 | 366.59 | 76.82 |
| 25+109 | 30+012 | 4903 | 2080.49 | 365.75 | 76.91 |
| 30+012 | 32+600 | 2588 | 1951.43 | 363.20 | 76.82 |

**Section-03 Chennai-Tada (21+400 to 54+400)**

***Table 7-11 : L.H.S Corrected Back Calculated Module (MPa)***

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| From | To | | Bituminous Layer | Granular Layer | Subgarde Layer |
| 22+000 | 25+345 | 3345 | 2345.84 | 308.46 | 99.83 |
| 25+345 | 29+343 | 3998 | 2404.13 | 309.78 | 99.90 |
| 29+343 | 33+102 | 3759 | 2439.65 | 323.26 | 99.90 |
| 33+102 | 38+239 | 5137 | 2545.44 | 311.47 | 99.90 |
| 38+239 | 40+528 | 2289 | 2306.99 | 342.69 | 99.80 |
| 40+528 | 43+746 | 3218 | 2292.65 | 308.73 | 99.90 |
| 43+746 | 50+339 | 6593 | 2300.36 | 310.07 | 99.90 |
| 50+339 | 54+400 | 4061 | 2360.29 | 337.30 | 96.40 |

***Table 7-12 : R.H.S Corrected Back Calculated Module (MPa)***

| Chainage (Km) | | Length (m) | 15th PerCentile Modulus | | |
|---|---|---|---|---|---|
| From | To | | Bituminous Layer | Granular Layer | Subgarde Layer |
| 22+000 | 27+537 | 5537 | 2639.9 | 324.8 | 96.2 |
| 27+537 | 34+027 | 6490 | 2852.2 | 302.2 | 99.9 |
| 34+027 | 42+850 | 8823 | 2585.3 | 327.7 | 99.8 |
| 42+850 | 48+015 | 5165 | 2441.6 | 317.4 | 99.9 |
| 48+015 | 50+514 | 2499 | 2457.2 | 301.2 | 99.7 |
| 50+514 | 54+400 | 3886 | 2481.5 | 303.3 | 99.9 |

### 7.6.8 Remaining Life and Overlay Estimation

The in-service three-layer pavement system has been analysed with the 15th percentile back-calculated corrected layer moduli and layer thicknesses. The critical strains have been calculated by IITPAVE program. From the performance criteria equations, the residual/remaining rutting and fatigue life has been estimated.

### 7.6.9 Performance Criteria

The layer moduli of in-service pavement back calculated from FWD deflection data are used to analyse the pavement for critical strains which are indicators of pavement performance in terms of rutting and fatigue cracking. The remaining life of pavement can

be obtained using the Fatigue and Rutting criteria mentioned in IRC – 115:2014 and in IRC-37:2018, the same approach can be used for design of bituminous overlays for existing flexible pavements. The performance models are as follows.

**Fatigue in Bituminous layer:**

As specified in IRC-37:2018, the fatigue model for 90 percent reliability (4.0 % air voids and 11.5% bitumen) was used as below;

Nf = 0.9206 * 10 -04 x [1/εt] 3.89 * [1/MR] 0.854

Where, Nf = fatigue life in number of standard axles,

εt = Maximum Tensile strain at the bottom of the bituminous layer

MR= resilient modulus of the bituminous layer.

**Rutting in Subgrade:**

Rutting model for 90 percent reliability level as specified in IRC: 115-2014 was used as below;

N= 1.41 x 10-08 [1/εv] 4.5337

Where, N= Number of cumulative standard axles,

εv= Vertical strain in the subgrade

**Section-01 Vijayawada-Chilakaluripet**

***Table 7-13 : Remaining Life of Existing Pavement-LHS***

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 355+000 | 357+342 | 2342.00 | 575 | 128 | 128 |
| 372+038 | 385+612 | 13574.00 | 503 | 112 | 112 |
| 385+612 | 405+012 | 19400.40 | 509 | 109 | 109 |
| 405+012 | 412+001 | 6988.30 | 553 | 120 | 120 |
| 412+001 | 422+605 | 10604.30 | 489 | 100 | 100 |

**Chilakaluripet Bypass**

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 0+000 | 3+105 | 3104.813 | 438.9 | 96.0 | 96.0 |
| 3+105 | 7+006 | 3901.187 | 438.9 | 96.8 | 96.8 |
| 7+006 | 11+606 | 4599.627 | 144.5 | 80.5 | 80.5 |
| 11+606 | 13+099 | 1493 | 439.7 | 96.4 | 96.4 |
| 13+099 | 16+500 | 3401.373 | 430.3 | 95.6 | 95.6 |

***Table 7-14 : Remaining Life of Existing Pavement-RHS***

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 355+000 | 357+342 | 2342.00 | 533 | 121 | 121 |
| 372+038 | 382+258 | 10219.50 | 532 | 121 | 121 |
| 382+258 | 398+756 | 16498.00 | 499 | 114 | 114 |
| 398+756 | 407+514 | 8758.00 | 491 | 111 | 111 |
| 407+514 | 420+000 | 12486.50 | 510 | 110 | 110 |
| 420+000 | 422+605 | 2605.00 | 551 | 117 | 117 |

**Chilakaluripet Bypass**

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 0+000 | 2+264 | 2264 | 427.8 | 94.4 | 94.4 |
| 2+264 | 5+246 | 2982 | 427.8 | 93.7 | 93.7 |
| 5+246 | 11+013 | 5767 | 427.0 | 94.2 | 94.2 |
| 11+013 | 16+499 | 5486 | 426.1 | 93.5 | 93.5 |

**Section-02 Chennai Bypass**

***Table 7-152 : Remaining Life of Existing Pavement-LHS***

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 0+000 | 3+256 | 3256 | 821.0 | 172.8 | 172.8 |
| 3+256 | 11+857 | 8601 | 791.9 | 173.0 | 173.0 |

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 11+857 | 22+095 | 10238 | 1091.3 | 243.0 | 243.0 |
| 25+107 | 32+600 | 7493 | 1415.5 | 335.3 | 335.3 |

***Table 7-13 : Remaining Life of Existing Pavement-RHS***

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 0+000 | 1+771 | 1771 | 382.4 | 151.5 | 151.5 |
| 1+771 | 7+765 | 5994 | 946.6 | 213.2 | 213.2 |
| 7+765 | 12+259 | 4494 | 837.9 | 191.7 | 191.7 |
| 12+259 | 22+090 | 9831 | 579.6 | 131.8 | 131.8 |
| 25+109 | 30+012 | 4903 | 705.8 | 161.9 | 161.9 |
| 30+012 | 32+600 | 2588 | 655.6 | 152.6 | 152.6 |

**Section-03 Chennai-Tada (21+400 to 54+400)**

***Table 7-162 : Remaining Life of Existing Pavement-LHS***

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 22+000 | 25+345 | 3345 | 712.0 | 78.6 | 79 |
| 25+345 | 29+343 | 3998 | 732.6 | 81.0 | 81 |
| 29+343 | 33+102 | 3759 | 783.1 | 89.8 | 90 |
| 33+102 | 38+239 | 5137 | 779.6 | 86.3 | 86 |
| 38+239 | 40+528 | 2289 | 799.1 | 97.1 | 97 |
| 40+528 | 43+746 | 3218 | 698.1 | 77.2 | 77 |
| 43+746 | 50+339 | 6593 | 704.2 | 78.2 | 78 |
| 50+339 | 54+400 | 4061 | 737.5 | 95.2 | 95 |

***Table 7-13 : Remaining Life of Existing Pavement-RHS***

| Chainage (Km) | | Length (m) | Rutting Life(MSA) | Fatigue Life(MSA) | Remaining life of Pavement (MSA) |
|---|---|---|---|---|---|
| From | To | | | | |
| 22+000 | 27+537 | 5537 | 776.1 | 97.0 | 97 |
| 27+537 | 34+027 | 6490 | 839.8 | 91.0 | 91 |
| 34+027 | 42+850 | 8823 | 837.9 | 97.0 | 97 |
| 42+850 | 48+015 | 5165 | 765.8 | 86.5 | 87 |
| 48+015 | 50+514 | 2499 | 721.4 | 78.2 | 78 |
| 50+514 | 54+400 | 3886 | 737.5 | 79.9 | 80 |

# CHAPTER 8

# REPAIR AND REHABILITATION OF STRUCURES

## 8.1 General

This chapter provides the repair and rehabilitation works on the distressed structures wherever observed along the project stretches. The repair and rehabilitation of the structures proposed below are based upon the conditional survey conducted which are furnished in Appendix to Main Report.

The success of repair and rehabilitation activity depends on the identification of the root cause of the deterioration of the structures. If this cause is properly identified appropriate repairs can be done for the improvement of strength and durability, thus extending the life of the structure. General procedures in the repair of distressed concrete structure are as mentioned below.

Remove all cracked, spalled and loose concrete.

Clean the exposed concrete surfaces and steel reinforcement.

Provide additional reinforcing bars, if there is loss in reinforcement.

Apply shotcrete/ polymer concrete for patch repair work and grouting for porous/ honeycombed concrete.

Apply protective coatings over the exposed/repaired surface.

Servicing of all bearings including lubrication, painting and replacement of damaged bearings.

Removal of vegetation and debris from the structural elements.

## 8.2 Crust

## 8.3 Condition Survey and Assessment

Along with structures inventory, present health condition of all the structures was recorded for all the elements of the bridges or culverts except foundations which are buried underground. Suitable repair and rehabilitation measures are proposed to maintain or restore their service life.

## 8.4 Repair and Rehabilitation

Based on condition survey and structure evaluation, various repair and rehabilitation measures were recommended. Different types of repairs and their methodologies are given below.

Based on condition survey and structure evaluation, various repair and rehabilitation measures were recommended. Different types of repairs and their methodologies are given below.

**Wearing Coat and Camber**

The repair of bituminous and cement concrete wearing coat shall be done by removing the loose materials and all failed material and filled with material of the equivalent specifications to the original construction.

**Expansion joint**

The Expansion joints shall be cleaned from the dust and debris. Elastomeric sealant compound in strip seal expansion joint shall be replaced to stop leakage from the expansion joints. All the damaged expansion joints shall be repaired by replacing joint sealant compound.

**RCC railing**

All the cracks in RCC railing shall be rectified using the cement/ epoxy grouting. The RCC railing where damaged shall be reconstructed by chipping the existing surface for better bonding with new concrete and wherever reinforcement is missing, new reinforcement bars of suitable diameter are anchored into existing deck slab. Nito bond or equivalent shall needs to applied to existing concrete surfaces before placing wet concrete to achieve the proper bondage between the existing concrete surface and wet concrete.

**Cracks in girders and in deck soffit**

All the cracks observed in girders and soffit of deck slab shall be treated by injecting epoxy resin.

**Spalling of concrete**

The spalled concrete shall be rectified by epoxy mortar / polymer mortar. The epoxy resins to be used shall have minimum bond strength of 12 N/mm2 and minimum tensile strength of 16 N/mm2.

The sand to be used in epoxy mortar shall be graded quartz sand.

Surface preparation shall be done either by mechanical (grinding and water blasting) or chemical method (acid etching and flushing with high pressure steam of water).

Detailed application of epoxy mortar shall be as per manufacture specifications and in accordance with section 2804 of MoRTH specifications.

**Treatment to Exposed and corroded steel**

To clean the rebar manually & by mechanical means to remove all scales, rust residue to make the rebars clean or any other means and ready for Rust Inhibition application. Then to wash the rebars with clean water and dry the surface immediately with soft cloth complete and providing and applying 2 coats of approved rust inhibition coat / system to exposed rebars and new rebars by using chemicals.

**Honey combing and cavities in concrete surfaces.**

The rectification of Honey combing and voids in concrete is similar to Spalling of concrete apart from pressured grouting prior to application of epoxy mortar to cover the voids and honey combing.

**Vegetation growth on structural members.**

Wherever the vegetation observed in the structural members shall be removed from root. The system can be adopted by acid itching or by manual/mechanical means. The hollow portion followed after removing the vegetation shall be covered with rich mortar in masonry structural member and with epoxy / polymer mortar for RCC structural members.

**Carbonation resistance coat**

To prevent carbonation effect in structural members, apply carbonation resistant coat.

## 8.5 Proposal for Structure

***Table 7-17 : Improvement Proposal summary of Existing Structures***

**Section-01 Vijayawada-Chilakaluripet**

| Chainage (km) | Type of Structure | Side | Recommendation |
|---|---|---|---|
| Nil | | | |

**Section-02 Chennai Bypass**

| Chainage (km) | Type of Structure | Side | Recommendation |
|---|---|---|---|
| Nil | | | |

**Section-03 Chennai Tada**

| Chainage (km) | Type of Structure | Side | Recommendation |
|---|---|---|---|
| Nil | | | |

**Section-04 Neelmangla-Tumkur**

| Chainage (km) | Type of Structure | Side | Recommendation |
|---|---|---|---|
| Nil | | | |

# CHAPTER 9

# CONDITION ASSESSMENT OF EXISTING TOLL PLAZA AND PROPOSAL OF FEASIBLE TOLL LANES

## 9.1 General

**Vijayawada-Chilakaluripet:** The Site of Six lane divided Project Highway comprises the section commencing from (Km 355+000 to Km 357+342), (Km 372+038 to Km 422+605), (Km 0+000 to Km 16+499) at Vijayawada of NH-16 and has Kaza toll Plazas at Km 420+500 and at km 35+400 (Venkatapalem on project Section in the state of Andhra Pradesh. The total length of Project Stretch is 69.408 km.

**Chennai Bypass:** Project Stretch starts from Km 0+000 and ends at Km 32+600 of NH-32/ NH-48 and has Vanagram toll Plazas at Km 16+500 and Surapattu toll Plazas at Km 28+600 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 32.600 km.

**Chennai-Tada:** Project Stretch starts from Km 21+400 and ends at Km 54+400 of NH-16 and has Nallur toll Plazas at Km 21+625 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 33.00 km.

**Neelmangla- Tumkur:** Project Stretch starts from Km 29+500 and ends at Km 74+168 of NH-48 and has kulumepalya toll plazas at Km 30+000 and Chokkenahalli toll plaza Km 61+500 on project Section in the state of Karnataka. The total length of Project Stretch is 44.668 km.

**Section-01 Vijayawada-Chilakaluripet**




***Kaza toll Plaza (420+500)***

**Section-02 Chennai Bypass**



*Vanagram toll Palaza (16+500)*




*Surapattu toll Plaza (28+600)*

**Section-03 Chennai-Tada**



*Nallur toll Plaza (21+625)*



*Nallur toll Plaza (21+625)*

**Section 04 Neelmangla-Tumkur**



*Kulumepalya toll Plaza (30+000)*




*Chokkenahalli (61+500)*

**Figure 7-7 : Toll Plaza Locations**

## 9.2 Salient Features of Toll Plaza

**Table 7-18 : Salient Feature of Toll Plazas**

**Section 1 Vijayawada-Chilakaluripet**

| S. No. | Particulars | Details of Kaza Toll Plaza |
|---|---|---|
| 1 | Toll Plaza Chainage and name | 420+500 |
| 2 | Number of Toll Lanes | 16 |
| 3 | No of ETC system | 16 |
| 4 | No of Toll Booths | 15 |
| 5 | Canopy/ FOB | Canopy Available / FOB Not Available |
| 6 | Admin Building | Available |
| 7 | Availibility of Tunnel | Available |
| 8 | Toilets (Gents & Ladies) | 2 |
| 9 | Type of Pavement at Toll Lanes | Rigid |
| 10 | Slow Speed Weigh in Motion Facility | Available (Not Working) |
| 11 | Static Weigh Bridge | 2(1 Not working) |
| 12 | Availability of loading/unloading facilities | Not Available |
| 13 | Storage facility of overloaded material | Not Available |
| 14 | High Mast Light | 4 |
| 15 | Street Lights | 28 |
| 16 | Traffic Aid Post | Available |
| 17 | Medical Aid Post | Available |
| 18 | Control Room | Available |
| 19 | Server Room | Available |
| 20 | UPS & Battery room | Available |
| 21 | Plaza Manager Room | Available |
| 22 | Cash up Room | Available |
| 23 | Room for Cashier | Available |

| S. No. | Particulars | Details of Kaza Toll Plaza |
|---|---|---|
| 24 | Cantilever/Gantry Board | Available |
| 25 | Electricity Supply | Available |
| 26 | Cash van garage | Available |
| 27 | PRO Office | Available |
| 28 | Meeting Room | Available |
| 29 | Changing room | Available |
| 30 | Lane Configuration | 6 lane |

**Note*:-** MLFF (Multi lane free flow system) shall be provided at Existing Toll Plaza Km 420+500 (Kaza toll plaza) by InvIT Concessionaire.

**Section 02 Chennai Bypass**

| S. No. | Particulars | Details of Vanagram Toll Plaza | Details of Surapattu Toll Plaza |
|---|---|---|---|
| 1 | Toll Plaza Chainage and name | 16+500 | 28+600 |
| 2 | Number of Toll Lanes | 10 | 12 |
| 3 | No of ETC system | 10 | 12 |
| 4 | No of Toll Booths | 9 | 11 |
| 5 | Canopy/ FOB | Canopy Available / FOB Not Available | Canopy Available / FOB Not Available |
| 6 | Admin Building | Not Available | Not Available |
| 7 | Availibility of Tunnel | Not Available | Not Available |
| 8 | Toilets (Gents & Ladies) | Not Available | 2 |
| 9 | Type of Pavement at Toll Lanes | Rigid | Rigid |
| 10 | Medium Speed Weigh in Motion Facility | 0 | 0 |
| 11 | Static Weigh Bridge | 0 | 0 |
| 12 | Availability of loading/unloading facilities | Not Available | Not Available |
| 13 | Storage facility of overloaded material | Not Available | Not Available |

| S. No. | Particulars | Details of Vanagram Toll Plaza | Details of Surapattu Toll Plaza |
|---|---|---|---|
| 14 | High Mast Light | 2 | 2 |
| 15 | Street Lights | 20 | 0 |
| 16 | Traffic Aid Post | Not Available | Not Available |
| 17 | Medical Aid Post | Not Available | Not Available |
| 18 | Control Room | Not Available | Not Available |
| 19 | Server Room | Not Available | Not Available |
| 20 | UPS & Battery room | Not Available | Not Available |
| 21 | Plaza Manager Room | Not Available | Not Available |
| 22 | Cash up Room | Not Available | Not Available |
| 23 | Room for Cashier | Not Available | Not Available |
| 24 | Cantilever/Gantry Board | Available | Available |
| 25 | Electricity Supply | Available | Available |
| 26 | Cash van garage | Available | Available |
| 27 | PRO Office | Not Available | Not Available |
| 28 | Meeting Room | Not Available | Not Available |
| 29 | Changing room | Not Available | Not Available |
| 30 | Lane Configuration | 6-lane | 6-lane |

Note*-

- The existing toll plazas at Vanagram will be demolished, and new toll plazas at Ch. 6+500, shall be constructed by the Authority. Accordingly, Multi lane free flow (MLFF) will be provided by the Authority and shall be maintained by the TOT/InvIT Concessionaire after the completion of the DLP period.
- MLFF (Multi lane free flow system) for 6 lanes shall be provided at Existing Toll Plaza km 28+600 (Surapattu Toll Plaza) by InvIT Concessionaire.

## Section 03 Chennai Tada

| S. No. | Particulars | Details of Nallur Toll Plaza |
|---|---|---|
| 1 | Toll Plaza Chainage and name | 21+625 |
| 2 | Number of Toll Lanes | 14 |
| 3 | No of ETC system | 14 |
| 4 | No of Toll Booths | 13 |
| 5 | Canopy/ FOB | Available |
| 6 | Admin Building | Available |
| 7 | Availibility of Tunnel | No |
| 8 | Toilets (Gents & Ladies) | 2 |
| 9 | Type of Pavement at Toll Lanes | Rigid |
| 10 | Medium Speed Weigh in Motion Facility | 0 |
| 11 | Static Weigh Bridge | 0 |
| 12 | Availability of loading/unloading facilities | Not Available |
| 13 | Storage facility of overloaded material | Not Available |
| 14 | High Mast Light | 6 |
| 15 | Traffic Aid Post | Not Available |
| 16 | Medical Aid Post | Available |
| 17 | Control Room | Available |
| 18 | Server Room | Available |
| 19 | UPS & Battery room | Available |
| 20 | Plaza Manager Room | Available |
| 21 | Cash up Room | Available |
| 22 | Room for Cashier | Available |
| 23 | Cantilever/Gantry Board | Available |
| 24 | Electricity Supply | Available |
| 25 | Cash van garage | Available |
| 26 | PRO Office | Available |
| 27 | Meeting Room | Not Available |

| S. No. | Particulars | Details of Nallur Toll Plaza |
|---|---|---|
| 28 | Changing room | Not Available |
| 29 | Lane Configuration | 6-lane |

**Section 04 Neelmangla-Tumkur**

| S. No. | Particulars | Details of Kulumepalya Toll Plaza | Details of Chokkenahalli Toll Plaza |
|---|---|---|---|
| 1 | Toll Plaza Chainage and name | 30+000 | 61+500 |
| 2 | Number of Toll Lanes | 10 | 10 |
| 3 | No of ETC system | 10 | 10 |
| 4 | No of Toll Booths | 9 | 9 |
| 5 | Canopy/ FOB | Canopy Available/ FOB Available | Canopy Available/ FOB Available |
| 6 | Admin Building | Admin building is in FOB | Admin building is in FOB |
| 7 | Availibility of Tunnel | No | No |
| 8 | Toilets (Gents & Ladies) | 2 | 1 |
| 9 | Type of Pavement at Toll Lanes | Rigid | Rigid |
| 10 | Medium Speed Weigh in Motion Facility | 0 | 0 |
| 11 | Static Weigh Bridge | 0 | 0 |
| 12 | Availability of loading/unloading facilities | Not Avaliable | Not Avaliable |
| 13 | Storage facility of overloaded material | Not Avaliable | Not Avaliable |
| 14 | High Mast Light | 2 | 2 |
| 15 | Street Lights | 0 | 0 |
| 16 | Traffic Aid Post | Not Avaliable | Not Avaliable |
| 17 | Medical Aid Post | Not Avaliable | Not Avaliable |
| 18 | Control Room | Available | Available |
| 19 | Server Room | Available | Available |

| S. No. | Particulars | Details of Kulumepalya Toll Plaza | Details of Chokkenahalli Toll Plaza |
|---|---|---|---|
| 20 | UPS & Battery room | Available | Available |
| 21 | Plaza Manager Room | Available | Available |
| 22 | Cash up Room | Available | Available |
| 23 | Room for Cashier | Available | Available |
| 24 | Cantilever/Gantry Board | Available | Available |
| 25 | Electricity Supply | Available | Available |
| 26 | Cash van garage | Available | Available |
| 27 | PRO Office | Available | Available |
| 28 | Meeting Room | Available | Available |
| 29 | Changing room | Available | Available |
| 30 | Lane Configuration | 4-lane | 4 & 6-lane |

Note*- The existing two toll plazas at Kulumepalya and Chokkenahalli will be demolished, and new toll plazas at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425) shall be constructed by the Authority. Accordingly, the MLFF will be provided by the Authority and shall be maintained by the TOT/InvIT Concessionaire after the completion of the DLP period.

## 9.3 Condition Survey Status and Proposals

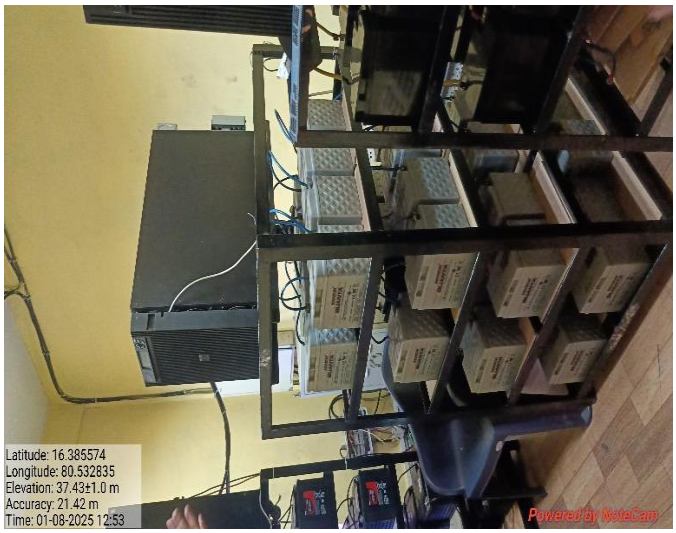
For improvisation, we visited the toll and audited the existing condition of the Plaza with respect to Section 10 of IRC SP 84-2014 provisions for toll plaza. Proposals are recommended with condition report.

***Figure 7-8 :*** **Condition Assessment**

**Section-01 Vijayawada-Chilakaluripet**




***Kaza toll Plaza (420+500)***




***Kaza toll Plaza (420+500)***

**Section-02 Chennai Bypass**




***Vanagram toll Palaza (16+500)***




***Surapattu toll Plaza (28+600)***

**Section-03 Chennai-Tada**




*Nallur toll Plaza (21+625)*




*Nallur toll Plaza (21+625)*

**Section 04 Neelmangla-Tumkur**




*Kulumepalya toll Plaza (30+000)*




*Chokkenahalli (61+500)*

## 9.4 TMS

**Table 7-19 : Existing Details of Toll Plaza's Lane Level Equipment**

**Section 1 Vijayawada-Chilakaluripet**

**Kaza Toll Plaza**

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| **A** | **Lane Level Equipment** | | | | |
| 1 | RFID ETC transceiver near Pay-axis - mounted on canopy/pole | No | 16 | 16 | |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| 2 | Electronics Enclosure | No | 16 | 16 | |
| 3 | Lane Controller with Industrial PC | No | 16 | 16 | |
| 4 | AVCC/ Axle Sensor with foundation | Set | 16 | 16 | |
| 5 | User Fare Display with mounting pole | No | 16 | 16 | |
| 6 | Automatic Barrier Gate | No | 16 | 16 | |
| 7 | Overhead Lane Status light (OHLS) | No | 16 | 16 | |
| 8 | Traffic light with mounting pole | No | 16 | 16 | |
| 9 | Loops with detector | No | 32 | 16 | 1 Per Lane |
| 10 | Incident Capture Camera with mounting pole | No | 16 | 16 | |
| 11 | Automatic Number Plate Recognition Camera with mounting pole (1 per lane) | No | 16 | 16 | |
| 12 | Customized industrial grade keyboard | No | 16 | 16 | |
| 13 | TFT Monitor | No | 16 | 16 | |
| 14 | Thermal Receipt Printer | No | 16 | 16 | |
| 15 | Barcode Reader with Stand | No | 2 | 0 | Not installed |
| 16 | Violation light & Alarm (on existing pole) and Foot switch in booth | No | 16 | 16 | |
| 17 | Booth CCTV camera with voice recording | No | 16 | 16 | |
| 18 | Intercom Slave unit in booth | No | 16 | 16 | |
| 19 | Height Sensor with mounting pole | No | 16 | 0 | Not installed |
| 20 | Fog Lights | No | 16 | 0 | Not installed |
| 21 | Weigh in Motion | No | 16 | 0 | Not working |
| 22 | Lane Level UPS | No | 16 | 16 | |
| 23 | Network Switch | No | 2 | 0 | Not installed |
| 24 | Lane level software | LS | 16 | 16 | |
| **B** | **Plaza Level Equipment** | | | | |
| 25 | Plaza Server (ETC Server) with Monitor and Keyboard | No | 1 | 1 | |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| 26 | Workstations for MIS, Cashup, Audit & LSDU | No | 4 | 4 | |
| 27 | Nerwork Printer | No | 1 | 0 | Not installed |
| 28 | Plaza Level Software | LS | 1 | 0 | Not installed |
| 29 | Internet Router for Connection to the CCH | No | 1 | 0 | Not installed |
| 30 | UPS system with battery as required for complete ETC system (10 KVA or above) | No | 2 | 2 | |
| 31 | Outdore wifi access point(Managed & Rugged) | No | 1 | - | Not Installed |
| 32 | LED Display for CCTV Monitoring (55" inch) | No | 1 | 1 | Not installed |
| 33 | Network Video Recorder (NVR) | No | 2 | 2 | |
| 34 | CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin) | No | 4 | 4 | |
| 35 | Intercom Master unit in control room | No | 1 | 1 | |
| 36 | DG Set | No | 2 | 2 | |
| 37 | Firewall | No | 1 | 1 | |
| 38 | Servo Stabilizer (60 KVA -3 phase or as available at the plaza) | No | 1 | 1 | |
| 39 | Cabling/ Networking | LS | 1 | 1 | |
| 40 | Broadband Internet Connection | No | 3 | 3 | |
| 41 | 24 Port Network switch (Layer 3) | No | 2 | 2 | |
| 42 | Static Weigh Bridge | No | 2 | 1 | Not working |
| 43 | PTZ CCTV Cameras | No | 2 | 2 | |

**Note*:-** MLFF (Multi lane free flow system) for 6 lanes shall be provided at Existing Toll Plaza Km 420+500 (Kaza toll plaza) by InvIT Concessionaire.

*Section 02 Chennai Bypass*

## Vanagram Toll Plaza

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| A | **Lane Level Equipment** | | | | |
| 1 | RFID ETC transceiver near Pay- axis - mounted on canopy/pole | No | 10 | 10 | |
| 2 | Electronic Enclosure | | | | Not Installed |
| 3 | Lane Controller with Industrial PC | No | 10 | 10 | |
| 4 | AVCC/ Axle Sensor with foundation | Set | 10 | 6 | Not installed |
| 5 | User Fare Display with mounting pole | No | 10 | 6 | Not installed |
| 6 | Automatic Barrier Gate | No | 10 | 10 | |
| 7 | Overhead Lane Status light (OHLS) | No | 10 | 6 | Not installed |
| 8 | Traffic light with mounting pole | No | 10 | 6 | Not installed |
| 9 | Loops with detector | No | 20 | 12 | Not installed |
| 10 | Incident Capture Camera with mounting pole | No | 10 | 6 | Not installed |
| 11 | Automatic Number Plate Recognition Camera with mounting pole (1 per lane) | No | 10 | 10 | |
| 12 | Customized industrial grade keyboard | No | 10 | 6 | Not installed |
| 13 | TFT Monitor | No | 10 | 10 | |
| 14 | Thermal Receipt Printer | No | 10 | 9 | Not working |
| 15 | Barcode Reader with Stand | No | 2 | 0 | Not installed |
| 16 | Violation light & Alarm (on existing pole) and Foot switch in booth | No | 10 | 6 | Not installed |
| 17 | Booth CCTV camera with voice recording | No | 10 | 10 | |
| 18 | Intercom Slave unit in booth | No | 10 | 6 | Not installed |
| 19 | Height Sensor with mounting pole | No | 10 | 0 | |
| 20 | Fog Lights | No | 10 | 0 | |
| 21 | Weigh in Motion | No | 10 | 0 | |
| 22 | Lane Level UPS | No | 10 | 10 | |
| 23 | Network Switch | No | 2 | 0 | |
| 24 | Lane level software | LS | 10 | 10 | |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| **B** | **Plaza Level Equipment** | | | | |
| 26 | Plaza Server (ETC Server) with Monitor and Keyboard | No | 1 | 1 | |
| 27 | Workstations for MIS, Cashup, Audit & LSDU | No | 4 | 4 | |
| 28 | Nerwork Printer | No | 1 | 0 | Not installed |
| 29 | Plaza Level Software | LS | 1 | 1 | |
| 30 | Internet Router for Connection to the CCH | No | 1 | 1 | |
| 31 | UPS system with battery as required for complete ETC system (10 KVA or above) | No | 2 | 2 | |
| 32 | LED Display for CCTV Monitoring (55" inch) | No | 1 | 0 | Not installed |
| 33 | Network Video Recorder (NVR) | No | 1 | 1 | |
| 34 | CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin) | No | 4 | 4 | |
| 35 | Intercom Master unit in control room | No | 1 | 1 | |
| 36 | DG Set | No | 1 | 1 | |
| 37 | Firewall | No | 1 | 1 | |
| 38 | Servo Stabilizer (60 KVA -3 phase or as available at the plaza) | No | 1 | 1 | |
| 39 | Cabling/ Networking | LS | 1 | 1 | |
| 40 | Broadband Internet Connection | No | 2 | 2 | |
| 41 | 24 Port Network switch (Layer 3) | No | 2 | 2 | |
| 42 | Static Weigh Bridge | No | 2 | 0 | Not installed |
| 43 | PTZ CCTV Cameras | No | 2 | 2 | |

Note*-

- The existing toll plaza at Vanagram will be demolished, and new toll plazas at Ch. 6+500, shall be constructed by the Authority. Accordingly, the MLFF will be provided by the Authority and shall be maintained by the TOT/InvIT Concessionaire after the completion of the DLP period.

## Surapattu Toll Plaza

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| A | **Lane Level Equipment** | | | | |
| 1 | RFID ETC transceiver near Pay-axis - mounted on canopy/pole | No | 12 | 12 | |
| 2 | Lane Controller with Industrial PC | No | 12 | 12 | |
| 3 | AVCC/ Axle Sensor with foundation | Set | 12 | 12 | Not Working |
| 4 | User Fare Display with mounting pole | No | 12 | 12 | |
| 5 | Automatic Barrier Gate | No | 12 | 12 | |
| 6 | Overhead Lane Status light (OHLS) | No | 12 | 12 | |
| 7 | Traffic light with mounting pole | No | 12 | 12 | |
| 8 | Loops with detector | No | 24 | 0 | Not Installed |
| 9 | Incident Capture Camera with mounting pole | No | 12 | 12 | |
| 10 | License Plate Image Capture Camera with mounting poles | No | 10 | 0 | Not Installed |
| 11 | Automatic Number Plate Recognition Camera with mounting pole (1 per lane) | No | 12 | 0 | Not Installed |
| 12 | Customized industrial grade keyboard | No | 12 | 0 | Not Installed |
| 13 | TFT Monitor | No | 12 | 0 | Not Installed |
| 14 | Thermal Receipt Printer | No | 12 | 12 | |
| 15 | Barcode Reader with Stand | No | 12 | 12 | |
| 16 | Violation light & Alarm (on existing pole) and Foot switch in booth | No | 12 | 12 | |
| 17 | Booth CCTV camera with voice recording | No | 12 | 0 | Not Installed |
| 18 | Intercom Slave unit in booth | No | 12 | 0 | Not Installed |
| 19 | Height Sensor with mounting pole | No | 12 | 12 | |
| 20 | Fog Lights | No | 12 | | Not Installed |
| 21 | Weigh in Motion | No | 12 | | Not Installed |
| 22 | Lane Level UPS | No | 12 | 12 | |
| 23 | Network Switch | No | 2 | 2 | |
| 24 | Lane level software | LS | 12 | | Not Installed |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| **B** | **Plaza Level Equipment** | | | | |
| 25 | Plaza Server (ETC Server) with Monitor and Keyboard | No | 1 | 1 | |
| 26 | Office PC with Monitor and Keyboard | No | | | Not Installed |
| 27 | Workstations for MIS, Cashup, Audit & LSDU | No | 4 | 4 | |
| 28 | Nerwork Printer | No | 1 | | Not Installed |
| 29 | Plaza Level Software | LS | 1 | | Not Installed |
| 30 | Internet Router for Connection to the CCH | No | 1 | | Not Installed |
| 31 | UPS system with battery as required for complete ETC system (10 KVA or above) | No | 2 | | Not Installed |
| 32 | Outdore wifi access point(Managed & Rugged) | No | 1 | 1 | |
| 33 | LED Display for CCTV Monitoring (55" inch) | No | 1 | | Not Installed |
| 34 | Network Video Recorder (NVR) | No | 1 | 1 | |
| 35 | CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin) | No | 4 | | Not Installed |
| 36 | Intercom Master unit in control room | No | 1 | | Not Installed |
| 37 | DG Set | No | 1 | | Not Installed |
| 38 | Firewall | No | 1 | | Not Installed |
| 39 | Servo Stabilizer (60 KVA -3 phase or as available at the plaza) | No | 1 | | Not Installed |
| 40 | Cabling/ Networking | LS | 1 | | Not Installed |
| 41 | Broadband Internet Connection | No | 2 | | Not Installed |
| 42 | 24 Port Network switch (Layer 3) | No | 2 | | Not Installed |
| 43 | Static Weigh Bridge | No | 1 | | Not Installed |
| 44 | PTZ CCTV Cameras | No | 2 | | Not Installed |

**Note*:-** MLFF (Multi lane free flow system) for 6 lanes shall be provided at Existing Toll Plaza Km 28+600 (Surapattu toll plaza) by InvIT Concessionaire.

*Section 03 Chennai Tada*

## Nallur Toll Plaza

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| A | **Lane Level Equipment** | | | | |
| 1 | RFID ETC transceiver near Pay-axis - mounted on canopy/pole | No | 14 | 14 | |
| 2 | Electronics Enclosure | No | 14 | 14 | |
| 3 | Lane Controller with Industrial PC | No | 14 | 14 | |
| 4 | AVCC/ Axle Sensor with foundation | Set | 14 | 14 | |
| 5 | User Fare Display with mounting pole | No | 14 | 14 | |
| 6 | Automatic Barrier Gate | No | 14 | 14 | |
| 7 | Overhead Lane Status light (OHLS) | No | 14 | 14 | |
| 8 | Traffic light with mounting pole | No | 14 | 14 | |
| 9 | Loops with detector | No | 28 | 28 | |
| 10 | Incident Capture Camera with mounting pole | No | 14 | 14 | |
| 11 | License Plate Image Capture Camera with mounting poles | No | 14 | - | Not Installed |
| 12 | Automatic Number Plate Recognition Camera with mounting pole (1 per lane) | No | 14 | 14 | |
| 13 | Customized industrial grade keyboard | No | 14 | 14 | |
| 14 | TFT Monitor | No | 14 | 14 | |
| 15 | Thermal Receipt Printer | No | 14 | 14 | |
| 16 | Barcode Reader with Stand | No | 2 | 0 | Not Installed |
| 17 | Violation light & Alarm (on existing pole) and Foot switch in booth | No | 14 | 14 | |
| 18 | Booth CCTV camera with voice recording | No | 14 | 14 | |
| 19 | Intercom Slave unit in booth | No | 14 | 14 | |
| 20 | Height Sensor with mounting pole | No | 14 | 0 | Not Installed |
| 21 | Fog Lights | No | 14 | 0 | Not Installed |
| 22 | Weigh in Motion | No | 14 | 0 | Not Installed |
| 23 | Lane Level UPS | No | 14 | 14 | |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| 23 | Network Switch | No | 2 | 0 | Not Installed |
| 24 | Lane level software | LS | 14 | 14 | |
| **B** | **Plaza Level Equipment** | | | | |
| 25 | Plaza Server (ETC Server) with Monitor and Keyboard | No | 1 | 1 | |
| 26 | Office PC with Monitor and Keyboard | No | 3 | 0 | |
| 27 | Workstations for MIS, Cashup, Audit & LSDU | No | 4 | 4 | |
| 28 | Nerwork Printer | No | 1 | | Not Installed |
| 29 | Plaza Level Software | LS | 1 | 1 | |
| 30 | Internet Router for Connection to the CCH | No | 1 | 1 | |
| 31 | UPS system with battery as required for complete ETC system (10 KVA or above) | No | 2 | 2 | |
| 32 | Outdore wifi access point(Managed & Rugged) | No | 1 | - | Not Installed |
| 33 | LED Display for CCTV Monitoring (55" inch) | No | 1 | - | Not Installed |
| 34 | Network Video Recorder (NVR) | No | 2 | 2 | |
| 35 | CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin) | No | 4 | 4 | |
| 36 | Intercom Master unit in control room | No | 1 | 1 | |
| 37 | DG Set | No | 1 | 1 | |
| 38 | Firewall | No | 1 | 1 | |
| 39 | Servo Stabilizer (60 KVA -3 phase or as available at the plaza) | No | 1 | 1 | |
| 40 | Cabling/ Networking | LS | 1 | 1 | |
| 41 | Broadband Internet Connection | No | 2 | 2 | |
| 42 | 24 Port Network switch (Layer 3) | No | 2 | 2 | |
| 43 | Static Weigh Bridge | No | 2 | 0 | Not Installed |
| 44 | PTZ CCTV Cameras | No | 2 | 2 | |

## Section 04 Neelmangla-Tumkur

## Kulumepalya Toll Plaza

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| **A** | **Lane Level Equipment** | | | | |
| 1 | RFID ETC transceiver near Pay-axis - mounted on canopy/pole | No | 10 | 10 | |
| 2 | Lane Controller with Industrial PC | No | 10 | 10 | |
| 3 | AVCC/ Axle Sensor with foundation | Set | 10 | 10 | |
| 4 | User Fare Display with mounting pole | No | 10 | 10 | |
| 5 | Automatic Barrier Gate | No | 10 | 10 | |
| 6 | Overhead Lane Status light (OHLS) | No | 10 | 10 | |
| 7 | Traffic light with mounting pole | No | 10 | 10 | |
| 8 | Loops with detector | No | 20 | 20 | |
| 9 | Incident Capture Camera with mounting pole | No | 10 | 10 | |
| 10 | License Plate Image Capture Camera with mounting poles | No | 10 | 10 | |
| 11 | Automatic Number Plate Recognition Camera with mounting pole (1 per lane) | No | 10 | 0 | Not Installed |
| 12 | Customized industrial grade keyboard | No | 10 | 10 | |
| 13 | TFT Monitor | No | 10 | 10 | |
| 14 | Thermal Receipt Printer | No | 10 | 10 | |
| 15 | Barcode Reader with Stand | No | 0 | 0 | |
| 16 | Violation light & Alarm (on existing pole) and Foot switch in booth | No | 10 | 10 | |
| 17 | Booth CCTV camera with voice recording | No | 10 | 10 | |
| 18 | Intercom Slave unit in booth | No | 10 | 10 | |
| 19 | Height Sensor with mounting pole | No | 10 | 0 | Not Installed |
| 20 | Fog Lights | No | 10 | 0 | Not Installed |
| 21 | Weigh in Motion | No | 10 | 0 | Not Installed |
| 22 | Lane Level UPS | No | 10 | 10 | |
| 23 | Network Switch | No | 2 | 2 | |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| 24 | Lane level software | LS | 10 | 10 | |
| **B** | **Plaza Level Equipment** | | | | |
| 25 | Plaza Server (ETC Server) with Monitor and Keyboard | No | 1 | 1 | |
| 26 | Office PC with Monitor and Keyboard | No | | | |
| 27 | Workstations for MIS, Cashup, Audit & LSDU | No | 4 | 4 | |
| 28 | Nerwork Printer | No | 1 | 1 | |
| 29 | Plaza Level Software | LS | 1 | 1 | |
| 30 | Internet Router for Connection to the CCH | No | 2 | 1 | 1 not available |
| 31 | UPS system with battery as required for complete ETC system (10 KVA or above) | No | 2 | 2 | |
| 32 | Outdore wifi access point(Managed & Rugged) | No | 1 | - | Not Installed |
| 33 | LED Display for CCTV Monitoring (55" inch) | No | 1 | 0 | Not Installed |
| 34 | Network Video Recorder (NVR) | No | 2 | 2 | |
| 35 | CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin) | No | 4 | 4 | |
| 36 | Intercom Master unit in control room | No | 1 | 1 | |
| 37 | DG Set | No | 1 | 1 | |
| 38 | Firewall | No | 1 | 1 | |
| 39 | Servo Stabilizer (60 KVA -3 phase or as available at the plaza) | No | 1 | 1 | |
| 40 | Cabling/ Networking | LS | 1 | 1 | |
| 41 | Broadband Internet Connection | No | 2 | 1 | 1 not available |
| 42 | 24 Port Network switch (Layer 3) | No | 2 | 2 | |
| 43 | Static Weigh Bridge | No | 2 | 0 | Not Installed |
| 44 | PTZ CCTV Cameras | No | 2 | 2 | |

## Chokkenahalli Toll Plaza

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| A | **Lane Level Equipment** | | | | |
| 1 | RFID ETC transceiver near Pay-axis - mounted on canopy/pole | No | 10 | 10 | |
| 2 | Lane Controller with Industrial PC | No | 10 | 10 | |
| 3 | AVCC/ Axle Sensor with foundation | Set | 10 | 10 | |
| 4 | User Fare Display with mounting pole | No | 10 | 10 | |
| 5 | Automatic Barrier Gate | No | 10 | 10 | |
| 6 | Overhead Lane Status light (OHLS) | No | 10 | 10 | |
| 7 | Traffic light with mounting pole | No | 10 | 10 | |
| 8 | Loops with detector | No | 20 | 20 | |
| 9 | Incident Capture Camera with mounting pole | No | 10 | 10 | |
| 10 | License Plate Image Capture Camera with mounting poles | No | 10 | 10 | |
| 11 | Automatic Number Plate Recognition Camera with mounting pole (1 per lane) | No | 10 | 0 | Not installed |
| 12 | Customized industrial grade keyboard | No | 10 | 0 | Not Working |
| 13 | TFT Monitor | No | 10 | 10 | |
| 14 | Thermal Receipt Printer | No | 10 | 10 | |
| 15 | Barcode Reader with Stand | No | 0 | 0 | |
| 16 | Violation light & Alarm (on existing pole) and Foot switch in booth | No | 10 | 10 | |
| 17 | Booth CCTV camera with voice recording | No | 10 | 10 | |
| 18 | Intercom Slave unit in booth | No | 10 | 10 | |
| 19 | Height Sensor with mounting pole | No | 10 | 0 | Not Installed |
| 20 | Fog Lights | No | 10 | 0 | Not Installed |
| 21 | Weigh in Motion | No | 10 | 0 | Not Installed |
| 22 | Lane Level UPS | No | 10 | 10 | |
| 23 | Network Switch | No | 2 | 2 | Not Installed |
| 24 | Lane level software | LS | 10 | 10 | |

| S.No | Equipment Description | Unit | Qty | Operational | Remarks |
|---|---|---|---|---|---|
| **B** | **Plaza Level Equipment** | | | | |
| 25 | Plaza Server (ETC Server) with Monitor and Keyboard | No | 1 | 1 | |
| 26 | Workstations for MIS, Cashup, Audit & LSDU | No | 4 | 4 | |
| 27 | Nerwork Printer | No | 1 | 1 | |
| 28 | Plaza Level Software | LS | 1 | 1 | |
| 29 | Internet Router for Connection to the CCH | No | 2 | 1 | |
| 30 | UPS system with battery as required for complete ETC system (10 KVA or above) | No | 2 | 2 | |
| 31 | LED Display for CCTV Monitoring (55" inch) | No | 1 | 1 | |
| 32 | Network Video Recorder (NVR) | No | 2 | 2 | |
| 33 | CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin) | No | 4 | 4 | |
| 34 | Intercom Master unit in control room | No | 1 | 1 | |
| 35 | DG Set | No | 1 | 1 | |
| 36 | Firewall | No | 1 | 1 | |
| 37 | Servo Stabilizer (60 KVA -3 phase or as available at the plaza) | No | 1 | 1 | |
| 38 | Cabling/ Networking | LS | 1 | 1 | |
| 39 | Broadband Internet Connection | No | 2 | 1 | |
| 40 | 24 Port Network switch (Layer 3) | No | 2 | 2 | |
| 41 | Static Weigh Bridge | No | 2 | 0 | Not Installed |
| 42 | PTZ CCTV Cameras | No | 2 | 2 | |

Note*- The existing two toll plazas at Kulumepalya and Chokkenahalli will be demolished, and new toll plazas at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425) shall be constructed by the Authority.

Accordingly, the MLFF will be provided by the Authority and shall be maintained by the TOT/InvIT Concessionaire after the completion of the DLP period.

Existing Toll Plazas (layout, Buildings and TMS Equipment) at Kaza Toll Plaza (Km 420+500) till implementation of MLFF by InvIT Concessionaire, Vanagram Toll Plaza (Km 16+500) {until the construction of new Toll Plaza at Km 6+500 (Tiruneermalai) by Authority}, Surapattu Toll Plaza (Km 28+600) till implementation of MLFF by InvIT Concessionaire, Nallur Toll Plaza(Km 21+625)- {until the construction of new Toll Plaza with MLFF at Km 34+180 (Durainallur) by the InvIT Concessionaire}, {kulumepalya Toll Plaza (Km 30+000) and Chokkenahalli Toll Plaza (Km 61+500) [until the construction new toll plazas with MLFF at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425) by Authority]}shall be retained and maintained.

MLFF shall be provided at Kaza Plaza (Km 420+500), Surapattu Plaza (Km 28+600), and Durainallur (Km 34+180) by the InvIT Concessionaire as per the specifications attached in Annexure-1. Any additional items required during the concession period for the proper functioning of the MLFF system shall also be provided, and no COS shall be considered.

After the implementation of MLFF, all existing facilities—such as the Admin Building, Traffic Aid Post, Medical Aid Post, Vehicle Rescue Post, toilet block, highway mini nest, and all other amenities within the toll plaza complex—shall be retained and maintained throughout the concession period.

The Concessionaire shall maintain/repair/replace existing TMS till implementation of MLFF.

Toll Plaza Maintenance shall be done by the Concessionaire as per provisions/ guidelines of MoRT&H/ Relevant Codal Provisions/ Circulars.

New Facilities such as electrical systems, Admin building, Traffic Aid Post, Medical Aid Post, Vehicle Rescue Post, 2 nos of toilet block, highway mini nest and all other facilities required/ mentioned in manual shall be provided shall be provided at following locations:

**Table B- 1 Proposed Toll Plaza (Chennai Tada Section)**

| S. No. | Chainage of Toll Plaza (km) | Location |
|---|---|---|
| 1 | At Km 34+180 | Durainallur |

The Chainage of proposed toll plaza is tentative Chainage and exact location shall be finalized in coordination with IE and Authority

Note*:-

After completion of MLFF at Durainallur (Km 34+180), the existing plaza at Km 21+625 (Nallur) shall be demolished, and the carriageway and median shall be constructed and matched with the carriageway on both sides at the location given Below: -

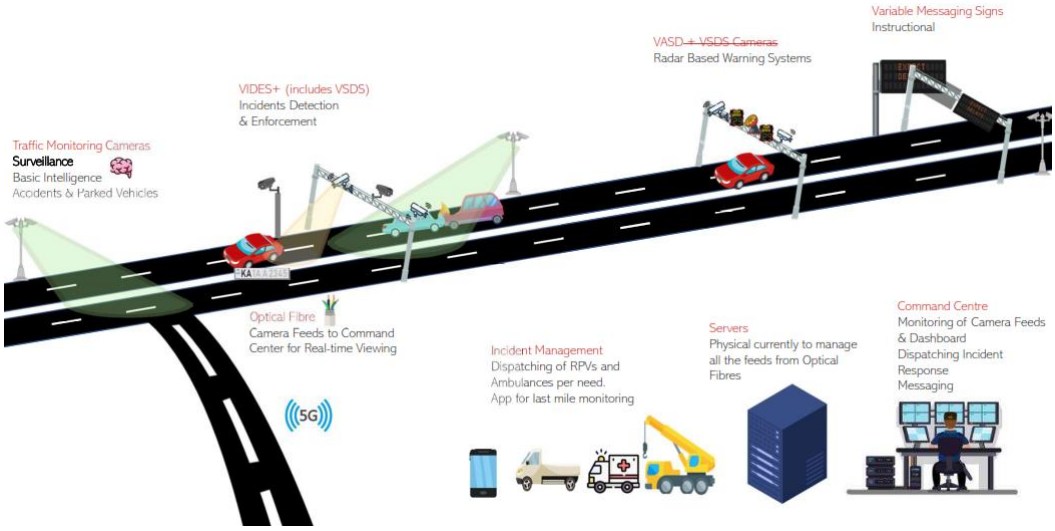
| S.No. | Chainage | | Remark |
|---|---|---|---|
| | From | To | |
| 1 | 21+400 | 21+865 | Reconstruction (Flexible Pavement) |

## 9.5 ATMS

- The following Specifications and Standards shall be applied in addition to 'Manual on Specifications and Standards for Highways published as IRC: SP: 99-2018 with all amendments and additions till date. Provision of ATMS in latest NHAI policy in vogue (currently, NHAI Policy Circular-Technical (11.53/2023) dt.10.10.2023 is being practiced which may be amended in due course of time) will govern the implementation. Latest Policy / Circular at the time of execution shall prevail.
- The ATMS implementation shall cover design, supply, installation, commissioning and operation and maintenance of Advanced Traffic Management Systems.
- The system would include out-door equipment including emergency call boxes, variable message signs systems, meteorological data system, close circuit TV camera (CCTV) system, traffic counting and classification system and transmission system. The indoor equipment would comprise a large display board, central computer (with Network Management System - NMS), CCTV monitor system, call centre system or management of emergency call boxes housed in a control centre with uninterrupted power supply. Any

new technology, meeting the requirements specified in these specifications should not be excluded. The systems shall meet following objectives:

a) Smooth and uninterrupted traffic flow
b) Enhance road safety
c) Real time information and guidance to users
d) Emergency assistance round the clock
e) Alerts for abnormal road and weather conditions
f) Reduced journey time and inconvenience




I. ATMS shall provide the following facilities to Highway users:
   a) Make emergency calls to Control Centre in case of accidents, breakdown, fire and ambulance.
   b) Pre-warn the Highway users about unusual condition on the road.
   c) Alarming users on Over Speeding
   d) Provide estimate details to cross particular stretch on highway between two pre-defined locations.

II. ATMS shall provide the following information/data to traffic managers for efficient and effective handling of traffic:
   a) Information regarding location of any incident, incoming calls, help required and messages to be passed to third parties.
   b) Information regarding traffic congestion, speed and weather conditions.

c) Information to users on over speeding and provides E challan as its integrated with Vahan and local state portal.

III. ATMS shall provide the following controls to traffic managers:

a) Change the variable message signs from the Control Centre.

b) Mobilize the movement of ambulances, cranes & patrolling vehicles.

c) Ensure timely help to users in emergency situations.

d) Monitoring traffic conditions and review incidents detected by VIDS and ANPR.

e) Monitoring video recording of accidents/ incidents for adding value addition to control accidents at prompt locations.

IV. The ATMS system shall include following sub-system:

a) Variable Message Sign system (Fixed and Portable)

b) Video Surveillance system / Traffic Monitoring Camera System (TMCS)

c) Video Incident Detection and Enforcement System (VIDES)

d) Vehicle Actuated Speed Display (VASD)

e) Emergency Call Boxes (ECB)

f) Mobile Radio Communication System

g) ATMS Command & Control Center with ATMS Software.

h) Power supply for Field Equipment as well as for ATMS Command & Control Center.

i) Communication Network with OFC Backbone.

V. These systems will include the following value additions:

a) Value Added Systems in the form of real time information on traffic conditions, unusual events, congestion levels, weather conditions etc.; to facilitate project users as also the Operator.

b) Through relevant websites including that for the Project SPV/Concessionaire.

c) Subscription based alert systems.

d) Dedicated TV channels pertaining to traffic movement.

e) Dedicated Toll-Free Telephone Systems.

## 9.6 Availability Requirements:

The inability to perform any required function, the occurrence of unexpected action or degradation of performance below the specifications shall be considered as a failure. The Mean-time-between-failure (MTBF) shall be the average operating time accumulated by the total population of identical items between failures. The system supplier/contractor shall submit MTBF and MTTR figures. The ATMS shall have an overall system availability of better than 99 percent. The ATMS shall be considered unavailable if any of its function cannot be properly executed and when any of the following conditions persist for more than 8 hours on the entire stretch: -

i. Variable Message System Failure: No display/Improper Display of VMS or failure of their related transmission/control system which would render the VMS inoperative.

ii. Emergency Call System Failure: Failure of any three consecutive Call boxes or failure of their related transmission system which would render the call boxes inoperative.

iii. ATCC Failure: Failure of more than one ATCC or failure of their related transmission system which would render the ATCC inoperative.

iv. Met Failure: Failure of more than one Met or failure of their related transmission system which would render the Met inoperative.

v. Video Surveillance System Failure: Failure of more than two Video Cameras or failure of their related transmission/control system which would render the cameras inoperative.

vi. Video Incident Detection System Failure: Failure of more than one Video Cameras or failure of their related transmission/control system which would render the cameras inoperative.

vii. Display at Control Centre: Whenever Control Centre is unable to get display of messages initiated by the Control Centre in-charge.

In addition to the above the system shall be considered unavailable when failure of the integrated ATMS Software or its hardware persists for more than 8 hours

## 9.7 Variable Message Signs (VMS):

Variable Massage Signs (VMSs) are to be installed for conveying the traffic conditions ahead to the drivers on real time basis

- Fixed VMS: Fixed VMS shall be mounted on a sturdy and aesthetically pleasing gantry structure with vertical clearance of at least 5.5 m
- Portable VMS: Portable signs shall be mounted at the back of a truck or similar vehicle

Variable message signs (VMSs) shall provide traveller information for warning, regulating, routing, and managing the traffic in order to improve the overall traffic flow.




**Figure 7-9 : VMS System**

## 9.8 Traffic Monitoring Camera System (TMCS):

- Pan-Tilt-Zoom Cameras
- At least 1 every kilometre
- 100m night range minimum
- Placement should be such that entire highway Stretch is visible

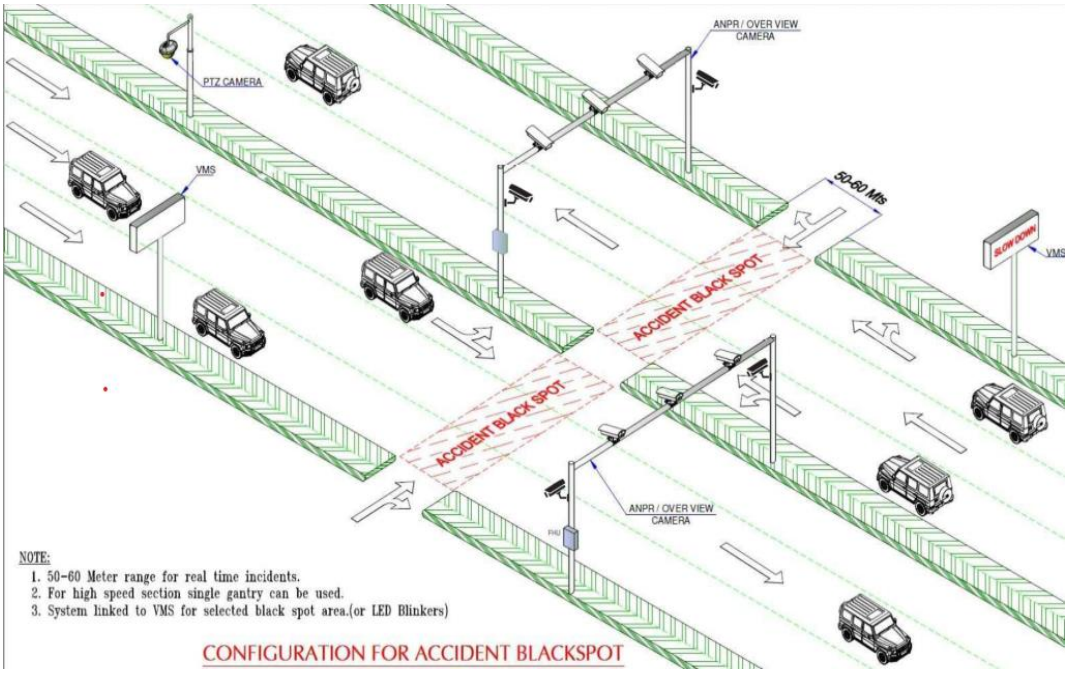
- Basic intelligence included (Accident + Stalled Vehicles)
- AI Can be centralized or edge-based
- One Traffic Operator manually viewing per 15 Cameras



## 9.9 Video Incident Detection and Enforcement System (VIDES):

- **System of Camera(s):**
  - Overview Camera
  - Side Camera
  - ANPR Camera(s)
  - Radar (if needed)
  - IR and Thermal if needed
- Generally, every 10 kilometre in accident prone areas or areas with likely over-speeding or traffic rule violations.
- 14 kinds of incidents to be detected using AI.
  - 8 of which are eChallan based
- ATCC will be part of it.

- VIDES will have dedicated operators(s) and Smart TV in Command Center

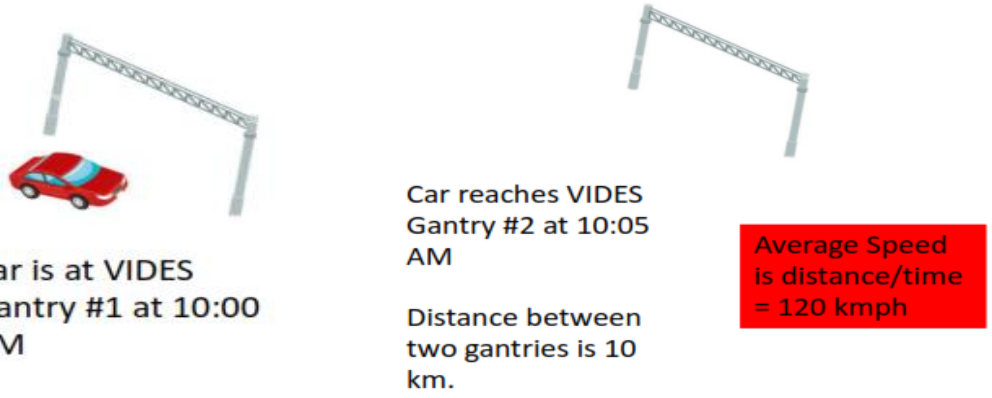



## VIDES Incidents

| Incident Type | Actionable |
|---|---|
| Accident | RPV/Ambulance/VMS/Rajmargyatra |
| Fog/Smoke | RPV/VMS/Rajmargyatra |
| Debris | RPV/VMS/Rajmargyatra |
| Pedestrian Crossing | RPV/VMS/Rajmargyatra |
| Animals on the carriageway | RPV/VMS/Rajmargyatra |
| Traffic Flow | Analysis/Messaging/Rajmargyatra |
| Overspeeding | eChallan |

| Incident Type | Actionable |
|---|---|
| Opposite Side Traffic | eChallan |
| Stalled or Stationary Vehicle | eChallan |
| Wrong Lane Driving | eChallan |
| Seatbelt Violation | eChallan |
| No Helmer in Two Wheeler | eChallan |
| Triple Ridings in Two Wheeler | eChallan |
| Two Wheeler or Banned Vehicle on Expressway | eChallan |

## Sectional Speeding




## 9.10 Vehicle Actuated Speed Display System (VASD):

- Radar and Lane-wise displays.
- No number plate recognition therefore no challan.
- Every 20 km and separated from VIDES.
- This is inexpensive way to warn before punishing offender through VIDES.



## 9.11 Automatic Number Plate Recognition (ANPR):

Automatic Number Plate Recognition (ANPR) system is based on artificial intelligence, providing a robust and ready-to-integrate system, capturing diverse types of license plates.

ANPR is also known as Automatic License Plate Recognition (ALPR), is software used to recognize the number plates automatically by performing sophisticated optical character recognition on images to read the license plates of vehicles.



**Figure 7-10: ANPR System**

## 9.12 Automatic Traffic Count and Classifier (ATCC):

The ATCC is a data-gathering instrument for use in the field (roadway). With Phoenix ATCC and possible combinations of sensors; traffic data and vehicle classification can be recorded and later retrieved. Speed, Number of Axles, Vehicle Class Type are just a few types of data, which can be gathered with this instrument. For the unit itself, the

welded aluminium case is durable, lightweight, and weather resistant. The Interior keypad & display are both sealed to prevent moisture from damaging them. Inside the case is the heart of the unit, the microprocessor. Printed circuit boards contain the microprocessor, backup battery, charging network, memory, and all other support circuitry for the unit.



**Figure 7-11: ATCC System**

## 9.13 Command Centre-The Brain:

- Two Video walls (TMCS/General and VIDES)
- Hardware upgraded to modern standards

- Unifying ATMS software that integrates with sub- system software such as VIDES, TMCS etc.
- Software(s) should be STQC certified
- Video recording saved for 180 days
- Aadhaar Based Attendance
- 1 Traffic Operator Per 15 TMCS Cameras
- Highway O&M & Data Analyst added (Appendix C)



OFC Backbone:

- Protocol for Laying OFC Cable (9.7)

- Minimum depth is 1.65 m from ground and width greater than 0.3 m for OFC Cable.
- No trench should be left open overnight
- Backbone is 24 cores
- Backbone to peripheral equipment can be 8/12 cores

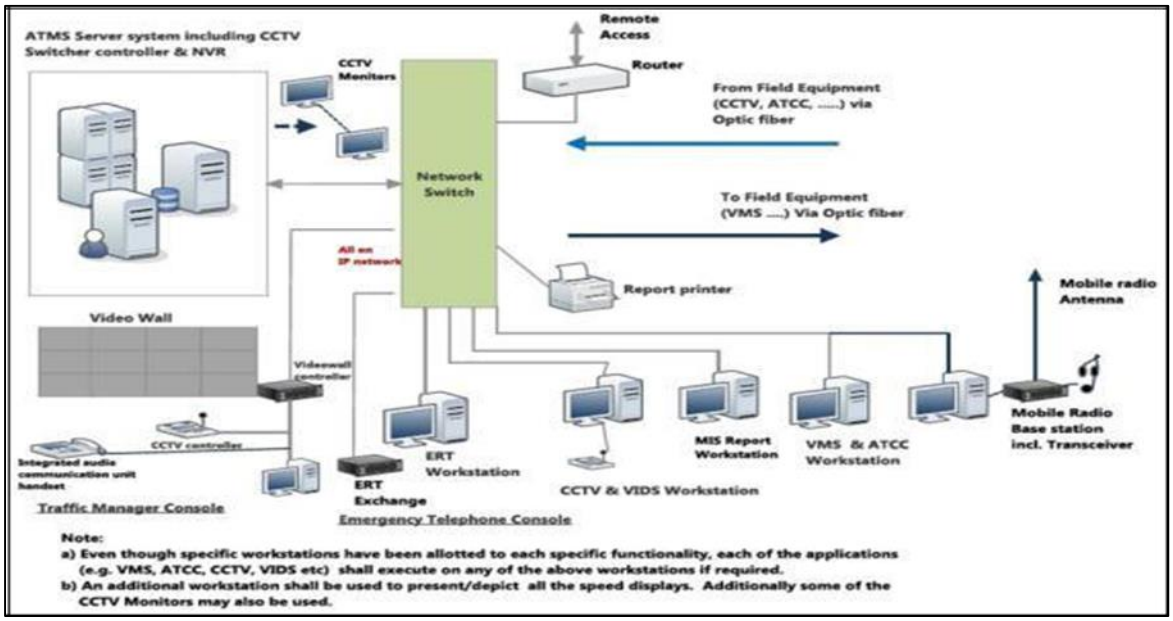



**Figure 7-12: OFC Backbone**

# Other Sub-Systems

| Sl No | ATMS Sub-Systems covered in 2016 Circular | Comments on relevance and adequacy |
|---|---|---|
| 1 | Variable Message Sign | 1. Circular gives all sizes of VMS. 5x1.8m or higher size full gantry proposed for 4/6 Lane NH and Expressways. 2.4x1.5m L Type (cantilever) proposed for 2L+PS Highways and Blackspot Locations.<br>2. All other specifications as per IRC 67:2022 & IRC SP 85:2023<br>3. Location- At start and end of Project, Blackspot Locations and Junctions with NH & Expressways. |
| 2 | Emergency Call Box | 1. Specifications as-is.<br>2. Mandatorily proposed for Greenfield Expressways and Hill Roads<br>3. PDs/ROs may see their relevance in other NHs or else may be de-scoped. |
| 3 | Mobile Radio Communication System | 1. Specifications as-is.<br>2. Circular provides RPV, Ambulance, Crane to have vehicle mounted Units and staff to have handheld units<br>3. Mandatorily proposed for Expressways and Hill Roads<br>4. PDs/ROs may see their relevance in other NHs or else may be de-scoped. |

| Sl No | ATMS Sub-Systems covered in 2016 Circular | Comments on relevance and adequacy |
|---|---|---|
| 4 | Portable WIMs | Not relevant after installation of WIMs in all Toll Plazas (Descope) |
| 5 | Automatic Traffic Counter and Classifier | Not relevant as it will be done with VIDS ANPR cameras (Integrated with ANPR from VIDS) |
| 6 | Travel Time Estimation System | Not relevant as it will be done with VIDS ANPR cameras. (Descope) |
| 7 | Meteorological System (MET) | Not relevant in general in view of Meghdoot and other Apps. (Descope) |
| 8 | Communication & Networking | Adequately covered<br>Made future-ready with 5G and cloud provisions |
| 9 | Power Supply | Adequately covered |

# Integrations

- DataLake for daily reporting and camera access **[API]**
- IP based video access with NHAI HQ for ICCC and Traffic Police Command Centers
- Integration with Rajmargyatra for broadcasting incidents **[API]**
- Provision to integrate with centralized computer aided dispatch system **[API]**
- Dedicated Work station for Traffic Enforcement Agency to sit in ATMS Control Room to improve coordination **[Physical]**
- Re-use of VIDES Gantry as Enforcement Gantry for GNSS Based Tolling



*Provision for Dedicated 100 Mbps internet connectivity with Command Center for sharing of feeds/data over internet.*

# Suggestive Location of ATMS Equipment

| Equipment | Locations |
|---|---|
| **Video Surveillance System (PTZ Camera)** | Min. 1 camera per km, alternating on both sides or on median. Additional cameras to be put up depending on non-linear structure, clovers, interchanges etc such effective surveillance of the entire highway stretch is achieved. |
| **Video Incident Detection and Enforcement System (Overview Camera, ANPR Camera, Radar etc)** | Min. 1 VIDES at every 10 km covering each side of Highway. Exact location of the VIDS should be such that it is placed facing accident and incident prone areas (blackspots, potential accident spot locations, clovers, interchanges, busy junctions etc, between two flyovers, IRAD data based etc). Additional VIDES can be put up depending on number of such locations as per audit by NHAI or Road Safety Experts or Recommendation of Local Traffic Police. |
| **Variable Message Sign** | At entry and exit of Project stretch, Blackspot locations, Major Junctions with NH/Expressways. Minimum 2 Portable VMS per Project Package |
| **Vehicle Actuated Speed Display** | Gantry Mounted System to be located after every 20km with minimum 2 in each package. Over speeding prone areas should also be considered. |

# Suggestive Location of ATMS Equipment (contd...)

| Equipment | Locations |
|---|---|
| **Emergency Road Side Telephone** | Only for Zones experiencing telecom blackspots along highway need to be provided by ERT. On long highway stretches (> 2 km) suffering from telecom blackspots, ERT to be located at every 2 Km on both sides of the highway stretch. |
| **Mobile Communication System** | Mobile wireless towers (towers for the main base station and repeater stations) to be appropriately designed and quantities arrived at depending mainly on the highway terrain. Handsets with relevant members of the Dispatch & O&M team along with Portable/Mobile wireless sets on O&M vehicles |
| **ATMS Command and Control Center** | Typically at 1 location per 100 km for a highway or depending on the scheme/structure of the project |

**Table 7-20 :Existing ATMS along the project stretch**

***Section 01 Vijayawada-Chilakaluripet***

| SL No | Equipment Description | Unit | Total Installed Quantity |
|---|---|---|---|
| 1 | CCTV PTZ Cameras | No | 17 |
| 2 | VIDS | No | 2 (LHS+RHS) |
| 3 | VASD | No | 1 (LHS+RHS) |
| 4 | VMS | No | 2 |
| 5 | Portable VMS | No | 2 |
| 6 | ECB | No | 16 |
| 7 | Surveillance Cameras | No | 58 |

***Section 02 Chennai Bypass***

| SL No | Equipment Description | Unit | Total Installed Quantity |
|---|---|---|---|
| Nil | | | |

***Section 03 Chennai Tada***

| SL No | Equipment Description | Unit | Total Installed Quantity |
|---|---|---|---|
| 1 | CCTV PTZ Cameras | No | 16 |
| 2 | ATCC | No | 3 |
| 3 | RF tower | No | 11 |
| 4 | ECB | No | 11 |

**Section 04 Neelmangla-Tumkur**

| SL No | Equipment Description | Unit | Total Installed Quantity |
|---|---|---|---|
| Nil | | | |

**Table 7-21.1 : ATMS Requirement along the project stretch**

**Video Surveillance system / Traffic monitoring camera system (TMCS)**

***Section 01 Vijayawada-Chilakaluripet***

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| PTZ CCTV Camera TMCS with basic analytics | To monitor traffic conditions (Day & Night) on the highway stretch including junctions, curves, ramps | Min. 1 camera per km, alternating on both side or on median. Additional cameras to be put up depending on non-linear structure, clovers, interchanges etc. such effective surveillance of the entire highway stretch is achieved. | 52 |

**Section 02 Chennai Bypass**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| PTZ CCTV Camera TMCS with basic analytics | To monitor traffic conditions (Day & Night) on the highway stretch including junctions, curves, ramps | Min. 1 camera per km, alternating on both side or on median. Additional cameras to be put up depending on non-linear structure, clovers, interchanges etc. such effective surveillance of the entire highway stretch is achieved. | 32 |

**Section 03 Chennai tada**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| PTZ CCTV Camera TMCS with basic analytics | To monitor traffic conditions (Day & Night) on the highway stretch including junctions, curves, ramps | Min. 1 camera per km, alternating on both side or on median. Additional cameras to be put up depending on non-linear structure, clovers, interchanges etc. such effective surveillance of the entire highway stretch is achieved. | 33 |

## Video incident Detection Enforcement System (VIDES)

***Section 01 Vijayawada-Chilakaluripet***

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| VIDES (Overview and ANPR Cameras) for VIDE with video analytics, enforcement and supported with local warning lights/VMS and e-challans generation | To automatically detect violations of traffic rules and collect evidence for e-Challan generation. Further, monitor (Day and Night) and warn road users on the main carriageway about dangerous traffic conditions (e.g. Contraflow, stopped traffic at Service road merged points, blind turns on the main carriageway & junctions with considerable traffic | Min. 1 VIDES at every 10 km covering each side of Highway. Exact location of the VIDES should be such that it is placed facing accident and incident prone areas (blackspots, potential accident spot location, clovers, interchanges, busy junctions etc.). Additional VIDES can be put up depending on number of such locations as per audit by NHAI or Road Safety Experts or Recommendation of Local Traffic Police. Provision of warning with flashing lights: 150 m before the area of detection.250 m before the area of detection to warn arriving vehicles. Provision of VMS linked to VIDES on Blackspots or high accident prone location decided by PD, NHAI. If warning VMS is used, then warning flashing lights may not be used on that location. | 10 |

**Section 02 Chennai Bypass**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| VIDES (Overview and ANPR Cameras) for VIDE with video analytics, enforcement and supported with local warning lights/VMS and e-challans generation | To automatically detect violations of traffic rules and collect evidence for e-Challan generation. Further, monitor (Day and Night) and warn road users on the main carriageway about dangerous traffic conditions (e.g. Contraflow, stopped traffic at Service road merged points, blind turns on the main carriageway & junctions with considerable traffic | Min. 1 VIDES at every 10 km covering each side of Highway. Exact location of the VIDES should be such that it is placed facing accident and incident prone areas (blackspots, potential accident spot location, clovers, interchanges, busy junctions etc.). Additional VIDES can be put up depending on number of such locations as per audit by NHAI or Road Safety Experts or Recommendation of Local Traffic Police. Provision of warning with flashing lights: 150 m before the area of detection.250 m before the area of detection to warn arriving vehicles. Provision of VMS linked to VIDES on Blackspots or high accident prone location decided by PD, NHAI. If warning VMS is used, then warning flashing lights may not be used on that location. | 4 |

### Section 03 Chennai tada

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| VIDES (Overview and ANPR Cameras) for VIDE with video analytics, enforcement and supported with local warning lights/VMS and e-challans generation | To automatically detect violations of traffic rules and collect evidence for e-Challan generation. Further, monitor (Day and Night) and warn road users on the main carriageway about dangerous traffic conditions (e.g. Contraflow, stopped traffic at Service road merged points, blind turns on the main carriageway & junctions with considerable traffic | Min. 1 VIDES at every 10 km covering each side of Highway. Exact location of the VIDES should be such that it is placed facing accident and incident prone areas (blackspots, potential accident spot location, clovers, interchanges, busy junctions etc.). Additional VIDES can be put up depending on number of such locations as per audit by NHAI or Road Safety Experts or Recommendation of Local Traffic Police. Provision of warning with flashing lights: 150 m before the area of detection.250 m before the area of detection to warn arriving vehicles. Provision of VMS linked to VIDES on Blackspots or high accident prone location decided by PD, NHAI. If warning VMS is used, then warning flashing lights may not be used on that location. | 6 |

## Vehicle Actuated Speed Display System (VASDS)

### *Section 01 Vijayawada-Chilakaluripet*

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| Vehicle Actuated speed detection and warning system | To warm road users on over speeding | Gantry Mounted System to be located after every 20km with minimum 2 in each package. Exact of Location of VASD shall be such that it is at maximum distance from nearby videos to avoid duplication as videos take care of speed violation as well whereas VASD is just for warning. Further, over speeding prone area may be considered for exact placement. | 4 |

**Section 02 Chennai Bypass**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| Vehicle Actuated speed detection and warning system | To warm road users on over speeding | Gantry Mounted System to be located after every 20km with minimum 2 in each package. Exact of Location of VASD shall be such that it is at maximum distance from nearby videos to avoid duplication as videos take care of speed violation as well whereas VASD is just for warning. Further, over speeding prone area may be considered for exact placement. | 2 |

**Section 03 Chennai tada**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| Vehicle Actuated speed detection and warning system | To warm road users on over speeding | Gantry Mounted System to be located after every 20km with minimum 2 in each package. Exact of Location of VASD shall be such that it is at maximum distance from nearby videos to avoid duplication as videos take care of speed violation as well whereas VASD is just for warning. Further, over speeding prone area may be considered for exact placement. | 4 |

## Variable Message sign (VMS) System

***Section 01 Vijayawada-Chilakaluripet***

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| VMS Displays (Full Gantry in 4/6 Lane Highway/ Expressways and L Type in 2L+PS Highways, Blackspot Locations, Major Junctions with NH/Expressway) | To inform/warn/guide road users at start of highway stretch & important junctions on highway conditions for travel planning | Minimum 2 in each Project to be Temporarily deployed before locations related to road words and incidents affecting traffic movement. Message languages: Hindi, English & local Language | 4 |

**Section 02 Chennai Bypass**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| VMS Displays (Full Gantry in 4/6 Lane Highway/ Expressways and L Type in 2L+PS Highways, Blackspot Locations, Major Junctions with NH/Expressway) | To inform/warn/guide road users at start of highway stretch & important junctions on highway conditions for travel planning | Minimum 2 in each Project to be Temporarily deployed before locations related to road words and incidents affecting traffic movement. Message languages: Hindi, English & local Language | 2 |

**Section 03 Chennai tada**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| VMS Displays (Full Gantry in 4/6 Lane Highway/ Expressways and L Type in 2L+PS Highways, Blackspot Locations, Major Junctions with NH/Expressway) | To inform/warn/guide road users at start of highway stretch & important junctions on highway | Minimum 2 in each Project to be Temporarily deployed before locations related to road words and incidents affecting traffic movement. Message languages: Hindi, English & local Language | 2 |

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| | conditions for travel planning | | |

The Concessionaire shall provide 2 (Nos.) Trolley Mounted Portable VMS.

**ATMS Command & Control Center**

***Section 01 Vijayawada-Chilakaluripet***

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| ATMS Control Centre | Using a suitable electronic and IT system (hardware and software) integrated with the ATMS field equipment, it supports centralized Monitoring of highway stretch receiving emergency calls and active management of accidents including providing system aided guidance and traffic Management activities. | Typically, at 1 location per 100 km for a highway or one per project depending upon the scheme | 1 |

**Section 02 Chennai Bypass**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| ATMS Control Centre | Using a suitable electronic and IT system (hardware and software) integrated with the ATMS field equipment, it supports centralized Monitoring of highway stretch receiving emergency calls and active management of accidents including providing system aided guidance and traffic Management activities. | Typically, at 1 location per 100 km for a highway or one per project depending upon the scheme | 1 |

**Section 03 Chennai tada**

| ITS Devices / System | User Need / Application | Rationale for Equipment location | Quantity |
|---|---|---|---|
| ATMS Control Centre | Using a suitable electronic and IT system (hardware and software) integrated with the ATMS field equipment, it supports centralized Monitoring of highway stretch receiving emergency calls and active management of accidents including providing system aided guidance and traffic Management activities. | Typically, at 1 location per 100 km for a highway or one per project depending upon the scheme | 1 |

**For Section 04 Neelmangla-Tumkur-**ATMS Shall be Provided by Authority and same shall be maintained by InvIT concessionaire after end of DLP period.

# CHAPTER 10

# DESIGN AND DOCUMENT REVIEW

## 10.1 DESIGN REVIVEW

### 10.1.1 General

Design is one of the important aspects of highway project. In four laning projects of NHAI, specifications and standards are defined as per four laning manual. Most of the elements of four laning like cross sections, super structures, drains, amenities etc. are typical and standard. Foundation of structure and pavement design are aspects which have major impact on life of highway asset to sustain during concession period and thereafter.

### 10.1.2 Pavement Design

Pavement design is basically an interplay between ground strata strength and traffic loading on pavement.

**Vijayawada- Chilakaluripet**.

#### A. Soil Strata

***Section-01 Vijayawada-Chilakaluripet***

The degree of compaction along the project corridor is ranging between 86.84% to 99.47% with an average value of 93.15% and the 4-days soaked CBR is ranging from 8.54% to 13.28% with an average value of 10.91%.

#### B. Traffic Loading

As per the trial pit survey, The existing pavement along the project corridor is Flexible in nature. The Flexible pavement composition comprises of Bituminous Layer, Granular Layer-I (WMM) and Granular Layer-II (GSB) on subgrade with average of 180 mm thick bituminous layer over 450 mm thick Granular layer

**Chennai Bypass**.

### A. Soil Strata

***Section-02 Chennai Bypass***

The 4-days soaked CBR is ranging from 9.86% to 10.11% with an average value of 9.98%.

### B. Traffic Loading

As per the trial pit survey, The existing pavement along the project corridor is Flexible in nature. The Flexible pavement composition comprises of Bituminous Layer, Granular Layer-I (WMM) and Granular Layer-II (GSB) on subgrade with average of 220 mm thick bituminous layer over 450 mm thick Granular layer

**Chennai- Tada**.

### A. Soil Strata

***Section-03 Chennai-Tada***

The degree of compaction along the project corridor is ranging between 93.16% to 99.48% with an average value of 96.32% and the 4-days soaked CBR is ranging from 9.48% to 10.91% with an average value of 10.195%.

### B. Traffic Loading

As per the trial pit survey, The existing pavement along the project corridor is Flexible in nature. The Flexible pavement composition comprises of Bituminous Layer, Granular Layer-I (WMM) and Granular Layer-II (GSB) on subgrade with average of 180 mm thick bituminous layer over 450 mm thick Granular layer

The FWD analysis is given in Chapter-7: Repair and rehabilitation of pavement.

## 10.1.3 Structure Design

Design drawing of structures were studied at site. All designs of structures are approved by IE. Elements of structural design were as per standard.

A detailed inventory of structures was carried out during which some minor issues were observed at structures on project road, a detailed structure wise inventory along with observations and recommendations is given in Chapter-8.

### 10.1.4 Toll Plaza

Toll plaza was visited for assessment of the existing condition of the Plaza with respect to Section 10 of IRC SP 84-2014 during which some shortfalls were observed in the existing infrastructure at toll plaza. A detailed inventory along with shortcomings and improvement proposals is given in Chapter-11.

## 10.2 DOCUMENT REVIEW

### 10.2.1 General

**Vijayawada-Chilakaluripet:** The Site of Six lane divided Project Highway comprises the section commencing from (Km 355+000 to Km 357+342), (Km 372+038 to Km 422+605), (Km 0+000 to Km 16+499) at Vijayawada of NH-16 and has Kaza toll Plazas at Km 420+500 on project Section in the state of Andhra Pradesh. The total length of Project Stretch is 69.408 km.

**Chennai Bypass:** Project Stretch starts from Km 0+000 and ends at Km 32+600 of NH-32/ NH-48 and has Vanagram toll Plazas at Km 16+500 and Surapattu toll Plazas at Km 28+600 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 32.600 km.

**Chennai-Tada:** Project Stretch starts from Km 21+400 and ends at Km 54+400 of NH-16 and has Nallur toll Plazas at Km 21+625 on project Section in the state of Tamil Nadu. The total length of Project Stretch is 33.000 km.

**Neelmangla- Tumkur:** Project Stretch starts from Km 29+500 and ends at Km 74+168 of NH-48 and has kulumepalya toll plazas at Km 30+000 and Chokkenahalli toll plaza Km 61+500 on project Section in the state of Karnataka. The total length of Project Stretch is 44.668 km.

### 10.2.2 Under Consideration/Construction Work

| S. No. | Particulars | Locations | Chainage | Tentative Hand Over Date | Brief Description of proposed improvement work |
|---|---|---|---|---|---|
| **Vijayawada-Chilakaluripet** | | | | | |
| **2** | DPR Tender invited For Access Controlled Highway | Addanki to Vijayawada | 355+000 to 422+605 | - | Part of BKV(Banglore-Kadappa-Vijayawada) Project |
| **Chennai Bypass** | | | | | |
| **1** | Shifting of Vanagram Toll plaza | Tiruneermalai | 6+500 | - | Shifting of Vanagram Toll plaza from 16+500 to 6+500 |
| **2** | Construction of VUP | Porur | 16+890 | - | Construction of VUP of size 20*5.5 |
| **3** | Construction of cut and cover RCC drain | Thamvaram | (Km. 0+370 to 1+280 and 31+400 to 31+800)LHS and (30+400 to 30+000) on RHS | - | Construction of cut and cover RCC drain from Km. (0+370 to 1+280 and 31+400 to 31+800)LHS and (30+400 to 30+000) on RHS |
| **4** | FOB | Nolambur | 21+800 | - | Construction of FOB with Width of 59.505m including Light |

| S. No. | Particulars | Locations | Chainage | Tentative Hand Over Date | Brief Description of proposed improvement work |
|---|---|---|---|---|---|
| **5** | Construction of Entry-Exit ramp | Porur | (km. 5+200 to 5+700) | - | Widening of Service Road and new construction of entry ramp (from Chainage 5+200 to 5+410 & 5+410 to 5+727) - 527m (LHS) including acceleration lane length and New Construction of exit ramp (from Chainage 5+696 to 5+510 & 5+510 to 5+200) - 496m (RHS) including deceleration length. |
| **6** | Construction of Causeway across Coovum River at Km 19+000 | Maduravoyal | 19+000 | - | Construction of Causeway bridge (5.5m wide) across Coovum River underneath the Grade Separator at Km 19.000, Maduravoyal (from Km 19.180 to Km 19.520, RHS) |
| **Chennai Tada** | | | | | |
| NIL | | | | | |
| **Neelmangla-Tumkur** | | | | | |

| S. No. | Particulars | Locations | Chainage | Tentative Hand Over Date | Brief Description of proposed improvement work |
|---|---|---|---|---|---|
| | • The section from Chainage 29+000 to 49+900 ,52+700 to 53+500 is currently under construction of six-laning . After the completion of the DLP period for this section, it shall maintained by the TOT/InvIT concessionaire.<br>• The DPR for six-laning has been invited by the authority for the stretch from Chainage 49+900 to 61+520. After the completion of the DLP period for this six-laning stretch, it shall be maintained by the TOT/InvIT concessionaire.<br>• New Toll Plaza with MLFF (Multi lane free flow system) shall be provided by Authority at MCW (Ch. 53+100), Ramp RHS (Ch. 53+100), Ramp RHS (Ch. 46+375), LHS Ramp (Ch.49+900) and Ramp LHS (Ch. 47+425) and the same shall be maintained by InvIT Concessionaire. | | | | |

## 10.3 Toll Contracts

Toll is being collected by Toll Collection Agency appointed by NHAI through open competitive bidding.

# CHAPTER 11

# COST ESTIMATE

## 11.1 General

The cost estimate has been prepared for the Project Stretch. Detail of the Project Stretch is presented in table below for ready reference.

***Table 7-22 : Project Stretch***

| Section No. | Section Name | | Chainage (Km) | | Length (Km) |
|---|---|---|---|---|---|
| | From | To | From | To | |
| **Section-1** | Chilakaluripet | Vijayawada | 355+000 | 357+342 | 2.342 |
| | Chilakaluripet Bypass | | 0+000 | 16+499 | 16.499 |
| | Chilakaluripet | Vijayawada | 372+038 | 422+605 | 50.567 |
| **Section-2** | Chennai Bypass | | 0+000 | 32+600 | 32.6 |
| **Section-3** | Chennai | Tada | 21+400 | 54+400 | 33.0 |
| **Section-4** | Neelmangla | Tumkur | 29+500 | 61+520 | 32.02 |
| | Tumkur Bypass | | 61+520 | 74+168 | 12.648 |
| **Total** | | | | | **179.676** |

The Project cost estimates have been prepared based on various items of works required such as:

- ATMS
- MLFF
- New Toll plaza

## 11.2 Improvement Proposal

## 11.3 Rate Analysis

Basic Schedule Rates 2025-26 for has been considered for cost estimates. Following the review, some items not available in SOR, have been considered as per prevailing industry /Market rates.

## 11.4 Estimates of Cost for Engineering and Safety Improvements

**Initial Cost for Engineering and Safety Improvements for Base year 2025-26:**

**Section-01 Vijayawada-Chilakaluripet**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| ATMS | KM | 52.91 | 8.237 |
| MLFF at existing Toll Plaza | Nos | 1 | 5.000 |
| **Total Excluding @18% GST** | | | **13.237** |
| **GST @18%** | | | **2.383** |
| **Total Amount** | | | **15.619** |

**Section-02 Chennai Bypass**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| ATMS | KM | 32.6 | 4.981 |
| MLFF at existing Toll Plaza Lanes (Surapattu) | Nos | 1 | 5.000 |
| **Total Excluding @18% GST** | | | **9.981** |
| **GST @18%** | | | **1.797** |
| **Total Amount** | | | **11.777** |

**Section-03 Chennai-Tada**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| ATMS | KM | 33 | 5.498 |
| New Toll Plaza with MLFF | Nos | 1 | 8.436 |
| **Total Excluding @18% GST** | | | **13.934** |
| **GST @18%** | | | **2.508** |
| **Total Amount** | | | **16.442** |

**Section-04 Neelmangla Tumkur**

| Particulars | Unit | Quantity | Cost (in Cr.) |
|---|---|---|---|
| **Nil** | | | |

*Note: - The rates for ATMS equipment and MLFF have been considered based on prevailing NHAI practices and accepted cost norms used in similar NHAI projects.*

# CHAPTER 12

# OPERATION & MAINTENANCE REQUIREMENT

## 12.1 General

Operation & Maintenance requirement of project stretch is assessed in following heads

A. Regular / Routine Operation and Maintenance

B. Periodic Operation and Maintenance

Regular maintenance consists of primarily highway maintenance which covers road repairs of pavement, shoulders, other traffic amenities and systems, structure, median, plants etc. cleaning, and maintenance Highway patrolling and surveillance, accident management are also part of regular Operation and Maintenance (O&M).

operation is not in Concessionaire scope this being an Annuity based contract.

At certain period elements like pavement, structures, etc. require major maintenance in form of overlays, replacement etc. These come under periodic maintenance.

Cost of such regular and periodic maintenance is worked out and has been given in subsequent sections of this chapter.

The assumptions used in this analysis have been discussed

| Particulars | Assumptions |
|---|---|
| Routine Maintenance Costs | 0.035 crores/Km/Year (Year FY 2011-12) -flexible and 0.04 crores/Km/Year (Year FY 2011-12) -Rigid |
| Periodic Maintenance Costs | 0.35 crores/Km/every 6 Years (Year FY 2011-12) |
| Electricity and Patrolling Expenses | 0.0125 crores/Km/Year (Year FY 2010-11) |
| Office Expenditure | 2.5 crores/Year (Year FY 2010-11) |
| Insurance | 0.15% of Total Project Cost (TPC |
| Toll Expense | 1.60 crore per Toll Plaza (Year FY 2010-11) for Four Lane |

### 12.1.1 Routine Operation and Maintenance

Cost of Routine Operation and Maintenance of project is given below.

**Table 7-23 : Cost of Routine Maintenance at current rates**

**Section-01 Vijayawada-Chilakaluripet**

| Year | Routine Maintenance (in Cr) | Toll Plaza & ATMS Operation and Maintenance (in Cr) | Electricity & Patrolling expenses (in Cr) | Other office expenses (in Cr) | Insurance (in Cr) | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) |
|---|---|---|---|---|---|---|
| 2026-2027 | 0.00 | 4.69 | 0.00 | 0.30 | 0.02 | 5.91 |
| 2027-2028 | 0.00 | 4.69 | 0.00 | 0.30 | 0.02 | 5.91 |
| 2028-2029 | 0.00 | 4.69 | 0.00 | 0.30 | 0.02 | 5.91 |
| 2029-2030 | 0.00 | 4.69 | 0.00 | 0.30 | 0.02 | 5.91 |
| 2030-2031 | 0.00 | 4.69 | 0.00 | 0.30 | 0.02 | 5.91 |
| 2031-2032 | 0.00 | 4.69 | 0.00 | 0.30 | 0.02 | 5.91 |
| 2032-2033 | 10.02 | 4.69 | 1.44 | 5.46 | 3.61 | 29.76 |
| 2033-2034 | 10.02 | 4.69 | 1.44 | 5.46 | 3.61 | 29.76 |
| 2034-2035 | 10.02 | 4.69 | 1.44 | 5.46 | 3.61 | 29.76 |
| 2035-2036 | 10.02 | 4.69 | 1.44 | 5.46 | 3.61 | 29.76 |
| 2036-2037 | 10.02 | 4.69 | 1.44 | 5.46 | 3.61 | 29.76 |
| 2037-2038 | 10.02 | 4.69 | 1.44 | 5.46 | 3.61 | 29.76 |
| 2038-2039 | 0.00 | 4.69 | 1.44 | 5.46 | 3.61 | 17.94 |
| 2039-2040 | 12.87 | 5.07 | 1.89 | 5.46 | 4.70 | 35.38 |
| 2040-2041 | 12.87 | 5.07 | 1.89 | 5.46 | 4.70 | 35.38 |

**Section-02 Chennai Bypass**

| Year | Routine Maintenance (in Cr) | Toll Plaza & ATMS Operation and Maintenance (in Cr) | Electricity & Patrolling expenses (in Cr) | Other office expenses (in Cr) | Insurance (in Cr) | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) |
|---|---|---|---|---|---|---|
| 2026-2027 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2027-2028 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2028-2029 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2029-2030 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2030-2031 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2031-2032 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2032-2033 | 0.00 | 7.72 | 0.89 | 5.46 | 0.74 | 17.47 |
| 2033-2034 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |

| Year | Routine Maintenance (in Cr) | Toll Plaza & ATMS Operation and Maintenance (in Cr) | Electricity & Patrolling expenses (in Cr) | Other office expenses (in Cr) | Insurance (in Cr) | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) |
|---|---|---|---|---|---|---|
| 2034-2035 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2035-2036 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2036-2037 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2037-2038 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2038-2039 | 0.00 | 7.72 | 0.89 | 5.46 | 0.74 | 17.47 |
| 2039-2040 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |
| 2040-2041 | 5.46 | 7.72 | 0.89 | 5.46 | 0.74 | 23.92 |

**Section-03 Chennai-Tada**

| Year | Routine Maintenance (in Cr) | Toll Plaza & ATMS Operation and Maintenance (in Cr) | Electricity & Patrolling expenses (in Cr) | Other office expenses (in Cr) | Insurance (in Cr) | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) |
|---|---|---|---|---|---|---|
| 2026-2027 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2027-2028 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2028-2029 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2029-2030 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2030-2031 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2031-2032 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2032-2033 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2033-2034 | 0.00 | 4.24 | 0.90 | 5.46 | 1.15 | 13.87 |
| 2034-2035 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2035-2036 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2036-2037 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2037-2038 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2038-2039 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |
| 2039-2040 | 0.00 | 4.24 | 0.90 | 5.46 | 1.15 | 13.87 |
| 2040-2041 | 6.54 | 4.24 | 0.90 | 5.46 | 1.15 | 21.59 |

**Section-04 Neelmangla-Tumkur**

| Year | Routine Maintenance (in Cr) | Toll Plaza & ATMS Operation and Maintenance (in Cr) | Electricity & Patrolling expenses (in Cr) | Other office expenses (in Cr) | Insurance (in Cr) | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) |
|---|---|---|---|---|---|---|
| 2026-2027 | 0.00 | 11.87 | 0.00 | 0.30 | 0.01 | 14.38 |

| Year | Routine Maintenance (in Cr) | Toll Plaza & ATMS Operation and Maintenance (in Cr) | Electricity & Patrolling expenses (in Cr) | Other office expenses (in Cr) | Insurance (in Cr) | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) |
|---|---|---|---|---|---|---|
| 2027-2028 | 0.00 | 11.87 | 0.00 | 0.30 | 0.01 | 14.38 |
| 2028-2029 | 0.00 | 11.87 | 0.00 | 0.30 | 0.01 | 14.38 |
| 2029-2030 | 0.89 | 11.87 | 0.33 | 5.46 | 0.35 | 22.30 |
| 2030-2031 | 0.89 | 11.87 | 0.33 | 5.46 | 0.35 | 22.30 |
| 2031-2032 | 0.89 | 11.87 | 0.33 | 5.46 | 0.35 | 22.30 |
| 2032-2033 | 7.29 | 12.61 | 1.22 | 5.46 | 1.29 | 32.88 |
| 2033-2034 | 8.79 | 12.89 | 1.22 | 5.46 | 1.29 | 34.98 |
| 2034-2035 | 8.79 | 12.89 | 1.22 | 5.46 | 1.29 | 34.98 |
| 2035-2036 | 6.40 | 12.89 | 1.22 | 5.46 | 1.29 | 32.16 |
| 2036-2037 | 8.79 | 12.89 | 1.22 | 5.46 | 1.29 | 34.98 |
| 2037-2038 | 8.79 | 12.89 | 1.22 | 5.46 | 1.29 | 34.98 |
| 2038-2039 | 2.39 | 12.89 | 1.22 | 5.46 | 1.29 | 27.43 |
| 2039-2040 | 8.79 | 12.89 | 1.22 | 5.46 | 1.29 | 34.98 |
| 2040-2041 | 6.40 | 12.89 | 1.22 | 5.46 | 1.29 | 32.16 |

### 12.1.2 Periodic Operation and Maintenance

Cost of Periodic operation and maintenance is given below.

**Table 7-24 : Cost of Periodic & Routine Maintenance at current rates**

**Section-01 Vijayawada-Chilakaluripet**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount (in Cr) incl GST |
|---|---|---|
| 2026-2027 | 5.91 | 0.00 |
| 2027-2028 | 5.91 | 0.00 |
| 2028-2029 | 5.91 | 0.00 |
| 2029-2030 | 5.91 | 0.00 |
| 2030-2031 | 5.91 | 0.00 |
| 2031-2032 | 5.91 | 0.00 |
| 2032-2033 | 29.76 | 0.00 |
| 2033-2034 | 29.76 | 0.00 |
| 2034-2035 | 29.76 | 0.00 |
| 2035-2036 | 29.76 | 0.00 |
| 2036-2037 | 29.76 | 0.00 |

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount (in Cr) incl GST |
|---|---|---|
| 2037-2038 | 29.76 | 0.00 |
| 2038-2039 | 17.94 | 150.73 |
| 2039-2040 | 35.38 | 0.00 |
| 2040-2041 | 35.38 | 0.00 |

**Section-02 Chennai Bypass**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount (in Cr) incl GST |
|---|---|---|
| 2026-2027 | 23.92 | 0.00 |
| 2027-2028 | 23.92 | 0.00 |
| 2028-2029 | 23.92 | 0.00 |
| 2029-2030 | 23.92 | 0.00 |
| 2030-2031 | 23.92 | 0.00 |
| 2031-2032 | 23.92 | 0.00 |
| 2032-2033 | 17.47 | 76.54 |
| 2033-2034 | 23.92 | 0.00 |
| 2034-2035 | 23.92 | 0.00 |
| 2035-2036 | 23.92 | 0.00 |
| 2036-2037 | 23.92 | 0.00 |
| 2037-2038 | 23.92 | 0.00 |
| 2038-2039 | 17.47 | 76.54 |
| 2039-2040 | 23.92 | 0.00 |
| 2040-2041 | 23.92 | 0.00 |

**Section-03 Chennai-Tada**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount (in Cr) incl GST |
|---|---|---|
| 2026-2027 | 21.59 | 0.00 |
| 2027-2028 | 21.59 | 0.00 |
| 2028-2029 | 21.59 | 0.00 |
| 2029-2030 | 21.59 | 0.00 |
| 2030-2031 | 21.59 | 0.00 |
| 2031-2032 | 21.59 | 0.00 |
| 2032-2033 | 21.59 | 0.00 |
| 2033-2034 | 13.87 | 99.08 |
| 2034-2035 | 21.59 | 0.00 |
| 2035-2036 | 21.59 | 0.00 |
| 2036-2037 | 21.59 | 0.00 |

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount (in Cr) incl GST |
|---|---|---|
| 2037-2038 | 21.59 | 0.00 |
| 2038-2039 | 21.59 | 0.00 |
| 2039-2040 | 13.87 | 99.08 |
| 2040-2041 | 21.59 | 0.00 |

**Section-04 Neelmangla-Tumkur**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount (in Cr) incl GST |
|---|---|---|
| 2026-2027 | 14.38 | 0.00 |
| 2027-2028 | 14.38 | 0.00 |
| 2028-2029 | 14.38 | 0.00 |
| 2029-2030 | 22.30 | 0.00 |
| 2030-2031 | 22.30 | 0.00 |
| 2031-2032 | 22.30 | 0.00 |
| 2032-2033 | 32.88 | 0.00 |
| 2033-2034 | 34.98 | 0.00 |
| 2034-2035 | 34.98 | 0.00 |
| 2035-2036 | 32.16 | 35.33 |
| 2036-2037 | 34.98 | 0.00 |
| 2037-2038 | 34.98 | 0.00 |
| 2038-2039 | 27.43 | 97.87 |
| 2039-2040 | 34.98 | 0.00 |
| 2040-2041 | 32.16 | 35.33 |

## 12.2 Total Cost of Operation and Maintenance

Total cost of operation and maintenance consist of both regular and periodic maintenance.

**Table 7-25 : Total OMEX Routine & Perodic with escalation**

**Section-01 Vijayawada-Chilakaluripet**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 5.91 | 0.00 | 5.91 |
| 2027-2028 | 6.21 | 0.00 | 6.21 |
| 2028-2029 | 6.52 | 0.00 | 6.52 |
| 2029-2030 | 6.85 | 0.00 | 6.85 |
| 2030-2031 | 7.19 | 0.00 | 7.19 |
| 2031-2032 | 7.55 | 0.00 | 7.55 |
| 2032-2033 | 39.89 | 0.00 | 39.89 |
| 2033-2034 | 41.88 | 0.00 | 41.88 |
| 2034-2035 | 43.98 | 0.00 | 43.98 |
| 2035-2036 | 46.17 | 0.00 | 46.17 |
| 2036-2037 | 48.48 | 0.00 | 48.48 |
| 2037-2038 | 50.91 | 0.00 | 50.91 |
| 2038-2039 | 32.21 | 270.70 | 302.91 |
| 2039-2040 | 66.71 | 0.00 | 66.71 |
| 2040-2041 | 70.05 | 0.00 | 70.05 |

**Section-02 Chennai Bypass**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 23.92 | 0.00 | 23.92 |
| 2027-2028 | 25.12 | 0.00 | 25.12 |
| 2028-2029 | 26.37 | 0.00 | 26.37 |
| 2029-2030 | 27.69 | 0.00 | 27.69 |
| 2030-2031 | 29.08 | 0.00 | 29.08 |
| 2031-2032 | 30.53 | 0.00 | 30.53 |
| 2032-2033 | 23.42 | 102.57 | 125.99 |
| 2033-2034 | 33.66 | 0.00 | 33.66 |
| 2034-2035 | 35.34 | 0.00 | 35.34 |
| 2035-2036 | 37.11 | 0.00 | 37.11 |
| 2036-2037 | 38.96 | 0.00 | 38.96 |
| 2037-2038 | 40.91 | 0.00 | 40.91 |
| 2038-2039 | 31.38 | 137.46 | 168.84 |
| 2039-2040 | 45.11 | 0.00 | 45.11 |
| 2040-2041 | 47.36 | 0.00 | 47.36 |

**Section-03 Chennai-Tada**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 21.59 | 0.00 | 21.59 |
| 2027-2028 | 22.66 | 0.00 | 22.66 |
| 2028-2029 | 23.80 | 0.00 | 23.80 |
| 2029-2030 | 24.99 | 0.00 | 24.99 |
| 2030-2031 | 26.24 | 0.00 | 26.24 |
| 2031-2032 | 27.55 | 0.00 | 27.55 |
| 2032-2033 | 28.93 | 0.00 | 28.93 |
| 2033-2034 | 19.51 | 139.42 | 158.93 |
| 2034-2035 | 31.89 | 0.00 | 31.89 |
| 2035-2036 | 33.49 | 0.00 | 33.49 |
| 2036-2037 | 35.16 | 0.00 | 35.16 |
| 2037-2038 | 36.92 | 0.00 | 36.92 |
| 2038-2039 | 38.76 | 0.00 | 38.76 |
| 2039-2040 | 26.15 | 186.83 | 212.98 |
| 2040-2041 | 42.74 | 0.00 | 42.74 |

**Section-04 Neelmangla-Tumkur**

| Year | Total Maintenance Amount (in Cr) incl GST (excluding Periodic Maintenance) | Total Periodic Maintenance Amount(in Cr) incl GST | Total Amount (in Cr) incl GST |
|---|---|---|---|
| 2026-2027 | 14.38 | 0.00 | 14.38 |
| 2027-2028 | 15.10 | 0.00 | 15.10 |
| 2028-2029 | 15.85 | 0.00 | 15.85 |
| 2029-2030 | 25.82 | 0.00 | 25.82 |
| 2030-2031 | 27.11 | 0.00 | 27.11 |
| 2031-2032 | 28.46 | 0.00 | 28.46 |
| 2032-2033 | 44.06 | 0.00 | 44.06 |
| 2033-2034 | 49.21 | 0.00 | 49.21 |
| 2034-2035 | 51.67 | 0.00 | 51.67 |
| 2035-2036 | 49.88 | 54.81 | 104.69 |
| 2036-2037 | 56.97 | 0.00 | 56.97 |
| 2037-2038 | 59.82 | 0.00 | 59.82 |
| 2038-2039 | 49.25 | 175.76 | 225.01 |
| 2039-2040 | 65.95 | 0.00 | 65.95 |
| 2040-2041 | 63.67 | 69.95 | 133.62 |

# Annexure-I

## Standard Specification of MLFF

## Multi-Lane Free Flow (MLFF) Barrier Less Tolling

### A. General

1. The Concessionaire shall implement Automatic Number Plate Recognition (ANPR) Camera and RFID (FASTAG) based Barrier Less Multi Lane Free Flow (MLFF) Tolling System at the proposed Toll Plaza location on the Highway stretch.
2. The Solution shall be integrated with e-Notice Module developed by National Informatics Center (NIC) through Central Clearing House (CCH) wherein the violators will be issued e-Notice in case they cross the Toll Plaza with FASTag that is not valid and functional. The Authority shall provide assistance in integrating the system with the e-Notice Module prepared by NIC.
3. The e-Notice shall be issued to the violators by NIC for amount equal to two times the fee applicable to that category of vehicles as per sub-rule (2) of rule 4 of the National Highways Fee (Determination of Rates and Collection) Rules 2008.The payment received against the e-Notice shall be settled through the Payment Gateway (PG) to the designated Bank Account(s) as per the prevailing guidelines.
4. In case of non-payment of fees against the e-Notice within prescribed time, the road user shall have restrictions on the VAHAN based services and blacklisting of VRN / FASTag under NETC system.

### B. Standards & Specifications

1. **MLFF Project**

    a. The Concessionaire shall either:

        1) Implement MLFF based tolling facility by installing new Gantries on main carriageway of the highway (minimum 02 (01 Main & 01 redundant)) for each direction (LHS & RHS) for MLFF based tolling within approx. 350m of existing fee plaza provided:

            i. The Concessionaire shall be fully responsible for ensuring the continuous safety, security, and illumination of the installed gantries, covering all necessary measures to protect the infrastructure and provide clear visibility under all weather and lighting conditions.

            ii. The Concessionaire shall be required to submit detailed design drawings including design calculations of gantries which should be approved from any of the Indian Institute of Technology (IIT)/ National Institute of Technology (NIT).

            OR

        2) Use existing infrastructure for barrier less tolling.

b. The MLFF Project shall broadly include, but not limited to the following components to be provided as per the functional and technical specifications mentioned in Schedule-C:

   1. Radio Frequency Identification (RFID) Reader
   2. Radio Frequency Identification (RFID) Antenna
   3. Automatic Number Plate Reader (ANPR) Camera System and Application
   4. IR Illuminator
   5. Audit Surveillance Camera System
   6. Detectors – Radar
   7. Detectors-Lidar
   8. High Speed Weigh In Motion (HSWIM)
   9. Networking and Communications
   10. Software Application, Dashboard and Portal
   11. MLFF Control Center
   12. Power Supply for Field Equipment as well as for MLFF Control Center
   13. Operation & Maintenance (O&M) of the entire MLFF Facility

c. Integration with CCH: The Concessionaire must process transactions from the MLFF Plaza Server in an online-only mode, ensuring toll fare calculations and transaction processing to Central Clearing House (CCH) as per NETC guidelines as amended from time to time. The host system should be capable of supporting both online and offline transaction processing based on internet connectivity availability.

d. Compliance with Interface Control Document (ICD) 2.5 or latest: The Concessionaire must ensure to comply with ICD 2.5 or latest specifications for processing the transactions.

e. Integration with TMCC –

   i. All Transactional Data: The Concessionaire shall integrate the MLFF System with the Toll Monitoring and Control Centre (TMCC) software or any such software, via API for the purpose of sharing all transactional data.

   ii. Equipment Health Monitoring: All Critical MLFF equipment shall be integrated with TMCC software for monitoring the real time health status. The SLA of MLFF equipment shall be calculated based on TMCC software and through other measures by IHMCL. Concessionaire shall strictly ensure provisioning of necessary arrangement including but not limited to proper network infrastructure, mapping of correct IP address etc. for reflection of correct uptime of equipment on TMCC dashboard.

f. Future integration with advanced technologies: The Concessionaire's solution should include API based integration with future tolling

technologies like GNSS and NHAI Applications like Raj Marg Yatra etc. or, Advance Traffic Management System (ATMS), any other similar system at no extra cost. The API for the same shall be provided by the Authority.

g. Service Levels: The Concessionaire shall implement the solution such that the MLFF Tolling System has accuracy levels above 99% especially with respect to vehicle count, classification and Registration Number readability.

h. Grievance Handling: The Concessionaire shall promptly resolve all the grievance related to e-Notice through an integrated system.

2. **Data Retention and Handover**

a) **Data Retention Period**:

The Concessionaire shall ensure the retention of the following data for the specified durations throughout the Concession Agreement:

i. **ANPR and Audit Surveillance Camera Images**: Minimum retention period of **180 days**
ii. **Video Recordings**: Minimum retention period of **30 days**.
iii. **Transaction Data and Reports**: Retention throughout the Concession Agreement.
iv. **Images, videos of all e**-Notice cases and other dispute cases shall be retained till the time the e-Notice or such case is disposed of.

b) **Data Handover:**

Upon the expiry or termination of the Concession Agreement, the Concessionaire shall hand over all retained transaction data, including images, videos, and reports, in a complete and organized manner to the Authority.

c) **Data Access and Evidence Provision**:

a. During the Concession period, the Concessionaire shall provide requisite image evidence and video recordings to the Authority within the defined storage limits upon request.
b. The data shall be made available promptly to assist the Authority in its operations, audits, or legal proceedings.

d) **Compliance and Penalty**:

The Concessionaire shall ensure compliance with the above requirements. Non-compliance may result in penalties or other actions as deemed appropriate by the Authority.

e) **Confidentiality and Security**:

The Concessionaire shall ensure the confidentiality and security of the retained data, preventing unauthorized access, misuse, or loss during the retention and handover period.

3. **Point of Sale (POS) setup for Sale of FASTag and Plaza Specific Discount Pass**

Concessionaire is responsible for setting up a **24*7** POS at the Control Centre

Building for issuance of FASTag as per NETC Guidelines and providing services of Plaza Specific Discount Pass.

The POS executive should be trained to assist road users with making payments for e-Notices.

**ANNEXURE C**

**TRAFFIC REPORTS**

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# Gorhar Barwa Adda section of NH19 in Jharkhand




**Traffic Due Diligence – Final Report**

**National Highways Authority of India**

January 2026

TRANSLINK®
Infrastructure Consultants Pvt Ltd
Smart Consulting

# Control information

| | |
|---|---|
| **Contract Reference:**<br>Letter of Commencement - FINDIV-16014(11)/1/2024-O/o CGM (Finance-II)/e-265207/116 dated 7th August 2025 | **Identification & Traceability:**<br>TIC/401/TF/TDD/R1-Final Report |
| **Assignment Title:** Traffic Due Diligence – Gorhar Barwa Adda section of NH19 in Jharkhand | |
| **Client** | **National Highways Authority of India**<br>Sector 10, Dwarka, New Delhi 110075 |
| **Consultant** | **Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited**<br>1103, I Square Corporate Park<br>Science City Road, Ahmedabad 380060 |

**Issue and Revision Records**

| Date | Revisions | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| 09.01.2026 | R1 | Darshan Doshi<br>Parthav Parikh<br>Rutvik Dhameliya | Rinku Kanani<br>Karan Dave | Tejas Patel | Traffic Due Diligence – Final Report |

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**Appendices**

**Appendix A:** Vehicle category-wise visual representation of origin-destination zones

Vehicle category-wise top origin-destination pairs

**Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

# Abbreviations (1)

| | |
|---|---|
| **AADC** | Annual Average Daily Collection |
| **AADT** | Annual Average Daily Traffic |
| **ADB** | Asian Development Bank |
| **ADT** | Average Daily Traffic |
| **AL** | Axle Load |
| **APC** | Annual Potential Collection |
| **BOT** | Build-Operate-Transfer |
| **BPCL** | Bharat Petroleum Corporation Limited |
| **CAGR** | Compound Annual Growth Rate |
| **CCL** | Central Coalfields Limited |
| **CII** | Confederation of Indian Industry |
| **CJV** | Car/ Jeep/ Van |
| **Ch** | Chainage |
| **CM** | Chief Minister |
| **CPI** | Consumer Price Index |
| **CTVC** | Classified Traffic Volume Count |
| **DBFOT** | Design, Build, Finance, Operate, and Transfer |
| **DFCCIL** | Dedicated Freight Corridor Corporation of India Limited |
| **DPR** | Detailed Project Report |
| **EDFC** | Eastern Dedicated Freight Corridor |
| **EPC** | Engineering, Procurement and Construction |
| **ETC** | Electronic Toll Collection |
| **EV** | Electric Vehicle |
| **FMC** | First Mile Connectivity |
| **FMCG** | Fast Moving Consumer Goods |

| | |
|---|---|
| **FY** | Financial Year |
| **GDP** | Gross Domestic Product |
| **GSDP** | Gross State Domestic Product |
| **GST** | Goods and Services Tax |
| **GVA** | Gross Value Added |
| **HAM** | Hybrid Annuity Mode |
| **HCV** | Heavy Commercial Vehicle |
| **HPCL** | Hindustan Petroleum Corporation Limited |
| **HQ** | Headquarter |
| **IEA** | International Energy Agency |
| **IHMCL** | Highways Management Company Limited |
| **IL&FS** | Infrastructure Leasing & Financial Services Limited |
| **IMD** | India Meteorological Department |
| **IMF** | International Monetary Fund |
| **INR** | Indian Rupee |
| **IOCL** | Indian Oil Corporation Limited |
| **IRC** | Indian Road Congress |
| **IWAI** | Inland Waterways Authority of India |
| **JH** | Jharkhand |
| **Km** | Kilometer |
| **LCV** | Light Commercial Vehicle |
| **LPG** | Liquefied Petroleum Gas |
| **MADT** | Monthly Average Daily Traffic |
| **MAV** | Multi Axle Vehicle |
| **MLFF** | Multi Lane Free Flow |

# Abbreviations (2)

| | |
|---|---|
| **MoRTH** | Ministry of Road Transport and Highways |
| **MoSPI** | Ministry of Statistics and Programme Implementation |
| **MT** | Million Tonnes |
| **MTPA** | Million Tonnes Per Annum |
| **NCR** | National Capital Region |
| **NH** | National Highway |
| **NHAI** | National Highways Authority of India |
| **NICDC** | National Industrial Corridor Development Corporation |
| **NW1** | National Waterway 1 |
| **NMP** | National Monetisation Pipeline |
| **OD** | Origin – Destination |
| **OECD** | Organisation for Economic Co-operation and Development |
| **OSV** | Oversized Vehicle |
| **PCI** | Per Capita Income |
| **PCU** | Passenger Car Unit |
| **PIA** | Project Influence Area |
| **PIU** | Project Implementation Unit |
| **PNGRB** | Petroleum & Natural Gas Regulatory Board |
| **POL** | Petroleum, Oil, and Lubricant |
| **PPP** | Public-Private Partnership |
| **QADT** | Quarterly Average Daily Traffic |
| **RBI** | Reserve Bank of India |
| **RO** | Regional Office |
| **RTO** | Regional Transport Office |
| **SAIL** | Steel Authority of India |
| **SCF** | Seasonal Correction Factor |
| **SH** | State Highway |
| **SIAM** | Society of Indian Automobile Manufacturers |
| **SME** | Small and Medium Enterprises |
| **TAZ** | Traffic Analysis Zone |
| **TC** | Toll Cost |
| **TIC** | Translink Infrastructure Consultants Private Limited |
| **TMT** | Thermo-Mechanically Treated |
| **TOT** | Toll, Operate, Transfer |
| **TP** | Toll Plaza |
| **UPEIDA** | Uttar Pradesh Expressways Industrial Development Authority |
| **VOC** | Vehicle Operating Cost |
| **VOT** | Value of Time |
| **WADT** | Weekly Average Daily Traffic |
| **WB** | West Bengal |
| **WPI** | Wholesale Price Index |
| **2A** | 2 Axle |
| **3A** | 3 Axle |
| **3PL** | Third-Party Logistics |

# Chapter 1: Introduction

- The assignment
- Objective and Scope of Work
- Approach and methodology
- Organisation of the report

This chapter outlines assignment background, scope of work, approach and methodology employed to ensure successful execution of the assignment.

Approach and methodology section highlights the structured approach which has been followed to gather data, conduct analysis, and make informed decisions throughout the project lifecycle. By employing a robust methodology, the consultant aims to ensure the accuracy, efficiency and reliability of the assignment’s outcomes.

# The assignment

**Ministry of Road Transport and Highways** (MoRTH) has entrusted **National Highways Authority of India** (hereinafter referred to as '**NHAI'** or '**Client'**) for monetisation of public funded operational national highway projects under the framework of National Monetisation Pipeline (NMP).

In this context, NHAI has commissioned Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited (hereinafter referred to as '**TIC'** or '**consultant'**) to carry out traffic due diligence for following national highway section in Jharkhand (hereinafter referred to as '**project highway**').

**Project highway under asset monetization programme**

| National highway section | Toll plaza | Concerned NHAI field office |
|---|---|---|
| **Gorhar Barwa Adda section of NH19** | Kulgo (Giridih district) | Project Implementation Unit – Dhanbad<br>Regional Office – Ranchi |

Source: Client

This document is the final report incorporating traffic data updates received up to October 2025 and confirmation from the client dated 15th December 2025 for recommended scenario. The report presents our understanding of the project highway, trend analysis of traffic and revenue, primary data analysis and traffic and revenue forecast for a concession period of 15 years.

# Objective and Scope of Work

The principal objective of the study is to determine traffic and revenue forecast for 15 years. This assessment provides input to stakeholders to evaluate viable monetization options for the project highway.

The broad **scope of the work** of the assignment is as follows:

- Review of available historical traffic and revenue data and relevant document received from the client
- Carrying out traffic survey and analysis at the project highway :
  - 7 days continuous and direction-wise classified traffic volume count
  - 3 days origin-destination
  - 3 days axle load
  - Any other surveys on the project highway and alternate corridors as per the need
- Site visit and stakeholder consultation to understand traffic characteristics and network dynamics
- Review of observed growth trends of the project highway and corridor subject to availability of data
- Estimate vehicle category-wise traffic and revenue for the base year
- Determine future toll rates
- Assessing diversion due to competing transportation modes and routes, network development, future development plans in the region, etc.
- Vehicle category and ticket distribution-wise traffic and revenue forecast for concession period
- Scenario development: most likely, optimistic and pessimistic

# Approach

The consultant adopted comprehensive approach to address the need of this assignment with key five focus areas as summarised in below figure.

**Approach for the assignment**



| Expertise in motion | Forecasting forward flow | Economy drive highways | Data drives decisions; paves road to resilience | Trust in travel |
|---|---|---|---|---|
| Team with transportation engineering expertise and experience | Encapsulate all possible exogeneous impacts on traffic growth | Models integrating economic indicators for traffic growth projections | Using statistical techniques and tools for accurate insights and risk assessments | Maintain integrity, transparency, and ethical practices |

Source: TIC

# Methodology (1)

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**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Project highway appreciation** | ▪ Assess the macro and micro road network, considering the overall road infrastructure and its specific sections<br>▪ Identify homogeneous/tollable sections with similar traffic patterns<br>▪ Evaluate any developments in the vicinity of the project highway that may impact economic growth and traffic volume<br>▪ Finalise survey locations and formats for data collection |
| **Secondary data collection** | ▪ Gather relevant past detailed project report / traffic study report and draft concession agreement<br>▪ Collect historical monthly traffic data for the toll plaza of the project highway and neighbouring toll plazas on the corridor, both upstream and downstream<br>▪ Source vehicle category/mapper class wise electronic toll collection (ETC) data as most reliable dataset from Indian Highways Management Company Limited (IHMCL) through the client for toll plazas under study and on the corridor and alternate corridors as well as across the country (subject to receipt from the client or as per availability in the public domain) for understanding of the various trends of economy as well as modal / vehicle technology shift<br>▪ Gather economic indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), per capita income, national, state and district Gross Domestic Product (GDP), employment rates and specific commodities related sales e.g., automobile, agriculture production etc.<br>▪ Gather demographic profiles, population data, industrial production etc.<br>▪ Collect secondary data related to alternative routes and modal shift developments if applicable |
| **Primary data collection** | ▪ 7 days continuous videography-based classified traffic volume count survey to gather independent traffic volume data<br>▪ 3 days origin-destination and commodity survey to understand travel patterns, trip purposes, influence region, growth drivers etc.<br>▪ 3 days axle load survey to determine the load characteristics of vehicles<br>▪ 1 day vehicle registration number plate survey to estimate ticket segmentation of local commercial vehicle without national permit if required<br>▪ Stakeholder consultation through interviews and focused group discussions |

Source: TIC

# Methodology (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Data analysis** | ▪ Review historical traffic and revenue data to understand growth trend, seasonality variation, elasticities for identified growth drivers through regression analysis subject to data availability and benchmark analysis of corridor<br>▪ Conduct data hygiene checks to identify errors, biases and inconsistencies in the collected data<br>▪ Analyse Weekly Average Daily Traffic (WADT) including peak hour, day and night traffic variances, as well as directional distribution of traffic for further input to various analysis<br>▪ Identify Traffic Analysis Zones (TAZ) and Primary Influence Areas (PIA)<br>▪ Determine vehicle category-wise origin-destination matrices, trip lengths and purposes<br>▪ Develop geographical distribution diagrams of traffic to visualize travel patterns<br>▪ Perform commodity and loading analysis<br>▪ Analyse historical journey tickets, including single, 24-hour return, daily multiple, monthly, local pass tickets and annual pass for passenger cars and understand the ground level situations for underlying patterns especially forced exemption if any in the case specific region and possibilities of reduction through proposed technological and administrative measures<br>▪ Estimate Annual Average Daily Traffic (QADT/AADT) for the base and future years as per case specific requirement<br>▪ Develop a traffic diversion model using IRC:SP:30 modality |
| **Forecasting** | ▪ Utilize an econometric model based on IRC: 108-2015 guidelines to analyse the relationship between vehicle traffic/PIA and socio-economic parameters such as Per Capita Income (PCI), Gross Domestic Product (GDP) of district/state/national, population, specific economic activities etc. as relevant with the identified growth drivers<br>▪ Calculate growth rates for each vehicle category. Adjust the growth rates based on induced traffic and traffic diversion effects, if applicable<br>▪ Perform traffic forecasting for 15 years period - normal traffic followed by generated and diverted traffic due to network and developmental impacts<br>▪ Conduct capacity analysis to assess the adequacy of the project highway<br>▪ Forecast annual toll revenue for 15 years based on traffic and toll rates projections |
| **Sensitivity and risk analysis** | ▪ Identify variables (macro-economic, growth drivers and relationships, scale and timeline of diversions, etc.) that significantly impact annual toll revenue and assess their sensitivity<br>▪ Develop scenarios for identified risks |

Source: TIC

# Organisation of the report

**Report structure**

| Sr. No. | Chapter | Particulars |
|---|---|---|
| 1 | **Introduction** | Scope of the assignment, approach and methodology |
| 2 | **Project highway profile** | Characteristics of the project highway like network understanding, socio-economic background of the region and proposed infrastructure developments in the influence region and network |
| 3 | **Traffic analysis** | Past performance of the project highway based on historical traffic and revenue data, traffic survey data analysis |
| 4 | **Economic context and traffic growth** | Economic context of influence region – Jharkhand and West Bengal, determination of traffic growth drivers and associated travel demand elasticities |
| 5 | **Baseline traffic and revenue forecast** | Elaborates method adopted for determining base year AADT, toll ticket distribution and revenue reconciliation |
| 6 | **Diversion analysis** | Impacts on the project highway due to proposed infrastructure developments in the influence region and network, assessment of induced traffic demand |
| 7 | **Final traffic and revenue forecast** | Traffic and revenue forecasts including diversions, scenario cases: most likely with and without overloading, optimistic and pessimistic |

Source: TIC

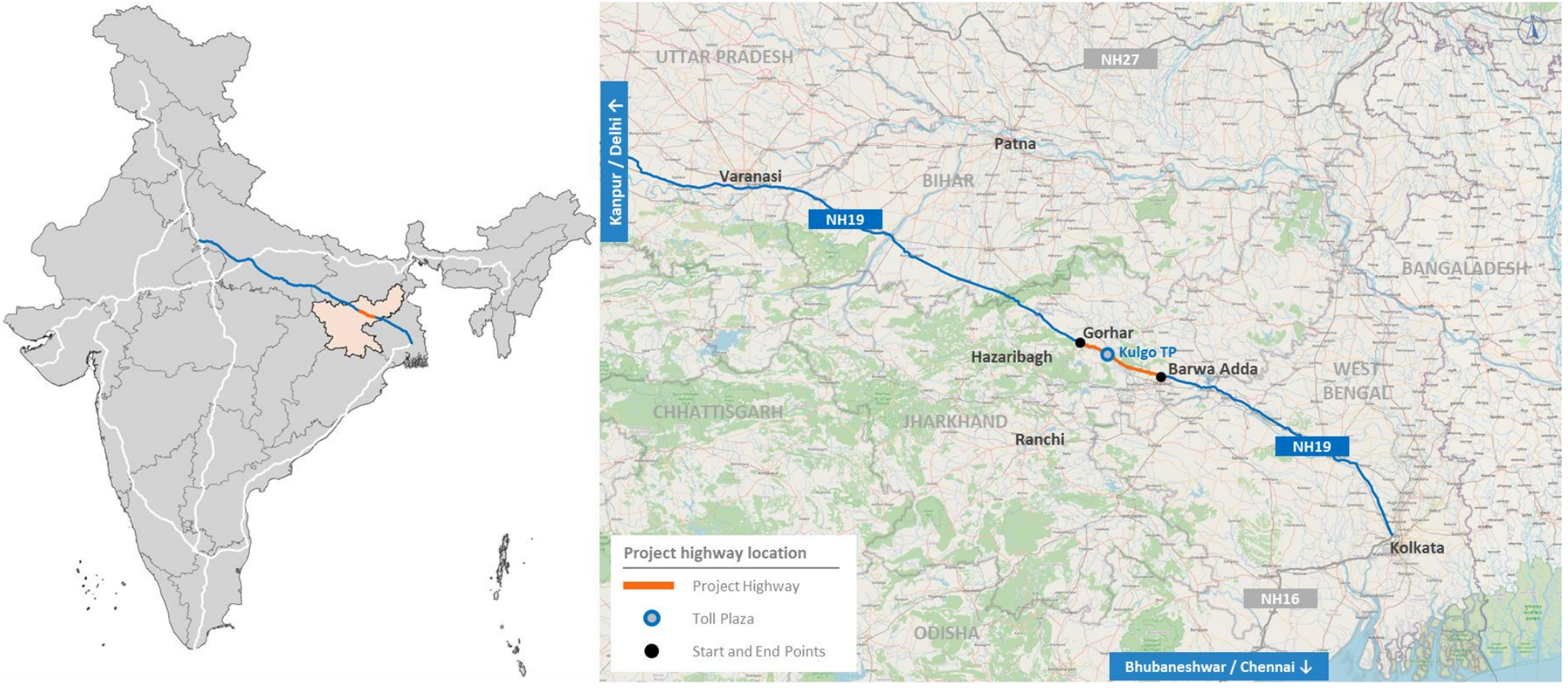
# Chapter 2: Project highway profile

- Location and key details
- Economic activities in the region
- Understanding of network and traffic corridors
- Proposed road network and infrastructure development in the influence region

This chapter exhibits our understanding of the project highway and key details, economic activities in the region and strategic network context based on site visit and stakeholder consultation. It covers list of infrastructure project development in the region and network which would have impact on the performance of the project highway.

# Location of the project highway

**Project highway location in national and state context**




Source: TIC analysis (map not to scale)

- The project highway is an integral part of golden quadrilateral along NH19, a strategic long-distance transport corridor linking Delhi/Agra and Kolkata.
- It serves as a critical inter-state traffic, ensuring all-weather connectivity among Uttar Pradesh, Bihar, Jharkhand and West Bengal and supporting efficient regional freight and passenger movement.
- ~80 km section along with other national highway linkages extend the connectivity to Patna – the capital of Bihar, Dhanbad/Hazaribagh – the two-highest coal reserve in Jharkhand and Ranchi – the capital of Jharkhand, respectively.

# Project snapshot (1)

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**Key project details**

| Particulars | Gorhar Barwa Adda section of NH19 (old NH2) |
|---|---|
| **Length (km)** | 80.522 |
| **Lane and pavement** | 4 / 6 lane divided carriageway, flexible pavement / rigid at toll plaza |
| **Chainage** | km 320.810 (near Gorhar village) to km 401.332 (Barwa Adda near Dhanbad) |
| **History** | ▪ **Gorhar Atka Village to Khairatunda (chainages km 320.810 to km 360.300 / design chainage km 361.000):** 6 lane construction completed in December 2022 through HAM mode by Dilip Buildcon Limited. Out of which Gorhar to Atka Village section (chainages km 320.810 to km 326.000) is 4 lane as descoped from HAM concession.<br>▪ **Khairatunda to Barwa Adda (chainages km 360.300 to km 401.332):** 6 lane construction completed in April 2022 through HAM mode Ashoka Buildcon Limited<br>▪ Present tolling modality: under public funded with short term tolling contracts |
| **Nos. of toll plaza** | 1 ETC enabled |
| **Toll plaza locations** | **Kulgo** at km 352.100<br>(known as Ghanghri toll plaza in local region) |
| **District** | Physically located within Giridih district<br>Socio-economic activities and traffic patterns are significantly influenced by Hazaribagh and Dhanbad districts |
| **Tolling start date** | 15th December 2010 |
| **Tolling length (km)** | 87.231 |
| **Overloading penalty** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with the client |
| **Micro-diversions at toll plaza location** | Nil |

Source: NHAI

# Project snapshot (2)

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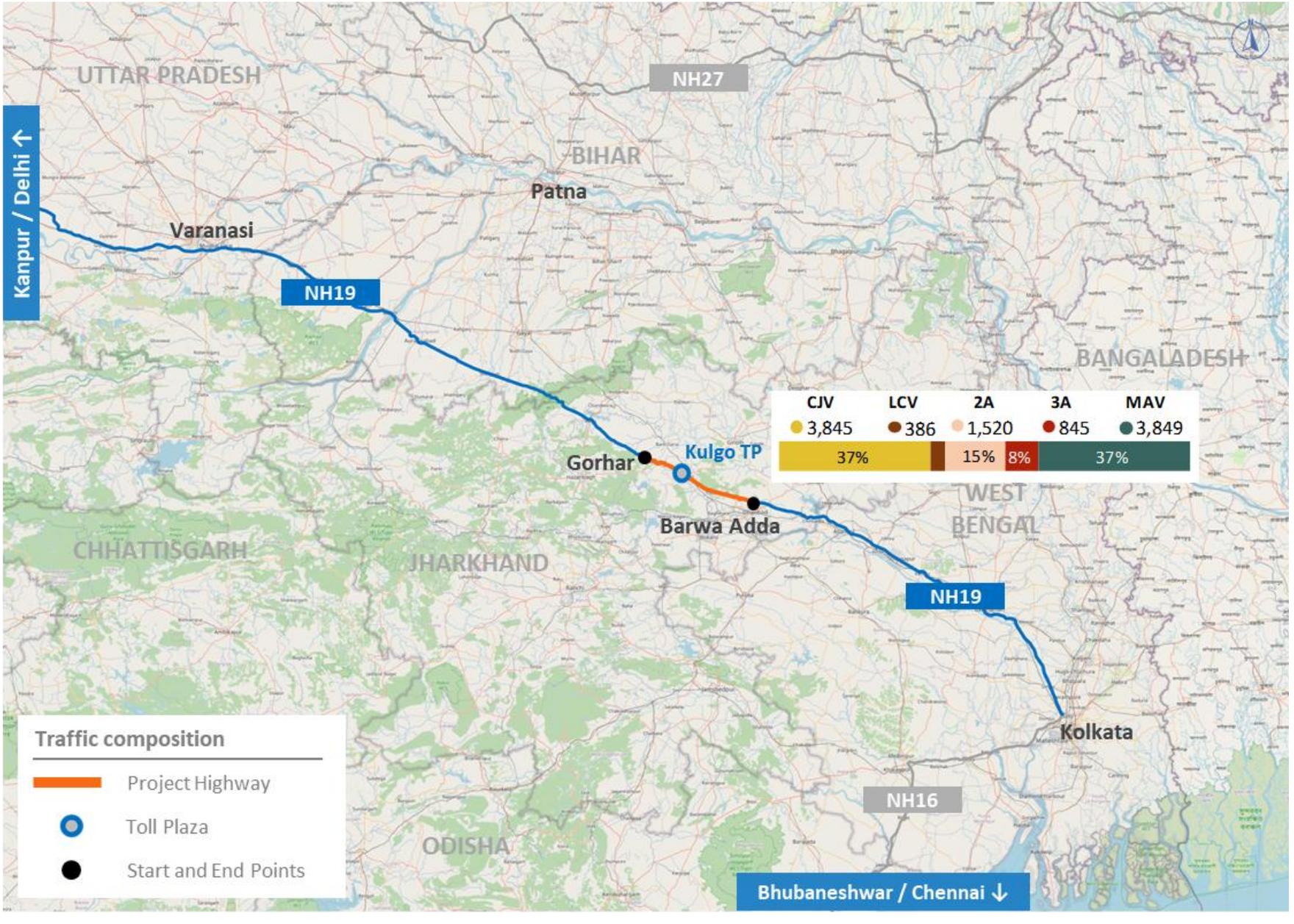
**Key project details**

| Particulars | Gorhar Barwa Adda section of NH19 (old NH2) |
|---|---|
| **Toll plaza locations** | **Kulgo** (also known as Ghanghri toll plaza) |
| **ETC Traffic (FY26 till October 2025)** | 7 months ADT: 10,470 PCU corresponding 7 months ADT: 28,851 |
| **ETC Traffic composition (FY26 till October 2025)** | 37% CJV/Mini LCV 14% 2A/LCV<br>3% Bus 46% 3A/MAV |
| **ETC Revenue** | FY25: INR 148 Crore FY26 till October 2025: INR 88 Crore |
| **ETC Revenue composition (FY26 till October 2025)** | 10% CJV/Mini LCV 14% 2A/LCV<br>3% Bus 73% 3A/MAV |
| **Present toll operator with Annual Potential Collection and quoted remittance** | **Prakash Asphalts & Toll Highways (India) Limited**<br>**Duration** : February 2025 to January 2026 (1 Year)<br>**Annual Potential Collection** : INR 144.75 Crore<br>**Quoted remittance** : INR 146.15 Crore (FY25 tolling rates)<br>Revised to INR 151.14 on 1st April 2025 with FY26 tolling rates<br><br>Future round of bidding completed for 1 year toll contract in November 2025.<br>**Skylark Infra Engineering Private Limited**<br>**Duration** : New toll operator is expected to take handover in January 2026 for 1 year<br>**Annual Potential Collection** : INR 156.51 Crore<br>**Quoted remittance** : INR 151.90 Crore (FY26 tolling rates) |
| **Previous tolling operator with Annual Potential Collection (APC) and Quoted Remittance** | **West Well Iron & Steel Private Limited**<br>**Duration** : January 2024 to January 2025 (1 Year)<br>**Annual Potential Collection** : INR 134.34 Crore<br>**Quoted remittance** : INR 137.35 Crore (FY24 tolling rates) |

Source: NHAI

# Project snapshot (3)

**ETC Traffic composition of FY26 till October 2025**

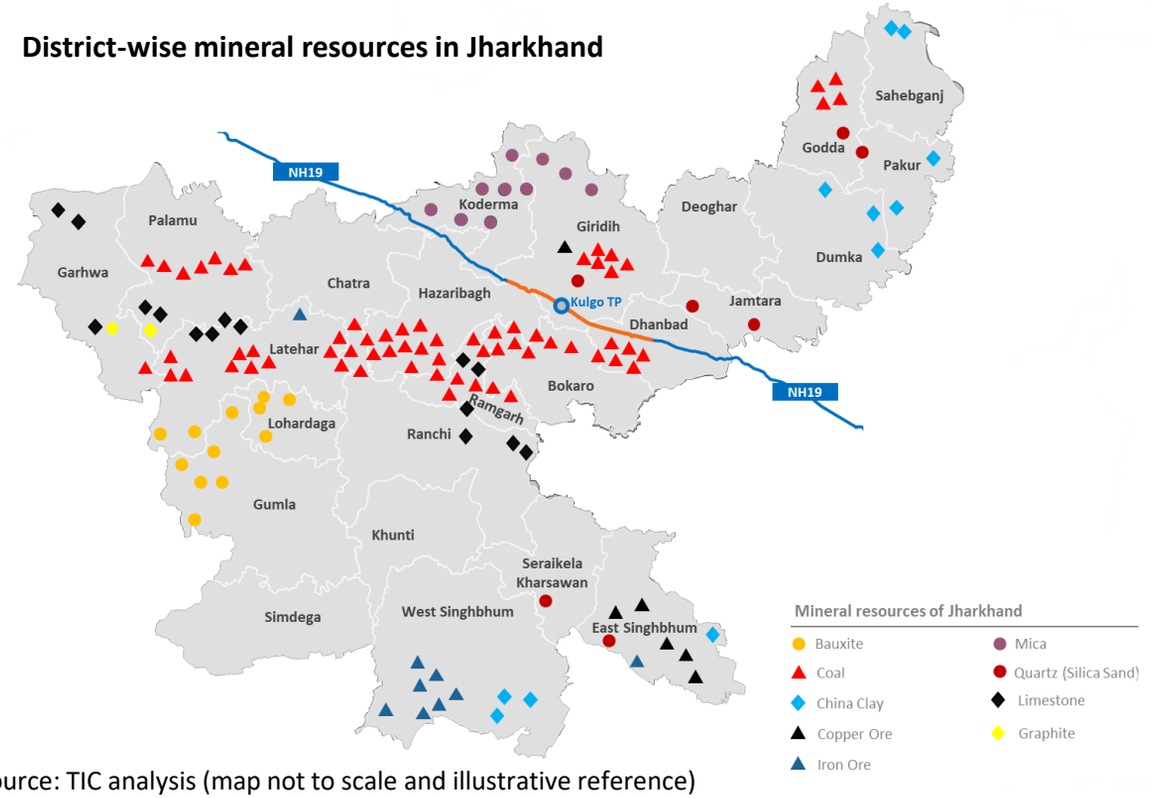



Source: TIC analysis (map not to scale)

# Economic activities in influence region (1)

- Jharkhand consists of about 40% of the country's mineral wealth which includes coal (~27% of country's reserve), iron ore (~25% of country's reserve), copper ore (~18% of country's reserve), uranium, mica, bauxite, granite, limestone, silver, graphite, magnetite and dolomite. The state is sole producer of coking coal, uranium and pyrite in India.
- Primary producer of high-quality coking coal, vital for the steel industry, with the Jharia Coalfield in Dhanbad district holding the largest deposits. Dhanbad is known as the "Coal Capital of India".
- In addition to Jharia, key coalfield region includes Bokaro, Karanpura, Hazaribagh and Palamu.
- Minerals / mining industry drives a substantial part of Jharkhand's economy by employment, revenue generation through royalty and exports but often at the cost of environmental degradation and community disruption due to illegal/overexploited mining, lack of infrastructure and skilled labour.
- Jamshedpur, Dhanbad, Bokaro, Ranchi, Deoghar and Hazaribagh are major cities and industrial areas in the state.
- The state's industries enjoy location advantage within eastern India being close to the in the region, raw material and access to ports of Kolkata, Haldia and Paradip.
- 80% of the state's population dependent on agriculture. Rice is the major food crop of the state.

**District-wise mineral resources in Jharkhand**




Source: TIC analysis (map not to scale and illustrative reference)

**Minerals and industrial applications**

| Mineral | Applications / Use |
|---|---|
| **Coal** | Power, Seel |
| **Bauxite** | Extraction of Aluminium |
| **Copper Ore** | Extraction of Copper |
| **Iron Ore** | Pig/Sponge Iron, Steel, TMT Bars, Wire Rods |
| **Limestone** | Cement, Iron industry |
| **Mica** | Electrical, Paint & Pigment |

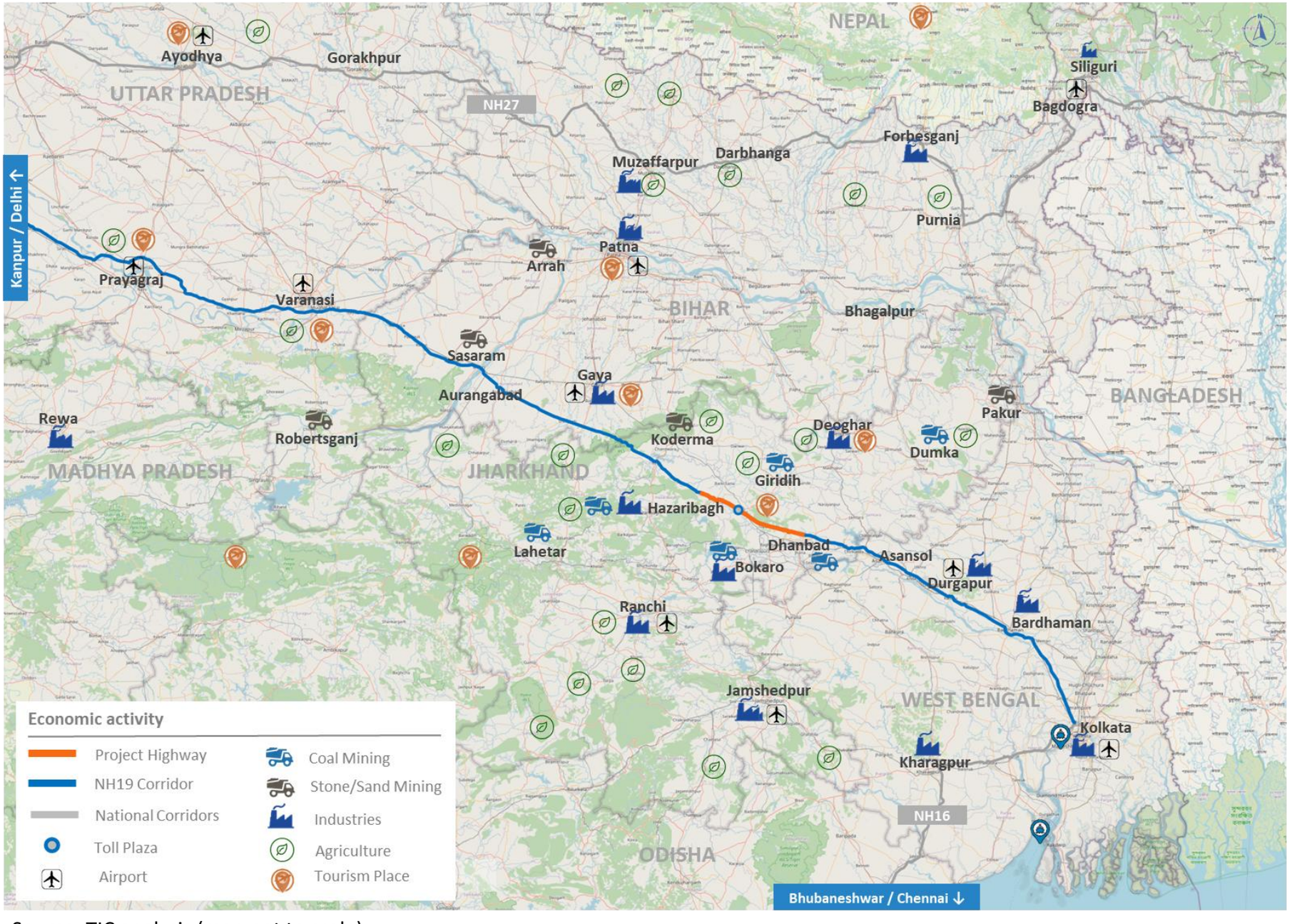
| Mineral | Applications / Use |
|---|---|
| **Pyroxenite** | Steel industry as flux |
| **Manganese** | Steel, Battery, Chemical |
| **Graphite** | Lubricant, Paint, Electrical |
| **Quartz** | Refractory, Glass, Ceramic, Watch |
| **China Clay** | Crockery, Paint, Paper |
| **Dolomite** | Cement, Magnesia |

Source: TIC secondary research

# Economic activities in influence region (2)

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**Economic activities in influence region**




Source: TIC analysis (map not to scale)

# Economic activities in influence region (3)

1 **Industry in Jharkhand**

- **Dhanbad - The Coal Capital of India,** located on the east of the project highway is known as the Coal Capital of India with the presence of some of the largest coal mines in the country. Industries located between Durgapur and Kolkata is also being supplied from Dhanbad in addition to imported coal from Haldia Port.
- **Hazaribagh,** located along the project highway is known for its rich mineral resources, particularly coal reserves under the North Karanpura Coalfields. The region holds several large coal mining projects operated by Central Coalfields Limited (CCL). Koderma-Hazaribagh belt is emerging industrial hub in Jharkhand.
- **Bokaro - The Powerhouse of Steel,** is best known for the presence of the Bokaro Steel Plant, one of the largest integrated steel plants in India operated by Steel Authority of India (SAIL). It serves as a major hub for steel production and allied industries in eastern India.
- **Jamshedpur – The Steel City of India,** Jamshedpur is the biggest and most developed industrial hub in Jharkhand, which was built by Tata Group and is now home to Tata Steel, Tata Motors, and various other manufacturing units. It plays a vital role in India's steel and automobile manufacturing.
- **Adityapur Industrial Area – emerging SME Hub** near Jamshedpur, hosting about 1,000 SMEs with presence of heavy/light engineering, ferro casting, chemicals, plastic and rubber, forging/mineral based units.
- **Ranchi** has presence of engineering (machining fabrication), mines and mineral-based units, chemicals, electrical and electronics, metallurgy (foundry and forge), casting and rolling, plastics and rubber industries.
- **Sindri – The Fertilizer Town,** legacy currently being revitalized by Hindustan Urvarak & Rasayan Limited through setting up new fertilizer facilities, aiming to re-establish Sindri as a major player in the sector.
- **Cement plants:** Bokaro, Sindri, Hansda, Jamshedpur, Godda (Jharkhand) and Asansol, Durgapur and Kolkata regions (West Bengal) to capitalize availability of limestone and fly ash from power plants in eastern India.
- State government has implemented several initiatives to promote cottage industries, including providing financial assistance, infrastructure support, and training programs – handicraft, handloom, sericulture, leather, pottery, bamboo crafts etc.
- Food Park at Ranchi and Apparel Park at Chaibasa act as mini-growth centre of Jharkhand.

Source: TIC secondary research

# Economic activities in influence region (4)

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**2 Industry in West Bengal**

- **Dankuni**, outskirts of Kolkata, is logistics and industrial hub with presence of various local/national transport/3PL companies and manufacturing units adding industrial flavor to goods traffic i.e., Coca Cola, Lux Hosiery, IFB Agro, Himani Specialty Chemicals, Ultratech, Aditya Birla, Hyundai, FCI, SAIL etc.
- **Durgapur** is planned and biggest industrial city with presence of dry dock. It houses about 20+ major steel industries like Durgapur Steel Plant (SAIL), Jay Balaji Steel Industries, Alloy Steel Plant etc.
- **Rajabandh**, outskirts of Durgapur, has presence of all three Oil PSUs (HPCL, BPCL, IOCL) with their bottling and fuel distribution terminals which sources LPG from Haldia port and petroleum products through rakes from various part of India. These terminals distribute both products in the nearby region of Jharkhand and Bihar. LPG is being supplied to east Uttar Pradesh (Gorakhpur Bottling Terminal) from Haldia port.
- **The well-established trade relationship between Jharkhand and West Bengal is reflected in freight traffic movements, contributing about 30–40% across freight vehicle categories.**

**3 Agriculture and allied activities**

- **Food Grains:** Rice (Kharif), Maize (Kharif), Wheat (Rabi)
- Rice is a dominant crop in Hazaribagh and Giridih districts along the project highway with cultivation spread across small and medium farms. Maize and pulses are also grown as secondary crops.
- **Pulses:** Arhar, Urad, Moong, Chickpea
- **Oilseeds:** Mustard, Groundnut
- **Cash Crops:** Potatoes, Tomatoes, Chilies (grown in various pockets)
- **Agro based industries** includes rice mills, oil mills, food processing units, dairy industry, and poultry farming are located across Ranchi, Hazaribagh, Palamu, Garhwa, Simdega, Gumla, Lohardaga. Swastik Group produces ‘Frooti’ and ‘Appy Fizz’ brand for Parle Agro at Ranchi.
- Prominent trading hubs (mandis) for Rice and Potato are established at Sealdah, Howarah, Diamond Harbour, Durgapur and Kolkata regions in West Bengal.
- Fish is mainly supplied from West Bengal and stored near the Jharkhand border for regional distribution
- **Inter and intra-state movement of agricultural produces are observed during all seasons.**

Source: TIC secondary research

# Economic activities in influence region (5)

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**4 Tourism**

- **Jharkhand** is known for its natural landscapes, wildlife, and religious sites. **Ranchi**, the state capital, is popular for waterfall such as Dassam, Hundru and Jonha.
- **Deoghar** is a major pilgrimage destination, famous for the Baidyanath Jyotirlinga Temple, attracting lakhs of devotees during the Shravani Mela.
- **Parasnath Hills (Shikharji)** in Giridih district is one of the holiest sites for the Jain community.

Source: TIC secondary research

# Our understanding of traffic corridors and road network

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**National corridor (long-distance traffic)**

- The project highway is a part of the Golden Quadrilateral / NH19 long-distance strategic corridor connecting Delhi / Agra with Kolkata in West Bengal.
- It directly connects national capital Delhi / NCR and northern states including other major cities/ industrial and logistics nodes along the corridor i.e.,
  - **Uttar Pradesh:** Mathura, Agra, Kanpur, Prayagraj, Varanasi (religious and industry)
  - **Bihar:** Sasaram, Aurangabad (agrarian economy), Gaya as future industrial node being developed by NICDC
  - **Jharkhand:** Gobindpur, Dhanbad (coal mining and collieries, steel industry)
  - **West Bengal:** Asansol, Durgapur, Panagarh (coal mining, largescale steel industry with captive power plants), Dankuni (warehouse / logistics hub), Kolkata (regional trade center, port, industry)
- Goods traffic (LCV/2A/MAV) includes to the movement between urban and industrial centers of Kolkata, Haldia Port, Durgapur, Dankuni, Assam, Bangladesh and Uttar Pradesh, Delhi / NCR, Punjab, Madhya Pradesh and Rajasthan.
- Kolkata, being state capital and regional trade center for east India, attracts/generates substantial volume of traffic.

**Regional linkages (medium-distance traffic)**

- In addition to role as national connector, the project highway establishes noteworthy regional connectivity between neighboring states of Bihar and Uttar Pradesh i.e., traffic between Patna, Raxaul (Bihar), Gorakhpur (Uttar Pradesh) and Kolkata (including Haldia Port) and Bhubaneshwar, Sambalpur, Baripada (Odisha).
- The project corridor experiences substantial medium-distance traffic, predominantly comprising manufacturing consignments, construction materials (notably steel), and petroleum products, transported from Jharkhand to the adjoining states of West Bengal, Bihar, and Uttar Pradesh.

**Local connectivity (short-distance traffic)**

- Short-distance traffic is predominantly observed between the regional nodes of Gaya, Ranchi, Dhanbad, Barhi, Chouparan, and Hazaribagh for business and social needs. Round the year regular traffic is being witnessed among these locations as local/regional commuters.
- Dhanbad, mining capital of Jharkhand, is connected with West Bengal through the project highway and supplies coal to industrial area of West Bengal.

# Corridor traffic summary (1)

**Kanpur – Kolkata corridor of NH19**

| Highway section | Lane configuration | Concessionaire / Operator | Toll Plazas with average PCU Traffic in FY26 YTD | Approx. Length (km) |
|---|---|---|---|---|
| **Chakeri (Kanpur) – Kokhraj** | 6 lane | Toll - Public Funded | Badauri (~32,000 PCU)<br>Katoghan (~30,000 PCU) | 145 |
| **Allahabad bypass** | 4 lane | TOT (Toll) – Cube Highways | Kokhraj / Handia Main Line Plazas (~25,000 PCU) | 84 |
| **Handia – Rajatalab** | 6 lane | TOT (Toll) – NIIF | Lalanagar (~28,000 PCU) | 72 |
| **Varanasi – Aurangabad** | 6 lane** | DBBOT (Toll) – Roadis road platform backed by PSP Investments | Dafi (~60,000 PCU)<br>Mohania (~48,000 PCU)<br>Sasaram (~40,000 PCU) | 192 |
| **Aurangabad – Barachatti** | 4 / 6 lane | Toll - Public Funded | Saukala (~34,000 PCU) | 60 |
| **Barachatti – Gorhar** | 4 / 6 lane * | Toll - Public Funded | Rasoiya Dhamna (~34,000 PCU) | 80 |
| **Gorha – Barwa Adda (Project Highway)** | 4 / 6 lane * | Toll - Public Funded | Kulgo (~29,000 PCU) | 80 |
| **Barwa Adda – Panagarh** | 6 lane | DBFOT (Toll) - IL&FS | Beliyad (~30,000 PCU)<br>Banskopa (~58,000 PCU) | 123 |
| **Panagarh – Palsit** | 6 lane | BOT (Toll) – Adani Group | Palsit (~62,000 PCU) | 68 |
| **Palsit – Dankuni** | 6 lane | BOT (Toll) – IRB Infrastructure | Dankuni (~64,000 PCU) | 64 |

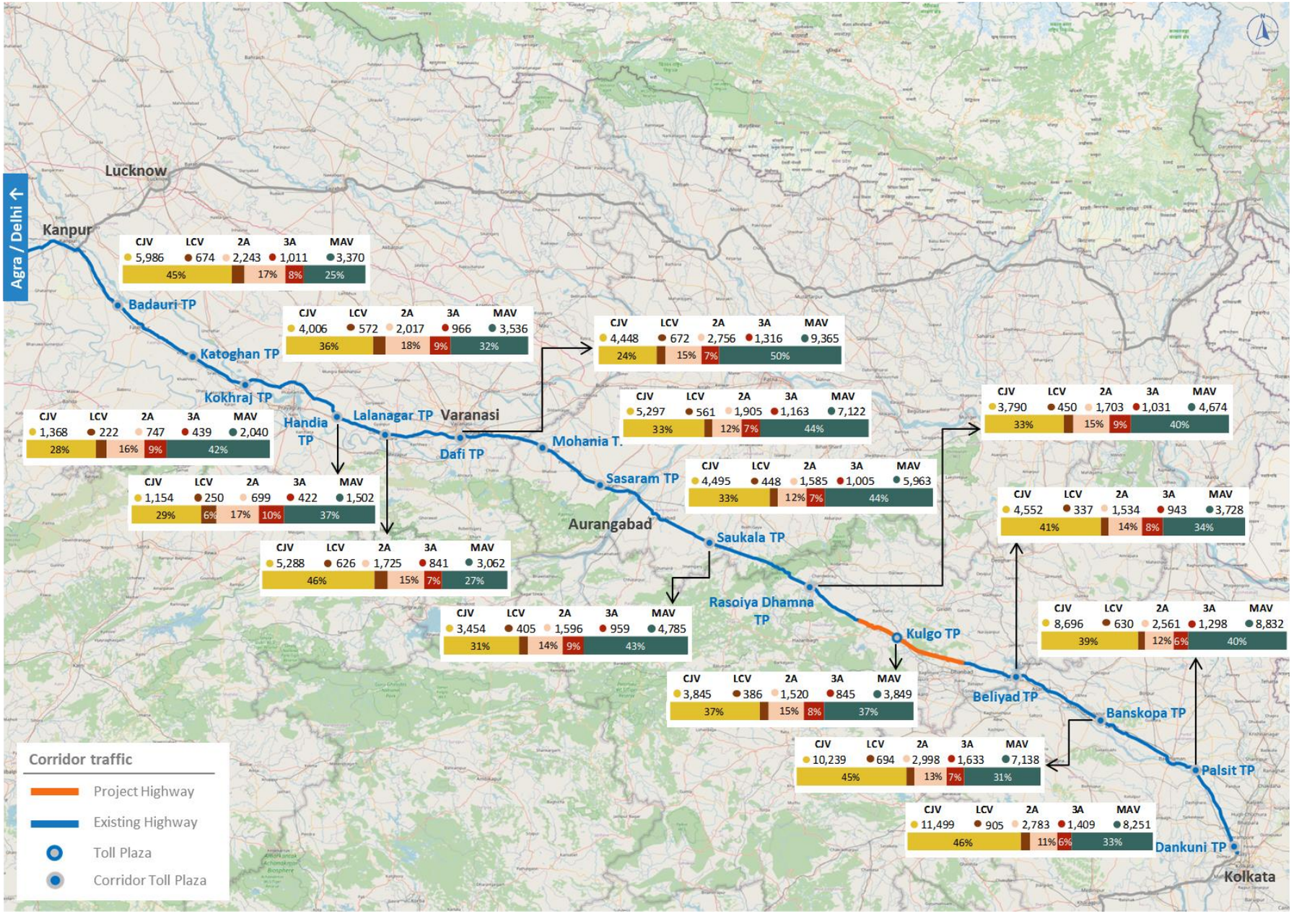
Source: TIC analysis

* partial section is under 4 to 6 lane construction

# Corridor traffic summary (2)

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**Traffic composition on the corridor: 7 months ADT of FY26 till October 2025**




Source: TIC analysis (map not to scale)

# Site photographs

**Kulgo Toll Plaza**




**Cross section**




**Rice farming adjacent to the NH19 corridor**



**Coal mining at Jharia**



**Ongoing 6 lane widening construction work at neighbouring section of Barachatti–Gorhar**







Source: TIC site visit

# Proposed infrastructure development in the region (1)

**Network and infrastructure development in the influence region (refer map on Pg 31)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Varanasi Kolkata Highspeed Corridor (NH319B)** | NHAI<br>Hybrid Annuity Mode (HAM)<br>Multiple packages | Greenfield 6 lane access controlled highspeed corridor to be developed as National Highway passing through Uttar Pradesh, Bihar, Jharkhand, West Bengal<br>**Uttar Pradesh (No. of construction package: 1):**<br>Package 1 - awarded in 2023, appointed date in November 2024 (10% physical progress)<br>**Bihar (Nos. of construction package: 6):**<br>Package 2, 3, 6, 7 - awarded in 2023, appointed date in October 2025<br>Package 4 and 5: revision in alignment due to forest objections. Appointed date expected by end of FY27<br>**Jharkhand (Nos. of construction package: 6):**<br>Package 8 to 13 - awarded in 2023, appointed date is expected by end of FY26. In principle approval received from various stakeholder.<br>**West Bengal (Construction packages are yet to be decided):**<br>DPR in-progress – submitted to NHAI HQ for comments. Appointed date expected by end of FY28<br>**Expected completion:**<br>Varanasi Jharkhand/West Bengal border section – FY30<br>Jharkhand/West Bengal border - Kolkata section – Q3 FY33 | **Negative**<br>Traffic movement between Varanasi/west and Hazaribagh/Bokaro/south from FY31 onwards<br>Traffic movement between Varanasi/west and Kolkata/Kharagpur/Haldia from Q4 FY33 onwards<br>Traffic movement between Dobhi/north and Hazaribagh/south from Q4 FY33 onwards |

Source: TIC research and analysis

# Proposed infrastructure development in the region (2)

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**Network and infrastructure development in the influence region (refer map on Pg 31)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Raxual Haldia Economic Corridor** | NHAI<br>Mode of development yet to be decided | DPR in-progress<br>Expected completion by end of FY33 | **Negative**<br>Traffic movement between Muzaffarpur/north-west Bihar and Kolkata/ Haldia/south |
| **Eastern Dedicated Freight Corridor** | Dedicated Freight Corridor Corporation of India Limited (DFCCIL) and Ministry of Railway | Sahnewal to Sonnagar: Operational<br>Sonnagar to Dankuni – Under implementation, construction activity is about to start in FY25<br>Expected completion by FY28 | **Negative**<br>For long-distance (> 600-700 km) commercial traffic on the corridor from Delhi/NCR/east and Dankuni/nearby region/east |
| **Kandla Gorakhpur LPG Pipeline** | Petroleum & Natural Gas Regulatory Board<br><br>IHB Limited – a joint venture of Indian Oil Corporation Limited (IOCL), Bharat Petroleum Corportaion Limited (BPCL) and Hindustan Petroleum Corportaion Limited (HPCL) | Expected completion by end of FY27 | **Negative**<br><br>Pipeline will transport LPG sourced from import terminals at Kandla, Dahej, and Pipavav, and refineries at Koyali and Bina. It will directly supply 22 LPG bottling plants 3 in Gujarat, 6 in Madhya Pradesh, and 13 in Uttar Pradesh—ensuring reliable and safe LPG distribution across northern India instead of road movement from Haldia port. |
| **LPG pipeline from Haldia to Panagarh and Rajabandh (HPCL / BPCL)** | HPCL and BPCL | Expected to be operational by FY28 | **Nil**<br>Bottling Terminals of both PSUs are located on east of the project highway |
| **Vande Bharat Express Train: Varanasi Howrah route** | Ministry of Railway | Train route will traverse through Gaya, Dhanbad, Asansol, Durgapur, Bardhaman between Varanasi and Howrah | **Negative**<br>Applicable on passenger vehicle categories (Car and Bus) |

Source: TIC research and analysis

# Proposed infrastructure development in the region (3)

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**Network and infrastructure development in the influence region (refer map on Pg 31)**

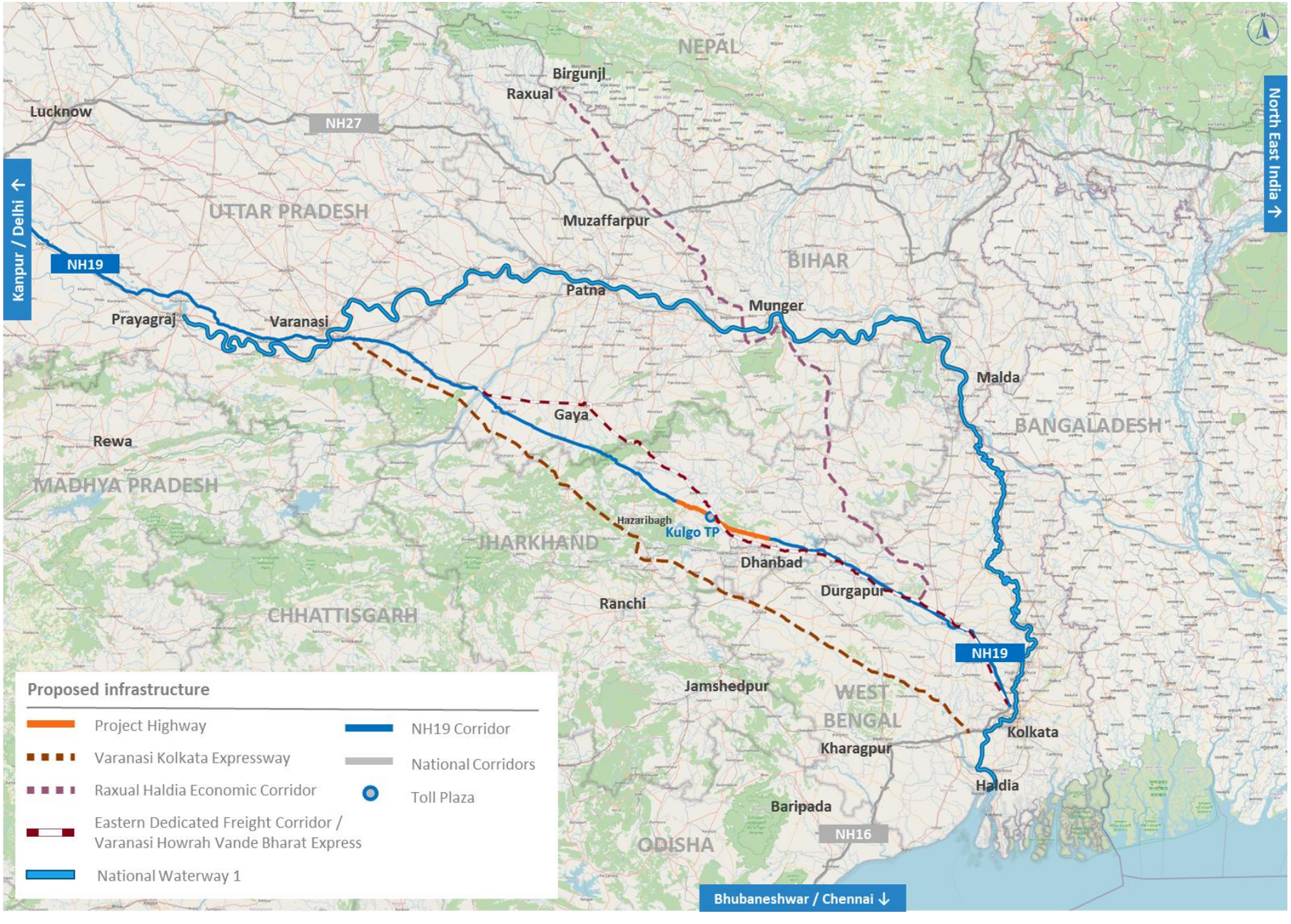
| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **National Waterway 1** | Inland Waterways Authority of India (IWAI) | Spanning 1,620 km along the Ganga River<br>Connects Haldia in West Bengal to Prayagraj (Allahabad) in Uttar Pradesh, passing through the states of West Bengal, Bihar and Uttar Pradesh | **Negative**<br>Freight traffic movement between Prayagraj and Kolkata / Haldia |
| **Ganga Expressway** | Uttar Pradesh Expressways Industrial Development Authority / Adani Group and IRB Developers<br>DBFOT (Toll) | Under construction;<br>Expected completion by FY27 | **Nil**<br>Induced traffic on NH19 corridor post-Prayagraj / Varanasi is considered as part of regular traffic growth.<br>No additional impact. |
| **Pending 4 to 6 lane construction of the project highway and neighbouring stretch of Barachatti – Gorhar** | NHAI<br>EPC / HAM | Construction expected during FY27 / FY28 | **Nil**<br>Construction traffic is granted exemption status at toll plazas in past. Further, location of aggregates / cement is in nearby vicinity so will not cross toll plaza frequently. |
| **Govindpur Nirsa elevated road** | | Sanctioned and under planning<br>Construction expected during FY28 / FY29 | Removes bottlenecks on the corridor. |

Source: TIC research and analysis

# Proposed infrastructure development in the region (4)

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**Network and infrastructure development in the influence region**




Source: TIC analysis (map not to scale)

# Chapter 3: Traffic analysis

- Historical data sources
- Historical traffic and revenue trends
- Seasonality variation
- Historical ticket distribution
- Commodity analysis
- Zonal influence and trip distance

This chapter covers various datasets received from NHAI followed by assessment of historical performance of the project highway. This analysis helps to understand baseline traffic patterns comprising traffic and revenue growth rates, seasonality variations, trip factors, ticket distribution and overloading characteristics.

Survey analysis helps to validate traffic volume, commodity movement pattern, network understanding received from site visit, inputs for ticket distribution, overloading pattern based on independent survey exercise.

# Historical datasets

- The project highway is currently being operated under the public-funded mode where toll is collected by third party tolling agencies through short-term contracts. Third party tolling agencies submit traffic and revenue report on monthly basis which is titled as Schedule V.
- The consultant observes that availability and accuracy of these reports are many times under question due to inadequate quality of technology interventions and record keeping during short term contracts by tolling agencies.
- Hence, availability followed by reliability of these datasets is essential to be addressed for historical analysis as well as further processing for base year and future traffic forecasts.
- ETC data is independently system generated and hence more reliable. The client sourced vehicle category-wise traffic data which doesn't include toll ticket distribution.
- Monthly reports submitted by contractors / tolling agencies to NHAI field offices (Schedule M/G/V) which is start point to validate the toll ticket distributing including cash components, violation/exemptions, overloading fee etc.

**Summary of the historical traffic and revenue data available for Kulgo Toll Plaza**

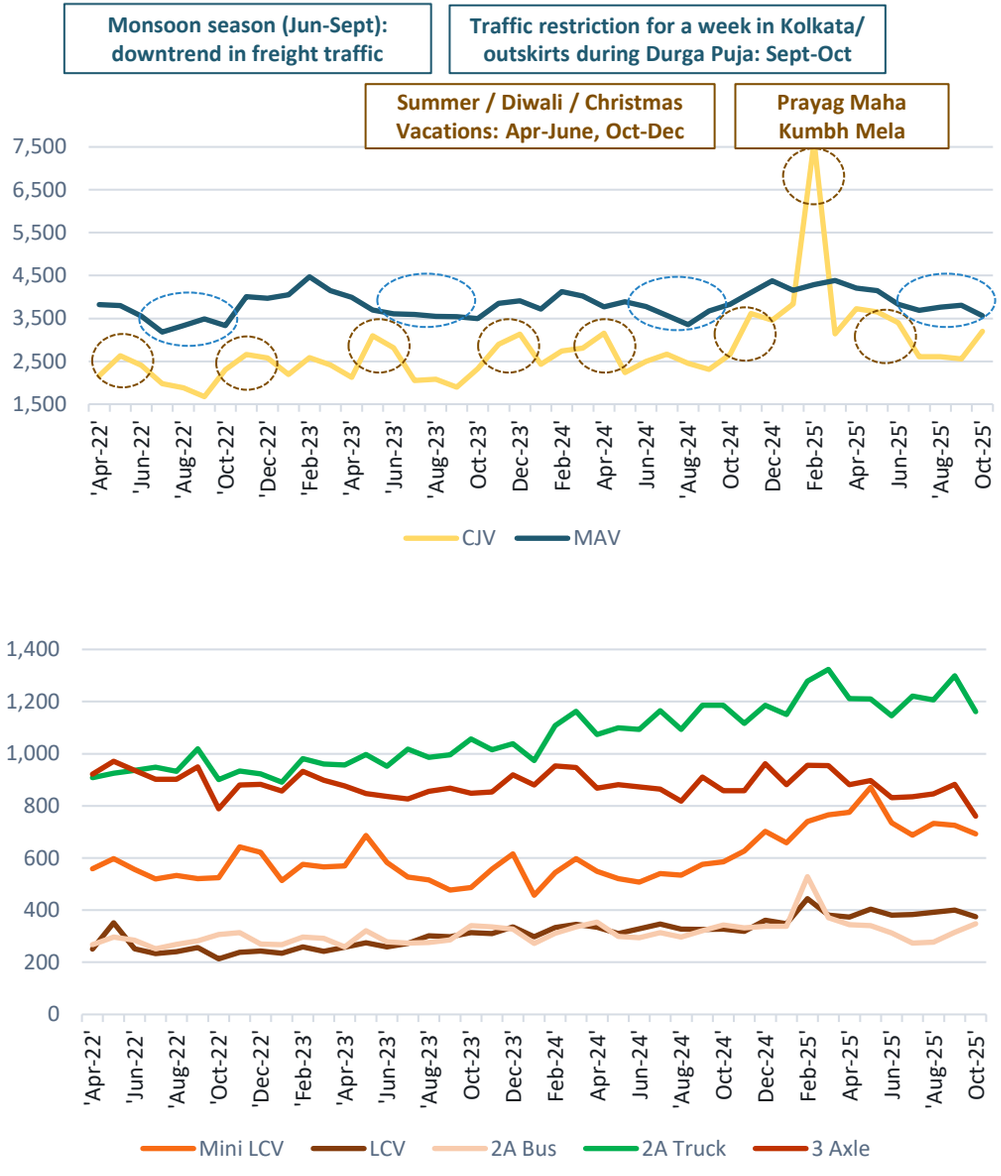
| Data sources | Duration of data | Observations |
|---|---|---|
| **Schedule V - Part A & B (monthly)** | FY18: Q4 only<br>FY19: Full year<br>FY20: all month except Aug'19<br>FY21: Full year<br>FY22: all months except Nov'21 to Jan'22<br>FY23 and FY24: Full year<br>FY25: all months except Dec'24<br>FY26: Q1, Q2, Oct'25 (7 months) | **Part A:** Vehicle category-wise total user fee collection<br>**Part B:**<br>Vehicle category total traffic<br>Ticket distribution data: Yes<br>Exemption/violation/ cash traffic data: Yes |
| **ETC Data (monthly)** | FY23: Full year<br>FY24: Full year<br>FY25: Full year<br>FY26: Q1, Q2, Oct'25 (7 months) | Vehicle category-wise ETC transactions covering total traffic and user fee collection<br>Ticket distribution data: No |
| **Overloading Reports (weekly)** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU | |
| **Neighbouring highways** | Historical traffic data to determine corridor growth trend | |

Source: TIC compilation of data received from NHAI

ETC and Schedule V datasets have been used for historical analysis due to their consistency and reliability.

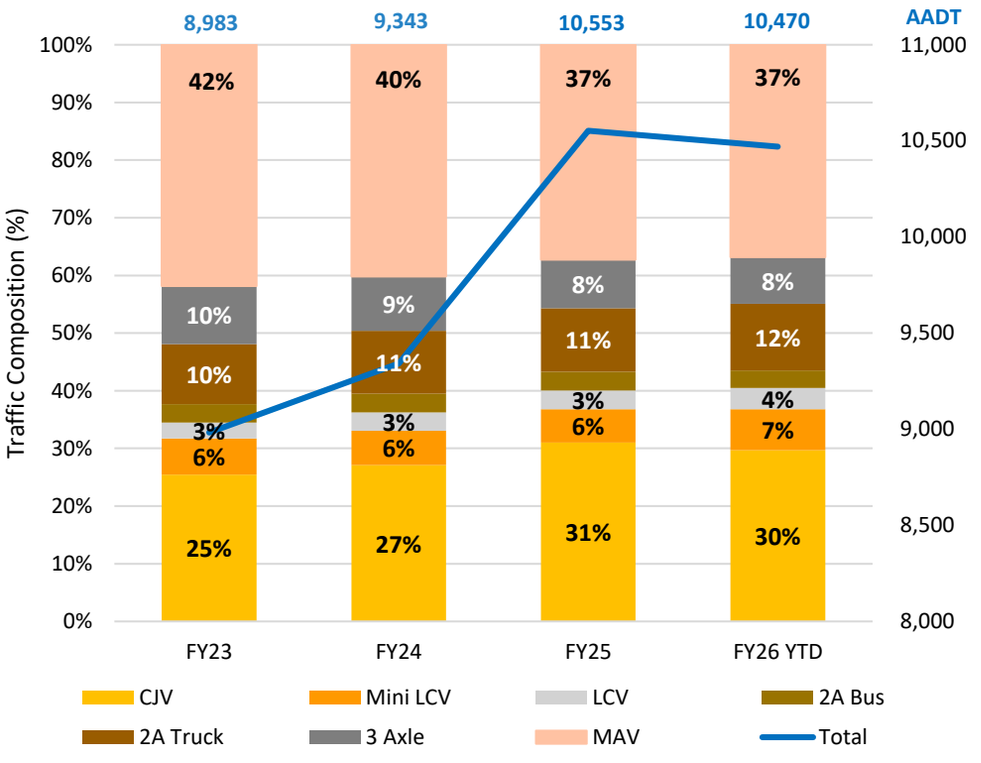
# Historical traffic analysis (1)

### Vehicle category-wise monthly traffic trend - ETC




Source: TIC analysis

### Vehicle category-wise annual traffic composition - ETC




- Traffic has trended in the range of 10,500 AADT (27,000-29,000 PCUs) in recent past with CJVs (30%) and MAVs (37%) as major contributors. High number of CJVs is due to proximity to Dhanbad / Hazaribagh.
- The corridor is susceptible to demand-supply fluctuations of illegally mined coal which is being mainly transported through 5A Trucks due to optimum cost-tonnage ratio including overloading.
- 2A Trucks and LCV contribution is on increasing trend on the corridor in last three years.

# Historical traffic analysis (2)

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**Vehicle category-wise traffic growth trend - ETC**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 2,287 | 561 | 251 | 283 | 938 | 901 | 3,762 | **8,983** | **26,518** |
| **FY24** | 2,533 | 552 | 300 | 301 | 1,022 | 876 | 3,759 | **9,343** | **27,047** |
| **FY25** | 3,273 | 608 | 345 | 343 | 1,162 | 890 | 3,931 | **10,553** | **29,274** |
| **FY26 till Oct'25** | 3,106 | 746 | 387 | 316 | 1,208 | 847 | 3,859 | **10,470** | **28,913** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 10.8% | (1.6%) | 19.3% | 6.6% | 8.9% | (2.8%) | (0.1%) | **4.0%** | **2.0%** |
| **FY25 vs FY24** | 29.2% | 10.2% | 15.1% | 13.7% | 13.7% | 1.6% | 4.6% | **13.0%** | **8.2%** |
| **FY26* vs FY25** | (5.1%) | 22.6% | 12.1% | (7.9%) | 3.9% | (4.8%) | (1.8%) | **(0.8%)** | **(1.2%)** |
| **CAGR (FY23 – FY26 YTD)** | 13.0% | 12.1% | 18.9% | 4.5% | 10.6% | (2.4%) | 1.0% | **6.3%** | **3.5%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

**Corridor growth trends (project highway and neighbouring sections)**

| CAGR | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Gorhar - Barwa Adda (Kulgo TP)** | | | | | | | | | |
| **Medium-term (5 Years)** | ~9% (CJV+Mini LCV) | | ~11% | ~9% (Bus+2A Truck) | | (~3%) | ~2% | **~5%** | **~3.5%** |
| **Neighbouring highway sections (upstream and downstream)** | | | | | | | | | |
| **Barchhati – Gorhar (short-term)** | 3.2% | (0.4%) | 6.9% | (4.0%) | 4.5% | (0.6%) | 1.4% | 2.0% | 1.6% |
| **Barchhati – Gorhar (medium-term)** | ~5% (CJV+Mini LCV) | | ~12% | ~9% (Bus+2A Truck) | | ~0.5% | ~6% | **~5%** | **~6%** |

Source: TIC analysis

# Historical traffic analysis (3)

**Illegal coal mining and its correlation with MAV traffic on the corridor:**

- The corridor is highly susceptible for illegal coal mining in Jharkhand since 2000 (post split from Bihar) which flourished under relatively weaker coalition state governments.
- Karanpura (Hazaribagh) and Jharia (Dhanbad) are two major coalfield regions from which coal is transported by road towards Uttar Pradesh and West Bengal. The project highway lies between these two coalfield regions and hence coal carrying traffic crosses Kulgo toll plaza subject to production-dispatch pairing between two coalfields regions and demand centers in neighbouring states.
- Similar fluctuations were observed at upstream and downstream highway sections i.e., Rasoiya Dhamna TP (towards Uttar Pradesh) and Beliyad TP (towards West Bengal) in past.
- MAV traffic recorded a 25% growth in FY2022, as road transport remained a significant mode of coal evacuation in Jharkhand as illegal / fake documents is not possible in case of rail logistics.
- This double-digit growth was followed by drop in MAV traffic which is mainly attributed:
  - **FY2023:** Stricter actions on illegal mining during May 2022 to June 2023
  - **FY2024:** Road to rail shift of coal logistics ~4 times higher movement by rail than earlier to Uttar Pradesh, Bihar, Nepal.
    A major focus during the year was the development of mechanized First Mile Connectivity (FMC) projects to eliminate the first leg of road transport from mine pitheads.
    - Tori-Shivpur rail line - significantly boosted rail capacity for the North Karanpura coalfields (covering Hazaribagh, Chatra, Ranchi, Latehar districts) from 45 MTPA to 100 MTPA
    - North Urimari Coal Handling Plant in South Karanpur coalfields (covering Hazaribagh, Ramgarh districts)
    - Ministry of Coal's target is to reach 87% by 2030 through rail logistics
  - **FY2025:** State government elections in May/June 2024
  - **FY2026:** Heavy monsoon during June to September 2025 i.e., 60%+ more rain fall than decadal average in Dhanbad, Ramgarh and Latehar districts as per reports published by India Meteorological Department (IMD) in Oct'25. These districts have major coal fields where operations impacted which led to shortfall of about 350-400 5A Trucks on the corridor.
- Post regularization of coal mining and shift to rail, the corridor witnesses coal movement for industrial demand and brick manufacturers established in neighbouring states which is of regular nature.

# Historical traffic analysis (4)

**LCV / Mini LCV / 2A Trucks witnessed double digit growth rate on the corridor as well as eastern states of Bihar, Jharkhand and Purvanchal region of Uttar Pradesh in last 2-3 years**, mainly due to following reasons:

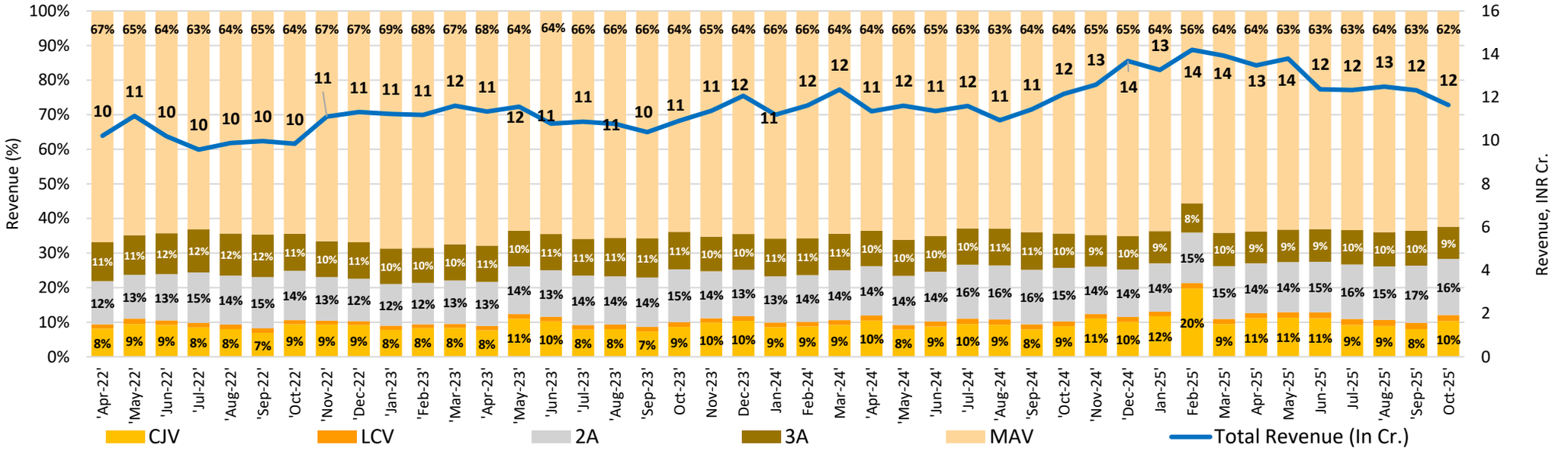
- **Connectivity to remote areas:** Improved rural road networks are making it easier for goods to be delivered to smaller towns and villages. This expands the market for businesses, who then purchase LCV / Mini LCV for distribution.
- **last-mile delivery boom :** Rapid growth of online shopping, spurred by greater internet penetration and smartphone usage, has increased the need for fast and reliable last-mile delivery services. Compact and efficient LCV / Mini LCV are ideal for navigating urban and semi-urban areas to deliver goods to customers' doorsteps.
- **Increased tier 2 and tier 3 demand:** Demand from tier 2 and tier 3 cities in Bihar and Jharkhand is a key driver for the LCV / 2A market. E-commerce / 3PL logistics companies and local businesses are in LCV fleets to meet delivery requirements efficiently.
- **Ease of finance and empowerment of rural economy:** Drivers started purchasing their own vehicle and approaching aggregators for transport business. These vehicles are affordable and versatile, making them suitable for transporting agricultural produce, livestock, and other goods for local inter and intra-state trade.
- Though recently reduced GST on auto components will sustain the momentum but not in double digit growth for future.

Overall decrease in traffic of passenger vehicles is due to heavy monsoon in H1 FY26 which is expected to revive during festivity and H2FY26.

# Historical revenue analysis

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### Vehicle category-wise monthly revenue composition and trend - ETC




| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) / Annual Average Daily Collection (AADC, in INR Lakh)** | | | | | | | | | |
| **FY23** | 8.8 | 2.1 | 1.6 | 3.4 | 13.2 | 14.1 | 84.0 | **127.3** | **34.89** |
| **FY24** | 10.1 | 2.1 | 1.8 | 3.6 | 15.1 | 14.4 | 88.2 | **135.3** | **36.97** |
| **FY25** | 13.3 | 2.3 | 2.1 | 4.1 | 17.7 | 14.6 | 94.0 | **148.2** | **40.59** |
| **FY26 till Oct'25** | 7.2 | 1.7 | 1.5 | 2.3 | 11.2 | 8.5 | 56.1 | **88.5** | **41.34** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 14.2% | 0.6% | 14.2% | 4.0% | 14.3% | 1.8% | 5.0% | **6.3%** | **6.0%** |
| **FY25 vs FY24** | 32.1% | 12.3% | 17.8% | 13.2% | 17.0% | 1.5% | 6.5% | **9.5%** | **9.8%** |
| **FY26* vs FY25** | 19.9% | 39.7% | 27.0% | 11.9% | 12.0% | 1.6% | 8.6% | **9.9%** | **9.9%** |

Source: TIC analysis

* against FY25 for 7 months i.e., April-October

# Ticket distribution (1)

Schedule V (Part B) is a monthly statement presenting vehicle category and ticket distribution-wise traffic data including exemption, local concession / other discounted details.
Toll ticket distribution refers to share of total revenue with respect to various journey types and related discounts applicable. This distribution depends on vehicle category, trip lengths, trip frequency and percentage of local traffic.
As per Toll Plaza Gazette Notification and Toll Rate Revision Circular of FY26 for Kulgo TP, types of toll tickets are being issued are presented in the below table.

| Ticket Category | Description |
|---|---|
| **Single Ticket** | One-way journey on the project highway is considered as single journey. For such journeys, users are required to pay the complete notified one-way fee. |
| **Return Ticket** | Two one-way journeys on the Project highway within 24 hours are covered under this category. For such journeys, users are required to pay one and half times of the fee payable for one-way journey. |
| **Monthly Pass** | Fifty one-way journeys on the Project highway within a month covered under this category. The concessionaire shall, upon request from any person, issue a monthly pass for fifty one-way journeys at a discounted rate equivalent to two-thirds of fifty one-way journeys. |
| **Local Pass (Local Personal)** | Road user who owns a mechanical vehicle registered for non-commercial purposes and resides within a distance of 20 km from the toll plaza can get local monthly pass. |
| **Commercial vehicle registered within district of plaza (Local Commercial)** | Commercial vehicles (excluding vehicles plying under national permit) registered in the district where the toll plaza is located.<br>Fee shall be 50% prescribed rate for that category of vehicle provided no service road or alternative road is available for use of such commercial vehicles. |
| **Exempted** | This journey ticket category is for all users (like Police, Fire Brigade, Ambulance, Defence, etc.) which are exempted from paying toll as per NHAI Toll rules. |
| **Annual Pass for private non-commercial CJV vehicles** | On June 18, 2025, MoRTH introduced a FASTag-based annual pass to facilitate seamless highway travel. This pass is valid for non-commercial private vehicles such as cars, jeeps, and vans, and remains effective for one year from the date of activation or up to 200 trips—whichever comes first for INR 3,000. Trip counting method is as follows:<br>Open Tolling: Each entry / exit counts as one trip<br>Closed Tolling: One entry to exit trip counts as one |

Source: DCA, NH Fee Rules 2008 and subsequent amendments and existing gazette notifications

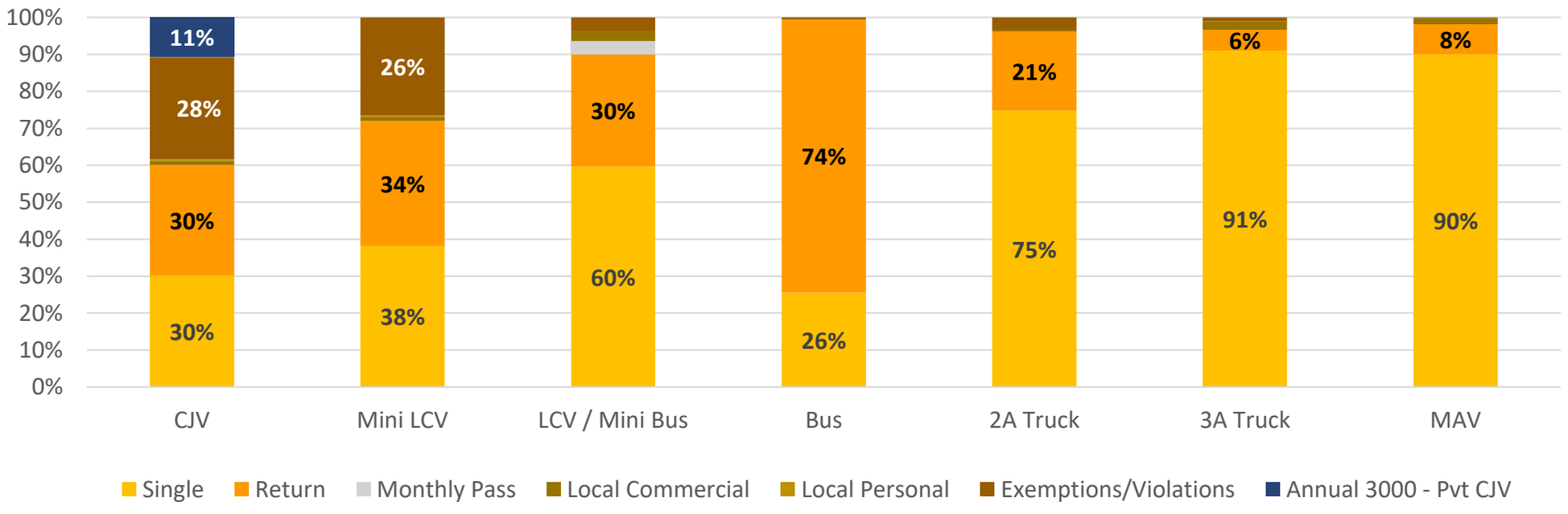
# Ticket distribution (2)

Currently it is envisaged that annual passes will be issued directly by concerned authority and hence revenue from sale of annual passes will not accrue to the concessionaire. NHAI has issued advisory for reimbursement of loss of revenue due to annual pass usage to the concessionaire which is part of Draft Concession Agreement as Clause 27.1.5 and described below:

- The concessionaire acknowledges and agrees that any user owning a non-commercial vehicle and holding a valid and functional FASTag Pass in accordance with MoRTH Gazette Notification No. G.S.R. 388(E) dated 17th June 2025shall be entitled to use the project highway without any restrictions, except to the extent specified in any applicable law, applicable permit or the provisions of the draft concession agreement.
- In respect of such vehicle crossing the toll plaza(s), the concessionaire shall be entitled to receive compensation from the authority equivalent to the product of:
  - The number of non-commercial vehicles crossing the toll plaza(s) with such pass; and
  - 90% of the applicable fee for single journey of such vehicle.
- Provided, however, that for the purpose of computation of such compensation, the counting of any particular vehicle shall be limited 2 crossing per day, notwithstanding that such vehicle may cross the toll plaza(s) multiple times on that day.
- The compensation payable under this clause shall be due and payable in monthly instalments within 7 days of the close of the month.

# Ticket distribution (3)

**Kulgo TP**




Source: TIC analysis

- Local trips by CJVs and Buses along Dumri, Bagodar, Dhanbad, Hazaribagh and Isri accounts for ~30% and ~74% of the return ticket category while similar nature of local trips of CJV and Mini LCV account for higher local commercial ticket category.
- More than 75% of the goods vehicles (2A, 3A and MAV) opt for single journey tickets showcasing higher influence of long-haul traffic.
- ~11% of CJV traffic is being witnessed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to increase to 1.5 to 2 times in future through gradual awareness among road users.

# Commodity analysis (1)

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**Direction-wise commodity distribution**

| Commodity | Mini LCV | | LCV | | 2A Truck | | 3A Truck | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Gorhar to Dhanbad | Dhanbad to Gorhar | Gorhar to Dhanbad | Dhanbad to Gorhar | Gorhar to Dhanbad | Dhanbad to Gorhar | Gorhar to Dhanbad | Dhanbad to Gorhar | Gorhar to Dhanbad | Dhanbad to Gorhar |
| Agriculture / Animal Husbandry | 28% | 7% | 7% | 5% | 4% | 5% | 7% | 4% | 14% | 6% |
| Fruit and Vegetables | 13% | 27% | 7% | 12% | 8% | 9% | 5% | 2% | 5% | 1% |
| FMCG / Food Products | 7% | 9% | 11% | 13% | 13% | 12% | 19% | 11% | 12% | 6% |
| Building / Construction Material | 1% | 1% | 1% | 0% | 1% | 1% | 1% | 0% | 6% | 1% |
| Cement | 0% | 0% | 0% | 1% | 1% | 1% | 1% | 2% | 1% | 5% |
| Aggregates / Sand | -- | -- | 0% | 0% | -- | -- | 1% | 2% | 2% | 2% |
| Minerals / Mining Commodities (majorly Coal) | 0% | -- | 0% | 1% | 1% | 1% | 1% | 2% | 8% | 8% |
| Iron Ore / Pellets | -- | -- | -- | -- | -- | -- | -- | -- | 0% | 3% |
| Manufacturing | 7% | 11% | 19% | 12% | 14% | 16% | 14% | 16% | 10% | 11% |
| Automobile and Spares | 0% | -- | 5% | 0% | 7% | 1% | 3% | 1% | 3% | 0% |
| Chemicals / Fertilizers | -- | 0% | 0% | 1% | 1% | 1% | 2% | 5% | 3% | 6% |
| Steel / Metal Products | 0% | 4% | 2% | 5% | 2% | 5% | 1% | 14% | 3% | 28% |
| Petroleum Products | 0% | 2% | 1% | 2% | 1% | 3% | 2% | 5% | 2% | 10% |
| Parcel / E-commerce | 5% | 9% | 24% | 33% | 22% | 30% | 23% | 25% | 8% | 5% |
| Miscellaneous | -- | 0% | 0% | 1% | 1% | -- | 0% | 1% | 0% | 0% |
| Empty | 38% | 27% | 23% | 13% | 24% | 14% | 19% | 9% | 25% | 10% |

Source: TIC analysis

*0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

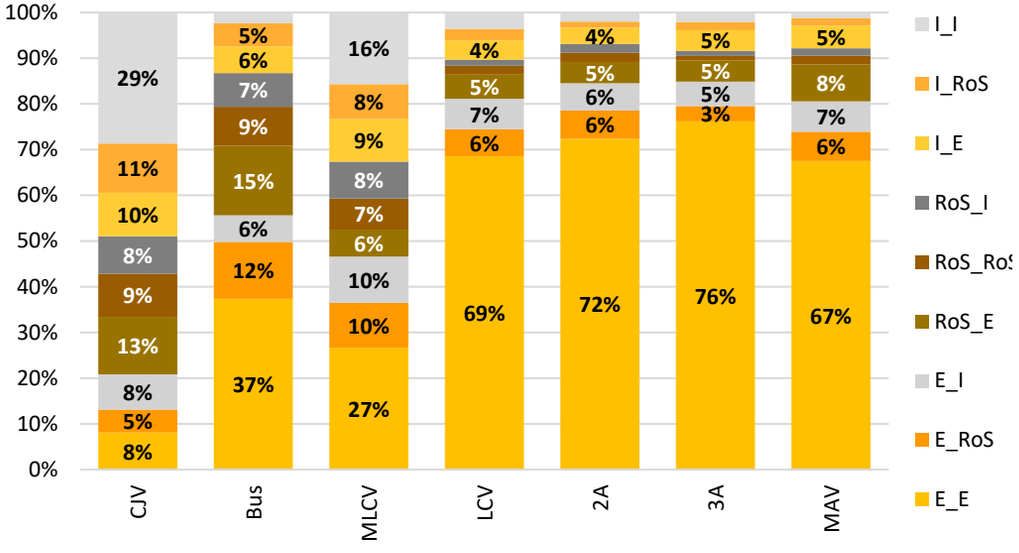
# Commodity analysis (2)

- Jharkhand's economy and population are heavily dependent on agriculture, with about 65% of its workforce relying on it for livelihood, especially in rural areas. This trend is clearly visible in the **Agriculture / Animal Husbandry (7–10%)** category. An equal proportion of long-haul traffic is observed under this category, carrying grains and pulses from Madhya Pradesh, Delhi, Rajasthan, Haryana, Bihar to West Bengal is a major trade centre for agricultural commodities.
- **Fruits and Vegetables (10%)** include medium-distance regional traffic movement across neighbouring states of Uttar Pradesh, Bihar, Jharkhand and West Bengal i.e., from farm to wholesale yard / retail market.
- **FMCG / Food Products (~15%)** including short-, medium-, and long-distance movements, have a considerable presence considerable presence on the project highway from production to consumption centers across corridors.
- **Steel/Metal Products** such as TMT Bars, Wires, Rods, Coils, Fabricated Engineering Items mainly being transported through MAV and 3A Trucks which contribute ~30% and ~15% respectively for MAV and 3A.
- **Coal (~10%)** movement was observed in both directions as the project highway is located between two major coalfields as discussed in earlier sections and hence movement towards Uttar Pradesh/Bihar and West Bengal is clearly visible through MAV (mainly 5A Trucks.)
- Regular movement of **petroleum products (~10%)** carrier between eastern Uttar Pradesh/Jharkhand/Bihar and Durgapur/Rajbandh where all three Oil PSUs (HPCL, BPCL, IOCL) have presence with bottling and fuel distribution terminals as well as from Haldia Port.
- **E-commerce / Parcel** items are mainly being carried through LCV / 2A / 3A Trucks and contribute about 30% in traffic of these categories.
- **Empty vehicle movement (~20% for Gorhar to Dhanbad direction and ~10% in opposite direction)** was clearly visible during site visit which mainly includes:
  - Cement bulk carrier returning to cement manufacturing clusters at Jharkhand
  - Petroleum product carriers returning to Durgapur/Rajbandh
  - High volume of goods vehicles return to Transport Nagar at Varanasi/Dhanbad
- Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

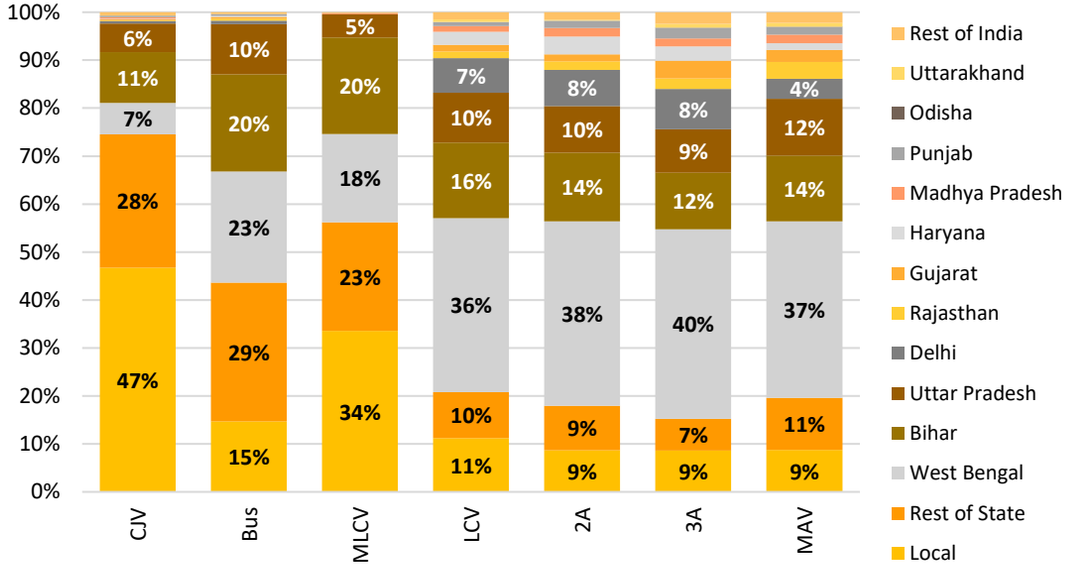
# Zonal influences and trip distances

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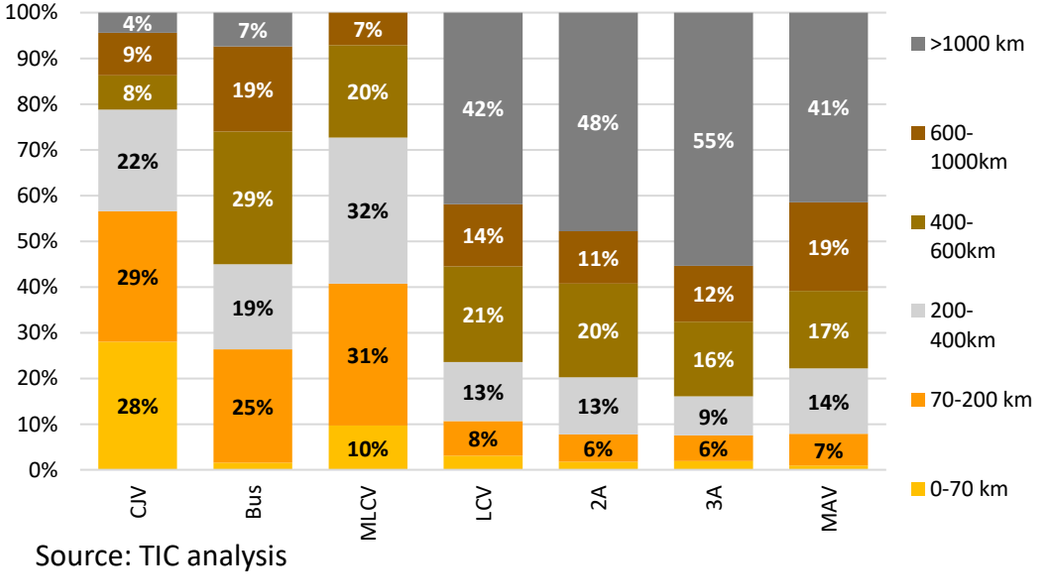
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distances




| Vehicle Category | Distances (in km) |
|---|---|
| CJV | 276 |
| Bus | 455 |
| Mini LCV | 290 |
| LCV | 894 |
| 2A | 958 |
| 3A | 1,081 |
| MAV | 922 |

Source: TIC analysis

Vehicle category-wise visual representation of origin-destination zones and top pairs are provided in Appendix A.

# Chapter 4: Economic context and traffic growth

- Economic context of influence region
- Determination of traffic growth drivers
- Estimation of demand elasticities
- Forecasts for growth drivers

IRC: 108-2015 mentions that traffic growth is typically driven by a combination of macro-economic trends and industry/commodity specific factors, known as independent variables or traffic growth drivers.

These growth drivers have two critical characteristics:

1) the rate at which it increases i.e., forecasts of independent variable
2) the project highway's relationship with the growth driver to attract, capture and retain the traffic over the forecast horizon i.e., travel demand elasticity

Growth drivers are typically identified through analysis of origin–destination data, site visits and a detailed understanding of the highway.

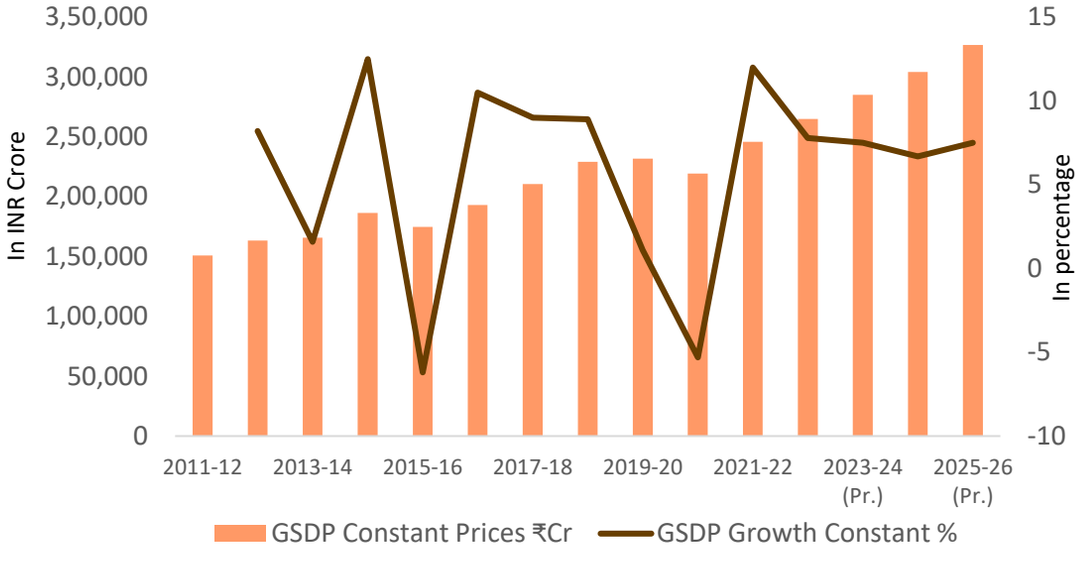
Travel demand elasticity is influenced by socio-economic conditions both within the region served by the project highway and across the wider national area of influence.

This chapter explains the growth drivers and elasticity in context of economic snapshot of primary districts / state and their correlation with the country.

# Jharkhand: From ‘Coal and Crops’ to ‘Factories and Services’

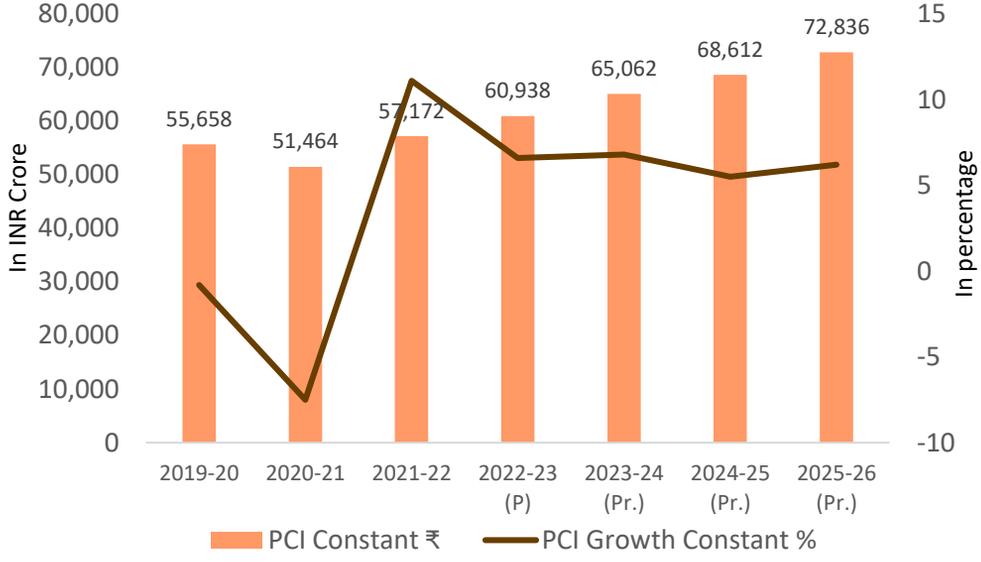
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**Jharkhand GSDP levels and growth rate**




GSDP grew 7.7% p.a. between FY2022 and FY2024

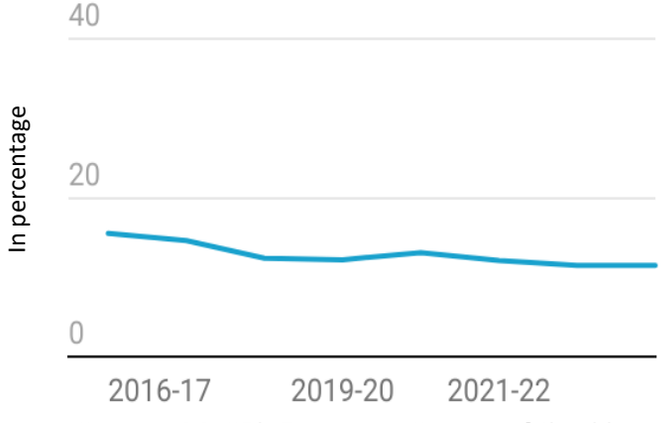
**Jharkhand PCI levels and growth rate**



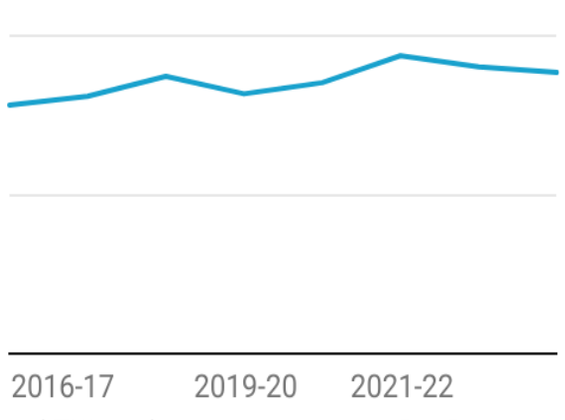

PCI growth observed a plateau in the last couple of years

Primary sector reliance reducing, economy structurally shifting towards industry and service led growth

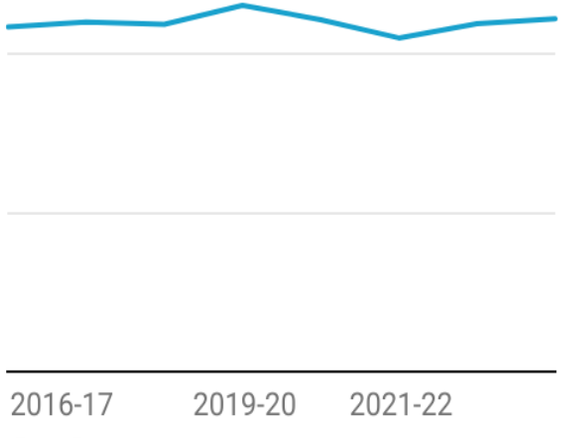
**Agriculture & Mining (%)**




**Secondary Total (%)**




**Tertiary Total (%)**

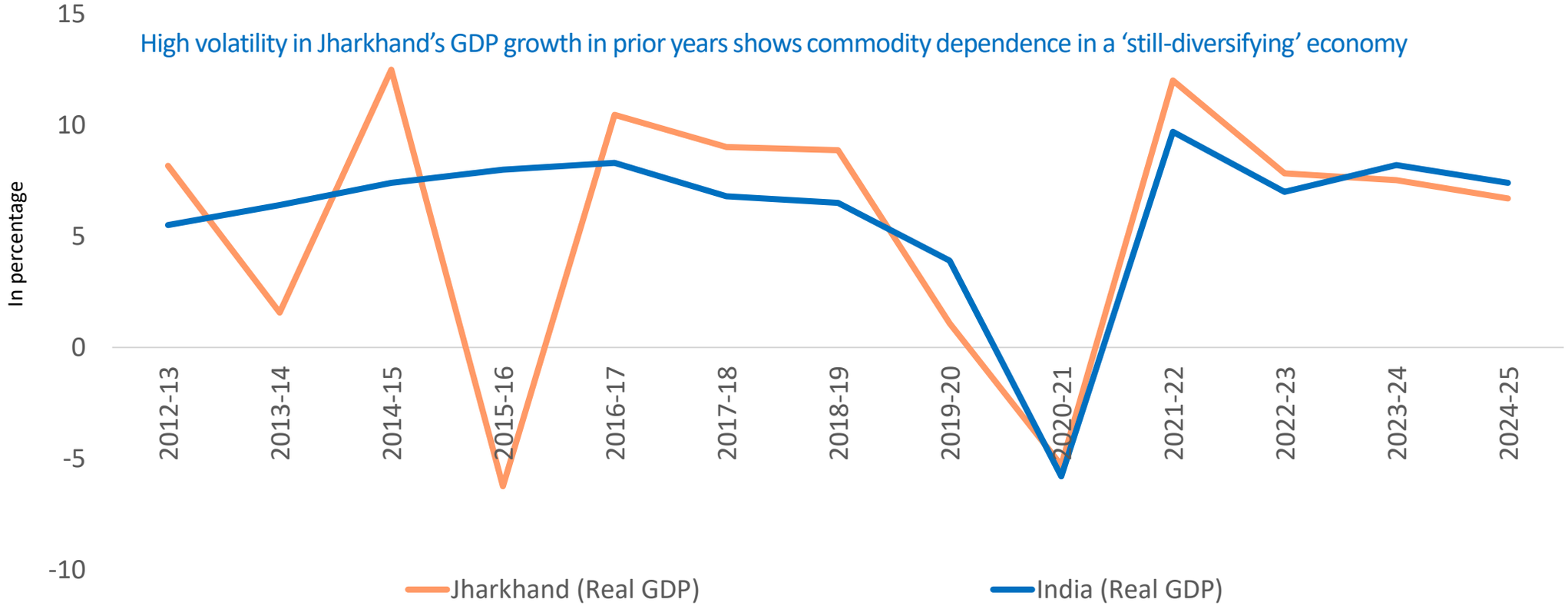



Source: MoSPI, Economic Survey of Jharkhand and TIC analysis

P – Provisional, Pr. - Projections

# Jharkhand and India GDP growth trend

**Jharkhand and India GDP growth trend**

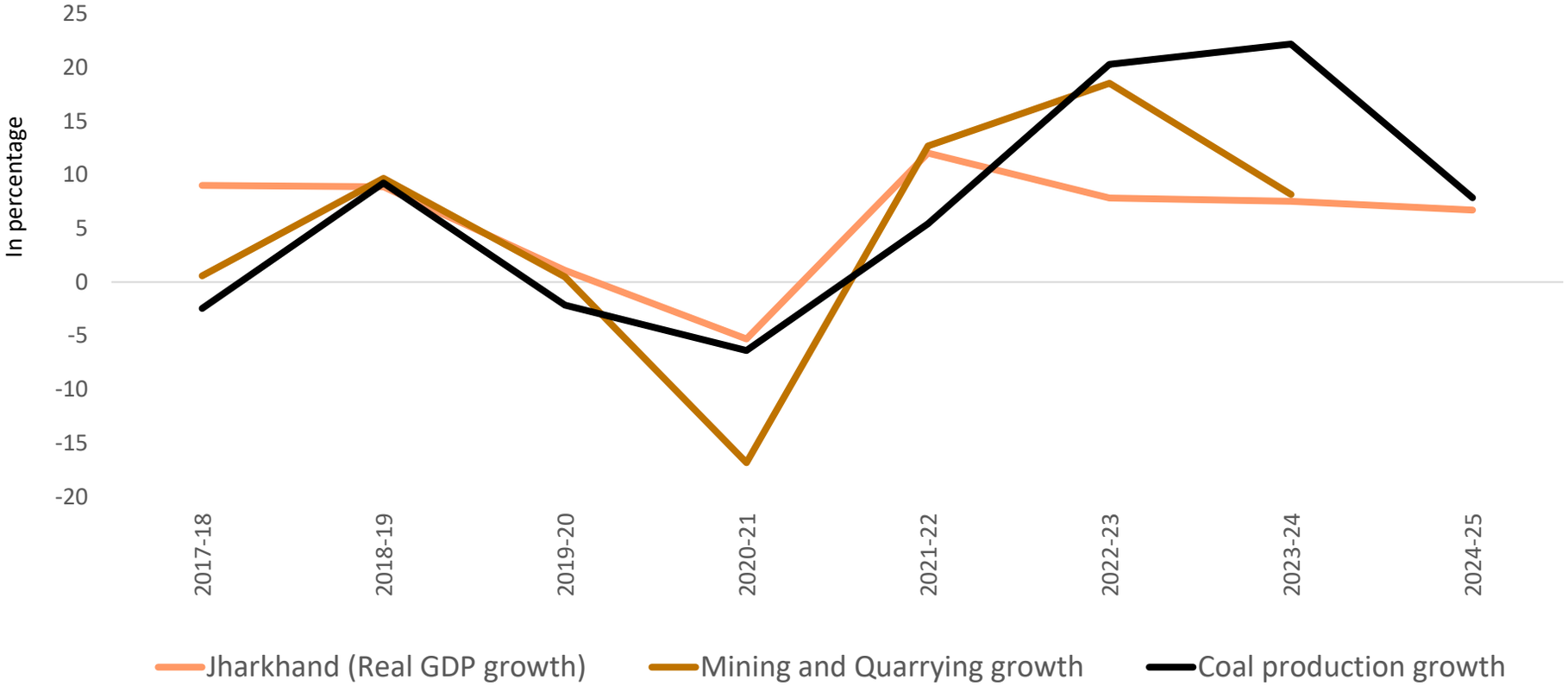



Source: MoSPI, Economic Survey of Jharkhand and TIC analysis

- Share of Mining and Quarrying in overall state GVA has slightly come down from 9.8% in FY2017 to 8.7% in FY2024, although the post-Covid growth in mining has remained solid.
- Share of Agriculture has decreased from 15.5% to 11.5%, while the manufacturing has increased from 21.2% to 24.2% in the same period.
- The sub-optimal performance of the agriculture sector reflects change in composition of demand with the increase in income.

# Coal: The “Just Transition” risk

**Sectoral dependence**




Source: Economic Survey of Jharkhand and TIC analysis

- Commodity sector (primarily coal) dependence indicates pressure on the growth as many legacy mines are nearing the end of their productive life. New mining licenses ae being issued but coal is fossil fuel and can’t be replenished.
- As India gradually transitions towards renewable energy to meet climate goals, coal demand may plateau in the coming decades. While this may not have a significant impact in the near term—as most coal supplied to power plants is transported by rail—it cannot be ignored in the larger context.

# Districts in immediate influence region (1)

**Sectoral contribution in district and state GDP (FY2024)**

| District | Agriculture and Mining (Primary) | Industry (Secondary) | Services (Tertiary) |
|---|---|---|---|
| **Dhanbad** | 11.9% | 60.5% | 27.5% |
| **Hazaribagh** | 20.6% | 37.9% | 41.5% |
| **Giridih** | 20.0% | 31.4% | 48.5% |
| **Jharkhand** | 20.1% | 35.4% | 44.4% |

Source: Department of Economic Survey of Jharkhand and TIC Analysis

**Contribution in state GDP and overall rank (FY2022, Current Prices)**

| District | Contribution in State GDP | Rank | Per Capita Income | Rank |
|---|---|---|---|---|
| **Dhanbad** | 14.8% | 1 | 1,54,955 | 1 |
| **Hazaribagh** | 5.31% | 6 | 87,931 | 10 |
| **Giridih** | 4.22% | 8 | 49,401 | 22 |

Dhanbad district leads among all the districts - both in district income and per capita income

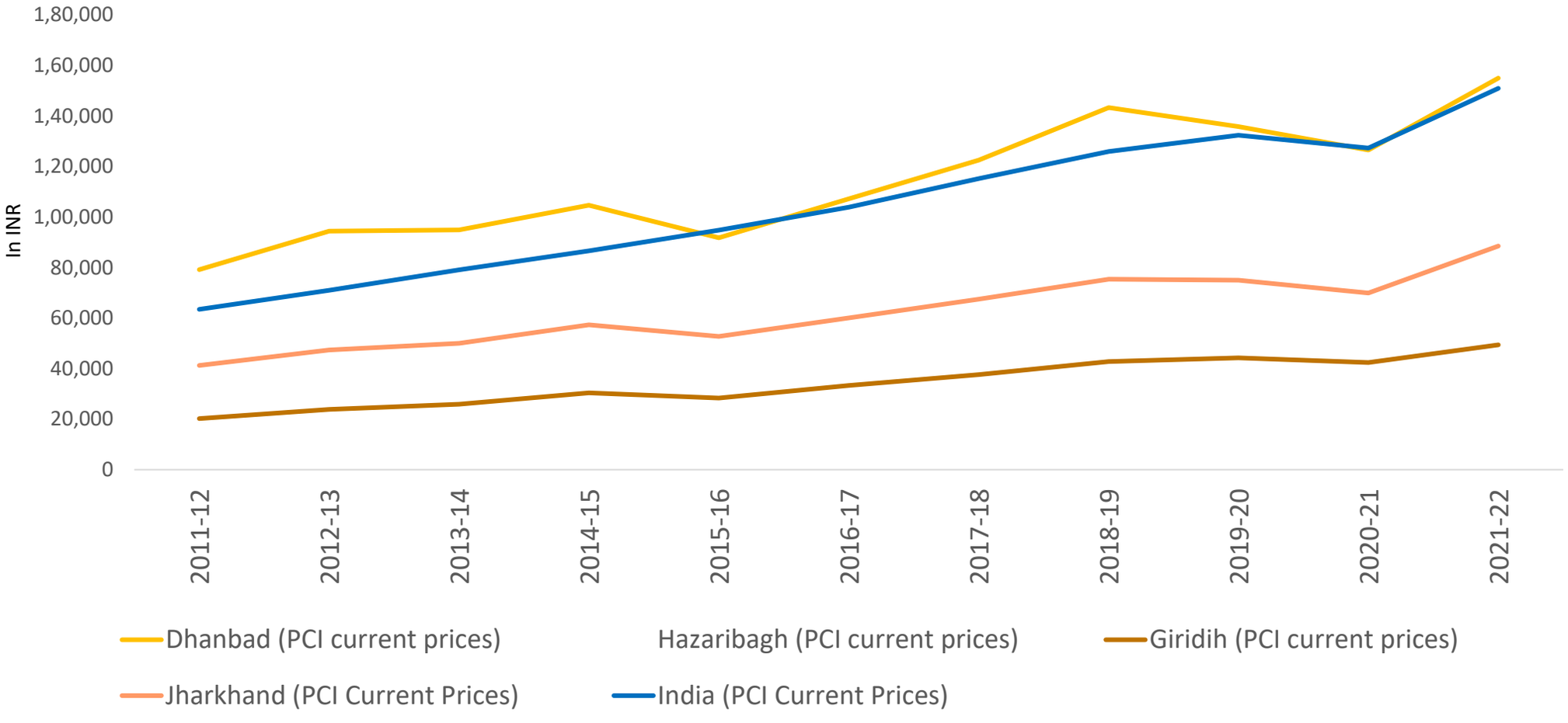
**Key district characteristics**

| Parameter | Dhanbad | Hazaribagh | Giridih |
|---|---|---|---|
| **Economic profile** | Industrial economy | Balanced, mixed economy | Service oriented economy |
| **GVA structure** | Mining hub and high industrial GVA<br>Minimal agriculture and services secondary | Agriculture and services together outweigh industry | Nearly half of GVA from services, relatively weak industry |
| **Income position** | Leads Jharkhand on district income and per capita income<br>Broadly in line with India average | Per capita income close to the Jharkhand state average | Per capita income below Dhanbad but improving over time |
| **Growth profile** | High growth and high volatility<br>Classic industrial boom bust profile | Slightly above state average growth indicating balanced expansion | Above average but smoother than Dhanbad, reflecting service led stability |

Source: TIC secondary research and analysis

# Districts in immediate influence region (2)

**Per capita income comparison: Jharkhand, India and districts in immediate influence region**




Source: Department of Economic Survey of Jharkhand and TIC analysis

**Dhanbad's per capita income levels are comparable to India's, while Hazaribagh's are closer to Jharkhand's, reflecting differences in demand composition.**

# Districts in immediate influence region (3)

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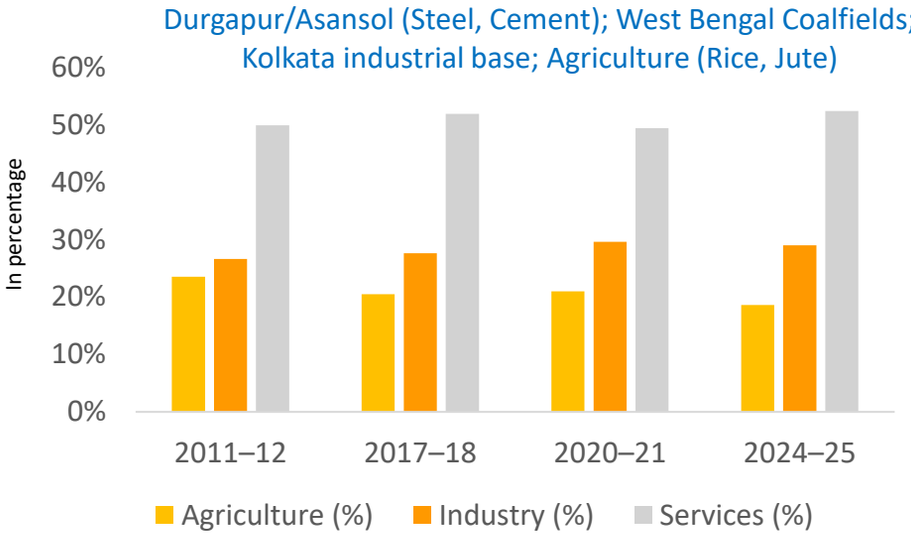
**District-wise summary of risk and opportunities**

| Parameter | Dhanbad | Hazaribagh | Giridih |
|---|---|---|---|
| **Primary driver** | Heavy Industry (Coal/Steel) | Mining and education | SME industry; religious tourism (Sammed Shikharji - Jainism's holiest pilgrimage) |
| **Key resource** | Coking Coal | Thermal Coal | Mica, Coal, Iron Ore |
| **Major risk** | Mine subsidence/fire | Land acquisition protests | Illegal mining and water issues, naxalism |
| **Growth opportunity** | Coal Bed Methane (CBM) | Logistics and smart city development | Eco and religious tourism |
| **Predicted strong growth segment** | HCV (Trucks) | Passenger Cars / HCV (Trucks) | Passenger Cars / Mini LCV / LCV |
| **Conclusion** | | | |
| **Profile and metrics (GVA share or growth)** | Jharkhand's top economy (largest district GDP)<br>Mining/industry dominates GVA<br>Per Capita Income ~national level<br>Volatile high growth | Balanced economy: agriculture + services together exceed industry; modestly above-average growth<br>Moderate Per Capita Income (≈state avg) | Service-oriented (~50% of GVA from services)<br>Industry weaker; above-average growth but less volatile<br>Lower Per Capita Income |
| **Toll traffic implication** | Heavy industrial base drives **huge freight flows** (many coal/steel products trucks)<br>Correlation: Dhanbad's growth strongly uplifts toll volumes | Mixed cargo-passenger traffic<br>Steady growth means **stable toll volumes** (bus/truck flows from agri-business and services) | Primarily local passenger traffic (cars, buses) rather than long-haul freight.<br>Toll plazas here see relatively **weaker heavy-vehicle flows** |

Source: TIC analysis

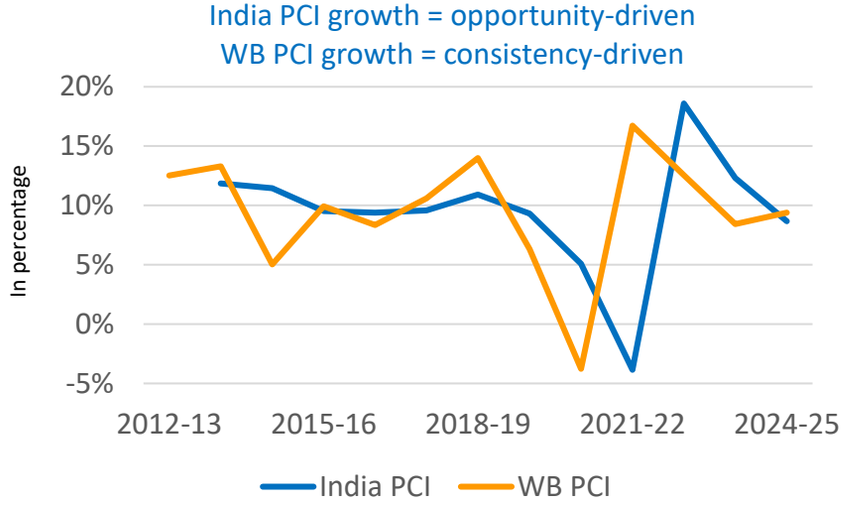
# West Bengal: substantial contributor to freight flow of NH19

**West Bengal GSDP sectoral composition**




Source: TIC analysis

**West Bengal and India PCI growth**




Source: TIC analysis

- Economy steadily shifted towards services, with agriculture's share declining and industry remaining broadly stable, signaling a consumption- and services-led growth model. **Trade (28%), real estate (22%) and logistics (15%)** dominate services sector.
- West Bengal grows more consistently but at a slightly lower pace than India. State's growth cycle is less volatile, and while WB occasionally outperforms (notably in FY16 and again in FY25), the typical gap favors India.
- West Bengal's long-term PCI growth rate is marginally higher than India's, but this is base-effect driven (lower starting income).

| Particulars | India | West Bengal |
|---|---|---|
| **Income growth style** | Opportunity / capex-led | Consumption / services-led |
| **Volatility** | Higher | Lower |
| **Traffic implication** | Cyclical surges | Persistent baseline traffic |
| **Revenue predictability** | Moderate | High |

Source: TIC analysis

# PESTLE analysis

| Parameter | Key factors / trends | Implication for toll traffic |
|---|---|---|
| **Political** | ▪ Strong central/state infrastructure push BJP-led government during 2014-2019 prioritizes roads and even during collation governments<br>▪ Elections highlight connectivity focus and trade development including rural economy<br>▪ Coalition governments and increased instances of illegal coal mining | ▪ Continued policy support ensures funding and execution of new highways, boosting trade and rural economy followed by future traffic volumes<br>▪ Any illegal coal mining will be up-side as it will be transported through road. The consultant has not considered any up-side for illegal coal mining observed n past. |
| **Economic** | ▪ Robust GDP (~7%-8%) driven by industry/services; diversifying from agrarian base in Jharkhand and WB<br>▪ Rising per capita incomes (highest in Dhanbad) | ▪ Broad-based growth fuels both freight and passenger traffic growth, underpinning toll revenue growth |
| **Social** | ▪ Population ~33 m, ~26% Scheduled Tribes (rural/agrarian); urbanization ~28%<br>▪ Literacy improving to ~70% | ▪ Lower urbanization and incomes suppress initial vehicle ownership, but expanding middle class gradually increases travel (especially in cities) |
| **Technological** | ▪ Multi Lane Free Flow (MLFF) implementation at toll plazas will improve efficiency but not volumes<br>▪ FASTag penetration: freight traffic ~100% but high violation in local CJV/Mini LCV<br>▪ EV policy targets (10% by 2027) but charging network still sparse | ▪ MLFF to be linked with state government (RTO) for stricter actions in case of blacklisted FASTag during barrier free toll plazas; increase in forced violation<br>▪ EV uptake currently minimal so toll usage unchanged. In long term, EV trucks may alter fuel tax vs toll mix – far in future |
| **Environmental** | ▪ Push for cleaner coal technologies and afforestation; monsoon irrigation projects; climate adaptation programs gaining traction | ▪ Stringent clearances can delay road projects. Transition away from coal may reduce future heavy freight on highways |
| **Legal / Regulatory** | ▪ Land acquisition and forest rights delays are common; state support agreement for stricter enforcement of initiatives for all aspects | ▪ Regulatory hurdles slow project completion, deferring new toll collections.<br>▪ Once ecosystem is established, tolling framework is stable and predictable across Jharkhand |

Source: TIC analysis

# Determination of growth drivers and elasticity (1)

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**Potential socio-economic indicators as growth drivers in context of IRC: 108-2015 and benchmark studies**

| Socio-economic indicators | Observations for availability/reliability of historical and forecast data |
|---|---|
| **Vehicle registration / Automobile Sales** | Sourcing vehicle registration data from concerned Regional Transport Office (RTO) within influence region is herculean task. In addition, it is not mandatory that Project Influence Area (PIA) matches with vehicle registration cases at ground level so not useful.<br>Society of Indian Automobile Manufacturers (SIAM) publishes automobile sales at region level but not at granular level. Can be used as proxy data to validate specific trends.<br>The consultant includes regional dealers' association of freight vehicles (if any) and local financing agencies to understand and validate specific trends observed in traffic. |
| **Per Capita Income** | Can be used as proxy data which reflects demand composition but not specific to commodities / vehicle category. Underlying forces are complex and changing at every strata of administrative structure i.e., districts, state, national. Historical data at state / national level available in public domain but not for district level. Further, availability of forecast data is major constraint in India. |
| **Population** | Population data are compiled on a decennial basis, with the latest census conducted in 2011, and do not provide a robust annual time series suitable for econometric modelling. In addition, migration trends across socio-economic segments and income-based geographies are highly volatile and difficult to forecast with confidence. Accordingly, population growth has not been adopted as a driver for forecasting future travel demand on the project highway. |
| **GDP / GSDP** | Dataset from national and international publications and government agencies which are highly reliable in context of forecast e.g., Focus Economics, RBI / RBI's Survey of Professional Forecasters (96$^{th}$ Round), SBI Research, CII, multilateral banks (ADB, World Bank etc.), IMF, OECD, Oxford etc.<br>The consultant typically uses Focus Economics monthly subscription and in-house/empaneled economists for correlation for state and district level GDP and industry specific aspects.<br>The client provides views on the consultant's draft and recommends the final forecast. |

Source: TIC research and analysis

# Determination of growth drivers and elasticity (2)

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- For any potential indicator (economic, commodity, or industry-related) to be used as a traffic growth driver, availability and reliability of both historical data and credible forecasts are critical success factors.
- Among the key socio-economic indicators discussed above, Gross Domestic Product (GDP) at the national level and Gross State Domestic Product (GSDP) at the state level are the only indicators for which robust historical data and reliable forecasts are consistently available. Accordingly, GDP/GSDP have been adopted as the primary growth drivers for traffic forecasting.
- In addition, steel and coal production have been incorporated as project-specific growth drivers, given that approximately 30% and 8% of traffic on the project highway, respectively, are attributable to the transportation of steel products and coal.
- The consultant held discussions with regional dealers' associations of freight vehicles, agricultural wholesale yards (popularly known as mandis), pilgrimage trusts where tourist footfall data are well organised, and inter-city bus terminals in the immediate influence region to validate specific traffic trends such as seasonality and growth patterns.
- In many cases, historical data show varying traffic trends due to various external events in the economy and region. In addition, variations in data recording by third-party tolling agencies and the presence of historical data gaps, as observed in this business case, necessitated further validation.
- Accordingly, validation of the historical data was carried out using traffic data from neighbouring toll plazas on the corridor and benchmark highway sections.
- Traffic growth may not be uniform during the forecasting period, considering factors such as increasing total traffic volumes relative to the capacity of the corridor and the project highway, technological advancements in the automotive industry, cost–tonnage ratios of specific commodity–vehicle combinations, and overloading trends versus strict government enforcement in the region.
- In India, the freight vehicle mix has been changing over the last decade, favouring multi-axle vehicles (MAVs) over 2-axle and 3-axle vehicles for long-distance traffic, given the operational efficiencies achievable with larger vehicles. At the same time, Mini LCVs and LCVs have become more popular for short-distance traffic and more localised supply movements compared to 2-axle vehicles.
- Considering ongoing technological advancements in the automotive industry, standard 2-axle and 3-axle trucks have been increasingly replaced by 6-tyre LCVs over the last couple of years, a trend that is expected to continue.
- The projected elasticity values are typically assumed to remain constant over the concession period in the Indian context; however, they may vary over time due to factors such as increasing traffic volumes relative to corridor capacity, technological advancements in the automotive industry, changes in cost–tonnage ratios of specific commodity–vehicle combinations, overloading trends versus enforcement intensity, and correction of regional imbalances.
- Considering all these aspects, vehicle category-wise elasticities have been estimated.

# Determination of growth drivers and elasticity (3)

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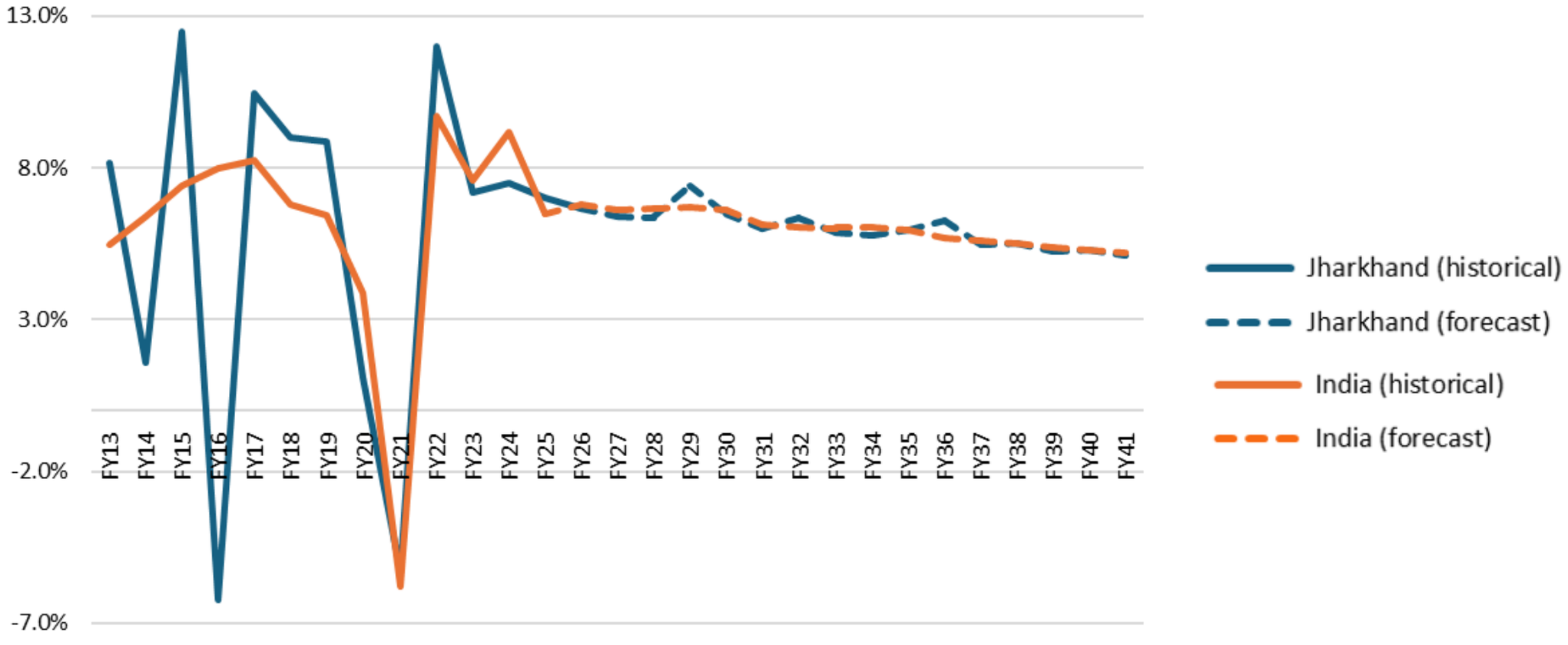
**Vehicle category-wise adopted elasticity**

| Vehicle Category | Kulgo TP | Independent variable |
|---|---|---|
| **CJV** | 0.75 - 1.10 | Weighted average of:<br>GSDP of Jharkhand, West Bengal, Bihar and Uttar Pradesh |
| **Mini LCV** | 0.65 - 0.75 | |
| **Bus** | 0.40 with periodical decrease in every 3rd year as per past trend | |
| **LCV / Mini Bus** | 0.60 - 0.65 | |
| **2A Truck** | 0.85 - 0.95 | Weighted average of:<br>GDP of the country, GSDP of Jharkhand, West Bengal, Bihar and Uttar Pradesh<br>Production of Finished Steel in the influence region i.e. Jharkhand, West Bengal and Odisha |
| **3A Truck** | 0.10 - 0.30 | |
| **MAV** | 0.85 - 1.00 | Weighted average of:<br>GDP of the country, GSDP of Jharkhand, West Bengal, Bihar and Uttar Pradesh<br>Production of Finished Steel in the influence region i.e. Jharkhand, West Bengal and Odisha<br>Production of Coal from Jharkhand and West Bengal |

Source: TIC estimate using historical traffic data for the project highway and benchmark references of up-stream / downstream toll plazas

# Forecasts for growth drivers (1)

**GDP and GSDP forecast**




Source: Client input and TIC estimates

- By analyzing historical patterns of state-level GSDP growth in relation to national GDP growth, state-wise GSDP projections have been developed. Under performing states compared to the national GDP are expected to witness an acceleration in growth and gradual convergence will realise by 2040 followed similar growth by 2047 with Viksit Bharat vision.
- WPI will be 3.24% throughout the concession period except 0.25% for FY27 to revise toll rates as provided by the Client.

# Forecasts for growth drivers (2)

**Production of finished steel**

- As per Annual Steel Report, Ministry of Steel – 230 MTPA is the National Steel Policy target for FY31; beyond FY31, India production is extrapolated based on historical CAGR.
- Latest media reports suggest that Odisha state's CM claiming Odisha to account for 50% of India's steelmaking capacity by 2030 i.e., capacity of 130 MT by FY31 up from 41 MT currently located in the state. This capacity assumes both crude and finished steel as well as capacity and not necessarily the production.
- The consultant believes this is overly optimistic (compared to current production) and therefore assume the share of Odisha to rise to 1/3$^{rd}$ (33%) by FY31 up from 16% production share of finished steel in FY24. Steep increase in share of Odisha (assumption) lead to moderate reduction in share for Jharkhand and West Bengal.

**Production of coal**

- Coal will be the main source of net demand growth through 2030, driven by electricity demand, cement, steel, and coal-based industrial processes in India. Coal's share in India's electricity mix is projected to fall from over 70% in 2025 to about 60% by 2030, even as the country's overall coal demand is expected to rise 17% over the next five years, according to the International Energy Agency (IEA).
- The largest absolute increase in coal consumption to 2030 is expected to take place in India, where demand is set to rise by 3% per year on average, leading to an overall increase of 225 million tonnes as per International Energy Agency's Coal 2025 report.

# Chapter 5: Baseline traffic and revenue forecast

- Base year AADT (FY26)
- Toll ticket distribution
- Revenue reconciliation

This chapter presents our approach to reach baseline forecast. The consultant estimated base year AADT and toll ticket distribution to reconcile base year traffic and revenue.

# Base year AADT estimate

- The consultant reviewed H1 FY26 ETC traffic data received from the client. Based on which traffic profiling for balance half of FY26 has been estimated using seasonality correction factors followed by estimation of FY26 AADT.
- An independent CTVC survey was undertaken to validate the ETC reported traffic data. The variance between CTVC and ETC data is comparatively higher for Car/Jeep/Van, Mini LCV, and Bus categories. For CJV/Mini LCV, this is attributed to local vehicles from nearby urban centre of Dhanbad and villages in surrounding area like Kulgo, Isri, Dumri, Bagodar at Kulgo toll plaza. For Bus, higher forced exemption was observed across the corridor in Jharkhand and Bihar. Conversely, the variance for LCV, Truck 2A, Truck 3A, and MAV categories remains marginal and within acceptable industry standards.
- Hence, the consultant multiplied variance factor with ETC AADT to determine the corrected FY26 AADT.

**Base Year AADT (FY26)**

| Particulars | ETC AADT | Variance factor | Corrected Base Year AADT |
|---|---|---|---|
| **Car/Jeep/Van** | 3,352 | 1.3772 | 4,617 |
| **Mini LCV** | 671 | 1.3547 | 909 |
| **Mini Bus/LCV** | 383 | 1.0209 | 391 |
| **Bus** | 338 | 1.0118 | 342 |
| **2A Truck** | 1,221 | 1.0057 | 1,228 |
| **3A Truck** | 865 | 1.0127 | 876 |
| **MAV** | 4,129 | 1.0015 | 4,135 |
| **OSV** | 3 | 1.0000 | 3 |
| **AADT** | **10,962** | | **12,500** |
| **PCU** | **30,461** | | **32,069** |

Source: TIC estimate

# Ticket distribution

**Kulgo TP**

| Vehicle categories | Car/Jeep/Van | | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|---|
| Ticket types | FY26 | FY27 onwards | FY26 onwards | | | | | |
| Single | 30.1% | 25.6% | 38.2% | 25.5% | 59.6% | 74.8% | 91.0% | 90.0% |
| Return | 30.0% | 28.0% | 33.8% | 73.9% | 30.5% | 21.4% | 5.6% | 8.2% |
| Monthly Pass | - | - | - | - | 3.5% | - | - | - |
| Local Commercial | - | - | 1.6% | - | 2.9% | 0.5% | 2.3% | 1.6% |
| Local Personal | 1.5% | 1.5% | - | - | - | - | - | - |
| Exemptions/Violations | 27.6% | 27.6% | 26.4% | 0.5% | 3.6% | 3.4% | 1.1% | 0.2% |
| Annual Pass - Pvt CJV | 10.7% | 17.2% | - | - | - | - | - | - |

Source: TIC estimate

- ~11% of CJV traffic is being witnessed using Annual Pass of INR 3,000 as on 30th October 2025 which is expected to increase by ~1.7 times in future through gradual awareness among road users.
- The consultant did not consider penetration of annual pass from estimated exemption/violation in future.
- For all vehicle categories, prevailing exemption/violation has considered for future. As per discussion with the client, prevailing forced exemption is likely to reduce post-implementation of Multi Lane Free Flow (MLFF) tolling system.
- Future segmentation will change due to expected diversions presented in Chapter 6.

# Validation of base year traffic and revenue

- The Consultant calculated base year revenue by multiplying traffic AADT with prevailing toll rates in accordance with estimated toll ticket distribution.
- Comparison summary with quoted remittance by tolling agency is presented in the below table.
- Quoted daily remittance should be lower than estimated revenue by approx. 5%-10% considering profit margins of tolling agencies.

**Traffic and revenue reconciliation for base year (all values are estimated with FY26 toll rate with old linking factor)**

| Toll Plaza | Base year revenue estimate by the Consultant (INR Crore) | Annual Potential Collection estimate by NHAI (INR Crore) | FY26 estimate vs NHAI APC | Quoted remittance By prevailing tolling agency (INR Crore) | Consultant estimate vs Quoted remittance |
|---|---|---|---|---|---|
| **Asanpur** | 160.49 | 149.70 | 7.2% | 151.14 | 6.2% |

Source: TIC estimate

# Chapter 6: Diversion analysis

- Varanasi Ranchi Kolkata highspeed corridor (NH319B)
- Raxual Haldia economic corridor
- Eastern dedicated freight corridor
- Kandla Gorakhpur LPG pipeline
- Vande Bharat express train: Varanasi Howrah route
- National Waterways 1

This chapter elaborates impacts of proposed infrastructure developments in the project influence and network in form of positive/negative diversion to/from the project highway. Analysis has been exercised using IRC: 108 - 2015 and IRC: SP: 30 - 2019.

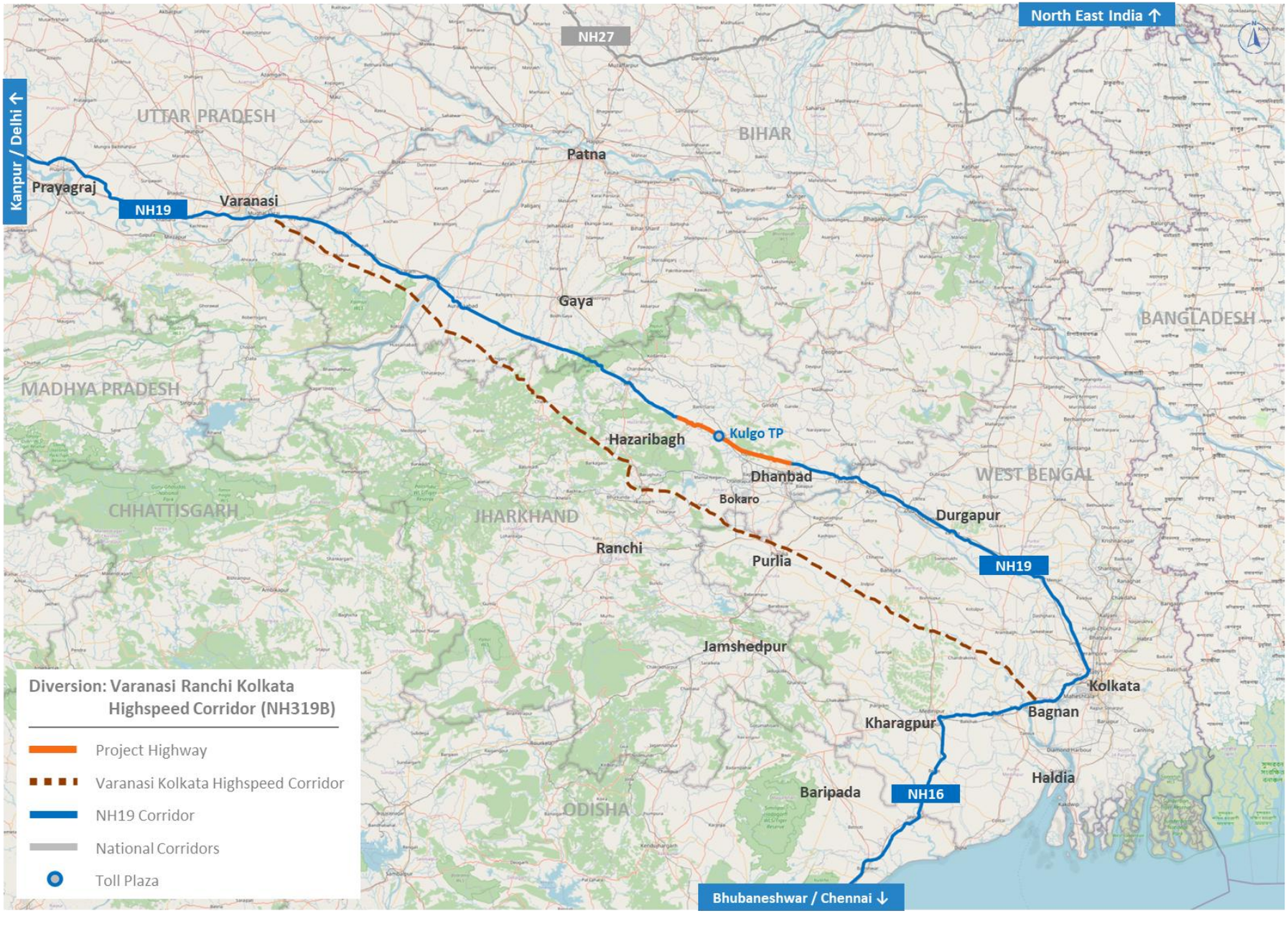
# Varanasi Ranchi Kolkata highspeed corridor (1)

- Varanasi Ranchi Kolkata highspeed corridor (NH319B) will be 6-lane greenfield access-controlled highspeed corridor conceptualized under Bharatmala Pariyojana and now will be part of Vision 2047, connecting Varanasi (Uttar Pradesh) with Kolkata (West Bengal).
- ~700 km highspeed corridor will be developed as National Highway with access-controlled and closed tolling modality.
- This will establish seamless connectivity among states Uttar Pradesh, Bihar, Jharkhand, and West Bengal and expected to reduce current travel time from 12-14 hours to 7-9 hours. This will significantly enhance economic corridor and traffic flow along one of India's historically critical trade routes, parallel to the Grand Trunk Road.
- Present status and expected completion of the proposed development is as follows:
  - **Uttar Pradesh (Nos. of construction package: 1):**
    Package 1 - awarded in 2023, appointed date in November 2024 (10% physical progress)
  - **Bihar (Nos. of construction package: 6):**
    Package 2, 3, 6, 7 - awarded in 2023, appointed date in October 2025
    Package 4 and 5: revision in alignment due to forest objections. Appointed date expected by end of FY27.
  - **Jharkhand (Nos. of construction package: 6):**
    Package 8 to 13 - awarded in 2023, appointed date is expected by end of FY26. In principle approval received from various stakeholders.
  - **West Bengal (Nos. of construction package: yet to be decided):**
    State government proposed a revised alignment requiring a new bridge over the Hooghly River at Bagnan, connecting to Pujali. Centre has accepted the proposal, the final alignment's clearance and land acquisition in West Bengal are still pending, which could potentially extend the overall execution period. DPR in-progress – submitted to NHAI HQ for comments. Appointed date expected by end of FY28.
- The consultant analysed expected diversion for three traffic movements considering expected entry-exit at about distance of 40-50 km and expected completion of sections between Varanasi – Jharkhand/West Bengal border by FY30 and Jharkhand/West Bengal border to Kolkata by Q3 FY33:
  - Traffic movement between Varanasi/west and Bokaro/surrounding region from FY31 onwards
  - Traffic movement between Varanasi/west and Kolkata/Kharagpur/Haldia from Q4 FY33 onwards
  - Traffic movement between Dobhi/north and Hazaribagh/south from Q4 FY33 onwards
- Change in ticket distribution is considered as part of this diversion because long-haul traffic will have significant impact.

# Varanasi Ranchi Kolkata highspeed corridor (2)

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**Varanasi Ranchi Kolkata highspeed corridor alignment and project highway context**




Source: TIC analysis (map not to scale)

# Varanasi Ranchi Kolkata highspeed corridor (3)

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**Diversion due to Varanasi Ranchi Kolkata highspeed corridor**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Varanasi – Jharkhand/West Bengal border** | | | | | | | | | |
| **Negative diversion** | Traffic movement between Varanasi/west and Bokaro/surrounding region | FY31 (50%)<br>FY32 onwards (100%) | Kulgo | (0.94%) | - | - | (1.25%) | (1.67%) | (2.66%) |
| **Jharkhand/West Bengal border to Kolkata** | | | | | | | | | |
| **Negative diversion** | Traffic movement between Varanasi/west and Kolkata/Kharagpur/ Haldia<br><br>Traffic movement between Dobhi/north and Hazaribagh/south | FY33 (20%)<br>FY34 (70%)<br>FY35 onwards (100%) | Kulgo | (11.15%) | - | (15.79%) | (31.26%) | (34.73%) | (22.87%) |

Source: TIC estimate

# Raxual Haldia Economic Corridor (1)

- Raxaul Haldia Economic Corridor is a planned 695 km, 6 lane, access-controlled greenfield highway development that will connect Raxaul on the India-Nepal border in Bihar to Haldia Port in West Bengal.
- Passing through parts of Bihar, Jharkhand, and West Bengal, the expressway is aimed at improving regional connectivity, reducing travel time, and facilitating smoother movement of goods and passengers across eastern India.
- By offering a faster and more efficient link between Nepal and an important maritime hub, it will play a key role in boosting cross-border trade and regional development.
- Development of this expressway will attract traffic between Nepal, Bihar, Jharkhand and southern West Bengal impacting negatively to project highway.

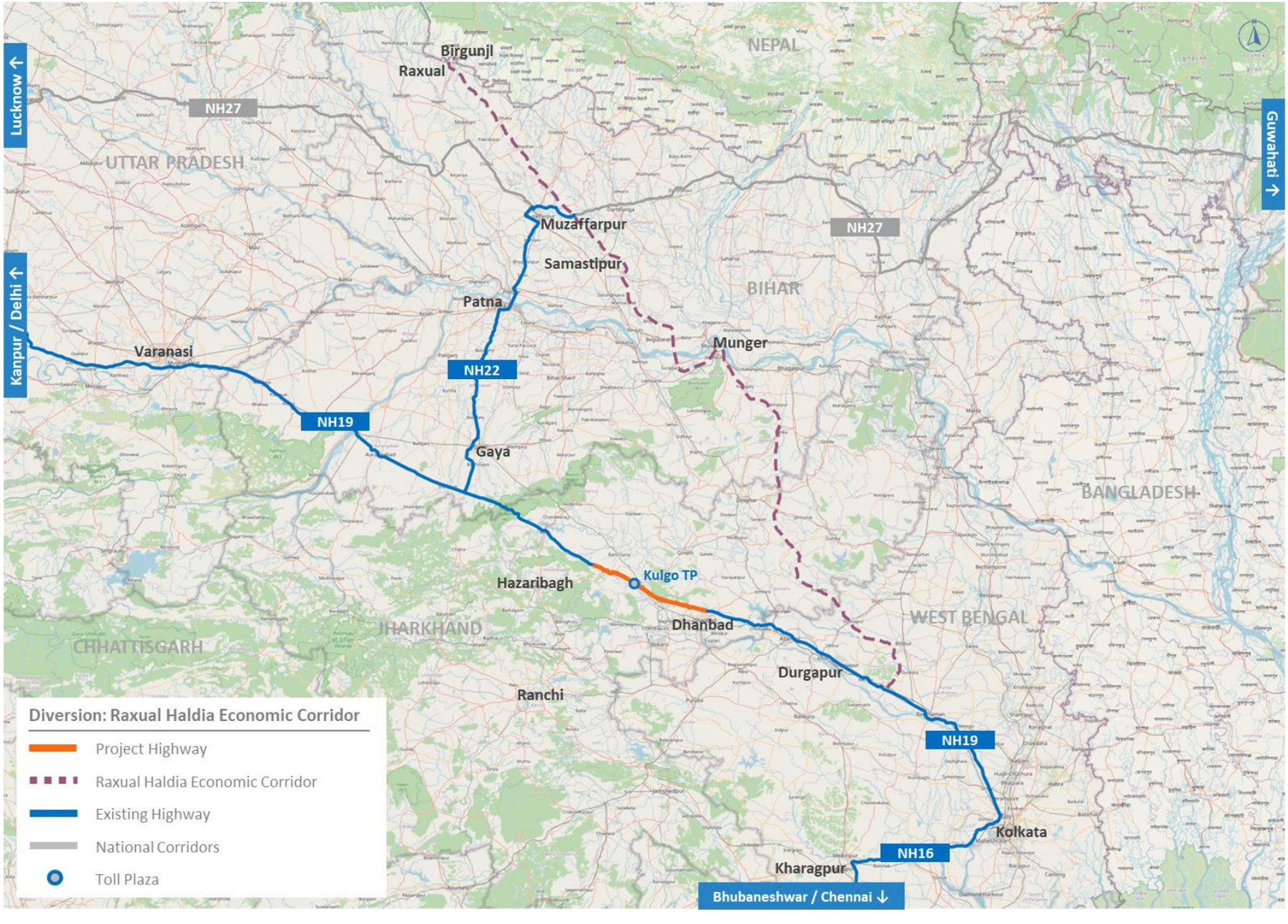
**Diversion due to Raxaul Haldia Economic Corridor**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Muzaffarpur/ north and Kolkata / Kharagpur / Haldia | FY34 (50%) FY35 onwards (100%) | Kulgo | (0.10%) | - | (0.11%) | (0.30%) | (0.35%) | (0.36%) |

Source: TIC estimate

# Raxual Haldia Economic Corridor (2)

**Raxaul Haldia Economic Corridor alignment and project highway context**




Source: TIC analysis (map not to scale)

# Eastern Dedicated Freight Corridor (1)

- Sonnagar - Dankuni section is the eastern extension of the Eastern Dedicated Freight Corridor (EDFC), designed to connect the existing freight corridor from Sonnagar in Bihar to Dankuni near Kolkata in West Bengal. Spanning approximately 538 kilometers, this stretch will establish a vital link between northern and eastern India, facilitating seamless movement of goods to and from eastern ports such as Haldia.
- Project is being implemented by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL), with the objective of enhancing freight capacity, reducing congestion on existing railway lines, and improving transport efficiency for industries located in Bihar, Jharkhand, and West Bengal.
- This section was earlier planned to be executed under the Public-Private Partnership (PPP) model (but now likely through EPC), with the Sonnagar - Andal to be developed in the first phase, followed by the Andal - Dankuni stretch. Once operational, it will enable faster and more cost-effective transportation of bulk commodities such as coal, steel, cement, fertilizers, and food grains, supporting the industrial and port connectivity in eastern India.
- Sonnagar - Dankuni link is expected to significantly decongest the existing Howrah - Delhi main line, improve supply chain efficiency, and contribute to the government's goal of developing a modern, high-capacity freight network across the country.

**Diversion due to Eastern Dedicated Freight Corridor**

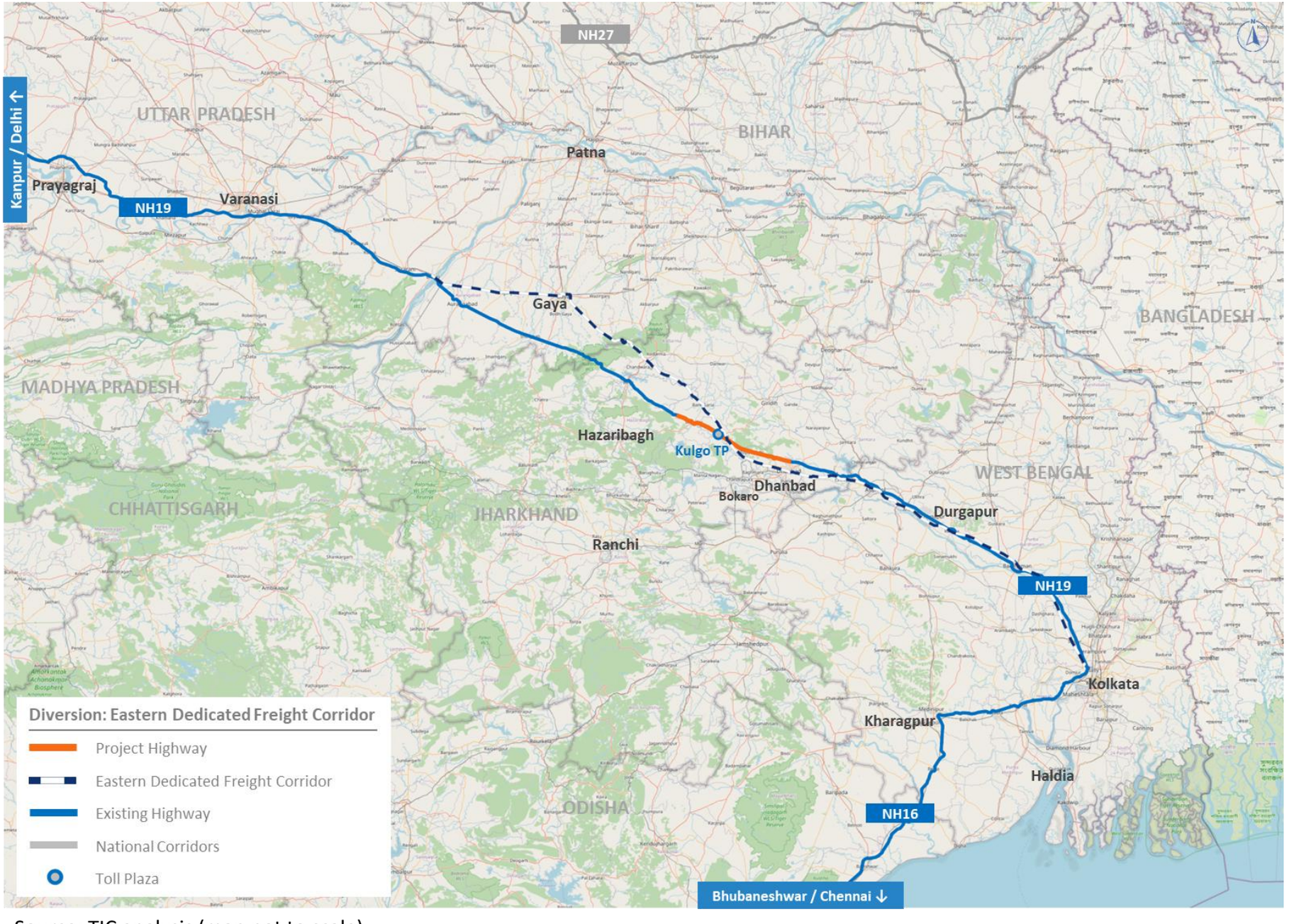
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement along the alignment of DFC with trip length more than 700 km | FY28 (30%)<br>FY29 (70%)<br>FY30 onwards (100%) | Kulgo | - | - | - | (3.57%) | (4.37%) | (5.86%) |

Source: TIC estimate

# Eastern Dedicated Freight Corridor (2)

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**Eastern Dedicated Freight Corridor and project highway context**




Source: TIC analysis (map not to scale)

# Kandla Gorakhpur LPG Pipeline (1)

- Kandla - Gorakhpur LPG Pipeline is a 2,805 km long project world's longest LPG pipeline being developed by IHB Limited, a joint venture of Indian Oil, BPCL, and HPCL. Authorized by the Petroleum & Natural Gas Regulatory Board (PNGRB) under the Common Carrier category, the pipeline traverses Gujarat, Madhya Pradesh, and Uttar Pradesh.
- The pipeline will transport LPG sourced from import terminals at Kandla, Dahej, and Pipavav, and refineries at Koyali and Bina. It will directly supply 22 LPG bottling plants 3 in Gujarat, 6 in Madhya Pradesh, and 13 in Uttar Pradesh—ensuring reliable and efficient LPG distribution across western and northern India.
- Development of this pipeline is expected to impact LPG transportation from Haldia Port (via Durgapur Bottling Plant to Purvanchal region, Bihar, Jharkhand), as Kandla serves as a major hub for handling petroleum, oil, and lubricants (POL) and will cater to a significant share of LPG movement through the new network.

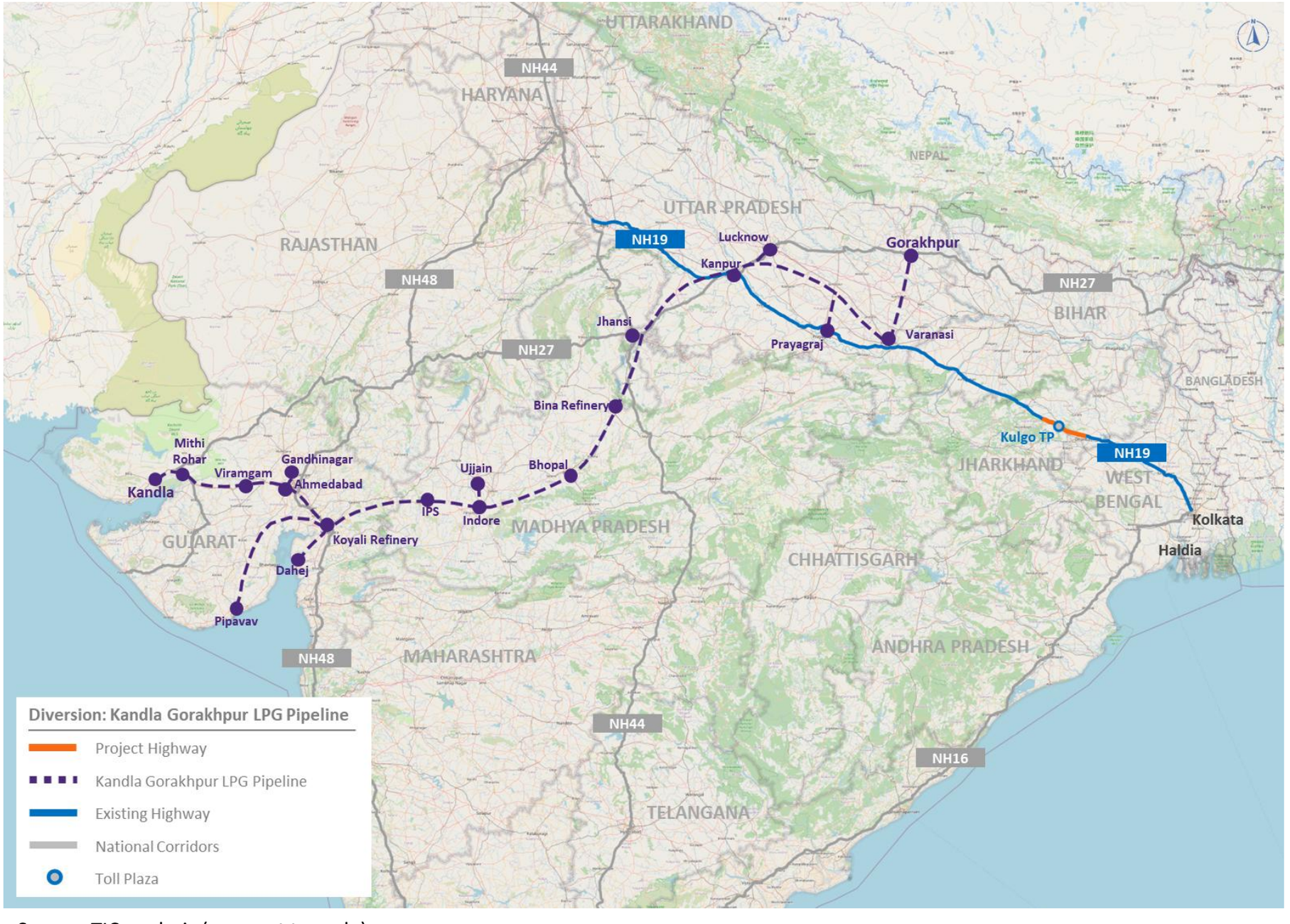
**Diversion due to Kandla Gorakhpur LPG Pipeline**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement from Haldia | FY27 (70%)<br>FY28 onwards (100%) | Kulgo | - | - | - | (0.06%) | (0.35%) | (3.86%) |

Source: TIC estimate

# Kandla Gorakhpur LPG Pipeline (2)

**Kandla Gorakhpur LPG Pipeline and project highway context**




Source: TIC analysis (map not to scale)

# Varanasi Howrah Vande Bharat Express (1)

Varanasi - Howrah Vande Bharat Express is a semi-high-speed train covering about 760 km between Varanasi and Howrah in around 7.5 to 8 hours, offering faster and more comfortable travel. It enhances connectivity across major cities like Patna, Gaya, and Asansol, boosting regional mobility and tourism in eastern India.

**Diversion due to Varanasi - Howrah Vande Bharat Express Train**

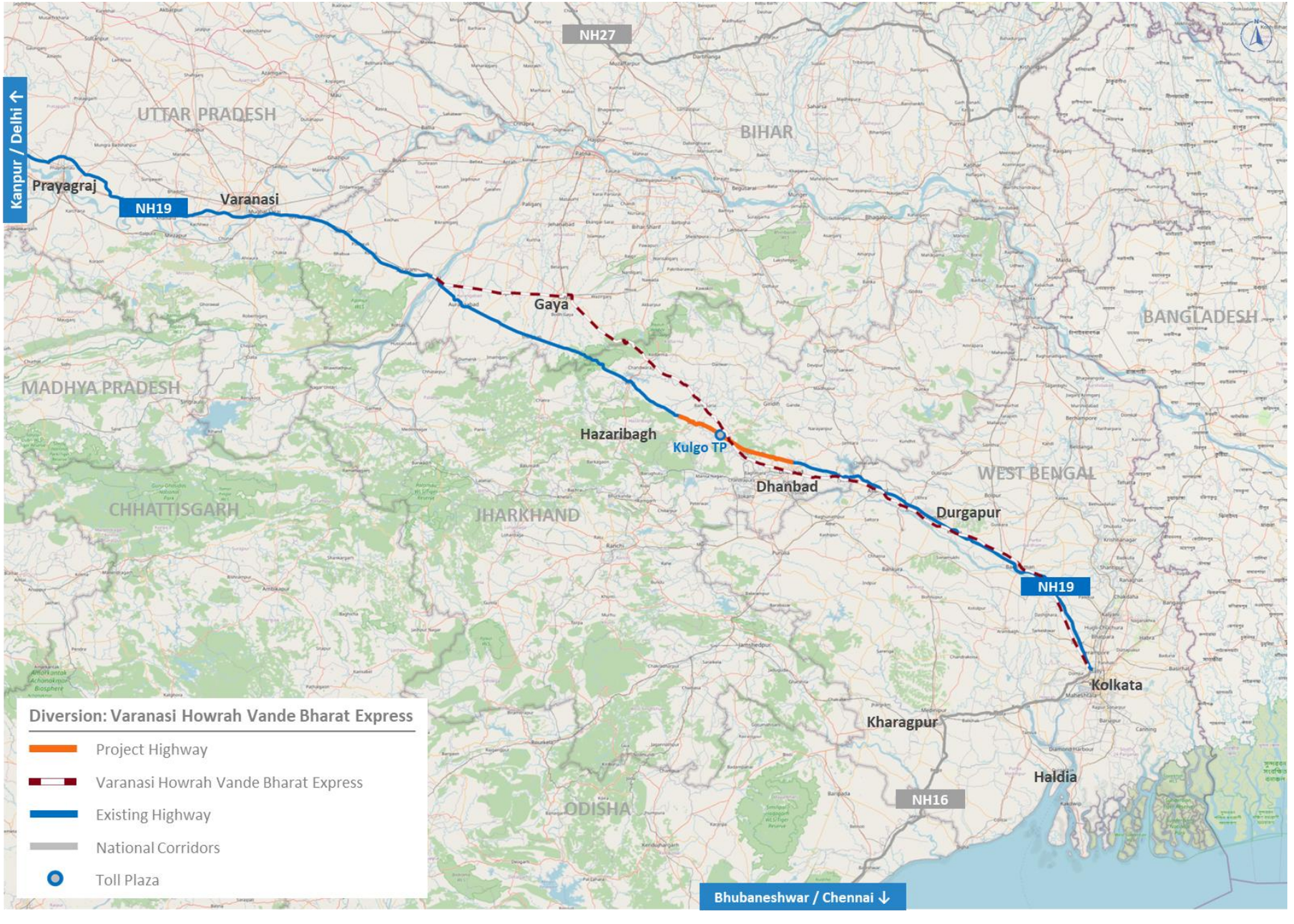
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Varanasi and Kolkata | FY27 onwards (100%) | Kulgo | (0.16%) | - | - | - | - | - |

Source: TIC estimate

# Varanasi Howrah Vande Bharat Express (2)

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**Varanasi Howrah Vande Bharat Express Train route and project highway context**




Source: TIC analysis (map not to scale)

# National Waterway 1 (NW1)

National Waterway 1 (NW1), also known as the Allahabad–Haldia Inland Waterway, is one of India's longest and most significant inland navigation corridors, spanning 1,620 km along the Ganga River. It connects Haldia in West Bengal to Prayagraj (Allahabad) in Uttar Pradesh, passing through the states of West Bengal, Jharkhand, Bihar, and Uttar Pradesh.

**Diversion due to National Waterway 1**

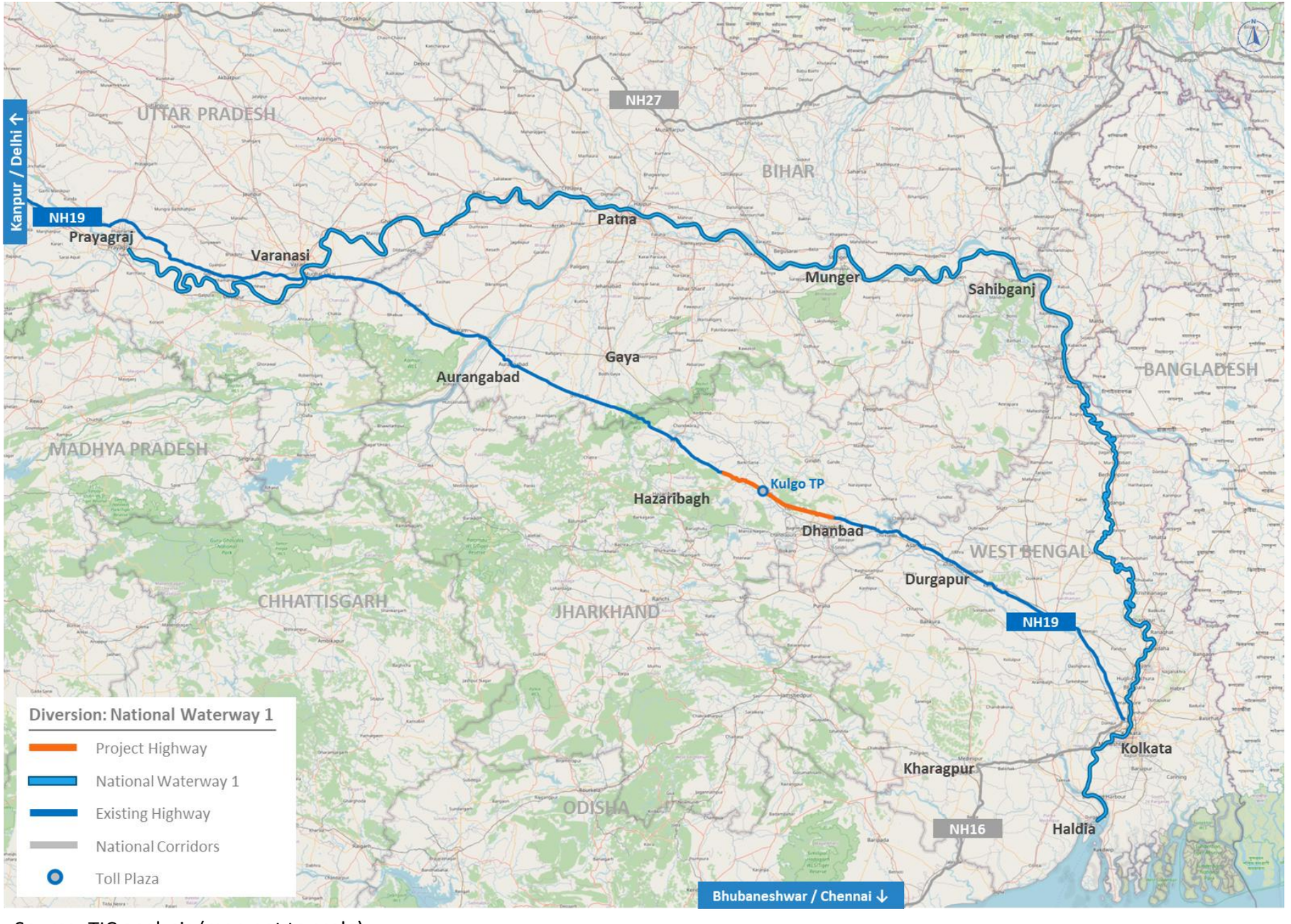
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Varanasi and Kolkata | FY26 onwards (100%) | Kulgo | - | - | - | (0.73%) | (0.62%) | (0.95%) |

Source: TIC estimate

# National Waterway 1 (NW1)

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**National Waterway 1 and project highway context**




Source: TIC analysis (map not to scale)

# Chapter 7: Final traffic and revenue forecast

- Traffic growth forecast
- Traffic and revenue forecast
- Scenario development

Following pre-diversion traffic forecast and diversion analysis, this chapter presents final traffic and revenue forecast for various scenarios: most likely with and without overloading, pessimistic and optimistic.

# Transactional Support Agreement and FY27 revenue estimate

- The project highway is proposed to be included in NHAI's Public InvIT.
- A Transactional Support Agreement will be executed between NHAI and the Public InvIT for the management of toll plaza operations for FY27.
- Tolling operations during FY27 will be undertaken by NHAI under the prevailing short-term contract modality.
- Accordingly, FY27 revenue has been estimated based on historical bidding trends for tolling contracts and is assumed to be 5%–10% lower than the estimated actual revenue.
- Consistent with this arrangement, manpower-related expenses for tolling operations have been excluded from O&M costs as confirmed by the client.

# Traffic and revenue forecast: Kulgo TP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 8.7% | 7.4% | 6.8% | 6.7% | 6.2% | 7.2% | 6.5% | 5.9% | 6.4% |
| Mini LCV | 4.9% | 4.5% | 5.0% | 4.5% | 4.3% | 4.6% | 4.1% | 3.8% | 4.1% |
| LCV | 9.6% | 6.6% | 5.1% | 4.0% | 3.7% | 5.8% | 3.9% | 3.5% | 4.0% |
| Bus | 2.7% | 2.7% | 2.3% | 1.3% | 2.5% | 2.3% | 2.4% | 2.0% | 2.2% |
| 2A Truck | 6.1% | 6.2% | 6.2% | 6.1% | 5.6% | 6.0% | 5.5% | 5.0% | 5.4% |
| 3A Truck | 1.1% | 1.1% | 1.1% | 1.2% | 0.9% | 1.1% | 0.7% | 0.7% | 0.8% |
| MAV | 5.8% | 6.0% | 6.3% | 6.3% | 5.6% | 6.0% | 5.7% | 4.9% | 5.5% |
| **AADT** | **6.6%** | **6.1%** | **5.9%** | **5.8%** | **5.3%** | **5.9%** | **5.5%** | **5.0%** | **5.4%** |
| **PCU** | **5.8%** | **5.7%** | **5.8%** | **5.8%** | **5.2%** | **5.7%** | **5.3%** | **4.8%** | **5.2%** |

**Post-diversion growth rate**

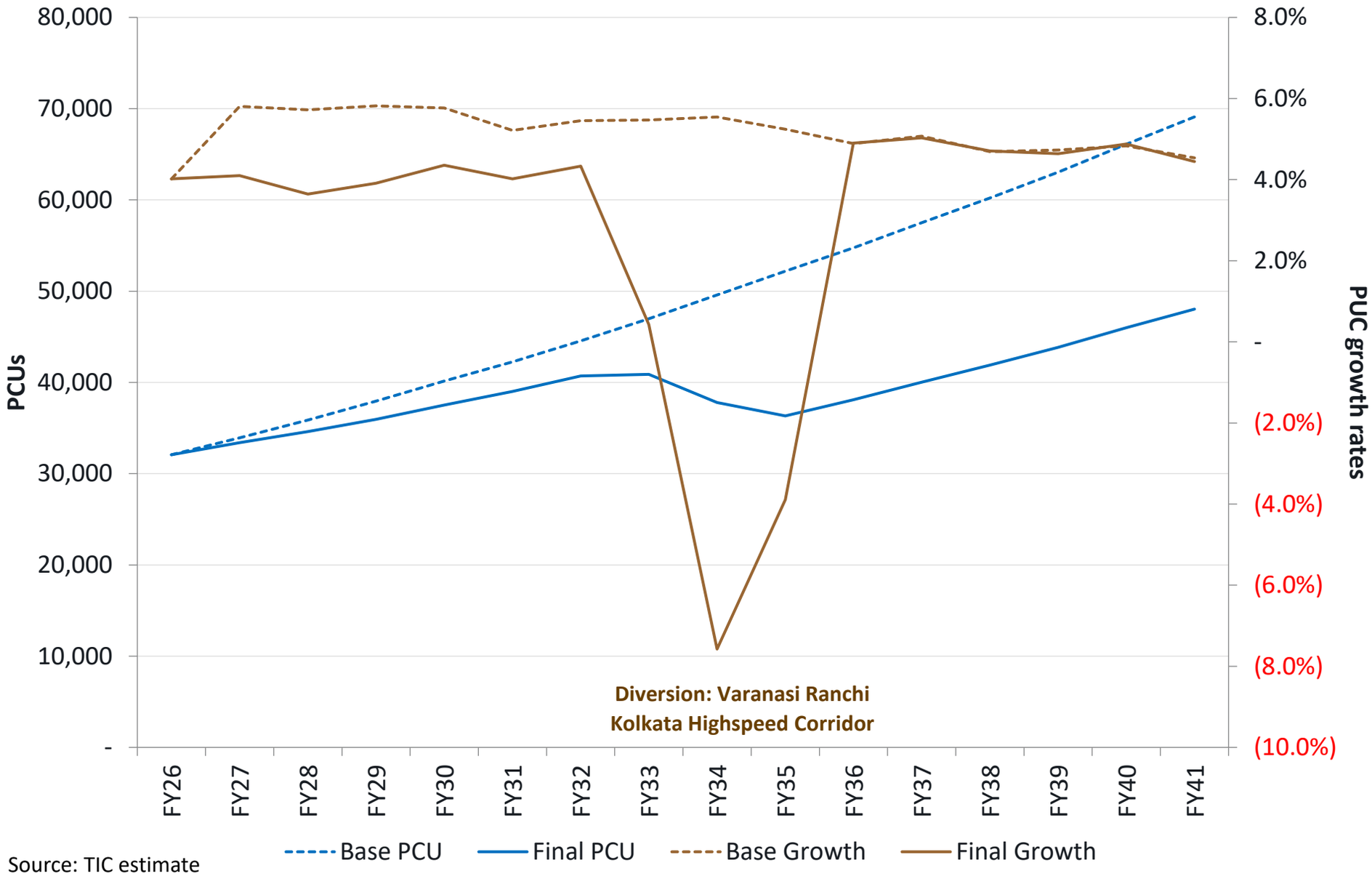
| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 8.6% | 7.4% | 6.8% | 6.7% | 5.7% | 7.0% | 3.9% | 5.9% | 5.4% |
| Mini LCV | 4.9% | 4.5% | 5.0% | 4.5% | 4.3% | 4.6% | 4.1% | 3.8% | 4.1% |
| LCV | 9.6% | 6.6% | 5.1% | 4.0% | 3.7% | 5.8% | 0.3% | 3.5% | 2.7% |
| Bus | 2.7% | 2.7% | 2.3% | 1.3% | 2.5% | 2.3% | 2.4% | 2.0% | 2.2% |
| 2A Truck | 6.1% | 5.0% | 4.6% | 4.9% | 4.9% | 5.1% | (2.9%) | 4.9% | 2.0% |
| 3A Truck | 0.9% | (0.3%) | (0.8%) | (0.2%) | (0.1%) | (0.1%) | (8.5%) | 0.6% | (3.0%) |
| MAV | 2.9% | 2.8% | 3.6% | 4.3% | 3.9% | 3.5% | (1.0%) | 4.8% | 2.4% |
| **AADT** | **5.5%** | **4.8%** | **4.8%** | **5.0%** | **4.5%** | **4.9%** | **1.1%** | **5.0%** | **3.5%** |
| **PCU** | **4.1%** | **3.6%** | **3.9%** | **4.4%** | **4.0%** | **4.0%** | **(0.5%)** | **4.7%** | **2.6%** |

Source: TIC estimate

# Traffic and revenue forecast: Kulgo TP (2)

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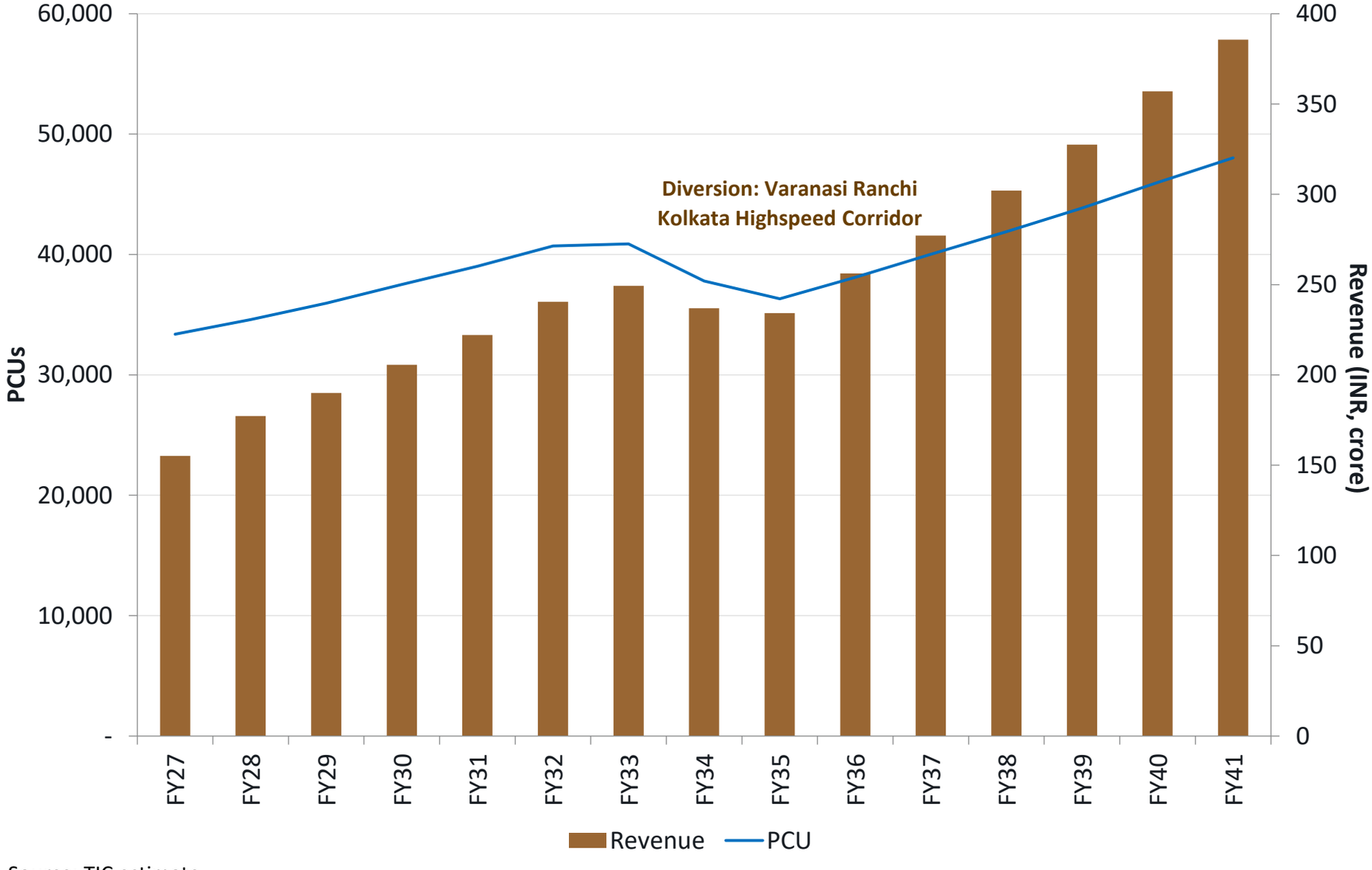
**Pre- and Post-diversion growth rate snapshot**




Source: TIC estimate

# Traffic and revenue forecast: Kulgo TP (3)

**Revenue and PCU snapshot**




Source: TIC estimate

# Scenario development definition

**Most Likely Scenario without overloading**

- No overloading penalty/fees is considered at present based on understanding from site visit. In context of present ground situation and possibility of diversion in case of collecting overloading fees, the consultant did not consider overloading fee collection in most likely scenario.
- The consultant has considered no reduction in toll rates during capacity augmentation implementation i.e., 4 to 6 lane construction of Gorhar to Atka Village (chainages km 320.810 to km 326.000). DPR for 6 laning is in-progress and completion of 6 lane construction is expected by end of FY28.
- Concession Agreement mentions that if the concessionaire incurs any financial loss due to modification in toll rates during capacity augmentation which is initiated post-handover of the project highway to the concessionaire, the authority (NHAI) shall pay the difference amount to the concessionaire on a quarterly basis considering no toll reduction during capacity augmentation and traffic census as per Article 19.

**Most Likely Scenario with overloading**

The consultant considered following changes from the most likely (with overloading) case to determine most likely (with overloading) scenario:

- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey.

**Optimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine optimistic scenario:

- GDP: increase (addition) of 0.25% from FY27 to FY35
- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey
- Delayed diversion of Varanasi Ranchi Kolkata Highspeed Corridor by a year

**Pessimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine pessimistic scenario:

- GDP: decrease (subtraction) of 0.25% from FY27 to FY35
- No overloading penalty/fees is being levied

Detailed traffic and revenue forecast for “Most likely scenario without overloading” is exhibited in Appendix B.

# Scenario summary: Kulgo TP (1)

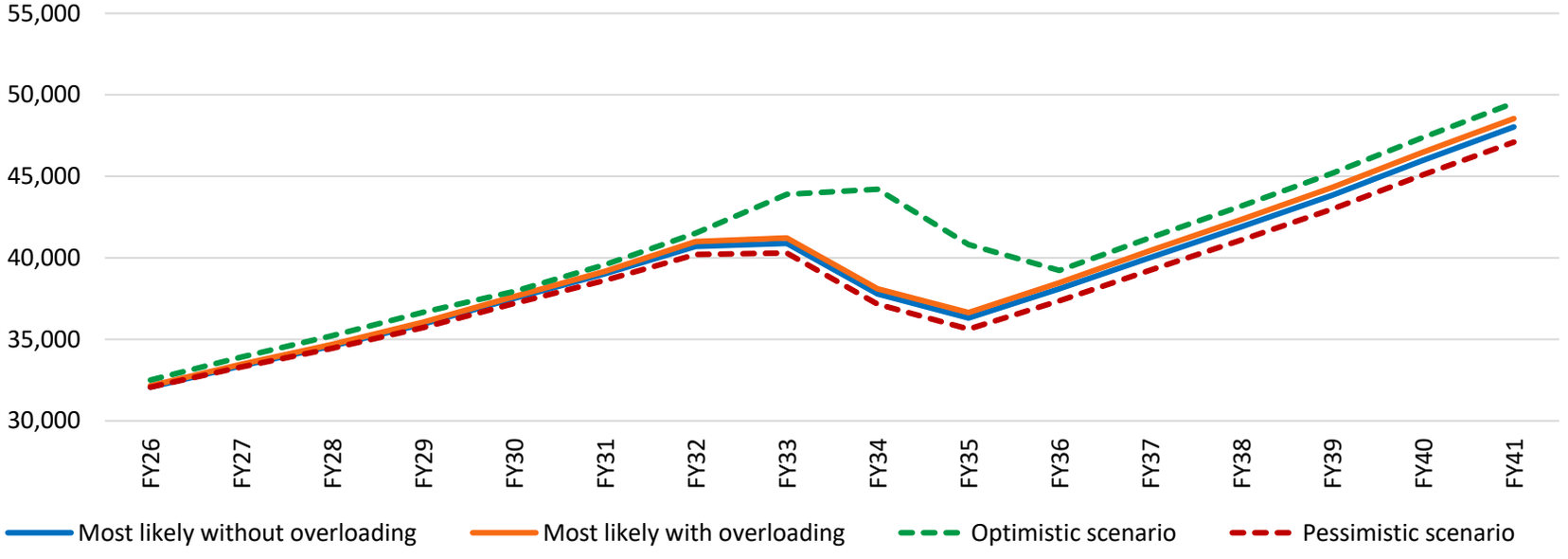
| | Most likely without overloading | | | Most likely with overloading | | | Optimistic scenario | | | Pessimistic scenario | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FY** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** |
| **FY27** | 33,383 | 4.1% | 155 | 33,474 | 4.1% | 155 | 33,909 | 4.3% | 155 | 33,313 | 3.9% | 155 |
| **FY28** | 34,599 | 3.6% | 177 | 34,693 | 3.6% | 209 | 35,217 | 3.9% | 181 | 34,456 | 3.4% | 177 |
| **FY29** | 35,951 | 3.9% | 190 | 36,049 | 3.9% | 224 | 36,668 | 4.1% | 194 | 35,729 | 3.7% | 189 |
| **FY30** | 37,516 | 4.4% | 206 | 37,618 | 4.4% | 243 | 37,930 | 3.4% | 245 | 37,207 | 4.1% | 204 |
| **FY31** | 39,023 | 4.0% | 222 | 39,172 | 4.1% | 260 | 39,578 | 4.3% | 262 | 38,622 | 3.8% | 220 |
| **FY32** | 40,714 | 4.3% | 240 | 41,003 | 4.7% | 269 | 41,518 | 4.9% | 272 | 40,207 | 4.1% | 237 |
| **FY33** | 40,889 | 0.4% | 249 | 41,216 | 0.5% | 276 | 43,889 | 5.7% | 293 | 40,291 | 0.2% | 246 |
| **FY34** | 37,792 | (7.6%) | 237 | 38,111 | (7.5%) | 260 | 44,216 | 0.7% | 302 | 37,154 | (7.8%) | 233 |
| **FY35** | 36,322 | (3.9%) | 234 | 36,647 | (3.8%) | 254 | 40,809 | (7.7%) | 283 | 35,631 | (4.1%) | 230 |
| **FY36** | 38,103 | 4.9% | 256 | 38,479 | 5.0% | 272 | 39,227 | (3.9%) | 277 | 37,375 | 4.9% | 251 |
| **FY37** | 40,020 | 5.0% | 277 | 40,450 | 5.1% | 287 | 41,239 | 5.1% | 293 | 39,252 | 5.0% | 272 |
| **FY38** | 41,904 | 4.7% | 302 | 42,354 | 4.7% | 313 | 43,183 | 4.7% | 319 | 41,098 | 4.7% | 296 |
| **FY39** | 43,847 | 4.6% | 328 | 44,317 | 4.6% | 339 | 45,187 | 4.6% | 346 | 43,002 | 4.6% | 321 |
| **FY40** | 45,987 | 4.9% | 357 | 46,478 | 4.9% | 370 | 47,393 | 4.9% | 377 | 45,098 | 4.9% | 350 |
| **FY41** | 48,033 | 4.4% | 386 | 48,544 | 4.4% | 400 | 49,503 | 4.5% | 407 | 47,101 | 4.4% | 378 |
| **Total (FY27 - FY41)** | | | **3,817** | | | **4,132** | | | **4,207** | | | **3,760** |

Source: TIC estimate

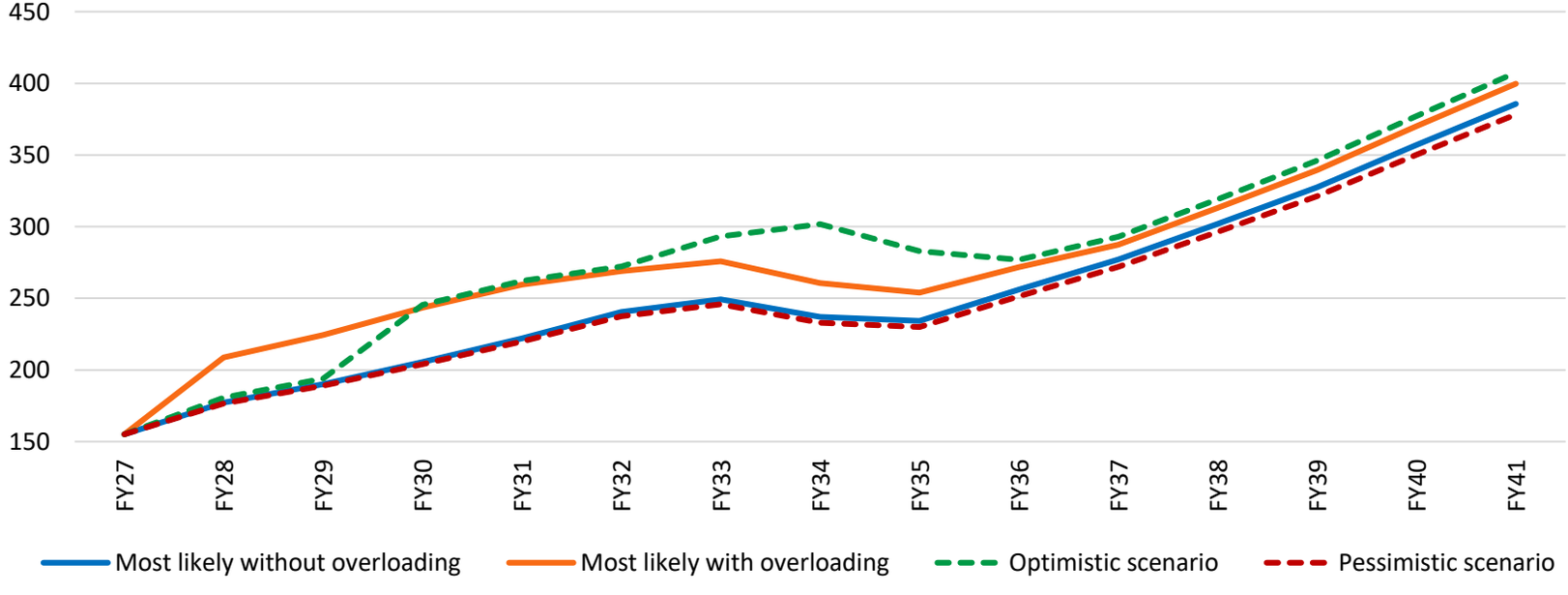
# Scenario summary: Kulgo TP (2)

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**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# List of Appendices

**Appendix A:** Vehicle category-wise visual representation of origin-destination zones and top origin-destination pairs

**Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

## Appendix A:

- Vehicle category-wise visual representation of origin-destination zones
- Vehicle category-wise top origin-destination pairs

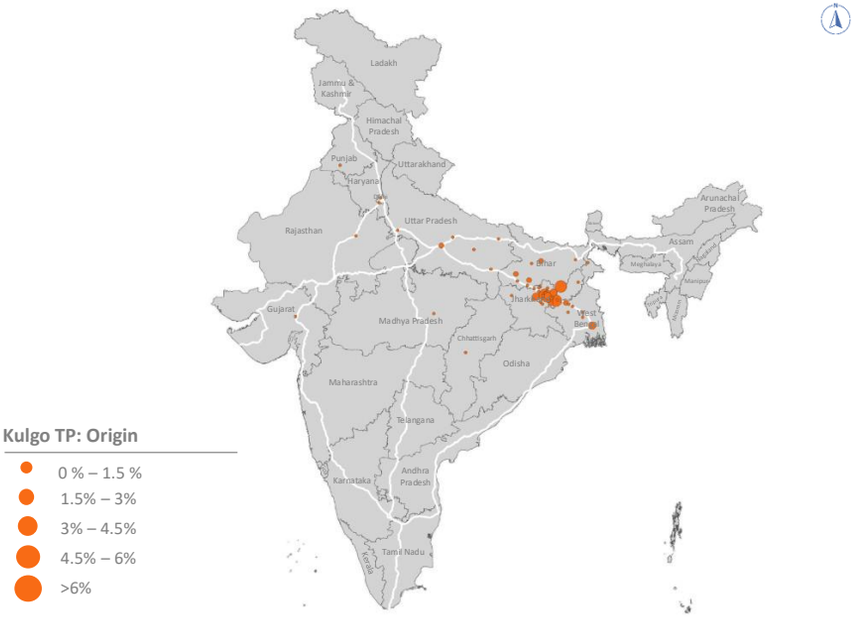
# Vehicle category-wise visual representation of OD (1)

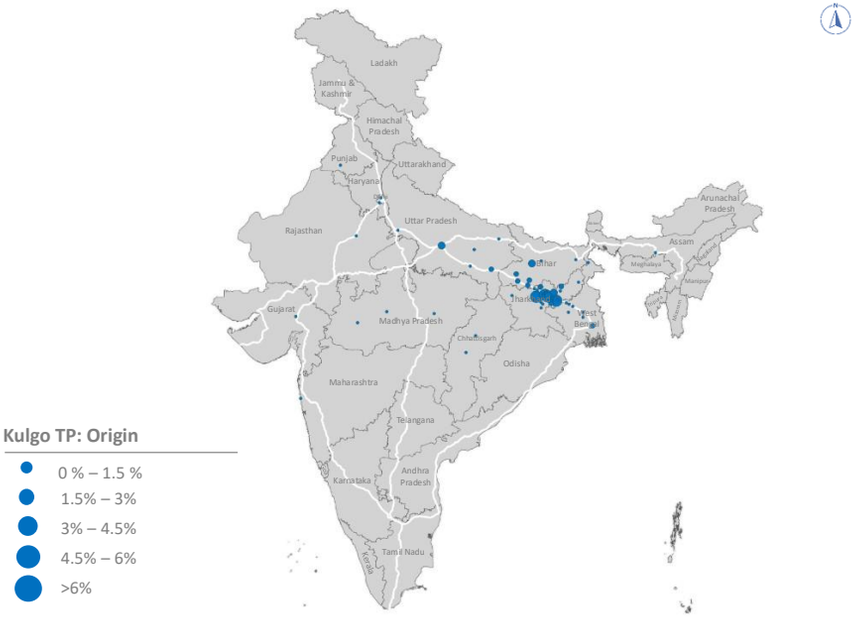
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## Origin

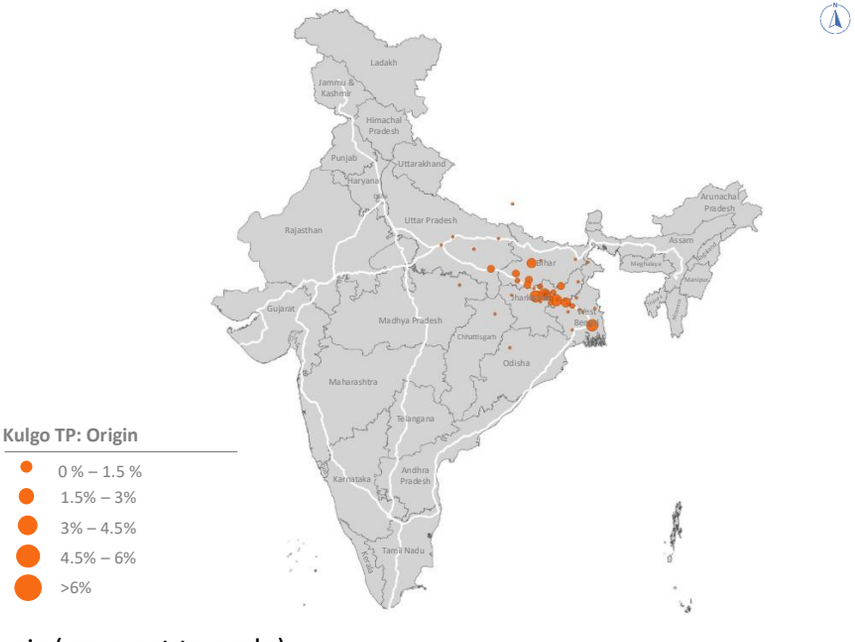
## Destination

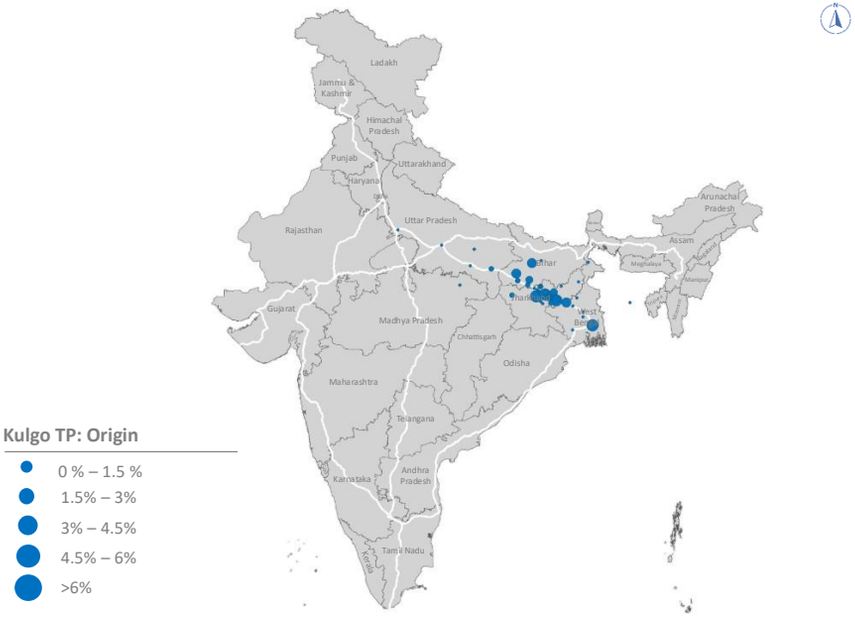
### CJV




### Mini LCV




Source: TIC analysis (map not to scale)

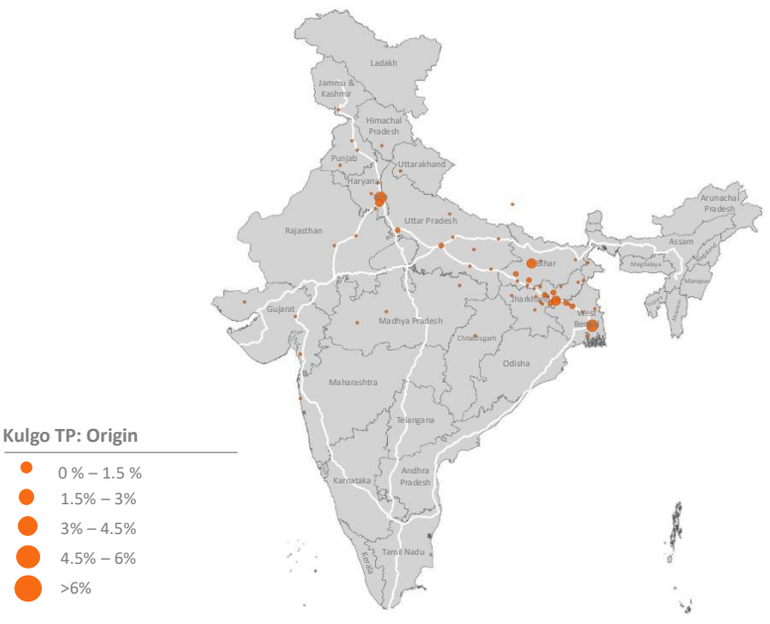
# Vehicle category-wise visual representation of OD (2)

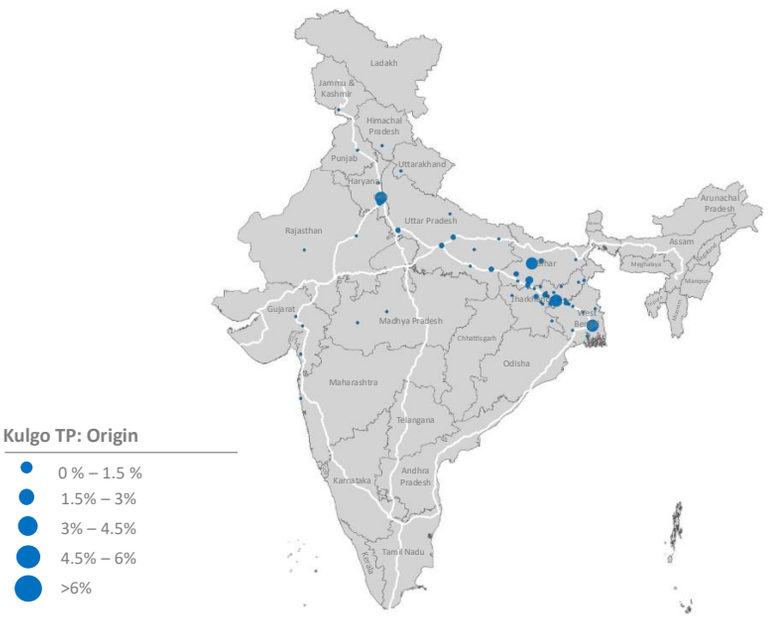
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## Origin

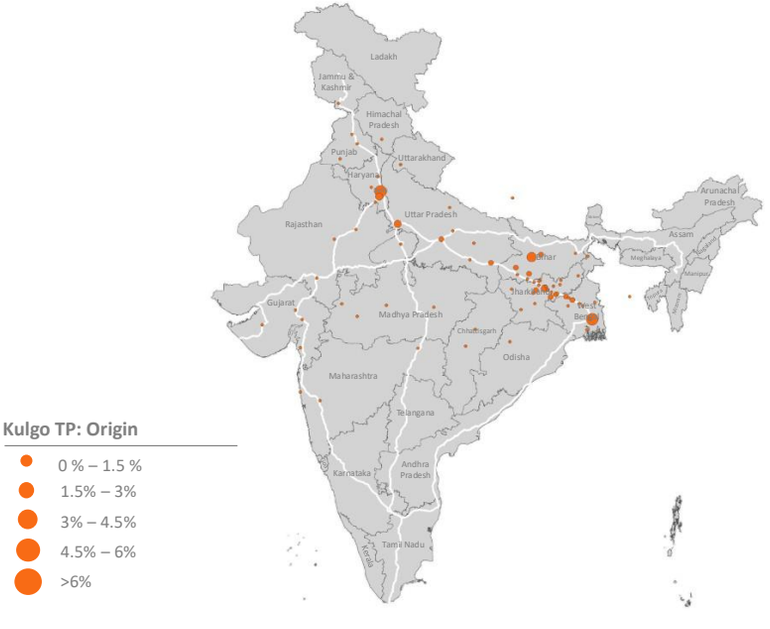
## Destination

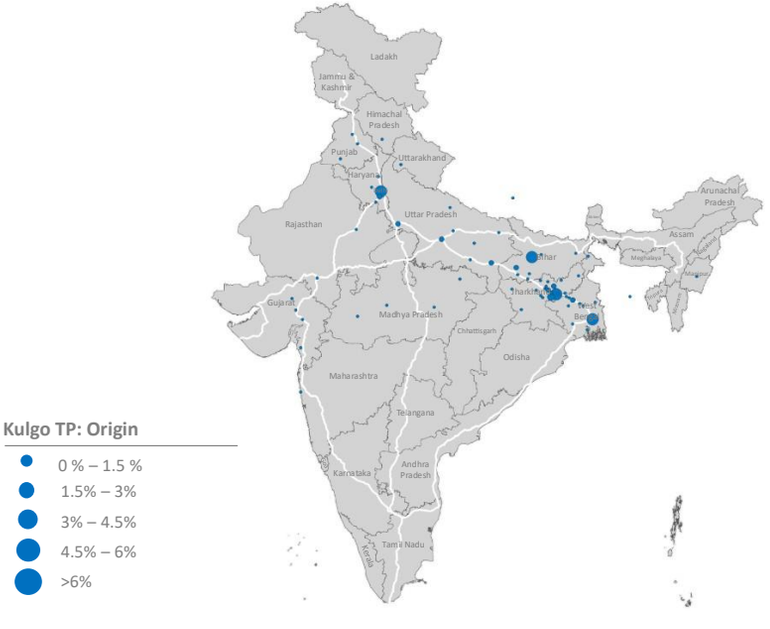
**LCV**




**2A**

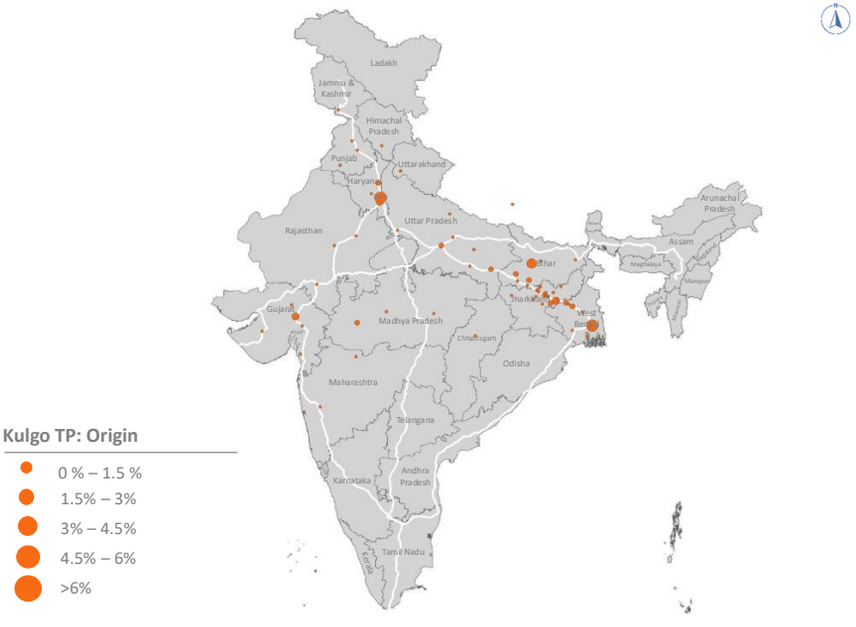
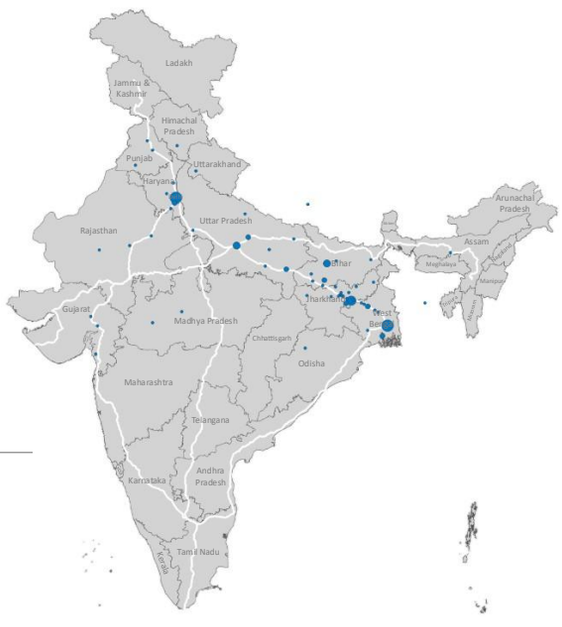
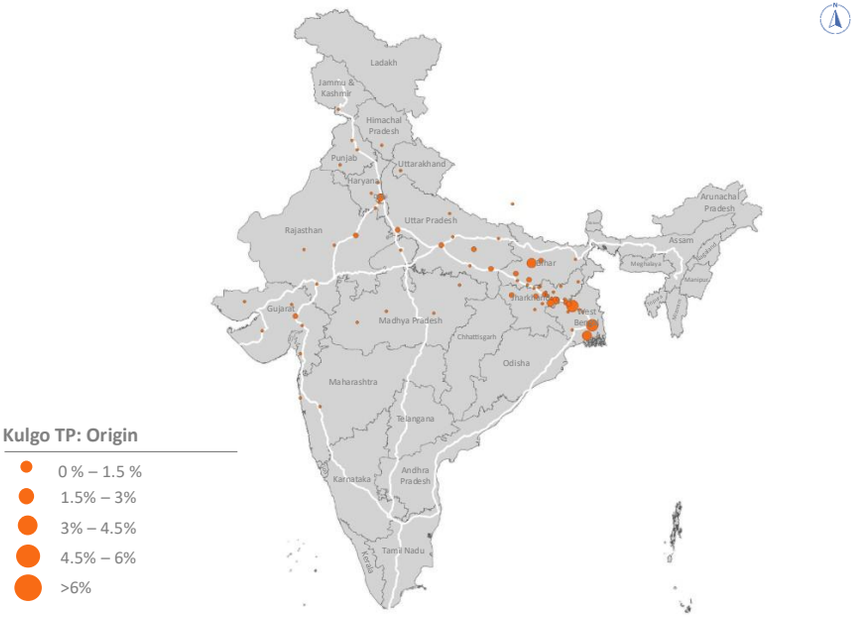
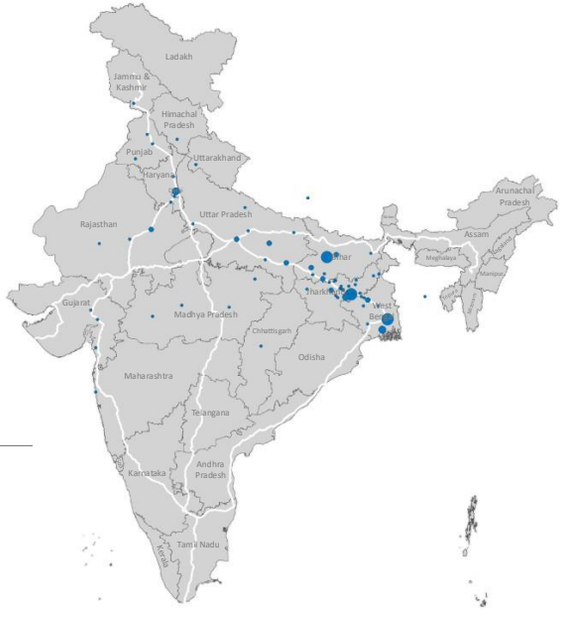



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (3)

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| | Origin | Destination |
|---|---|---|
| 3A |  |  |
| MAV |  |  |



Source: TIC analysis (map not to scale)

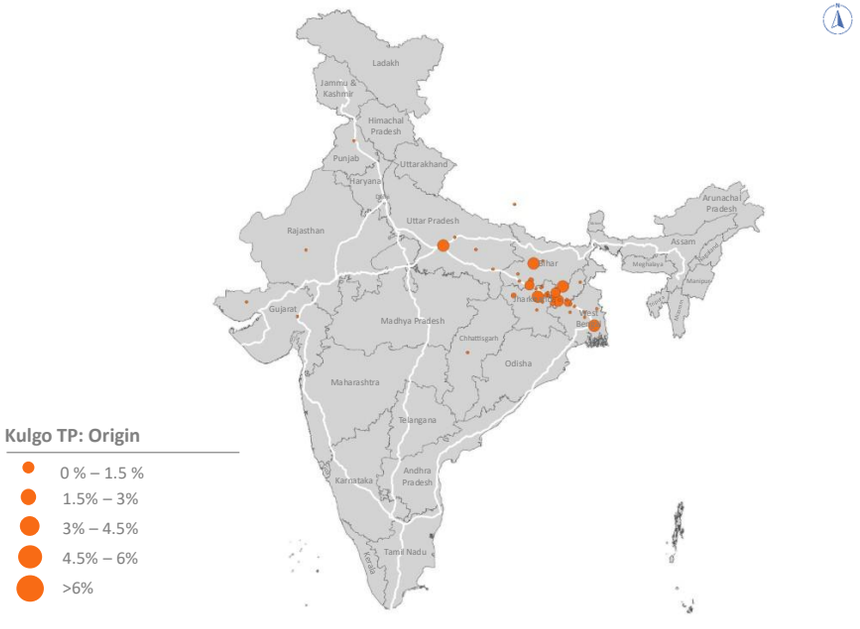
# Vehicle category-wise visual representation of OD (4)

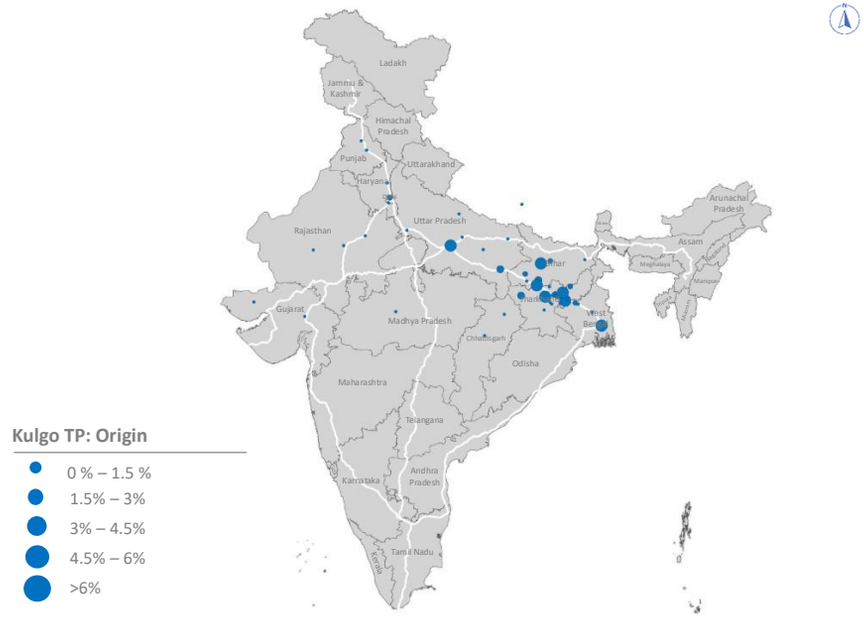
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**Origin**

**Destination**

**Bus**




Source: TIC analysis (map not to scale)

# Vehicle category-wise top OD pairs (1)

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**CJV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Dumri | Bagodar | 3% |
| 2 | Dhanbad | Hazaribagh | 3% |
| 3 | Deoghar | Hazaribagh | 3% |
| 4 | Bagodar | Dhanbad | 3% |
| 5 | Bagodar | Dumri | 2% |
| 6 | Dhanbad | Bagodar | 2% |
| 7 | Hazaribagh | Dhanbad | 2% |
| 8 | Deoghar | Kanpur | 2% |
| 9 | Isri | Bagodar | 1% |
| 10 | Beko | Dumri | 1% |

**Mini LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Bagodar | Dhanbad | 4% |
| 2 | Dhanbad | Bagodar | 3% |
| 3 | Patna | Kolkata | 3% |
| 4 | Hazaribagh | Dhanbad | 3% |
| 5 | Kolkata | Patna | 2% |
| 6 | Baradih | Dhanbad | 2% |
| 7 | Dhanbad | Hazaribagh | 2% |
| 8 | Deoghar | Hazaribagh | 2% |
| 9 | Asansol | Chatra | 2% |
| 10 | Bagodar | Dumri | 1% |

**Bus**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Kolkata | Patna | 5% |
| 2 | Hazaribagh | Dhanbad | 5% |
| 3 | Patna | Kolkata | 4% |
| 4 | Kanpur | Giridih | 3% |
| 5 | Giridih | Kanpur | 3% |
| 6 | Kolkata | Gaya | 2% |
| 7 | Dhanbad | Hazaribagh | 2% |
| 8 | Deoghar | Kanpur | 2% |
| 9 | Hazaribagh | Giridih | 2% |
| 10 | Kolkata | Nawada | 2% |

**LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Kolkata | Patna | 8% |
| 2 | Kolkata | Delhi | 7% |
| 3 | Delhi | Kolkata | 5% |
| 4 | Patna | Kolkata | 4% |
| 5 | Kolkata | Varanasi | 2% |
| 6 | Kolkata | Kanpur | 1% |
| 7 | Kolkata | Lucknow | 1% |
| 8 | Kanpur | Kolkata | 1% |
| 9 | Gurgaon | Kolkata | 1% |
| 10 | Bagodar | Dhanbad | 1% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2)

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**2A Truck**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Kolkata | Patna | 7% |
| 2 | Delhi | Kolkata | 6% |
| 3 | Kolkata | Delhi | 6% |
| 4 | Patna | Kolkata | 4% |
| 5 | Kanpur | Kolkata | 1% |
| 6 | Kolkata | Varanasi | 1% |
| 7 | Kolkata | Kanpur | 1% |
| 8 | Gaya | Kolkata | 1% |
| 9 | Varanasi | Kolkata | 1% |
| 10 | Ahmedabad | Kolkata | 1% |

**3A Truck**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Delhi | Kolkata | 9% |
| 2 | Kolkata | Delhi | 6% |
| 3 | Ahmedabad | Kolkata | 4% |
| 4 | Patna | Kolkata | 3% |
| 5 | Kolkata | Patna | 3% |
| 6 | Kolkata | Kanpur | 2% |
| 7 | Indore | Kolkata | 2% |
| 8 | Kolkata | Lucknow | 1% |
| 9 | Kolkata | Varanasi | 1% |
| 10 | Kolkata | Ahmedabad | 1% |

**MAV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Delhi | Kolkata | 3% |
| 2 | Patna | Kolkata | 3% |
| 3 | Kolkata | Patna | 2% |
| 4 | Kolkata | Delhi | 2% |
| 5 | Ahmedabad | Kolkata | 1% |
| 6 | Varanasi | Kolkata | 1% |
| 7 | Kolkata | Jaipur | 1% |
| 8 | Haldia | Patna | 1% |
| 9 | Kanpur | Kolkata | 1% |
| 10 | Kolkata | Varanasi | 1% |

Source: TIC analysis

# **Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

# Kulgo TP (1): Traffic forecast (AADT)

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 4,617 | 909 | 391 | 342 | 1,228 | 876 | 4,138 | **12,500** | **32,069** |
| **FY27** | 5,012 | 954 | 428 | 351 | 1,303 | 884 | 4,258 | **13,190** | **33,383** |
| **FY28** | 5,384 | 997 | 457 | 361 | 1,368 | 881 | 4,379 | **13,826** | **34,599** |
| **FY29** | 5,750 | 1,047 | 480 | 369 | 1,431 | 874 | 4,536 | **14,487** | **35,951** |
| **FY30** | 6,136 | 1,093 | 499 | 374 | 1,501 | 873 | 4,732 | **15,209** | **37,516** |
| **FY31** | 6,486 | 1,140 | 518 | 384 | 1,574 | 872 | 4,918 | **15,892** | **39,023** |
| **FY32** | 6,950 | 1,187 | 537 | 393 | 1,651 | 871 | 5,117 | **16,706** | **40,714** |
| **FY33** | 7,209 | 1,235 | 539 | 404 | 1,627 | 812 | 5,136 | **16,961** | **40,889** |
| **FY34** | 7,267 | 1,290 | 513 | 414 | 1,411 | 652 | 4,674 | **16,221** | **37,792** |
| **FY35** | 7,421 | 1,342 | 503 | 424 | 1,293 | 555 | 4,442 | **15,980** | **36,322** |
| **FY36** | 7,849 | 1,393 | 527 | 432 | 1,360 | 559 | 4,670 | **16,791** | **38,103** |
| **FY37** | 8,409 | 1,451 | 545 | 437 | 1,429 | 562 | 4,902 | **17,734** | **40,020** |
| **FY38** | 8,879 | 1,505 | 563 | 447 | 1,501 | 566 | 5,141 | **18,602** | **41,904** |
| **FY39** | 9,365 | 1,559 | 586 | 456 | 1,573 | 569 | 5,388 | **19,497** | **43,847** |
| **FY40** | 9,945 | 1,620 | 605 | 467 | 1,650 | 573 | 5,654 | **20,514** | **45,987** |
| **FY41** | 10,473 | 1,677 | 626 | 477 | 1,727 | 576 | 5,912 | **21,468** | **48,033** |

Source: TIC estimate

# Kulgo TP (2): Traffic AADT growth rates

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| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 8.6% | 4.9% | 9.6% | 2.7% | 6.1% | 0.9% | 2.9% | **5.5%** | **4.1%** |
| **FY28** | 7.4% | 4.5% | 6.6% | 2.7% | 5.0% | (0.3%) | 2.8% | **4.8%** | **3.6%** |
| **FY29** | 6.8% | 5.0% | 5.1% | 2.3% | 4.6% | (0.8%) | 3.6% | **4.8%** | **3.9%** |
| **FY30** | 6.7% | 4.5% | 4.0% | 1.3% | 4.9% | (0.2%) | 4.3% | **5.0%** | **4.4%** |
| **FY31** | 5.7% | 4.3% | 3.7% | 2.5% | 4.9% | (0.1%) | 3.9% | **4.5%** | **4.0%** |
| **FY32** | 7.2% | 4.1% | 3.7% | 2.5% | 4.9% | (0.1%) | 4.0% | **5.1%** | **4.3%** |
| **FY33** | 3.7% | 4.1% | 0.4% | 2.7% | (1.5%) | (6.8%) | 0.4% | **1.5%** | **0.4%** |
| **FY34** | 0.8% | 4.5% | (4.8%) | 2.5% | (13.2%) | (19.7%) | (9.0%) | **(4.4%)** | **(7.6%)** |
| **FY35** | 2.1% | 4.0% | (2.0%) | 2.4% | (8.4%) | (14.8%) | (5.0%) | **(1.5%)** | **(3.9%)** |
| **FY36** | 5.8% | 3.8% | 4.7% | 2.0% | 5.2% | 0.7% | 5.1% | **5.1%** | **4.9%** |
| **FY37** | 7.1% | 4.1% | 3.4% | 1.1% | 5.0% | 0.6% | 5.0% | **5.6%** | **5.0%** |
| **FY38** | 5.6% | 3.7% | 3.3% | 2.2% | 5.1% | 0.7% | 4.9% | **4.9%** | **4.7%** |
| **FY39** | 5.5% | 3.6% | 4.1% | 2.2% | 4.8% | 0.6% | 4.8% | **4.8%** | **4.6%** |
| **FY40** | 6.2% | 3.9% | 3.2% | 2.4% | 4.9% | 0.7% | 4.9% | **5.2%** | **4.9%** |
| **FY41** | 5.3% | 3.5% | 3.5% | 2.1% | 4.7% | 0.6% | 4.6% | **4.6%** | **4.4%** |

Source: TIC estimate

# Kulgo TP (3): Revenue forecast (INR Crore)

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **155.1** |
| **FY28** | 16.6 | 3.2 | 3.2 | 4.9 | 21.0 | 15.7 | 112.6 | **177.3** |
| **FY29** | 18.4 | 3.5 | 3.5 | 5.2 | 22.8 | 16.1 | 120.4 | **190.1** |
| **FY30** | 20.3 | 3.7 | 3.8 | 5.5 | 24.9 | 16.7 | 130.6 | **205.6** |
| **FY31** | 22.8 | 4.1 | 4.0 | 5.9 | 27.0 | 17.3 | 141.0 | **222.0** |
| **FY32** | 25.3 | 4.5 | 4.3 | 6.2 | 29.5 | 18.0 | 152.6 | **240.4** |
| **FY33** | 26.9 | 4.8 | 4.5 | 6.6 | 30.0 | 17.4 | 159.0 | **249.3** |
| **FY34** | 28.1 | 5.2 | 4.5 | 7.1 | 27.2 | 14.4 | 150.5 | **237.0** |
| **FY35** | 30.2 | 5.6 | 4.5 | 7.5 | 25.8 | 12.8 | 147.8 | **234.3** |
| **FY36** | 33.0 | 6.0 | 5.0 | 8.0 | 28.3 | 13.4 | 162.4 | **256.2** |
| **FY37** | 36.3 | 6.5 | 5.3 | 8.3 | 30.6 | 14.0 | 176.1 | **277.2** |
| **FY38** | 40.4 | 7.1 | 5.7 | 8.9 | 33.5 | 14.6 | 192.0 | **302.0** |
| **FY39** | 43.7 | 7.5 | 6.2 | 9.4 | 36.6 | 15.2 | 208.8 | **327.5** |
| **FY40** | 48.6 | 8.2 | 6.6 | 10.0 | 39.8 | 16.0 | 227.8 | **357.1** |
| **FY41** | 52.6 | 8.7 | 7.1 | 10.6 | 43.0 | 16.6 | 246.9 | **385.6** |

Source: TIC estimate

# Kulgo TP (4): Revenue growth rates

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 19.0% | 15.9% | 18.1% | 13.6% | 15.5% | 10.3% | 13.9% | **14.3%** |
| **FY29** | 10.9% | 9.0% | 9.6% | 6.0% | 8.7% | 2.9% | 6.9% | **7.2%** |
| **FY30** | 10.1% | 7.7% | 8.1% | 5.1% | 9.2% | 3.6% | 8.5% | **8.2%** |
| **FY31** | 12.1% | 10.5% | 6.6% | 6.3% | 8.2% | 3.6% | 7.9% | **8.0%** |
| **FY32** | 11.3% | 8.2% | 8.2% | 6.7% | 9.3% | 3.8% | 8.2% | **8.3%** |
| **FY33** | 6.3% | 6.5% | 4.0% | 6.2% | 1.9% | (3.2%) | 4.2% | **3.7%** |
| **FY34** | 4.2% | 8.1% | (1.3%) | 6.8% | (9.4%) | (17.1%) | (5.3%) | **(5.0%)** |
| **FY35** | 7.4% | 9.3% | 1.6% | 6.0% | (5.2%) | (11.4%) | (1.8%) | **(1.1%)** |
| **FY36** | 9.4% | 7.4% | 10.0% | 6.3% | 9.9% | 4.8% | 9.9% | **9.3%** |
| **FY37** | 10.1% | 7.1% | 6.9% | 4.5% | 8.2% | 4.0% | 8.5% | **8.2%** |
| **FY38** | 11.2% | 9.2% | 6.7% | 6.4% | 9.2% | 4.9% | 9.0% | **9.0%** |
| **FY39** | 8.4% | 6.6% | 8.8% | 6.0% | 9.3% | 4.0% | 8.8% | **8.4%** |
| **FY40** | 11.1% | 8.5% | 6.9% | 6.5% | 8.9% | 4.9% | 9.1% | **9.0%** |
| **FY41** | 8.3% | 6.6% | 7.6% | 5.5% | 8.0% | 4.1% | 8.4% | **8.0%** |

Source: TIC estimate

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# Chilakaluripet Vijayawada section of NH16 in Andhra Pradesh









**Traffic Due Diligence – Final Report**

**National Highways Authority of India**

January 2026

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# Control information

| | |
|---|---|
| **Contract Reference:**<br>Letter of Commencement - FINDIV-16014(11)/1/2024-O/o CGM (Finance-II)/e-265207/116 dated 7th August 2025 | **Identification & Traceability:**<br>TIC/401/TF/TDD/R1-Final Report |
| **Assignment Title:** Traffic Due Diligence – Chilakaluripet Vijayawada section of NH16 in Andhra Pradesh | |
| **Client** | **National Highways Authority of India**<br>Sector 10, Dwarka, New Delhi 110075 |
| **Consultant** | **Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited**<br>1103, I Square Corporate Park<br>Science City Road, Ahmedabad 380060 |

**Issue and Revision Records**

| Date | Revisions | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| 09.01.2026 | R1 | Darshan Doshi<br>Parthav Parikh<br>Rutvik Dhameliya | Dhyey Hirpara<br>Yagnesh Dave | Tejas Patel | Traffic Due Diligence – Final Report |

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**Appendix A:** Vehicle category-wise visual representation of origin-destination zones

Vehicle category-wise top origin-destination pairs

**Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

# Abbreviations (1)

| | |
|---|---|
| **AADC** | Annual Average Daily Collection |
| **AADT** | Annual Average Daily Traffic |
| **ADB** | Asian Development Bank |
| **ADT** | Average Daily Traffic |
| **AL** | Axle Load |
| **AP** | Andhra Pradesh |
| **APC** | Annual Potential Collection |
| **APCRDA** | Andhra Pradesh Capital Region Development Authority |
| **BOT** | Build-Operate-Transfer |
| **CAGR** | Compound Annual Growth Rate |
| **CBIC** | Chennai – Bengaluru Industrial Corridor |
| **CJV** | Car/ Jeep/ Van |
| **CPI** | Consumer Price Index |
| **CSIR** | Central Road Research Institute |
| **CTVC** | Classified Traffic Volume Count |
| **CUMTA** | Chennai Unified Metropolitan Transport Authority |
| **DBFOT** | Design, Build, Finance, Operate, and Transfer |
| **DPR** | Detailed Project Report |
| **EPC** | Engineering, Procurement and Construction |
| **ETC** | Electronic Toll Collection |
| **EV** | Electric Vehicle |
| **FMCG** | Fast Moving Consumer Goods |
| **FSI** | Floor Space Index |
| **FY** | Financial Year |

| | |
|---|---|
| **GDP** | Gross Domestic Product |
| **GI** | Geographical Indication |
| **GSDP** | Gross State Domestic Product |
| **GST** | Goods and Services Tax |
| **HAM** | Hybrid Annuity Mode |
| **HCV** | Heavy Commercial Vehicle |
| **HQ** | Headquarter |
| **IHMCL** | Highways Management Company Limited |
| **IMF** | International Monetary Fund |
| **INR** | Indian Rupee |
| **IRC** | Indian Road Congress |
| **ISRO** | Indian Space Research Organisation |
| **IWAI** | Inland Waterways Authority of India |
| **Km** | Kilometer |
| **LCV** | Light Commercial Vehicle |
| **MADT** | Monthly Average Daily Traffic |
| **MAV** | Multi Axle Vehicle |
| **MLFF** | Multi Lane Free Flow |
| **MMTPA** | Million Metric Tonnes Per Annum |
| **MoRTH** | Ministry of Road Transport and Highways |
| **MSME** | Micro, Small, and Medium Enterprises |
| **MTPA** | Million Tonnes Per Annum |
| **NH** | National Highway |
| **NHAI** | National Highways Authority of India |

# Abbreviations (2)

| | |
|---|---|
| **NHIT** | National Highways Infra Trust |
| **NMP** | National Monetisation Pipeline |
| **NW** | National Waterway |
| **OD** | Origin – Destination |
| **OECD** | Organisation for Economic Co-operation and Development |
| **ORR** | Outer Ring Road |
| **OSV** | Oversized Vehicle |
| **PCI** | Per Capita Income |
| **PCU** | Passenger Car Unit |
| **PIA** | Project Influence Area |
| **PIU** | Project Implementation Unit |
| **PPP** | Public-Private Partnership |
| **QADT** | Quarterly Average Daily Traffic |
| **RBI** | Reserve Bank of India |
| **RO** | Regional Office |

| | |
|---|---|
| **RoS** | Rest of State |
| **RTO** | Regional Transport Office |
| **SCF** | Seasonal Correction Factor |
| **SH** | State Highway |
| **SIAM** | Society of Indian Automobile Manufacturers |
| **TAZ** | Traffic Analysis Zone |
| **TIC** | Translink Infrastructure Consultants Private Limited |
| **TOT** | Toll, Operate, Transfer |
| **TP** | Toll Plaza |
| **VCIC** | Vishakhapatnam – Chennai Industrial Corridor |
| **VGTM** | Vijayawada, Guntur, Tenali, Manglagiri |
| **WADT** | Weekly Average Daily Traffic |
| **WPI** | Wholesale Price Index |
| **2A** | 2 Axle |
| **3A** | 3 Axle |

# Chapter 1: Introduction

- The assignment
- Objective and Scope of Work
- Approach and methodology
- Organisation of the report

This chapter outlines assignment background, scope of work, approach and methodology employed to ensure successful execution of the assignment.

Approach and methodology section highlights the structured approach which has been followed to gather data, conduct analysis, and make informed decisions throughout the project lifecycle. By employing a robust methodology, the consultant aims to ensure the accuracy, efficiency and reliability of the assignment’s outcomes.

# The assignment

**Ministry of Road Transport and Highways** (MoRTH) has entrusted **National Highways Authority of India** (hereinafter referred to as '**NHAI'** or '**client'**) for monetisation of public funded operational national highway projects under the framework of National Monetisation Pipeline (NMP).

In this context, NHAI has commissioned Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited (hereinafter referred to as '**TIC'** or '**consultant'**) to carry out traffic due diligence for following national highway section in Andhra Pradesh. (hereinafter referred to as '**project highway**').

**Project highway under asset monetization programme**

| National highway section | Toll plaza | Concerned NHAI field office |
|---|---|---|
| **Vijayawada Chilakaluripet section of NH16** | Kaza (Guntur district) | Project Implementation Unit – Amaravati<br>Regional Office – Vijayawada |

Source: Client

This document is the final report incorporating traffic data updates received up to October 2025 and confirmation from the client dated 15th December 2025 for recommended scenario. The report presents our understanding of the project highway, trend analysis of traffic and revenue, primary data analysis and traffic and revenue forecast for a concession period of 15 years.

# Objective and Scope of Work

The principal objective of the study is to determine traffic and revenue forecast for 15 years. This assessment provides input to stakeholders to evaluate viable monetization options for the project highway.

The broad **scope of the work** of the assignment is as follows:

- Review of available historical traffic and revenue data and relevant document received from the client
- Carrying out traffic survey and analysis at the project highway :
    - 7-days continuous and direction-wise classified traffic volume count
    - 3-days origin-destination
    - 3-days axle load
    - Any other surveys on the project highway and alternate corridors as per the need
- Site visit and stakeholder consultation to understand traffic characteristics and network dynamics
- Review of observed growth trends of the project highway and corridor subject to availability of data
- Estimate vehicle category-wise traffic and revenue for the base year
- Determine future toll rates
- Assessing diversion due to competing transportation modes and routes, network development, future development plans in the region, etc.
- Vehicle category and ticket distribution-wise traffic and revenue forecast for concession period
- Scenario development: most likely, optimistic and pessimistic

# Approach

The consultant adopted comprehensive approach to address the need of this assignment with key five focus areas as summarised in below figure.

**Approach for the assignment**



| Expertise in motion | Forecasting forward flow | Economy drive highways | Data drives decisions; paves road to resilience | Trust in travel |
|---|---|---|---|---|
| Team with transportation engineering expertise and experience | Encapsulate all possible exogeneous impacts on traffic growth | Models integrating economic indicators for traffic growth projections | Using statistical techniques and tools for accurate insights and risk assessments | Maintain integrity, transparency, and ethical practices |

Source: TIC

# Methodology (1)

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**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Project highway appreciation** | ▪ Assess the macro and micro road network, considering the overall road infrastructure and its specific sections<br>▪ Identify homogeneous/tollable sections with similar traffic patterns<br>▪ Evaluate any developments in the vicinity of the project highway that may impact economic growth and traffic volume<br>▪ Finalize survey locations and formats for data collection |
| **Secondary data collection** | ▪ Gather relevant past detailed project report / traffic study report and draft concession agreement as per availability<br>▪ Collect historical monthly traffic data for the toll plazas of the project highway and neighbouring toll plazas on the corridor, both upstream and downstream<br>▪ Source vehicle category/mapper class wise electronic toll collection (ETC) data as most reliable dataset from Indian Highways Management Company Limited (IHMCL) through the client for toll plazas under study and on the corridor and alternate corridors as well as across the country (subject to receipt from the client or as per availability in the public domain) for understanding of the various trends of economy as well as modal / vehicle technology shift<br>▪ Gather economic indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), per capita income, national, state and district Gross Domestic Product (GDP), employment rates and specific commodities related sales e.g., automobile, agriculture production etc.<br>▪ Gather demographic profiles and population data<br>▪ Collect secondary data related to alternative routes and modal shift developments if applicable |
| **Primary data collection** | ▪ 7-day continuous videography-based classified traffic volume count survey to gather independent traffic volume data<br>▪ 3-day origin-destination and commodity survey to understand travel patterns, trip purposes, influence region, growth drivers etc.<br>▪ 3-day axle load survey to determine the load characteristics of vehicles<br>▪ 1-day vehicle registration number plate survey to estimate ticket segmentation of local commercial vehicle without national permit if required<br>▪ Stakeholder consultation through interviews and focused group discussions |

Source: TIC

# Methodology (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Data analysis** | ▪ Review historical traffic and revenue data to understand growth trend, seasonality variation, elasticities for identified growth drivers through regression analysis subject to data availability and benchmark analysis of corridor<br>▪ Conduct data hygiene checks to identify errors, biases and inconsistencies in the collected data<br>▪ Analyse Weekly Average Daily Traffic (WADT) including peak hour, day and night traffic variances, as well as directional distribution of traffic for further input to various analysis<br>▪ Identify Traffic Analysis Zones (TAZ) and Primary Influence Areas (PIA)<br>▪ Determine vehicle category-wise origin-destination matrices, trip lengths and purposes<br>▪ Develop geographical distribution diagrams of traffic to visualize travel patterns<br>▪ Perform commodity and loading analysis<br>▪ Analyse historical journey tickets, including single, 24-hour return, daily multiple, monthly, local pass tickets and annual pass for passenger cars and understand the ground level situations for underlying patterns especially forced exemption if any in the case specific region and possibilities of reduction through proposed technological and administrative measures<br>▪ Estimate Annual Average Daily Traffic (QADT/AADT) for the base and future years as per case specific requirement<br>▪ Develop a traffic diversion model using IRC:SP:30 modality |
| **Forecasting** | ▪ Utilize an econometric model based on IRC: 108-2015 guidelines to analyse the relationship between vehicle traffic/PIA and socio-economic parameters such as Per Capita Income (PCI), Gross Domestic Product (GDP) of district/state/national, population, specific economic activities etc. as relevant with the identified growth drivers<br>▪ Calculate growth rates for each vehicle category. Adjust the growth rates based on induced traffic and traffic diversion effects, if applicable<br>▪ Perform traffic forecasting for 15 years period - normal traffic followed by generated and diverted traffic due to network and developmental impacts<br>▪ Conduct capacity analysis to assess the adequacy of the project highway<br>▪ Forecast annual toll revenue for 15 years based on traffic and toll rates projections |
| **Sensitivity and risk analysis** | ▪ Identify variables (macro-economic, growth drivers and relationships, scale and timeline of diversions, etc.) that significantly impact annual toll revenue and assess their sensitivity<br>▪ Develop scenarios for identified risks |

Source: TIC

# Organisation of the report

**Report structure**

| Sr. No. | Chapter | Particulars |
|---|---|---|
| 1 | **Introduction** | Scope of the assignment, approach and methodology |
| 2 | **Project highway profile** | Characteristics of the project highway like network understanding, socio-economic background of the region and proposed infrastructure developments in the influence region and network |
| 3 | **Traffic analysis** | Past performance of the project highway based on historical traffic and revenue data, traffic survey data analysis |
| 4 | **Economic context and traffic growth** | Economic context of influence region – Jharkhand and West Bengal, determination of traffic growth drivers and associated travel demand elasticities |
| 5 | **Baseline traffic and revenue forecast** | Elaborates method adopted for determining base year AADT, toll ticket distribution and revenue reconciliation |
| 6 | **Diversion analysis** | Impacts on the project highway due to proposed infrastructure developments in the influence region and network, assessment of induced traffic demand |
| 7 | **Final traffic and revenue forecast** | Traffic and revenue forecasts including diversions, scenario cases: most likely with and without overloading, optimistic and pessimistic |

Source: TIC

# Chapter 2: Project highway profile

- Location and key details
- Economic activities in the region
- Understanding of network and traffic corridors
- Proposed road network and infrastructure development in the influence region

This chapter exhibits our understanding of the project highway and key details, economic activities in the region and strategic network context based on site visit and stakeholder consultation. It covers list of infrastructure project development in the region and network which would have impact on the performance of the project highway.

# Location of the project highway

**Project highway location in national and state context**






Source: TIC analysis (map not to scale)

- An integral part of Golder Quadrilateral (GQ) / East Coast Corridor which connects Kolkata and Chennai.
- NH16 corridor has evolved over the period in past few years and witnessed hike in traffic along with improvement of level of service across the corridor.
- The project highway strategically located at central region of Andhra Pradesh and hence as acts as spinal cord for the state by extending the connectivity to different parts of the country i.e., West Bengal/Odisha in north and Karnataka/Tamil Nadu in south.
- Additionally, the corridor plays a vital role in supporting port-led industrial development, logistics parks, and regional economic hubs along the eastern coast, strengthening Andhra Pradesh's integration with national and international supply chains.

# Project snapshot (1)

**Key project details**

| Particulars | Chilakaluripet Vijayawada section of NH16 |
|---|---|
| **Length (km)** | **Present length:** 84.303 km<br>**Revised length:** 69.408 km (post de-scope due to development of Vijayawada Bypass)<br>Construction of Vijayawada Bypass (ending at km 422.605 on NH16) is in advance stage and likely to be completed by January 2026. Post construction of Vijayawada Bypass, the section from km 422.605 to km 437.500 shall be de-notified and handed over to state government and will be excluded from present configuration of Vijayawada Chilakaluripet section of NH16 i.e., 14.895 km and hence the length for of the project highway will be 69.408 km asset monetization proposal. |
| **Lane and pavement** | 6-lane divided carriageway, flexible pavement / rigid at toll plaza |
| **Chainage** | km 355.000 (Chilakaluripet) to km 422.605 (end of Vijayawada Bypass) excluding km 357.342 to 372.038 and including km 0.000 to km 16.499 |
| **History** | ▪ Vijayawada Chilakaluripet section of NH16 was earlier developed and operated under a DBFOT (Toll) for 4 to 6 lane widening concession by IJM (India) Infrastructure Limited during May 2009 to September 2024 including construction period. Six laning work completed in 2010 while Chilakaluripet Bypass was constructed in 2024.<br>▪ Post BOT concession, section has been managed under public-funded mode with short term toll contracts. |
| **Nos. of toll plaza and location** | 1 ETC enabled |
| **Toll plaza locations** | **Kaza** at km 420.500 |
| **District** | Physically located within Guntur jurisdiction<br>Socio-economic activities and traffic patterns are significantly influenced by Vijayawada, Amaravati, Guntur and Tenali. |
| **Tolling start date** | 1st May 2009 |
| **Tolling length (km)** | 80.802 |
| **Overloading penalty** | No overloading penalty/fee being levied at present based on understanding from site visit and discussion with PIU Amaravati/toll operators. |
| **Micro-diversions at toll plaza location** | Nil |

Source: NHAI

# Project snapshot (2)

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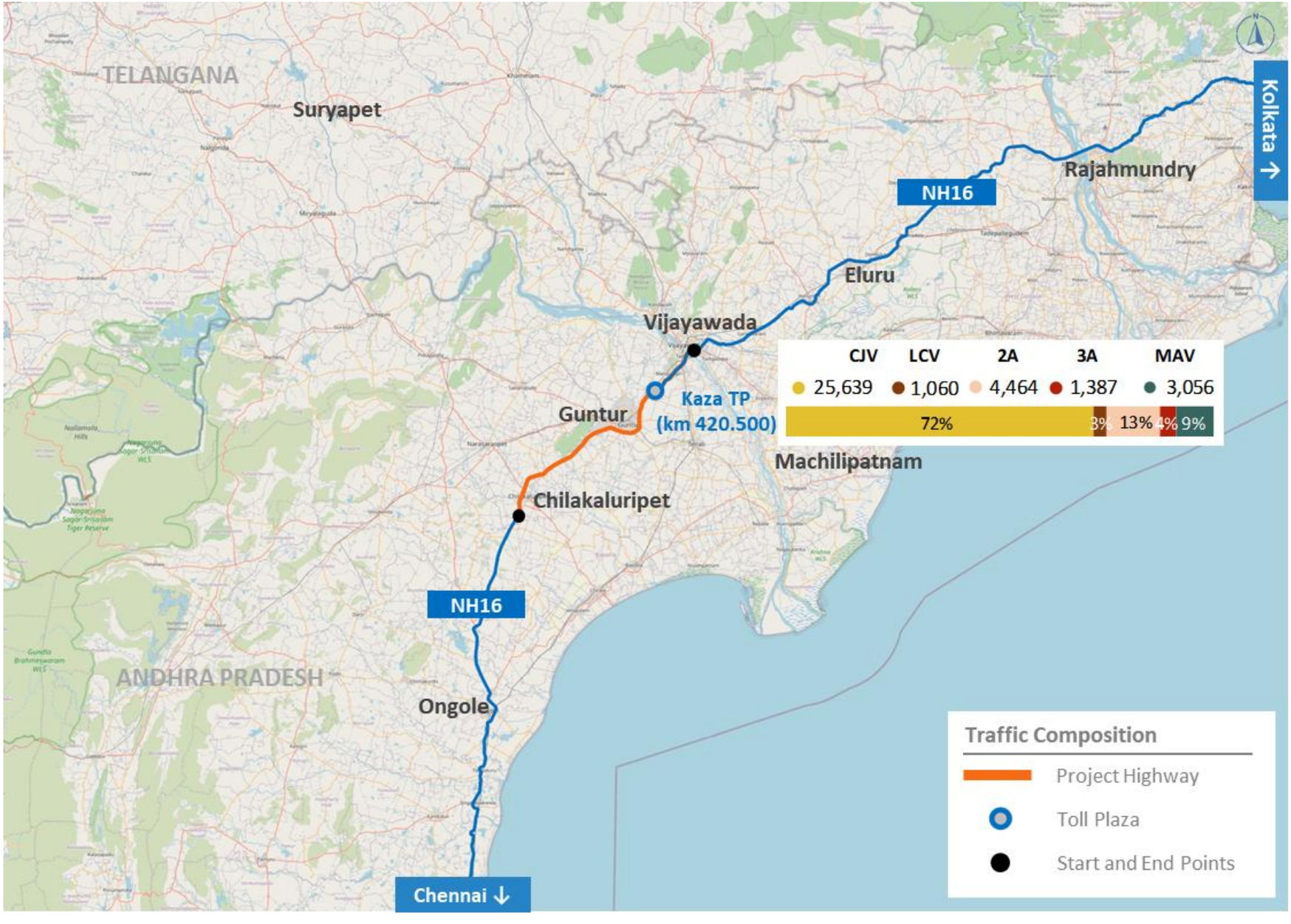
**Key project details**

| Particulars | Vijayawada Chilakaluripet section of NH16 |
|---|---|
| **Toll plaza locations** | **Kaza** |
| **ETC Traffic (FY26 till October 2025)** | 7 months ADT: 35,609 PCU corresponding 7 months ADT: 58,546 |
| **ETC Traffic composition (FY26 till October 2025)** | 72% CJV/Mini LCV 8% 2A/LCV<br>8% Bus 12% 3A/MAV |
| **ETC Revenue** | FY25: INR 243 Crore<br>FY26 (till October 2025): INR 181 Crore<br>Considering old tolling length including 14.895 km to be de-scoped from start of FY27 |
| **ETC Revenue composition (FY26 till October 2025)** | 32% CJV/Mini LCV 15% 2A/LCV<br>11% Bus 41% 3A/MAV |
| **Present toll operator with quoted remittance** | **Sri Sai Enterprises**<br>**Duration** : January 2025 to December 2025 (1 Year)<br>**Annual Potential Collection** : INR 310.80 Crore<br>**Quoted remittance** : INR 303.67 Crore (FY25 tolling rates)<br>Revised to INR 322.71 on 1st April 2025 with FY26 tolling rates<br>Future round of bidding completed for 1 year toll contract in December 2025.<br>**Highway Infrastructure Limited**<br>**Duration** : New toll operator is expected to take handover in January 2026 for 1 year<br>**Annual Potential Collection** : INR 321.09 Crore<br>**Quoted remittance** : INR 328.77 Crore (FY26 tolling rates) |
| **Previous tolling operator** | **Sri Sai Enterprises**<br>**Duration** : October 2024 to January 2025 (3 months)<br>**Annual Potential Collection** : INR 289.13 Crore<br>**Quoted remittance** : INR 247.07Crore (FY25 tolling rates)<br>Bidding was low as shifted from BOT (Toll) to public funded modality in recent past as well as freight traffic (3A/MAV) was in transit state of being diverted to NH216 from July 2024. |

Source: NHAI

# Project snapshot (3)

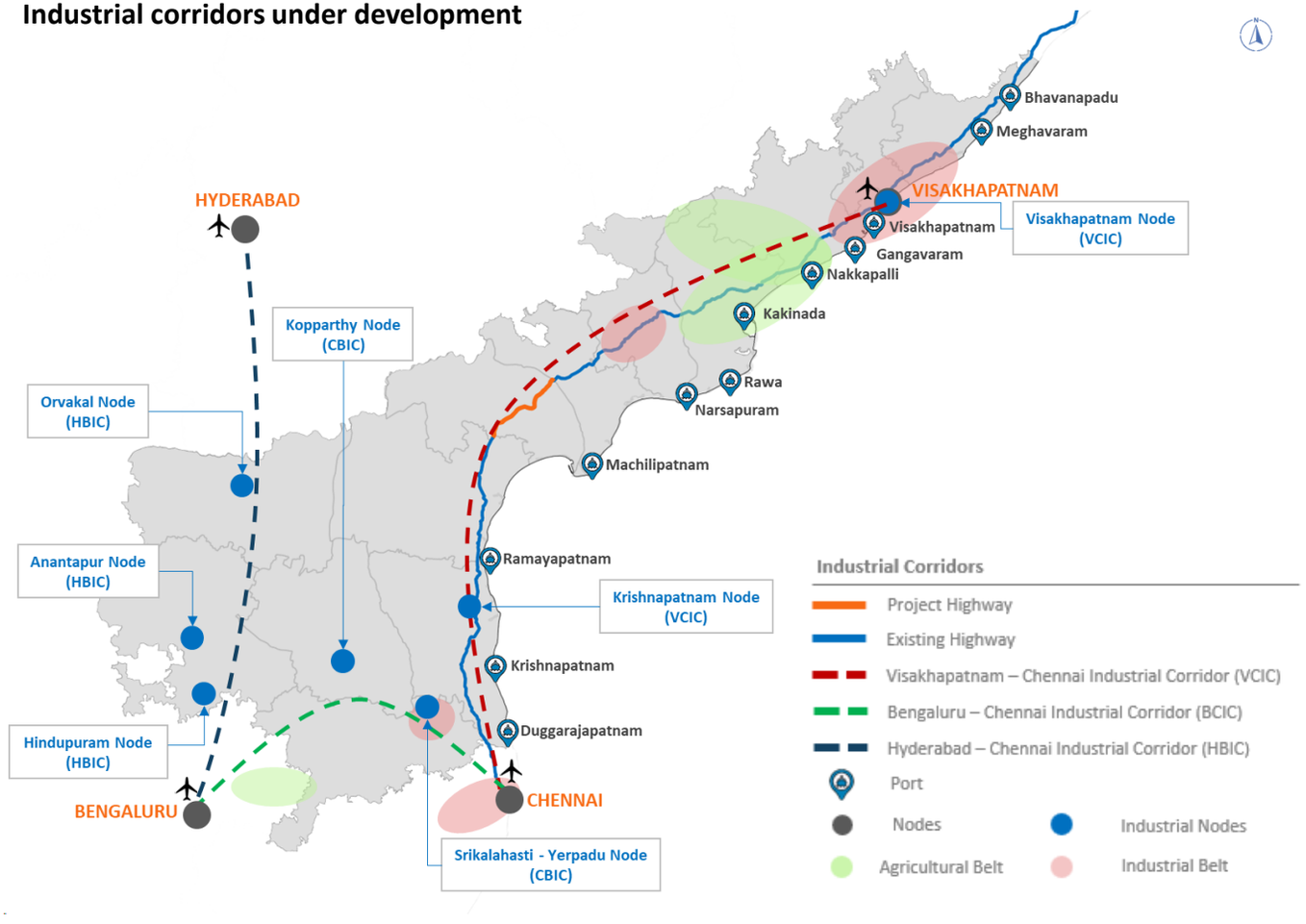
**ETC Traffic composition of FY26 till October 2025**




Source: TIC analysis (map not to scale)

# Economic activities in influence region (1)

**Industrial corridors under development**




Source: TIC analysis (map not to scale)

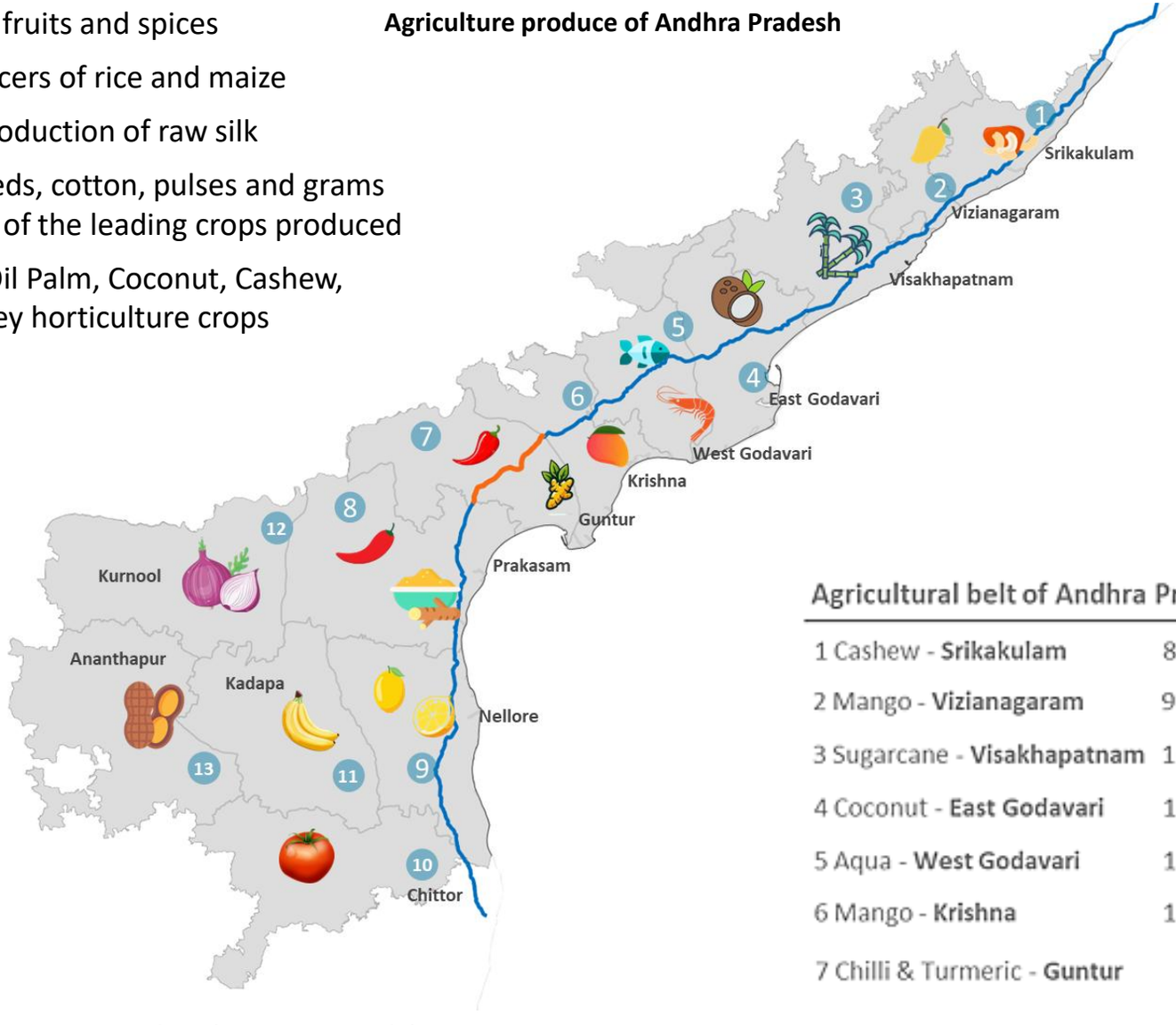
- Visakhapatnam – Chennai Industrial Corridor (VCIC) is hosts three industrial nodes at Vizag, Chittoor and Kopparthy
- Chennai – Bengaluru Industrial Corridor (CBIC) proposes high impact / market driven nodes in Tamil Nadu, Andhra Pradesh and Karnataka. Krishnapatnam and Nellore are two major nodes of CBIC in Andhra Pradesh.

- Industry landscape includes fisheries, textiles and pharmaceutical
- 15 operational ports along the coastline helps in uplifting the industry landscape
- Amongst the top 5 exporting states of India. The important industry / economic centers of the state has a well-connected road network of NH and SH
- NH16 which is an integral part of golden quadrilateral passes through Andhra Pradesh with about 50% of length of ~990 kms
- 1st state in the country to launch single window portal to boost its industry landscape
- The state further envisages to boosts its economy by capitalizing the full potential of industrial corridors in context of recent change of ruling party during state election
- Visakhapatnam – Chennai Industrial Corridor (VCIC) is hosts three industrial nodes at Vizag, Chittoor and Kopparthy
- The project highway is the important road asset connecting the nodes of industrial corridors.

# Economic activities in influence region (2)

- 1st production of fruits and spices
- 2nd largest producers of rice and maize
- 2nd position in production of raw silk
- Rice, chilly, oilseeds, cotton, pulses and grams are amongst few of the leading crops produced
- Mango, Guava, Oil Palm, Coconut, Cashew, Lemon etc. are key horticulture crops

**Agriculture produce of Andhra Pradesh**




Agricultural belt of Andhra Pradesh

| | |
|---|---|
| 1 Cashew - **Srikakulam** | 8 Chilli & Turmeric - **Prakasam** |
| 2 Mango - **Vizianagaram** | 9 Citrus - **Nellore** |
| 3 Sugarcane - **Visakhapatnam** | 10 Tomato - **Chittor** |
| 4 Coconut - **East Godavari** | 11 Banana - **Kadapa** |
| 5 Aqua - **West Godavari** | 12 Onion - **Kurnool** |
| 6 Mango - **Krishna** | 13 Gorundnut - **Ananthapur** |
| 7 Chilli & Turmeric - **Guntur** | |

Source: TIC analysis (map not to scale)

# Economic activities in influence region (3)

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**Economic activities in influence region**




Source: TIC analysis (map not to scale)

# Economic activities in influence region (4)

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**1 Industry**

- **Vijayawada,** major commercial and industrial hub with automobile body-building, food processing, textile, and agro-based industries; serves as a key logistics and trading center in Andhra Pradesh.
- **Guntur,** prominent agro-industrial zone known for chilli processing, cotton ginning, tobacco curing, and fertilizer industries; hosts one of Asia's largest agricultural markets.
- **Tenali & Mangalagiri,** centers for rice milling, handloom weaving, and small-scale manufacturing, contributing to rural employment and local trade.
- **Amaravati Capital Region,** emerging administrative and urban hub driving growth in construction, real estate, logistics, and service sectors.
- **Sand Mining from Krishna River,** regulated sand mining supports construction demand in the Amaravati region and generates moderate traffic at the Kaza TP.

**2 Agriculture and allied activities**

- **Rice (Paddy)** is the dominant crop across Krishna and Guntur districts, supported by fertile alluvial soils and irrigation from the Krishna River and Prakasam Barrage.
- **Chilli, cotton, maize,** and **pulses** are major secondary crops; **Guntur Sannam chilli (GI-tagged)** is globally recognized for its export value. **Sugarcane** and **turmeric** are cultivated in select regions, contributing to crop diversification and agri-based processing industries.
- **Kavali and Ongole** are key centers for **tobacco** trading.
- Horticulture and vegetable farming (banana, mango, tomato, brinjal) are practiced commercially, supplying fresh produce to Vijayawada, Guntur, and Amaravati markets.
- Allied activities such as dairy, floriculture, and aquaculture (especially inland fish and prawn farming) provide additional income to rural communities. **Nellore** region is known as **'Shrimp Capital of India'.**

**3 Tourism**

- **Vijayawada,** major pilgrimage and tourist hub known for the Kanaka Durga Temple and Krishna Riverfront; Bhavani Island promotes eco and leisure tourism.
- **Amaravati,** ancient Buddhist heritage site featuring the Amaravati Stupa and Dhyana Buddha statue, attracting national and international visitors.
- **Mangalagiri,** renowned for the Lakshmi Narasimha Swamy Temple, a major religious destination between Vijayawada and Guntur.

Source: TIC secondary research

# Guntur Sannam Chilli (GI-tagged)

- Andhra Pradesh is India's largest chilli producer, contributing 40-50% of the national output. The Guntur district alone is the '**Chilli Capital of India'** responsible for about 15% of the total Indian chilli production and largest exporter after Mexico.
- Guntur Market Yard is the largest chilli market in Asia, playing a direct role in setting both domestic and international chilli prices.
- Production has shown consistently positive two decadal growth trend (FY94 to FY23), driven by strong market demand and continuous adoption of modern agricultural technology.
- Guntur chilli is vital to India's spice trade. It's a key export to countries like China, Vietnam, Thailand, and the USA, contributing significantly to India's overall spice exports.
- Geographical Indication (GI) tag for Guntur Sannam Chilies ensures product authenticity, helps farmers secure better prices, and maintains its international reputation for fiery hotness and pungency.
- As a crucial commercial crop, Guntur Chilli secures a prime status in Andhra Pradesh's agriculture and export economy, boosting the state's GDP, trade balance, and rural income. Cultivating the GI-tagged variety offers higher net returns and economically viable for farmers.

**Chilli Farming in Guntur district**




**Cold Storage for Chillies on Guntur Bypass**






Source: TIC site visit

# Our understanding of traffic corridor and road network

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**National corridor (long-distance traffic)**

- The project highway forms a vital part of the Golden Quadrilateral (NH16), serving as east coast economic corridor connecting Kolkata and Chennai through key cities such as Cuttack, Bhubaneswar, Visakhapatnam, Rajahmundry, Vijayawada, Guntur, Ongole (extends to Kadapa region), Nallur, Sri City (south Andhra Pradesh), Chennai and extends to Bengaluru via Naidupeta/Tirupati.
- It facilitates movement of long-distance freight traffic between the southern, eastern, and northeastern regions of India. This includes industrial goods, agricultural produce, fertilizers, petroleum products, and port-based cargo from Chennai, Krishnapatnam, Gangavaram, and Visakhapatnam ports supporting national-level trade and logistics operations.
- The project highway establishes link to Tirupati Balaji (located approximately 130 km south of the Nellore on the corridor), one of the richest temples in the world and an important Hindu pilgrimage site. Passenger traffic from north Andhra Pradesh being witnessed on the project highway.

**Regional linkages (medium-distance traffic)**

- At the regional level, the corridor connects important urban and industrial centers such as Vijayawada, Guntur, Tenali, Chilakaluripet, and Ongole, ensuring efficient movement of goods between coastal Andhra Pradesh and the inland districts.
- Project highway supports substantial medium-distance freight such as agricultural produce (rice, cotton, chillies), fertilizers, construction materials, and consumer goods, transported to and from Guntur, Prakasam, and Krishna districts. It also plays a vital role in facilitating regional trade with Hyderabad, Tirupati, and Nellore through well-developed road linkages.

**Local connectivity (short-distance traffic)**

- Short-distance traffic primarily includes daily commuters, agricultural transport, and local trade movement between regional nodes such as Guntur, Mangalagiri, NTR, and Chilakaluripet.
- This section also supports the movement of perishable goods and produce from nearby mandals and rural areas to Vijayawada and Guntur markets, including the Guntur Mirchi Yard and NTR Wholesale Market.
- The corridor thus acts as a critical enabler of local economic activity, linking industrial, agricultural, and service-based growth centers within central Andhra Pradesh.

# Corridor traffic summary (1)

**Kolkata Chennai corridor of NH19**

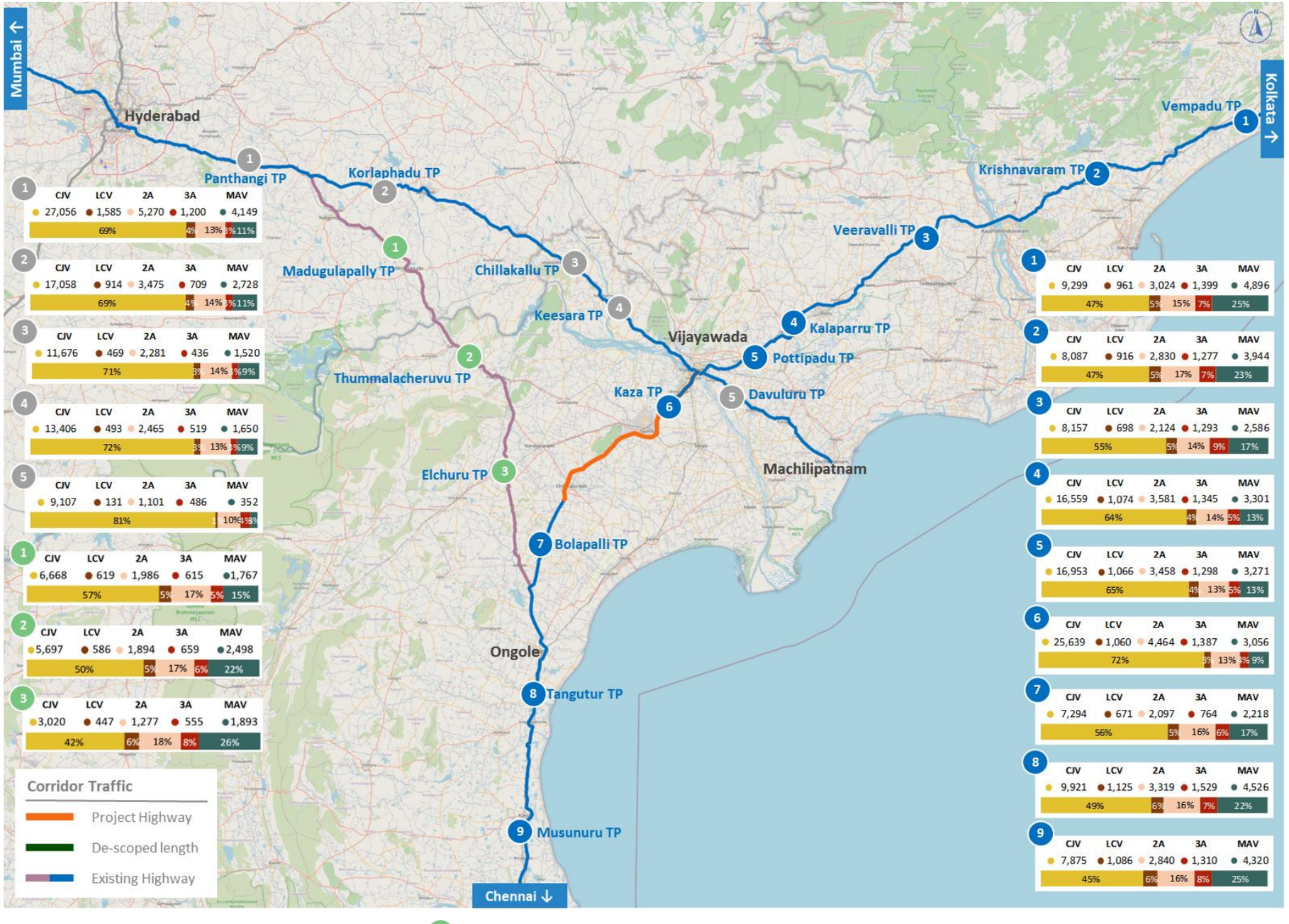
| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Dhankuni – Kharagpur** | BOT (Toll) – Maple Highways | 80,000 |
| **Kharagpur – Baleshwar** | BOT (Toll) – IL&FS | 18,000 |
| **Baleshwar – Bhadrak** | Toll - Public Funded | 32,000 |
| **Bhadrak – Chandikhole** | Toll - Public Funded | 35,000 |
| **Chandikhol – Bhubaneshwar** | BOT (Toll) – Maple Highways | 45,000 |
| **Bhubaneshwar – Sunakhala** | Toll - Public Funded | 25,000 |
| **Sunakhala – Puintola** | Toll - Public Funded | 25,000 |
| **Puintola – Icchapuram** | TOT (Toll) – Safeway Concession/Macquire | 21,000 |
| **Icchapuram – Nandigaon** | TOT (Toll) – Safeway Concession/Macquire | 20,000 |
| **Nandigama – Srikakulam** | NHIT (Private InvIT Bundle 4) | 28,000 |
| **Champavati/ Kopperla – Visakhapatnam** | NHIT (Private InvIT Bundle 4) | 32,000 |
| **Anakapall – Anandapuram** | NHIT (Private InvIT Bundle 4) | 25,000 |
| **Anandapuram – Tuni** | Toll - Public Funded | 44,000 |
| **Tuni – Diwancheruvu** | Toll - Public Funded | 40,000 |
| **Diwancheruvu – Kovvuru** | BOT (Toll) – PATH Group State Authority | 51,000 |
| **Kovvuru – Devarapalli – Gundugolanu** | NHIT (Private InvIT Bundle 4) | 33,000 |
| **Gundugolanu – Vijayawada** | Toll - Public Funded | 50,000 |
| **Vijayawada – Chilakaluripet** | Toll - Public Funded | 60,000 |
| **Chilkaluripet – Nellore** | BOT (Toll) – Interise (CPPIB) | 30,000 / 50,000 / 45,000 |
| **Nellore – Tada** | BOT (Toll) – Vertis (KKR) | 52,000 / 33,000 |
| **Tada – Chennai** | Toll - Public Funded | 62,000 |

Source: TIC analysis

# Corridor traffic summary (2)

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**Traffic composition on the corridor: AADT of FY26 till October 2025**




Source: TIC analysis (map not to scale)

AADT of FY25

# Site photographs

**Start Point (km 355.000)**




**Kaza Toll Plaza (km 420.500)**



**Cross section**




**End Point (km 437.500)**




**Advance stage of construction at Vijayawada Bypass**







Source: TIC site visit

# Proposed infrastructure development in the region (1)

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**Network and infrastructure development in the influence region (refer map on Pg 31)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Vijayawada Western Bypass** | NHAI / HAM<br>Two packages | Construction of Vijayawada Bypass (ending at km 422.605 on NH16) is in advance stage and likely to be completed by January 2026. | **Negative – reduction on tolling length from FY27**<br>Post construction of Vijayawada Bypass, the section from km 422.605 to km 437.500 shall be de-notified and handed over to state government and will be excluded from present configuration of Vijayawada Chilakaluripet section of NH16 i.e., 14.895 km. Hence, the length for of the project highway will be 69.400 km from start of FY27. |
| **Amaravati Outer Ring Road** | NHAI / HAM<br>Multiple packages<br>Mode of development is yet to be decided | Alignment is finialled and DPR work is in advance stage<br>Expected completion is in FY33 | **Negative**<br>Three sets of traffic movement will be affected:<br>▪ Northend region outside ORR towards Eluru/Rajahmundry: locations on north Pottipadu which is the junction of NH16 and ORR<br>▪ Western region outside ORR towards Hyderabad: locations on west of Saidapuram which is the junction of NH65 and ORR<br>▪ Eastern region outside ORR towards Machilipatnam: locations on east of Davuluru which is the junction of NH65 and ORR |
| **Development of Amaravati Capital City and nearby region** | Andhra Pradesh Capital Region Development Authority | As major phases of the capital city's infrastructure such as government administrative complexes, educational institutions, housing townships and commercial centers become operational, travel demand within the region is expected to rise throughout the concession period | **Positive**<br>This growth will lead to increased daily commuting between Amaravati/Vijayawada and Guntur, as well as heightened movement of goods and services supporting the expanding urban ecosystem. |

Source: TIC research and analysis

# Proposed infrastructure development in the region (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Network and infrastructure development in the influence region (refer map on Pg 31)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Ramayapatnam Port** | Andhra Pradesh Maritime Board through Ramayapatnam Port Development Corporation Limited | About 65% work of Phase-1 completed as of June 2025 including 4 km of dredging.<br>Expected to be operational by end of FY27. | **Positive** for 2A, 3A, MAV |
| **Chennai Hyderabad high-speed rail** | National High Speed Rail Corporation Limited in support with concerned state governments | South Central Railway submitted final alignment to be included in the detailed project report (DPR) to State Government of Tamil Nadu and requested approvals in November 2025 to keep the survey work on track.<br>Expected to be operational in FY38 | **Negative**<br><br>Traffic movement from/ to Hyderabad, Vijayawada and Chennai |
| **Bengaluru Vijayawada Expressway** | NHAI / HAM<br>Multiple packages and developers | **Brownfield section:**<br>NH44 Bengaluru to Kodikonda (73 km) & NH16 Addanki to Vijayawada (113 km)<br><br>**Greenfield section:**<br>Kodikonda to Addanki (343 km)<br>Likely expected to be completion in FY28 | **Nil** as on date as the proposed development ends at Adanki.<br><br>As per preliminary discussion with the client, the project highway may upgrade to access control corridor in long-term future in continuation of Bengaluru Vijayawada Expressway. It is at pre-proposal stage and no decision yet finalised.<br><br>As per client, there should not be major impact on overall revenue in case of access control modality because significant freight traffic diverted due to Amaravati Outer Ring Road (FY34) will pay for Guntur – Chilakaluripet section while traffic between Guntur – Vijayawada will pay for this section instead of full length. |

Source: TIC research and analysis

# Proposed infrastructure development in the region (3)

**Network and infrastructure development in the influence region (refer map on Pg 31)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **4 laning of Kathipudi Ongole section of NH216** | MoRTH<br>Mode of development to be decided<br>Multiple Packages | DPR to be initiated followed by land acquisition which is complex in coastal agriculture belt of Andhra Pradesh.<br>Expected to be completed in FY33. | **Nil**<br>Potential divertible traffic and timeline is similar for proposed development and Amaravati Outer Ring Road and hence not considered. |
| **National Waterway 4 (NW4)** | Inland Waterway Authority of India (IWAI) | Kakinada to Puducherry through canal which is integrated with Bhadrachalam Rajahmundry section of Godavari River and Wazira Vijayawada section of Krishna River<br><br>Additional reaches:<br>Godavari River: Bhadrachalam to Nasik<br>Krishna River: Wazirabad to Galagali<br><br>Canal system to be strengthened in next 5 – 6 years to extend the reach up to Tamil Nadu | **Nil**<br>Not directly affecting cargo hinterland is coastal agriculture belt being served by NH216 |

Source: TIC research and analysis

# Proposed infrastructure development in the region (4)

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**Network and infrastructure development in the influence region**




Source: TIC analysis (map not to scale)

# Chapter 3: Traffic analysis

- Historical data sources
- Historical traffic and revenue trends
- Seasonality variation
- Historical ticket distribution
- Commodity analysis
- Zonal influence and trip distance

This chapter covers various datasets received from NHAI followed by assessment of historical performance of the project highway. This analysis helps to understand baseline traffic patterns comprising of traffic and revenue growth rates, seasonality variations, trip factors, ticket distribution and overloading characteristics if any.

Survey analysis helps to understand and validate traffic volume, commodity movement pattern, network understanding received from site visit, inputs for ticket distribution, overloading pattern based on independent survey exercise.

# Historical datasets

- The project highway was operated under BOT (Toll) during May 2009 to September 2024 followed by being operated under the public-funded mode where toll is collected by third party toll agencies through short-term contracts. Third party toll agencies submit traffic and revenue report on monthly basis which is titled as Schedule V.
- The consultant observes that availability and accuracy of these reports are many times under question due to inadequate quality of technology interventions and record keeping during short term contracts by tolling agencies.
- Hence, availability followed by reliability of these datasets is essential to be addressed for historical analysis as well as further processing for base year and future traffic forecasts.
- ETC data is independently system generated and hence more reliable. The client sourced vehicle category-wise traffic data which doesn't include toll ticket distribution.
- Monthly reports submitted by contractors / tolling agencies to NHAI field offices (Schedule M/G/V) which is start point to validate the toll ticket distributing including cash components, violation/exemptions, overloading fee etc.

**Summary of the historical traffic and revenue data available for Kaza Toll Plaza**

| Data sources | Duration of data | Observations |
|---|---|---|
| **Schedule V - Part A & B (monthly)** | FY11 : Q4 only<br>FY12 to FY24 : Full year<br>FY25 : 9 month<br>Except<br>Jul/Oct/Nov'24<br>FY26 : Q1, Q2, Oct'25<br>(7 months) | **Part A:** Vehicle category-wise total user fee collection<br>**Part B:**<br>Vehicle category total traffic<br>Ticket distribution data: Yes<br>Exemption/violation/ cash traffic data: Yes |
| **ETC Data (monthly)** | FY23 : Full year<br>FY24 : Full year<br>FY25 : Full year<br>FY26 : Apr-Oct'25 (7 months) | Vehicle category-wise ETC transactions covering total traffic and user fee collection<br>Ticket distribution data: No |
| **Overloading Reports (weekly)** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU Amaravati | |
| **Neighbouring highways** | Historical traffic data to determine corridor growth trend | |

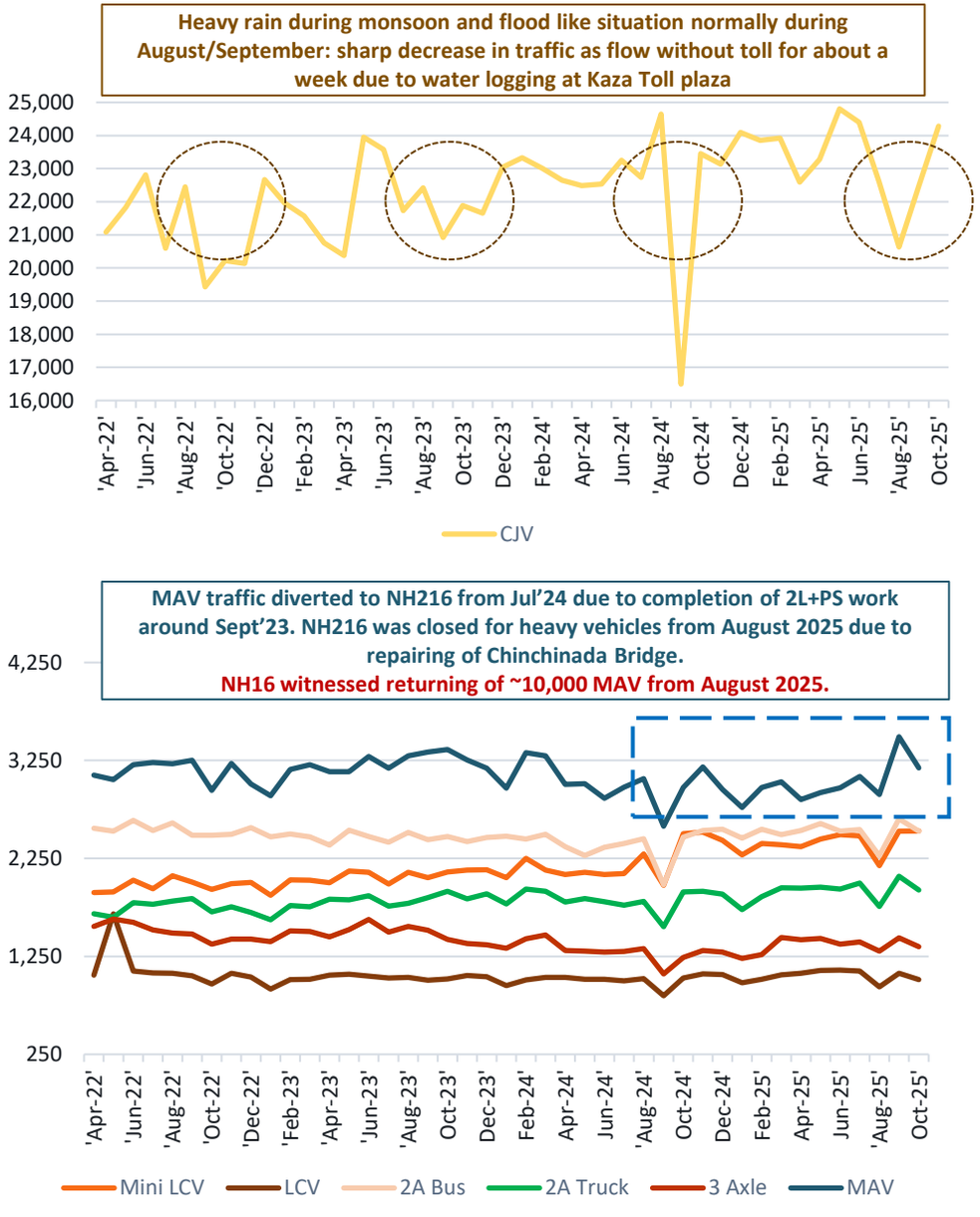
Source: TIC compilation of data received from NHAI

Monthly toll reports (Schedule M/G) submitted during BOT (Toll) was as per NH Fee Rules 1997 with internal swapping of traffic for freight vehicle categories as per discussion with the client and BOT (Toll) concessionaire. Hence, Schedule M/G during BOT (Toll) tenure is useful in terms broad level freight traffic characteristics instead of vehicle category-wise (separately for LCV, 2A, 3A, MAV) growth pattern.

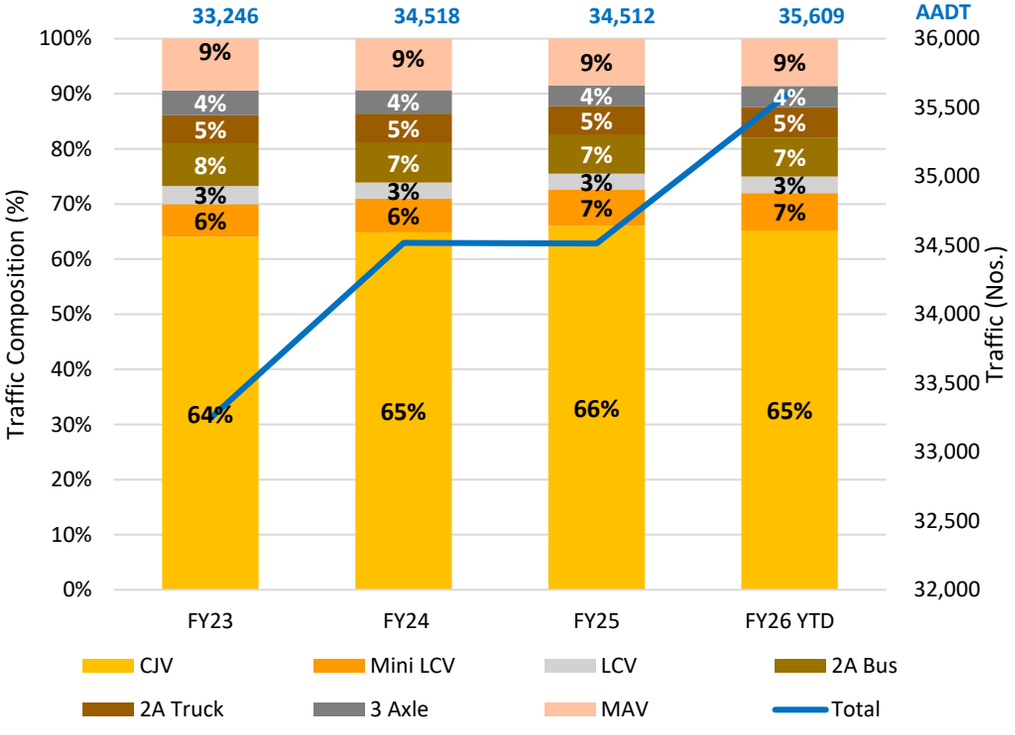
ETC data was reviewed for historical analysis as it is reliable.

# Historical traffic analysis (1)

### Vehicle category-wise monthly traffic trend - ETC




### Vehicle category-wise annual traffic composition - ETC




- Traffic has trended in the range of 34,500 AADT (56,000 PCUs) in recent past with CJVs (30%) and MAVs (37%) as major contributors. High number of CJVs is due to proximity to Dhanbad / Hazaribagh.
- The corridor is susceptible to demand-supply fluctuations of illegally mined coal which is being mainly transported through 5A Trucks due to optimum cost-tonnage ratio including overloading.
- 2A Trucks and LCV contribution is on increasing trend on the corridor in last three years.

Source: TIC analysis

# Historical traffic analysis (2)

**NH16 vs NH216: dynamic equilibrium during FY26 to FY29**




Source: TIC analysis (map not to scale)

- NH216 is important coastal highway running from Kathipudi to Ongole along the coast, connecting districts of east Godawari, West Godavari, Krishna, Guntur and Prakasam, serving as vital economic corridor for fisheries, tourism and agriculture. The same was improved to 2L+PS in September 2023 including Kakinada Bypass.
- Due to this development MAV traffic diverted to NH216 gradually from July 2024 and achieved almost equilibrium in July 2025.
- Core reasons for this diversion even after lower Level of Service (4L/6L NH16 vs 2L+PS NH216) are as follows:
  - Toll cost is ~25% lower than NH16
  - Cheaper fuel cost at Yanam part of the Union Territory of Puducherry.

- NH216 got closed for heavy vehicles from August 2025 due to repairing of Chinchinada Bridge.
- Hence, the project highway witnessed sharp jump of ~10,000 MAV, ~2,000 3A, ~15,000 2A trucks per month from August 2025 which is due to return of diverted traffic from NH216. This incremental gain is expected till March 2026 till heavy vehicle movement is prohibited due to major bridge repairing.
- The consultant estimated base year FY26 with this incremental gain followed by diversion to NH216 from April 2026 (FY27) at higher pace as well as additional diversion of ~25% in FY28 which was under transition. It is expected that traffic will stabilize between NH16 and NH216 from H2FY29.

# Historical traffic analysis (3)

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Vehicle category-wise traffic growth trend - ETC**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 21,295 | 1,976 | 1,091 | 2,528 | 1,739 | 1,492 | 3,125 | **33,246** | **56,246** |
| **FY24** | 22,385 | 2,099 | 1,030 | 2,462 | 1,850 | 1,494 | 3,229 | **34,518** | **57,886** |
| **FY25** | 22,774 | 2,264 | 1,013 | 2,407 | 1,819 | 1,283 | 2,951 | **34,512** | **56,367** |
| **FY26 till Oct'25** | 23,207 | 2,431 | 1,060 | 2,523 | 1,941 | 1,387 | 3,058 | **35,609** | **58,546** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 5.1% | 6.2% | (5.6%) | (2.6%) | 6.4% | (1.9%) | 3.3% | **3.8%** | **2.9%** |
| **FY25 vs FY24** | 1.7% | 7.9% | (1.6%) | (2.2%) | (1.6%) | (12.4%) | (8.6%) | **0.0%** | **(2.6%)** |
| **FY26* vs FY25** | 4.3% | 12.3% | 6.5% | 8.2% | 8.7% | 9.7% | 4.4% | **5.6%** | **6.0%** |
| **CAGR (FY23 - FY26 YTD)** | 3.5% | 8.6% | (1.1%) | (0.1%) | 4.5% | (2.9%) | (0.9%) | **2.8%** | **1.6%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

- **FY2019/FY2020:** The project highway is integral part of strategic NH16, traffic growth was witnessed at healthy and sustainable pace every year till FY20. **Revision of Safe Axle Weights for Transport Vehicles by MoRTH** was introduced in July 2018 (FY19), increasing loads by 15-25% to match international standards, boosting vehicle capacity and lowering logistics costs. This led to decrease in 3A/MAV traffic as lower number of trucks plying to carry similar tonnage in past. In addition, the state government **banned sand mining** and transportation in FY2020.
- **FY2021:** decrease of traffic as inter/intra-state travel was affected due to **Covid19 pandemic**.
- Toll plaza faces challenge of water logging for 3-4 days during heavy monsoon like recent August 2025 during which traffic flows without toll and sharp dip in traffic was observed.

Andhra Pradesh weather forecast: Low pressure area over Bay of Bengal to trigger heavy rainfall - The Hindu
Kaza Toll Plaza : జలదిగ్బంధంలో మంగళగిరి కాజా టోల్ ప్లాజా | Mangalagiri | Special Report | NTV Telugu - YouTube

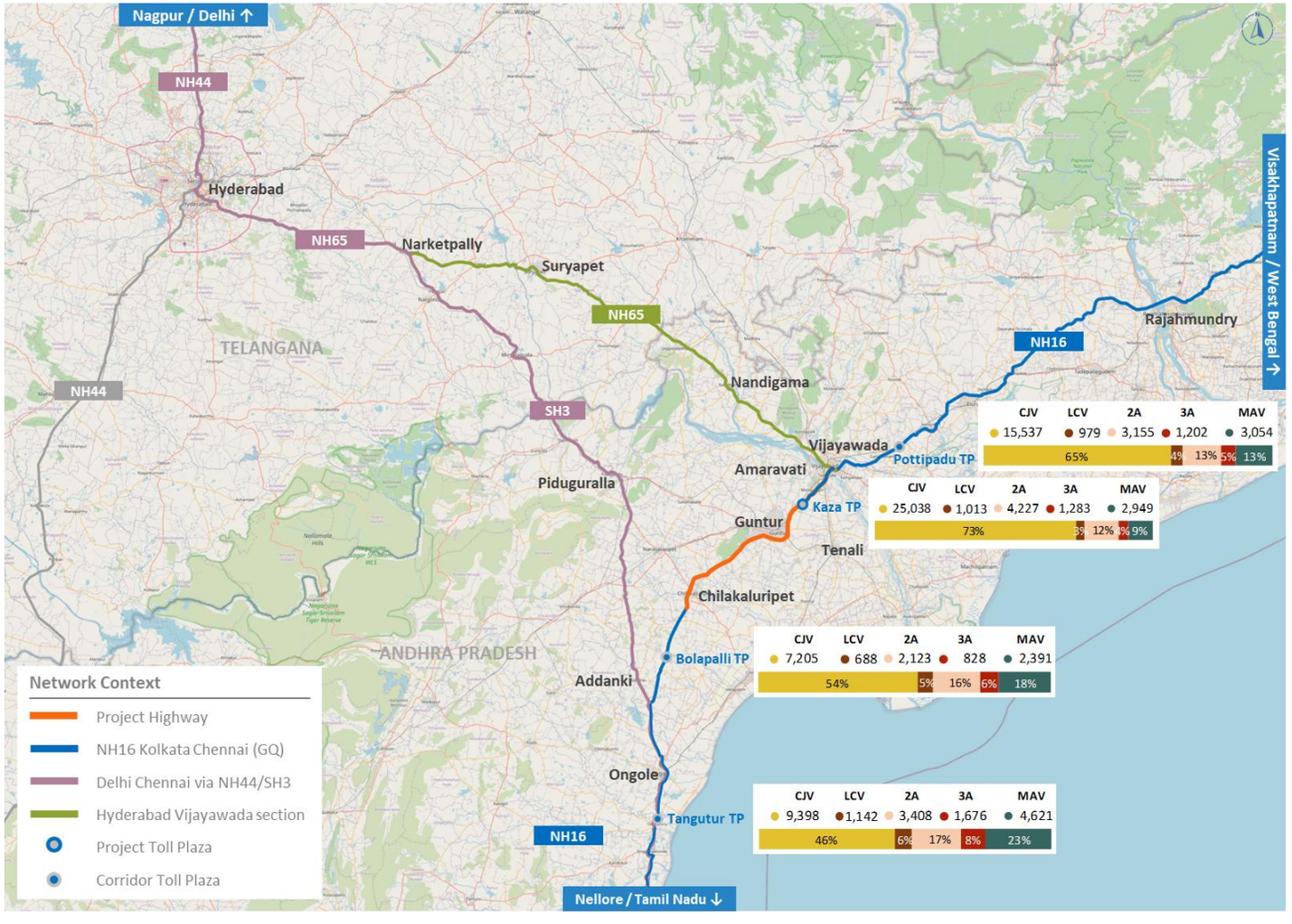
**Kaza Toll Plaza during heavy rain in Aug'25**



Source: Secondary research

# Historical traffic analysis (4)

**Benchmark road section on NH16 corridor for long-term growth trend**




Source: TIC analysis (map not to scale)

- Neighbouring highway section (Pottipadu TP) on north of the project highway (Kaza TP) witness traffic of Hyderabad and till Vijayawada. Hence, traffic characteristics are different.
- While highway sections on south of the project highway, except homogeneous section covered under immediate tollable section, witness traffic between Hyderabad/north and Ongole/south. This is significant long-haul traffic volume with different characteristics.
- Hence, only immediate tollable section in south of the project highway can act as benchmark for determining long-term growth rate.

**Corridor growth trends**

| CAGR | CJV/Mini LCV | LCV | Bus/2A Truck | 3A/MAV* | Total | PCU |
|---|---|---|---|---|---|---|
| **FY15 – FY19** | 10.8% | (2.3%) | 7.2% | 2.9% | **6.7%** | **5.0%** |
| **FY15 – FY24** | 8.0% | 0.5% | 4.0% | 1.9% | **5.0%** | **3.0%** |

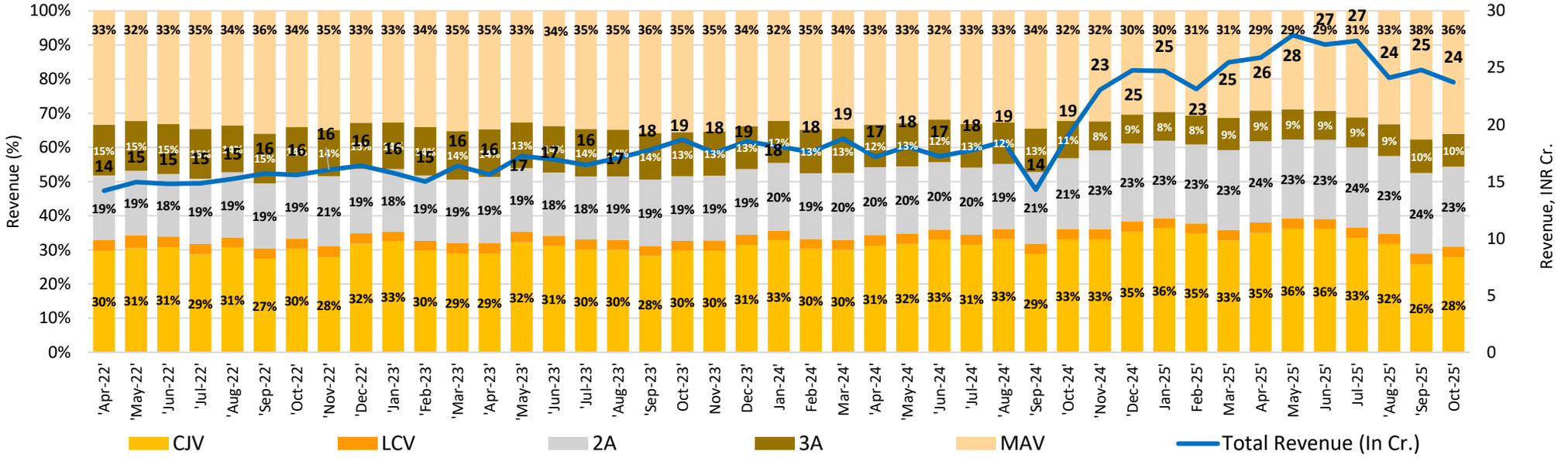
Source: TIC analysis

* observed lower growth is driven by the joint influence of the 3A/MAV

# Historical revenue analysis

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**Vehicle category-wise monthly revenue composition and trend - ETC**




| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) / Annual Average Daily Collection (AADC, in INR Lakh)** | | | | | | | | | |
| **FY23** | 50.0 | 5.4 | 5.7 | 15.4 | 19.7 | 26.2 | 62.7 | **184.9** | **50.66** |
| **FY24** | 57.6 | 6.4 | 6.2 | 16.9 | 23.2 | 27.8 | 72.3 | **210.3** | **57.47** |
| **FY25** | 72.2 | 8.6 | 7.2 | 24.6 | 27.7 | 25.5 | 77.5 | **243.2** | **66.63** |
| **FY26 till Oct'25** | 51.5 | 7.2 | 5.5 | 20.4 | 21.8 | 16.4 | 58.0 | **180.8** | **84.50** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 15.3% | 18.3% | 9.4% | 10.0% | 17.9% | 6.0% | 15.4% | **13.8%** | **13.4%** |
| **FY25 vs FY24** | 25.3% | 34.0% | 17.1% | 45.3% | 19.3% | (8.2%) | 7.2% | **15.6%** | **16.0%** |
| **FY26* vs FY25** | 47.6% | 79.0% | 50.2% | 96.9% | 55.6% | 9.6% | 44.5% | **48.1%** | **48.1%** |

Source: TIC analysis

* against FY25 for 7 months i.e., April-October

# Ticket distribution (1)

Schedule V (Part B) is a monthly statement presenting vehicle category and ticket distribution -wise traffic data including exemption, local concession / other discounted details.
Toll ticket distribution refers to share of total revenue with respect to various journey types and related discounts applicable. This distribution depends on vehicle category, trip lengths, trip frequency and percentage of local traffic.
As per Toll Plaza Gazette Notification and Toll Rate Revision Circular of FY26 for Kulgo TP, types of toll tickets are being issued are presented in the below table.

| Ticket Category | Description |
|---|---|
| **Single Ticket** | One-way journey on the project highway is considered as single journey. For such journeys, users are required to pay the complete notified one-way fee. |
| **Return Ticket** | Two one-way journeys on the Project highway within 24 hours are covered under this category. For such journeys, users are required to pay one and half times of the fee payable for one-way journey. |
| **Monthly Pass** | Fifty one-way journeys on the Project highway within a month covered under this category. The concessionaire shall, upon request from any person, issue a monthly pass for fifty one-way journeys at a discounted rate equivalent to two-thirds of fifty one-way journeys. |
| **Local Pass (Local Personal)** | Road user who owns a mechanical vehicle registered for non-commercial purposes and resides within a distance of 20 km from the toll plaza can get local monthly pass. |
| **Commercial vehicle registered within district of plaza (Local Commercial)** | Commercial vehicles (excluding vehicles plying under national permit) registered in the district where the toll plaza is located.<br>Fee shall be 50% prescribed rate for that category of vehicle provided no service road or alternative road is available for use of such commercial vehicles. |
| **Exempted** | This journey ticket category is for all users (like Police, Fire Brigade, Ambulance, Defence, etc.) which are exempted from paying toll as per NHAI Toll rules. |
| **Annual Pass for private non-commercial CJV vehicles** | On June 18, 2025, MoRTH introduced a FASTag-based annual pass to facilitate seamless highway travel. This pass is valid for non-commercial private vehicles such as cars, jeeps, and vans, and remains effective for one year from the date of activation or up to 200 trips—whichever comes first for INR 3,000. Trip counting method is as follows:<br>Open Tolling: Each entry / exit counts as one trip<br>Closed Tolling: One entry to exit trip counts as one |

Source: DCA, NH Fee Rules 2008 and subsequent amendments and existing gazette notifications

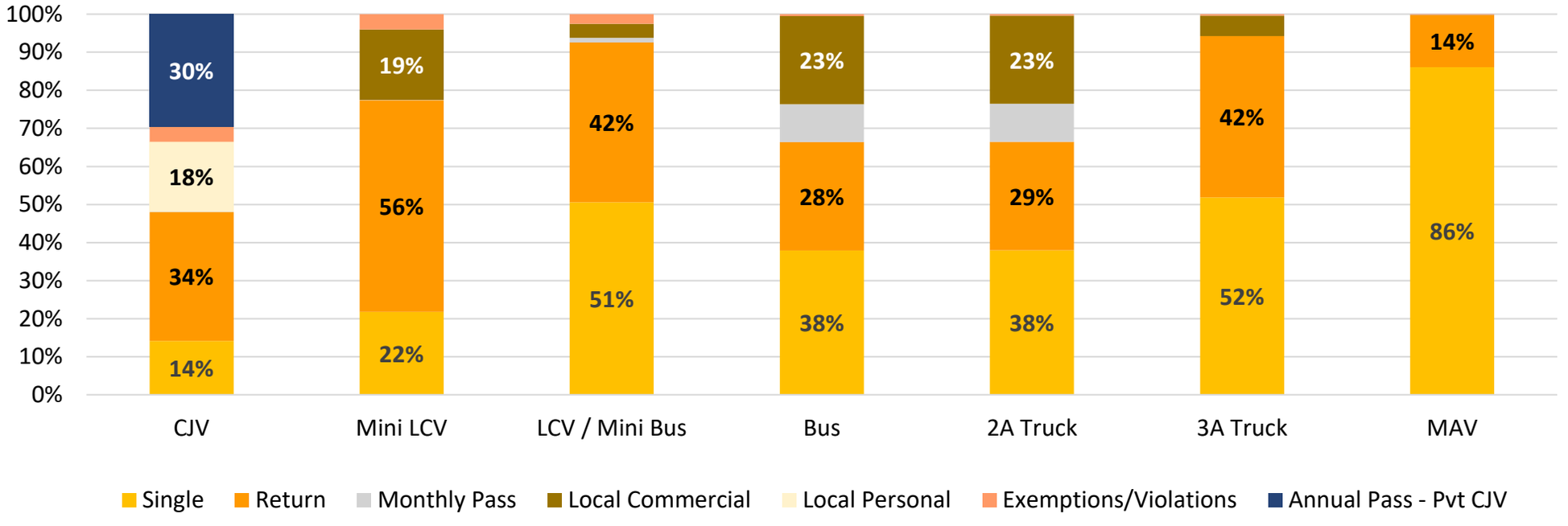
# Ticket distribution (2)

Currently it is envisaged that annual passes will be issued directly by concerned authority and hence revenue from sale of annual passes will not accrue to the concessionaire. NHAI has issued advisory for reimbursement of loss of revenue due to annual pass usage to the concessionaire which is part of Draft Concession Agreement as Clause 27.1.5 and described below:

- The concessionaire acknowledges and agrees that any user owning a non-commercial vehicle and holding a valid and functional Fastag Pass in accordance with MoRTH Gazette Notification No. G.S.R. 388(E) dated 17th June 2025shall be entitled to use the project highway without any restrictions, except to the extent specified in any applicable law, applicable permit or the provisions of the draft concession agreement.
- In respect of such vehicle crossing the toll plaza(s), the concessionaire shall be entitled to receive compensation from the authority equivalent to the product of:
  - The number of non-commercial vehicles crossing the toll plaza(s) with such pass; and
  - 90% of the applicable fee for single journey of such vehicle.
- Provided, however, that for the purpose of computation of such compensation, the counting of any particular vehicle shall be limited 2 crossing per day, notwithstanding that such vehicle may cross the toll plaza(s) multiple times on that day.
- The compensation payable under this clause shall be due and payable in monthly instalments within 7 days of the close of the month.

# Ticket distribution (3)

**Historical ticket distribution at Kaza TP**




Source: TIC analysis

- Passenger traffic is predominantly local, with CJV and buses showing a high share of local personal/return tickets, indicating frequent short-distance travel between Vijayawada, Guntur and adjoining towns.
- ~19% of Mini LCV uses commercial pass which reflecting short-haul movements linked to agriculture, trade and urban logistics.
- Goods traffic is mainly long-haul, as over 85%+ of MAV and 50%+ of 3A of traffic opt for single journey tickets, emphasizing the corridor's inter-state freight presence.
- ~30% of CJV traffic is being witnessed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to be increase to 1.25 times in future through gradual awareness among road users.

# Commodity analysis

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**Direction-wise commodity distribution**

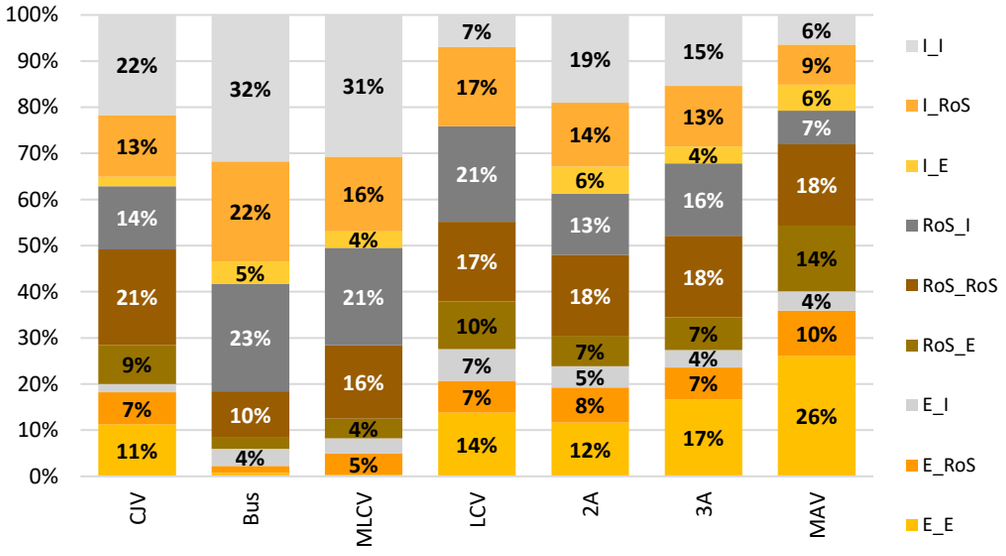
| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Vijayawada to Guntur | Guntur to Vijayawada | Vijayawada to Guntur | Guntur to Vijayawada | Vijayawada to Guntur | Guntur to Vijayawada | Vijayawada to Guntur | Guntur to Vijayawada | Vijayawada to Guntur | Guntur to Vijayawada |
| Agriculture / Animal Husbandry | 18% | 10% | 16% | 10% | 10% | 8% | 14% | 8% | 10% | 13% |
| Fruits and Vegetables | 15% | 18% | -- | 15% | 9% | 11% | 7% | 11% | 4% | 19% |
| FMCG / Food Products | 4% | 5% | -- | 5% | 5% | 6% | 6% | 9% | 5% | 5% |
| Building & Construction Material | 1% | 1% | -- | -- | 0% | 1% | 0% | 1% | 1% | 2% |
| Cement | 1% | 1% | 8% | -- | 2% | 1% | 3% | 4% | 6% | 7% |
| Aggregates / Sand | -- | -- | -- | -- | 1% | 1% | 12% | 4% | 3% | 1% |
| Minerals / Mining Commodities | -- | -- | -- | -- | -- | -- | 0% | 0% | 1% | 2% |
| Manufacturing | 10% | 11% | 4% | 15% | 9% | 8% | 6% | 6% | 8% | 11% |
| Automobile and Spares | 0% | 1% | -- | 2% | 1% | 4% | 2% | 2% | 6% | 8% |
| Chemicals / Fertilisers | 1% | 1% | 4% | -- | 1% | 1% | 1% | 2% | 6% | 3% |
| Steel / Metal Products | 3% | 2% | 4% | 2% | 5% | 3% | 8% | 4% | 23% | 8% |
| Petroleum Products | 2% | 2% | 15% | 2% | 11% | 10% | 12% | 12% | 6% | 4% |
| Parcel / E-commerce | 13% | 18% | 26% | 22% | 18% | 26% | 12% | 17% | 5% | 9% |
| Miscellenaeous | 1% | 2% | -- | -- | 3% | 1% | 3% | 4% | 1% | 0% |
| Empty | 32% | 29% | 23% | 25% | 25% | 21% | 16% | 16% | 15% | 7% |

Source: TIC analysis *0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

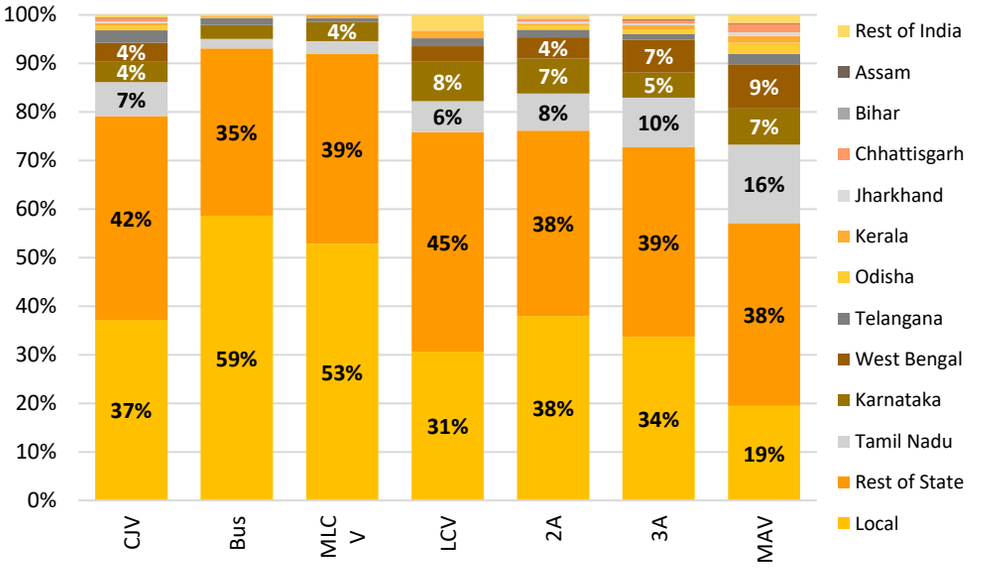
Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

# Zonal influences and trip distances

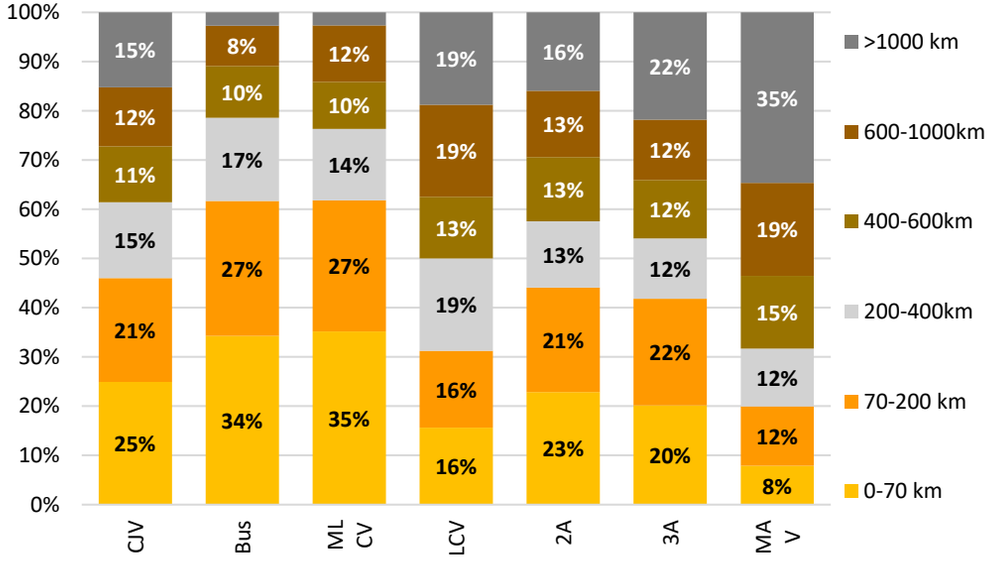
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance




Source: TIC analysis

| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 468 |
| Bus | 212 |
| Mini LCV | 276 |
| LCV | 440 |
| 2A | 581 |
| 3A | 586 |
| MAV | 837 |

Vehicle category-wise visual representation of origin-destination zones and top pairs are exhibited in Appendix A.

# Chapter 4: Economic context and traffic growth

- Economic context of influence region
- Determination of traffic growth drivers
- Estimation of demand elasticities
- Forecasts for growth drivers

IRC: 108-2015 mentions that traffic growth is typically driven by a combination of macro-economic trends and industry/commodity specific factors, known as independent variables or traffic growth drivers.

These growth drivers have two critical characteristics:

1) the rate at which it increases i.e., forecasts of independent variable
2) the project highway's relationship with the growth driver to attract, capture and retain the traffic over the forecast horizon i.e., travel demand elasticity

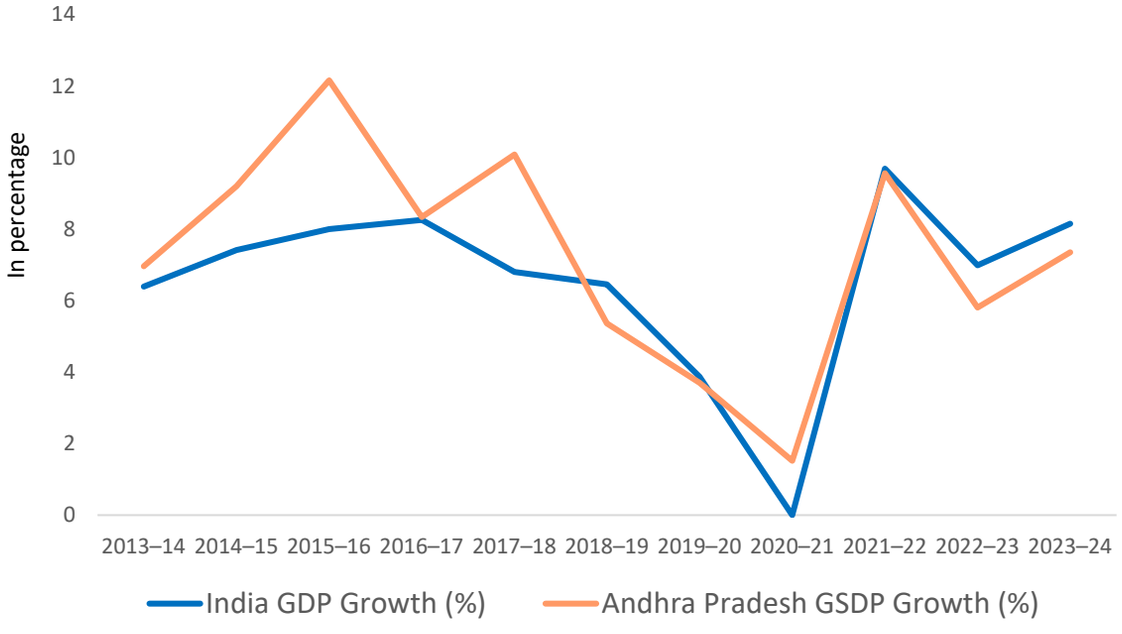
Growth drivers are typically identified through analysis of origin–destination data, site visits and a detailed understanding of the highway.

Travel demand elasticity is influenced by socio-economic conditions both within the region served by the project highway and across the wider national area of influence.

This chapter explains the growth drivers and elasticity in context of economic snapshot of primary districts / state and their correlation with the country.

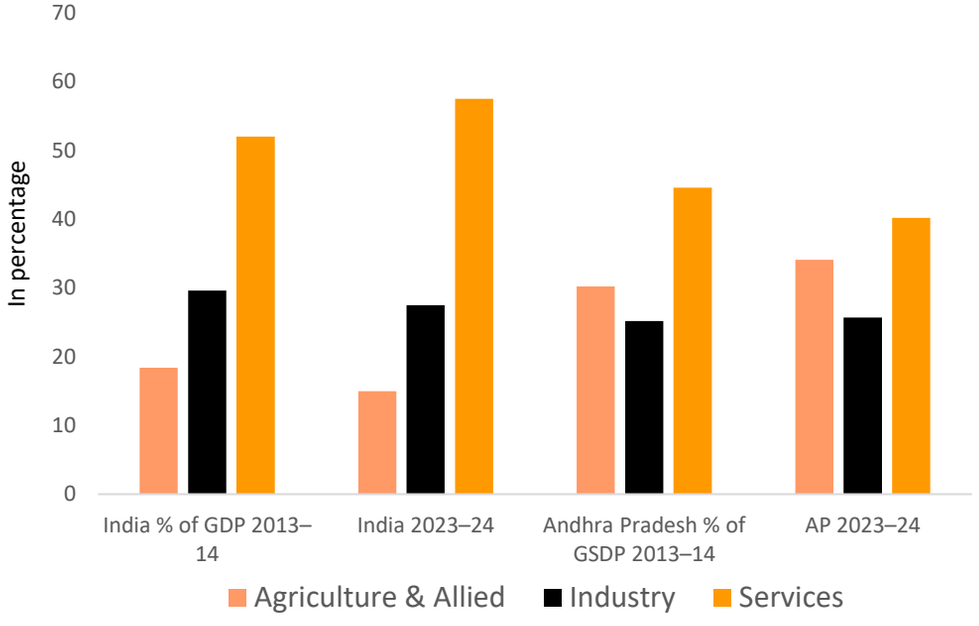
# Andhra Pradesh remains a key high performing growth state

**GDP: India vs Andhra Pradesh**




Source: Economic Survey of Andhra Pradesh and TIC analysis

**Sectoral composition shift (India vs Andhra Pradesh)**



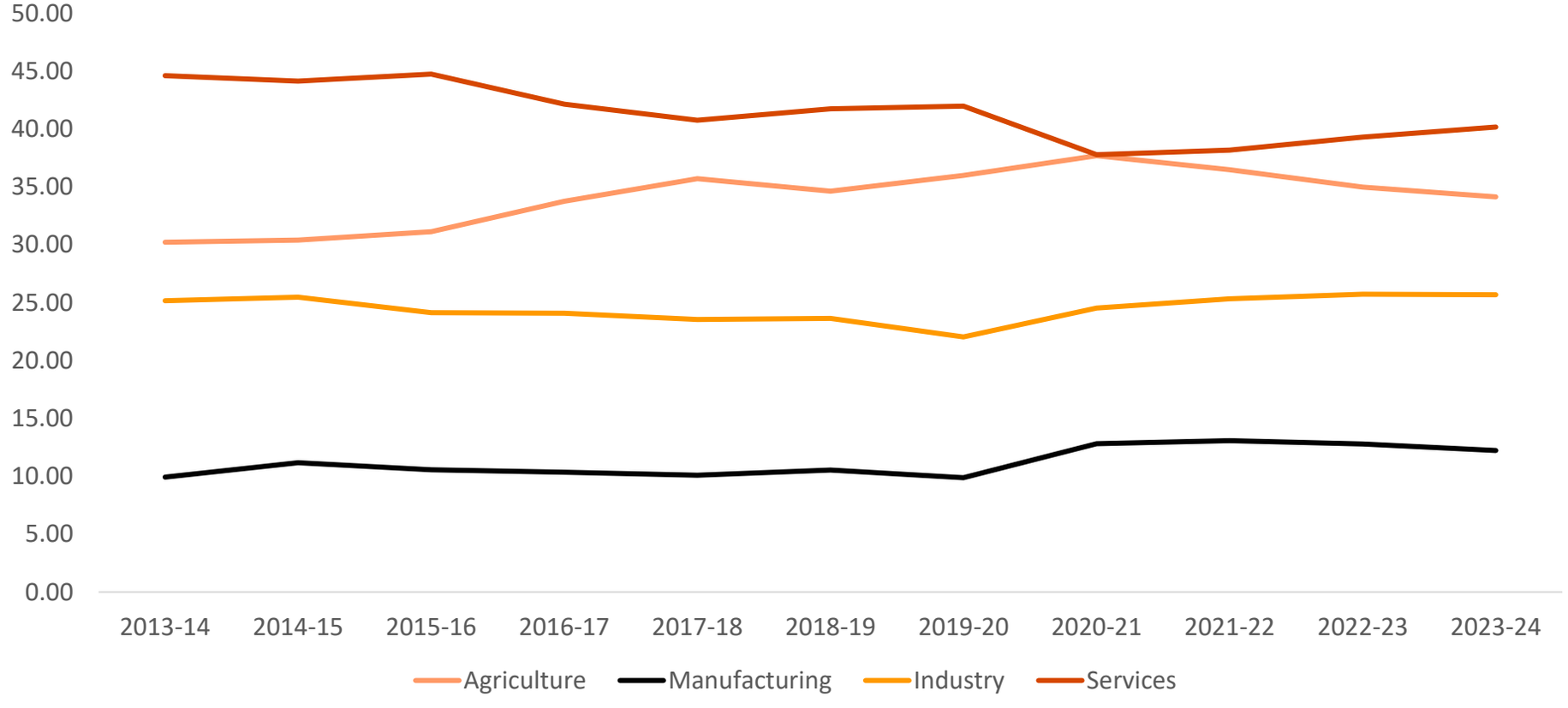

Source: MoSPI, Economic Survey of Andhra Pradesh and TIC analysis

- **Resilient Outperformer:** Andhra Pradesh consistently grew faster than India, except during FY19–20 when bifurcation-related fiscal strain and weak monsoons reduced output. Over the decade real growth has averaged nearly 7.9 %, outperforming India's ~6.8 %.
- The gap is most evident in FY2015-16 and FY2017-18 when state investments and irrigation projects spurred rapid expansion.
- **Pandemic Contrast**: While India's GDP shrank –5.8 % in FY21, AP still posted +1.5 % growth — underscores the stabilising role of agriculture and public spending.
- **Structural Divergence**: Unlike India's shift toward services, AP's agriculture share rose from 30 % to 34 %, led by allied sectors (livestock + fisheries), keeping the economy land- and production-linked.

**Andhra Pradesh represents a distinct structural path within India's growth story**

# Recent trend shows diversification from agriculture in the state

**Andhra Pradesh GSDP composition (% share)**

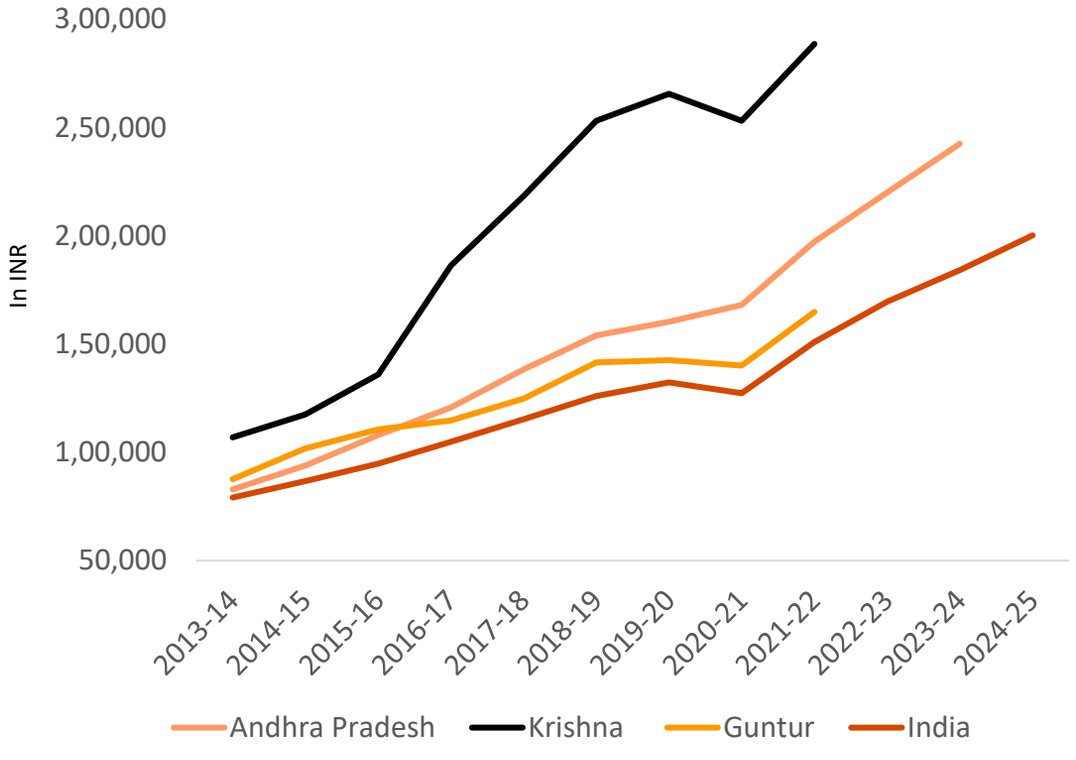



Source: Economic Survey of Andhra Pradesh and TIC analysis

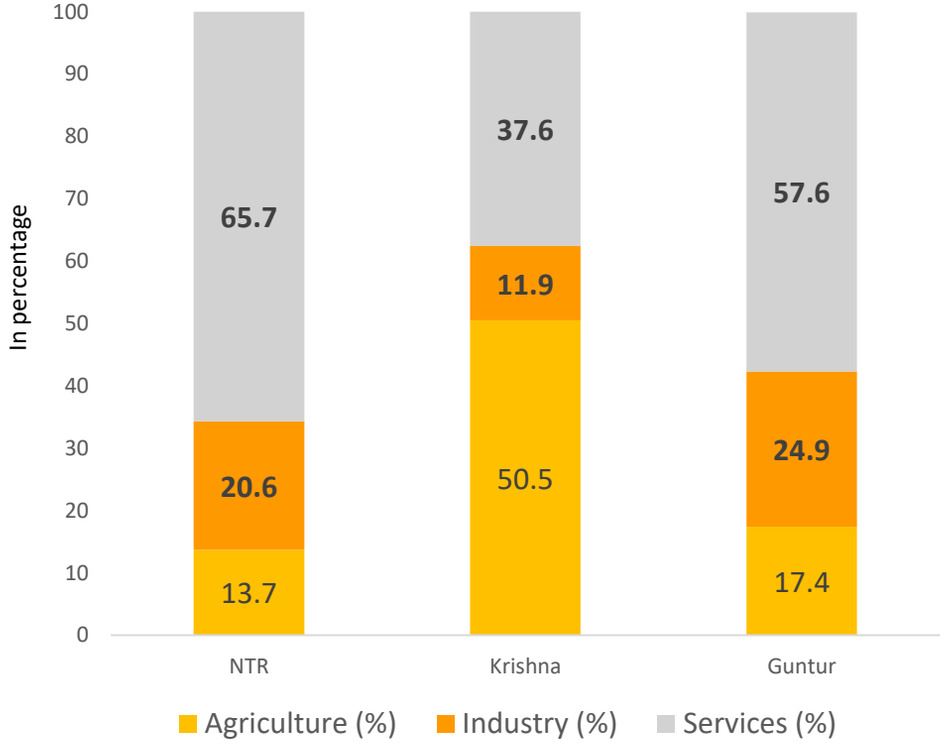
- Andhra Pradesh remains agrarian; share rises due to livestock and fisheries growth. Instead of de-agrarianisation, the state has diversified within the rural economy.
- Manufacturing remains modest but is rising slowly thanks to construction materials, textiles and agro-processing industries.
- Andhra Pradesh has yet to undergo the urban-services boom seen nationally. This pattern suggests a production-oriented, land-linked economy supported by irrigation, logistics, and agro-industry rather than finance and IT.

# This creates a significant income gap

**Per capita income**




**Sectoral contribution in district**




Source: Economic Survey of Andhra Pradesh and TIC analysis

**Summary of Tamil Nadu's economic performance**

| District | Growth Focus | PCI CAGR (10-Year growth) |
|---|---|---|
| **Guntur** | Agro-industrial expansion; dairy, aquaculture, and logistics | **~8.2%** |
| **Krishna** | Services, logistics, and trade hub (Vijayawada, Machilipatnam) | **~13.2%** |
| **Andhra Pradesh (overall)** | Balanced structural growth with high infra intensity | **~11.4%** |

Source: Economic Survey of Andhra Pradesh and TIC analysis

# Districts in immediate influence region

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**District-wise summary of risk and opportunities**

| Parameter | Andhra Pradesh (State) | Guntur | Krishna | NTR (Vijayawada) |
|---|---|---|---|---|
| **Primary driver** | ▪ Dual-engine: primary sector + services | ▪ Agriculture + agro-processing<br>▪ Textiles and MSMEs | ▪ Agriculture, fisheries and logistics | ▪ Urban services and administration (Vijayawada core) |
| **Key resource** | ▪ Irrigated deltas, fisheries<br>▪ growing financial & real-estate services | ▪ GI-Tag Chilli, cotton/tobacco belts; processing clusters<br>▪ Education and health institutions | ▪ Delta irrigation, coastal access, freight corridors (NH, port linkage) | ▪ Transport hub (rail/road)<br>▪ Administrative concentration<br>▪ Jawaharlal Nehru Auto Nagar Industrial Estate |
| **Major risk** | ▪ Monsoon variability, state-wide agri sensitivity<br>▪ fiscal space constraints | ▪ Commodity price swings and crop volatility<br>▪ Need for value-add and storage/cold-chain depth | ▪ Exposure to fisheries/agrarian shocks<br>▪ Industrial depth lower than Vizag/Tirupati belt | ▪ Urban congestion and land/water constraints with rapid real-estate growth |
| **Growth opportunity** | ▪ Services and manufacturing upgrades horticulture & fisheries value-chains<br>▪ Logistics | ▪ Spice value-addition (extracts, sauces)<br>▪ Textiles/apparel<br>▪ Food-processing clusters<br>▪ Education-health services | ▪ Logistics, cold chains and light manufacturing around port/industrial corridors<br>▪ Tourism | ▪ Service exports, retail, construction, smart-city style urban renewal<br>▪ Skill hubs |
| **Predicted strong growth segment** | ▪ LCV/HCV for agri and industrial goods<br>▪ Passenger traffic with rising incomes | ▪ LCV/HCV (agri produce and processed foods)<br>▪ Urban passenger flows | ▪ Mixed freight (fisheries/agri/logistics)<br>▪ Regional passenger growth | ▪ Passenger cars and buses (commuter/services)<br>▪ LCV for urban distribution |

Source: TIC secondary research and analysis

# Growth scenarios

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### Growth scenario summary

| Scenario | Expected real growth | Core drivers | Key conditions | Likely outcomes |
|---|---|---|---|---|
| **High-growth / Accelerated** | 8–9% | ▪ Rapid execution of industrial corridors and expressways<br>▪ Large anchor investments (food-tech, textiles, electronics, green energy)<br>▪ Amaravati revival spurs services, real estate, tourism<br>▪ Multimodal logistics parks operational | ▪ Strong public and private capex<br>▪ Investor-friendly reforms<br>▪ Favourable global trade<br>▪ climate-resilient infrastructure | ▪ District GDP more than doubles by 2030<br>▪ Per-capita income rises sharply<br>▪ Manufacturing and services deepen<br>▪ Logistics, freight and passenger traffic accelerate strongly across corridors |
| **Baseline / Central Case** | 6.5–7% | ▪ Steady growth in allied agriculture and agro-processing<br>▪ MSME expansion<br>▪ Services and logistics grow along NH corridors<br>▪ Housing and credit demand remains stable | ▪ Timely but phased project execution<br>▪ Stable credit environment<br>▪ Moderate inflation<br>▪ Policy continuity | ▪ District GDP roughly doubles by 2030<br>▪ Per-capita income grows 1.8–2×<br>▪ Balanced sectoral mix improves resilience<br>▪ Corridor spillovers lift urban services and logistics |
| **Conservative / Downside** | 5.5–6% | ▪ Slow allied agriculture growth<br>▪ Delays in corridor and port projects<br>▪ Weak industrial park occupancy<br>▪ Subdued services expansion | ▪ Fiscal stress limits capex<br>▪ Global slowdown<br>▪ Climate shocks<br>▪ MSME stress | ▪ Growth remains near state average<br>▪ Income gains driven more by inflation than productivity<br>▪ Weaker investor interest<br>▪ Limited traffic upside beyond baseline levels |

Source: TIC secondary research and analysis

# PESTEL Analysis

| Factor | Forward-looking positives | Potential downsides |
|---|---|---|
| **Political** | ▪ Stable central–state relations<br>▪ Commitment to industrial corridors and port projects<br>▪ Rural welfare schemes maintain demand | ▪ State finances are tight<br>▪ Any change in political priorities (e.g., shift away from Amaravati) could stall projects |
| **Economic** | ▪ Continued public capex<br>▪ Corridor-led manufacturing<br>▪ Allied agriculture and aquaculture growth | ▪ Global slowdown and weaker national services growth may cap Andhra Pradesh's export earnings<br>▪ Interest rates remain high |
| **Social / Demographic** | ▪ Rising literacy, moderate population growth (~0.6% p.a.), urbanisation in Krishna (~52%) drives services | ▪ Ageing rural population could shrink farm labour<br>▪ Income inequalities between coastal (Krishna) and hinterland (Guntur interior) may widen |
| **Technological** | ▪ Digital payments, fintech and e-commerce adoption<br>▪ Potential for EV manufacturing and renewable energy<br>▪ Agro-processing technology | ▪ Skills mismatch in rural areas<br>▪ Delayed adoption of technology due to infrastructure gaps |
| **Legal / Regulatory** | ▪ Land pooling reforms for Amaravati<br>▪ Ease-of-doing business improvements<br>▪ MSME dispute resolution | ▪ Litigation over land acquisition<br>▪ Uncertainty around property rights in capital region<br>▪ Potential trade regulations |
| **Environmental** | ▪ Emphasis on drip irrigation, crop diversification and cyclone preparedness<br>▪ EV push reduces emissions | ▪ Climate volatility (cyclones, droughts) threatens agriculture and port operations<br>▪ Coastal erosion could affect shrimp farms |

Source: TIC analysis

# Determination of growth drivers and elasticity (1)

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**Potential socio-economic indicators as growth drivers in context of IRC: 108-2015 and benchmark studies**

| Socio-economic indicators | Observations for availability/reliability of historical and forecast data |
|---|---|
| **Vehicle registration / Automobile Sales** | Sourcing vehicle registration data from concerned Regional Transport Office (RTO) within influence region is herculean task. In addition, it is not mandatory that Project Influence Area (PIA) matches with vehicle registration cases at ground level so not useful.<br>Society of Indian Automobile Manufacturers (SIAM) publishes automobile sales at region level but not at granular level. Can be used as proxy data to validate specific trends.<br>The consultant includes regional dealers' association of freight vehicles (if any) and local financing agencies to understand and validate specific trends observed in traffic. |
| **Per Capita Income** | Can be used as proxy data which reflects demand composition but not specific to commodities / vehicle category. Underlying forces are complex and changing at every strata of administrative structure i.e., districts, state, national. Historical data at state / national level available in public domain but not for district level. Further, availability of forecast data is major constraint in India. |
| **Population** | Population data are compiled on a decennial basis, with the latest census conducted in 2011, and do not provide a robust annual time series suitable for econometric modelling. In addition, migration trends across socio-economic segments and income-based geographies are highly volatile and difficult to forecast with confidence. Accordingly, population growth has not been adopted as a driver for forecasting future travel demand on the project highway. |
| **GDP / GSDP** | Dataset from national and international publications and government agencies which are highly reliable in context of forecast e.g., Focus Economics, RBI / RBI's Survey of Professional Forecasters (96$^{th}$ Round), SBI Research, CII, multilateral banks (ADB, World Bank etc.), IMF, OECD, Oxford etc.<br>The consultant typically uses Focus Economics monthly subscription and in-house/empaneled economists for correlation for state and district level GDP and industry specific aspects.<br>The client provides views on the consultant's draft and recommends the final forecast. |

Source: TIC research and analysis

# Determination of growth drivers and elasticity (2)

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- For any potential indicator (economic, commodity, or industry-related) to be used as a traffic growth driver, availability and reliability of both historical data and credible forecasts are critical success factors.
- Among the key socio-economic indicators discussed above, Gross Domestic Product (GDP) at the national level and Gross State Domestic Product (GSDP) at the state level are the only indicators for which robust historical data and reliable forecasts are consistently available. Accordingly, GDP/GSDP have been adopted as the primary growth drivers for traffic forecasting.
- The consultant held discussions with regional dealers' associations of freight vehicles, agricultural wholesale yards (popularly known as mandis) and inter-city bus terminals in the immediate influence region to validate specific traffic trends such as seasonality and growth patterns.
- In many cases, historical data show varying traffic trends due to various external events in the economy and region. In addition, variations in data recording by third-party tolling agencies and the presence of historical data gaps, as observed in this business case, necessitated further validation.
- Accordingly, validation of the historical data was carried out using traffic data from neighbouring toll plazas on the corridor and benchmark highway sections.
- Traffic growth may not be uniform during the forecasting period, considering factors such as increasing total traffic volumes relative to the capacity of the corridor and the project highway, technological advancements in the automotive industry, cost–tonnage ratios of specific commodity–vehicle combinations, and overloading trends versus strict government enforcement in the region.
- In India, the freight vehicle mix has been changing over the last decade, favouring multi-axle vehicles (MAVs) over 2-axle and 3-axle vehicles for long-distance traffic, given the operational efficiencies achievable with larger vehicles. At the same time, Mini LCVs and LCVs have become more popular for short-distance traffic and more localised supply movements compared to 2-axle vehicles.
- Considering ongoing technological advancements in the automotive industry, standard 2-axle and 3-axle trucks have been increasingly replaced by 6-tyre LCVs over the last couple of years, a trend that is expected to continue.
- The projected elasticity values are typically assumed to remain constant over the concession period in the Indian context; however, they may vary over time due to factors such as increasing traffic volumes relative to corridor capacity, technological advancements in the automotive industry, changes in cost–tonnage ratios of specific commodity–vehicle combinations, overloading trends versus enforcement intensity, and correction of regional imbalances.
- Considering all these aspects, vehicle category-wise elasticities have been estimated.

# Determination of growth drivers and elasticity (3)

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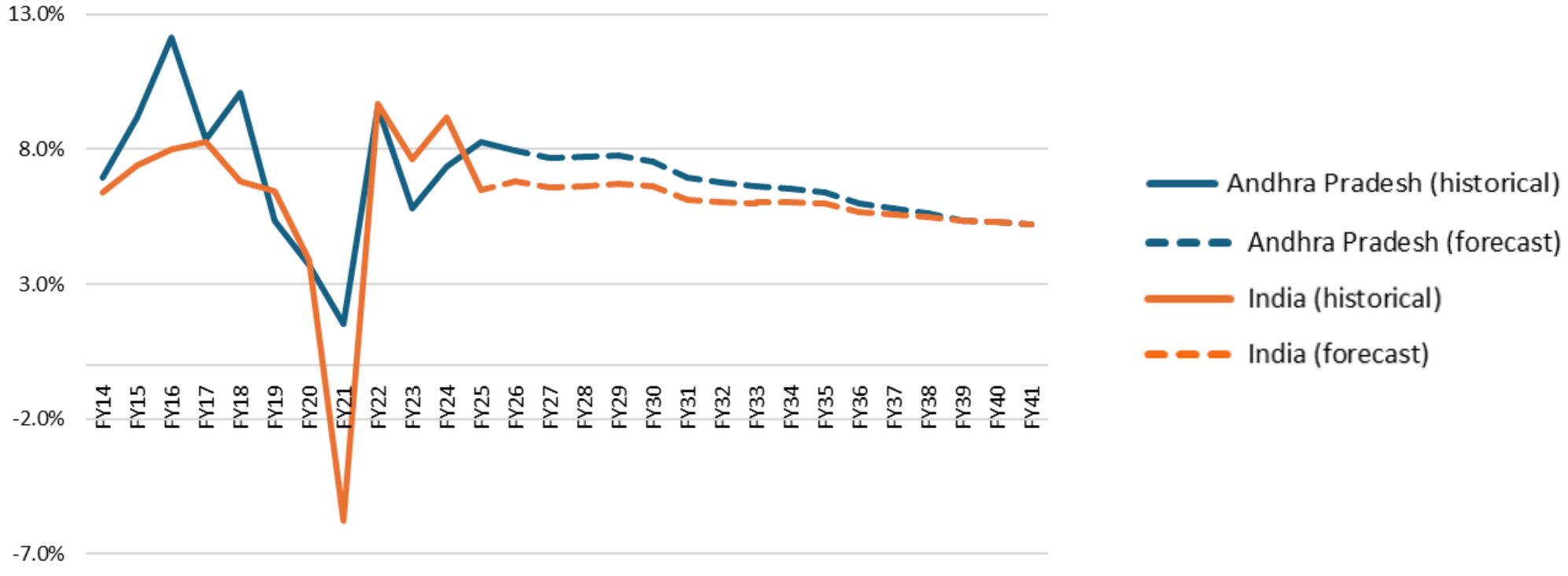
**Vehicle category-wise adopted elasticity**

| Vehicle Category | Asanpur | Independent variable |
|---|---|---|
| **CJV** | 1.10 | GSDP of Andhra Pradesh |
| **Mini LCV** | 0.60 | Weighted average of GDP, GSDP of Andhra Pradesh and Tamil Nadu |
| **Bus** | 0.35 | GSDP of Andhra Pradesh |
| **LCV / Mini Bus** | 0.70 | |
| **2A Truck** | 0.80 | Weighted average of GDP, GSDP of Andhra Pradesh and Tamil Nadu |
| **3A Truck** | 0.35 followed by gradual decrease | |
| **MAV** | 0.90 | |

Source: TIC estimate using historical traffic data for the project highway and benchmark references of up-stream / downstream toll plazas

# Forecasts for growth drivers

**GDP and GSDP forecast**




Source: Client input and TIC estimates

- By analysing historical patterns of state-level GSDP growth in relation to national GDP growth, state-wise GSDP projections have been developed. Under performing states compared to the national GDP are expected to witness an acceleration in growth and gradual convergence will realise by 2040 followed similar growth by 2047 with Viksit Bharat vision.
- WPI will be 3.24% throughout the concession period except 0.25% for FY27 to revise toll rates as provided by the Client.

# Chapter 5: Baseline traffic and revenue forecast

- Base year AADT (FY26)
- Toll ticket distribution
- Revenue reconciliation

This chapter presents our approach to reach baseline forecast. The consultant estimated base year AADT and toll ticket distribution to reconcile base year traffic and revenue.

# Base year AADT estimate (1)

- **CJV, Mini LCV, LCV, Bus:** The consultant reviewed H1 FY26 ETC traffic data received from the client. Based on which traffic profiling for balance half of FY26 has been estimated using seasonality correction factors followed by estimation of FY26 AADT.
- **2A, 3A, MAV:** as explained in Chapter 3 (Pg 34)
  - NH216 got closed for heavy vehicles from August 2025 due to repairing of Chinchinada Bridge.
  - Hence, the project highway witnessed sharp jump of ~10,000 MAV, ~2,000 3A, ~15,00 2A trucks per month from August 2025 which is due to return of diverted traffic from NH216. This incremental gain is expected till March 2026 till heavy vehicle movement is prohibited due to major bridge repairing.
  - The consultant estimated base year FY26 with this incremental gain. followed by diversion to NH216 from April 2026 (FY27) at higher pace as well as additional diversion in FY28 of ~25% which was under transition. It is expected that traffic will stabilize between NH16 and NH216 from H2FY29.
- An independent CTVC survey was undertaken to validate the ETC reported traffic data. The variance between CTVC and ETC data is comparatively higher for Car/Jeep/Van, Mini LCV, and Bus categories. For CJV/Mini LCV, this is attributed to local vehicles from nearby urban centres of Vijayawada and Guntur and villages in surrounding area like Mangalagiri, Vaddeswaram, Namburu, Old Guntur at Kaza toll plaza. Conversely, the variance for LCV, Bus, Truck 2A, Truck 3A, and MAV categories remains marginal and within acceptable industry standards.
- Hence, the consultant multiplied variance factor with ETC AADT to determine the corrected FY26 AADT.

# Base year AADT estimate (2)

**Base Year AADT (FY26) – Kaza TP**

| Particulars | ETC AADT | Variance factor | Corrected Base Year AADT |
|---|---|---|---|
| **Car/Jeep/Van** | 24,092 | 1.0407 | 25,073 |
| **Mini LCV** | 2,385 | 1.0407 | 2,482 |
| **Mini Bus/LCV** | 1,070 | 1.0176 | 1,089 |
| **Bus** | 2,511 | 1.0054 | 2,525 |
| **2A Truck** | 1,993 | 1.0038 | 2,000 |
| **3A Truck** | 1383 | 1.0040 | 1,388 |
| **MAV** | 3,159 | 1.0015 | 3,164 |
| **OSV** | 3 | 1.0208 | 3 |
| **Total AADT** | **36,596** | | **37,725** |
| **Total PCU** | **59,972** | | **61,180** |

Source: TIC estimate

# Ticket distribution

**Ticket distribution in FY26**

| Ticket types | Car/Jeep/Van | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|
| **Single** | 14.2% | 21.8% | 37.9% | 50.6% | 38.0% | 51.8% | 86.0% |
| **Return** | 33.9% | 55.6% | 28.5% | 42.0% | 28.5% | 42.4% | 13.7% |
| **Monthly Pass** | 0.1% | 0.1% | 10.0% | 1.2% | 10.0% | - | - |
| **Local Commercial** | - | 18.6% | 23.1% | 3.7% | 23.2% | 5.4% | 0.1% |
| **Local Personal** | 18.4% | - | - | - | - | - | - |
| **Exemptions/Violations** | 4.0% | 4.0% | 0.5% | 2.5% | 0.4% | 0.4% | 0.2% |
| **Annual Pass - Pvt CJV** | 29.6% | - | - | - | - | - | - |

Source: TIC estimate

- ~30% of CJV traffic is being witnessed using Annual Pass of INR 3,000 as on 30$^{th}$ October 2025 which is expected to increase by ~1.25 times in future through gradual awareness among road users.
- The consultant did not consider penetration of annual pass from estimated exemption/violation in future.
- For all vehicle categories, prevailing exemption/violation has considered for future. As per discussion with the client, prevailing forced exemption is likely to reduce post-implementation of Multi Lane Free Flow (MLFF) tolling system.
- Future segmentation will significantly change due to expected diversions especially post-construction of Amaravati Outer Ring Road in FY34 as discussed in Chapter 6.

# Validation of base year traffic and revenue

- The Consultant calculated base year revenue by multiplying traffic AADT with prevailing toll rates in accordance with estimated toll ticket distribution.
- Comparison summary with quoted remittance by tolling agency is presented in the below table.
- Quoted daily remittance should be lower than estimated revenue by approx. 5%-10% considering profit margins of tolling agencies.

**Traffic and revenue reconciliation for base year (all values are estimated with FY26 toll rate with old linking factor)**

| Toll Plaza | Base year revenue estimate by the Consultant (INR Crore) | Annual Potential Collection estimate by NHAI (INR Crore) | FY26 estimate vs NHAI APC | Quoted remittance By tolling agency (INR Crore) | Consultant estimate vs Quoted remittance |
|---|---|---|---|---|---|
| **Kaza** | 335.25 | 330.28 | 1.5% | 322.71 | 3.89% |

Source: TIC estimate

# Chapter 6: Diversion analysis

- Amaravati Outer Ring Road
- Ramayapatnam Port
- Developmental traffic due to Amaravati Capital City
- Chennai Hyderabad high-speed rail

This chapter elaborates impacts of proposed infrastructure developments in the project influence and network in form of positive/negative diversion to/from the project highway. Analysis has been exercised using IRC: 108-2015 and IRC: SP: 30-2019.

# Amaravati Outer Ring Road (1)

- Amaravati Outer Ring Road (ORR) is a major proposed infrastructure project designed to circle the new capital city of Amaravati in Andhra Pradesh. Proposed outer ring road will be around 189 km long, six-lane, access-controlled greenfield road being developed by National Highways Authority of India. Alignment is finialled and DPR work is in advance stage.
- Proposed ring road is planned to connect Guntur, Tenali, Vuyyuru and Amaravati to support the region's growth as outlined in Master Plan 2050 by Andhra Pradesh Capital Region Development Authority.
- A part of the project highway including the existing Kaza TP will be within the boundary to be established by proposed ring road which will encircle Vijayawada, Amaravati and Guntur. Consequently, a significant portion of through traffic is expected to divert to the ring road, as vehicles will prefer to bypass the city to avoid congestion, leading to a significant reduction in through traffic.
- Negative diversion due to proposed outer ring road has been estimated for three sets of traffic (refer map on next page)
  - Northend region outside ORR towards Eluru/Rajahmundry: locations on north Pottipadu which is the junction of NH16 and ORR
  - Western region outside ORR towards Hyderabad: locations on west of Saidapuram which is the junction of NH65 and ORR
  - Eastern region outside ORR towards Machilipatnam: locations on east of Davuluru which is the junction of NH65 and ORR

**Diversion due to Amaravati Outer Ring Road**

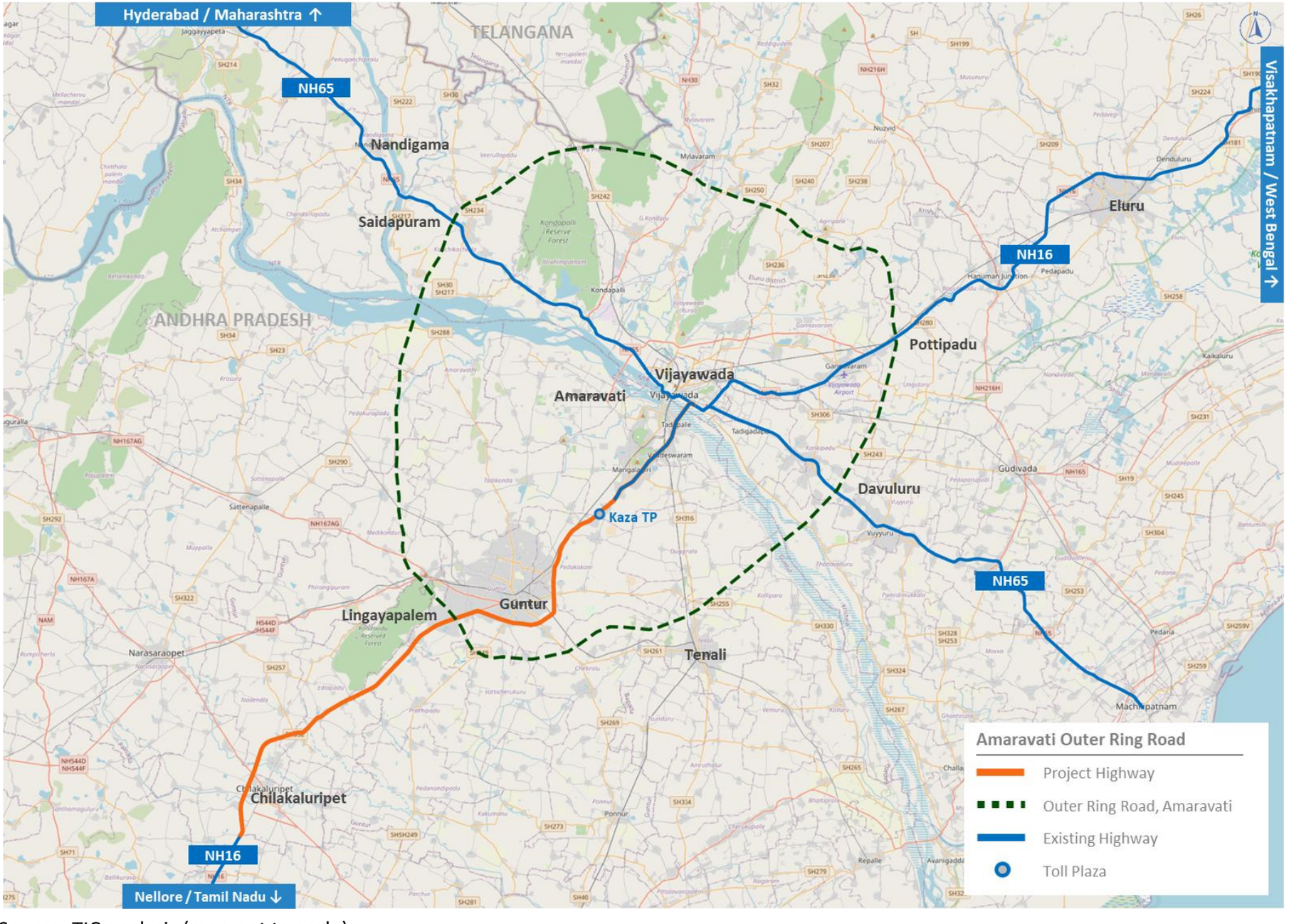
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Pottipadu/north and Lingayapalem/south | FY34 (40%) FY35 (80%) FY36 (100%) onwards | Kaza | (35.49%) | - | (21.00%) | (24.01%) | (33.67%) | (51.90%) |
| | Traffic movement between Saidapuram/west and Lingayapalem/south | FY34 (40%) FY35 (80%) FY36 (100%) onwards | Kaza | (5.07%) | - | (4.36%) | (3.89%) | (3.37%) | (4.51%) |
| | Traffic movement between Davuluru/east and Lingayapalem/south | FY34 (40%) FY35 (80%) FY36 (100%) onwards | Kaza | (1.49%) | - | (1.17%) | (2.21%) | (2.59%) | (1.42%) |

Source: TIC estimate

# Amaravati Outer Ring Road (2)

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**Amaravati Outer Ring Road alignment and project highway context**

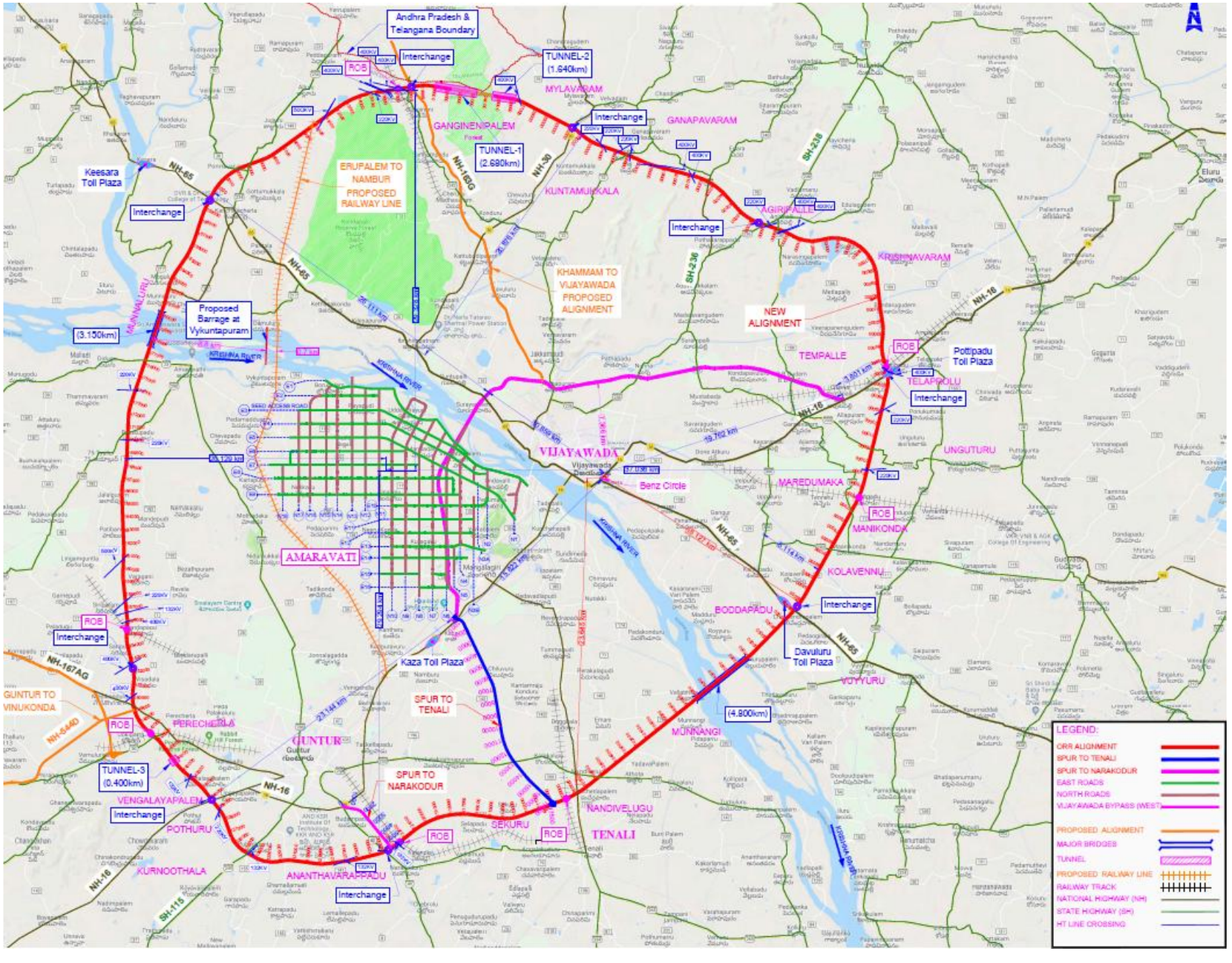



Source: TIC analysis (map not to scale)

# Amaravati Outer Ring Road (3)

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**Amaravati Outer Ring Road alignment in regional context**




Source: NHAI

# Ramayapatnam Port (1)

- Ramayapatnam port is a greenfield development by the state government in Prakasam district and implemented by Andhra Pradesh Maritime Board through Ramayapatnam Port Development Corporation Limited.
- Construction of Phase-1 commenced in July 2022 and expected to be operational by end of FY27. Phase-1 development includes four multipurpose berths, breakwaters and dredging works with cargo handling capacity of 30 MTPA extended to 19 berths with 138 MTPA capacity in future. This port-led economic development will strengthen trade and growth of the region.
- About 65% work completed as of June 2025 including 4 km of dredging works.
- This development is likely to attract additional traffic to the project road, leading to a developmental traffic.
- The consultant carried out following steps to determine developmental traffic based on details available in DPR:
  - Primary hinterland of Ramayapatnam Port:
    - Andhra Pradesh: Prakasam, Guntur, Kurnool districts
    - Telangana: Nalgonda, Mahboobnagar, Rangareddy, Hyderabad
  - Target traffic: exports of agricultural goods, granite and seafood and imports of coal and fertilizers
  - Determining origin-destination zones which will use the project highway i.e. VGTM region – Vijaywada, Guntur, Tenali, Mangaligiri including Amaravati Capital City in future
  - Tonnage forecast including ramp-up during phased development and competition split due to proposed greenfield port development like Machilipatnam and proposed
  - Other associated port-led economic development like integrated refinery and petrochemical complex with 9-12 MMTPA capacity and an ethylene cracker by Bharat Petroleum Corporation Limited (BPCL) by 2030, logistics and warehousing facilities in the region
  - Modal split for determined cargo-tonnage combination of traffic: road vs rial logistics expected
  - Determining volume of trucks from expected tonnage traffic based on existing pattern on the project highway

# Ramayapatnam Port (2)

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**Ramayapatnam Port and project highway context**




Source: TIC analysis (map not to scale)

**Developmental traffic due to Ramayapatnam Port**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | |
|---|---|---|---|---|---|---|
| | | | | 2A | 3A | MAV |
| **Developmental traffic** | Traffic movement from identified hinterland to Ramayapatnam Port | FY28 (85%) FY29 (90%) FY30 (90%) FY31 (95%) FY32 (100%) | Kaza | 1.22% | 0.84% | 1.01% |

Source: TIC estimate

# Amaravati Capital City (1)

- Development related to Amaravati Capital City and nearby region is expected to generate significant developmental and induced traffic at the project highway.
- As major phases of the capital city's infrastructure such as government administrative complexes, educational institutions, housing townships and commercial centers become operational, travel demand within the region is expected to rise. This growth will lead to increased daily commuting between Amaravati/Vijayawada and Guntur, as well as heightened movement of goods and services supporting the expanding urban ecosystem.
- In the long term, the enhanced connectivity and economic opportunities offered by the Amaravati Capital City and nearby region will act as strong promoter for traffic growth through the project highway. The induced traffic will primarily consist of passenger vehicles, public transport and logistics movement associated with residential and business development.
- Consequently, the Kaza TP is likely to experience a steady rise in traffic.

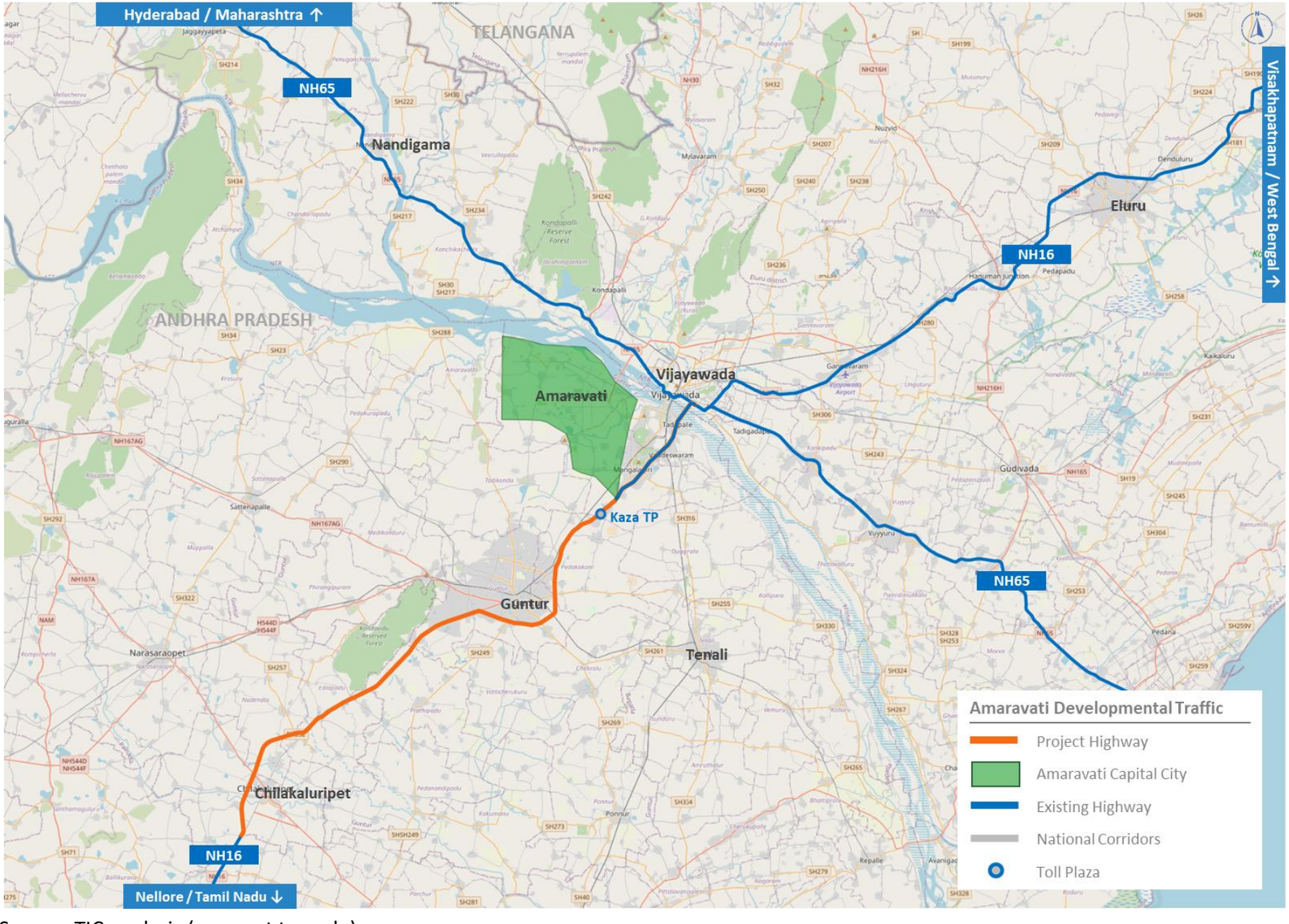
The consultant carried out following steps as preparatory work to determine developmental traffic for Amaravati Capital City and nearby region:

- Comprehensive economic assessment of the Vijayawada, Guntur, Tenali, Manglagiri (VGTM) region with focus on Guntur Vijayawada corridor region
- Present and future transport movement in VGTM region and potential movement that will use the project highway
- Benchmark with existing planned city progress against envisaged development and population i.e. Noida (Uttar Pradesh), Naya Raipur (Chhattisgarh), Navi Mumbai (Maharashtra), Gandhinagar (Gujarat) and implications for Amaravati Capital City development
- All the planned cities next to big cities are unable to achieve their planned population within the stipulated time frame. About 30% - 40% of population is achieved from the planned population.
- Phasing of identified development, investment and population at Amaravati Capital City e.g. Quantum Valley, Health City, Pharma Zone, Educational Campuses, Mangalagiri Gold Cluster etc.

# Amaravati Capital City (2)

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**Ramayapatnam Port and project highway context**




Source: TIC analysis (map not to scale)

# Amaravati Capital City (3)

Two methods adopted to determine the developmental traffic:

- **Floating population method:**
  - Determining external trip rate (External-Internal, Internal-External) for passenger and freight traffic for benchmark case of Chandigarh Urban Complex and associated region
  - Trip rates applied for Amaravati Master Plan followed by determination of volume estimate based on existing occupancy pattern on the project highway
  - Identification of share of traffic movement between Guntur direction and Amaravati Capital City region for passenger and freight traffic
  - Phasing of the volume estimate for target traffic movement
- **Land-use based trip generation method** using Trip Generation Manual for Indian Cities developed by CSIR – Central Road Research Institute
  - Determining land use pattern from Amaravati Master Plan and calculate 'Total Built-Up Area' using area and Floor Space Index (FSI) for Residential, Commercial, Industrial, Open Space and Recreation, Institutional Facilities, Infrastructure Reserve and sub-categories
  - Derived vehicle-category wise traffic volume for each land use (and sub-categories) using land-use based trip generation equations for each vehicle category mentioned in Trip Generation Manual for Indian Cities
  - Determining external trip rate (External-Internal, Internal-External) for passenger and freight traffic for benchmark cases of Chandigarh and Vijayawada cities
  - Trip rates applied for Amaravati Master Plan followed by determination of volume estimate based on existing occupancy pattern on the project highway
  - Identification of share of traffic movement between Guntur direction and Amaravati Capital City region for passenger and freight traffic
  - Phasing of the volume estimate for target traffic movement

The consultant developed three scenarios (most likely, optimistic and pessimistic) for 5-year period during FY30 to FY45 with combination of proposed scale of development and phasing options followed by ramping-up of traffic volume for target movement.

# Amaravati Capital City (4)

**Developmental traffic due to Amaravati Capital City**

| Toll Plaza | Affected traffic movement | Scenario | Timeline | Diversion as % of Base Year AADT | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | CJV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Kaza** | Traffic movement between Amaravati and Guntur/south | **Most likely** | **FY30** | 2.88% | - | 0.43% | - | 0.46% |
| | | | **FY46** | 8.72% | 27.28% | 7.11% | - | 9.12% |
| | | **Optimistic** | **FY30** | 5.35% | - | 0.37% | - | 0.48% |
| | | | **FY46** | 8.72% | 27.28% | 7.11% | - | 9.12% |
| | | **Pessimistic** | **FY30** | 2.88% | - | 0.43% | - | 0.46% |
| | | | **FY46** | 5.97% | 18.38% | 8.44% | - | 8.75% |

Source: TIC estimate

# Chennai Hyderabad high-speed rail (1)

- Chennai–Hyderabad High Speed Rail Corridor is a proposed 778 km high-speed rail link connecting Chennai Central, Minjur (on Chennai Ring Road), Tirupati, Amaravati/Vijayawada, and Hyderabad across Tamil Nadu, Andhra Pradesh and Telangana.
- Proposed development will transform regional connectivity, boosts trade, tourism, and economic growth, becoming a key part of India's high-speed network.
- Upon completion, it is expected to reduce the current Chennai–Hyderabad travel time from approximately 12 hours to about ~3 hours.
- South Central Railway submitted final alignment to be included in the detailed project report (DPR) to State Government of Tamil Nadu and requested approvals in November 2025 to keep the survey work on track.
- Latest media reports suggest that:
  - Chennai Unified Metropolitan Transport Authority (CUMTA) confirmed that DPR for the highspeed rail corridor will be finalized within a month after the state government grants its approval as the alignment had been revised to include a station at Tirupati, replacing the earlier plan to pass through Gudur.
  - In a letter to the state transport department earlier this week, the South Central Railway sought early finalization of the alignment and station locations, in-principle approval for the acquisition of land, and incorporation of the rail corridor into Tamil Nadu's long-term infrastructure master plan.
- The consultant considered that proposed development will be operational in FY38 with benchmark case of Ahmedabad Mumbai high-speed rail and present political leadership at Telangana, Andhra Pradesh and Tamil Nadu.

**Diversion due to Chennai Hyderabad high-speed rail**

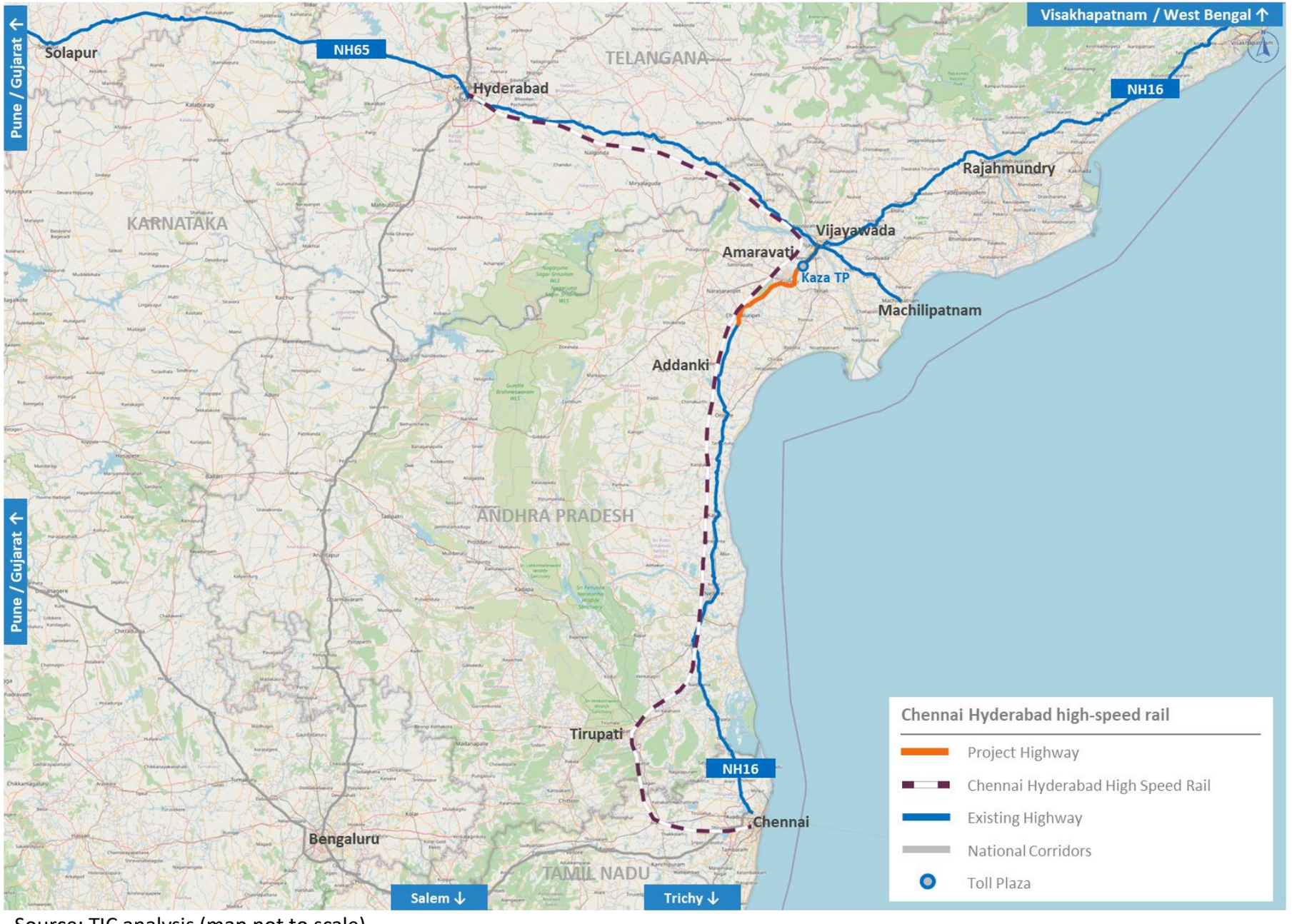
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | LCV | Bus | 2A Trucks | 3A Trucks | MAV |
| **Amaravati Developmental Traffic** | | | | | | | | | |
| **Negative diversion** | Traffic movement from/ to Hyderabad, Vijayawada and Chennai | FY38 (70%) FY39 (100%) | Kaza | (4.29%) | - | (2.87%) | - | - | - |

Source: TIC estimate

# Chennai Hyderabad high-speed rail (2)

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**Chennai Hyderabad high-speed rail alignment and project highway context**




Source: TIC analysis (map not to scale)

# Chapter 7: Final traffic and revenue estimate

- Traffic growth forecast
- Traffic and revenue forecast
- Scenario development

Following pre-diversion traffic forecast and diversion analysis, this chapter presents final traffic and revenue forecast for various scenarios: most likely with and without overloading, pessimistic and optimistic.

# Transactional Support Agreement and FY27 revenue estimate

- The project highway is proposed to be included in NHAI's Public InvIT.
- A Transactional Support Agreement will be executed between NHAI and the Public InvIT for the management of toll plaza operations for FY27.
- Tolling operations during FY27 will be undertaken by NHAI under the prevailing short-term contract modality.
- Accordingly, FY27 revenue has been estimated based on historical bidding trends for tolling contracts and is assumed to be 5%–10% lower than the estimated actual revenue.
- Consistent with this arrangement, manpower-related expenses for tolling operations have been excluded from O&M costs as confirmed by the client.

# Traffic and revenue forecast: Kaza TP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 5.0% | 5.3% | 6.6% | 6.6% | 7.2% | 6.2% | 6.9% | 6.0% | 6.4% |
| Mini LCV | 4.3% | 4.6% | 4.3% | 4.4% | 4.1% | 4.3% | 3.8% | 3.3% | 3.8% |
| LCV | 4.8% | 5.0% | 5.0% | 5.1% | 4.7% | 4.9% | 4.4% | 3.8% | 4.4% |
| Bus | 2.3% | 2.3% | 2.2% | 2.3% | 2.1% | 2.3% | 2.1% | 1.7% | 2.0% |
| 2A Truck | 4.1% | 3.0% | 5.8% | 5.7% | 5.8% | 4.9% | 5.4% | 4.3% | 4.9% |
| 3A Truck | (1.2%) | (2.7%) | 1.0% | 1.2% | 1.1% | (0.1%) | 1.0% | 0.8% | 0.7% |
| MAV | (4.2%) | (8.9%) | 5.6% | 6.1% | 6.2% | 0.8% | 6.1% | 4.9% | 4.5% |
| **AADT** | **3.7%** | **3.6%** | **5.9%** | **5.9%** | **6.3%** | **5.1%** | **6.1%** | **5.3%** | **5.6%** |
| **PCU** | **2.0%** | **1.0%** | **5.3%** | **5.4%** | **5.7%** | **3.9%** | **5.6%** | **4.8%** | **5.0%** |

**Post-diversion growth rate**

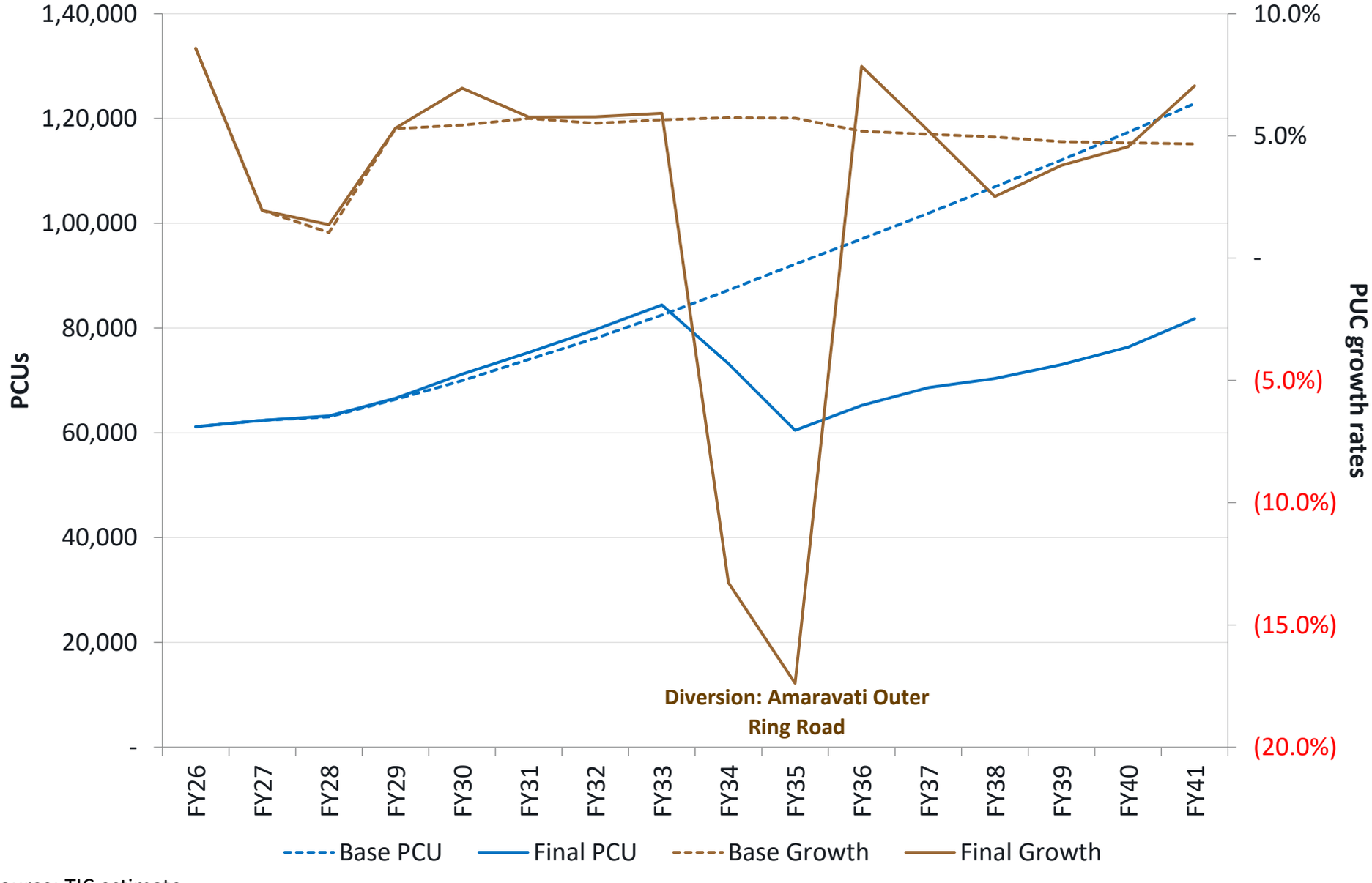
| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 5.0% | 5.3% | 6.6% | 9.7% | 7.3% | 6.8% | (2.9%) | 5.5% | 2.9% |
| Mini LCV | 4.3% | 4.6% | 4.3% | 4.4% | 4.1% | 4.3% | 3.8% | 3.3% | 3.8% |
| LCV | 4.8% | 5.0% | 5.0% | 5.1% | 4.7% | 4.9% | 1.8% | 6.0% | 4.2% |
| Bus | 2.3% | 2.3% | 2.2% | 2.3% | 2.1% | 2.3% | 2.1% | 1.1% | 1.8% |
| 2A Truck | 4.1% | 4.1% | 5.9% | 6.2% | 5.9% | 5.2% | (0.0%) | 4.2% | 3.0% |
| 3A Truck | (1.2%) | (2.0%) | 1.0% | 1.2% | 1.2% | 0.0% | (8.5%) | 0.8% | (2.8%) |
| MAV | (4.2%) | (8.1%) | 5.7% | 6.6% | 6.3% | 1.1% | (8.9%) | 6.6% | (0.3%) |
| **AADT** | **3.7%** | **3.7%** | **5.9%** | **8.1%** | **6.4%** | **5.5%** | **(2.3%)** | **4.9%** | **2.6%** |
| **PCU** | **2.0%** | **1.4%** | **5.3%** | **6.9%** | **5.8%** | **4.3%** | **(2.8%)** | **4.6%** | **2.0%** |

Source: TIC estimate

# Traffic and revenue forecast: Kaza TP (2)

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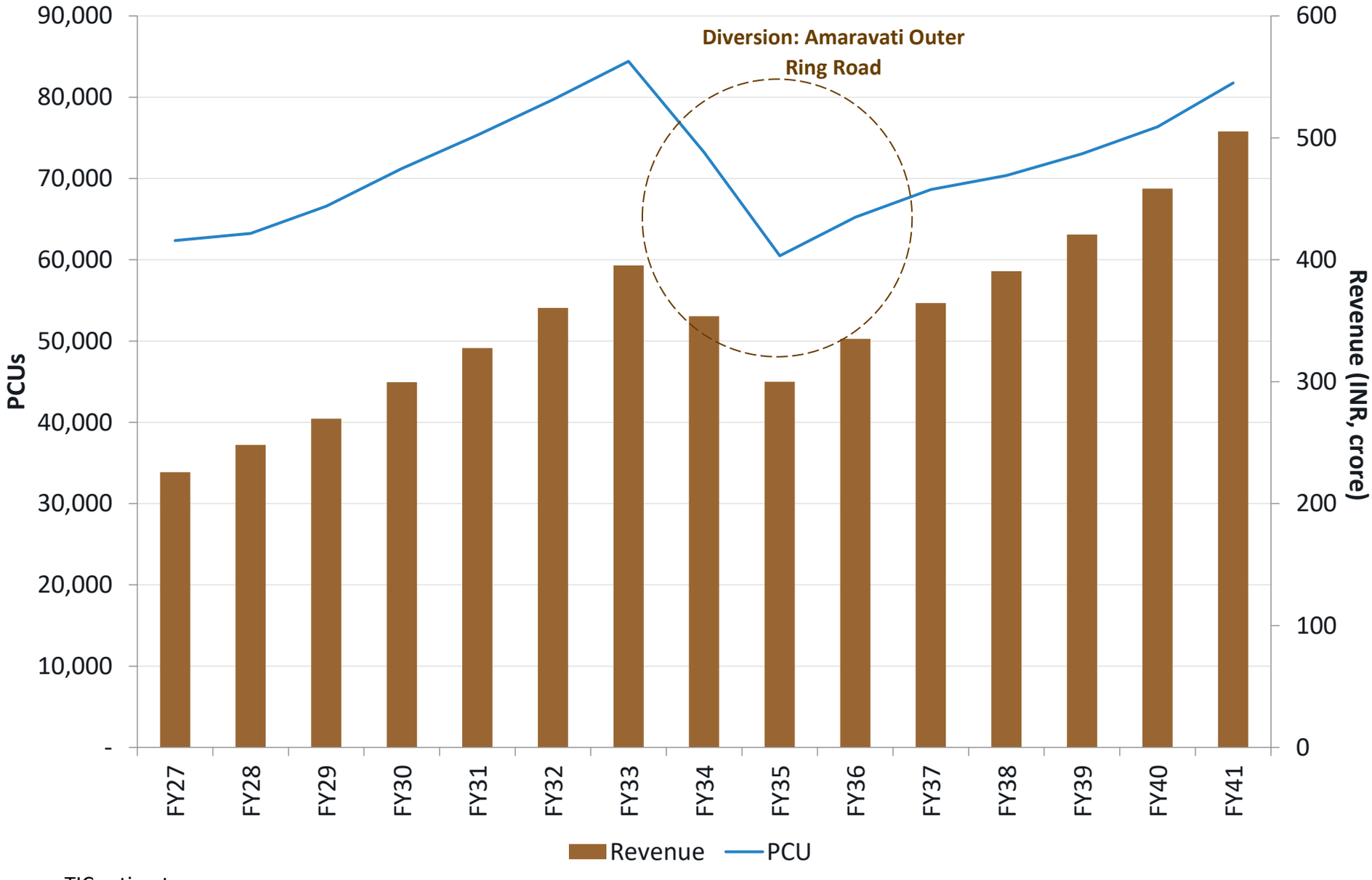
**Pre- and Post-diversion growth rate snapshot**




Source: TIC estimate

# Traffic growth forecast: Kaza TP (3)

**Revenue and PCU snapshot**




Source: TIC estimate

# Scenario development definition

**Most Likely Scenario without overloading**

- No overloading penalty/fees is considered at present based on understanding from site visit. In context of present ground situation and possibility of diversion in case of collecting overloading fees, the consultant did not consider overloading fee collection in most likely scenario.

**Most Likely Scenario with overloading**

The consultant considered following changes from the most likely (with overloading) case to determine most likely (with overloading) scenario:

- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey.

**Optimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine optimistic scenario:

- GDP: increase (addition) of 0.25% from FY27 to FY35
- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey
- Delayed the impact due to Outer Ring Road, Amaravati by a year

**Pessimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine pessimistic scenario:

- GDP: decrease (subtraction) of 0.25% from FY27 to FY35
- No overloading penalty/fees is being levied

Detailed traffic and revenue forecast for 'Most likely scenario without overloading' is exhibited in Appendix B.

# Scenario summary: Kaza TP (1)

| | Most likely without overloading | | | Most likely with overloading | | | Optimistic scenario | | | Pessimistic scenario | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FY | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) |
| FY27 | 62,377 | 2.0% | 226 | 62,423 | 2.0% | 226 | 62,606 | 1.9% | 226 | 62,377 | 2.0% | 226 |
| FY28 | 63,234 | 1.4% | 248 | 63,277 | 1.4% | 261 | 63,448 | 1.3% | 249 | 63,234 | 1.4% | 248 |
| FY29 | 66,596 | 5.3% | 270 | 66,641 | 5.3% | 283 | 66,945 | 5.5% | 271 | 66,471 | 5.1% | 269 |
| FY30 | 71,224 | 6.9% | 299 | 71,271 | 6.9% | 315 | 72,324 | 8.0% | 318 | 70,951 | 6.7% | 298 |
| FY31 | 75,337 | 5.8% | 328 | 75,407 | 5.8% | 342 | 76,713 | 6.1% | 347 | 74,880 | 5.5% | 326 |
| FY32 | 79,697 | 5.8% | 361 | 79,834 | 5.9% | 372 | 81,461 | 6.2% | 379 | 79,039 | 5.6% | 358 |
| FY33 | 84,419 | 5.9% | 395 | 84,586 | 6.0% | 406 | 86,578 | 6.3% | 415 | 68,341 | (13.5%) | 318 |
| FY34 | 73,217 | (13.3%) | 354 | 73,383 | (13.2%) | 363 | 92,134 | 6.4% | 456 | 56,181 | (17.8%) | 269 |
| FY35 | 60,489 | (17.4%) | 300 | 60,646 | (17.4%) | 308 | 80,523 | (12.6%) | 409 | 59,620 | 6.1% | 296 |
| FY36 | 65,233 | 7.8% | 335 | 65,417 | 7.9% | 341 | 67,743 | (15.9%) | 352 | 61,390 | 3.0% | 318 |
| FY37 | 68,633 | 5.2% | 364 | 68,844 | 5.2% | 368 | 71,317 | 5.3% | 380 | 63,839 | 4.0% | 342 |
| FY38 | 70,363 | 2.5% | 391 | 70,584 | 2.5% | 395 | 75,008 | 5.2% | 417 | 67,079 | 5.1% | 374 |
| FY39 | 73,038 | 3.8% | 421 | 73,269 | 3.8% | 426 | 78,764 | 5.0% | 454 | 70,368 | 4.9% | 407 |
| FY40 | 76,367 | 4.6% | 458 | 76,607 | 4.6% | 464 | 80,374 | 2.0% | 484 | 73,548 | 4.5% | 443 |
| FY41 | 81,752 | 7.1% | 505 | 82,002 | 7.0% | 511 | 83,240 | 3.6% | 519 | 78,721 | 7.0% | 488 |
| Total (FY27 - FY41) | | | 5,255 | | | 5,381 | | | 5,676 | | | 4,979 |

Source: TIC estimate



Reaches LOS B of 6-Laning 60,000 PCU/day



Reaches LOS C and D

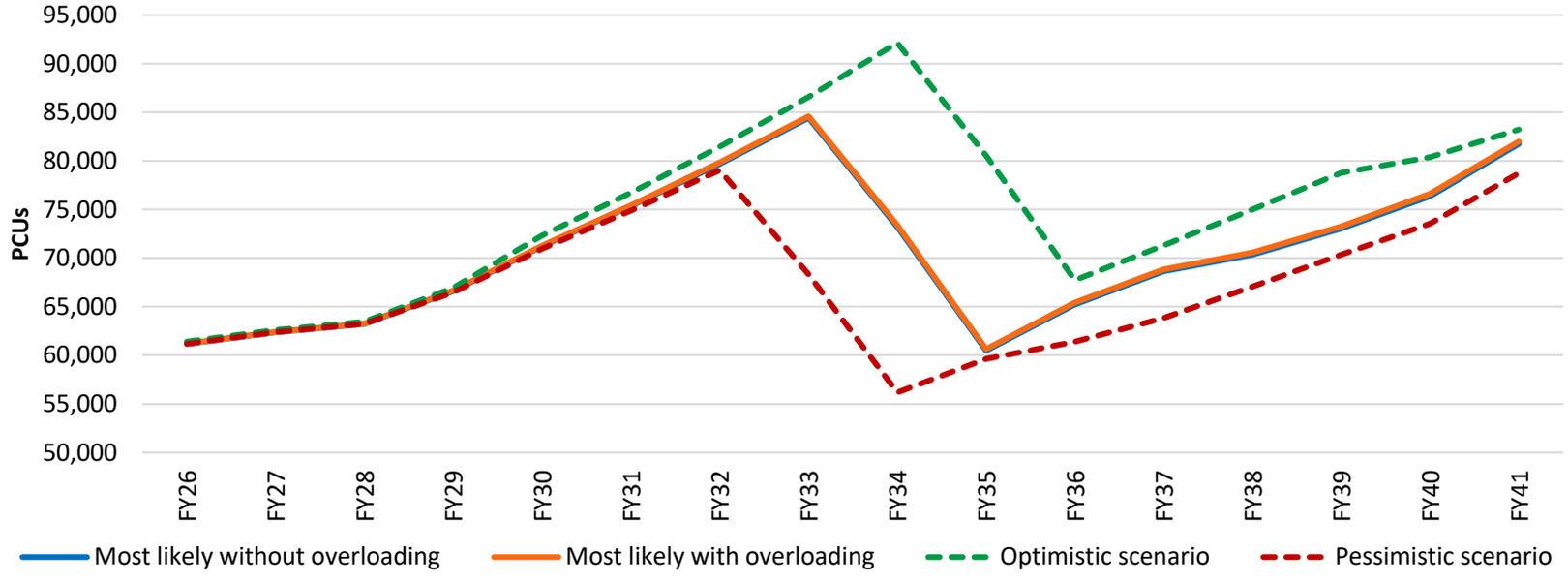
**Benchmark cases:**

Gujarat: Ahmedabad Mumbai Corridor (Mandva Toll) – 1,45,000 PCU
Gujarat: Ahmedabad Mumbai Corridor (Choryasi Toll) – 1,22,000 PCU
Haryana: Delhi Panipat Corridor (Bhagan Toll) – 1,07,000 PCU

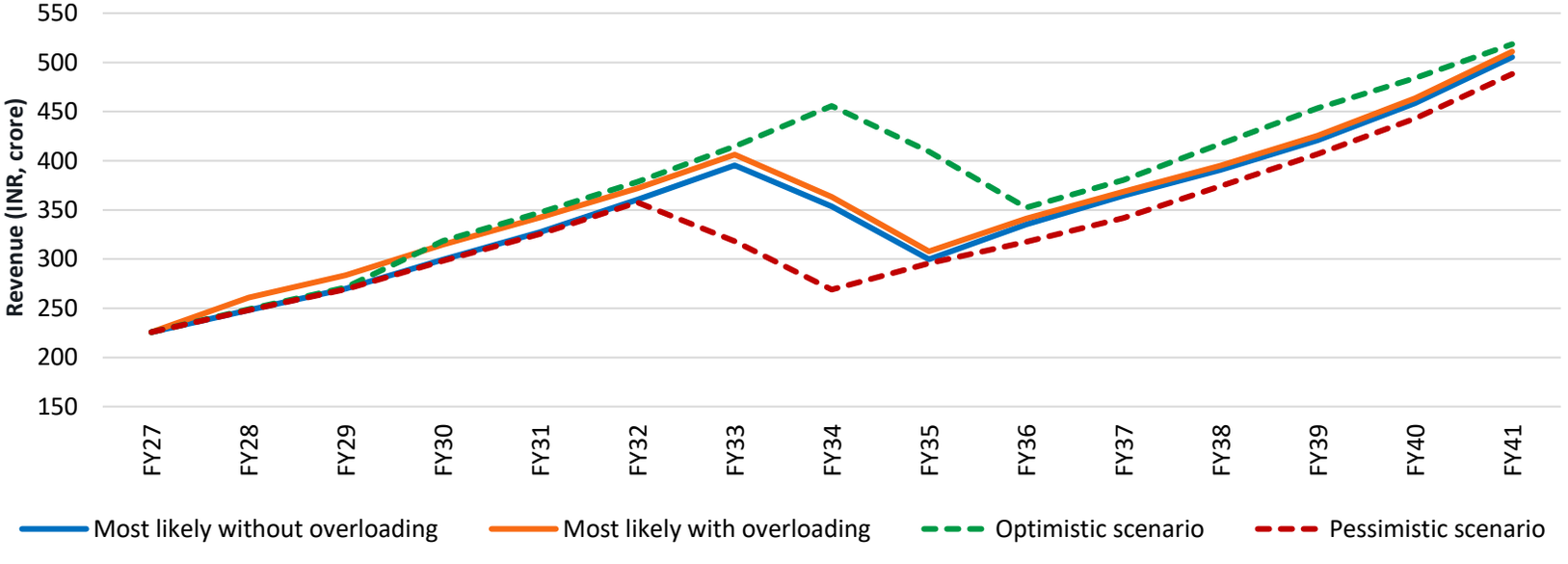
Design capacity for 6-lane National Highway is determined as per as per IRC: 106 and IRC: SP 87 and standard industry practice for determining Level of Service C/D/E.

# Scenario summary: Kaza TP (2)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# List of Appendices

**Appendix A:** Vehicle category-wise visual representation of origin-destination zones and top origin-destination pairs

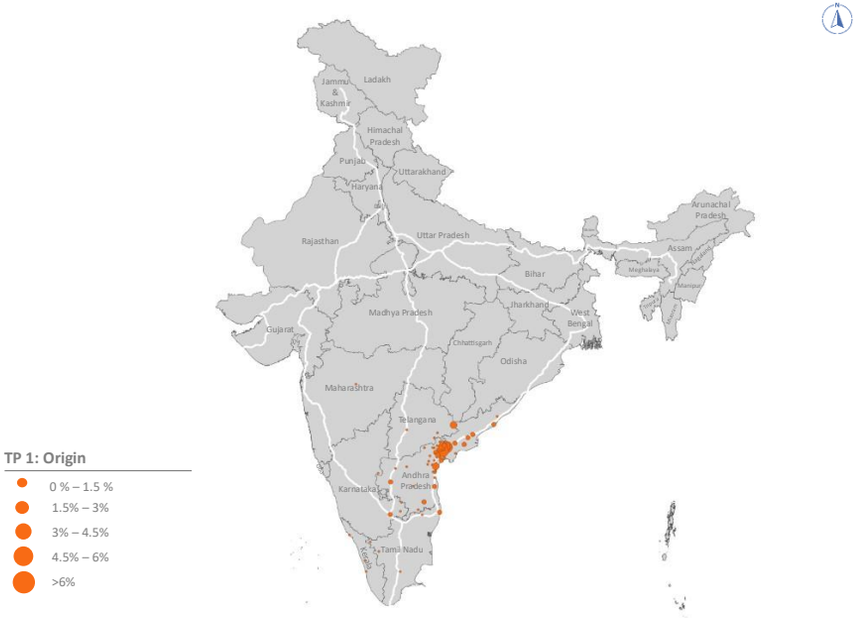
**Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

## Appendix A:

- Vehicle category-wise visual representation of origin-destination zones
- Vehicle category-wise top origin-destination pairs

# Vehicle category-wise visual representation of OD (1)

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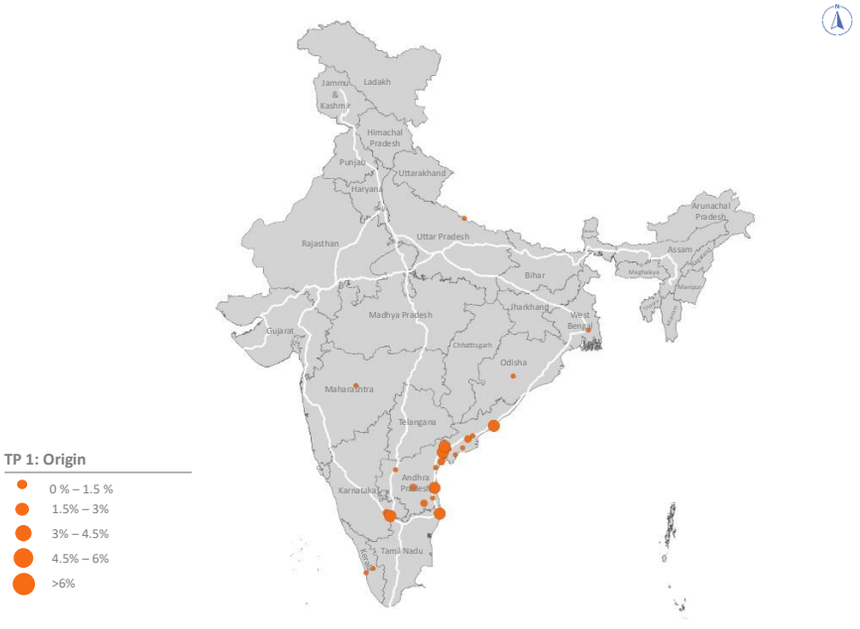
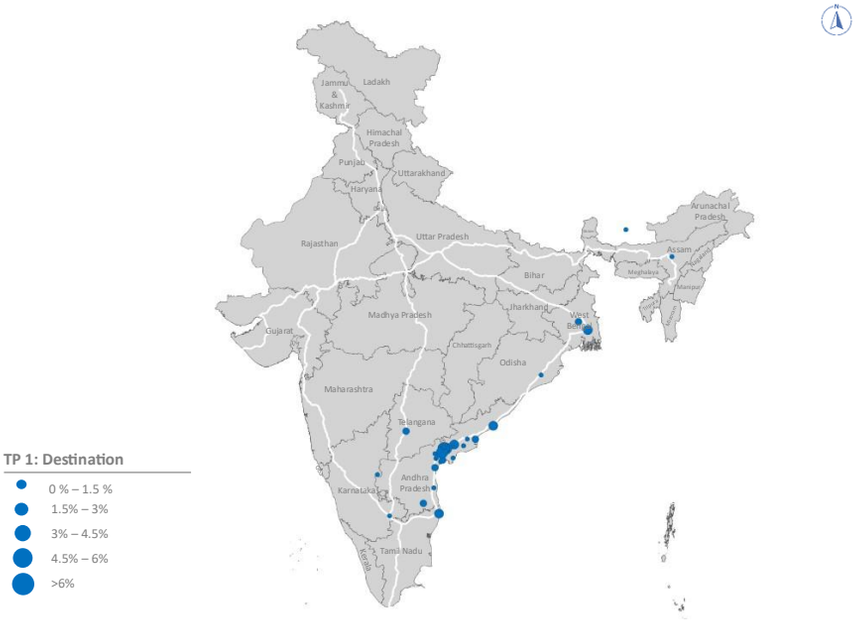
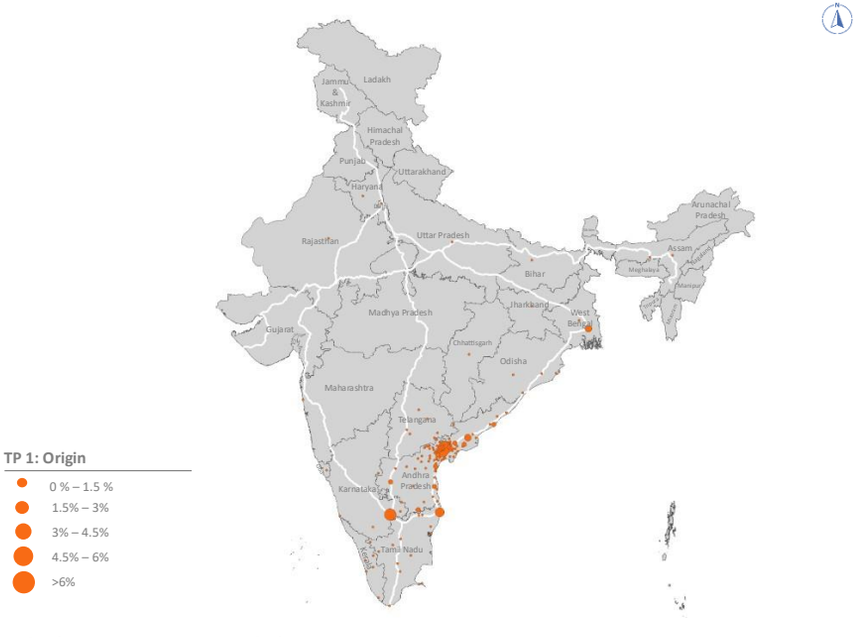
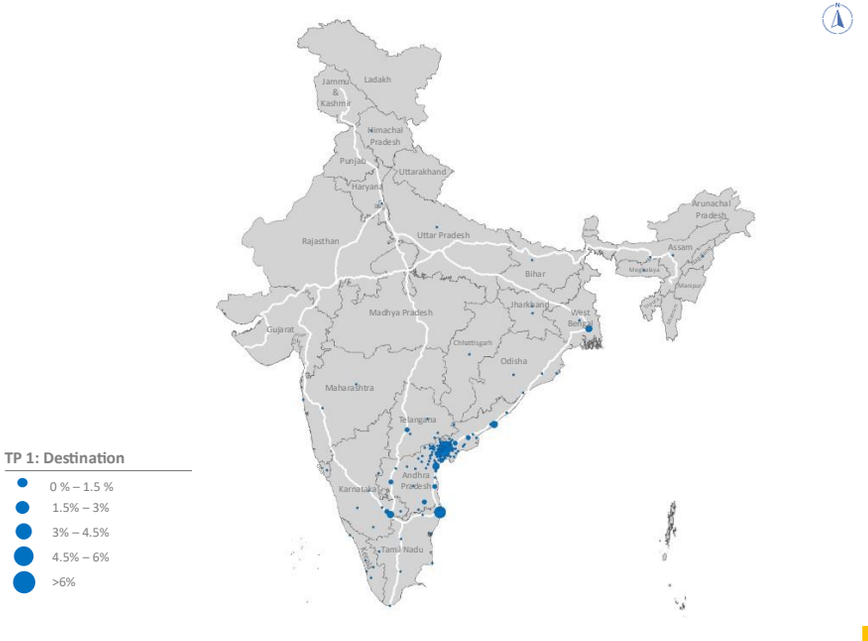
| | Origin | Destination |
|---|---|---|
| **CJV** |  |  |
| **Mini LCV** |  |  |



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (2)

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| | Origin | Destination |
|---|---|---|
| **LCV** |  |  |
| **2A** |  |  |



Source: TIC analysis (map not to scale)

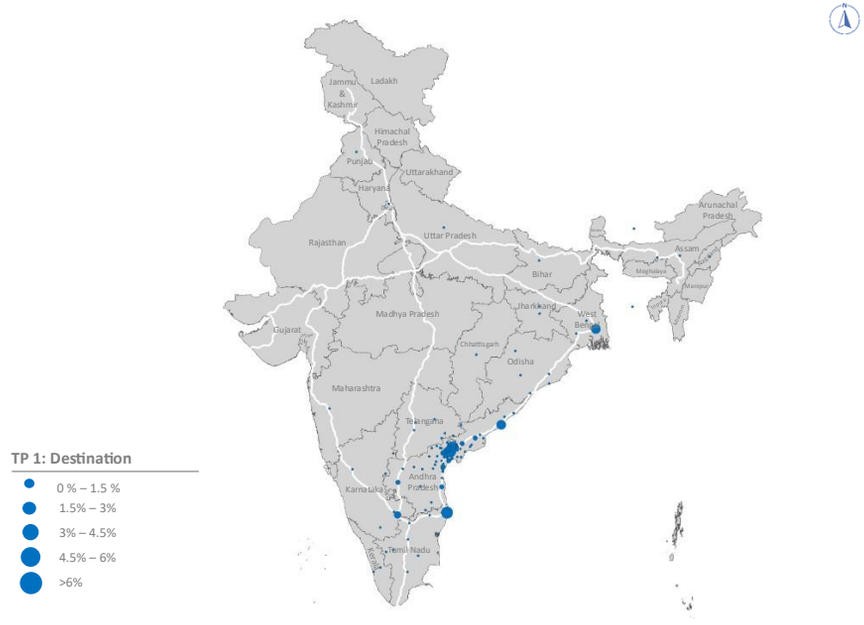
# Vehicle category-wise visual representation of OD (3)

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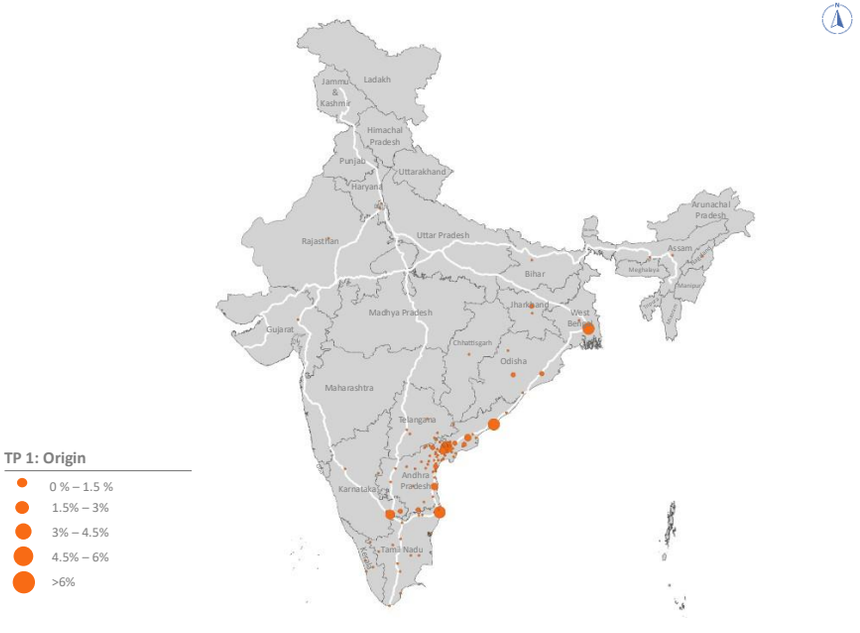
**Origin** | **Destination**

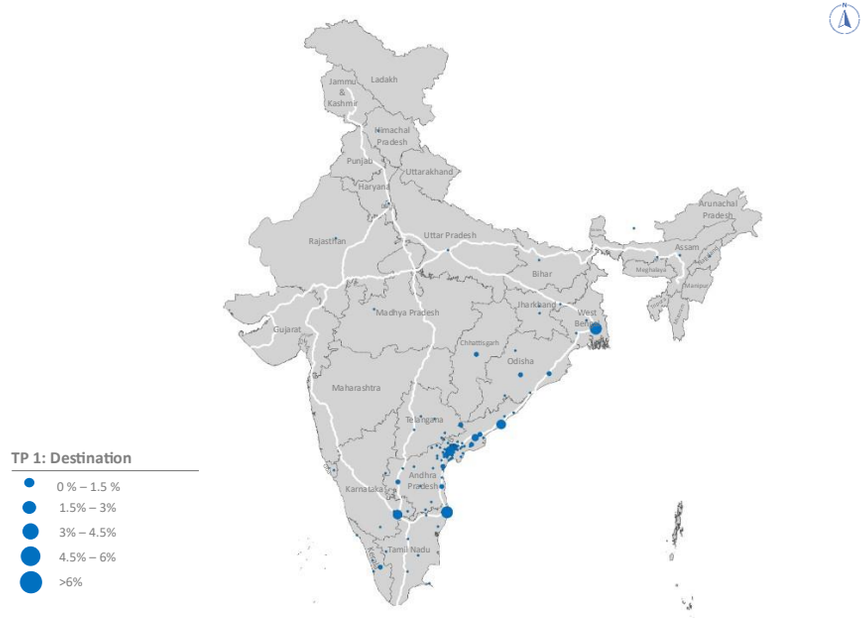
**3A**




**MAV**




Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (4)

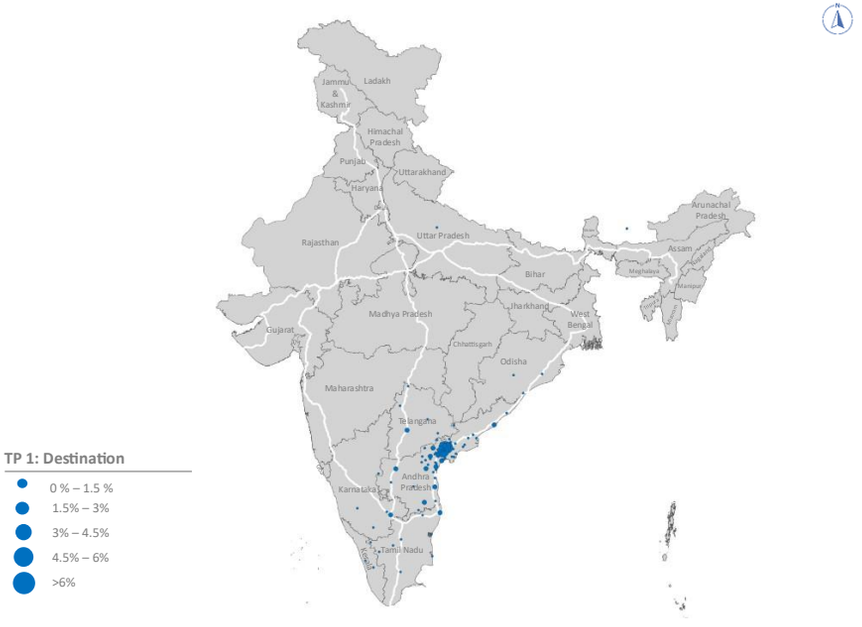
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**Origin**

**Destination**

**Bus**



# Vehicle category-wise top OD pairs (1)

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**CJV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Guntur | Amaravati | 3% |
| 2 | Amaravati | Guntur | 2% |
| 3 | Guntur | Vijayawada | 2% |
| 4 | Tiruvallur | Visakhapatnam | 2% |
| 5 | Vijayawada | Guntur | 2% |
| 6 | Tiruvallur | West Bengal | 2% |
| 7 | West Bengal | Bellary | 2% |
| 8 | Visakhapatnam | Tiruvallur | 1% |
| 9 | West Bengal | Tiruvallur | 1% |
| 10 | Amaravati | Namburu | 1% |

**Mini LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Guntur | Vijayawada | 4% |
| 2 | Guntur | Amaravati | 4% |
| 3 | Amaravati | Guntur | 4% |
| 4 | Vijayawada | Guntur | 4% |
| 5 | Guntur | Eluru | 1% |
| 6 | Bellary | Rajamahendravaram | 1% |
| 7 | Ongole | Dakshin Bastar Dantewada | 1% |
| 8 | Guntur | Kondapalli | 1% |
| 9 | Guntur | Gundimeda | 1% |
| 10 | Rajamahendravaram | Guntur | 1% |

**Bus**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Vijayawada | Guntur | 6% |
| 2 | Guntur | Vijayawada | 6% |
| 3 | Amaravati | Guntur | 5% |
| 4 | Guntur | Amaravati | 3% |
| 5 | Ongole | Vijayawada | 2% |
| 6 | Vijayawada | Vinukonda | 2% |
| 7 | Vijayawada | Ongole | 2% |
| 8 | Vinukonda | Vijayawada | 2% |
| 9 | Bellary | Vijayawada | 1% |
| 10 | Vijayawada | Nellore | 1% |

**LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Guntur | Kondapalli | 3% |
| 2 | Vijayawada | Tiruvallur | 3% |
| 3 | West Bengal | Bellary | 3% |
| 4 | Vijayawada | Bellary | 3% |
| 5 | Martur | Visakhapatnam | 2% |
| 6 | Guntur | Tadepalle | 2% |
| 7 | Guntur | Visakhapatnam | 2% |
| 8 | Guntur | Amaravati | 2% |
| 9 | Ongole | Vijayawada | 2% |
| 10 | Tiruvallur | Chhattisgarh | 2% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2)

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**2A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Guntur | Amaravati | 3% |
| 2 | Amaravati | Guntur | 2% |
| 3 | Guntur | Vijayawada | 2% |
| 4 | West Bengal | Bellary | 2% |
| 5 | Vijayawada | Guntur | 2% |
| 6 | Tiruvallur | West Bengal | 1% |
| 7 | Tiruvallur | Vijayawada | 1% |
| 8 | Bellary | West Bengal | 1% |
| 9 | Tiruvallur | Visakhapatnam | 1% |
| 10 | West Bengal | Tiruvallur | 1% |

**3A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Tiruvallur | West Bengal | 3% |
| 2 | Guntur | Vijayawada | 2% |
| 3 | West Bengal | Tiruvallur | 2% |
| 4 | Visakhapatnam | Tiruvallur | 2% |
| 5 | Guntur | Amaravati | 2% |
| 6 | Tiruvallur | Visakhapatnam | 2% |
| 7 | West Bengal | Bellary | 2% |
| 8 | Amaravati | Guntur | 2% |
| 9 | Guntur | North Valluru | 1% |
| 10 | Vijayawada | Guntur | 1% |

**MAV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Tiruvallur | Visakhapatnam | 3% |
| 2 | West Bengal | Bellary | 3% |
| 3 | Tiruvallur | West Bengal | 3% |
| 4 | West Bengal | Tiruvallur | 2% |
| 5 | Visakhapatnam | Tiruvallur | 2% |
| 6 | Bellary | West Bengal | 2% |
| 7 | Tiruvallur | Vijayawada | 1% |
| 8 | Tiruvallur | Rajamahendravaram | 1% |
| 9 | Guntur | Amaravati | 1% |
| 10 | Bellary | Visakhapatnam | 1% |

Source: TIC analysis

## Appendix B:

- Detailed traffic and revenue forecast – most likely scenario without overloading

# Kaza TP (1): Traffic forecast (AADT)

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| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 25,073 | 2,482 | 1,089 | 2,525 | 2,000 | 1,388 | 3,167 | **37,725** | **61,180** |
| **FY27** | 26,314 | 2,590 | 1,141 | 2,583 | 2,081 | 1,372 | 3,034 | **39,115** | **62,377** |
| **FY28** | 27,714 | 2,709 | 1,198 | 2,643 | 2,166 | 1,344 | 2,790 | **40,564** | **63,234** |
| **FY29** | 29,555 | 2,826 | 1,258 | 2,702 | 2,294 | 1,358 | 2,948 | **42,941** | **66,596** |
| **FY30** | 32,426 | 2,950 | 1,322 | 2,764 | 2,436 | 1,375 | 3,142 | **46,416** | **71,224** |
| **FY31** | 34,787 | 3,070 | 1,384 | 2,823 | 2,578 | 1,391 | 3,339 | **49,373** | **75,337** |
| **FY32** | 37,133 | 3,193 | 1,480 | 2,881 | 2,739 | 1,408 | 3,571 | **52,403** | **79,697** |
| **FY33** | 39,726 | 3,318 | 1,582 | 2,948 | 2,906 | 1,423 | 3,815 | **55,719** | **84,419** |
| **FY34** | 33,906 | 3,446 | 1,468 | 3,007 | 2,662 | 1,154 | 2,932 | **48,574** | **73,217** |
| **FY35** | 27,002 | 3,576 | 1,326 | 3,080 | 2,429 | 881 | 1,945 | **40,239** | **60,489** |
| **FY36** | 30,004 | 3,703 | 1,510 | 3,137 | 2,575 | 890 | 2,101 | **43,920** | **65,233** |
| **FY37** | 31,908 | 3,832 | 1,575 | 3,192 | 2,696 | 897 | 2,261 | **46,361** | **68,633** |
| **FY38** | 32,268 | 3,960 | 1,642 | 3,189 | 2,819 | 904 | 2,430 | **47,212** | **70,363** |
| **FY39** | 33,448 | 4,088 | 1,710 | 3,213 | 2,944 | 911 | 2,607 | **48,921** | **73,038** |
| **FY40** | 35,399 | 4,217 | 1,780 | 3,265 | 3,074 | 918 | 2,736 | **51,389** | **76,367** |
| **FY41** | 39,146 | 4,349 | 2,017 | 3,316 | 3,162 | 924 | 2,894 | **55,809** | **81,752** |

Source: TIC estimate

# Kaza TP (2): Traffic AADT growth rates

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 5.0% | 4.3% | 4.8% | 2.3% | 4.1% | (1.2%) | (4.2%) | **3.7%** | **2.0%** |
| **FY28** | 5.3% | 4.6% | 5.0% | 2.3% | 4.1% | (2.0%) | (8.1%) | **3.7%** | **1.4%** |
| **FY29** | 6.6% | 4.3% | 5.0% | 2.2% | 5.9% | 1.0% | 5.7% | **5.9%** | **5.3%** |
| **FY30** | 9.7% | 4.4% | 5.1% | 2.3% | 6.2% | 1.2% | 6.6% | **8.1%** | **6.9%** |
| **FY31** | 7.3% | 4.1% | 4.7% | 2.1% | 5.9% | 1.2% | 6.3% | **6.4%** | **5.8%** |
| **FY32** | 6.7% | 4.0% | 6.9% | 2.1% | 6.2% | 1.2% | 7.0% | **6.1%** | **5.8%** |
| **FY33** | 7.0% | 3.9% | 6.9% | 2.3% | 6.1% | 1.1% | 6.8% | **6.3%** | **5.9%** |
| **FY34** | (14.7%) | 3.9% | (7.2%) | 2.0% | (8.4%) | (18.9%) | (23.2%) | **(12.8%)** | **(13.3%)** |
| **FY35** | (20.4%) | 3.8% | (9.7%) | 2.5% | (8.8%) | (23.6%) | (33.8%) | **(17.2%)** | **(17.4%)** |
| **FY36** | 11.1% | 3.6% | 13.9% | 1.8% | 6.0% | 1.0% | 8.1% | **9.1%** | **7.8%** |
| **FY37** | 6.3% | 3.5% | 4.3% | 1.8% | 4.7% | 0.8% | 7.6% | **5.6%** | **5.2%** |
| **FY38** | 1.1% | 3.4% | 4.2% | (0.1%) | 4.6% | 0.8% | 7.5% | **1.8%** | **2.5%** |
| **FY39** | 3.7% | 3.2% | 4.1% | 0.7% | 4.4% | 0.8% | 7.3% | **3.6%** | **3.8%** |
| **FY40** | 5.8% | 3.2% | 4.1% | 1.6% | 4.4% | 0.7% | 4.9% | **5.0%** | **4.6%** |
| **FY41** | 10.6% | 3.1% | 13.3% | 1.6% | 2.9% | 0.7% | 5.8% | **8.6%** | **7.1%** |

Source: TIC estimate

# Kaza TP (3): Revenue forecast (INR Crore)

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **225.7** |
| **FY28** | 87.1 | 9.1 | 7.6 | 32.0 | 26.5 | 19.8 | 66.0 | **248.0** |
| **FY29** | 95.9 | 9.8 | 8.2 | 33.9 | 29.1 | 20.7 | 72.1 | **269.7** |
| **FY30** | 109.8 | 10.7 | 9.0 | 36.0 | 32.0 | 21.8 | 80.1 | **299.5** |
| **FY31** | 121.6 | 11.4 | 9.9 | 38.3 | 35.4 | 22.8 | 88.1 | **327.5** |
| **FY32** | 135.4 | 12.5 | 10.8 | 40.5 | 39.0 | 24.1 | 98.3 | **360.5** |
| **FY33** | 150.0 | 13.4 | 12.0 | 43.0 | 42.9 | 25.3 | 108.8 | **395.4** |
| **FY34** | 135.6 | 14.5 | 11.5 | 45.6 | 40.2 | 20.9 | 85.6 | **353.8** |
| **FY35** | 111.8 | 15.5 | 10.7 | 48.5 | 38.0 | 16.6 | 58.8 | **299.9** |
| **FY36** | 128.7 | 16.8 | 12.7 | 51.3 | 41.9 | 17.5 | 66.3 | **335.1** |
| **FY37** | 141.0 | 18.0 | 13.7 | 54.2 | 45.5 | 18.2 | 73.9 | **364.4** |
| **FY38** | 149.8 | 19.3 | 14.8 | 56.0 | 49.3 | 19.1 | 82.3 | **390.6** |
| **FY39** | 159.9 | 20.6 | 16.1 | 58.7 | 53.5 | 19.9 | 91.9 | **420.8** |
| **FY40** | 177.7 | 22.3 | 17.4 | 62.0 | 58.1 | 20.9 | 100.1 | **458.4** |
| **FY41** | 202.4 | 23.9 | 20.4 | 65.3 | 61.9 | 21.8 | 109.6 | **505.4** |

Source: TIC estimate

# Kaza TP (4): Revenue growth rates

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 15.9% | 16.0% | 15.2% | 11.9% | 13.8% | 6.6% | 0.4% | **9.9%** |
| **FY29** | 10.1% | 6.8% | 8.3% | 6.1% | 9.9% | 4.7% | 9.3% | **8.7%** |
| **FY30** | 14.5% | 9.7% | 9.5% | 6.1% | 10.1% | 5.4% | 11.1% | **11.0%** |
| **FY31** | 10.7% | 6.7% | 9.5% | 6.5% | 10.4% | 4.6% | 10.0% | **9.4%** |
| **FY32** | 11.3% | 9.2% | 9.9% | 5.9% | 10.2% | 5.3% | 11.5% | **10.1%** |
| **FY33** | 10.8% | 7.4% | 11.2% | 6.1% | 10.1% | 5.1% | 10.6% | **9.7%** |
| **FY34** | (9.6%) | 8.1% | (4.8%) | 5.9% | (6.4%) | (17.3%) | (21.3%) | **(10.5%)** |
| **FY35** | (17.6%) | 7.3% | (6.2%) | 6.3% | (5.3%) | (20.8%) | (31.3%) | **(15.2%)** |
| **FY36** | 15.2% | 8.0% | 18.5% | 5.8% | 10.1% | 5.3% | 12.7% | **11.7%** |
| **FY37** | 9.5% | 7.2% | 7.8% | 5.6% | 8.6% | 4.4% | 11.4% | **8.8%** |
| **FY38** | 6.2% | 7.3% | 7.9% | 3.4% | 8.3% | 4.8% | 11.5% | **7.2%** |
| **FY39** | 6.8% | 6.9% | 8.6% | 4.8% | 8.7% | 4.3% | 11.6% | **7.7%** |
| **FY40** | 11.1% | 7.9% | 8.2% | 5.6% | 8.5% | 4.7% | 8.9% | **8.9%** |
| **FY41** | 14.0% | 7.3% | 17.0% | 5.3% | 6.6% | 4.6% | 9.5% | **10.2%** |

Source: TIC estimate

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# Chennai Bypass section in Tamil Nadu










**Traffic Due Diligence – Final Report**

**National Highways Authority of India**

January 2026

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# Control information

| | |
|---|---|
| **Contract Reference:**<br>Letter of Commencement - FINDIV-16014(11)/1/2024-O/o CGM (Finance-II)/e-265207/116 dated 7th August 2025 | **Identification & Traceability:**<br>TIC/401/TF/TDD/R1-Final Report |
| **Assignment Title:** Traffic Due Diligence – Chennai Bypass section in Tamil Nadu | |
| **Client** | **National Highways Authority of India**<br>Sector 10, Dwarka, New Delhi 110075 |
| **Consultant** | **Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited**<br>1103, I Square Corporate Park<br>Science City Road, Ahmedabad 380060 |

**Issue and Revision Records**

| Date | Revisions | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| 09.01.2026 | R1 | Darshan Doshi<br>Parthav Parikh<br>Rutvik Dhameliya<br>Savan Rathod | Dhyey Hirpara<br>Karan Dave | Tejas Patel | Traffic Due Diligence – Final Report |

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**Appendix B:** Vehicle category-wise visual representation of origin-destination zones

Vehicle category-wise top origin-destination pairs

**Appendix C:** Detailed traffic and revenue forecast – most likely scenario without overloading

# Abbreviations (1)

| | |
|---|---|
| **AADC** | Annual Average Daily Collection |
| **AADT** | Annual Average Daily Traffic |
| **ADB** | Asian Development Bank |
| **ADT** | Average Daily Traffic |
| **AL** | Axle Load |
| **AP** | Andhra Pradesh |
| **APC** | Annual Potential Collection |
| **BFSI** | Banking, Financial Services, and Insurance |
| **BOT** | Build-Operate-Transfer |
| **BPO** | Business Process Outsourcing |
| **CAGR** | Compound Annual Growth Rate |
| **CBIC** | Chennai – Bengaluru Industrial Corridor |
| **CFS** | Container Freight Station |
| **CJV** | Car/ Jeep/ Van |
| **CPI** | Consumer Price Index |
| **CPRR** | Chennai Peripheral Ring Road |
| **CTVC** | Classified Traffic Volume Count |
| **CUMTA** | Chennai Unified Metropolitan Transport Authority |
| **DBFOT** | Design, Build, Finance, Operate, and Transfer |
| **DPR** | Detailed Project Report |
| **DTA** | Domestic Tariff Area |
| **EPC** | Engineering, Procurement and Construction |
| **ETC** | Electronic Toll Collection |
| **EV** | Electric Vehicle |
| **FMCG** | Fast Moving Consumer Goods |

| | |
|---|---|
| **FY** | Financial Year |
| **GDP** | Gross Domestic Product |
| **GSDP** | Gross State Domestic Product |
| **GST** | Goods and Services Tax |
| **GVA** | Gross Value Added |
| **HAM** | Hybrid Annuity Mode |
| **HCV** | Heavy Commercial Vehicle |
| **HQ** | Headquarter |
| **IEA** | International Energy Agency |
| **IHMCL** | Highways Management Company Limited |
| **IMF** | International Monetary Fund |
| **INR** | Indian Rupee |
| **IRC** | Indian Road Congress |
| **ISRO** | Indian Space Research Organisation |
| **IT** | Information technology |
| **ITES** | Information Technology Enabled Services |
| **IWAI** | Inland Waterways Authority of India |
| **JV** | Joint Venture |
| **Km** | Kilometer |
| **LCV** | Light Commercial Vehicle |
| **LNG** | Liquefied Natural Gas |
| **LPG** | Liquefied Petroleum Gas |
| **MADT** | Monthly Average Daily Traffic |
| **MAV** | Multi Axle Vehicle |
| **MLFF** | Multi Lane Free Flow |

# Abbreviations (2)

| | |
|---|---|
| **MMBT** | Madhavaram Mofussil Bus Terminus |
| **MMLP** | Multimodal Logistics Park |
| **MMTPA** | Million Metric Tonnes Per Annum |
| **MoFHW** | Ministry of Health and Family Welfare |
| **MoRTH** | Ministry of Road Transport and Highways |
| **MoSPI** | Ministry of Statistics and Programme Implementation |
| **MRF** | Madras Rubber Factory |
| **MRO** | Maintenance, Repair, and Operations |
| **MSME** | Micro, Small, and Medium Enterprises |
| **MT** | Million Tonnes |
| **MTPA** | Million Tonnes Per Annum |
| **NE** | National Expressway |
| **NH** | National Highway |
| **NHAI** | National Highways Authority of India |
| **NHIT** | National Highways Infra Trust |
| **NMP** | National Monetisation Pipeline |
| **NW** | National Waterway |
| **OD** | Origin – Destination |
| **OECD** | Organisation for Economic Co-operation and Development |
| **OSV** | Oversized Vehicle |
| **PCI** | Per Capita Income |
| **PCU** | Passenger Car Unit |
| **PIA** | Project Influence Area |
| **PIU** | Project Implementation Unit |
| **PPP** | Public-Private Partnership |
| **PSU** | Public Sector Undertaking |
| **QADT** | Quarterly Average Daily Traffic |
| **RBI** | Reserve Bank of India |
| **RO** | Regional Office |
| **RoS** | Rest of State |
| **RTO** | Regional Transport Office |
| **SaaS** | Software as a Service |
| **SCF** | Seasonal Correction Factor |
| **SEZ** | Special Economic Zone |
| **SH** | State Highway |
| **SIAM** | Society of Indian Automobile Manufacturers |
| **SIPCOT** | State Industries Promotion Corporation of Tamil Nadu |
| **TAZ** | Traffic Analysis Zone |
| **TIC** | Translink Infrastructure Consultants Private Limited |
| **TMT** | Thermo-Mechanically Treated |
| **TN** | Tamil Nadu |
| **TNRDC** | Tamil Nadu Road Development Company Ltd |
| **TOT** | Toll, Operate, Transfer |
| **TP** | Toll Plaza |
| **UNESCO** | United Nations Educational, Scientific and Cultural Organization |
| **VCIC** | Vishakhapatnam – Chennai Industrial Corridor |
| **WADT** | Weekly Average Daily Traffic |
| **WPI** | Wholesale Price Index |
| **2A** | 2 Axle |
| **3A** | 3 Axle |

# Chapter 1: Introduction

- The assignment
- Objective and Scope of Work
- Approach and methodology
- Organisation of the report

This chapter outlines assignment background, scope of work, approach and methodology employed to ensure successful execution of the assignment.

Approach and methodology section highlights the structured approach which has been followed to gather data, conduct analysis, and make informed decisions throughout the project lifecycle. By employing a robust methodology, the consultant aims to ensure the accuracy, efficiency and reliability of the assignment’s outcomes.

# The assignment

**Ministry of Road Transport and Highways** (MoRTH) has entrusted **National Highways Authority of India** (hereinafter referred to as '**NHAI'** or '**client'**) for monetisation of public funded operational national highway projects under the framework of National Monetisation Pipeline (NMP).

In this context, NHAI has commissioned Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited (hereinafter referred to as '**TIC'** or '**consultant'**) to carry out traffic due diligence for following national highway section in Tamil Nadu (hereinafter referred to as '**project highway**').

**Project highway under asset monetization programme**

| National highway section | Toll plaza | Concerned NHAI field office |
|---|---|---|
| **Chennai Bypass** | Vanagaram (Chennai district)<br>Tiruneermalai (Chengalpattu district) *<br>Surapattu (Tiruvallur district) | Project Implementation Unit – Chennai 2<br>Regional Office – Chennai |

Source: Client

^^ existing toll plaza at Vanagaram will be shifted to Tiruneermalai from 1st April 2028 (FY29)

This document is the final report incorporating traffic data updates received up to October 2025 and confirmation from the client dated 15th December 2025 for recommended scenario. The report presents our understanding of the project highway, trend analysis of traffic and revenue, primary data analysis and traffic and revenue forecast for a concession period of 15 years.

# Objective and Scope of Work

The principal objective of the study is to determine traffic and revenue forecast for 15 years. This assessment provides input to stakeholders to evaluate viable monetization options for the project highway.

The broad **scope of the work** of the assignment is as follows:

- Review of available historical traffic and revenue data and relevant document received from the client
- Carrying out traffic survey and analysis at the project highway :
  - 7 days continuous and direction-wise classified traffic volume count
  - 3 days origin-destination
  - 3 days axle load
  - Any other surveys on the project highway and alternate corridors as per the need
- Site visit and stakeholder consultation to understand traffic characteristics and network dynamics
- Review of observed growth trends of the project highway and corridor subject to availability of data
- Estimate vehicle category-wise traffic and revenue for the base year
- Determine future toll rates
- Assessing diversion due to competing transportation modes and routes, network development, future development plans in the region, etc.
- Vehicle category and ticket distribution-wise traffic and revenue forecast for concession period
- Scenario development: most likely, optimistic and pessimistic

# Approach

The consultant adopted comprehensive approach to address the need of this assignment with key five focus areas as summarised in below figure.

**Approach for the assignment**



| Expertise in motion | Forecasting forward flow | Economy drive highways | Data drives decisions; paves road to resilience | Trust in travel |
|---|---|---|---|---|
| Team with transportation engineering expertise and experience | Encapsulate all possible exogeneous impacts on traffic growth | Models integrating economic indicators for traffic growth projections | Using statistical techniques and tools for accurate insights and risk assessments | Maintain integrity, transparency, and ethical practices |

Source: TIC

# Methodology (1)

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**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Project highway appreciation** | ▪ Assess the macro and micro road network, considering the overall road infrastructure and its specific sections<br>▪ Identify homogeneous/tollable sections with similar traffic patterns<br>▪ Evaluate any developments in the vicinity of the project highway that may impact economic growth and traffic volume<br>▪ Finalize survey locations and formats for data collection |
| **Secondary data collection** | ▪ Gather relevant past detailed project report / traffic study report and draft concession agreement as per availability<br>▪ Collect historical monthly traffic data for the toll plazas of the project highway and neighbouring toll plazas on the corridor, both upstream and downstream<br>▪ Source vehicle category/mapper class wise electronic toll collection (ETC) data as most reliable dataset from Indian Highways Management Company Limited (IHMCL) through the client for toll plazas under study and on the corridor and alternate corridors as well as across the country (subject to receipt from the client or as per availability in the public domain) for understanding of the various trends of economy as well as modal / vehicle technology shift<br>▪ Gather economic indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), per capita income, national, state and district Gross Domestic Product (GDP), employment rates and specific commodities related sales e.g., automobile, agriculture production etc.<br>▪ Gather demographic profiles and population data<br>▪ Collect secondary data related to alternative routes and modal shift developments if applicable |
| **Primary data collection** | ▪ 7-day continuous videography-based classified traffic volume count survey to gather independent traffic volume data<br>▪ 3-day origin-destination and commodity survey to understand travel patterns, trip purposes, influence region, growth drivers etc.<br>▪ 3-day axle load survey to determine the load characteristics of vehicles<br>▪ 1-day vehicle registration number plate survey to estimate ticket segmentation of local commercial vehicle without national permit if required<br>▪ Stakeholder consultation through interviews and focused group discussions |

Source: TIC

# Methodology (2)

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**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Data analysis** | ▪ Review historical traffic and revenue data to understand growth trend, seasonality variation, elasticities for identified growth drivers through regression analysis subject to data availability and benchmark analysis of corridor<br>▪ Conduct data hygiene checks to identify errors, biases and inconsistencies in the collected data<br>▪ Analyse Weekly Average Daily Traffic (WADT) including peak hour, day and night traffic variances, as well as directional distribution of traffic for further input to various analysis<br>▪ Identify Traffic Analysis Zones (TAZ) and Primary Influence Areas (PIA)<br>▪ Determine vehicle category-wise origin-destination matrices, trip lengths and purposes<br>▪ Develop geographical distribution diagrams of traffic to visualize travel patterns<br>▪ Perform commodity and loading analysis<br>▪ Analyse historical journey tickets, including single, 24-hour return, daily multiple, monthly, local pass tickets and annual pass for passenger cars and understand the ground level situations for underlying patterns especially forced exemption if any in the case specific region and possibilities of reduction through proposed technological and administrative measures<br>▪ Estimate Annual Average Daily Traffic (QADT/AADT) for the base and future years as per case specific requirement<br>▪ Develop a traffic diversion model using IRC:SP:30 modality |
| **Forecasting** | ▪ Utilize an econometric model based on IRC: 108-2015 guidelines to analyse the relationship between vehicle traffic/PIA and socio-economic parameters such as Per Capita Income (PCI), Gross Domestic Product (GDP) of district/state/national, population, specific economic activities etc. as relevant with the identified growth drivers<br>▪ Calculate growth rates for each vehicle category. Adjust the growth rates based on induced traffic and traffic diversion effects, if applicable<br>▪ Perform traffic forecasting for 15 years period - normal traffic followed by generated and diverted traffic due to network and developmental impacts<br>▪ Conduct capacity analysis to assess the adequacy of the project highway<br>▪ Forecast annual toll revenue for 15 years based on traffic and toll rates projections |
| **Sensitivity and risk analysis** | ▪ Identify variables (macro-economic, growth drivers and relationships, scale and timeline of diversions, etc.) that significantly impact annual toll revenue and assess their sensitivity<br>▪ Develop scenarios for identified risks |

Source: TIC

# Organisation of the report

**Report structure**

| Sr. No. | Chapter | Particulars |
|---|---|---|
| 1 | **Introduction** | Scope of the assignment, approach and methodology |
| 2 | **Project highway profile** | Characteristics of the project highway like network understanding, socio-economic background of the region and proposed infrastructure developments in the influence region and network |
| 3 | **Traffic analysis** | Past performance of the project highway based on historical traffic and revenue data, traffic survey data analysis |
| 4 | **Economic context and traffic growth** | Economic context of influence region, determination of traffic growth drivers and associated travel demand elasticities |
| 5 | **Baseline traffic and revenue forecast** | Elaborates method adopted for determining base year AADT, toll ticket distribution and revenue reconciliation |
| 6 | **Diversion analysis** | Impacts on the project highway due to proposed infrastructure developments in the influence region and network, assessment of induced traffic demand |
| 7 | **Final traffic and revenue forecast** | Traffic and revenue forecasts including diversions, scenario cases: most likely with and without overloading, optimistic and pessimistic |

Source: TIC

# Chapter 2: Project highway profile

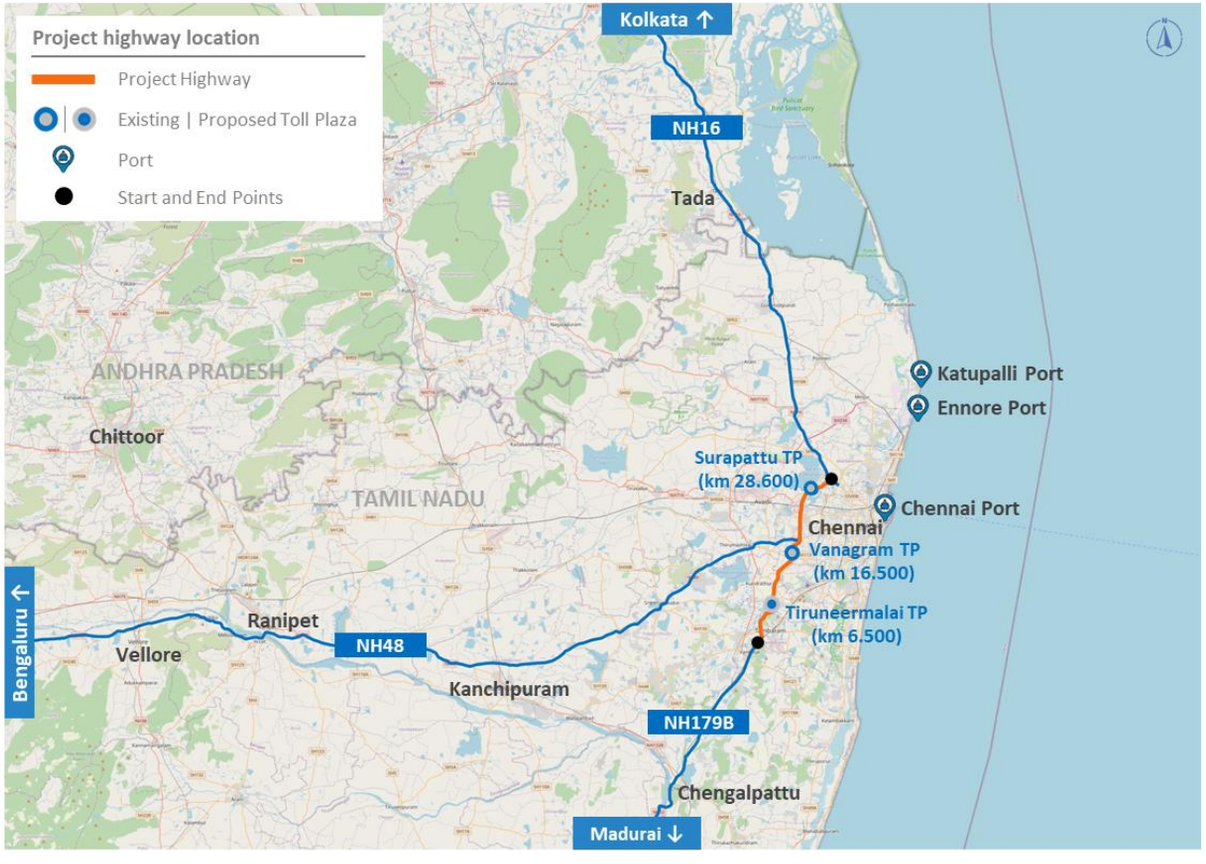
- Location and key details
- Economic activities in the region
- Understanding of network and traffic corridors
- Proposed road network and infrastructure development in the influence region

This chapter exhibits our understanding of the project highway and key details, economic activities in the region and strategic network context based on site visit and stakeholder consultation. It covers list of infrastructure project development in the region and network which would have impact on the performance of the project highway.

# Location of the project highway

**Project highway location in national and state context**






Source: TIC analysis (map not to scale)

- The project highway is a 32 km bypass section of Chennai city, part of two national highways i.e., Golden Quadrilateral (Mumbai – Bengaluru – Chennai corridor NH48) and NH179B (old NH32/NH45) connecting Chennai to south Tamil Nadu. It starts at Irumbuliyur junction (near Tambaram in southern Chennai) and extends to Madhavaram junction on NH16 on north of the city.
- Chennai bypass plays significant role in reducing congestion within Chennai city and streamlining traffic flow along the north-south corridor in the state and upwards journey towards Andhra Pradesh when conceptualized.
- With the rapid urban expansion and integration of peripheral areas into the Chennai Metropolitan Region, the bypass effectively become part of the city but being access control (with open tolling and limited entry-exit) modality still comparatively effective for road users. It caters to substantial intra-city and port-related traffic, including movements between Bengaluru/western and Chennai maritime cluster covering ports of Chennai, Ennore and Kattupalli.

# Project snapshot (1)

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**Key project details**

| Particulars | Chennai Bypass | |
|---|---|---|
| **Length (km)** | 32.600 | |
| **Lane and pavement** | 6-lane divided carriageway, flexible pavement / rigid at toll plaza | |
| **Chainage** | km 0.000 (Tambaram) to km 32.600 (Madhavaram) | |
| **History** | ▪ May 2011: Construction of Chennai Bypass Phase-II connecting NH48 (old NH4) and NH16 (old NH5) and widening of Chennai Bypass Phase-I connecting NH32 (old NH45) and NH48 (old NH4) through EPC by Hindustan Construction Company Limited<br>▪ Present tolling modality: under public funded with short term toll contracts | |
| **Nos. of toll plaza and location** | 2 ETC enabled | |
| **Toll plaza locations** | **Vanagaram** (km 16.500) / **Tiruneermalai** (km 6.500)* | **Surapattu** (km 28.600) |
| **Tolling start date** | 4th June 2003 | 14th May 2013 |
| **District** | Chennai / Chengalpattu | Tiruvallur |
| | Socio-economic activities and traffic is influenced by districts under Chennai Unified Metropolitan Authority (CUMTA) i.e., Chennai, Chengalpattu, Kancheepuram, Tiruvallur and Ranipet | |
| **Tolling length (km)** | 35.813 | 49.723 |
| **Overloading penalty** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU Chennai II | |
| **Micro-diversions at toll plaza location** | Nil | Nil |

Source: PIU Chennai 2 and NHAI HQ

* Present toll plaza at Vanagram location is to be shifted to Tiruneermalai due to identified black spot near toll plaza and proposed construction of Vehicular Underpass (VUP) at km 16.890

# Project snapshot (2)

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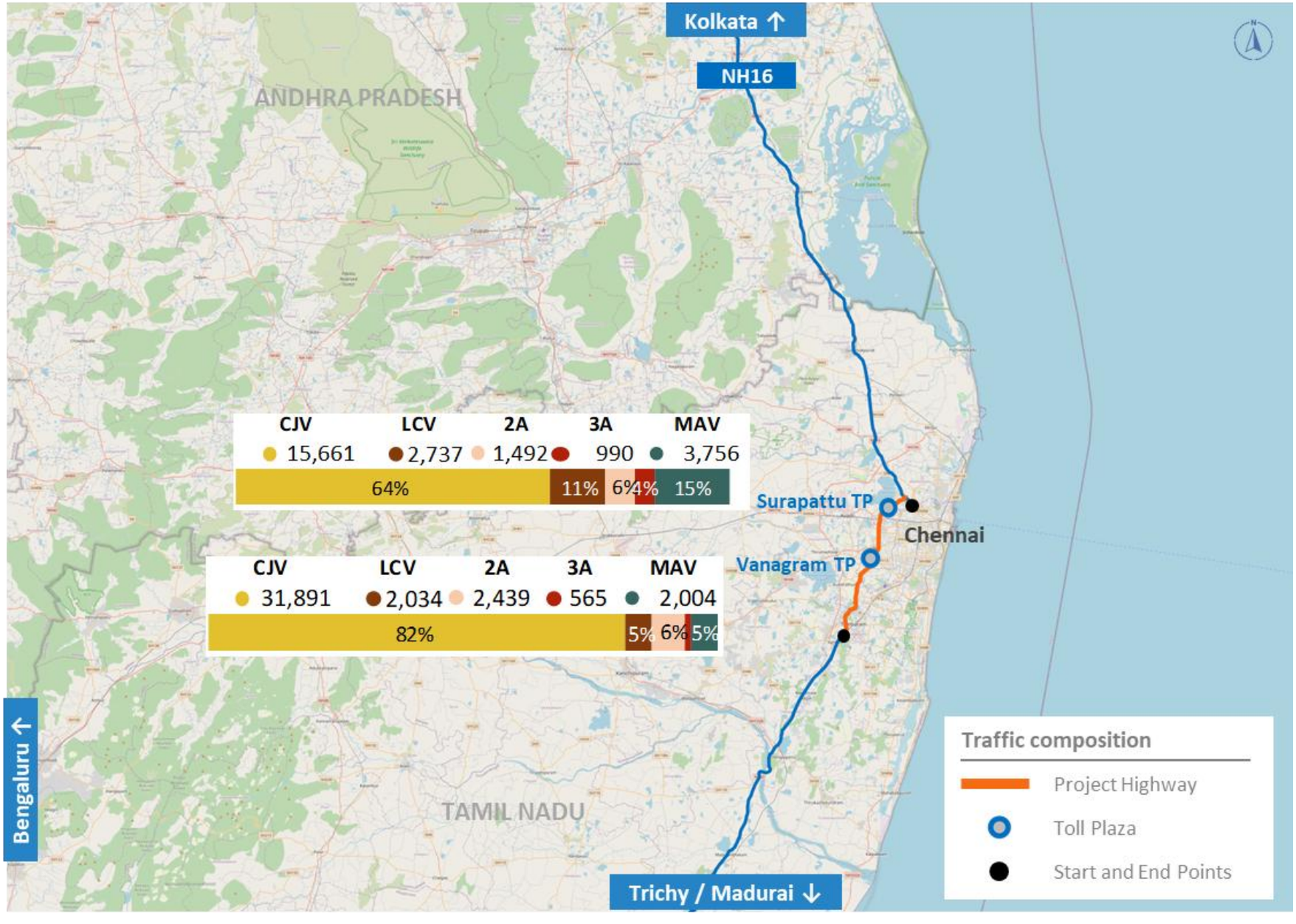
**Key project details**

| Particulars | Chennai Bypass | |
|---|---|---|
| **Toll plaza locations** | **Vanagaram** (km 16.500) / **Tiruneermalai** (km 6.500) | **Surapattu** (km 28.600) |
| **ETC Traffic (FY26 till October 2025)** | 7 months ADT: 38,936<br>PCU corresponding 7 months ADT: 52,985 | 7 months ADT: 24,645<br>PCU corresponding 7 months ADT: 44,154 |
| **ETC Traffic composition (FY26 till October 2025)** | 82% CJV/Mini LCV 8% 2A/LCV<br>4% Bus 6% 3A/MAV | 64% CJV/Mini LCV 16% 2A/LCV<br>1% Bus 19% 3A/MAV |
| **ETC Revenue** | FY25: INR 81 Crore FY26 till Oct'25: INR 54 Crore | FY25: INR 105 Crore FY26 till Oct'25: INR 66 Crore |
| **ETC Revenue composition (FY26 till October 2025)** | 55% CJV/Mini LCV 12% 2A/LCV<br>9% Bus 24% 3A/MAV | 30% CJV/Mini LCV 18% 2A/LCV<br>1% Bus 51% 3A/MAV |
| **Present toll operator with Annual Potential Collection (APC) and quoted remittance** | **Eagle Infra India Limited**<br>Duration: April 2025 to April 2026 (1 Year)<br>**APC:** INR 87.80 Crore (FY26 tolling rates)<br>**Quoted remittance:**<br>INR 83.39 Crore (FY26 tolling rates) | **Skylark Infra Engineering Private Limited**<br>Duration: September 2025 to September 2026 (1 Year)<br>**APC:** INR 108.10 Crore (FY26 tolling rates)<br>**Quoted remittance:**<br>INR 106.57 Crore (FY26 tolling rates) |
| **Previous tolling operator with Annual Potential Collection (APC) and Quoted Remittance** | **Eagle Infra India Limited**<br>Duration: April 2024 to April 2025 (1 Year)<br>**APC:** INR 75.18 Crore (FY25 tolling rates)<br>**Quoted remittance:**<br>INR 73.94 Crore (FY25 tolling rates) | **Skylark Infra Engineering Private Limited**<br>Duration: September 2024 to August 2025 (1 Year)<br>**APC:** INR 105.82 Crore (FY25 tolling rates)<br>**Quoted remittance:**<br>INR 105.57 Crore (FY25 tolling rates) |

Source: PIU Chennai 2 and NHAI HQ

# Project snapshot (3)

**ETC Traffic composition of FY26 till October 2025**

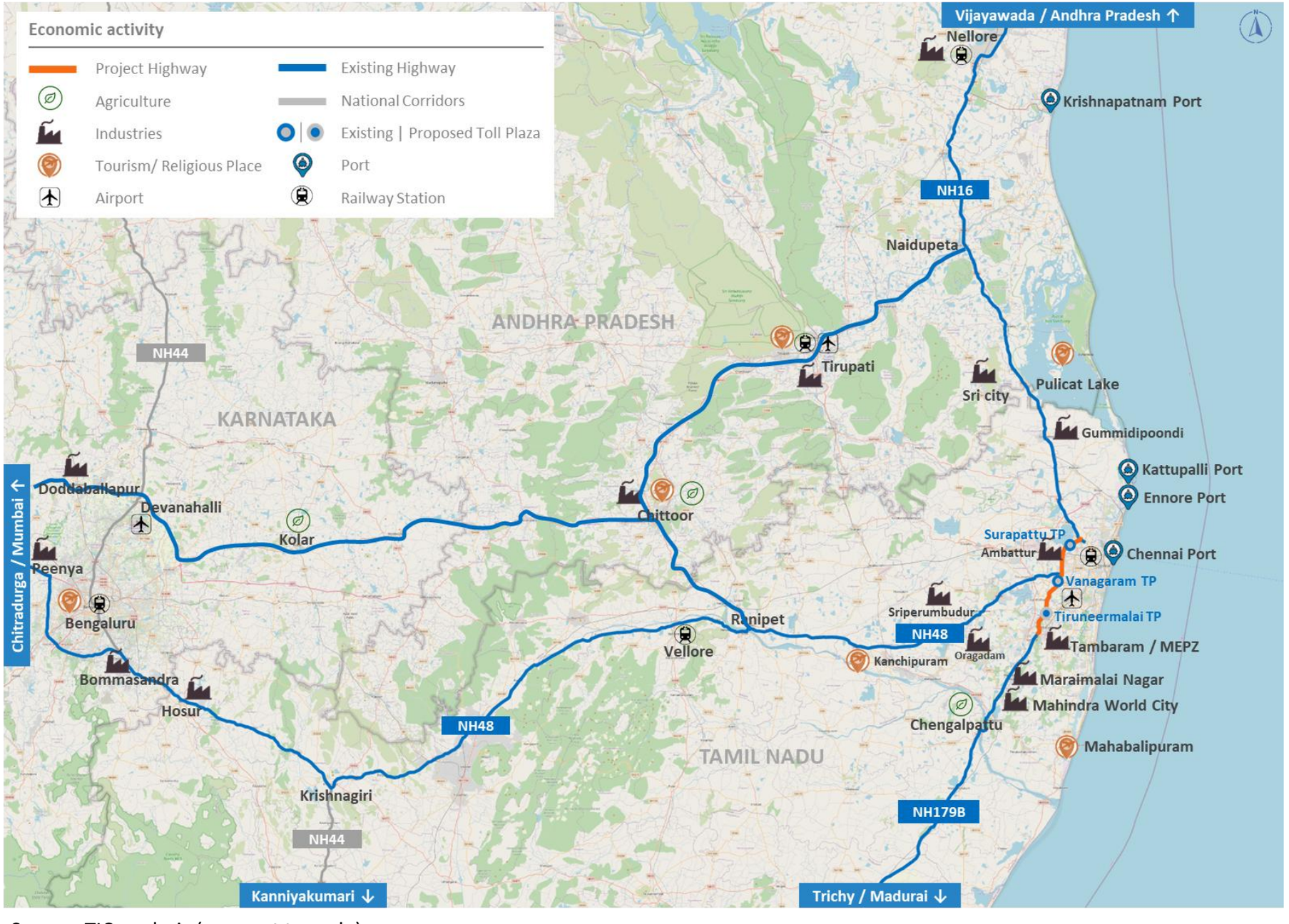



Source: TIC analysis (map not to scale)

# Economic activities in influence region (1)

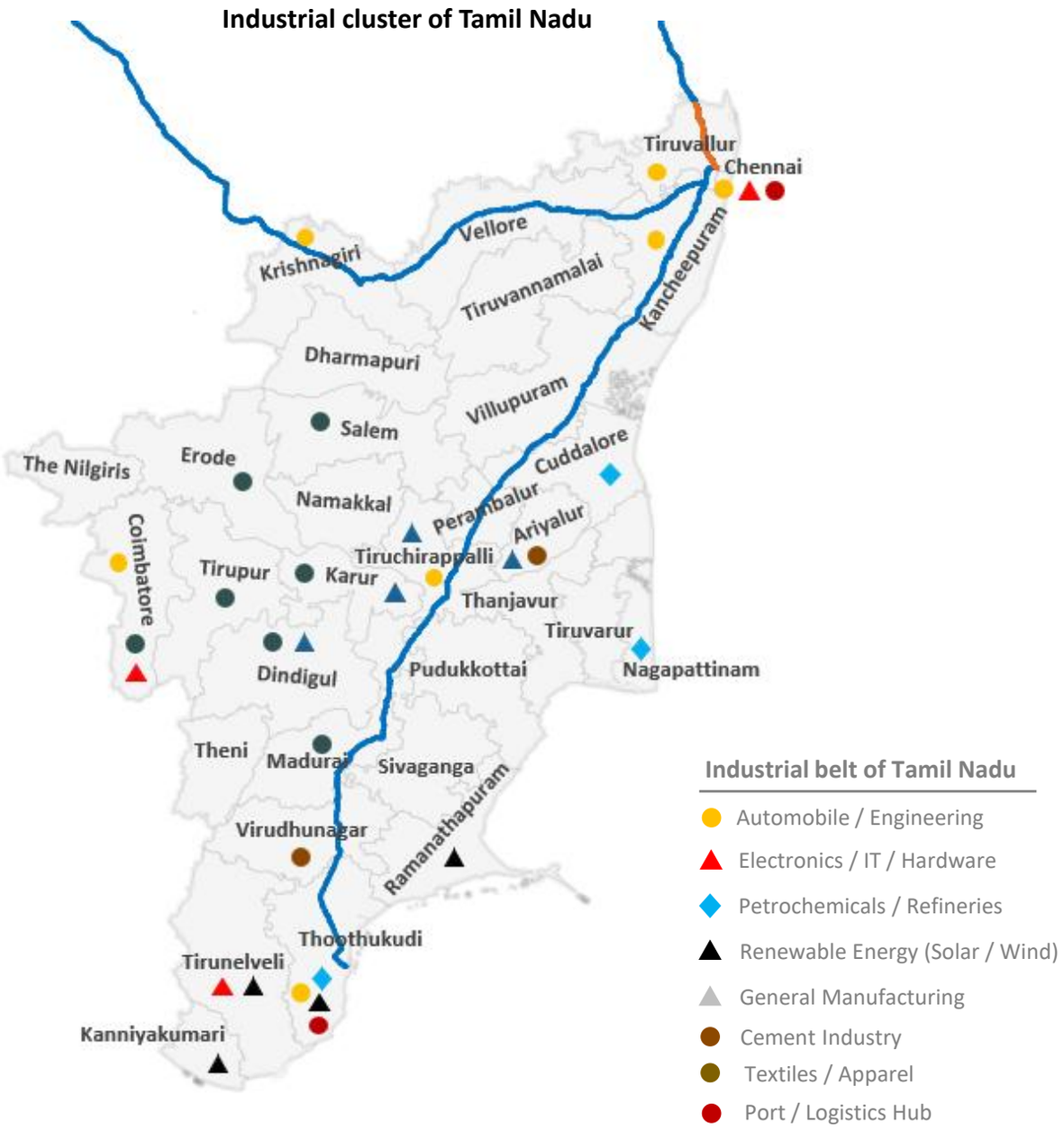
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**Economic activities in influence region**




Source: TIC analysis (map not to scale)

# Economic activities in influence region (2)




- Tamil Nadu is one of India's most industrialized state with a diversified economy driven by manufacturing, services and agriculture.
- The state's strategic coastal location along the bay of Bengal supports strong maritime trade through Chennai, Ennore, Kattupalli and Thoothukudi ports.
- Agriculture remains important in the state's southern and delta regions, with key crops including paddy, sugarcane, cotton and millets.
- Major cluster-wise industrial capabilities are:
  - **Chennai:** Automotive, Precision Manufacturing, Electronics, Warehousing
  - **Hosur:** Automobiles and MRO
  - **Salem:** Technical Textiles, Polymers, General Engineering
  - **Tiruchirappalli:** Fabrication, general Engineering
  - **Coimbatore:** General Engineering, Space Technology and Precision Manufacturing

Source: TIC analysis (map not to scale); illustrative reference

# Economic activities in influence region (3)

1

**Industry**

- **North Chennai Cluster**
  - **Manali:** home to chemical, general engineering, logistics and manufacturing units
  - **Ennore:** key port-related industries, auto (Ashok Leyland, MRF), Oil PSU – bottling/distribution terminals
  - **Redhills:** features Horizon Industrial Parks with plug-and-play facilities
  - **Outside Chennai:** Gummidipoondi – Tamil Nadu's oldest and Sri City – integrated multi-sector SEZ and DTA zones with residential and social facilities (part of Andhra Pradesh but situated on border of TN/AP)
- **South West Cluster (Automotive and Electronic)**
  - **Sriperumbudur:** SIPCOT Industrial Park, includes areas like Pillaipakkam, Sunguvarchatram, and Araneri
  - **Oragadam:** huge auto hub with global names (BMW, Nissan), logistics, and energy sectors
  - **Irungattukottai:** significant cluster with modern infrastructure
  - This belt is a major automobile and electronics hub with presence of Hyundai, Nissan, Samsung, Dell etc. generating large export freight volume via Chennai and Ennore Ports.
- **West cluster: Ambattur** and **Puzhal** host engineering and small-scale industries
- **South Cluster**
  - **Madras Export Processing Zone:** SEZ in Tambaram with presence of IT, ITES, electronics, logistics and manufacturing (leather and footwear, agro, pharma, plastics, textiles)
  - **Maraimalai Nagar:** home to automotive, pharmaceutical and chemicals
  - **Mahindra World City:** India's first integrated business and residential township having IT/ITeS, manufacturing (auto ancillaries, Electronics), and logistics, with major firms like BMW, Infosys, Pegatron, BASF, and TVS Group operating within its multi-sector SEZ and DTA zones
  - **Ariyalur Cement Manufacturing cluster** (near Trichy) supplies cement to Chennai and nearby region.
- **Sriperumbudur - Maduravoyal** stretch serves as a logistics and warehousing corridor, with multiple CFSs and distribution hubs supporting port-based trade.
- **Porur and Chennai Metropolitan Region periphery,** Rapidly growing commercial and service sectors, with rising movement of goods, construction materials, and workforce through the bypass.
- Chennai Bypass acts as a key industrial and logistics connector, integrating manufacturing, warehousing, and port operations within the Chennai Metropolitan Region.

Source: TIC secondary research

# Economic activities in influence region (4)

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**2 Maritime Cluster**

- **Chennai Maritime Cluster** comprises three ports i.e., **Chennai, Ennore (Kamarajar) and Kattupalli**. Chennai maritime cluster is preferred choice for Far East origin/destinations for hinterland identified.
- **Hinterland served by Chennai Bypass:** south/south-west Tamil Nadu, Karnataka, Chennai and nearby industrial region discussed earlier in this section.
- **Major commodities handled:**
  - **Chennai Port:** mainly import cargo which includes **Container Cargo (~63%)**, Petroleum, Oil, Lubricants and LPG/LNG (~25%), Dry and Break Bulk Cargo (~10%)
  - **Ennore Port:** both export-import cargo which includes **Container Cargo (~25%)**, Petroleum, Oil, Lubricants and LPG/LNG (~12%), **Coal (~50% including Thermal, Steam, Coking)**, Dry and Break Bulk Cargo (~10%)
  - **Kattupalli Port:** Container Cargo, Soda Ash (major contribution), Black Oil Products (including Bitumen)
- **Capacity utilisation:** Chennai (36%) and Ennore (57%) in FY25 with designed capacity of 136 MMTPA and 97 MMTPA respectively.
- Port traffic especially container cargo is heavily dependent on road logistics.
- **Container Cargo and petroleum products are major items observed at the project highway** as regular movement between hinterland and maritime cluster which is highly volatile in monthly trend.
- Area nearby port cluster (Manali, Ennore Port Road, Redhill) is hub of logistics facilities like Container Freight Stations (CFS), warehousing/container yards, truck terminals, lodging/boarding for truckers.
- Chennai Multimodal Logistics Park (MMLP) is under construction at Mappedu (accessible through NH48 and at west of Chennai). Phase 1 commercial operations is expected by start of FY27. This will improve freight efficiency, reduce last-mile delivery challenges, link ports (Chennai, Ennore, Kattupalli) with industries and boost economic growth.
- Well established container ecosystem of this cluster and planned capacity expansion of container berths will ensure the associated traffic from hinterland on the project highway.
- NHAI is developing elevated corridor exclusively for Chennai Port (Maduravoyal to Chennai Port Gate 10) strengthen external evacuation infrastructure which will have a negative impact at Surapattu TP.

Source: TIC secondary research

# Economic activities in influence region (5)

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**3 Agriculture and allied activities**

- **Paddy (rice)** is the primary crop grown in Tiruvallur, Kanchipuram and Chengalpattu districts, supported by irrigation from Poondi and Chembarambakkam reservoirs, while groundnut, sugarcane, millets and pulses are major secondary crops contributing to local agri-based processing.
- **Horticulture** and **floriculture** including banana, tomato, brinjal, mango and jasmine are commercially cultivated, supplying fresh produce to Koyambedu Market and surrounding urban centers.
- Allied activities such as dairy, poultry, and inland aquaculture are prominent near Red Hills and Minjur, driven by high urban demand and proximity to the Chennai Metropolitan Region.
- **Koyambedu Wholesale Market Complex**, located along the Chennai Bypass, spans about 295 acres and houses over 3,000 shops. It is one of the largest hubs for perishable goods in India, handling thousands of tonnes of fruits, vegetables, and flowers every day. The market supplies produce to the entire region and attracts heavy volume of business travelers and vehicles daily. It draws traffic from all directions, including southern Tamil Nadu, areas north of Chennai/Andhra Pradesh, and as far as Kolar and western Karnataka for fruits and vegetables.
- Nellore is known as 'Shrimp capital of India' with aquaculture influence in the region.

**4 Tourism**

- **Chennai** offers a mix of coastline, history, spirituality, and wildlife experiences for visitors which attracts a large volume of domestic and international tourists e.g., historic Fort St. George, cultural hubs like Kalakshetra, Kapaleeshwarar Temple, spiritual sites - Santhome Basilica and unique Madras Crocodile Bank.
- **Sri Venkateshwara Swami Vaari Temple at Tirupati** (richest temple in the world) attracts thousands of devotees from across India. IN addition to the same, Mypadu beach, Pulikat lake, ISRO center etc. are locate on the north of Chennai.
- **Kanchipuram**, known as the City of Thousand Temples, is a key spiritual and heritage destination, also famous for its traditional silk weaving.
- **Mahabalipuram**, a UNESCO World Heritage Site, promotes heritage and coastal tourism, collectively enhancing the region's religious, cultural, and leisure tourism along the Chennai Bypass corridor.

Source: TIC secondary research

# Economic activities in influence region (6)

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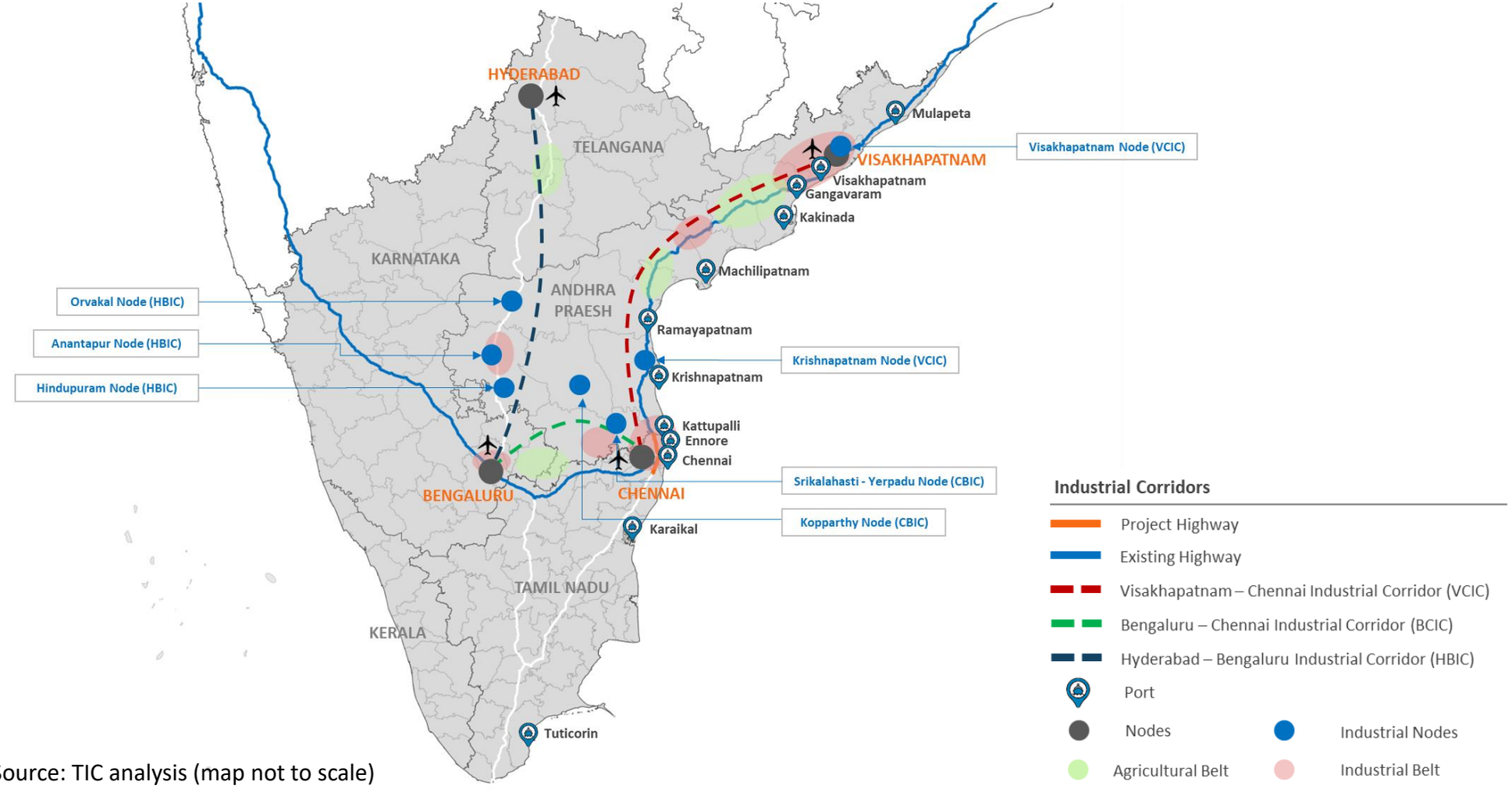
**5 Social / Educational**

- Various educational institutes, hospitals, social amenities are established along the bypass especially at Maduravoyal junction and immediate vicinity of 5 km on both end which sustain regular passenger traffic.
- Kalaignagar Centenary Bus Terminus (KCBT) near Kilambakkam (southern part of Chennai) and Madhavaram Mofussil Bus Terminus (MMBT) near end point (northern part of Chennai) facilitates regular bus services which use the project highway.

Source: TIC secondary research

# Economic activities in influence region (7)

**Industrial corridors under development**




Source: TIC analysis (map not to scale)

- **Chennai – Bengaluru Industrial Corridor (CBIC)** proposes high impact / market driven nodes at **Ponneri in Tamil Nadu (NH16), Tumkur in Karnataka (NH48), Krishnapatnam/Nellore in Andhra Pradesh (NH16).**
- Industrial hubs and logistics with improved road/rail links, connecting Bengaluru and Chennai through strategic locations like Tumakuru, Kolar, Sriperumbudur and Krishnapatnam - leveraging proximity to Chennai Maritime Cluster for East Asia trade.

# Our understanding of traffic corridor and road network

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**National corridor (long-distance traffic)**

- Chennai Bypass forms a strategic link within the Golden Quadrilateral (NH48), connecting the Mumbai–Bengaluru–Chennai corridor and South Tamil Nadu – Chennai linkages which facilitates long-distance freight movement across southern and western India, enabling continuous movement of goods between Bengaluru, Hosur, Sriperumbudur and Chennai, and further linking to eastern coastal ports such as Chennai, Ennore and Kattupalli.
- Project highway carries high volumes of industrial, containerized and port-based cargo, including automobiles, electronics, machinery and FMCG products, forming a key component of the Delhi–Chennai and Mumbai–Chennai freight corridors that support national-level logistics and trade.

**Regional linkages (medium-distance traffic)**

- The bypass connects major industrial and logistics zones within the Chennai Metropolitan Region (CMR) — including Tambaram, Chengalpattu, Sriperumbudur, Porur, Maduravoyal, Ambattur and Puzhal — supporting efficient freight transfer between manufacturing hubs and port terminals.
- It serves as a connector for automobile and electronic industries located along the Sriperumbudur–Oragadam–Irungattukottai industrial belt, facilitating transport to Chennai, Ennore, and Kattupalli ports for export and distribution. The corridor also links regional traffic between western approaches (NH44/Bengaluru) and northern/eastern sectors of Chennai city, reducing congestion on inner urban routes.

**Local connectivity (short-distance traffic)**

- Due to the rapid urbanization of Chennai, the bypass now functions as an integral part of the city's internal road network, handling substantial intra-city and suburban traffic. It supports the daily movement of commuters, goods vehicles, and port-related transport between industrial clusters, residential zones, and logistics parks.
- Additionally, it provides last-mile connectivity to city distribution centers and container yards, contributing to the efficient functioning of the urban freight ecosystem within the Chennai region.

Chennai bypass, initially designed to cater to intercity and freight traffic, is now being extensively used by urban commuters making it function more as urban corridor. Majority of traffic has either destination/origination within core city that is on eastern side of Chennai Bypass. Being access-controlled (with open tolling and limited entry-exit) modality makes it still effective for road users with sustaining a level of service comparable to a national highway. It caters to substantial intra-city and port-related traffic, including movements between Bengaluru/western and Chennai maritime cluster covering ports of Chennai, Ennore and Kattupalli.

# Corridor traffic summary (1)

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**Kolkata-Chennai corridor of NH16 and NH719B (old NH32/NH45)**

| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Dhankuni – Kharagpur** | BOT (Toll) – Maple Highways | 80,000 |
| **Kharagpur – Baleshwar** | BOT (Toll) – IL&FS | 18,000 |
| **Baleshwar – Bhadrak** | Toll - Public Funded | 32,000 |
| **Bhadrak – Chandikhole** | Toll - Public Funded | 35,000 |
| **Chandikhol – Bhubaneshwar** | BOT (Toll) – Maple Highways | 45,000 |
| **Bhubaneshwar – Sunakhala** | Toll - Public Funded | 25,000 |
| **Sunakhala – Puintola** | Toll - Public Funded | 25,000 |
| **Puintola – Icchapuram** | TOT (Toll) – Safeway Concession/Macquire | 21,000 |
| **Icchapuram – Nandigaon** | TOT (Toll) – Safeway Concession/Macquire | 20,000 |
| **Nandigama – Srikakulam** | NHIT (Private InvIT Bundle 4) | 28,000 |
| **Champavati/ Kopperla – Visakhapatnam** | NHIT (Private InvIT Bundle 4) | 32,000 |
| **Anakapall – Anandapuram** | NHIT (Private InvIT Bundle 4) | 25,000 |
| **Anandapuram – Tuni** | Toll - Public Funded | 44,000 |
| **Ankapalli – Tuni** | Public Funded | 44,000 |
| **Tuni – Diwancheruvu** | Public Funded | 40,000 |

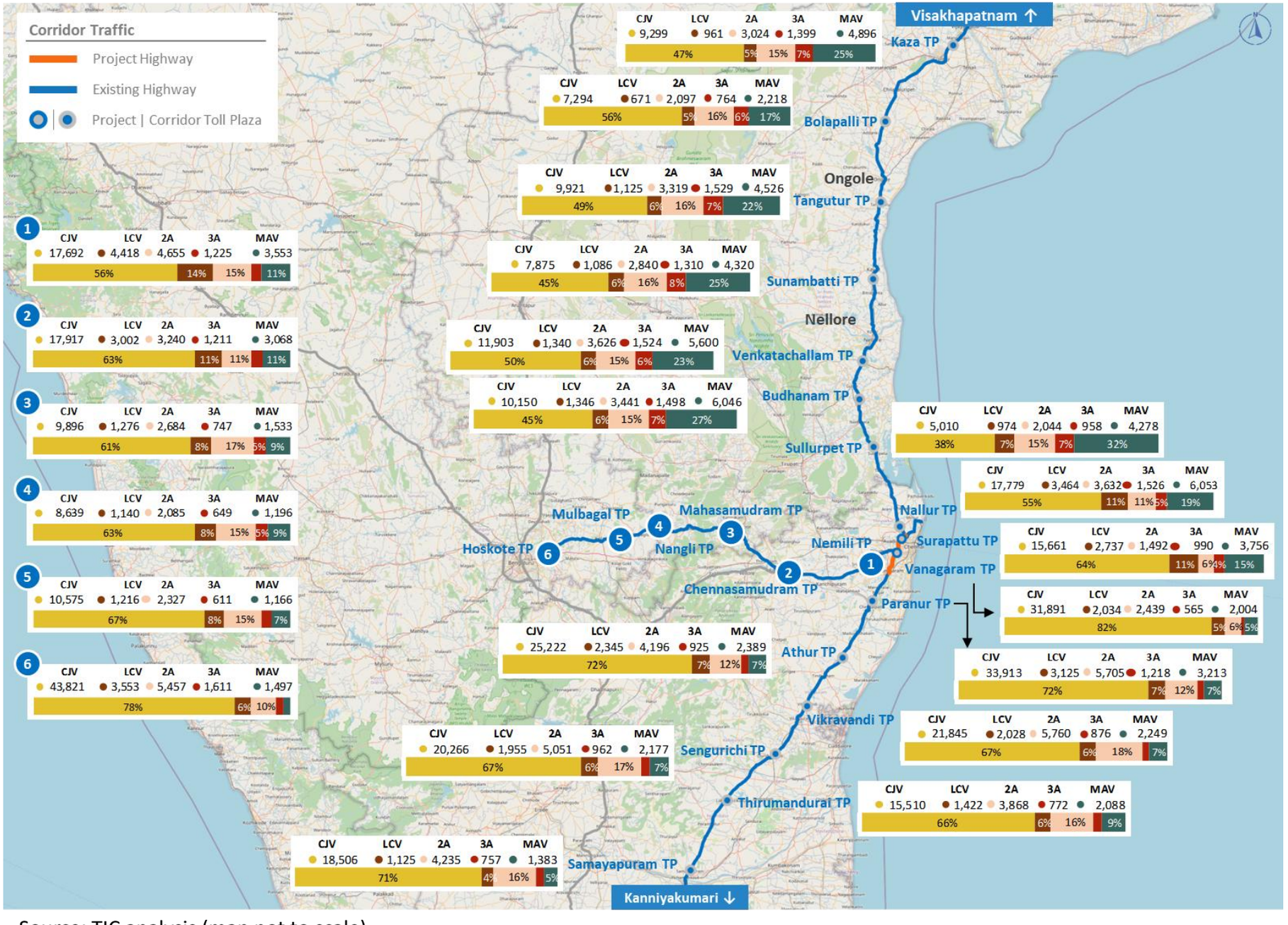
| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Gundugolanu – Devarapalli – Kovvuru** | NHIT (Private InvIT 4) | 33,000 |
| **Gundugolanu – Vijayawada** | Public Funded – Under Monetization (Pvt InvIT 5) | 50,000 |
| **Vijayawada – Chilakaluripet** | Toll - Public Funded | 60,000 |
| **Chilkaluripet – Nellore** | BOT (Toll) – Interise (CPPIB) | 30,000 / 50,000 / 45,000 |
| **Nellore – Tada** | BOT (Toll) – Vertis (KKR) | 52,000 / 33,000 |
| **Tada – Chennai** | Toll - Public Funded | 62,000 |
| **Chennai Bypass** | Toll - Public Funded | 45,000 / 52,000 |
| **Tambaram – Tindivanam** | Public Funded | 77,000 / 55,000 |
| **Tindivanam – Ulundurpet** | BOT (Toll) – Vertis (KKR) | 53,000 |
| **Ulundurpet – Padalur** | BOT (Toll) – Abertis India | 50,000 |
| **Padalur – Trichy** | BOT (Toll) – Uniquest Infra Ventures | 40,000 |
| **Trichy – Madurai** | Public Funded | 24,000 |
| **Madurai – Thoothukudi** | Public Funded – TOT 19 (Under Bidding) | 25,000 |

Source: TIC analysis

# Corridor traffic summary (2)

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**Traffic composition on the corridor: 7 months ADT of FY26 till October 2025**




Source: TIC analysis (map not to scale)

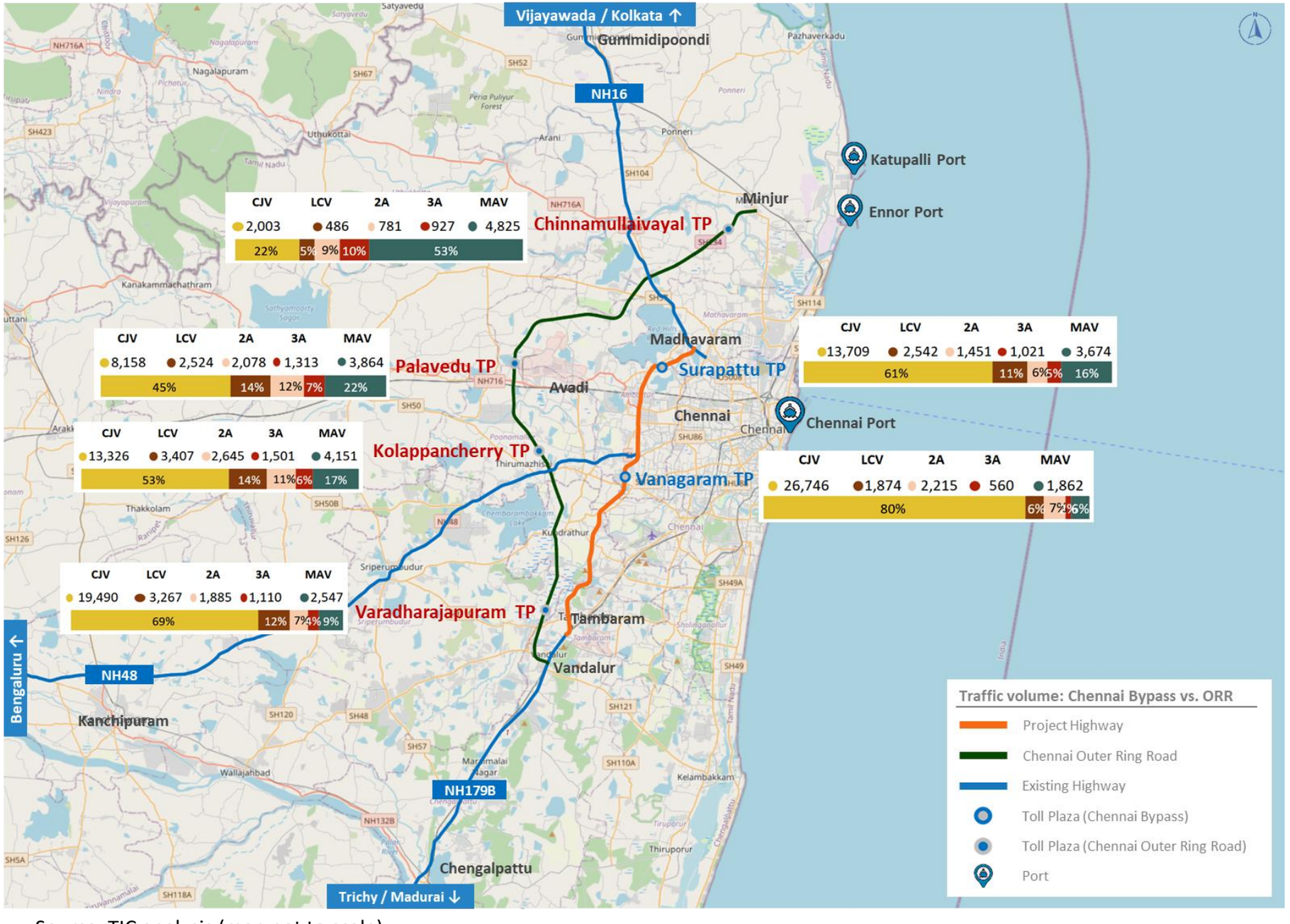
# Competing corridor: network and traffic summary (1)

- **Chennai Outer Ring Road** (ORR) is a 62 km 6-lane access-controlled corridor developed in two phases by state government to ease city traffic.
- ORR was developed in two phases:
  - Phase-1: Vandalur to Nemilicheri; started in 2014 without toll till January 2022
  - Phase-2: Nemilicheri to Minjur; started around March 2021 without toll till January 2022
- ORR connects Chennai - Tirchy Highways at Vandalur with Thivottiyur - Ponneri - Panchetti road at Minjur. It passes through NH48 at Nazarathpet, NH205 at Nemilicheri, Padiyanallur at NH16
- Vehicles coming from via Tada/Bengaluru/Tirchy can reach the ports in north Chennai through ORR without entering Chennai bypass road. Similarly, vehicles from Madhavaram, Red Hills, Puzhal, Thiruvottiyur and other northern parts of the city heading to Tirupati can reach Chennai - Tirupati NH through ORR. The vehicles from the Madhavaram bus terminus can enter NH48 (towards Bengaluru) through Nazarathpet.
- 6-lane access-controlled road has service roads on either side and designed with standards of express highway with no U-turns (except at toll gates) and vehicles are permitted to run at 100 km.
- The user fee is collected at four toll plaza locations (open tolling modality with access-controlled) in order of starting from Vandalur to Minjur i.e., Varatharajapuram (Ch km 6.000) Kolappancheri (Ch km 21.800), Palavedu (Ch km 30.850 and Chinnamullaivoyal (Ch km 56.700).
- Traffic between Chennai Bypass and ORR has attained dynamic equilibrium during FY25 to FY26 YTD as per traffic data, origin-destination survey at both the highway sections (2 TPs on Chennai Bypass and 4 TPs on ORR), site visit and stakeholder consultation.
- Traffic diversion takes place from Chennai Bypass to alternate routes including ORR during various during Diwali/Pongal/Ayudha Pooja etc. festivity, VIP movement, peak hours diversion, water logging at Chennai Bypass due to heavy monsoon etc.
- Comparative summary of traffic volume of FY25 and FY26 till September 2025 for Chennai Bypass and ORR is presented on next page.

# Competing corridor: network and traffic summary (2)

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**Traffic composition: Chennai Bypass and ORR (FY25)**

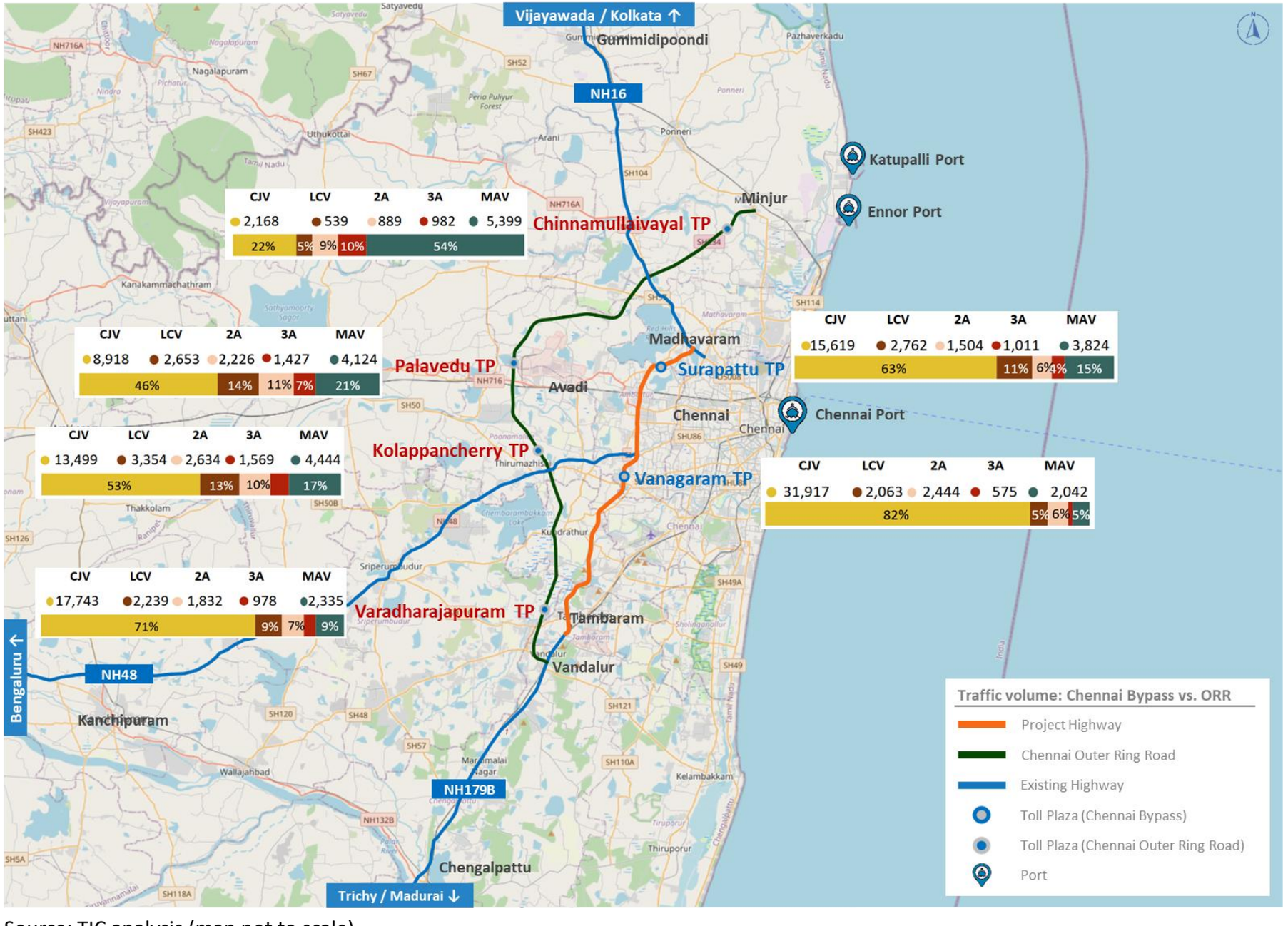



Source: TIC analysis (map not to scale)

# Competing corridor: network and traffic summary (3)

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**Traffic composition: Chennai Bypass and ORR (7 months ADT of FY26 till September 2025)**




Source: TIC analysis (map not to scale)

# Site photographs

**Start Point (km 0.000)**




**Vanagaram Toll Plaza (km 16.620)**




**Maduravoyal Interchange**




**Cross Section**




**Surapattu Toll Plaza (km 28.600)**



**End Point (km 32.600)**




Source: TIC site visit

# Proposed infrastructure development in the region (1)

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**Network and infrastructure development in the influence region (refer map on Pg 35)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Chennai Peripheral Ring Road (CPRR) (6 lane + PS with Service Road )** | Tamil Nadu Road Development Corporation / EPC<br>5 Sections with multiple packages and developers | **Section 1:**<br>Northern port access road (Ennore Port to Thatchur on NH16 (25.40 Km)<br>Under construction; expected completion in FY28<br>**Section 2:**<br>Thatchur on NH16 to start of Thiruvallur Bypass (26.10 Km)<br>**Section 3:**<br>Start of Thiruvallur Bypass to Sriperumbudur on NH48 (30.10 Km)<br>Only Package 3: Start of Thiruvallur Bypass to Vengathur (10.40 Km)<br>Under construction<br>**Section 4:**<br>Sriperumbudur NH48 to Singaperumalkoli on NH38/NH719B (23.80 Km)<br>**Section 5:**<br>Singaperumalkoli on NH38/NH719B to Mamallapuram (28.24 Km)<br>Under bidding process | **Negative** for Surapattu TP<br><br>**Chennai – Bengaluru Industrial Corridor (CBIC)** proposes high impact / market driven nodes at Ponneri in Tamil Nadu (NH48), Tumkur in Karnataka (NH48), Krishnapatnam/Nellore in Andhra Pradesh (NH16).<br>Bengaluru – Chittor – Thatchoor corridor in association with northern end of Chennai Peripheral Ring Road (CPRR) will **be backbone to this mega industrial corridor.**<br><br>Traffic movement between Bengaluru/west and Ennore/Kattupalli Port without using logistics facility (CFS/Container Yard) at Manali area |
| **Bengaluru Chennai Expressway (4 lane)** | NHAI / HAM<br>Multiple phases/packages and developers | **Phase 1 of NE7 (Karnataka):** operational<br>**Phase 2 of NE7 (Andhra Pradesh):** Total 3 packages; under construction and expected to be operational by mid FY28<br>**Phase 3 of NE7 (Tamil Nadu):** Total 3 packages; under construction and expected to be operational by mid FY28<br>**Chittoor Thatchur section of NH716B:** Total 4 packages; under construction and expected to be operational by end of FY28 | |
| **Chittoor Thatchoor section NH716B (6 lane)** | NHAI / HAM<br>Multiple packages and developers | Total 4 packages; under construction and expected to be operational by end of FY28 | |

Source: TIC research and analysis

# Proposed infrastructure development in the region (2)

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**Network and infrastructure development in the influence region (refer map on Pg 35)**

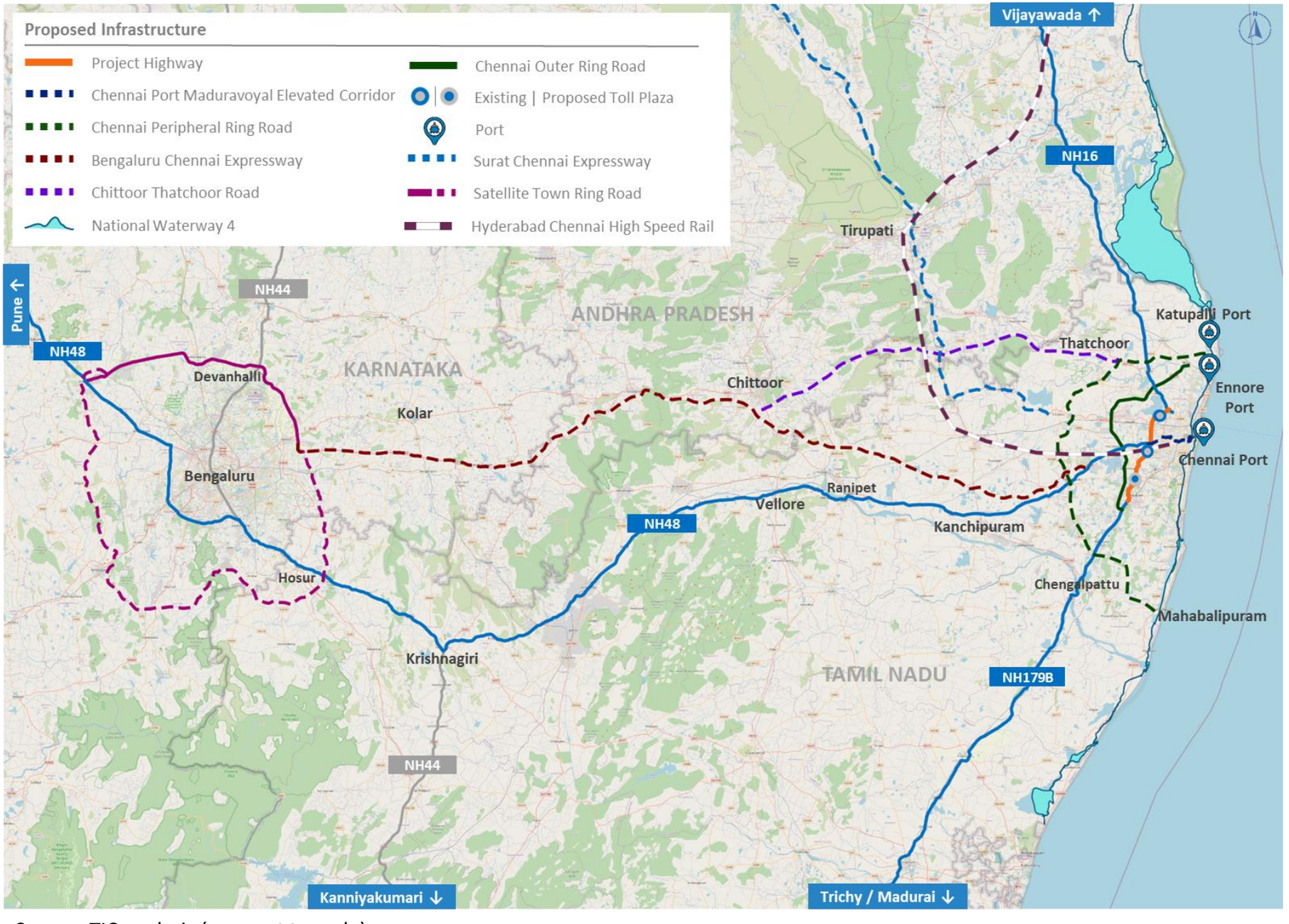
| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Chennai Port Maduravoyal elevated corridor (Double tier 4-lane elevated corridor)** | NHAI / 4 EPC Packages<br>J. Kumar Infra Projects Limited in JV with Azvirt LLC | Under construction<br>Expected completion in FY29 | **Negative** for Surapattu Toll Plaza<br>▪ NHAI is developing elevated corridor exclusively for Chennai Port (Maduravoyal to Chennai Port Gate No. 10) strengthen external evacuation infrastructure.<br>▪ Double tier 4-lane elevated corridor along the Coum River as part of NH48 and will land inside premise of Chennai Port.<br>▪ Further, Chennai Port is implementing strengthening program of internal roads for ease on movement between Gate No. 1 to 10 followed by internal elevated corridor as long-term solution to ease out internal congestion.<br>▪ This development will provide ease to port-bound traffic, improve freight access, and reduce congestion. |
| **Surat Chennai Expressway** | NHAI / HAM<br>Multiple packages and developers | Multiple sections at various stages i.e., land acquisition, bidding, and construction<br>Expected completion by FY30 | **Nil** |
| **Proposals mentioned in Comprehensive Mobility Plan Chennai Metropolitan Area (Executive Version 2023 – 2048)** | Chennai Unified Metropolitan Transport Authority (CUMTA)<br>▪ Additional entry/exit ramp request on Chennai Bypass<br>▪ Metro rail development | Additional entry/exit at Ch km 5.200 in context of Madras Export Processing Zone (MEPZ)<br>Airport – Kilambakkam – Chengalpattu (42.1 km; Corridor 1 Extension) by 2030<br>Perungalathur to Madhavaram Mofussil Bus Terminus (MMBT) along Chennai Bypass (34.6 km; by 2040) | **Positive**<br>Perungalathur to Madhavaram Mofussil Bus Terminus (MMBT) along Chennai Bypass (34.6 km; by 2040) has been considered under effect of capacity constraint as one of the alternate option for commuters<br>Refer **Appendix A: Additional entry/exit request on Chennai Bypass other than in context of MEPZ and Metro Planning** |

Source: TIC research and analysis

# Proposed infrastructure development in the region (3)

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**Network and infrastructure development in the influence region**




Source: TIC analysis (map not to scale)

# Chapter 3: Traffic analysis

- Historical data sources
- Historical traffic and revenue trends
- Seasonality variation
- Historical ticket distribution
- Commodity analysis
- Zonal influence and trip distance

This chapter covers various datasets received from NHAI followed by assessment of historical performance of the project highway. This analysis helps to understand baseline traffic patterns comprising traffic and revenue growth rates, seasonality variations, trip factors, ticket distribution and overloading characteristics.

Survey analysis helps to validate traffic volume, commodity movement pattern, network understanding received from site visit, inputs for ticket distribution, overloading pattern based on independent survey exercise.

# Historical datasets

- The project highway is currently being operated under the public-funded mode where toll is collected by third party tolling agencies through short-term contracts. Third party tolling agencies submit traffic and revenue report on monthly basis which is titled as Schedule V.
- The consultant observes that availability and accuracy of these reports are many times under question due to inadequate quality of technology interventions and record keeping during short term contracts by tolling agencies.
- Hence, availability followed by reliability of these datasets is essential to be addressed for historical analysis as well as further processing for base year and future traffic forecasts.
- ETC data is independently system generated and hence more reliable. The client sourced vehicle category-wise traffic data which doesn't include toll ticket distribution.
- Monthly reports submitted by contractors / tolling agencies to NHAI field offices (Schedule M/G/V) which is start point to validate the toll ticket distributing including cash components, violation/exemptions, overloading fee etc.

**Summary of the historical traffic and revenue data available for Vanagaram and Surapattu Toll Plazas**

| Data sources | Duration of data | Observations |
|---|---|---|
| **Schedule V - Part A & B (monthly)** | FY14: Full year (except Apr-13)<br>FY15: Full year<br>FY16: Full year<br>FY17: Full year<br>FY18: Full year<br>FY19: Full year<br>FY20: Full year<br>FY21: Partial for both toll plazas<br>FY22: Nil<br>FY23: Full year<br>FY24: Full year<br>FY25: Full year<br>FY26: H1 (except Apr-25) (6 months) | **Part A:** Vehicle category-wise total user fee collection<br>**Part B:**<br>Vehicle category total traffic<br>Ticket distribution data: Yes<br>Exemption/violation/ cash traffic data: Yes |
| **ETC Data (monthly)** | FY23: Full year<br>FY24: Full year<br>FY25: Full year<br>FY26: Q1, Q2, Oct'25 (7 months) | Vehicle category-wise ETC transactions covering total traffic and user fee collection<br>Ticket distribution data: No |
| **Overloading Reports (weekly)** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU Chennai 2 | |
| **Neighbouring highways** | Historical traffic data to determine corridor growth trend | |

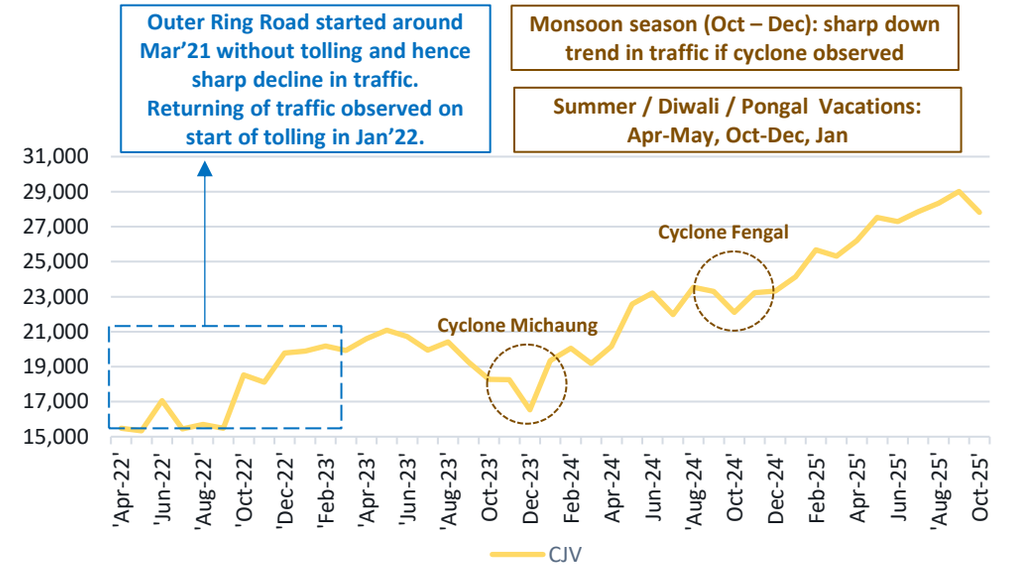
Source: TIC compilation of data received from NHAI

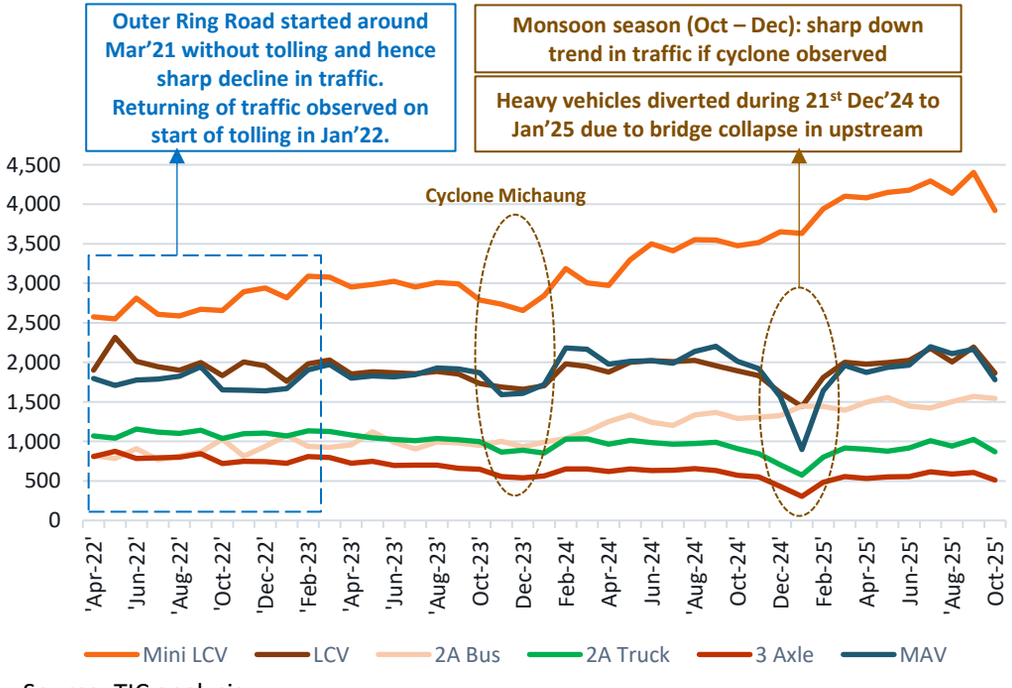
ETC data was reviewed for historical analysis as it is reliable. Schedule M/V dataset observed intermittent anomalies but useful at broad level for analysing long-term growth trend.

# Historical traffic analysis (1): Vanagram TP

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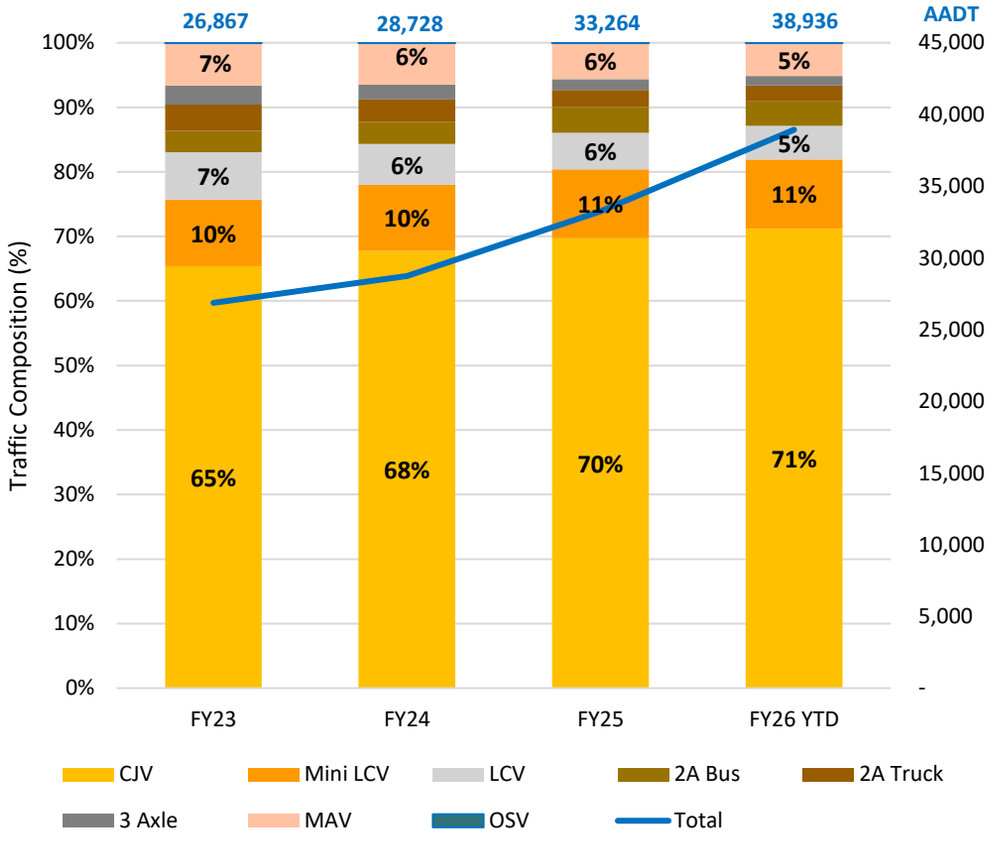
### Vehicle category-wise monthly traffic trend - ETC




Source: TIC analysis

### Vehicle category-wise annual traffic composition - ETC




- Traffic has trended in the range of 39,000 AADT (53,000 PCUs) in recent past with CJVs (70%) and Mini LCV (10%) as major contributors while balance ~20% is total contribution of heavy freight vehicles.
- High number of CJVs is obviously because of urban nature of bypass section which is mainly destined/originated within Chennai city i.e., inside the area of virtual semi-circle established by Chennai Bypass.

# Historical traffic analysis (2): Vanagram TP

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**Vehicle category-wise traffic growth trend**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 17,566 | 2,772 | 1,970 | 890 | 1,100 | 788 | 1,781 | **26,867** | **39,641** |
| **FY24** | 19,468 | 2,927 | 1,826 | 998 | 990 | 653 | 1,866 | **28,728** | **41,454** |
| **FY25** | 23,197 | 3,549 | 1,874 | 1,328 | 887 | 560 | 1,869 | **33,264** | **46,293** |
| **FY26 till Oct'25** | 27,725 | 4,166 | 2,034 | 1,505 | 934 | 565 | 2,007 | **38,936** | **52,985** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 10.8% | 5.6% | (7.3%) | 12.2% | (10.0%) | (17.1%) | 4.5% | **6.9%** | **4.6%** |
| **FY25 vs FY24** | 19.2% | 21.2% | 2.6% | 33.0% | (10.4%) | (14.3%) | 0.4% | **15.8%** | **11.7%** |
| **FY26* vs FY25** | 23.7% | 22.7% | 3.3% | 16.8% | (3.9%) | (9.9%) | (2.3%) | **19.0%** | **13.5%** |
| **CAGR (FY23 – FY26 YTD)** | 20.0% | 17.7% | 1.3% | 23.4% | (6.3%) | (12.5%) | 4.9% | **16.0%** | **12.3%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

**Long and medium-term growth rate of project highway**

| CAGR | CJV/Mini LCV | LCV | Bus/2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|
| **Vanagram TP** | | | | | | | |
| **Short-term** | 18.0% | 3.1% | 10.4% | (6.5%) | 5.6% | 14.9% | 12.2% |
| **Medium-term** | 17.8% | (8.7%) | 6.8% | (8.8%) | 4.1% | 11.7% | 8.9% |
| **Long-term** | 13% - 15% | 1% - 3% | 12% - 15% | (~3%) | ~5% | 12% - 13% | |

Source: TIC analysis

Short-term is realistic as exhibits growth post-ORR Phase-2 commencement in FY21/FY22 without/with toll and return of loyal traffic

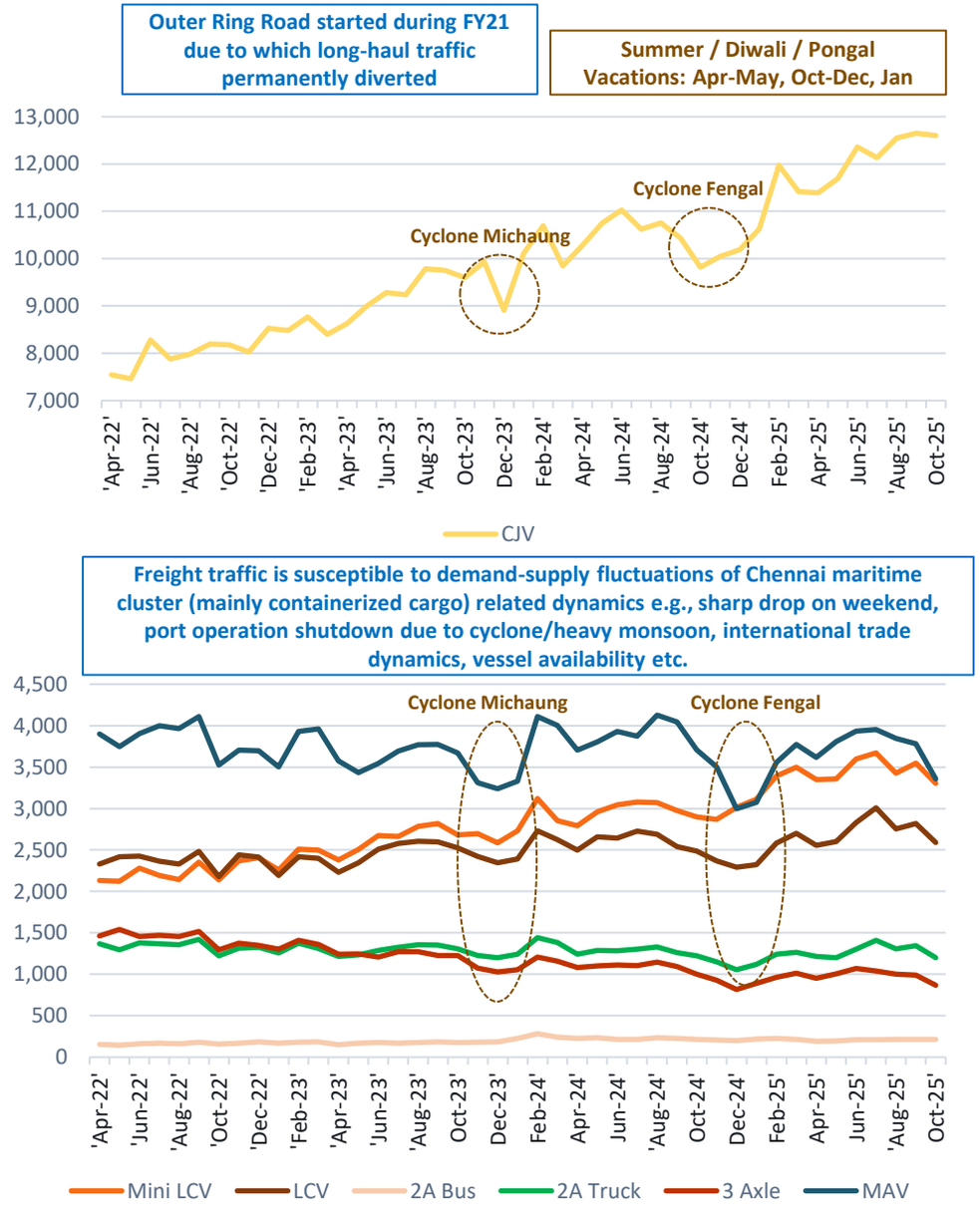
Medium-term reestablishes growth trend as includes shock due to diversion of ORR Phase-2 commencement in FY21/FY22

Long-term reassures the growth potential of the project highway as includes shock due to diversion of ORR Phase-1 (FY15/FY16) and Phase-2 (FY21/FY22)

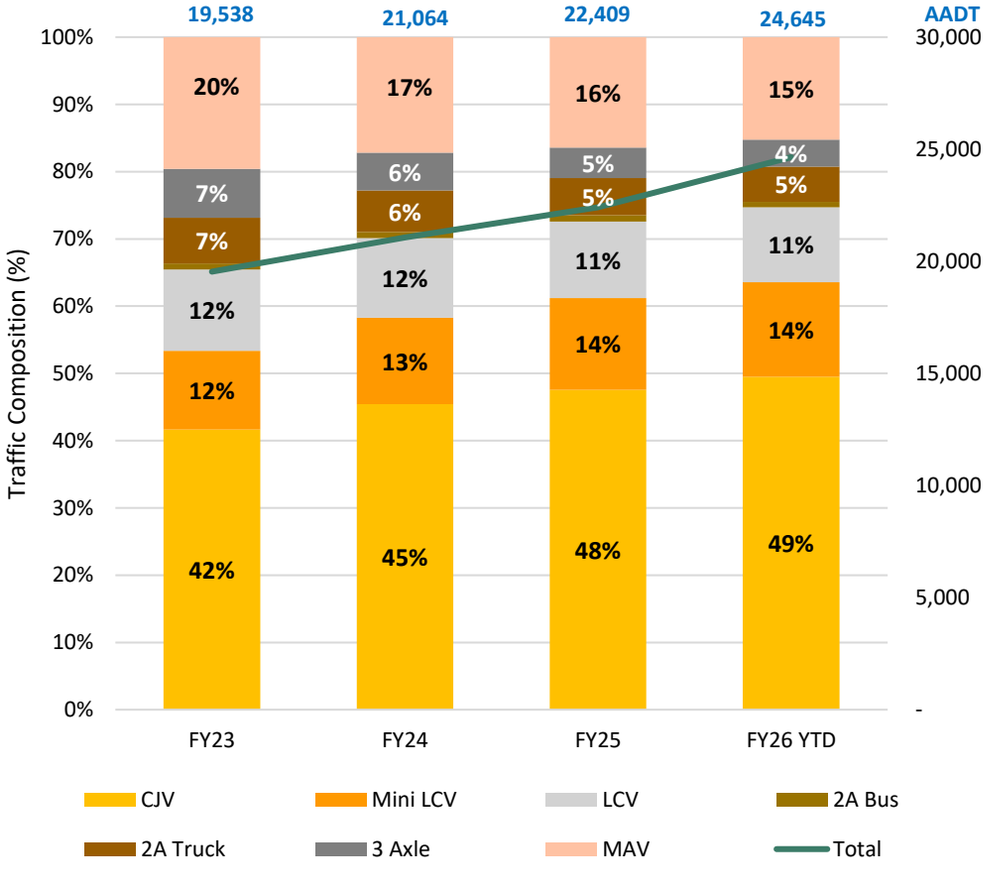
# Historical traffic analysis (3): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

### Vehicle category-wise monthly traffic trend - ETC




### Vehicle category-wise annual traffic composition - ETC




- Surapattu TP observed a significantly lower volume of CJV (~44% of Vanagram TP) and Bus (~15% of Vanagram TP) which is because traffic uses internal routes passing through Ambattur residential and industrial area.
- While freight traffic observed higher volume than Vanagram TP due to addition of traffic from industrial clusters in south-west of Chennai and Karnataka, merging through NH48 at Maduravoyal junction i.e., LCV (~35% ↑ ), 2A (~40% ↑), 3A (~75% ↑) and MAV (~90% ↑).

Source: TIC analysis

# Historical traffic analysis (4): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Vehicle category-wise traffic growth trend**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 8,139 | 2,282 | 2,365 | 168 | 1,333 | 1,417 | 3,836 | **19,538** | **39,980** |
| **FY24** | 9,558 | 2,706 | 2,491 | 193 | 1,297 | 1,185 | 3,633 | **21,064** | **40,377** |
| **FY25** | 10,652 | 3,057 | 2,542 | 220 | 1,231 | 1,021 | 3,686 | **22,409** | **41,526** |
| **FY26 till Oct'25** | 12,197 | 3,464 | 2,737 | 208 | 1,283 | 990 | 3,765 | **24,645** | **44,154** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 17.4% | 18.6% | 5.3% | 15.1% | (2.7%) | (16.4%) | (5.4%) | **7.8%** | **1.0%** |
| **FY25 vs FY24** | 11.4% | 13.0% | 2.0% | 14.0% | (5.1%) | (13.8%) | 1.5% | **6.4%** | **2.8%** |
| **FY26* vs FY25** | 15.9% | 16.5% | 5.0% | (7.3%) | 0.5% | (9.3%) | (3.3%) | **9.1%** | **3.3%** |
| **CAGR (FY23 – FY26 YTD)** | 17.6% | 18.2% | 6.0% | 8.9% | (1.5%) | (13.4%) | (0.7%) | **9.7%** | **4.1%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

**Long and medium-term growth rate of project highway**

| CAGR | CJV/Mini LCV | LCV | Bus/2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|
| **Surapattu TP** | | | | | | | |
| **Short-term** | 13.4% | 5.2% | (4.9%) | (9.1%) | 0.3% | 7.5% | 3.1% |
| **Medium-term** | ~14% | ~4.5% | ~6.5% | (~3.5%) | ~9% | 11.7% | 8.9% |
| **Long-term** | ~15% | ~4% | ~6% | (~3.5%) | ~10% | 8% - 10% | |

Source: TIC analysis

Short-term is realistic as exhibits growth post-ORR Phase-2 commencement in FY21/FY22 without/with toll and return of loyal traffic

Medium-term reestablishes growth trend as includes shock due to diversion of ORR Phase-2 commencement in FY21/FY22

Long-term reassures the growth trend as includes shocks due to diversion of ORR Phase-1 (FY15/FY16) and Phase-2 (FY21/FY22)

# Historical traffic analysis (5)

- The project highway, being of urban nature, passenger traffic contributes heavily as observed in trend analysis.
- Key characteristics for CJVs traffic are as follows in addition to discussed in preceding of pages:
  - The project highway observed periodical diversion of traffic from southern or northern end of the bypass e.g., during Diwali/Pongal/Ayudha Pooja etc. festive periods, VIP movement, peak hours diversion, water logging in upstream due to heavy monsoon etc. Diversions planned en-route Kilambakkam ahead of Diwali | Chennai News - The Times of India
  - Traffic observed lower on weekend and during flood/cyclone like situations which is obvious for an urban corridor like Chennai Bypass. While, during monsoon moderately down as road users have social and work commitments to be fulfilled.
  - Traffic observed on higher during festivity / school vacations / marriage seasons i.e., April-May, Jan-Feb, Oct-Nov.
  - Vanagram TP observed forced exemption in CJV/Mini LCV categories during peak hours due to identified black spot near toll plaza. Traffic police requests toll operating agency to open boom barrier for faster evacuation of traffic. This challenge will be eliminated on shifting of toll plaza to new location and hence improvement in forced exemption/violation is expected.
- Vegetable/Fruits/Flowers traffic carrying by Mini LCV / LCV / 2A is of captive nature at both toll plazas in context of Koyambedu Wholesale Market.
- Across Tamil Nadu, all vehicle categories observes higher traffic during months of January and May due to Pongal and Jalikattu Festivity / vacations / marriage season (after 14$^{th}$ January) which leads to higher social travel of passenger vehicles. This also contributes to increase in consumption at urban centers.
- Last week of December and first half of January is harvesting season followed by increase in rural demand (annual grocery purchase) in second half of the month is being witnessed.
- May observes higher real estate and construction material movement as pre-monsoon completion of work.
- 2A/3A observed very limited effect of restrictions on illegal sand mining in Southern Tamil Nadu during FY24 at the project highway.

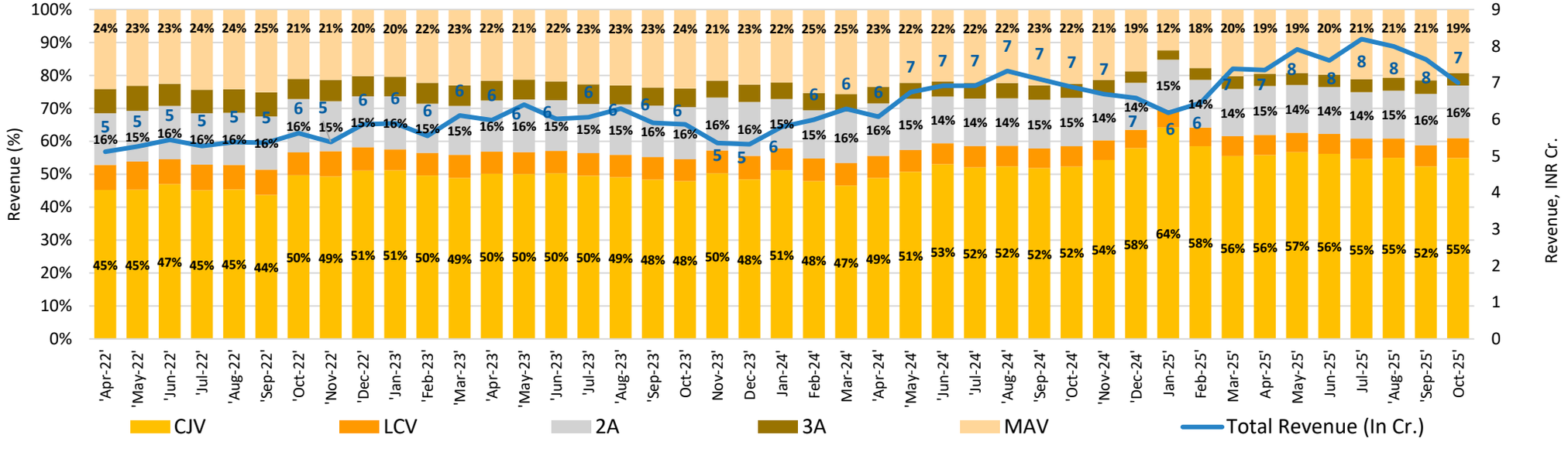
# Historical traffic analysis (6)

- Container cargo and petroleum products are major items observed at the project highway as regular movement between hinterland and maritime cluster which is highly volatile in monthly trend. Traffic gets affected as and when port operations are temporarily shutdown due to cyclone. Decrease in port traffic is visible on weekend compared to weekdays.
- Cyclone has affected the traffic in past due to lower social/business movement as well as temporary shutdown of port operations.
  - **FY2025:** Cyclone Fengel in November-December 2024
  - **FY2024:** Cyclone Michaung in December 2023
  - **FY2023:** Cyclone Mandous in December 2022
  - **FY2021:** Cyclone Nivar in November 2020
  - **FY2019:** Cyclone Gaza in November 2018
  - **FY2017:** Cyclone Vardah in December 2016
  - **FY2016:** Tamil Nadu recorded an exceptionally heavy rainfall during November - December 2015 due to the north-east Monsoons. This unprecedented rainfall took place in four spells, and which has badly affected traffic across Tamil Nadu mainly Chennai and adjoining districts.

# Historical revenue analysis (1): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Vehicle category-wise monthly revenue composition and trend - ETC**



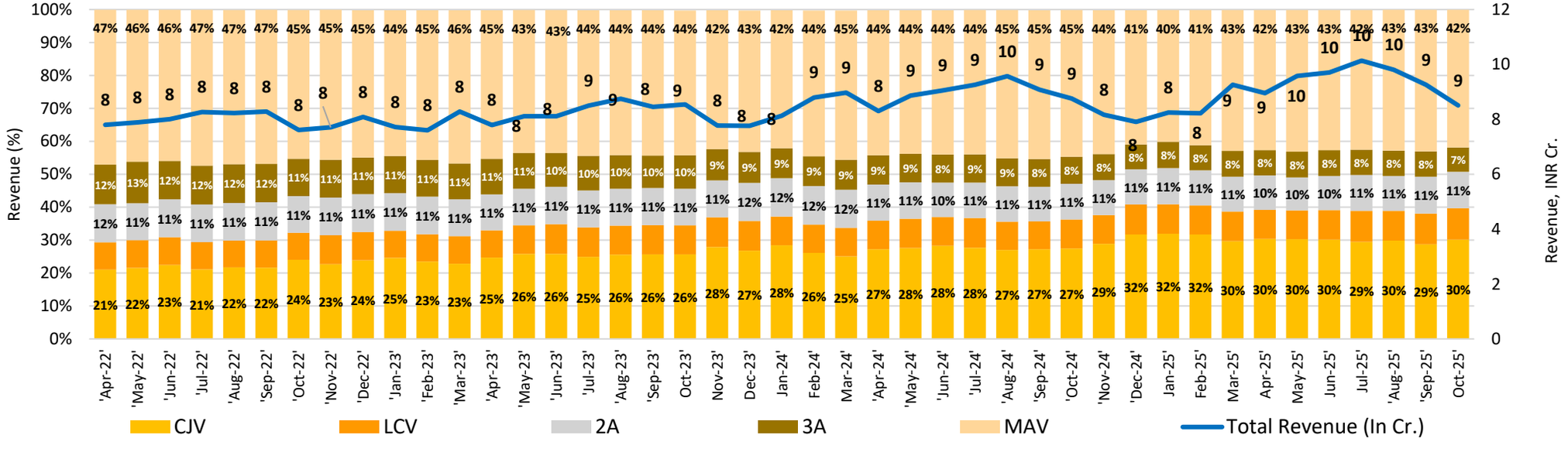

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) and Annual Average Daily Collection (in INR Lakh)** | | | | | | | | | |
| **FY23** | 27.4 | 4.2 | 4.9 | 4.6 | 5.7 | 4.4 | 15.0 | **66.2** | **18.14** |
| **FY24** | 30.5 | 4.5 | 4.9 | 5.5 | 5.6 | 4.0 | 16.4 | **71.3** | **19.46** |
| **FY25** | 38.3 | 5.8 | 5.0 | 6.9 | 5.0 | 3.4 | 16.8 | **81.2** | **22.25** |
| **FY26 till Oct'25** | 25.6 | 4.0 | 3.3 | 4.8 | 3.2 | 2.1 | 10.8 | **53.7** | **25.08** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 11.3% | 6.8% | (0.4%) | 19.5% | (3.4%) | (10.9%) | 9.5% | **7.6%** | **7.3%** |
| **FY25 vs FY24** | 25.5% | 28.0% | 2.1% | 26.4% | (10.0%) | (13.2%) | 2.8% | **14.0%** | **14.3%** |
| **FY26* vs FY25** | 18.6% | 24.1% | 7.0% | 21.7% | (0.3%) | (7.8%) | 0.5% | **12.0%** | **12.0%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

# Historical revenue analysis (2): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Vehicle category-wise monthly revenue composition and trend - ETC**




| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) and Annual Average Daily Collection (in INR Lakh)** | | | | | | | | | |
| **FY23** | 16.8 | 4.8 | 8.0 | 1.2 | 9.7 | 11.0 | 44.0 | **95.5** | **26.16** |
| **FY24** | 20.1 | 5.8 | 8.8 | 1.5 | 9.8 | 9.8 | 43.9 | **99.7** | **27.24** |
| **FY25** | 23.2 | 6.9 | 9.2 | 1.7 | 9.5 | 8.6 | 45.5 | **104.7** | **28.68** |
| **FY26 till Oct'25** | 14.9 | 4.8 | 6.0 | 1.0 | 6.0 | 5.1 | 28.2 | **66.0** | **30.81** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 19.9% | 22.0% | 9.7% | 21.0% | 1.7% | (10.8%) | (0.4%) | **4.4%** | **4.1%** |
| **FY25 vs FY24** | 15.5% | 18.8% | 5.2% | 16.0% | (3.0%) | (12.5%) | 3.7% | **5.0%** | **5.3%** |
| **FY26* vs FY25** | 11.5% | 21.6% | 9.4% | (2.4%) | 5.0% | (5.6%) | 0.7% | **4.9%** | **4.9%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

# Ticket distribution (1)

Schedule V (Part B) is a monthly statement presenting vehicle category and ticket distribution-wise traffic data including exemption, local concession / other discounted details.
Toll ticket distribution refers to share of total revenue with respect to various journey types and related discounts applicable. This distribution depends on vehicle category, trip lengths, trip frequency and percentage of local traffic.
As per Toll Plaza Gazette Notification and Toll Rate Revision Circular of FY26 for Kulgo TP, types of toll tickets are being issued are presented in the below table.

| Ticket Category | Description |
|---|---|
| **Single Ticket** | One-way journey on the project highway is considered as single journey. For such journeys, users are required to pay the complete notified one-way fee. |
| **Return Ticket** | Two one-way journeys on the Project highway within 24 hours are covered under this category. For such journeys, users are required to pay one and half times of the fee payable for one-way journey. |
| **Monthly Pass** | Fifty one-way journeys on the Project highway within a month covered under this category. The concessionaire shall, upon request from any person, issue a monthly pass for fifty one-way journeys at a discounted rate equivalent to two-thirds of fifty one-way journeys. |
| **Local Pass (Local Personal)** | Road user who owns a mechanical vehicle registered for non-commercial purposes and resides within a distance of 20 km from the toll plaza can get local monthly pass. |
| **Commercial vehicle registered within district of plaza (Local Commercial)** | Commercial vehicles (excluding vehicles plying under national permit) registered in the district where the toll plaza is located.<br>Fee shall be 50% prescribed rate for that category of vehicle provided no service road or alternative road is available for use of such commercial vehicles. |
| **Exempted** | This journey ticket category is for all users (like Police, Fire Brigade, Ambulance, Defence, etc.) which are exempted from paying toll as per NHAI Toll rules. |
| **Annual Pass for private non-commercial CJV vehicles** | On June 18, 2025, MoRTH introduced a FASTag-based annual pass to facilitate seamless highway travel. This pass is valid for non-commercial private vehicles such as cars, jeeps, and vans, and remains effective for one year from the date of activation or up to 200 trips—whichever comes first for INR 3,000. Trip counting method is as follows:<br>Open Tolling: Each entry / exit counts as one trip<br>Closed Tolling: One entry to exit trip counts as one |

Source: DCA, NH Fee Rules 2008 and subsequent amendments and existing gazette notifications

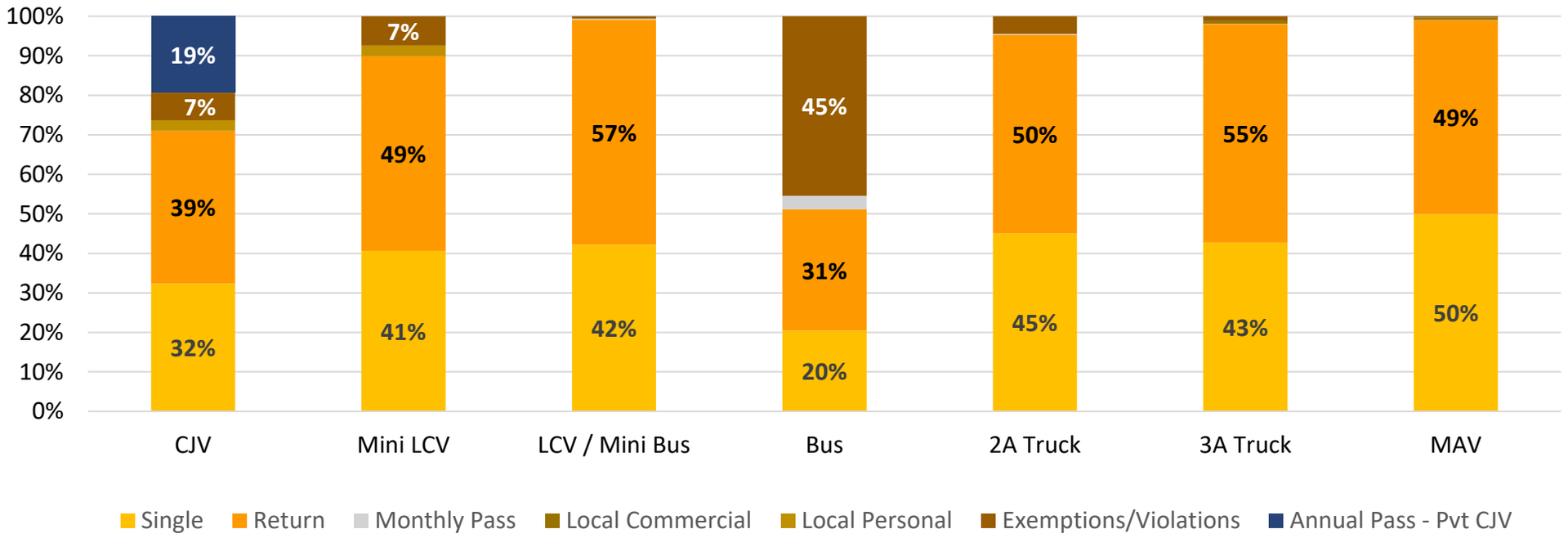
# Ticket distribution (2)

Currently it is envisaged that annual passes will be issued directly by concerned authority and hence revenue from sale of annual passes will not accrue to the concessionaire. NHAI has issued advisory for reimbursement of loss of revenue due to annual pass usage to the concessionaire which is part of Draft Concession Agreement as Clause 27.1.5 and described below:

- The concessionaire acknowledges and agrees that any user owning a non-commercial vehicle and holding a valid and functional FASTag Pass in accordance with MoRTH Gazette Notification No. G.S.R. 388(E) dated 17th June 2025 shall be entitled to use the project highway without any restrictions, except to the extent specified in any applicable law, applicable permit or the provisions of the draft concession agreement.
- In respect of such vehicle crossing the toll plaza(s), the concessionaire shall be entitled to receive compensation from the authority equivalent to the product of:
  - The number of non-commercial vehicles crossing the toll plaza(s) with such pass; and
  - 90% of the applicable fee for single journey of such vehicle.
- Provided, however, that for the purpose of computation of such compensation, the counting of any particular vehicle shall be limited 2 crossing per day, notwithstanding that such vehicle may cross the toll plaza(s) multiple times on that day.
- The compensation payable under this clause shall be due and payable in monthly instalments within 7 days of the close of the month.

# Ticket distribution (3): Vanagaram TP

**Ticket distribution**

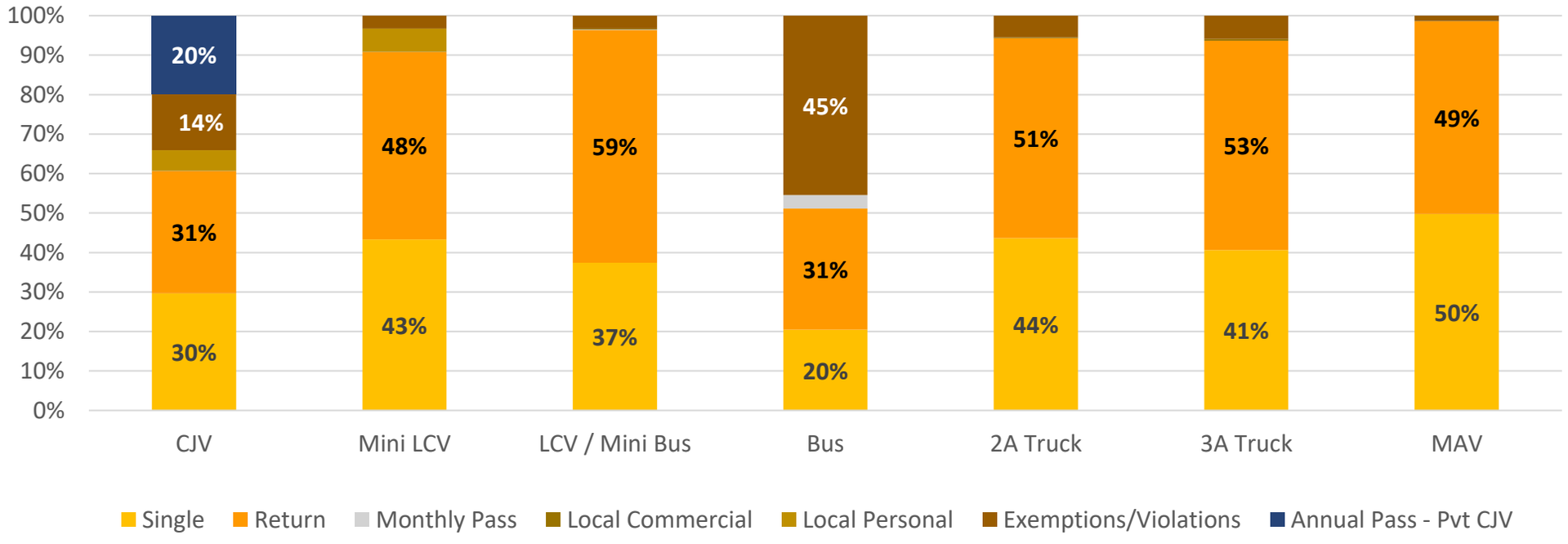



Source: TIC analysis

- Urban nature of the project highway is evident from the ticket distribution of CJVs, Mini LCVs and LCVs, where the share of return tickets exceeds single-journey tickets, indicating frequent short-distance trips associated with daily commuting. About 19% of CJV users have opted for the Annual Pass of INR 3,000 as on 31st October 2025 and is expected to increase further with awareness and adoption.
- Bus category experiences a notable quantum of exemptions or violations (54%), due to the TNSTC government buses in Tamil Nadu opting for monthly pass valid for 50 trips yet frequently exceeding this limit. While approximately 34% of private/semi-private bus traffic uses return tickets, reflecting inter-district and inter-state movement.
- Goods vehicles (2A, 3A and MAV) show a broadly similar ticketing pattern, with around 50% opting for single and return tickets, indicating substantial intra-state goods movement, largely to and from Chennai, which functions as the state's largest consumption and production hub in addition to trips to Chennai/Ennore maritime cluster.

# Ticket distribution (4): Surapattu TP

**Ticket distribution**




Source: TIC analysis

- Ticketing patterns for CJVs, Mini LCVs and LCVs reflect the urban character of the corridor, with return tickets forming a higher/equal share than single-journey tickets, indicating frequent short-distance and daily commuter trips.
- Annual Pass of INR 3,000 adoption among CJVs is around 20% as on 31st October 2025 and this proportion is expected to increase with awareness and regular usage.
- Goods vehicles (2A, 3A and MAV) exhibit a similar distribution between single and return tickets (around 50%), highlighting significant intra-state freight movement, primarily to and from Chennai, the state's major consumption and production hub.
- Volume of bus is about 200-225 so violation of TNSTC bus category doesn't affect much compared to Vanagram TP.

# Commodity analysis (1): Vanagaram TP

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**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram |
| Agriculture / Animal Husbandry | 3% | 3% | 4% | 1% | 5% | 2% | 7% | 1% | 3% | 2% |
| Fruit and Vegetables | 8% | 13% | 12% | 7% | 8% | 4% | 7% | 2% | 4% | 6% |
| FMCG / Food Products | 4% | 6% | 3% | 5% | 4% | 5% | 3% | 9% | 4% | 4% |
| Building & Construction Material | 0% | 1% | 1% | 2% | 1% | -- | 1% | -- | 0% | 2% |
| Cement | -- | 2% | 1% | 9% | 1% | -- | 2% | 6% | 2% | 7% |
| Sand | 2% | 1% | 3% | 1% | 1% | 1% | 7% | 3% | 8% | 3% |
| Aggregates / Stone | 0% | -- | 0% | 0% | -- | -- | -- | -- | -- | 0% |
| Manufacturing | 13% | 15% | 17% | 11% | 13% | 9% | 14% | 11% | 14% | 11% |
| Automobile and Spares | 2% | 1% | 2% | 1% | 1% | 2% | 4% | 0% | 2% | 2% |
| Chemicals / Fertilisers | -- | -- | 1% | 0% | -- | 0% | 0% | 0% | 1% | 1% |
| Steel / Metal Products | 4% | 5% | 6% | 9% | 4% | 5% | 4% | 12% | 6% | 14% |
| Petroleum Products | 2% | 6% | 3% | 6% | 3% | 7% | 5% | 12% | 7% | 13% |
| Parcel / E-commerce | 2% | 2% | 3% | 4% | 3% | 5% | 4% | 6% | 1% | 6% |
| Miscellaneous | 0% | 1% | 1% | -- | -- | 1% | 0% | -- | 0% | 1% |
| Empty | 58% | 44% | 45% | 41% | 56% | 59% | 41% | 36% | 46% | 28% |

Source: TIC analysis *0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

# Commodity analysis (2): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram | Tambaram to Madhavaram | Madhavaram to Tambaram |
| Agriculture / Animal Husbandry | 3% | 5% | 3% | 3% | 4% | 3% | 5% | 6% | 1% | 2% |
| Fruit and Vegetables | 1% | 5% | 2% | 2% | 3% | 3% | 1% | 2% | 1% | 3% |
| FMCG / Food Products | 4% | 9% | 3% | 3% | 4% | 3% | 1% | 2% | 3% | 3% |
| Fly Ash / Construction Material | 3% | 1% | 0% | 2% | 1% | 2% | 0% | 1% | 1% | 1% |
| Cement | 0% | 0% | 0% | 2% | 2% | 3% | 1% | 2% | 2% | 4% |
| Aggregates / Stone | 0% | 1% | 1% | 1% | 3% | 2% | 3% | 2% | 4% | 1% |
| Minerals and Mining Commodities | 1% | 0% | 1% | -- | 0% | 0% | 1% | 0% | 1% | 0% |
| Manufacturing | 13% | 20% | 7% | 14% | 17% | 12% | 16% | 12% | 10% | 24% |
| Automobile and Spares | 1% | 2% | 1% | 1% | 0% | 0% | 1% | 2% | 3% | 2% |
| Chemicals / Fertilisers | 1% | 2% | 1% | 0% | 1% | 0% | 1% | 2% | 1% | 1% |
| Steel / Metal Products | 6% | 6% | 8% | 8% | 7% | 10% | 6% | 6% | 8% | 17% |
| Petroleum Products | 3% | 4% | 4% | 6% | 5% | 9% | 5% | 15% | 6% | 9% |
| Parcel / E-commerce | 7% | 10% | 13% | 11% | 10% | 6% | 7% | 9% | 4% | 8% |
| Miscellaneous | 2% | 1% | 1% | 0% | 4% | -- | 1% | 0% | 1% | 0% |
| Empty | 54% | 34% | 55% | 48% | 39% | 48% | 51% | 38% | 57% | 27% |

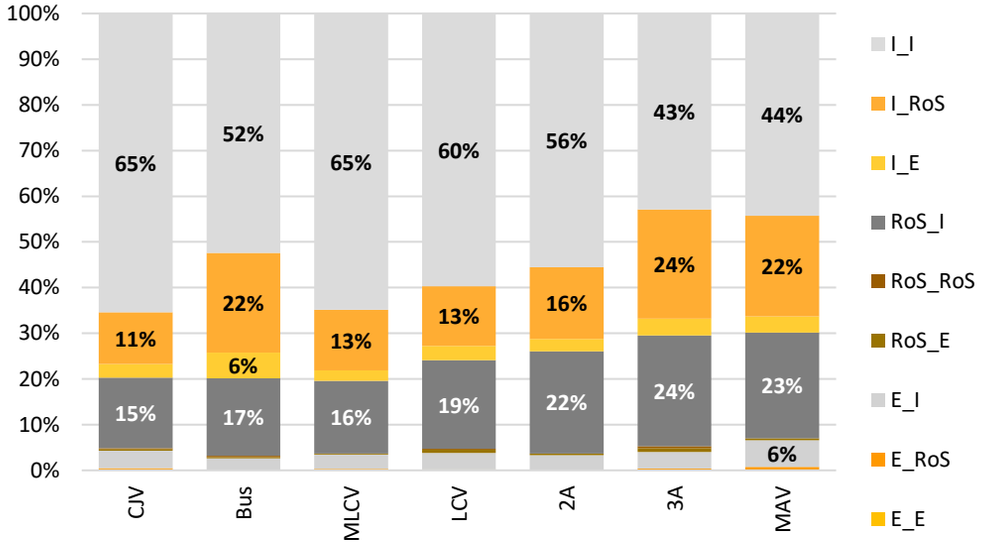
Source: TIC analysis *0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

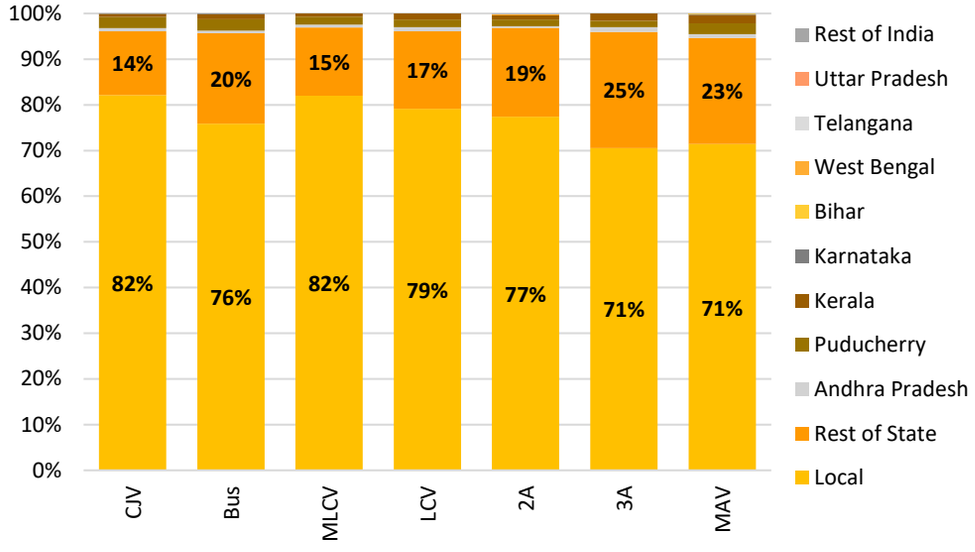
# Zonal influences and trip distances (1): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

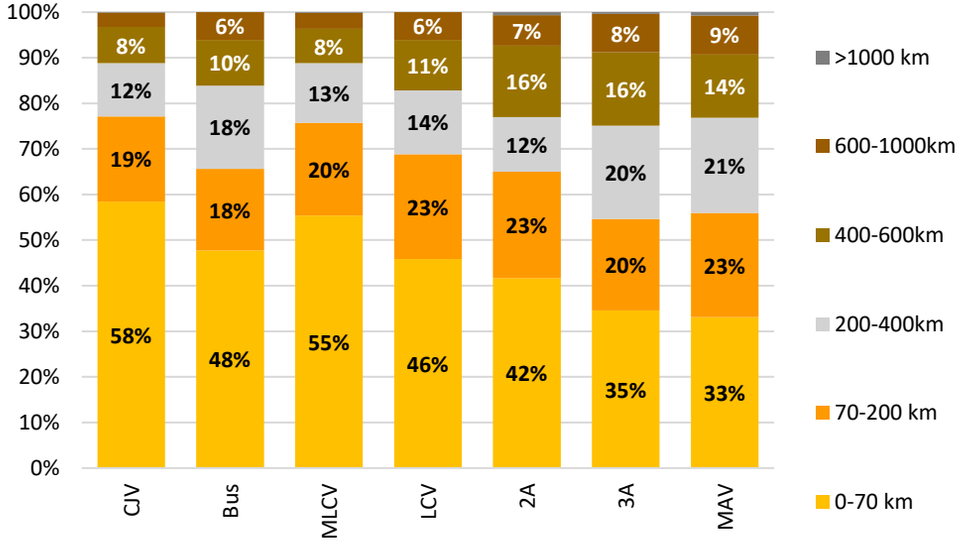
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distances



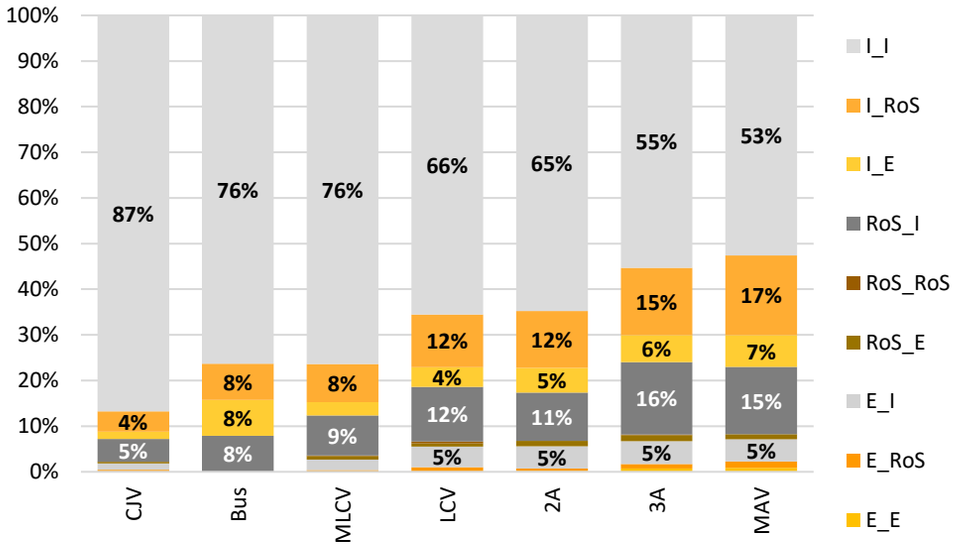

| Vehicle Category | Distances (in km) |
|---|---|
| CJV | 147 |
| Bus | 171 |
| Mini LCV | 159 |
| LCV | 191 |
| 2A | 217 |
| 3A | 253 |
| MAV | 251 |

Vehicle category-wise visual representation of origin-destination zones and top pairs are provided in Appendix B.

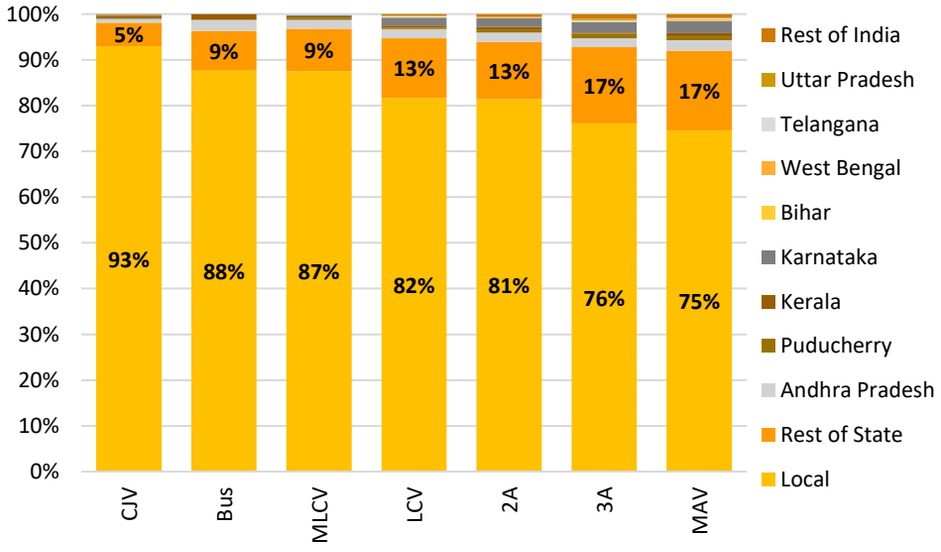
Source: TIC analysis

# Zonal influences and trip distances (2): Surapattu TP

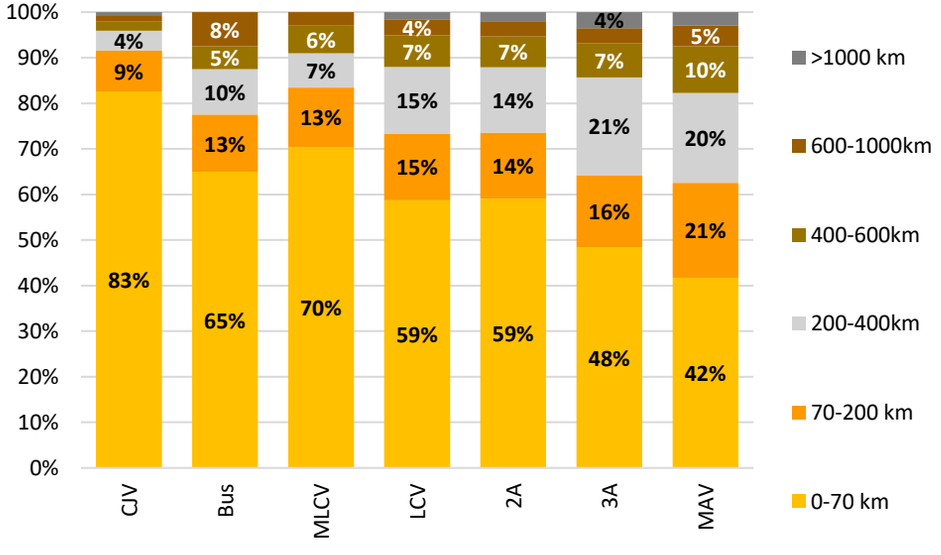
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distances




Source: TIC analysis

| Vehicle Category | Distances (in km) |
|---|---|
| CJV | 88 |
| Bus | 127 |
| Mini LCV | 117 |
| LCV | 182 |
| 2A | 185 |
| 3A | 238 |
| MAV | 245 |

Vehicle category-wise visual representation of origin-destination zones and top pairs are provided in Appendix B.

# Chapter 4: Economic context and traffic growth

- Economic context of influence region
- Determination of traffic growth drivers
- Estimation of demand elasticities
- Forecasts for growth drivers

IRC-108:2015 mentions that traffic growth is typically driven by a combination of macro-economic trends and industry/commodity specific factors, known as independent variables or traffic growth drivers.

These growth drivers have two critical characteristics:

1) the rate at which it increases i.e., forecasts of independent variable
2) the project highway's relationship with the growth driver to attract, capture and retain the traffic over the forecast horizon i.e., travel demand elasticity

Growth drivers are typically identified through analysis of origin–destination data, site visits and a detailed understanding of the highway.

Travel demand elasticity is influenced by socio-economic conditions both within the region served by the project highway and across the wider national area of influence.

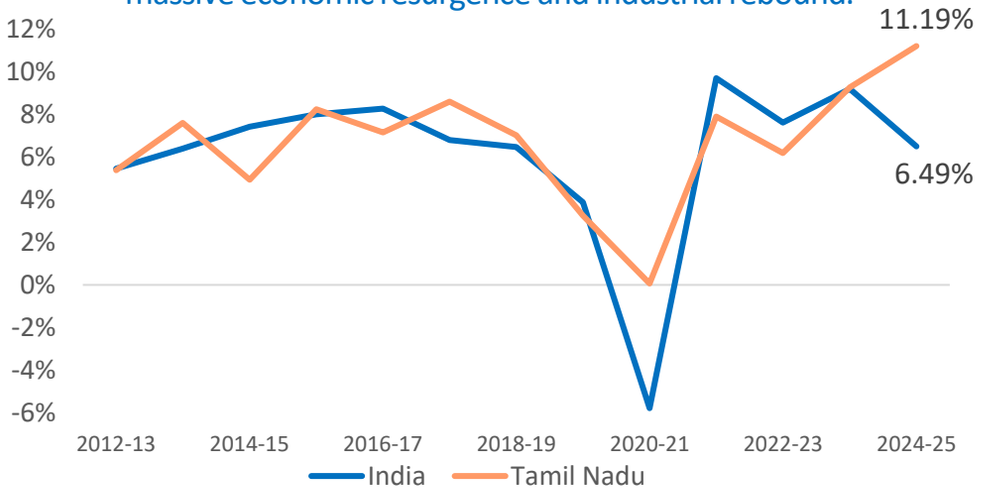
This chapter explains the growth drivers and elasticity in context of economic snapshot of primary districts / state and their correlation with the country.

# Beating the national curve: Tamil Nadu's growth story in numbers

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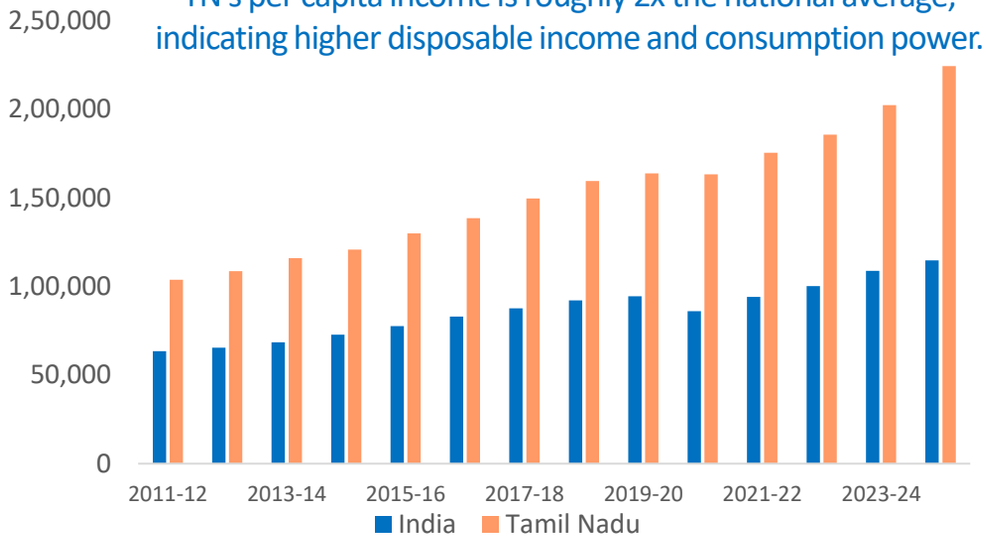
**Real GDP growth rate: India vs Tamil Nadu**

TN is2x faster than the national average in FY25, signaling a massive economic resurgence and industrial rebound.

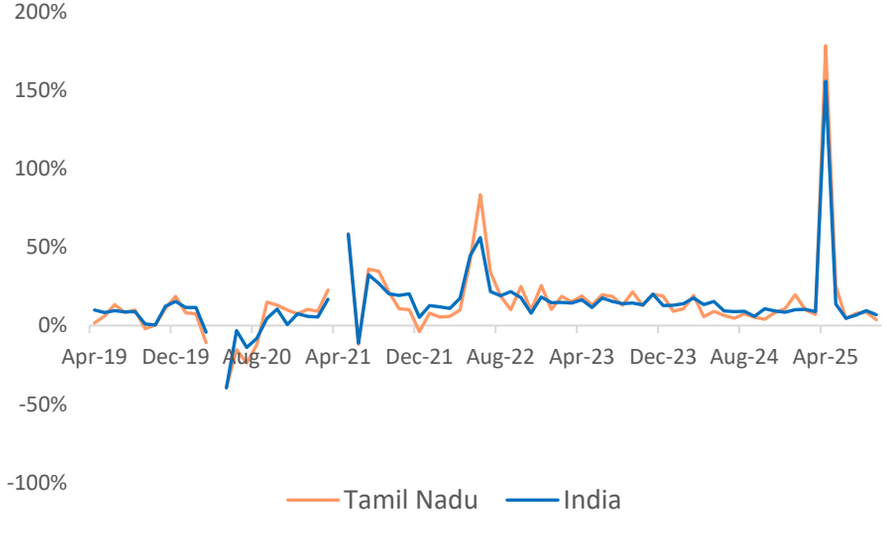



**Per Capita Income (in INR): India vs Tamil Nadu**

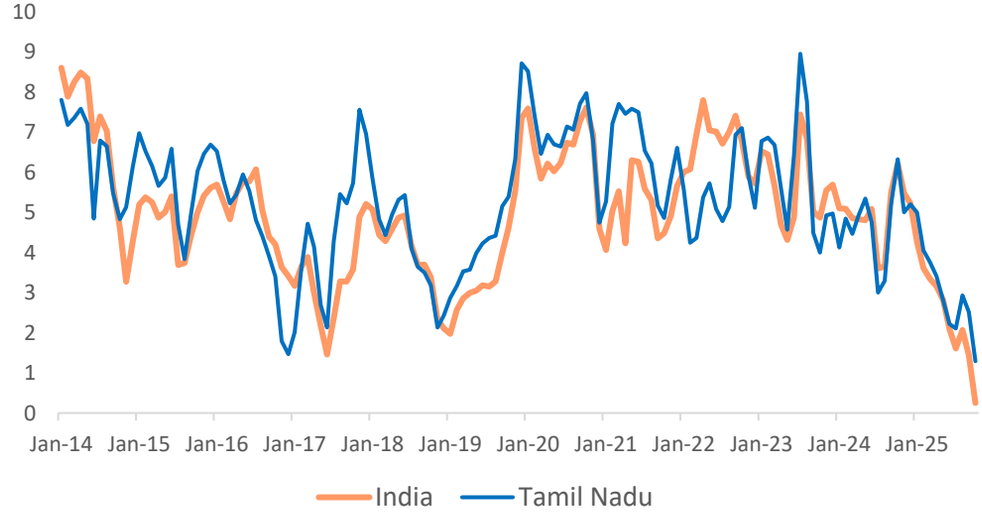
TN's per capita income is roughly 2x the national average, indicating higher disposable income and consumption power.




**GST growth rate: India vs Tamil Nadu**




**Consumer Price Indiex: India vs. Tamil Nadu**




Source: MoSPI, GST Council, TIC analysis

**GST and CPI show that TN tracks all-India pattern very closely, confirming that state is tightly integrated with the national business cycle.**

# Sectoral contribution to Tamil Nadu's economic output

**Tamil Nadu's GVA split**

| | 2017-18 | 2024-25 | CAGR | Share of GVA(2024-25) |
|---|---|---|---|---|
| Agriculture, forestry and fishing | 111,270.61 | 151,804 | 4.5 | 9.8 |
| Mining and quarrying | 4,859.62 | 6,914 | 5.2 | 0.4 |
| Manufacturing | 248,985 | 376,911 | 6.1 | 24.5 |
| Electricity, gas, water supply & other utility services | 9,514.42 | 14,622 | 6.3 | 0.9 |
| Construction | 117,806 | 190,591 | 7.1 | 12.4 |
| Trade, repair, hotels and restaurants | 118,017.44 | 173,287 | 5.6 | 11.2 |
| Transport, storage, communication & services related to broadcasting | 66,365.54 | 80,649 | 2.8 | 5.2 |
| Financial services | 63,873.07 | 88,346 | 4.7 | 5.7 |
| Real estate, ownership of dwelling & professional services | 167,515.67 | 269,279 | 7 | 17.5 |
| Public administration | 29,428.67 | 40,030 | 4.5 | 2.6 |
| Other services | 76,854.7 | 149,119 | 9.9 | 9.7 |
| TOTAL GSVA at basic prices | 1,014,491 | 1,541,551 | 6.2 | 100 |

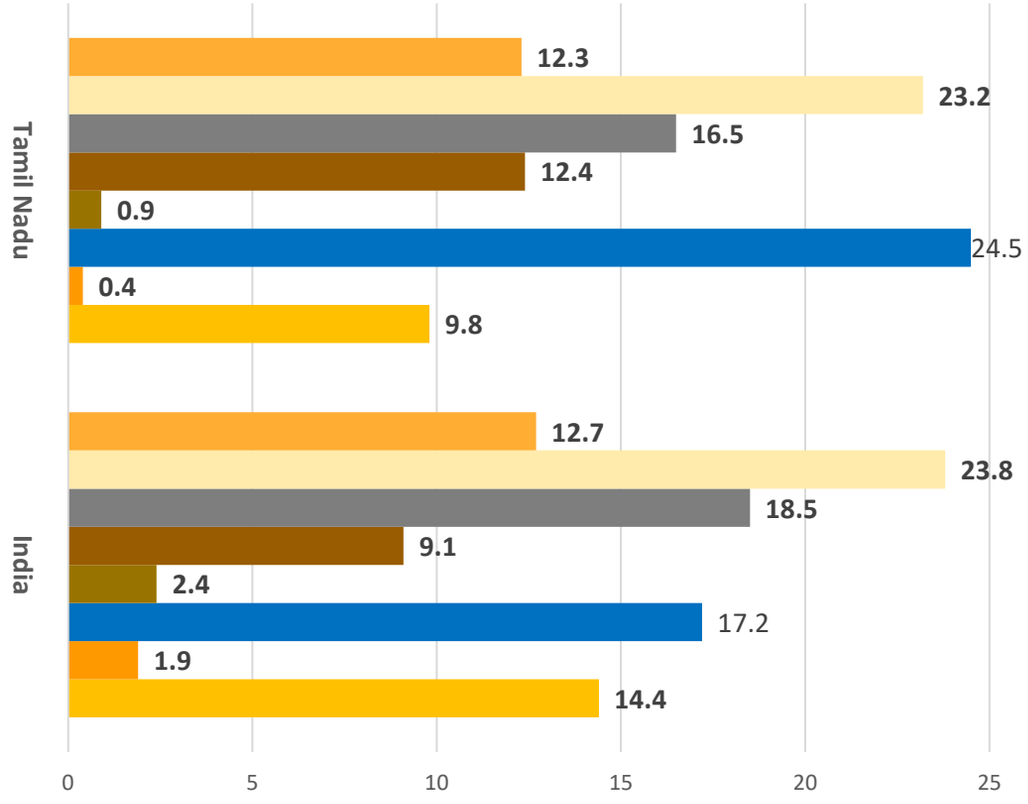
Source: MoSPI and TIC analysis

- 'Manufacturing, Real Estate Ownership and professional Services' and 'Construction' contribute more than 50% of the total state GVA.
- 'Manufacturing industries' contributing to the GVA includes Manufacturing of Motor Vehicles, Machinery and Equipment, Textiles, Wearing Apparels and Food Products.

# Tamil Nadu's industrial base and export performance

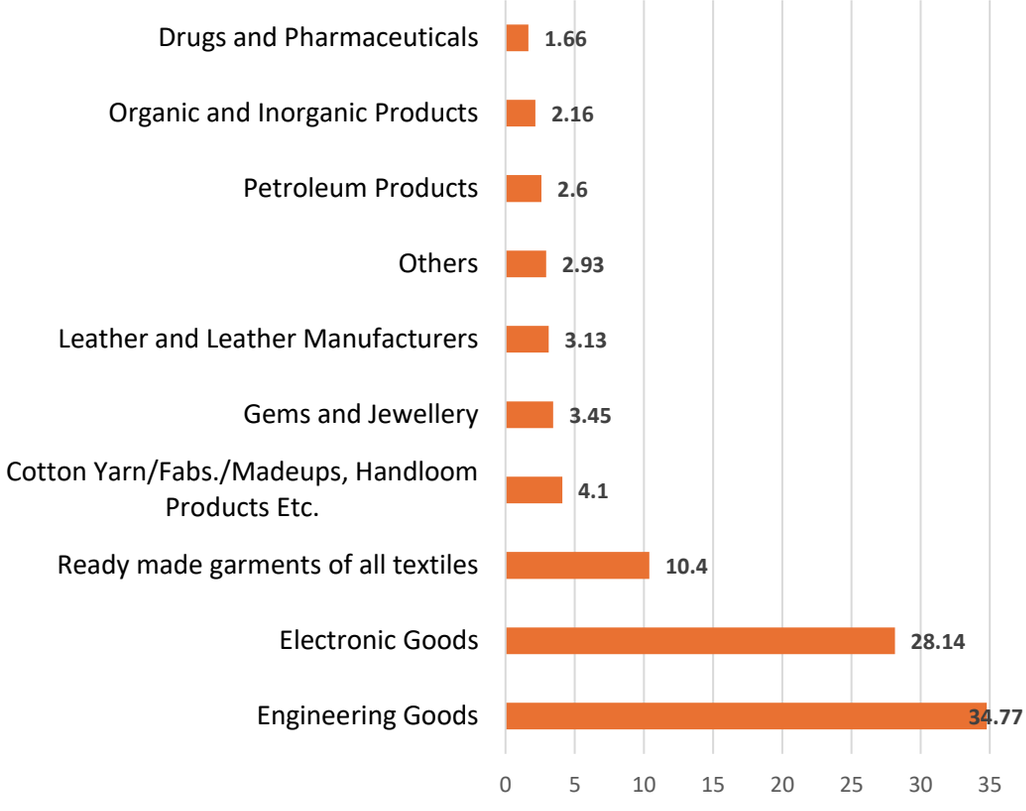
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**Share of GVA across sectors: India vs Tamil Nadu**




Source: MoSPI, TIC analysis

**% share in Tamil Nadu's export**




Source: MoSPI, TIC Analysis

- TN has a **significantly higher industrial base** (Secondary Sector) of 37.7% than the national average of 28.7% , driven by manufacturing and construction.
- TN earned Exports worth US$52.07Bn, **11.9% of Total Indian Exports** in FY25.
- **Engineering Goods, Electronic Goods and Ready-made garments were the top exported commodities.**

# Tamil Nadu is a major player in key manufacturing

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**Tamil Nadu's Manufacturing Sector: Output and National Share**

| Industry group | All India output (INR Crore) | Tamil Nadu output (INR Crore) | TN share in India |
|---|---|---|---|
| **Basic metals** | 21,53,243 | 66,446 | 3.09% |
| **Coke and refined petroleum products** | 20,30,771 | 91,117 | 4.49% |
| **Food products** | 17,90,378 | 1,38,749 | 7.75% |
| **Chemicals and chemical products** | 13,15,603 | 62,573 | 4.76% |
| **Motor vehicles, trailers and semi-trailers** | 11,32,869 | 2,69,415 | 23.78% |

Source: Annual Survey of Industries –Tamil Nadu, 2022-23, TIC analysis

- TN is a major player in key manufacturing sectors such as leather products, engineering goods, automotive components, castings, pumps and readymade garments.
- The State is also emerging as a hub for many sunrise sectors like Electric Vehicles and Startups in the areas of FinTech and Software as a Service (SaaS).

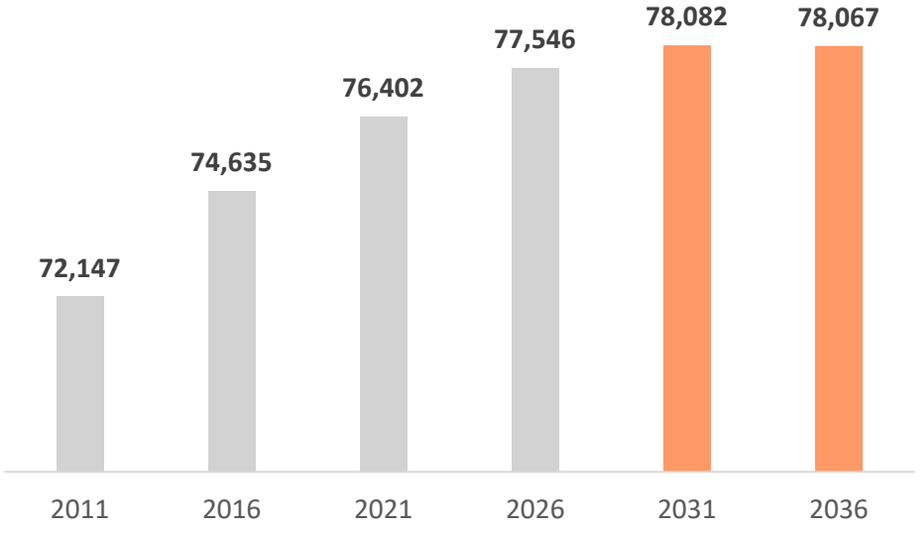
**Summary of Tamil Nadu's economic performance**

| Parameter | Key evidence (data-backed) | Interpretation / Implication |
|---|---|---|
| **Manufacturing-led state (vs India)** | Manufacturing share: **24.5% (TN)** vs **17.2% (India)**; Agriculture: **9.8% (TN)** vs **14.4% (India)** | Tamil Nadu is structurally **industrial and value-added**, not primary-sector dependent; reflects mature manufacturing base and productivity-led growth. |
| **Strong construction and industrial ecosystem** | Construction share: **12.4% (TN)** vs **9.1% (India)**; Manufacturing + Construction = **36.9% of GVA** | Indicates sustained **capex, urbanisation and infrastructure build-out**, supporting industrial expansion, employment, and logistics demand. |
| **Production-linked services dominance** | Financial, real estate & professional services: **23.2% (TN)** vs **23.8% (India)** | Services depth comparable to India, but **less consumption-heavy** and more **manufacturing- and asset-linked**, reinforcing industrial supply chains. |
| **High-value export basket** | Engineering goods **34.8%** + Electronics **28.1%** = **~62.9% of exports** | Export profile is **technology- and capital-goods driven**, with strong global integration; textiles, leather, gems add diversification but are secondary. |
| **Trade- and freight-intensive growth model** | Manufacturing-heavy GVA + engineering/electronics exports | Structural drivers point to **high freight intensity**, supporting strong demand for **container traffic, ports, industrial corridors, and highway logistics**. |

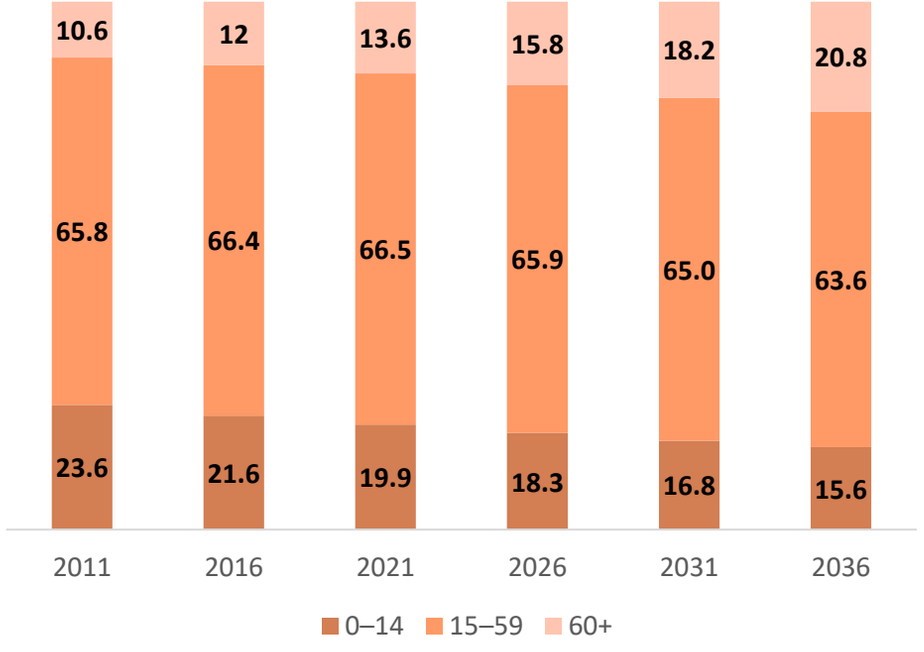
Source: MoSPI, TIC analysis

# Demographics

**Population growth ('000s)**




**Population share (%)**



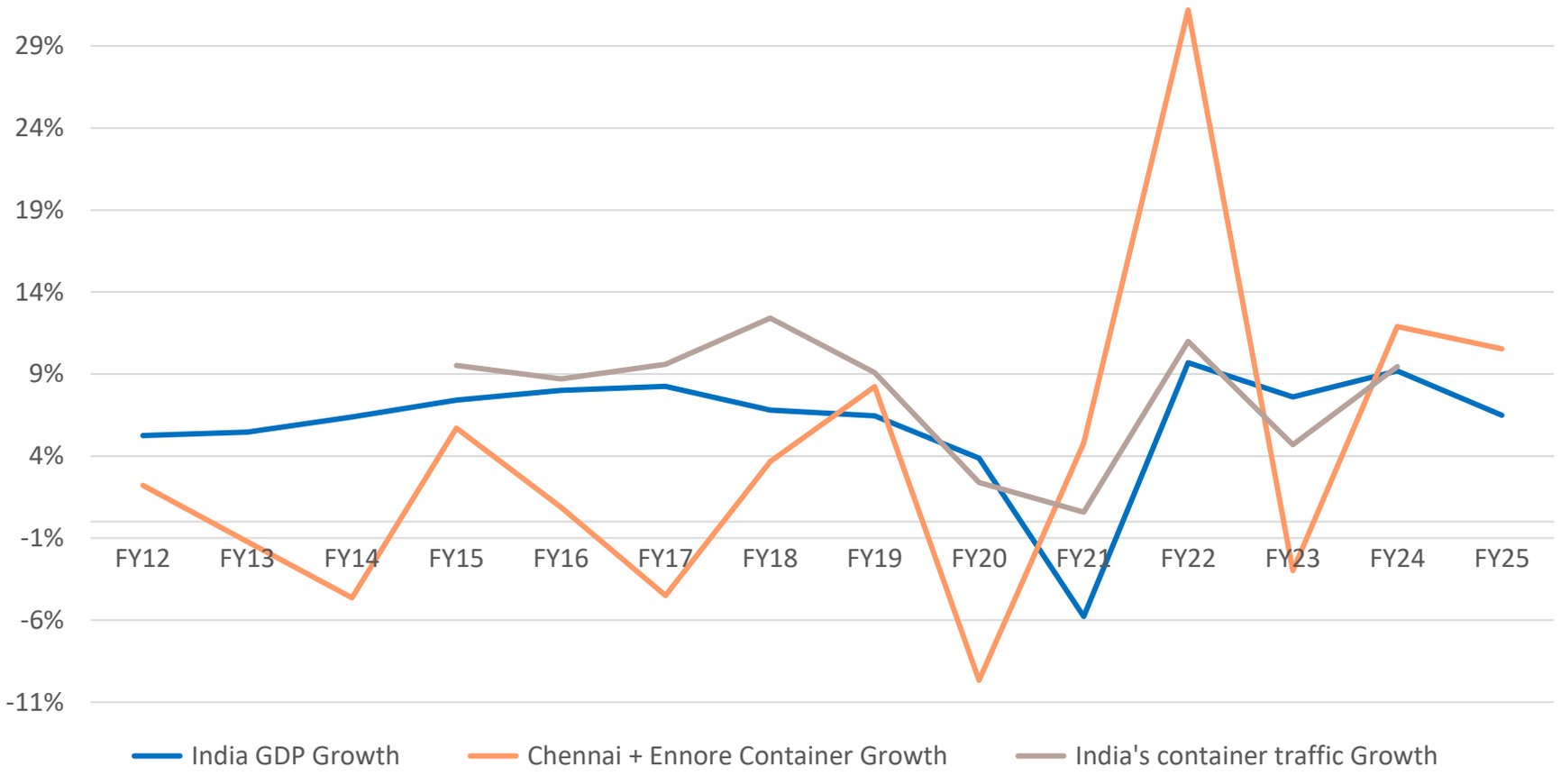

**Implication for Toll Traffic**

| Parameter | Impact | Target plaza | Direction | Evidence |
|---|---|---|---|---|
| **Population** | Increased state liability<br>Shift to agrarian economy for 60+ age group after two decades<br>Moderate decrease in consumption base | Nallur (NH16)<br>Surapattu and Vanagram (Chennai Bypass) | Moderate in longer run of 20 years | Tamil Nadu's population grew at CAGR 0.48% between 2026 and 2011 as per MoFHW estimates, lower than India's population at 1.1% in the same period.<br>The trend shows that Tamil Nadu has high aging population (60+) of 15.8%, much higher than India estimates of 11.4%. |

Source: MoFHW, TIC analysis

# Chennai maritime cluster – container traffic

**Container traffic trend at Chennai maritime cluster (Chennai and Ennore Port)**




**Implication for Toll Traffic**

| Parameter | Impact | Target plaza | Direction | Evidence |
|---|---|---|---|---|
| **Port throughput** | Causes MAV traffic swings | Nallur (NH16)<br>Surapattu (Chennai Bypass) | Volatile | Linked to seasonal shipping & EXIM cycles |

Source: Indian Port Association, TIC analysis

# Economic variables and impact on toll traffic

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**Economic variables and impact on toll traffic**

| Economic Indicator (Tamil Nadu) | Latest Data/Trend | Implication for Toll Traffic |
|---|---|---|
| **IIP – Manufacturing** (Index of Industrial Production) | Index **157** (Apr-Jun 2025), up from 153.9 a year prior (~**2%** increase) | **Steady goods traffic:** Manufacturing index shows modest 2% growth. Manufacturing growth supports current LCV/Truck volumes. Observed traffic (average growth rate of ~10%) exceeds manufacturing growth, indicating other factors (urbanization, services) also drive traffic. |
| **IIP – Electricity** (power generation index) | Index **163.68** (Apr-Jun 2025), down from 179.9 a year prior (**-8,9%** YoY) | **↓ Decline, followed by modest rise in heavy freight:** YoY decline of 8.9% but June 2025 showed +16.7% MoM recovery. Coal transport to power plants affects Ennore Port Cargo and Surapattu TP commercial traffic. |
| **GSDP growth (Real)** | **+11.9%** Real GDP growth rate in FY25 > national GDP (6.49%) | **↑ Overall traffic:** Strong economic growth drives higher travel demand – more freight shipments and passenger trips on toll roads. |
| **Manufacturing GVA & growth** | Manufacturing output **₹3.769 lakh Cr** (2024–25), **14.7%** growth; Industry ~24.5% o GVA (Industry ~37.7% share) | **↑ Goods traffic, primarily intra-district:** 14.7% manufacturing growth drives commercial vehicles. |
| **Road infrastructure expansion** | State and National Highway length **6,805 km** as per 2024–25 report | **↑ Traffic capacity:** New/expanded roads improve connectivity, inducing more traffic. Added NH mileage encourages inter-district travel and freight movement, raising toll road usage. |
| **Agriculture trends** (Agri GVA, Horticulture) | Agri GVA growth **~2.5%** (2024–25); Tamil Nadu **exported 1.34 lakh tonnes of fish products**, generating ₹6,854 crore in foreign exchange in 2023-24. | **↑ Seasonal freight:** Steady agri growth and high horticultural produce volume drive produce shipments (e.g., vegetables to markets). Expect more **LCV/2A truck traffic** during harvest peaks (perishables to cities). |
| **Exports contribution** | Exports grew by ~20% in FY25 to US$52.07 led by electronic goods, engineering goods, ready made garments | **↑ Long-haul trucks:** 20% export growth generates outbound freight to Chennai/Ennore ports. This is also visible in Chennai Container growth rate of 10.5% in FY25 despite high base of 11.9% in FY24. |
| **MSME base** | **58.13 lakh** MSME units registered in Tamil – vibrant small industry ecosystem | **↑ Local distribution:** A large MSME sector implies dispersed production and consumption, leading to more **LCV and small-truck trips** ferrying raw materials and finished goods between industrial estates, warehouses, and markets. |
| **Port throughput volatility** | Causes MAV traffic swings | Linked to seasonal shipping & EXIM cycles |

Source: MoSPI, Directorate of Economics and Statistics, TIC analysis

# District-level growth and manufacturing focus (1)

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**Economic variables and impact on toll traffic**

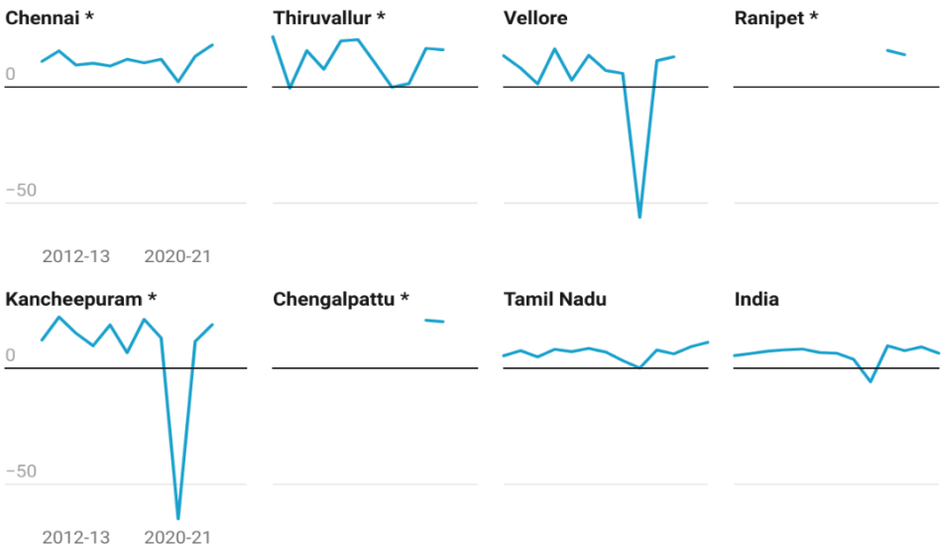
| District | GDP (INR Crore) | Growth Rate (FY22-23) | Share in State GDP | PCI (INR) | Growth focus | Strategic Role |
|---|---|---|---|---|---|---|
| **Chennai*** | 1,78,898 | 18.20% | 12.30% | 5,85,501 | Services, finance, IT hub (77% services in District GVA) | Gateway for port-linked services, financial center, and IT/BPO employment |
| **Thiruvallur*** | 1,05,781 | 16.10% | 7.30% | 4,30,950 | Balanced manufacturing-services; fastest growing district | Heavy engineering hub (INR 51,952 Crore fixed capital), auto components, SIPCOT estates with spillover from Chennai |
| **Vellore** | 24,700 | 13.10% | 1.70% | 1,43,808 | Educational hub with emerging manufacturing | Functions as educational hub (VIT) supporting skilled labour needs; 388 factories, INR 564 Crore fixed capital |
| **Kancheepuram*** | 59,514 | 18.80% | 4.10% | 7,44,980 | Manufacturing powerhouse; automotive & electronics leader | Contributes ~20% of Tamil Nadu's fixed capital and ~24% of industrial output; hosts Hyundai, Renault-Nissan, Samsung, Foxconn |
| **Chengalpattu*** | 1,30,965 | 20.10% | 9.00% | 7,46,994 | Manufacturing-services mix; IT corridor + industrial zones | IT/ITES hub (Siruseri), automotive suppliers, balanced industrial growth with highest PCI in region |
| **Ranipet*** | 18,439 | 14.00% | 1.30% | 2,40,069 | Chemical & pharmaceutical manufacturing base | Specialty chemicals, pharmaceutical exporters, transitioning from traditional industries |
| **Chennai Metropolitan Area** | **4,93,598** | **17.40%** | **34.00%** | **5,49,699** | **Diversified manufacturing-services engine** | **State's economic powerhouse; balances high-end services with advanced manufacturing** |
| **Tamil Nadu** | **14,51,929** | | **100.00%** | | **Service-led (52%) with strong industrial base (37.7%)** | **2x national GDP growth; 11.9% of India's exports; 2x national PCI** |

Source: Statistical Handbook of Tamil Nadu (2022-23), TIC analysis

* part of Chennai Metropolitan Area

# District-level growth and manufacturing focus (2)

**GDP growth rate: district vs State/India**




- Since FY24, Tamil Nadu's real growth has been above the India average, and within the focus districts Thiruvallur is the fastest growing at around 13%, driven by large SIPCOT Gummidipoondi Industrial Estates, auto and electronics manufacturing and strong spill overs from Chennai.
- **The Six focus districts contribute ~36% to Tamil Nadu's GDP** FY23. ~44% of total Manufacturing GDP and ~56% of Financial Services of Tamil Nadu comes from this region. Chennai has the highest contribution of 12.32%, due to high Financial service industry base and Port infrastructure

Source: Statistical Handbook of Tamil Nadu (2022-23), TIC analysis

* The expanded Chennai Metropolitan Area (CMA)MA falls in five Districts of Tamil Nadu State, viz. Chennai District, parts of Thiruvallur District, Kancheepuram District, Chengalpattu District, and part of Arakkonam Taluk of Ranipet District.

* Kancheepuram district was split to create Chengalpattu district, which was formed in 2019; Vellore district was split into three districts: Vellore, Ranipet, and Tirupattur, in August 2019

**Six districts drive ~35% of state GDP through an integrated industrial corridor spanning services, manufacturing, and export excellence**

**Service and Knowledge Core**

**Chennai and Chengalpattu** lead as the financial capital and tech hub, anchoring SaaS, BFSI, and R&D sectors across the state

**Manufacturing Powerhouse**

**Kancheepuram and Thiruvallur** form Asia's auto corridor, hosting global OEMs and generating the highest industrial output at INR 3.34 lakh crore

**Export and Engineering Belt**

**Ranipet and Vellore** provide specialised manufacturing clusters and workforce infrastructure, pivoting towards future mobility and EV production

# District-wise risks and opportunities

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**District-wise risks and opportunities**

| District | Key opportunities | Key risks |
|---|---|---|
| **Chennai** | ▪ Port-led trade growth supported by expressway and metro expansion<br>▪ Strong BFSI, IT and corporate services base<br>▪ Improved regional connectivity via metro expansion and proposed Parandur airport, strengthening talent access | ▪ Urban flooding and monsoon vulnerability in low-lying areas<br>▪ Severe inner-city congestion near port zones until de-bottlenecking is completed<br>▪ Rising cybersecurity and data-governance compliance risks for BFSI and tech firms |
| **Thiruvallur** | ▪ Western industrial cluster (Sriperumbudur–Oragadam) driving auto, FMCG and 3PL demand<br>▪ Strong growth in Grade-A warehousing and logistics<br>▪ Strategic positioning along key industrial corridors | ▪ Rapid land price escalation affecting project viability<br>▪ High exposure to global automotive demand cycles<br>▪ Freight bottlenecks until corridor upgrades are fully operational |
| **Kancheepuram** | ▪ Core auto, EV and electronics manufacturing hub (Oragadam–Sriperumbudur)<br>▪ Large-format industrial and warehouse parks<br>▪ Corridor extensions improving hinterland connectivity | ▪ Infrastructure strain from heavy truck movement<br>▪ Cyclical risks linked to automotive exports<br>▪ Increasing environmental and regulatory compliance requirements |
| **Chengalpattu** | ▪ Engineering, textiles, apparel and precision manufacturing growth<br>▪ Rising 3PL and FMCG warehousing demand<br>▪ Proximity to ports and proposed airport enhances logistics attractiveness | ▪ Peak-hour congestion along GST Road<br>▪ Land-use pressure from rapid urbanisation<br>▪ Competition with Kancheepuram for large industrial projects |
| **Ranipet** | ▪ Expanding industrial–logistics corridor linking Chennai to western Tamil Nadu<br>▪ Established engineering and legacy manufacturing base<br>▪ Relatively lower land costs enable scalable industrial expansion | ▪ Environmental compliance challenges in legacy industries<br>▪ Lower skilled-labour density compared to Chennai core<br>▪ Growth dependent on timely completion of corridor infrastructure |

Source: TIC analysis

# PESTEL Analysis

| Factor | State-level insight | District-level implication |
|---|---|---|
| **Political / Policy** | ▪ **Corridor development:** The state is advancing industrial corridors like Chennai-Bengaluru Industrial Corridor (CBIC) to integrate manufacturing hubs<br>▪ **Governance and stability**: Tamil Nadu is recognized for "Good Governance" and maintaining peaceful labour relations, a key attractor for FDI<br>▪ **Proactive policy:** Specific policies for sunrise sectors (EV, FinTech) and a target to become a $1 Trillion economy | ▪ **Ranipet/Vellore:** These districts are critical nodes on the industrial corridor, benefiting from infrastructure upgrades.<br>▪ **Greater Chennai:** Policy stability supports the massive long-term capital commitments in this region (e.g., INR 32,861 Crore in Oragadam) |
| **Economic** | ▪ **Hyper-urbanization:** The state has a high industrial density with 31,859 factories (Rank 1 in India)<br>▪ **Growth engines:** A dual-engine economy driven by Services (53.63% of GVA) and Industry (33.37% of GVA)<br>▪ **Capital investment:** High fixed capital investment, particularly in heavy engineering and auto sectors | ▪ **Chennai:** The service & financial capital with the highest GDDP contribution (12.30%)<br>▪ **Thiruvallur:** The heavy industry hub with massive fixed capital investment (INR 51,952 Crore)<br>▪ **Kancheepuram:** The manufacturing leader with the highest total output (INR 3.34 Lakh Crore) |
| **Social** | ▪ **Urban workforce:** High urbanization rate (~49%) supports a deep pool of skilled labour for services and industry<br>▪ **Human development:** High rankings in Human Development Index (HDI) and literacy ensure a steady supply of "employable" talent | ▪ **Chengalpattu:** High concentration of knowledge workers for the IT corridor<br>▪ **Vellore**: Functions as an educational hub (VIT) supporting the skilled labour needs of the Ranipet industrial belt |
| **Technological** | ▪ **Electronics hardware:** A strategic shift from assembly to high-value component manufacturing (e.g., Foxconn, Dell)<br>▪ **Future mobility:** Rapid growth in Electric Vehicle (EV) technology and manufacturing<br>▪ **SaaS & IT**: Chennai and Chengalpattu are established global hubs for SaaS/ITeS | ▪ **Kancheepuram (Sriperumbudur):** The "Electronics Corridor" hosting major mobile and hardware OEMs<br>▪ **Chengalpattu (Siruseri):** The tech R&D hub with the largest IT park (407 acres allotted)<br>▪ Implementation support to MLFF from state |
| **Environmental** | ▪ **Sustainable mobility:** Push for EV manufacturing aligns with green energy goals<br>▪ **Climate resilience:** Coastal industrial zones require robust planning against climate risks<br>▪ **Resource management:** Focus on water supply and waste management within SIPCOT parks | ▪ **Thiruvallur/Chennai:** As coastal districts, infrastructure resilience is key for long-term sustainability<br>▪ **Ranipet:** Transitioning from traditional tanning (high pollution risk) to cleaner engineering and non-leather footwear industries |
| **Legal / Regulatory** | ▪ **Land Acquisition:** SIPCOT plays a central role in acquiring land (over 33,000 acres acquired state-wide) to provide legally clear titles to industries<br>▪ **Regulatory Ease:** Single-window clearances and transparent regulatory frameworks facilitate ease of doing business | ▪ **All focus districts:** SIPCOT has developed specific industrial complexes (e.g., Oragadam, Ranipet SEZ, Gummidipoondi,) to handle land and zoning legally, shielding investors from acquisition hurdles |

Source: TIC analysis

# Determination of growth drivers and elasticity (1)

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**Potential socio-economic indicators as growth drivers in context of IRC: 108-2015 and benchmark studies**

| Socio-economic indicators | Observations for availability/reliability of historical/forecast data |
|---|---|
| **Vehicle registration / Automobile Sales** | Sourcing vehicle registration data from concerned Regional Transport Office (RTO) within influence region is herculean task. In addition, it is not mandatory that Project Influence Area (PIA) matches with vehicle registration cases at ground level so not useful.<br>Society of Indian Automobile Manufacturers (SIAM) publishes automobile sales at region level but not at granular level. Can be used as proxy data to validate specific trends.<br>The consultant includes regional dealers' association of freight vehicles (if any) and local financing agencies to understand and validate specific trends observed in traffic. |
| **Per Capita Income** | Can be used as proxy data which reflects demand composition but not specific to commodities / vehicle category. Underlying forces are complex and changing at every strata of administrative structure i.e., districts, state, national. Historical data at state / national level available in public domain but not for district level. Further, availability of forecast data is major constraint in India. |
| **Population** | Population data are compiled on a decennial basis, with the latest census conducted in 2011, and do not provide a robust annual time series suitable for econometric modelling. In addition, migration trends across socio-economic segments and income-based geographies are highly volatile and difficult to forecast with confidence. Accordingly, population growth has not been adopted as a driver for forecasting future travel demand on the project highway. |
| **GDP / GSDP / GDDP** | Dataset from national and international publications and government agencies which are highly reliable in context of forecast e.g., Focus Economics, RBI / RBI's Survey of Professional Forecasters (96$^{th}$ Round), SBI Research, CII, multilateral banks (ADB, World Bank etc.), IMF, OECD, Oxford etc.<br>The consultant typically uses Focus Economics monthly subscription and in-house/empaneled economists for correlation for state and district level GDP and industry specific aspects.<br>The client provides views on the consultant's draft and recommends the final forecast. |

Source: TIC research and analysis

# Determination of growth drivers and elasticity (2)

- For any potential indicator (economic, commodity, or industry-related) to be used as a traffic growth driver, availability and reliability of both historical data and credible forecasts are critical success factors.
- Among the key socio-economic indicators discussed above, Gross Domestic Product (GDP) at the national level, Gross State Domestic Product (GSDP) and Gross District Domestic Product (GDDP) at the state level are the only indicators for which robust historical data and reliable forecasts are consistently available. Accordingly, GDP/GSDP have been adopted as the primary growth drivers for traffic forecasting.
- In addition, port traffic (general and container traffic) have been incorporated as project-specific growth drivers.
- The consultant held discussions with regional dealers' associations of freight vehicles, agricultural wholesale yards (popularly known as mandis), pilgrimage trusts where tourist footfall data are well organised, and inter-city bus terminals in the immediate influence region to validate specific traffic trends such as seasonality and growth patterns.
- In many cases, historical data show varying traffic trends due to various external events in the economy and region. In addition, variations in data recording by third-party tolling agencies and the presence of historical data gaps, as observed in this business case, necessitated further validation.
- Accordingly, validation of the historical data was carried out using traffic data from neighbouring toll plazas on the corridor and benchmark highway sections.
- Traffic growth may not be uniform during the forecasting period, considering factors such as increasing total traffic volumes relative to the capacity of the corridor and the project highway, technological advancements in the automotive industry, cost–tonnage ratios of specific commodity–vehicle combinations, and overloading trends versus strict government enforcement in the region.
- In India, the freight vehicle mix has been changing over the last decade, favouring multi-axle vehicles (MAVs) over 2-axle and 3-axle vehicles for long-distance traffic, given the operational efficiencies achievable with larger vehicles. At the same time, Mini LCVs and LCVs have become more popular for short-distance traffic and more localised supply movements compared to 2-axle vehicles.
- Considering ongoing technological advancements in the automotive industry, standard 2-axle and 3-axle trucks have been increasingly replaced by 6-tyre LCVs over the last couple of years, a trend that is expected to continue.
- The projected elasticity values are typically assumed to remain constant over the concession period in the Indian context; however, they may vary over time due to factors such as increasing traffic volumes relative to corridor capacity, technological advancements in the automotive industry, changes in cost–tonnage ratios of specific commodity–vehicle combinations, overloading trends versus enforcement intensity, and correction of regional imbalances.
- Considering all these aspects, vehicle category-wise elasticities have been estimated.

# Determination of growth drivers and elasticity (3)

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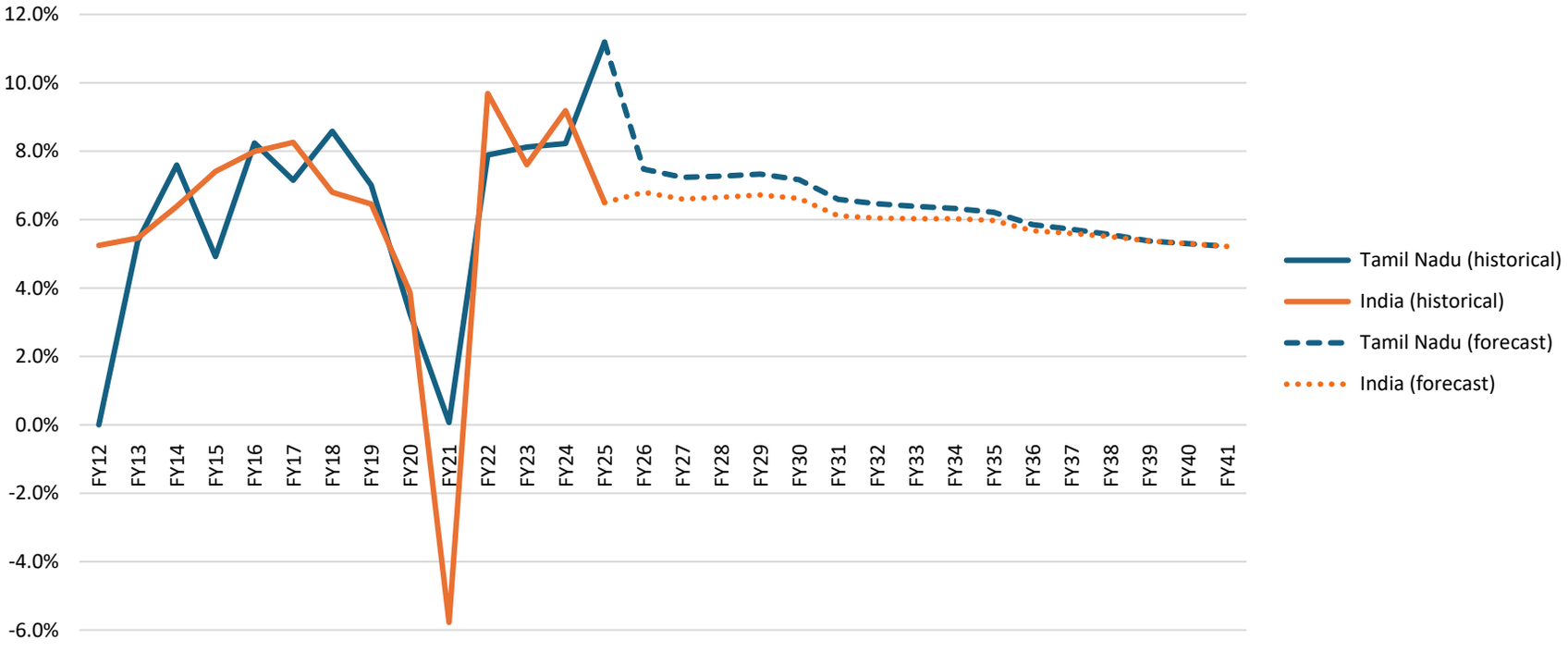
**Vehicle category-wise adopted elasticity**

| Vehicle Category | Vanagram TP / Tiruneermalai TP | Surapattu TP | Independent variable |
|---|---|---|---|
| **CJV** | 1.25 – 1.90 | 1.25 – 1.90 | Weighted average of:<br>GSDP of Tamil Nadu<br>GDDP of Chennai, Kancheepuram, Chengalpattu and Thiruvallur districts |
| **Mini LCV** | 1.50 – 1.90 | 1.50 – 1.90 | |
| **Bus** | 0.40 | 0.40 | Weighted average of GSDP of Tamil Nadu, GDDP of Chennai |
| **LCV / Mini Bus** | 1.50 – 1.90 | 1.15 – 1.80 | Weighted average of:<br>GSDP of Tamil Nadu<br>GDDP of Chennai, Kancheepuram, Chengalpattu and Thiruvallur districts |
| **2A Truck** | 0.30 – 0.90 | 0.20 – 0.75 | Weighted average of:<br>GSDP of Tamil Nadu<br>GDDP of Chennai, Kancheepuram, Chengalpattu districts<br>Chennai port cluster – container traffic |
| **3A Truck** | 0.10 | 0.10 | |
| **MAV** | 0.30 – 0.90 | 0.30 – 0.90 | |

Source: TIC estimate using historical traffic data for the project highway and benchmark references of up-stream / downstream toll plazas

# Forecasts for growth drivers (1)

**GDP and GSDP forecast**




Source: Client input and TIC estimates

- Tamil Nadu's growth is **institution-led, not personality-led**, which sharply limits political downside risk to economic momentum.
- Even when political leadership changes, **industrial approvals, land allotments, port expansion, and corridor projects continue largely uninterrupted**. This is *critical* for long-gestation assets like highways, toll roads, ports, and logistics parks.
- Tamil Nadu politics is often described as "populist", but **this has not translated into anti-growth outcomes**. Welfare-heavy politics **boosts passenger traffic** (buses, 2W/4W), while industry policy continuity sustains **freight traffic**.
- District GDP are expected to grow at higher pace than state GDP for initial 7 year followed by moderately higher for balance concession period.
- WPI will be 3.24% throughout the concession period except 0.25% for FY27 to revise toll rates as provided by the Client.

# Forecasts for growth drivers (2)

**Chennai port cluster – container and general traffic**

- In context of Chennai Port Cluster discussion in earlier sections (Pg 22) and Chennai Port Authority Comprehensive Master Plan 2047 (February 2023), the consultant believes that Chennai Port's cargo is projected to rise steadily from ~49 MT in FY22 to ~76 MT by FY35, driven by 3.3%–3.5% CAGR anchored to the Port's Master Plan forecasts. Ennore Port resembles the similar growth trajectory.
- The growth trajectory reflects ongoing capacity upgrades and improved evacuation infrastructure outlined in the Master Plan.
- Container traffic is expected to grow at ~6% CAGR with volatile nature like trend discussed in earlier sections (Pg 60) as linked to seasonal shipping and EXIM cycles for Chennai maritime cluster (Chennai, Ennore and Kattupalli ports).

# Chapter 5: Baseline traffic and revenue forecast

- Base year AADT (FY26)
- Toll ticket distribution
- Revenue reconciliation

This chapter presents our approach to reach baseline forecast. The consultant estimated base year AADT and toll ticket distribution to reconcile base year traffic and revenue.

# Base year AADT estimate

- The consultant reviewed H1 FY26 ETC traffic data received from the client. Based on which traffic profiling for balance half of FY26 has been estimated using seasonality correction factors followed by estimation of FY26 AADT.
- An independent CTVC survey was undertaken to validate the ETC reported traffic data. The variance between CTVC and ETC data is comparatively higher for Car/Jeep/Van, Mini LCV, and Bus categories. For CJV/Mini LCV, this is attributed to local vehicles from nearby urban centres of Chennai and villages in surrounding area like Tambaram, Guduvancheri, Chengalpattu and Medavakkam at Vanagram and Surapattu toll plazas. For Bus, higher forced exemption was observed across the corridor in Tamil Nadu. Conversely, the variance for LCV, Truck 2A, Truck 3A, and MAV categories remains marginal and within acceptable industry standards.
- Hence, the consultant multiplied variance factor with ETC AADT to determine the corrected FY26 AADT.

**Base Year AADT (FY26)**

| Particulars | Vanagram TP / Tiruneermalai TP | | | Surapattu TP | | |
|---|---|---|---|---|---|---|
| | ETC AADT | Variance factor | Corrected Base Year AADT | ETC AADT | Variance factor | Corrected Base Year AADT |
| **Car/Jeep/Van** | 26,451 | 1.1053 | 29,235 | 12,181 | 1.1560 | 14,081 |
| **Mini LCV** | 4,094 | 1.1106 | 4,546 | 3,469 | 1.0316 | 3,579 |
| **Mini Bus/LCV** | 2,014 | 1.0174 | 2,049 | 2,702 | 1.0330 | 2,791 |
| **Bus** | 1,416 | 2.0793 | 2,945 | 225 | 1.1793 | 265 |
| **2A Truck** | 1,018 | 1.0416 | 1,060 | 1,260 | 1.0571 | 1,332 |
| **3A Truck** | 543 | 1.0140 | 551 | 950 | 1.0600 | 1,007 |
| **MAV** | 1,997 | 1.0054 | 2,008 | 3,715 | 1.0135 | 3,765 |
| **OSV** | 7 | 1.0000 | 7 | 13 | 1.0000 | 13 |
| **Total AADT** | **37,540** | | **42,400** | **24,515** | | **26,833** |
| **Total PCU** | **51,514** | | **59,587** | **43,783** | | **46,659** |

Source: TIC estimate

# Ticket Distribution (1): Vanagram TP / Tiruneermalai TP

**Ticket distribution for CJV/Mini LCV**

| Vehicle categories | Car/Jeep/Van | | | | Mini LCV | | | |
|---|---|---|---|---|---|---|---|---|
| Ticket types | FY26 | FY27 | FY28 | FY29 onwards | FY26 | FY27 | FY28 | FY29 onwards |
| Single | 32.3% | 26.0% | 26.0% | 26.0% | 40.6% | 40.6% | 40.6% | 40.6% |
| Return | 38.7% | 30.5% | 30.5% | 30.5% | 49.3% | 49.3% | 49.3% | 49.3% |
| Monthly Pass | - | - | - | - | - | - | - | - |
| Local Commercial | - | - | - | - | 2.7% | 2.7% | 2.7% | 4.7% |
| Local Personal | 2.7% | 2.7% | 2.7% | 3.7% | - | - | - | - |
| Exemptions/Violations | 6.9% | 6.9% | 6.9% | 5.9% | 7.4% | 7.4% | 7.4% | 5.4% |
| Annual Pass - Pvt CJV | 19.4% | 33.9% | 33.9% | 33.9% | - | - | - | - |

Source: TIC estimate

- Vanagram TP observed forced exemption in CJV/Mini LCV categories during peak hours due to identified black spot near toll plaza. Traffic police requests toll operating agency to open boom barrier for faster evacuation of traffic. This challenge will be eliminated on shifting of toll plaza to new location and hence improvement in forced exemption/violation is expected.
- ~19% of CJV traffic is observed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to increase by ~1.6 times in future through gradual awareness among road users. The consultant did not consider penetration of annual pass from estimated exemption/violation in future.

**Ticket distribution for Bus / LCV / 2A / 3A / MAV**

| Vehicle categories | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|
| Ticket types | FY26 onwards | | | | |
| Single | 20.5% | 42.2% | 45.0% | 42.7% | 49.9% |
| Return | 30.7% | 56.9% | 50.2% | 55.3% | 49.0% |
| Monthly Pass | 3.4% | 0.3% | 0.2% | 0.1% | 0.1% |
| Local Commercial | - | 0.0% | 0.1% | 0.8% | 0.6% |
| Exemptions/Violations | 45.4% | 0.6% | 4.5% | 1.1% | 0.4% |

Source: TIC estimate

- For all vehicle categories, prevailing exemption/violation has considered for future. As per discussion with the client, prevailing forced exemption is likely to reduce post-implementation of Multi Lane Free Flow (MLFF) tolling system.
- Future segmentation will change due to expected diversions presented in Chapter 6.

# Ticket Distribution (2): Surapattu TP

**Ticket distribution**

| Vehicle categories | Car/Jeep/Van | | | |
|---|---|---|---|---|
| **Ticket types** | **FY26** | **FY27** | **FY28** | **FY29 onwards** |
| **Single** | 29.6% | 23.1% | 23.1% | 23.1% |
| **Return** | 31.0% | 22.7% | 22.7% | 22.7% |
| **Monthly Pass** | 0.1% | 0.1% | 0.1% | 0.1% |
| **Local Commercial** | - | - | - | - |
| **Local Personal** | 5.2% | 5.2% | 5.2% | 5.2% |
| **Exemptions/Violations** | 14.3% | 14.3% | 14.3% | 14.3% |
| **Annual Pass - Pvt CJV** | 19.8% | 34.6% | 34.6% | 34.6% |

| Vehicle categories | Mini LCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|
| **Ticket types** | **FY26 onwards** | | | | | |
| **Single** | 43.3% | 20.5% | 37.4% | 43.7% | 40.6% | 49.8% |
| **Return** | 47.5% | 30.7% | 58.9% | 50.6% | 53.0% | 48.8% |
| **Monthly Pass** | 0.1% | 3.4% | 0.1% | 0.02% | - | - |
| **Local Commercial** | 5.8% | - | 0.3% | 0.2% | 0.5% | 0.1% |
| **Local Personal** | - | - | - | - | - | - |
| **Exemptions/Violations** | 3.3% | 45.4% | 3.3% | 5.5% | 5.9% | 1.3% |
| **Annual Pass - Pvt CJV** | - | - | - | - | - | - |

Source: TIC estimate

- ~19% of CJV traffic is observed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to increase by ~1.65 times in future through gradual awareness among road users.
- The consultant did not consider penetration of annual pass from estimated exemption/violation in future.
- For all vehicle categories, prevailing exemption/violation has considered for future. As per discussion with the client, prevailing forced exemption is likely to reduce post-implementation of Multi Lane Free Flow (MLFF) tolling system.
- Future segmentation will change due to expected diversions presented in Chapter 6.

# Validation of base year traffic and revenue

- The Consultant calculated base year revenue by multiplying traffic AADT with prevailing toll rates in accordance with estimated toll ticket distribution.
- Comparison summary with quoted remittance by tolling agency is presented in the below table.
- Quoted daily remittance should be lower than estimated revenue by approx. 5%-10% considering profit margins of tolling agencies.

**Traffic and revenue reconciliation for base year (all values are estimated with FY26 toll rate with old linking factor)**

| Toll plaza | Base year revenue estimate by the Consultant (INR Crore) | Annual Potential Collection estimate by NHAI (INR Crore) | FY26 estimate vs NHAI APC | Quoted remittance By tolling agency (INR Crore) | Consultant estimate vs Quoted remittance |
|---|---|---|---|---|---|
| **Vanagram** | 95.79 | 87.80 | 9.1% | 83.39 | 14.9% |
| **Surapattu** | 113.45 | 108.10 | 4.9% | 106.57 | 6.5% |

Source: TIC estimate

# Chapter 6: Diversion analysis

- Bengaluru – Chittor – Thatchoor corridor and Chennai Peripheral Ring Road link
- Chennai Port Maduravoyal elevated corridor
- Additional entry/exit at Ch 5.200 km of Chennai Bypass

This chapter elaborates impacts of proposed infrastructure developments in the project influence and network in form of positive/negative diversion to/from the project highway. Analysis has been exercised using IRC: 108-2015 and IRC: SP: 30-2019.

# Bengaluru – Chittor – Thatchoor corridor and CPRR link (1)

- **Chennai – Bengaluru Industrial Corridor (CBIC)** proposes high impact / market driven nodes at Ponneri in Tamil Nadu (NH48), Tumkur in Karnataka (NH48), Krishnapatnam/Nellore in Andhra Pradesh (NH16).
- Bengaluru – Chittor – Thatchoor corridor in association with northern end of Chennai Peripheral Ring Road (CPRR) will be backbone to this mega industrial corridor.
- **Bengaluru Chennai Expressway (NE7)** and **Chittoor Thatchur section of NH716B** will link both states to Chennai Maritime Cluster covering ports of Chennai, Ennore and Kattupalli. Both will be access-controlled development.
  - **Phase 1 of NE7 (Karnataka):** operational
  - **Phase 2 of NE7 (Andhra Pradesh):** Total 3 packages; physical progress by August 2025 are Package 1 (~60%), Package 2 (~35%), Package 3 (~80%) and expected to be operational by mid FY28
  - **Phase 3 of NE7 (Tamil Nadu):** Total 3 packages; physical progress by August 2025 are Package 1 (~85%), Package 2 (~55%), Package 3 (~80%) and expected to be operational by mid FY28
  - **Chittoor Thatchur section of NH716B:** Total 4 packages; physical progress by August 2025 are Package 1 (~55%), Package 2 (~30%), Package 3 (~70%), Package 4 (~15%) and expected to be operational by end of FY28
- **CPRR,** 6-lane 132 km access-controlled expressway under development in Tamil Nadu by Tamil Nadu Road Development Company, will **act as last mile connectivity for this maritime cluster.** This last mile section is expected to be operational by FY28.
- Presently traffic uses either NH48/Chennai Bypass or NH69/Chennai Bypass link to reach Chennai Maritime Cluster.

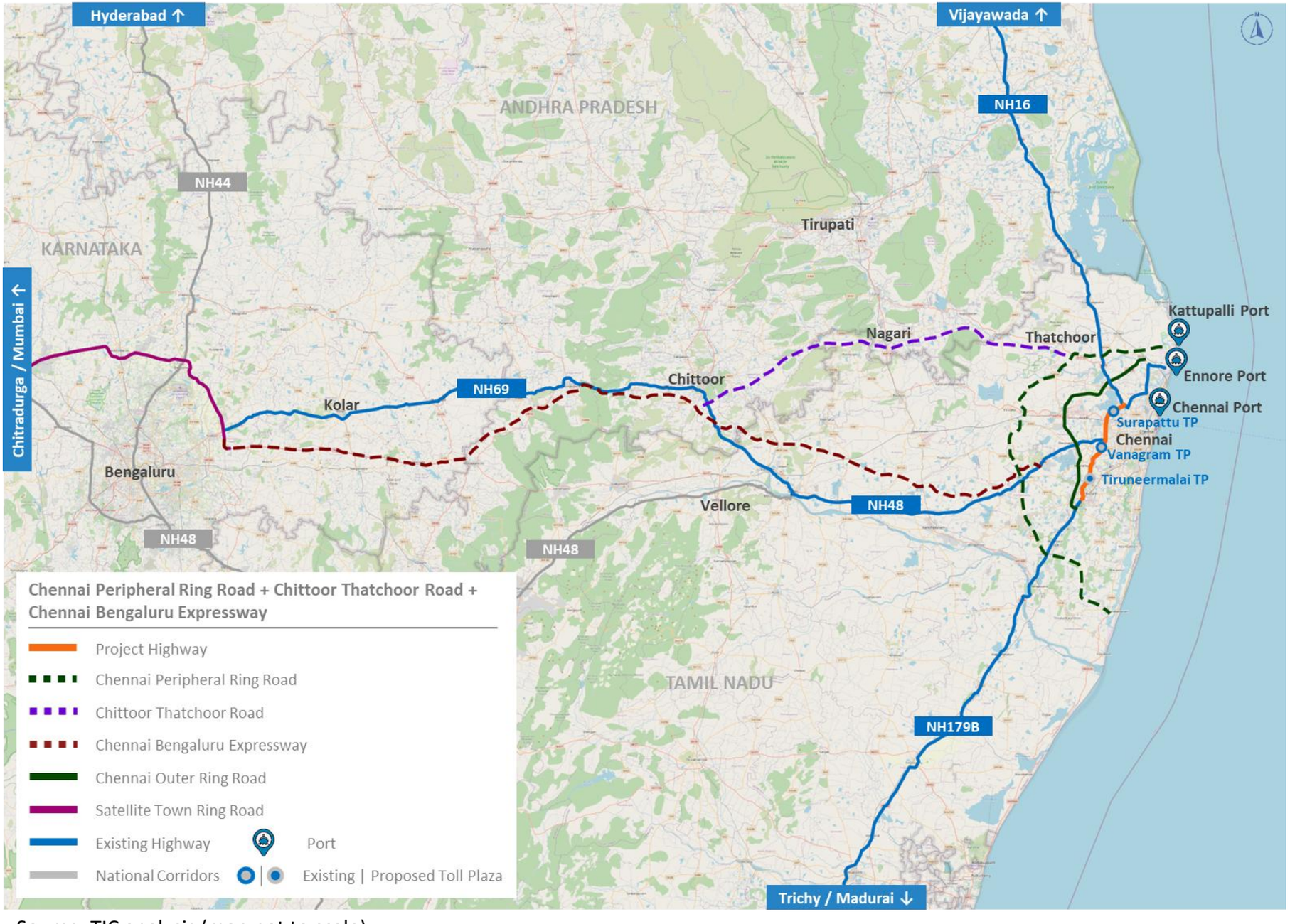
**Diversion due to Bengaluru – Chittor – Thatchoor corridor and CPRR link**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Bengaluru/west and Ennore/Kattupalli Port without using logistics facility (CFS/Container Yard) at Manali area | - | Vanagram / Tiruneermal | - | - | - | - | - | - |
| | | FY28 (20%)<br>FY29 (70%)<br>FY30 (100%) onwards | Surapattu | (0.17%) | - | - | (2.40%) | (2.46%) | (2.32%) |

Source: TIC estimate

# Bengaluru – Chittor – Thatchoor corridor and CPRR link (2)

**Bengaluru – Chittor – Thatchoor corridor and CPRR alignment and project highway context**




Source: TIC analysis (map not to scale)

# Chennai Port Maduravoyal elevated corridor (1)

**Chennai Port Maduravoyal elevated corridor (under implementation with expected completion by mid FY29)**

- NHAI is developing elevated corridor exclusively for Chennai Port (Maduravoyal to Chennai Port Gate No. 10) strengthen external evacuation infrastructure.
- Double tier 4-lane elevated corridor along the Cooum River as part of NH48 and will land inside premise of Chennai Port. Divided into four construction packages and awarded to J. Kumar Infra Projects Limited in JV with Azvirt LLC through EPC mode.
- Further, Chennai Port is implementing strengthening program of internal roads for ease on movement between Gate No. 1 to 10 followed by internal elevated corridor as long-term solution to ease out internal congestion.
- This development will provide ease to port-bound traffic, improve freight access, and reduce congestion.

**Integrated logistics facility at Chennai (Mappedu) Multimodal Logistics Park (MMLP) – acts as dry port for Chennai Maritime Cluster**

- Area nearby Chennai maritime cluster (Manali, Ennore Port Road, Redhill) is hub of logistics facilities like Container Freight Stations (CFS), warehousing/container yards, truck terminals, customs, lodging/boarding for truckers.
- Chennai Multimodal Logistics Park (MMLP) is under construction at Mappedu (accessible through NH48 and at west of Chennai). Phase 1 commercial operations is expected by start of FY27. This will improve freight efficiency, reduce last-mile delivery challenges, link ports (Chennai, Ennore, Kattupalli) with industries and boost economic growth.

**Sriperumbudur to Maduravoyal Elevated Corridor (long-term)**

- In addition to this, DPR of 'Construction of 6 lane Elevated Corridor from Sriperumbudur to Maduravoyal' for future connectivity is under process by Chennai Metro Rail Limited in close coordination with NHAI as plan is to integrate metro connectivity with the elevated corridor. This will further enhance seamless connectivity for Chennai port bound traffic.

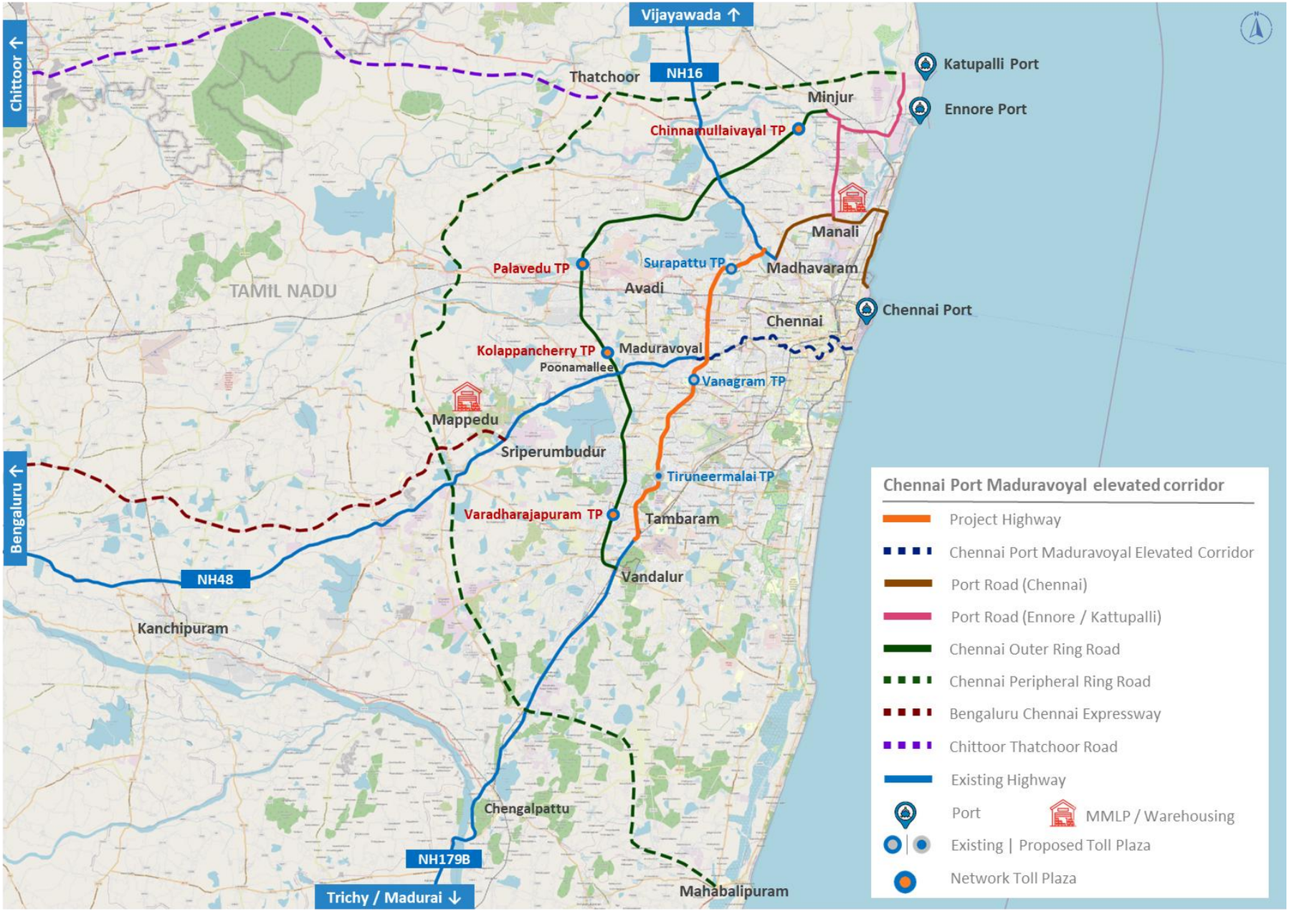
**Altogether will have two-layer impact on the present network:**

- Traffic which is associated to Chennai Port **without using logistics facility (CFS/Yard) at Manali area** – elevated corridor will act as natural choice for such traffic i.e., factory stuffing/sealed container to/from manufacturing facility
- Traffic which is associated to Chennai Port **using logistics facility (CFS/Yard) at Manali area** – partly will use Mappedu MMLP as dry port followed by elevated corridor as seamless connectivity.

**Chennai Port Maduravoyal Elevated Corridor will be the natural choice irrespective any other combinational options like CPRR/ORR etc. for traffic associated with Chennai Port in longer run as extended ecosystem for containerized cargo.**

# Chennai Port Maduravoyal elevated corridor (2)

**Chennai Port Maduravoyal elevated corridor alignment and project highway context**




Source: TIC analysis (map not to scale)

# Chennai Port Maduravoyal elevated corridor (3)

**Diversion due to Chennai Port Maduravoyal elevated corridor**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement from/to Chennai Port with/without using logistics facility at Manali Area including associated empty movement | - | Vanagram / Tiruneermalai | - | - | - | - | - | - |
| | | FY29 (50%) FY30 (100%) onwards | Surapattu | - | - | (30.41%) | (31.22%) | (29.31%) | (31.03%) |

Source: TIC estimate

# Additional entry/exit at Ch km 5.200 (1)

- Madras Export Processing Zone (MEPZ) is multi-product Special Economic Zone (SEZ) established near Tambaram in southern part of Chennai in 1984. Its proximity to these ports enables efficient port-linked trade and supports Tamil Nadu's export growth.
- Being SEZ, it is closely liked with port for EXIM cargo. Major imports is raw materials like electronic components, chemicals, fabrics and exports of finished goods such as electronics, engineering products, garments, and pharmaceuticals.
- Reference discussion with MEPZ Authority, daily about 150-200 freight vehicles movement is realized between Chennai Maritime Cluster and MEPZ. Thes vehicles use Outer Ring Road (ORR) which is about 40 km higher in distance and accordingly toll rates.
- As Chennai Bypass is access-controlled with limited entry-exit, the present route via ORR require a long detour, causing delays in the movement of export and import goods.
- In this context, MEPZ has requested NAHI to develop a dedicated entry and exit ramp at Ch km 5.200 on Chennai Bypass. The proposed ramp will provide direct connectivity, improving logistics efficiency, reducing travel time for freight vehicles, and facilitating smoother port-linked trade operations through Chennai Port.
- The proposed development is under bidding process and expected to be operational by mid FY28.
- The consultant carried out volume count and origin-destination surveys at MEPZ Goods entry-exit gate and on alternate route to determine quantum of such induced traffic due to development of additional entry-exit at Ch km 5.200.
- In addition to MEPZ, nearby industrial area at Thirumudivakkam and Tambaram originated/destined traffic will use the proposed facility at Ch km 5.200 which is before Vanagaram / Tiruneermalai TP (Ch km 6.500) and hence will be positive impact for the project highway.

**Positive impact due to Additional entry/exit at Ch 5.200 Km**

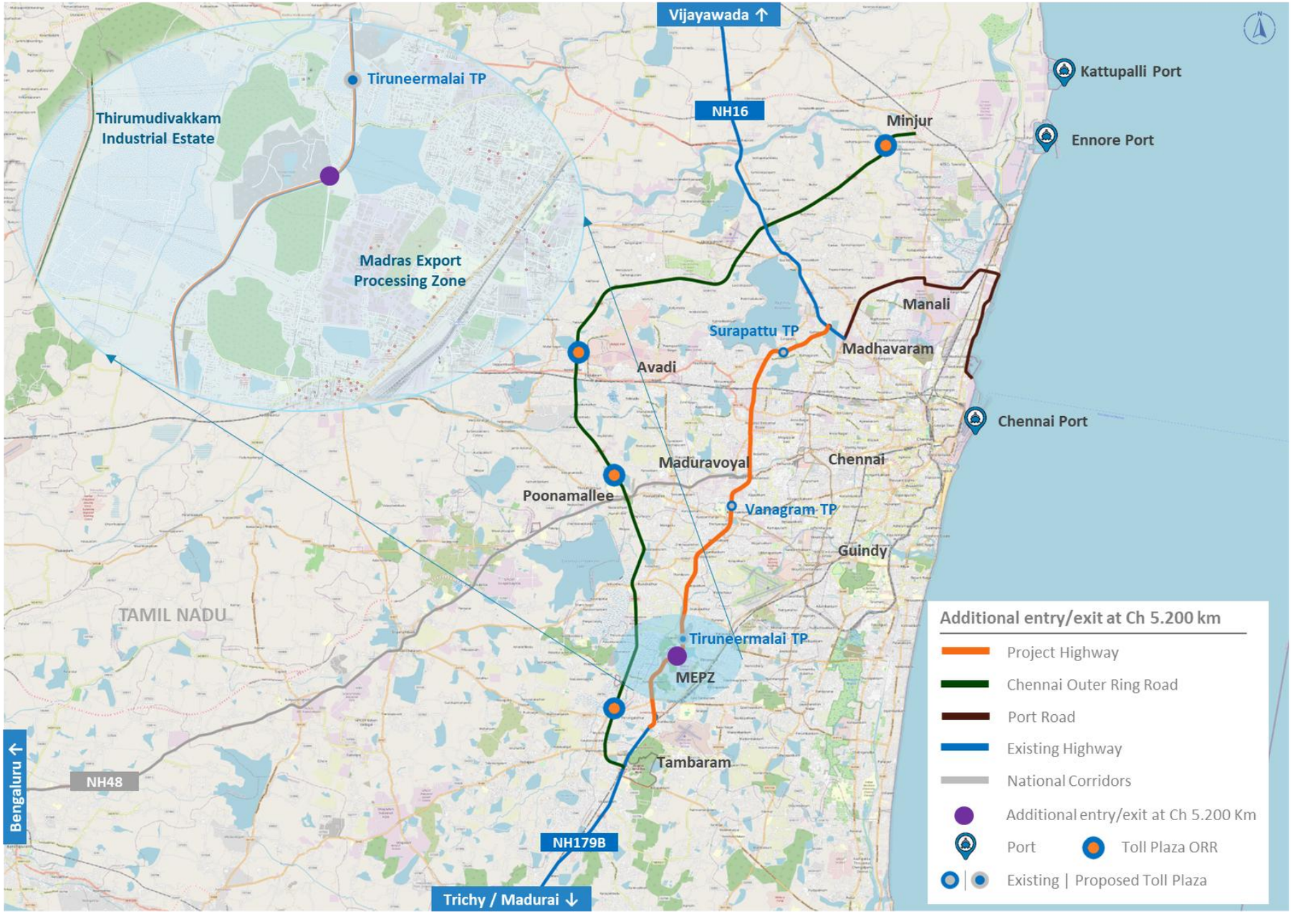
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Positive impact** | Traffic movement between MEPZ and Madhavaram / Manali / Ports (Ennore, Chennai, Kattupalli) | FY28 (30%) FY29 (100%) onwards | Vanagaram / Tiruneermalai | - | 0.86% | 0.21% | 3.32% | 2.30% | 1.57% |
| | | FY28 (30%) FY29 (100%) onwards | Surapattu | - | 1.14% | 0.15% | 2.32% | 1.24% | 0.82% |

Source: TIC estimate

# Additional entry/exit at Ch km 5.200 (2)

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**Chennai Port Maduravoyal elevated corridor alignment and project highway context**




Source: TIC analysis (map not to scale)

# Chapter 7: Final traffic and revenue forecast

- Capacity analysis
- Traffic growth forecast
- Traffic and revenue forecast
- Scenario development

Following pre-diversion traffic forecast and diversion analysis, this chapter presents final traffic and revenue forecast for various scenarios: most likely with and without overloading, pessimistic and optimistic.

# Capacity analysis (1)

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**Assumption for design capacity determination and tollable section-wise capacity analysis**

| Tollable sections / Level of Service | Capacity (PCU / Hour) | Tambaram - Maduravoyal (Vanagaram TP / Tiruneermalai TP) | Maduravoyal - Madhavaram (Surapattu TP) |
|---|---|---|---|
| **Lane configuration** | 6 Lane | 6 Lane | 6 Lane |
| **Level of Service B** | 5,400 | 5,400 | 5,400 |
| **Level of Service C** | 7,560 | 7,560 | 7,560 |
| **Level of Service D** | 8,640 | 8,640 | 8,640 |
| **Level of Service E** | 9,720 | 9,720 | 9,720 |
| **Level of Service F** | 10,800 | 10,800 | 10,800 |
| **Peak Hour Factor** | | 5.92% | 6.12% |
| **Peak Hour PCU (FY41)** | | 8,974 | 6,888 |
| **Capacity Saturation (LOS B)** | | **Yes** | **Yes** |
| **Capacity Saturation (LOS C)** | | **Yes** | **No** |
| **Capacity Saturation (LOS D)** | | **Yes** | **No** |
| **Capacity Saturation (LOS E)** | | **No** | **No** |
| **Capacity Saturation (LOS F)** | | **No** | **No** |

Source: TIC estimate

Design capacity for 6-lane National Highway is determined as per as per IRC: 106 and IRC: SP 87 and standard industry practice for determining Level of Service C/D/E

# Capacity analysis (2)

**Tambaram Maduravoyal section (Vanagaram TP / Tiruneermalai TP)**

- Tambaram Maduravoyal section is heavily congested, crossing Level of Service (LOS) B by FY31, LOS C by FY35 and LOS D by FY37, primarily due to high volumes of daily commuter CJV traffic associated with the urban catchment of Chennai and surrounding districts.
- This section experiences extended peak-hour conditions of nearly 8 hours per day (approx. 4 hours each during morning and evening with no possibility of readjustment of peak hours considering business hours during day-time), which is expected to result in LOS E by FY40.
- At this stage, traffic is likely to redistribute to alternate routes.
- Accordingly, the consultant has considered capacity constraints for the Tambaram–Maduravoyal section from FY37 to FY41 at LOS D being access control corridor with limited entry/exit.

**Maduravoyal – Madhavaram (Surapattu TP)**

- Maduravoyal Madhavaram section carries a relatively higher proportion of freight traffic, driven largely by port-led goods movement.
- As a result, this section will observe LOS C from FY38 to FY41 (horizon years), and hence no capacity constraint has been considered for this section.

# Transactional Support Agreement and FY27 revenue estimate

- The project highway is proposed to be included in NHAI's Public InvIT.
- A Transactional Support Agreement will be executed between NHAI and the Public InvIT for the management of toll plaza operations for FY27.
- Tolling operations during FY27 will be undertaken by NHAI under the prevailing short-term contract modality.
- Accordingly, FY27 revenue has been estimated based on historical bidding trends for tolling contracts and is assumed to be 5%–10% lower than the estimated actual revenue.
- Consistent with this arrangement, manpower-related expenses for tolling operations have been excluded from O&M costs as confirmed by the client.

# Traffic and revenue forecast: Vanagaram TP / Tiruneermalai TP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 14.2% | 13.8% | 13.9% | 12.3% | 12.8% | 13.4% | 10.7% | 2.1% | 8.2% |
| Mini LCV | 13.1% | 13.2% | 13.3% | 11.8% | 11.5% | 12.6% | 10.8% | 2.0% | 8.0% |
| LCV | 2.5% | 2.6% | 2.6% | 2.3% | 2.3% | 2.5% | 2.1% | 0.4% | 1.6% |
| Bus | 2.9% | 2.9% | 2.9% | 2.6% | 3.9% | 3.1% | 2.7% | 0.5% | 2.0% |
| 2A Truck | 4.7% | 3.3% | 2.5% | 2.2% | 2.3% | 3.0% | 3.4% | 0.5% | 2.1% |
| 3A Truck | 0.8% | 0.8% | 0.8% | 0.7% | 0.7% | 0.8% | 0.7% | 0.1% | 0.5% |
| MAV | 2.7% | 3.9% | 2.2% | 1.9% | 4.5% | 3.0% | 2.9% | 0.6% | 2.1% |
| **AADT** | **11.8%** | **11.7%** | **11.9%** | **10.6%** | **11.3%** | **11.5%** | **9.7%** | **2.0%** | **7.3%** |
| **PCU** | **9.2%** | **9.4%** | **9.5%** | **8.6%** | **9.6%** | **9.3%** | **8.4%** | **1.7%** | **6.2%** |

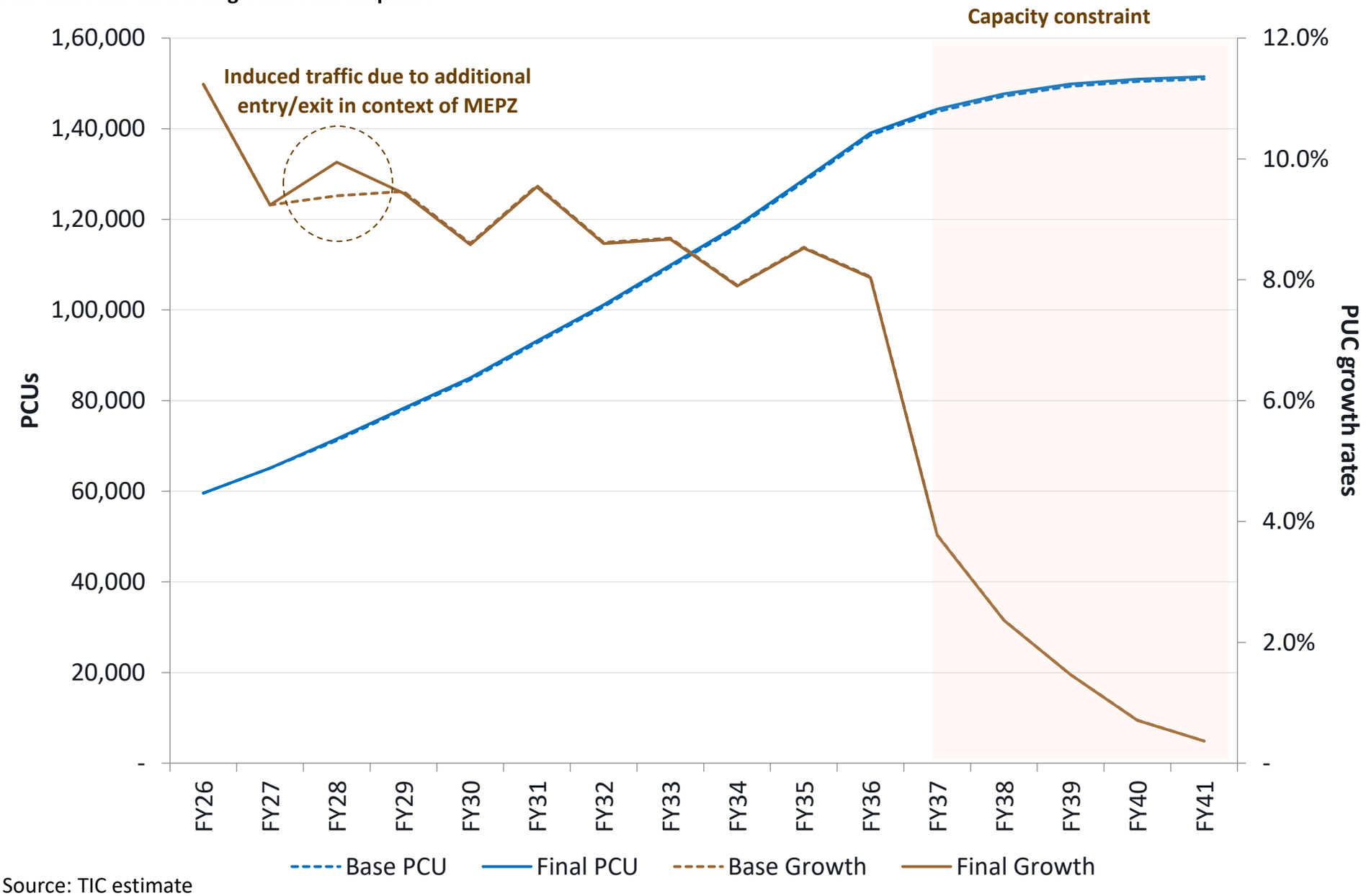
**Post-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 14.2% | 13.8% | 13.9% | 12.3% | 12.8% | 13.4% | 10.7% | 2.1% | 8.2% |
| Mini LCV | 13.1% | 14.2% | 13.3% | 11.8% | 11.5% | 12.8% | 10.8% | 2.0% | 8.1% |
| LCV | 2.5% | 2.8% | 2.6% | 2.3% | 2.3% | 2.5% | 2.1% | 0.4% | 1.6% |
| Bus | 2.9% | 2.9% | 2.9% | 2.6% | 3.9% | 3.1% | 2.7% | 0.5% | 2.0% |
| 2A Truck | 4.7% | 6.7% | 2.5% | 2.2% | 2.3% | 3.7% | 3.4% | 0.5% | 2.4% |
| 3A Truck | 0.8% | 3.1% | 0.8% | 0.7% | 0.7% | 1.2% | 0.7% | 0.1% | 0.7% |
| MAV | 2.7% | 5.5% | 2.2% | 1.9% | 4.5% | 3.4% | 2.9% | 0.6% | 2.3% |
| **AADT** | **11.8%** | **12.0%** | **11.9%** | **10.6%** | **11.3%** | **11.5%** | **9.7%** | **2.0%** | **7.4%** |
| **PCU** | **9.2%** | **9.9%** | **9.4%** | **8.6%** | **9.5%** | **9.3%** | **8.3%** | **1.7%** | **6.2%** |

Source: TIC estimate

# Traffic and revenue forecast: Vanagaram TP / Tiruneermalai TP (2)

**Pre- and Post-diversion growth rate snapshot**

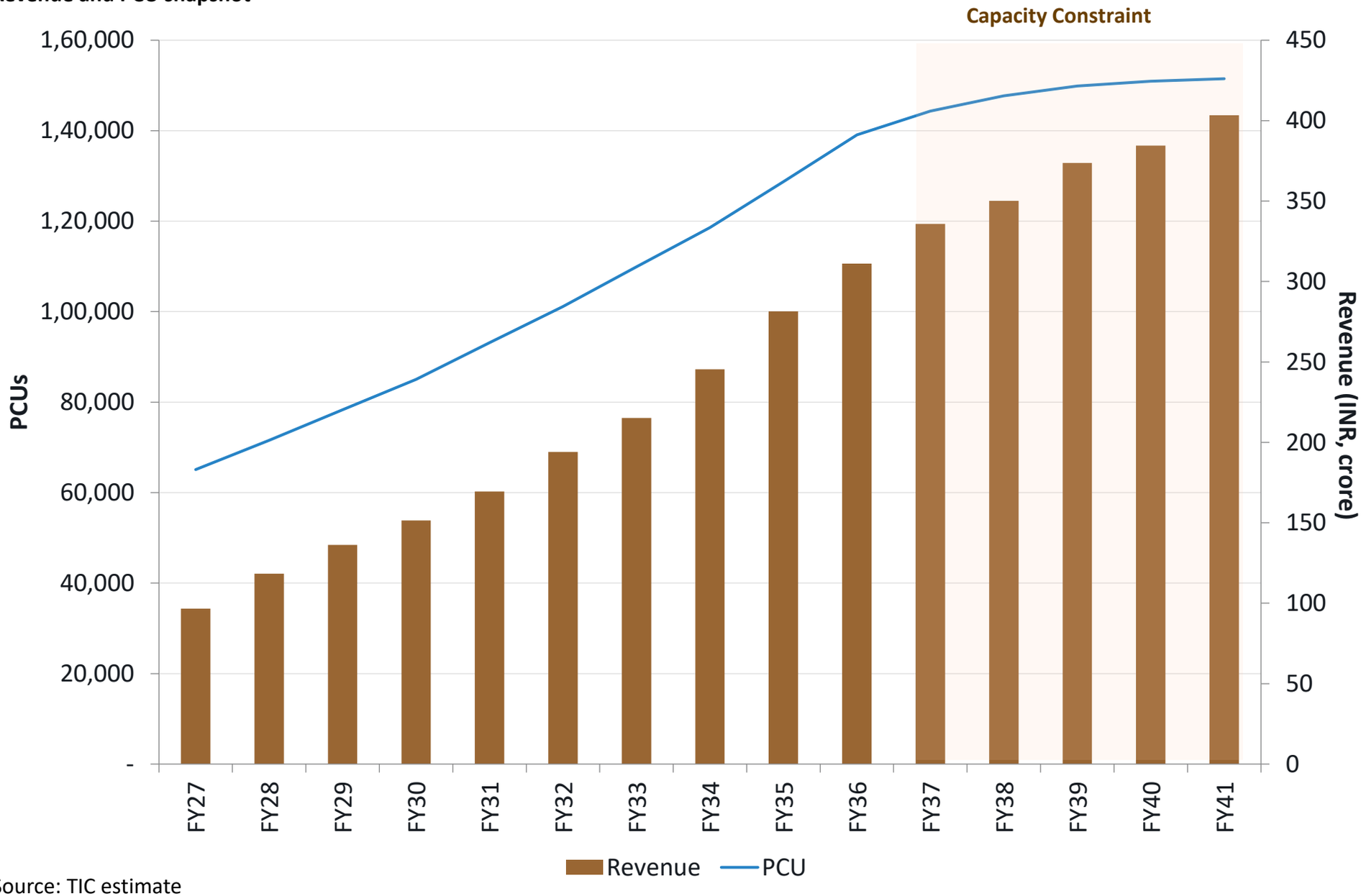



Source: TIC estimate

# Traffic and revenue forecast Vanagaram TP / Tiruneermalai TP (3)

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**Revenue and PCU snapshot**




Source: TIC estimate

# Traffic and revenue forecast: Surapattu TP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 14.0% | 13.6% | 13.7% | 12.1% | 12.7% | 13.2% | 10.6% | 8.7% | 10.6% |
| Mini LCV | 12.8% | 12.9% | 13.0% | 11.5% | 11.2% | 12.3% | 10.5% | 9.1% | 10.5% |
| LCV | 4.7% | 4.8% | 4.8% | 4.2% | 4.2% | 4.5% | 3.9% | 3.4% | 3.9% |
| Bus | 2.9% | 2.9% | 2.9% | 2.6% | 3.9% | 3.1% | 2.7% | 2.3% | 2.7% |
| 2A Truck | 3.3% | 2.1% | 1.5% | 1.4% | 1.4% | 1.9% | 2.4% | 1.5% | 1.8% |
| 3A Truck | 0.8% | 0.8% | 0.8% | 0.7% | 0.7% | 0.8% | 0.7% | 0.6% | 0.7% |
| MAV | 2.8% | 4.0% | 2.2% | 1.9% | 4.7% | 3.1% | 3.0% | 2.9% | 3.0% |
| **AADT** | **10.2%** | **10.3%** | **10.3%** | **9.3%** | **10.1%** | **10.0%** | **8.9%** | **7.7%** | **8.8%** |
| **PCU** | **7.0%** | **7.5%** | **7.1%** | **6.6%** | **7.8%** | **7.2%** | **7.0%** | **6.4%** | **6.8%** |

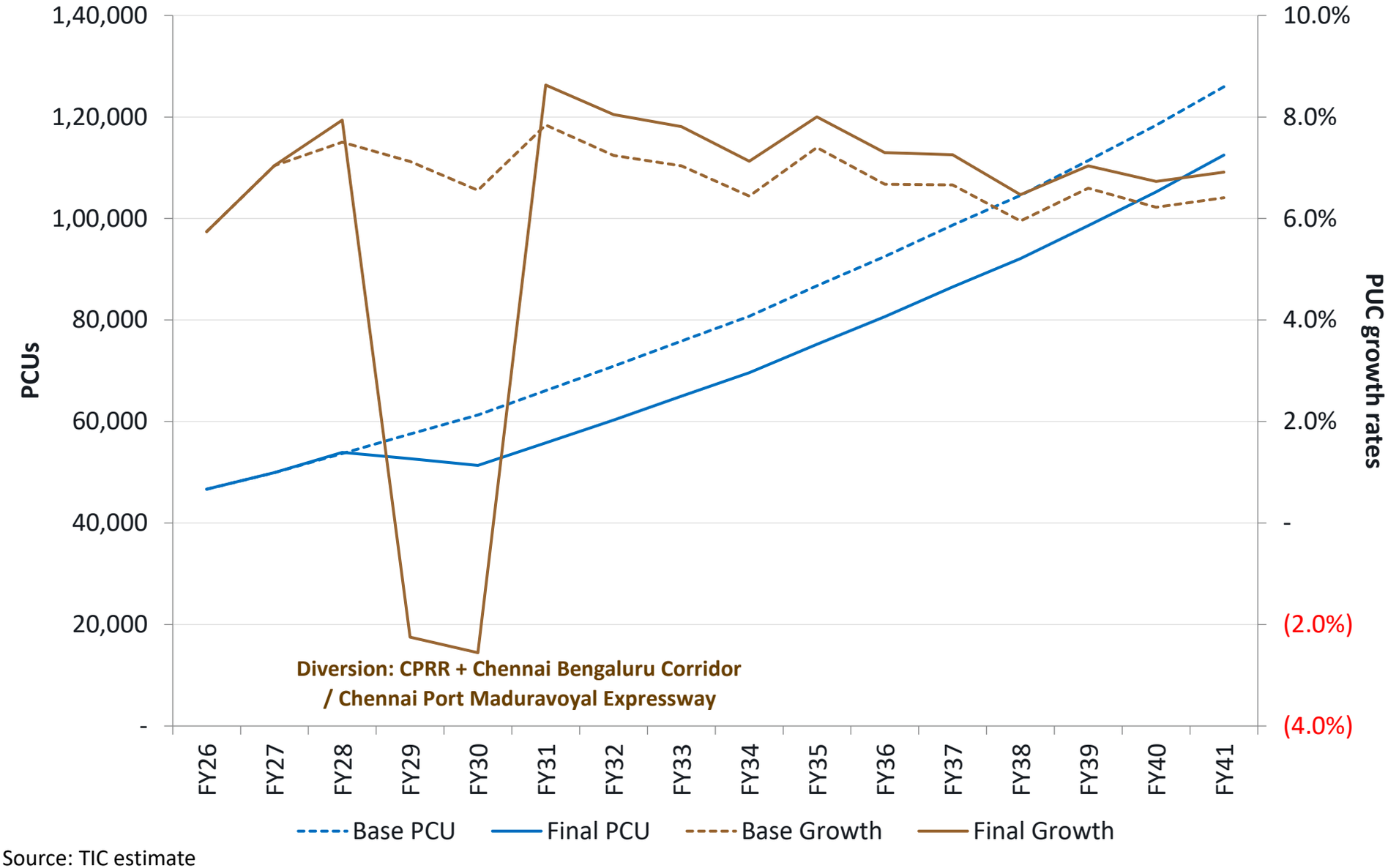
**Post-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 14.0% | 13.6% | 13.6% | 12.1% | 12.7% | 13.2% | 10.6% | 8.7% | 10.6% |
| Mini LCV | 12.8% | 14.2% | 13.0% | 11.5% | 11.2% | 12.5% | 10.5% | 9.1% | 10.6% |
| LCV | 4.7% | 4.9% | (11.1%) | (14.4%) | 4.2% | (2.7%) | 3.9% | 3.4% | 1.3% |
| Bus | 2.9% | 2.9% | 2.9% | 2.6% | 3.9% | 3.1% | 2.7% | 2.3% | 2.7% |
| 2A Truck | 3.3% | 4.0% | (15.2%) | (18.1%) | 1.4% | (5.4%) | 2.4% | 1.5% | (0.8%) |
| 3A Truck | 0.8% | 1.6% | (15.1%) | (17.5%) | 0.7% | (6.3%) | 0.7% | 0.6% | (1.9%) |
| MAV | 2.8% | 4.4% | (14.8%) | (17.8%) | 4.7% | (4.7%) | 3.0% | 2.9% | 0.2% |
| **AADT** | **10.2%** | **10.6%** | **5.4%** | **5.0%** | **10.6%** | **8.4%** | **9.4%** | **8.0%** | **8.5%** |
| **PCU** | **7.0%** | **7.9%** | **(2.2%)** | **(2.6%)** | **8.6%** | **3.6%** | **7.7%** | **6.9%** | **6.0%** |

Source: TIC estimate

# Traffic growth forecast: Surapattu TP (2)

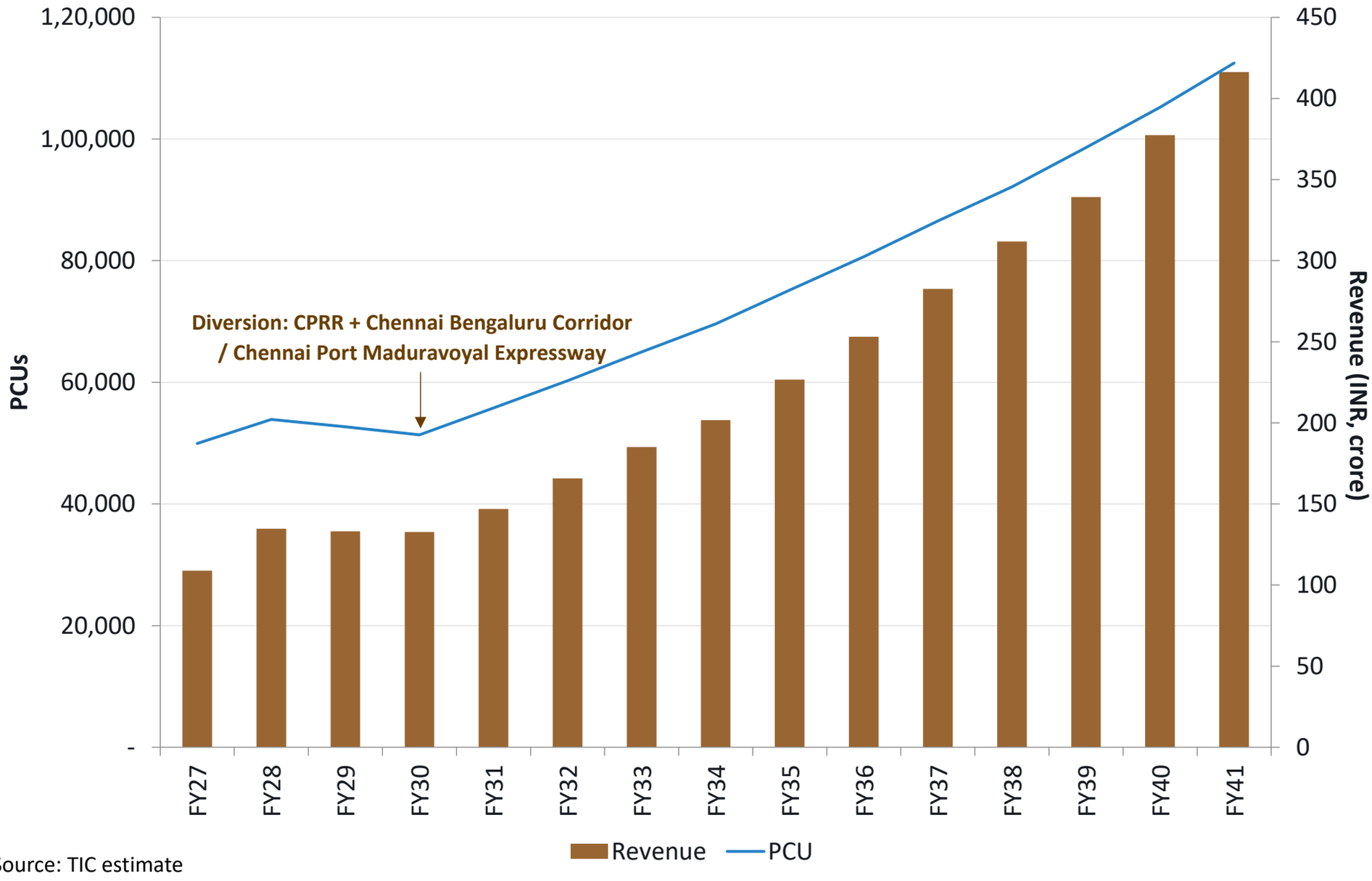
**Pre- and Post-diversion growth rate snapshot**




Source: TIC estimate

# Traffic growth forecast: Surapattu TP (3)

**Revenue and PCU snapshot**




Source: TIC estimate

# Scenario development definition

**Most Likely Scenario without overloading**

- No overloading penalty/fees is considered at present based on understanding from site visit. In context of present ground situation and possibility of diversion in case of collecting overloading fees, the consultant did not consider overloading fee collection in most likely scenario.

**Most Likely Scenario with overloading**

The consultant considered following changes from the most likely (with overloading) case to determine most likely (with overloading) scenario:

- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey.

**Optimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine optimistic scenario:

- GDP: increase (addition) of 0.25% from FY27 to FY35
- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey
- Delayed the impact due to Chennai Port Maduravoyal elevated corridor by a year

**Pessimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine pessimistic scenario:

- GDP: decrease (subtraction) of 0.25% from FY27 to FY35
- No overloading penalty/fees is being levied

Detailed traffic and revenue forecast for 'Most likely scenario without overloading' is exhibited in Appendix C.

# Scenario summary: Vanagaram TP / Tiruneermalai TP (1)

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| | Most likely without overloading | | | Most likely with overloading | | | Optimistic scenario | | | Pessimistic scenario | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FY** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** |
| **FY27** | 65,092 | 9.2% | 97 | 65,124 | 9.2% | 97 | 65,458 | 9.6% | 97 | 64,884 | 8.9% | 97 |
| **FY28** | 71,566 | 9.9% | 118 | 71,600 | 9.9% | 123 | 72,200 | 10.3% | 119 | 71,102 | 9.6% | 118 |
| **FY29** | 78,317 | 9.4% | 136 | 78,351 | 9.4% | 141 | 79,265 | 9.8% | 138 | 77,547 | 9.1% | 135 |
| **FY30** | 85,036 | 8.6% | 151 | 85,070 | 8.6% | 156 | 86,191 | 8.7% | 158 | 83,929 | 8.2% | 149 |
| **FY31** | 93,147 | 9.5% | 169 | 93,197 | 9.6% | 174 | 94,788 | 10.0% | 177 | 91,583 | 9.1% | 167 |
| **FY32** | 1,01,157 | 8.6% | 194 | 1,01,252 | 8.6% | 197 | 1,03,349 | 9.0% | 201 | 99,103 | 8.2% | 190 |
| **FY33** | 1,09,930 | 8.7% | 215 | 1,10,042 | 8.7% | 218 | 1,12,734 | 9.1% | 224 | 1,07,304 | 8.3% | 210 |
| **FY34** | 1,18,609 | 7.9% | 245 | 1,18,738 | 7.9% | 248 | 1,22,057 | 8.3% | 255 | 1,15,384 | 7.5% | 239 |
| **FY35** | 1,28,721 | 8.5% | 281 | 1,28,870 | 8.5% | 284 | 1,32,960 | 8.9% | 293 | 1,24,763 | 8.1% | 273 |
| **FY36** | 1,39,066 | 8.0% | 311 | 1,39,234 | 8.0% | 313 | 1,43,706 | 8.1% | 323 | 1,34,739 | 8.0% | 302 |
| **FY37** | 1,44,309 | 3.8% | 336 | 1,44,495 | 3.8% | 337 | 1,49,166 | 3.8% | 348 | 1,39,790 | 3.7% | 325 |
| **FY38** | 1,47,718 | 2.4% | 350 | 1,47,905 | 2.4% | 351 | 1,52,705 | 2.4% | 363 | 1,43,075 | 2.3% | 339 |
| **FY39** | 1,49,880 | 1.5% | 374 | 1,50,068 | 1.5% | 375 | 1,54,948 | 1.5% | 387 | 1,45,159 | 1.5% | 362 |
| **FY40** | 1,50,942 | 0.7% | 384 | 1,51,131 | 0.7% | 386 | 1,56,050 | 0.7% | 398 | 1,46,183 | 0.7% | 372 |
| **FY41** | 1,51,494 | 0.4% | 403 | 1,51,683 | 0.4% | 405 | 1,56,623 | 0.4% | 418 | 1,46,715 | 0.4% | 391 |
| **Total (FY27–FY41)** | | | **3,767** | | | **3,805** | | | **3,899** | | | **3,668** |

Source: TIC estimate

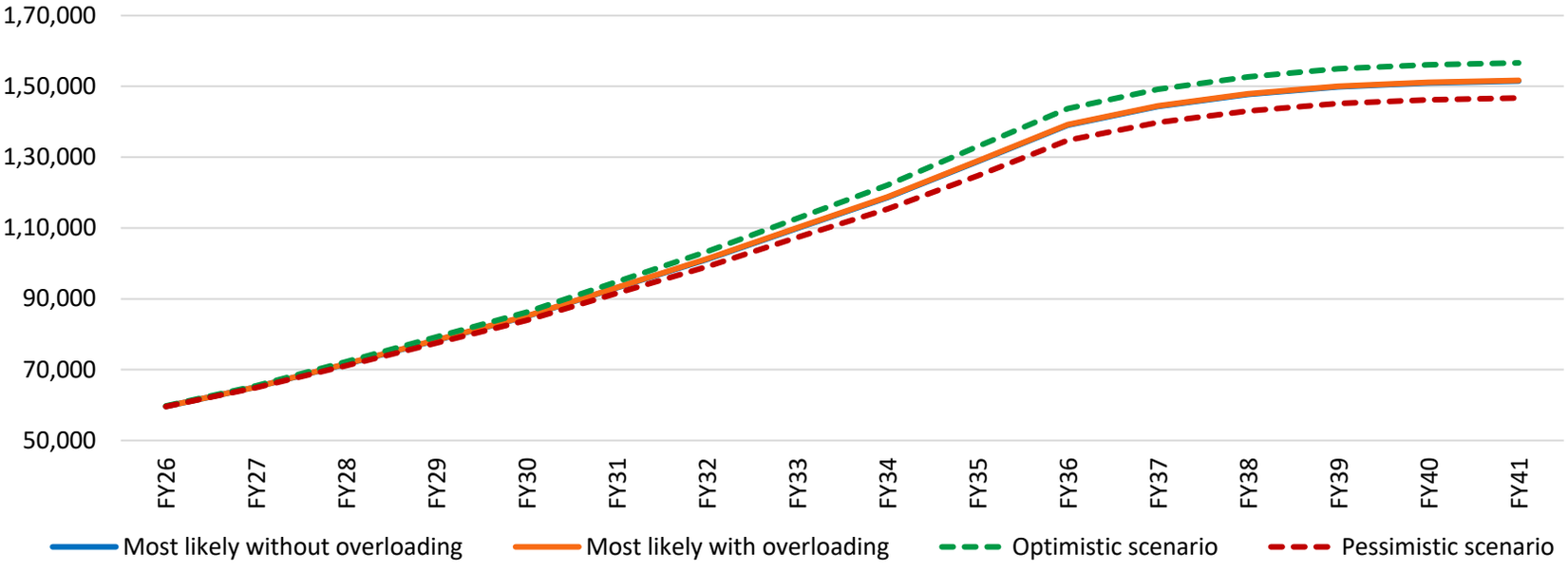
**Benchmark cases for traffic at present:**
Karnataka: Bengaluru Nelmangala Urban Corridor (6 Lane) – 1,22,000 PCU
Karnataka: Bengaluru Airport Corridor (Devanhalli TP) – 1,07,000 PCU
Gujarat: Ahmedabad Ring Road (4 Lane, Ramol TP) – 1,02,000 PCU

Refer Capacity Analysis (Pg 85)

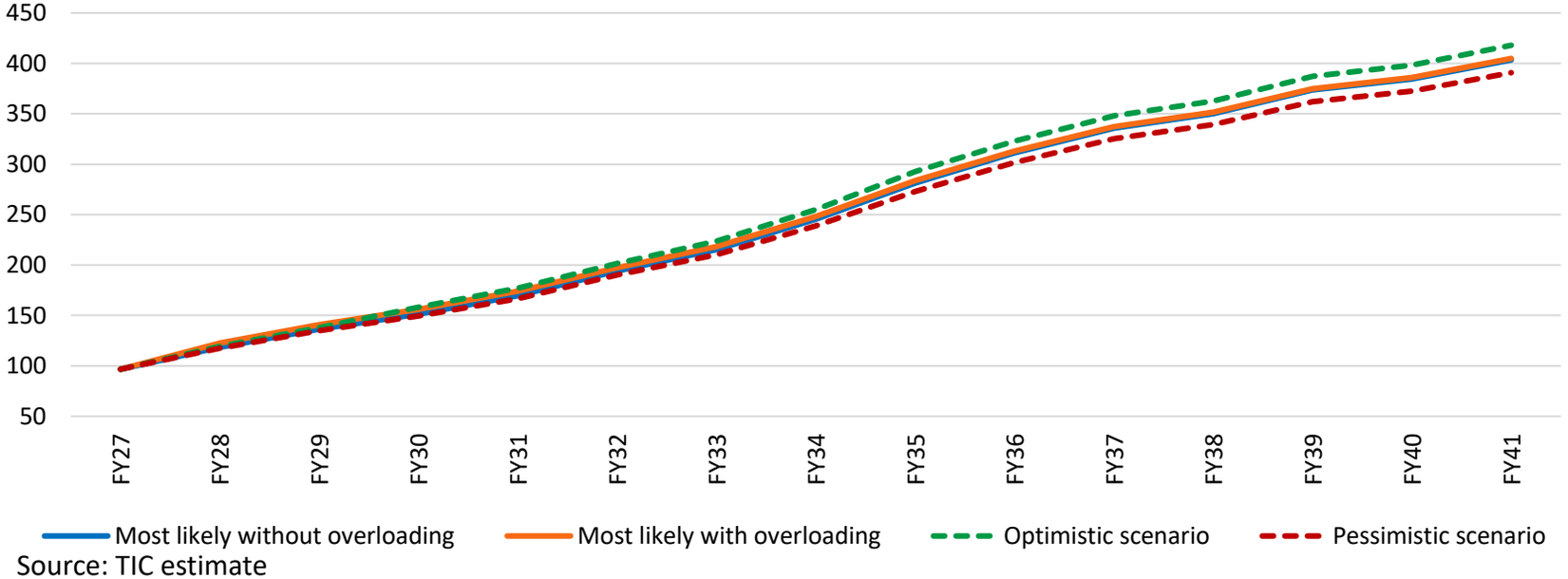
- LOS B Peak Hour 5,400 PCU/day
- LOS C Peak Hour 7,560 PCU/day
- LOS D Peak Hour 8,640 PCU/day

# Scenario summary: Vanagaram TP / Tiruneermalai TP (2)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# Scenario summary: Surapattu TP (1)

| | Most likely without overloading | | | Most likely with overloading | | | Optimistic scenario | | | Pessimistic scenario | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FY** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** |
| **FY27** | 49,943 | 7.0% | 109 | 50,001 | 7.0% | 109 | 50,357 | 7.3% | 109 | 49,819 | 6.8% | 109 |
| **FY28** | 53,908 | 7.9% | 135 | 53,969 | 7.9% | 146 | 54,492 | 8.2% | 136 | 53,629 | 7.6% | 134 |
| **FY29** | 52,696 | (2.2%) | 133 | 52,747 | (2.3%) | 145 | 58,179 | 6.8% | 149 | 52,261 | (2.6%) | 132 |
| **FY30** | 51,349 | (2.6%) | 133 | 51,391 | (2.6%) | 145 | 56,845 | (2.3%) | 161 | 50,753 | (2.9%) | 131 |
| **FY31** | 55,780 | 8.6% | 147 | 55,842 | 8.7% | 159 | 56,697 | (0.3%) | 161 | 54,939 | 8.2% | 145 |
| **FY32** | 60,269 | 8.0% | 166 | 60,387 | 8.1% | 174 | 61,522 | 8.5% | 177 | 59,158 | 7.7% | 163 |
| **FY33** | 64,975 | 7.8% | 185 | 65,115 | 7.8% | 193 | 66,563 | 8.2% | 197 | 63,562 | 7.4% | 181 |
| **FY34** | 69,606 | 7.1% | 202 | 69,768 | 7.1% | 208 | 71,545 | 7.5% | 213 | 67,878 | 6.8% | 197 |
| **FY35** | 75,177 | 8.0% | 227 | 75,365 | 8.0% | 232 | 77,556 | 8.4% | 239 | 73,055 | 7.6% | 221 |
| **FY36** | 80,663 | 7.3% | 253 | 80,875 | 7.3% | 257 | 83,262 | 7.4% | 264 | 78,351 | 7.2% | 246 |
| **FY37** | 86,516 | 7.3% | 283 | 86,754 | 7.3% | 285 | 89,352 | 7.3% | 293 | 84,001 | 7.2% | 275 |
| **FY38** | 92,111 | 6.5% | 312 | 92,355 | 6.5% | 315 | 95,155 | 6.5% | 324 | 89,401 | 6.4% | 303 |
| **FY39** | 98,591 | 7.0% | 339 | 98,842 | 7.0% | 342 | 1,01,871 | 7.1% | 352 | 95,659 | 7.0% | 330 |
| **FY40** | 1,05,224 | 6.7% | 377 | 1,05,481 | 6.7% | 381 | 1,08,751 | 6.8% | 392 | 1,02,058 | 6.7% | 367 |
| **FY41** | 1,12,496 | 6.9% | 416 | 1,12,759 | 6.9% | 420 | 1,16,295 | 6.9% | 432 | 1,09,074 | 6.9% | 404 |
| **Total (FY27-FY41)** | | | **3,416** | | | **3,511** | | | **3,600** | | | **3,338** |

Source: TIC estimate

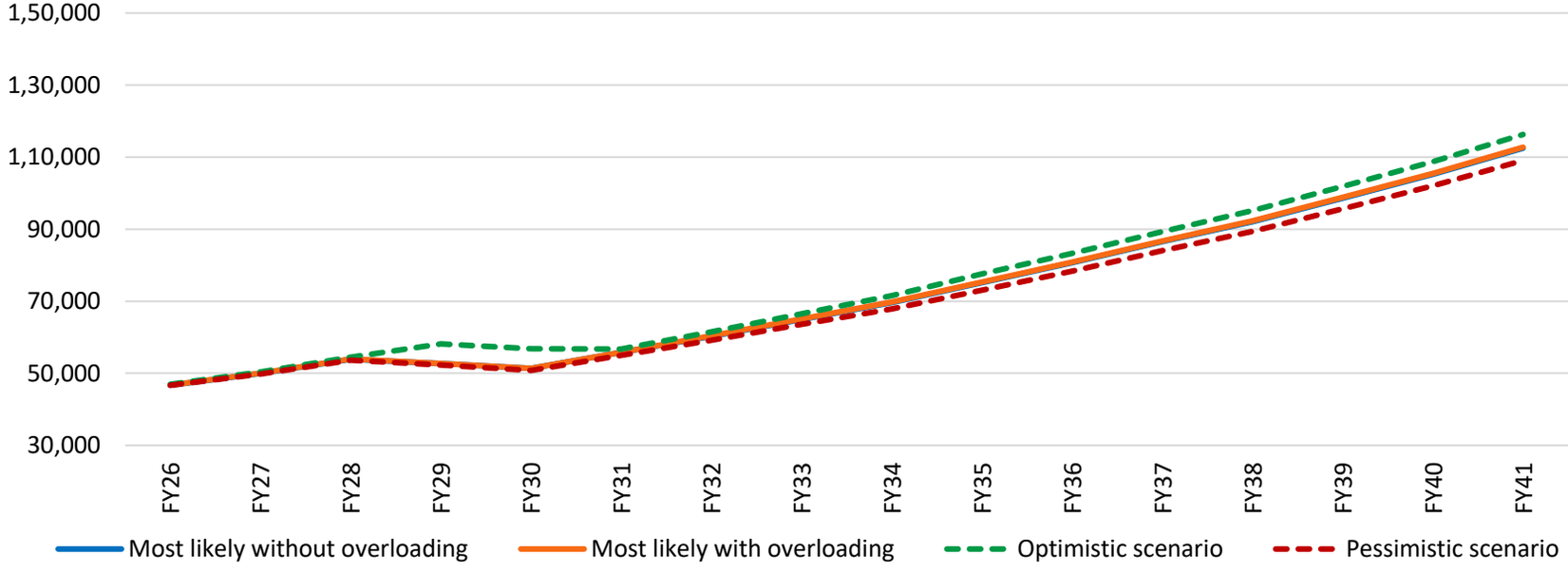
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Refer Capacity Analysis (Pg 85)

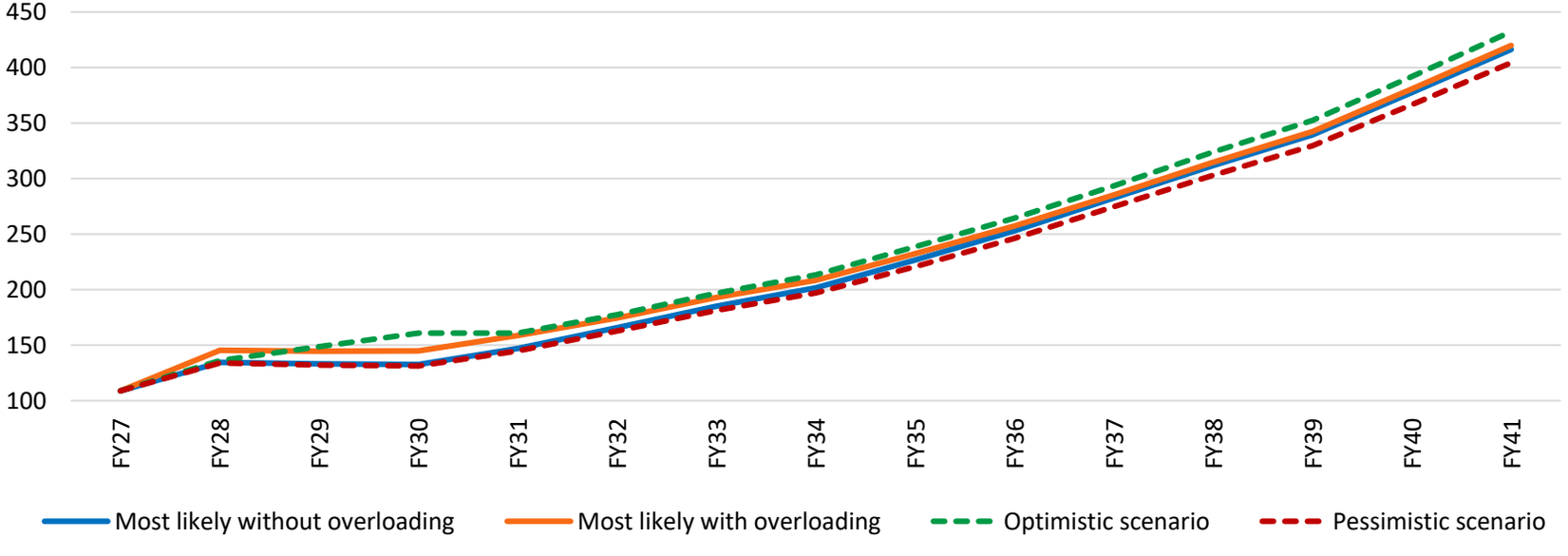
- LOS B Peak Hour 5,400 PCU/day
- LOS C Peak Hour 7,560 PCU/day
- LOS D Peak Hour 8,640 PCU/day

# Scenario summary: Surapattu TP (2)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# List of Appendices

**Appendix A:** Additional entry/exit request by Chennai Unified Metropolitan Transport Authority (CUMTA)

**Appendix B:** Vehicle category-wise visual representation of origin-destination zones
Top origin-destination pairs

**Appendix C:** Detailed traffic and revenue forecast – most likely scenario without overloading

## Appendix A:

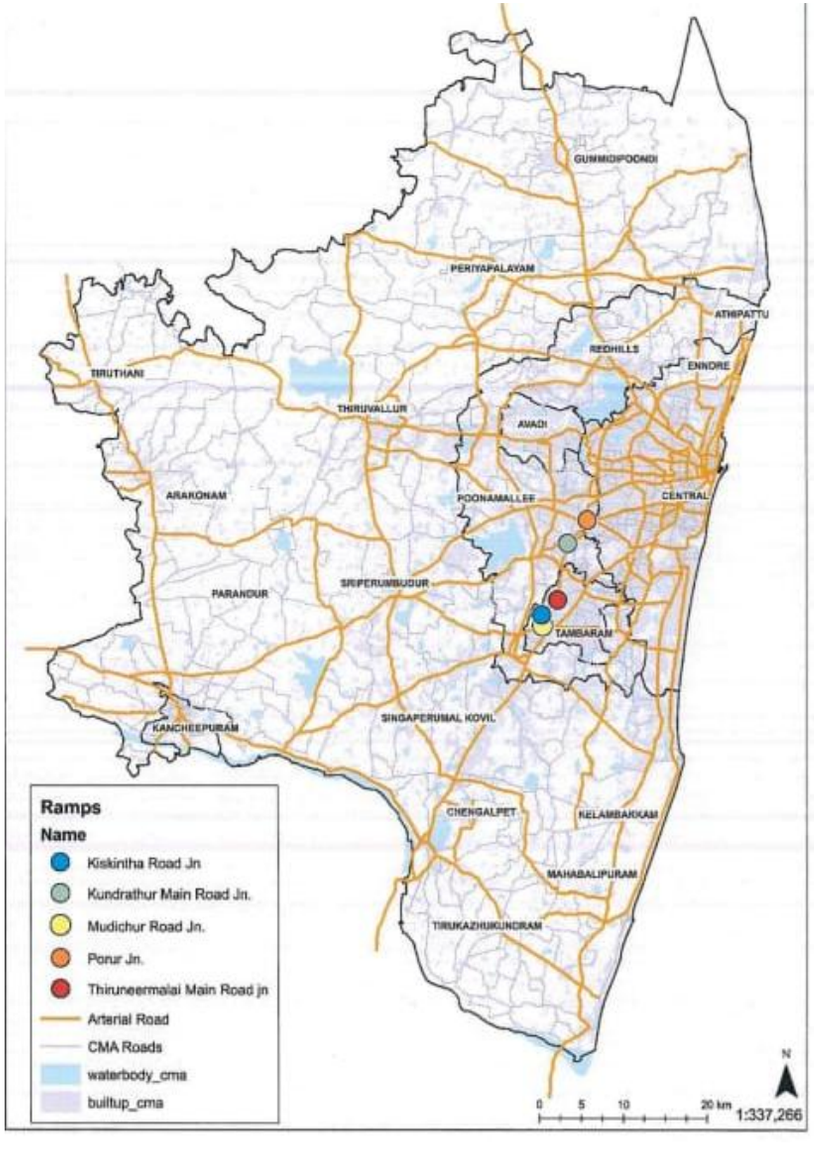
- Additional entry/exit request by Chennai Unified Metropolitan Transport Authority (CUMTA)
- Metro along Chennai Bypass

# Additional entry/exit request by CUMTA (1)

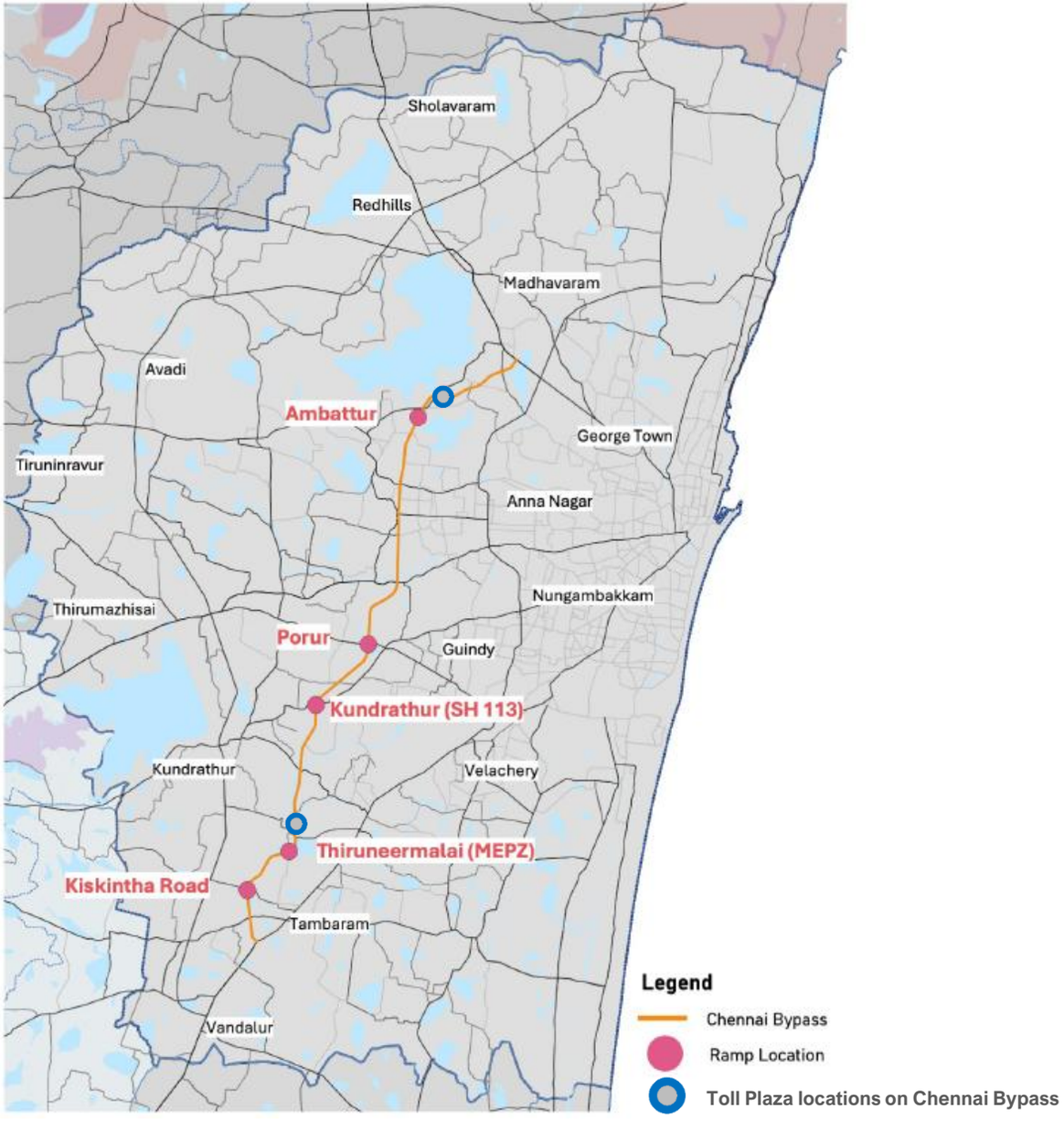
- Chennai Unified Metropolitan Transport Authority (CUMTA) has requested NHAI for additional entry/exit on Chennai Bypass considering urban nature of intra-city traffic as follows:
  - Mudichar road junction
  - Thirumazhisai road junction
  - Kiskintha road junction
  - Kundrathur main road junction
  - Porur junction
- NHAI has decided to provide only Thirumazhisai road junction at Ch 5.200 km which is in context of Madras Export Processing Zone (MEPZ) as discussed in earlier sections.
- No other proposals for remining locations as per the client/NHAI.
- In case of consideration of requested additional entry/exit ramp on Chennai Bypass, prima facie it will help to boos the traffic as tolling modality is access-controlled with limited entry-exit and open tolling at Tiruneermalai (km 6.500) and Surapattu (km 28.600).

# Additional entry/exit request by CUMTA (2)

**Additional entry/exit request by CUMTA**




Source: PIU Chennai 2




Source: CMP for Chennai Metropolitan Area (Executive Version 2023 – 2048)

# Metro along Chennai Bypass

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Action Plan for Public Transport

## Metro

### Short-Term (2030)

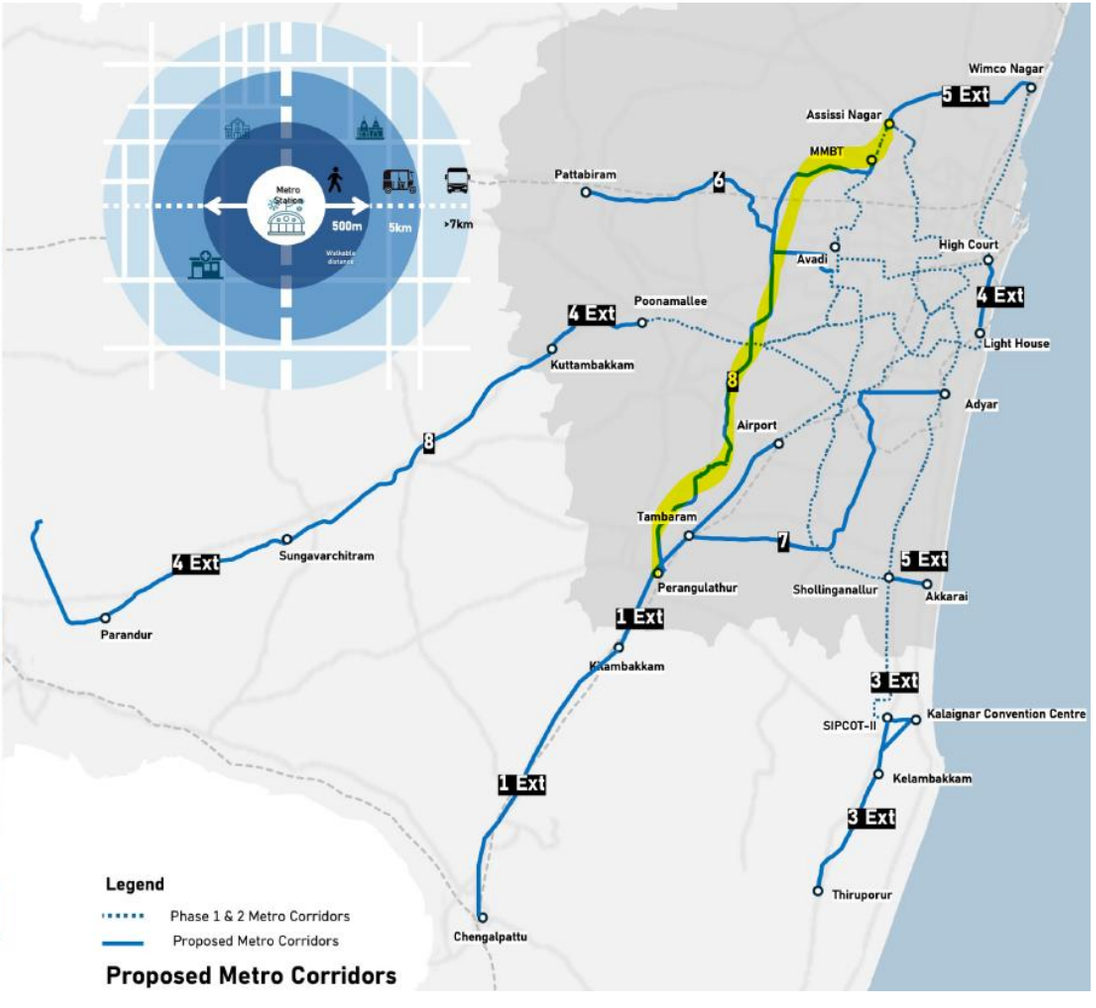
| Details | Corridor | PHPDT 2048 | Corridor Length in Km |
|---|---|---|---|
| **Corridor 6 New** | Koyambedu to Pattabiram (Via Avadi) | 15,635 | 20.8 |
| **Corridor 1 Ext** | Airport –Kilambakkam-Chengalpattu | 12,471 | 42.4 |
| **Corridor 4 Ext** | Poonamallee - Kuthambakkam terminal - Sunguvachatram (Phase 1 of line to Parandur) | 10,307 | 27.9 |
| **Corridor 5 Ext.** | Assisi Nagar to Wimco Nagar | 10,647 | 11.0 |
| **Corridor 4 Ext** | Light House to High court | 7,539 | 4.7 |
| **Corridor 3 Ext** | SIPCOT-II to Kalaignar Convention Centre/ Muttukadu | Connectivity to Convention Centre | 2.0 |

### Medium-Term (2040)

| Details | Corridor | PHPDT 2048 | Corridor Length in Km |
|---|---|---|---|
| **Corridor 4 Ext** | Sungavarchatram – Parandur (Phase 2 of Parandur line) | 8,940 | 25.0 |
| **Corridor 3 Ext** | Kalaignar Convention Centre to Kelambakkam | Network Synergy | 4.7 |
| **Corridor 5 Ext** | Sholinganallur to Akkarai | | 2.0 |
| **Corridor 7 New** | Tambaram to Adyar (Via Guindy-Velachery) | 11,328 | 25 |
| **Corridor 8 New** | Perungalathur to MMBT along Bypass* | 11,002 | 34.6 |

### Long-Term (2048)

| Details | Corridor | PHPDT 2048 | Corridor Length in Km |
|---|---|---|---|
| **Corridor 3 Ext** | Kelambakkam to Thiruporur | Connectivity to Thiruporur Town | 8.0 |




Source: CMP for Chennai Metropolitan Area (Executive Version 2023 – 2048)

Metro development Perungalathur to Madhavaram Mofussil Bus Terminus (MMBT) along Chennai Bypass (34.6 km; by 2040) has been considered under effect of capacity constraint as one of the alternate option for commuters

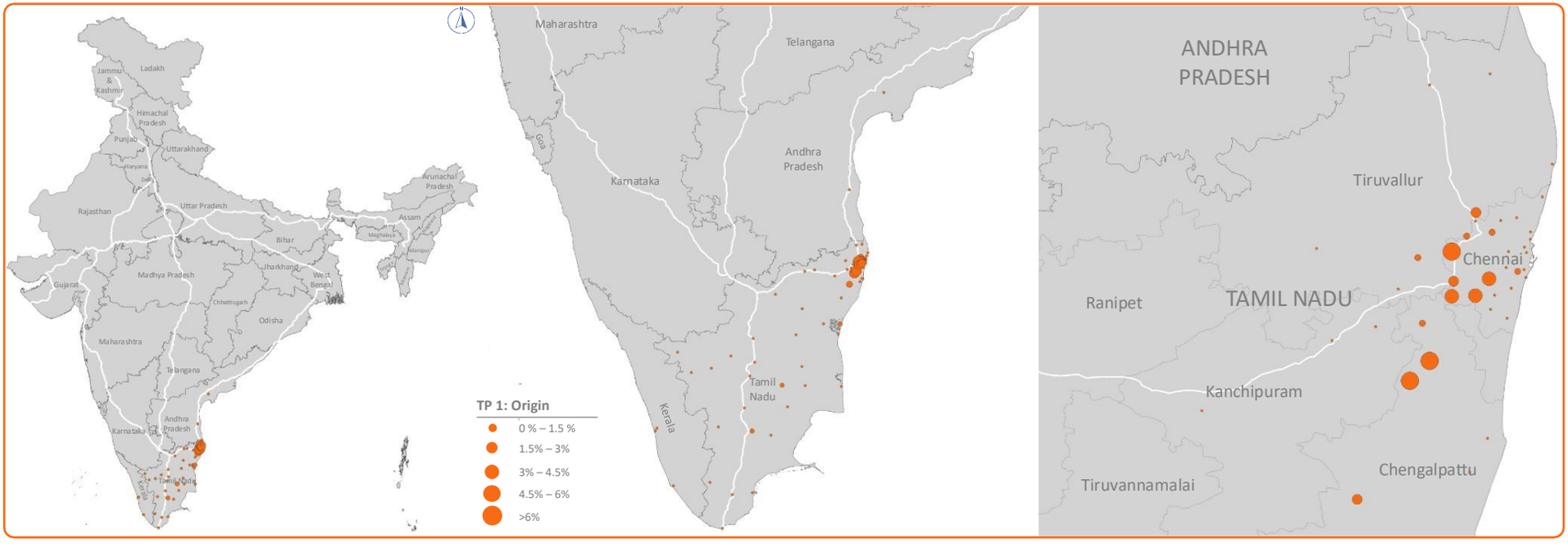
## Appendix B:

- Vehicle category-wise visual representation of origin-destination zones for Chennai Bypass
- Vehicle category-wise top origin-destination pairs

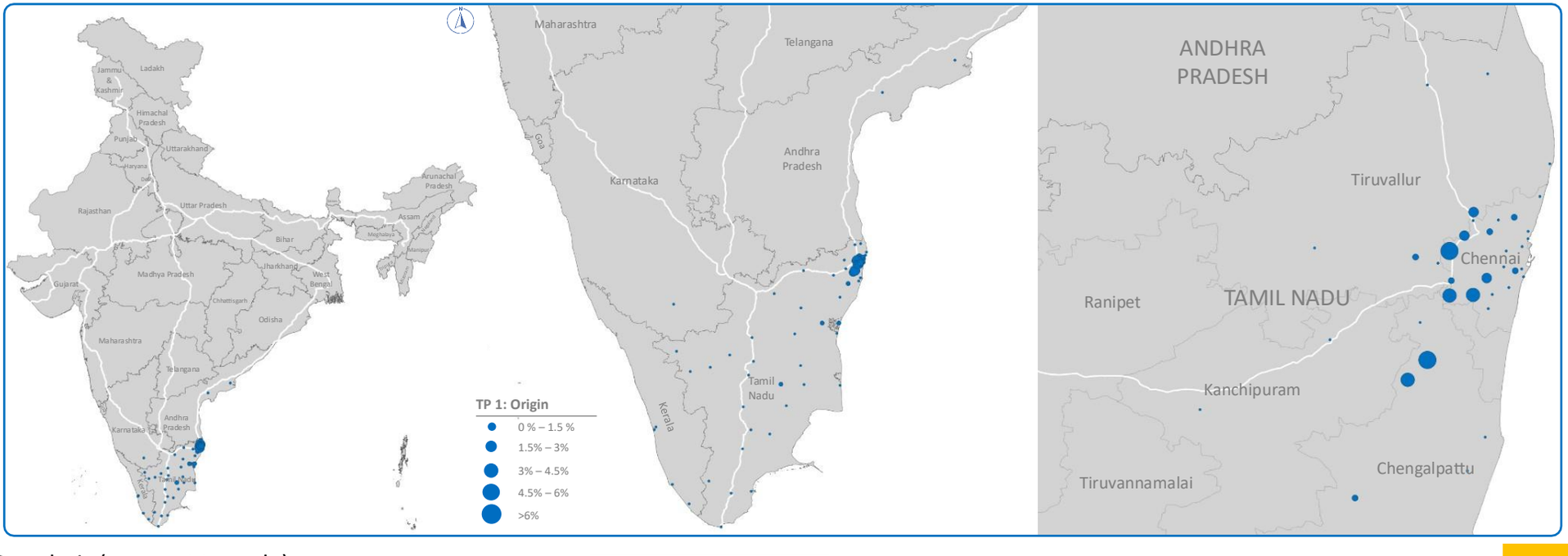
# Vehicle category-wise visual representation of OD (CJV): Vanagaram TP

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**Origin**




**Destination**

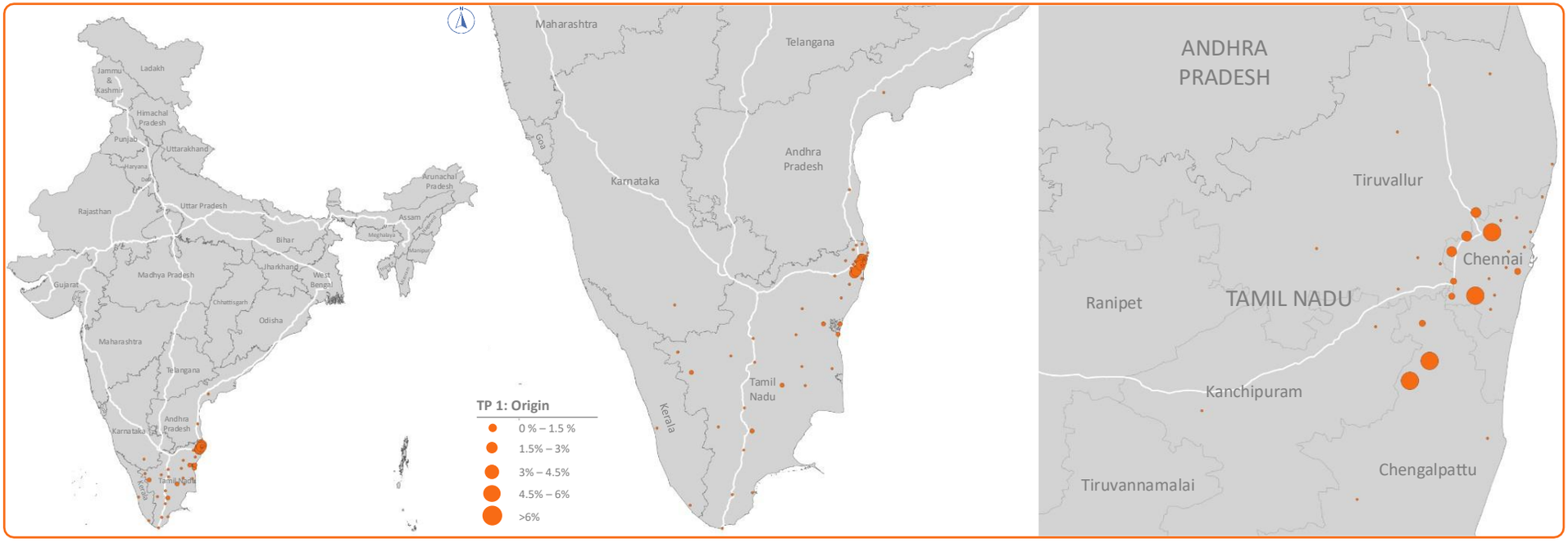



Source: TIC analysis (map not to scale)

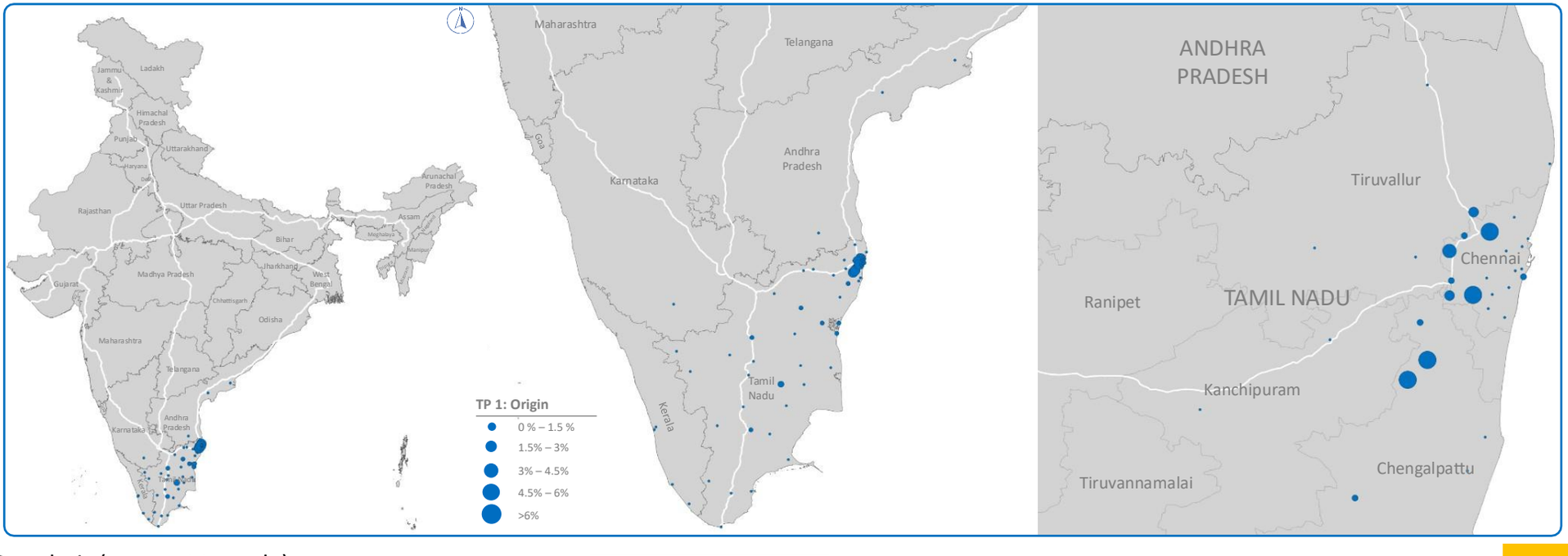
# Vehicle category-wise visual representation of OD (Bus): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

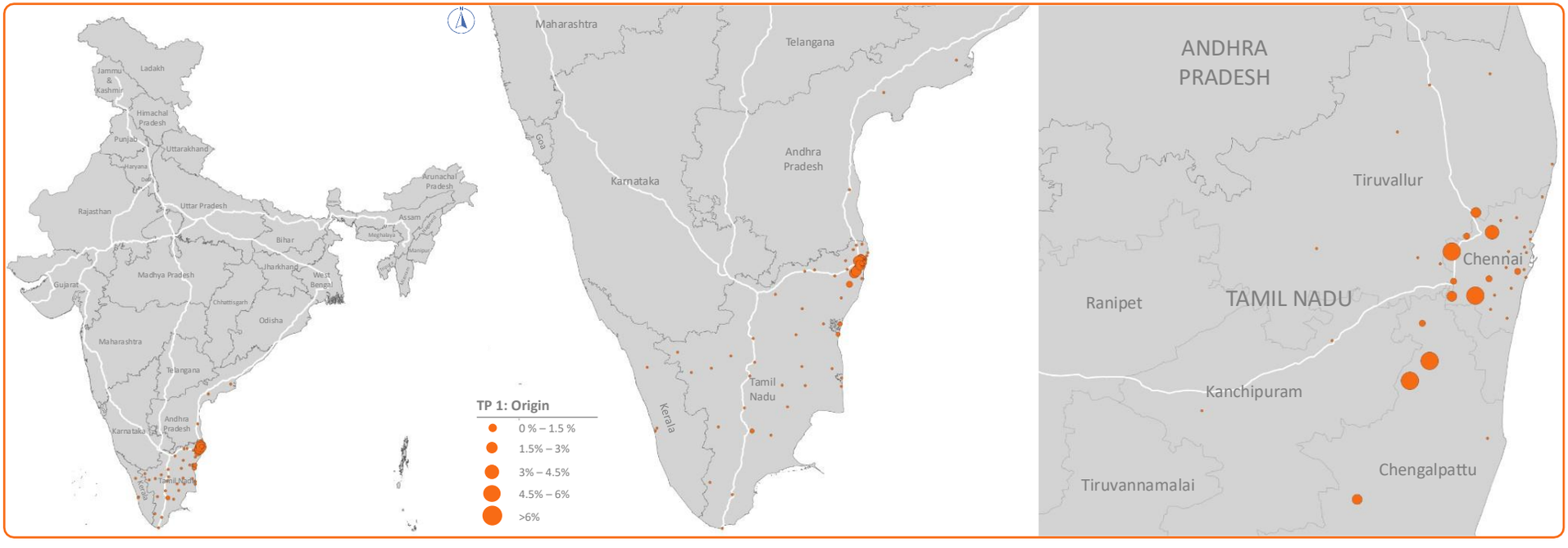



Source: TIC analysis (map not to scale)

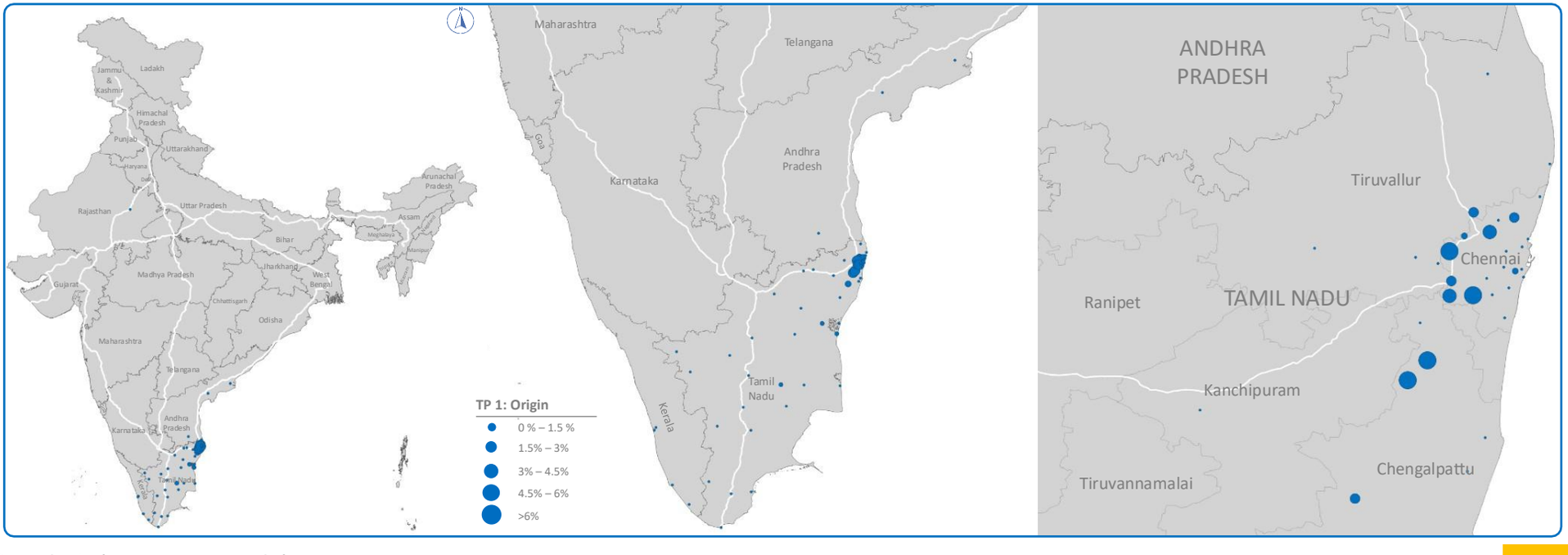
# Vehicle category-wise visual representation of OD (Mini LCV): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

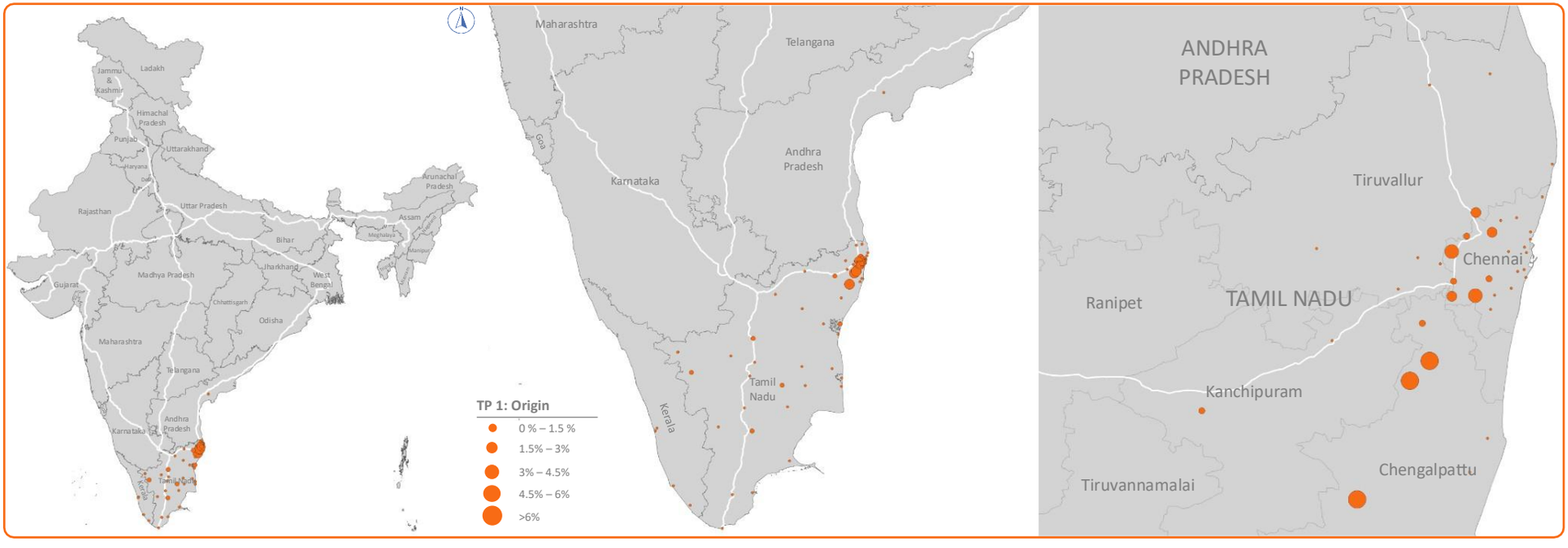



Source: TIC analysis (map not to scale)

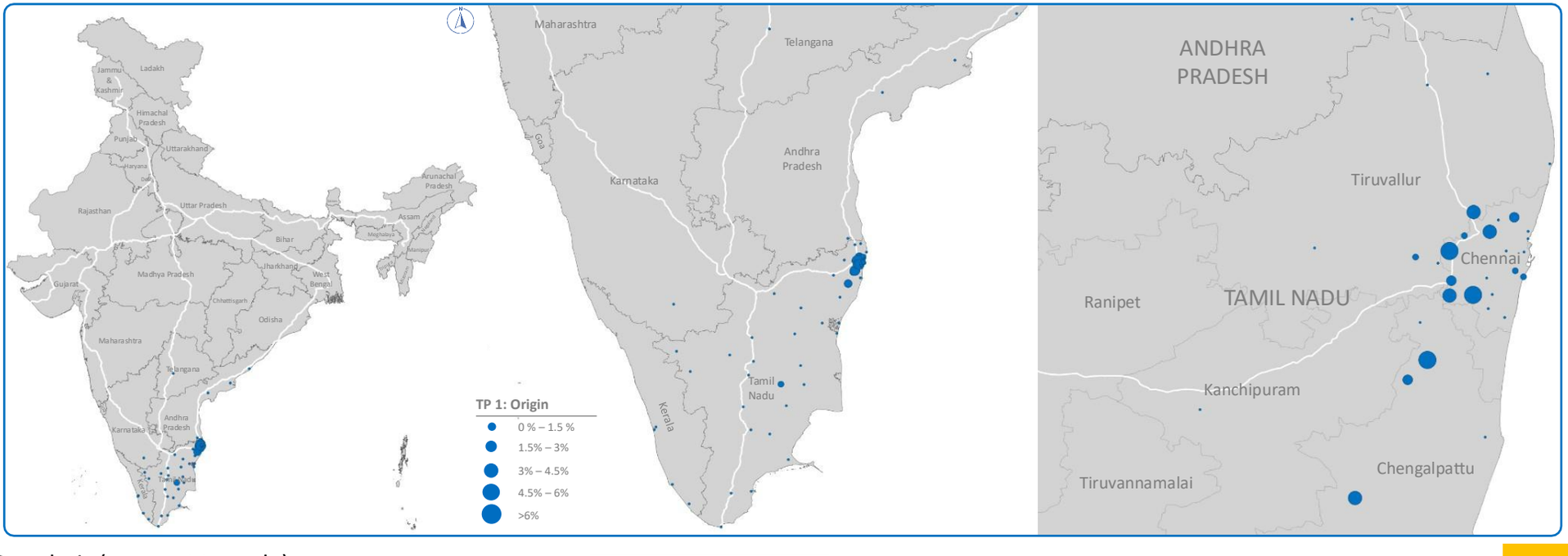
# Vehicle category-wise visual representation of OD (LCV): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Origin**




**Destination**

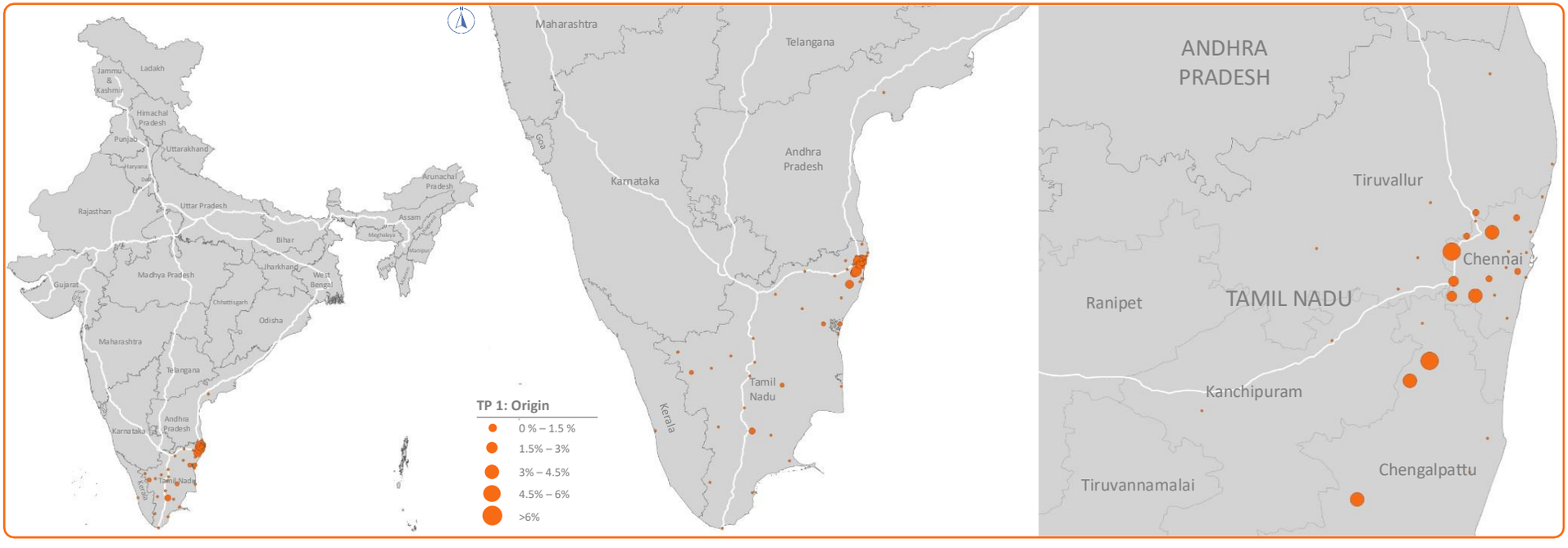



Source: TIC analysis (map not to scale)

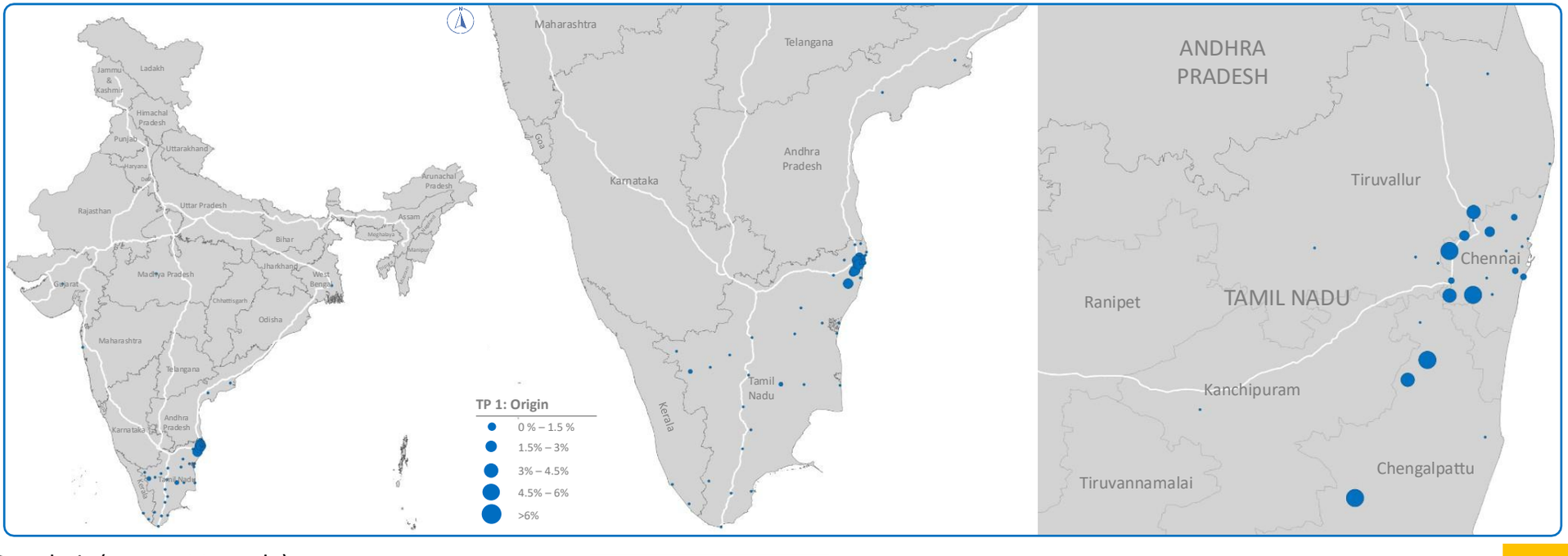
# Vehicle category-wise visual representation of OD (2A): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

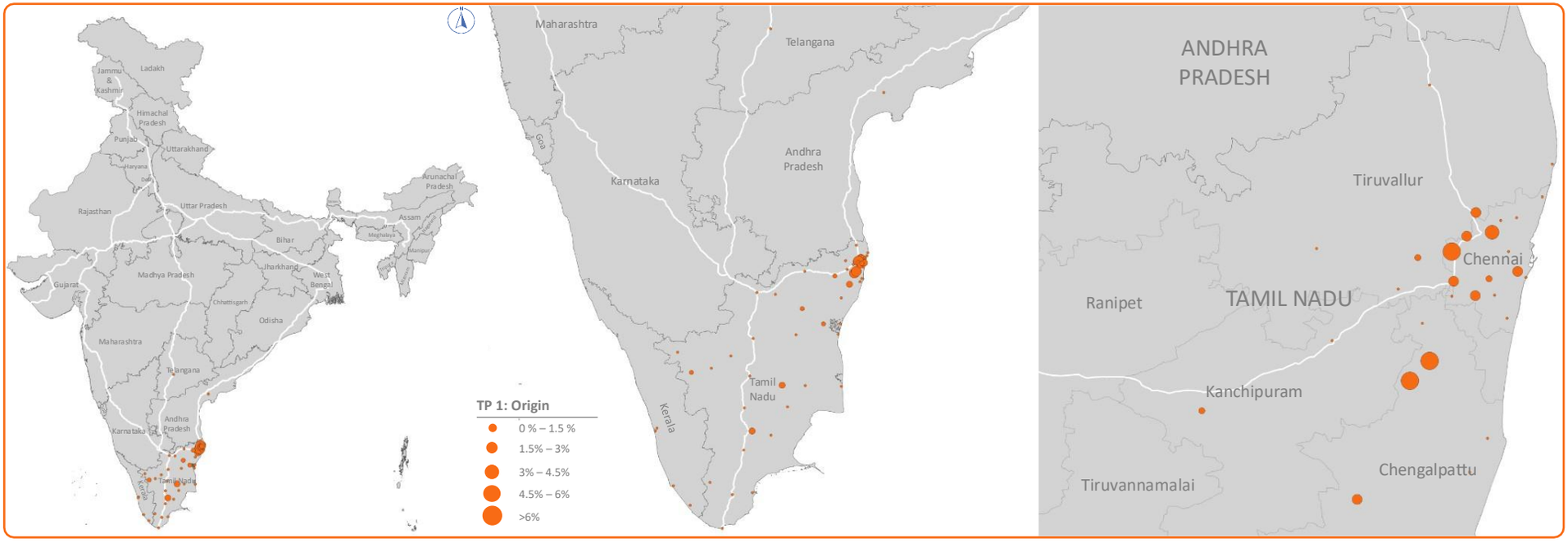



Source: TIC analysis (map not to scale)

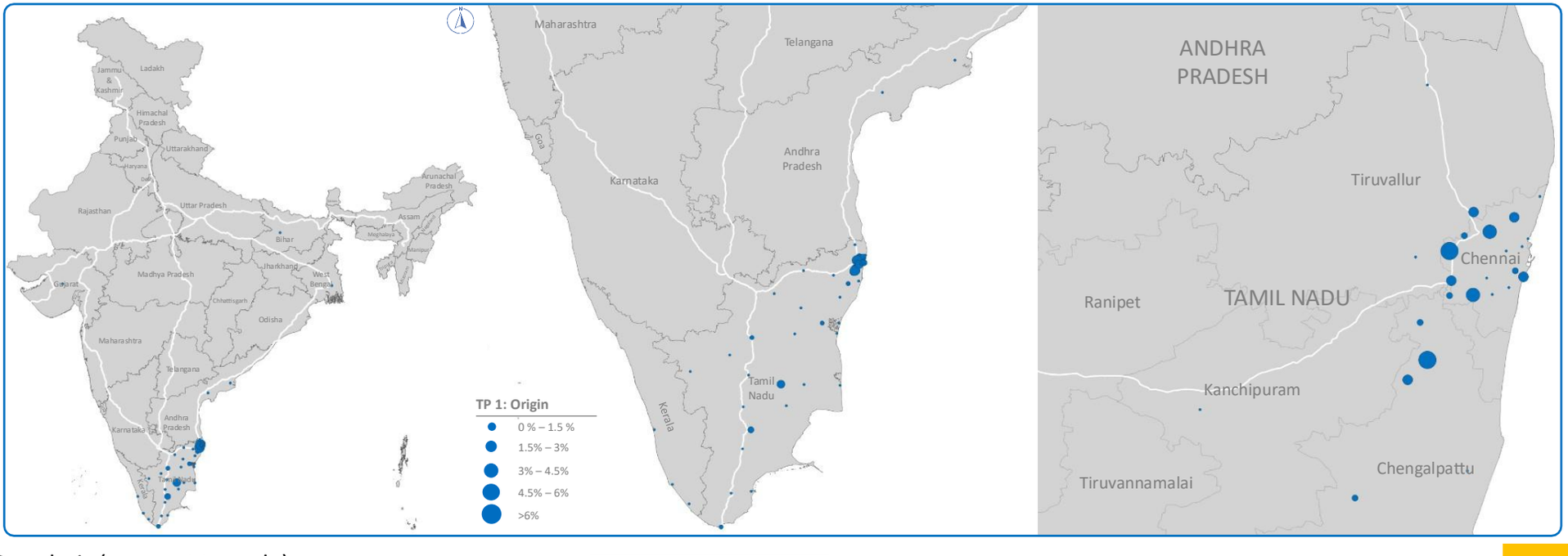
# Vehicle category-wise visual representation of OD (3A): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

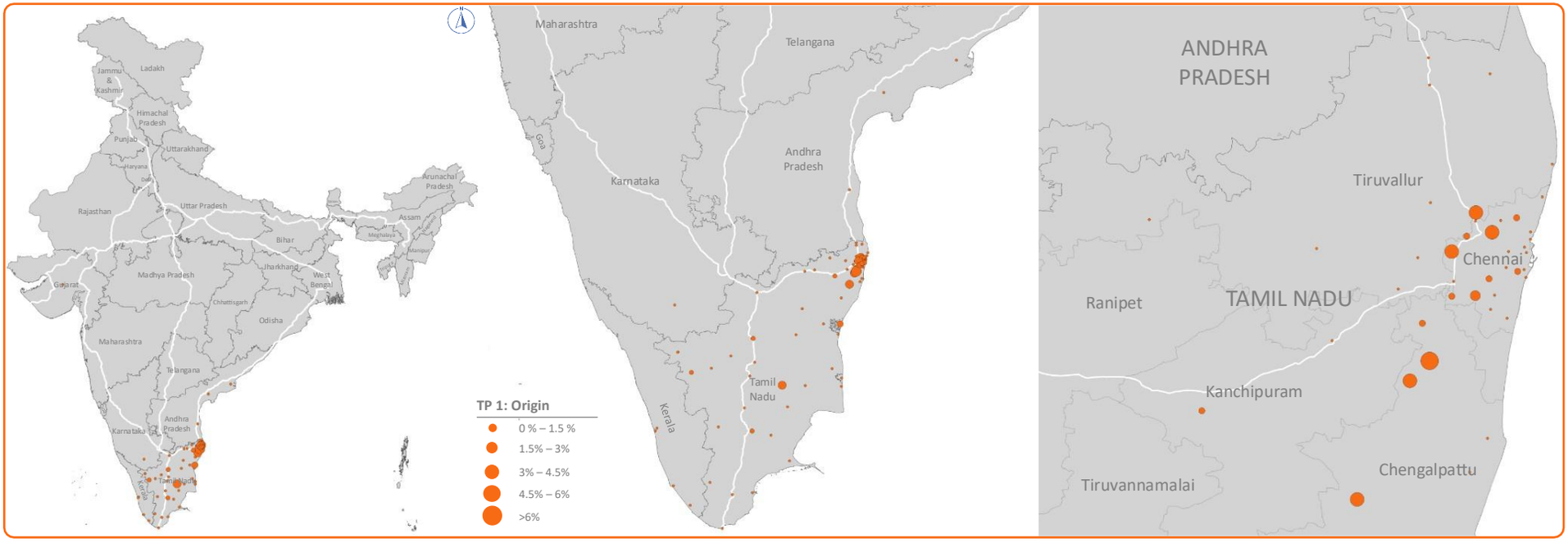



Source: TIC analysis (map not to scale)

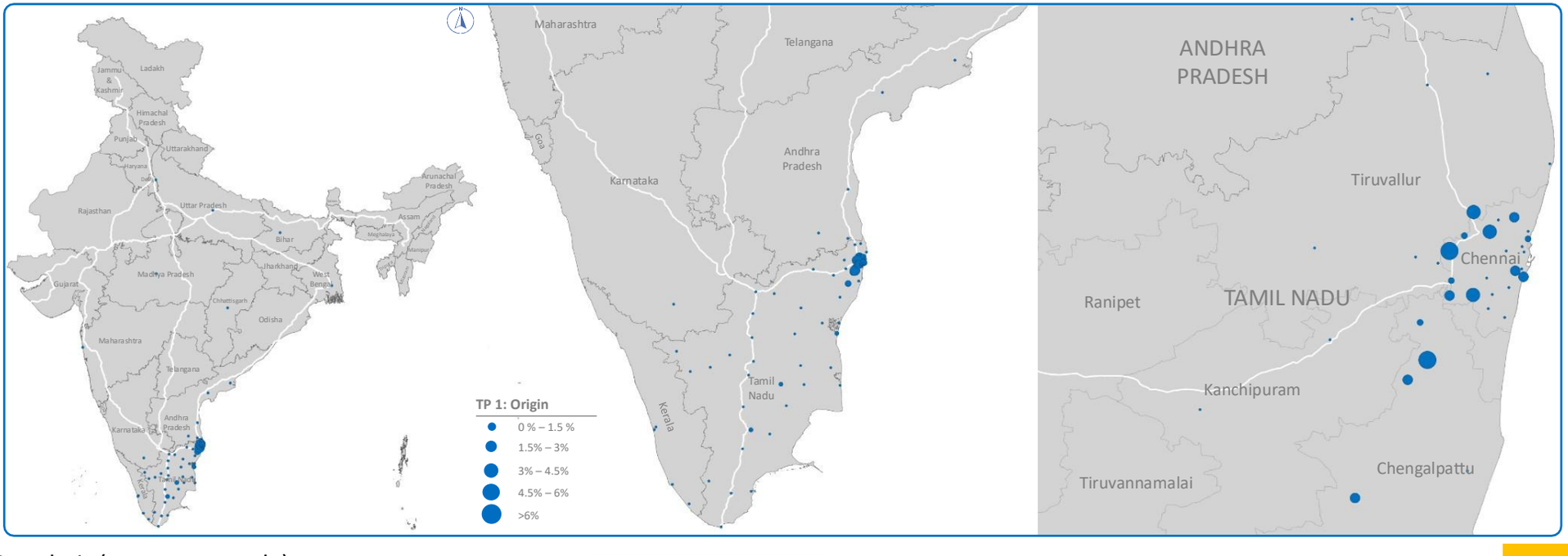
# Vehicle category-wise visual representation of OD (MAV): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

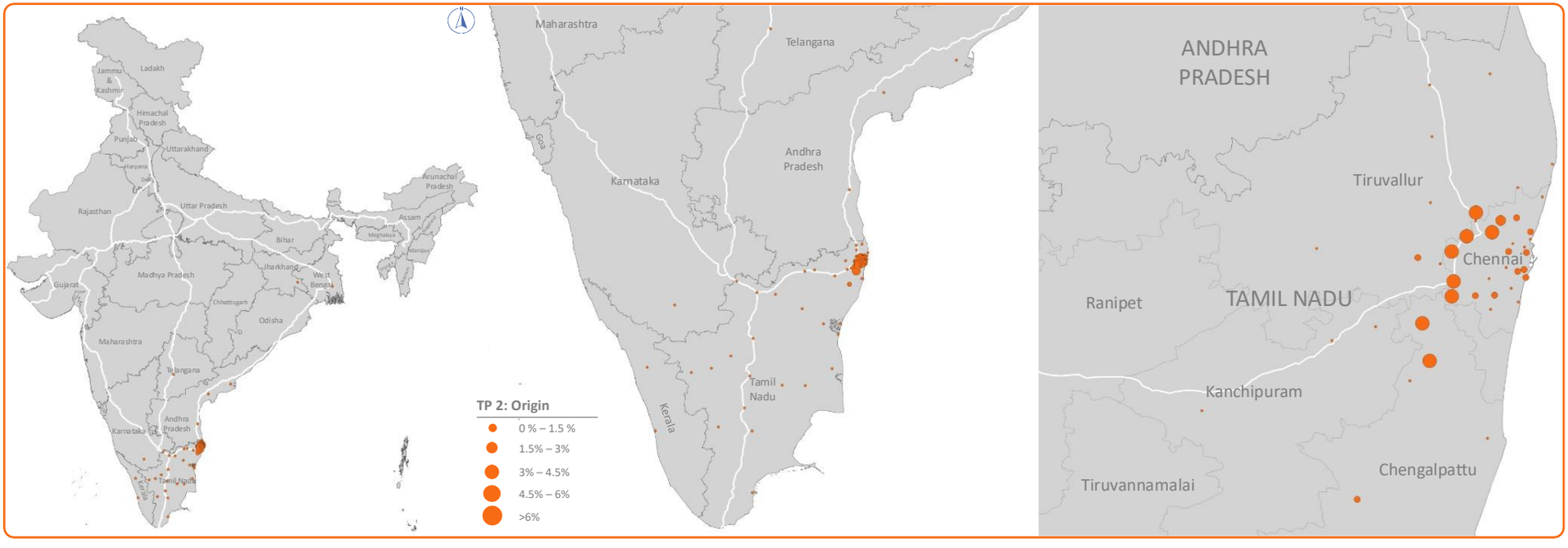



Source: TIC analysis (map not to scale)

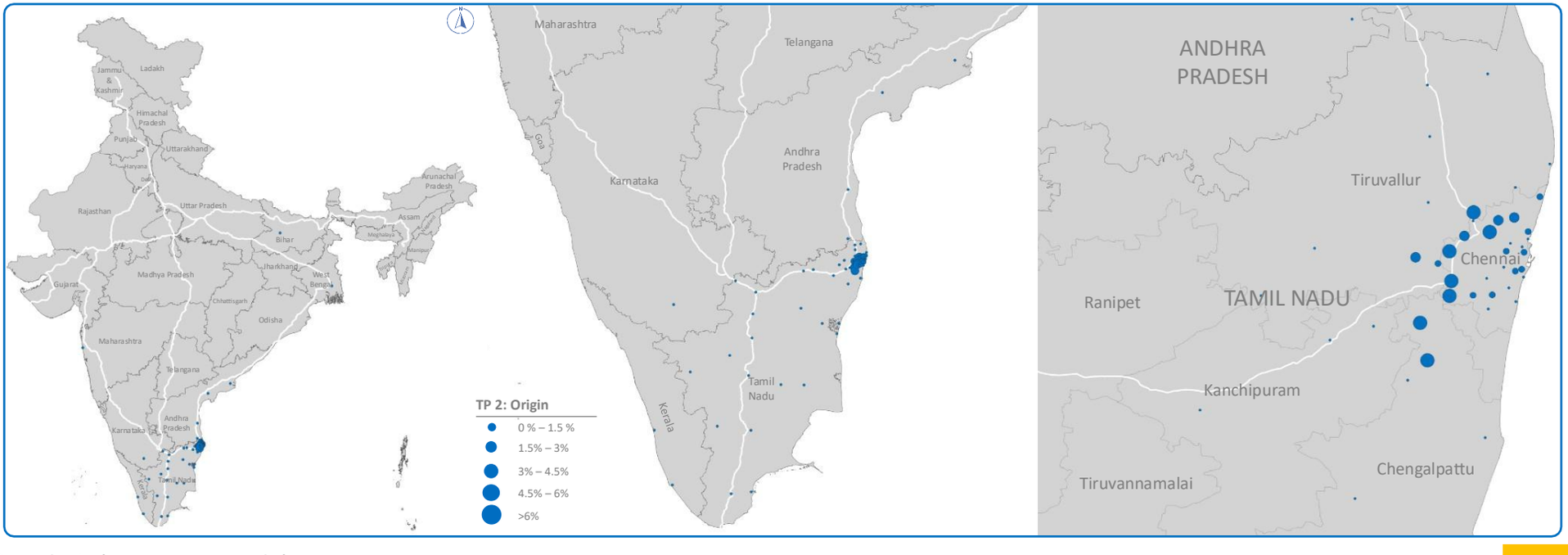
# Vehicle category-wise visual representation of OD (CJV): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

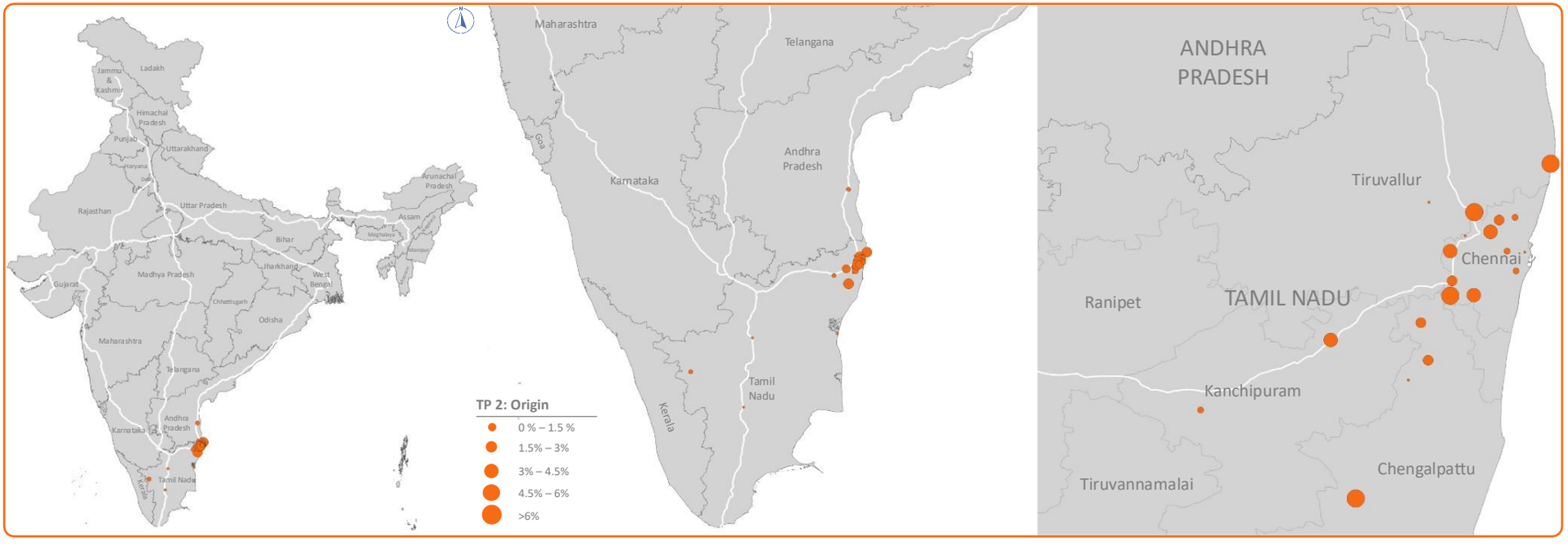



Source: TIC analysis (map not to scale)

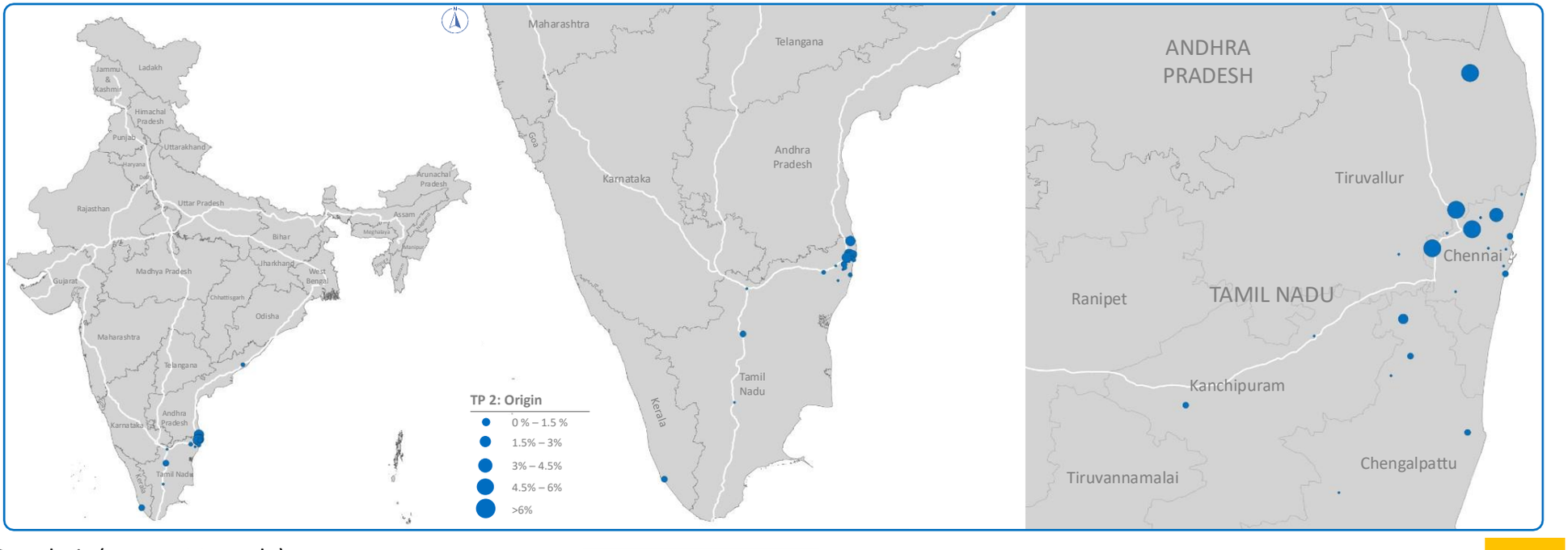
# Vehicle category-wise visual representation of OD (Bus): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

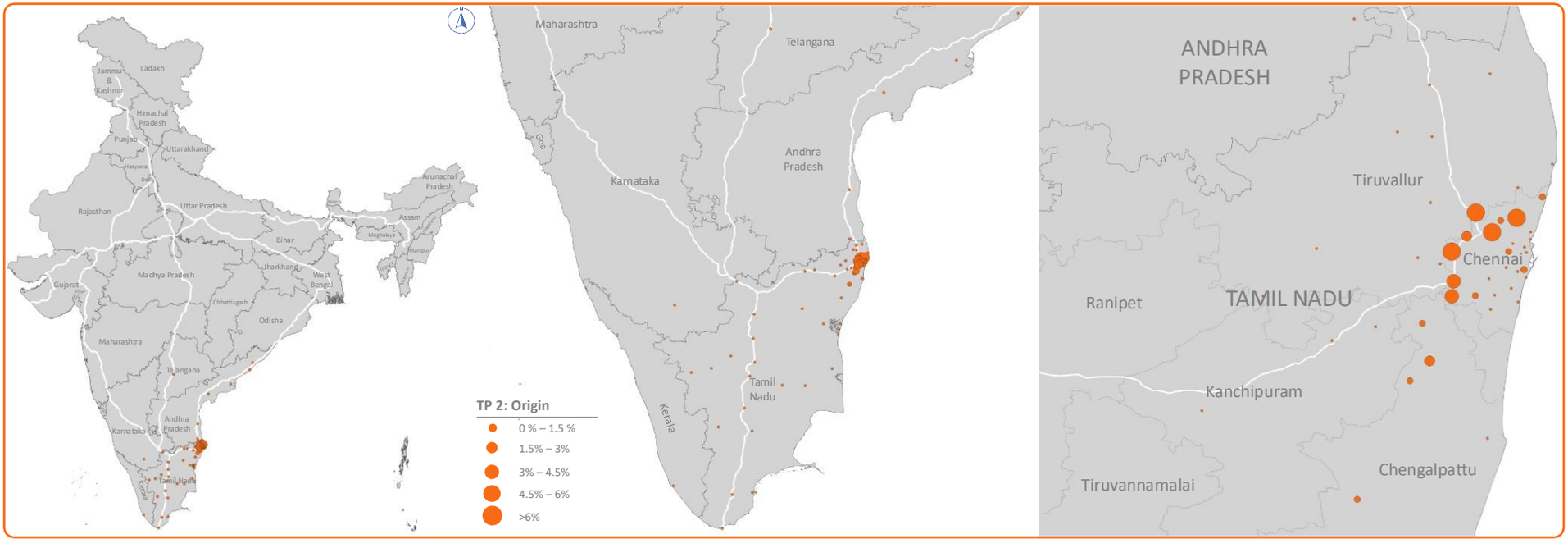



Source: TIC analysis (map not to scale)

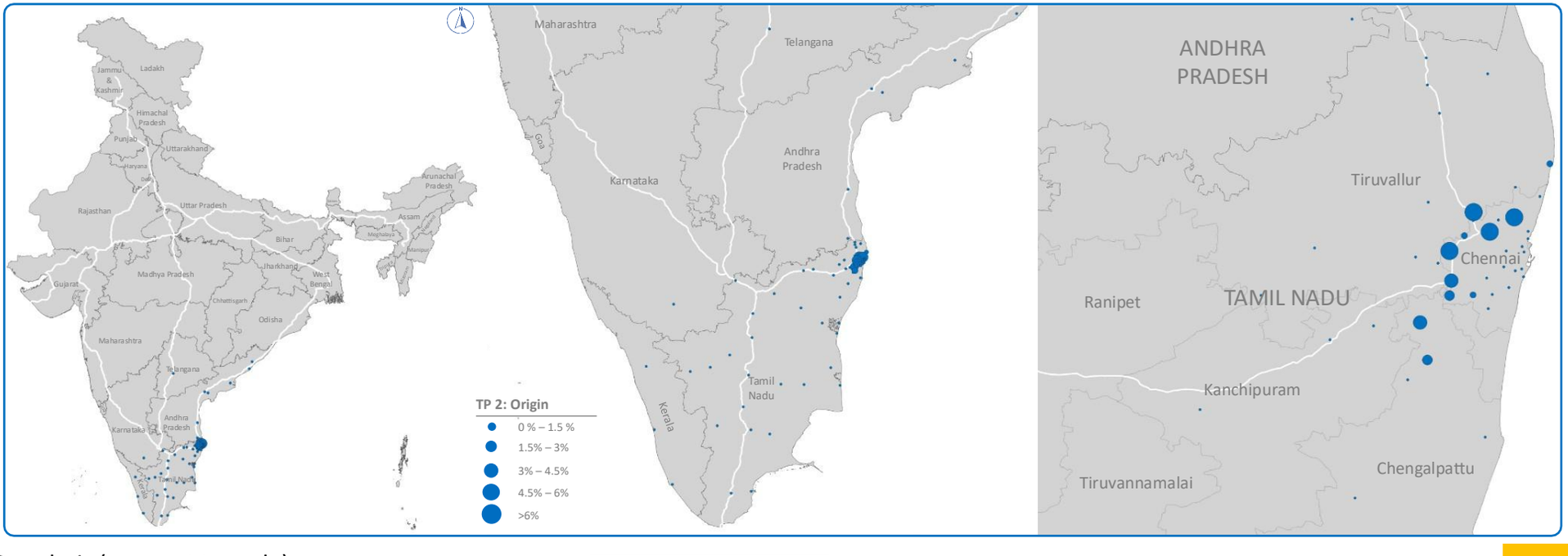
# Vehicle category-wise visual representation of OD (Mini LCV): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

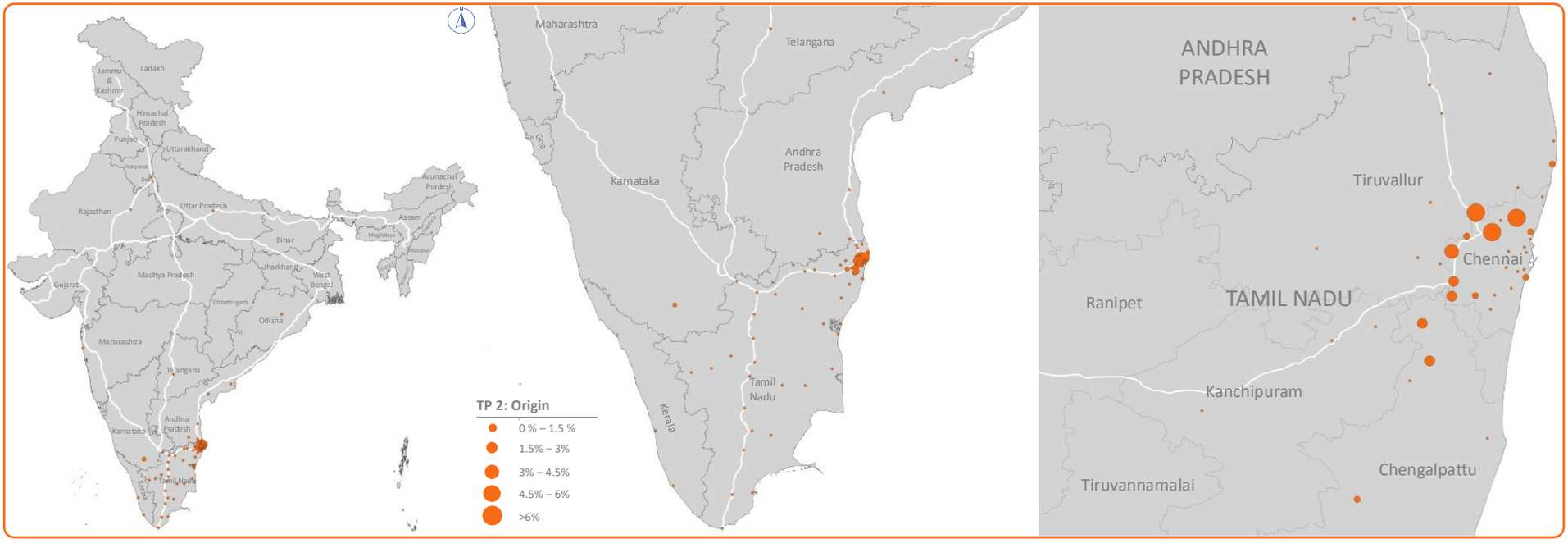



Source: TIC analysis (map not to scale)

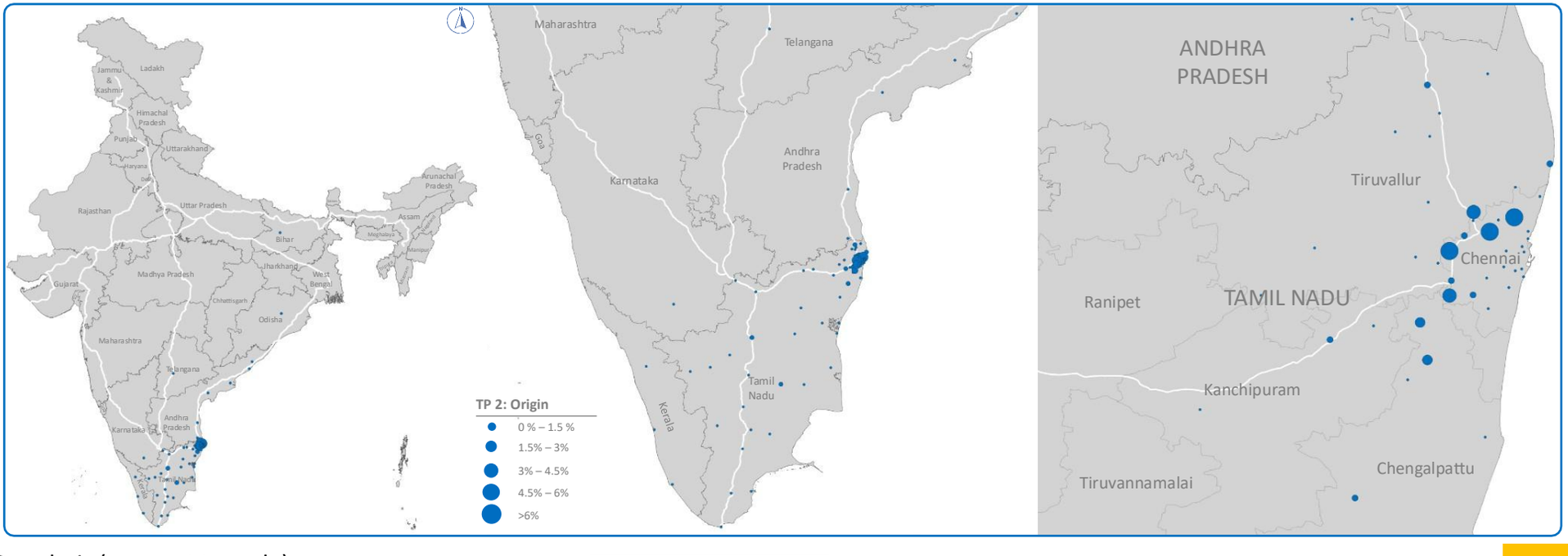
# Vehicle category-wise visual representation of OD (LCV): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

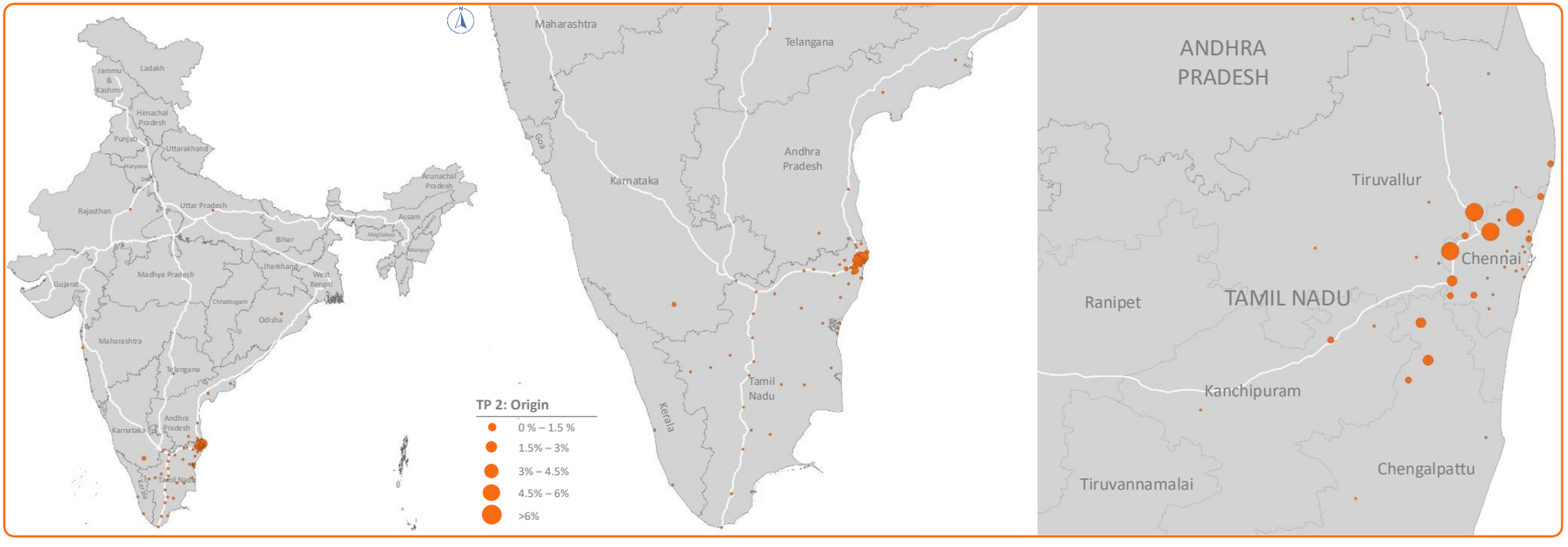



Source: TIC analysis (map not to scale)

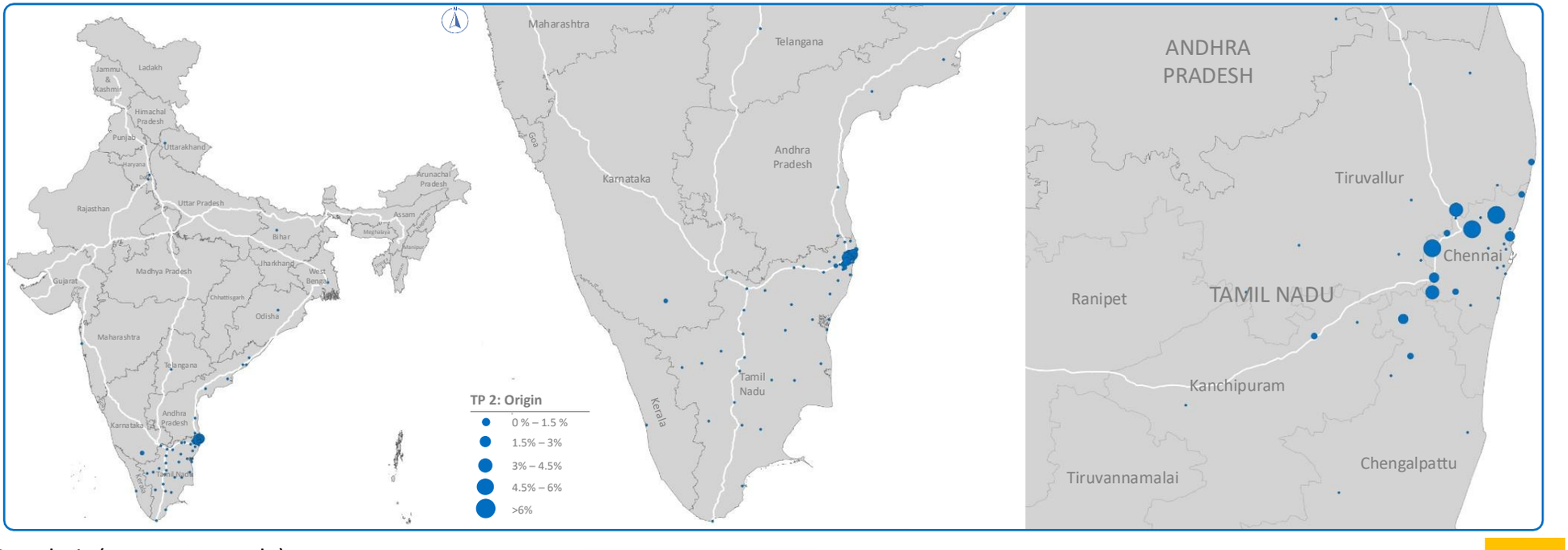
# Vehicle category-wise visual representation of OD (2A): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

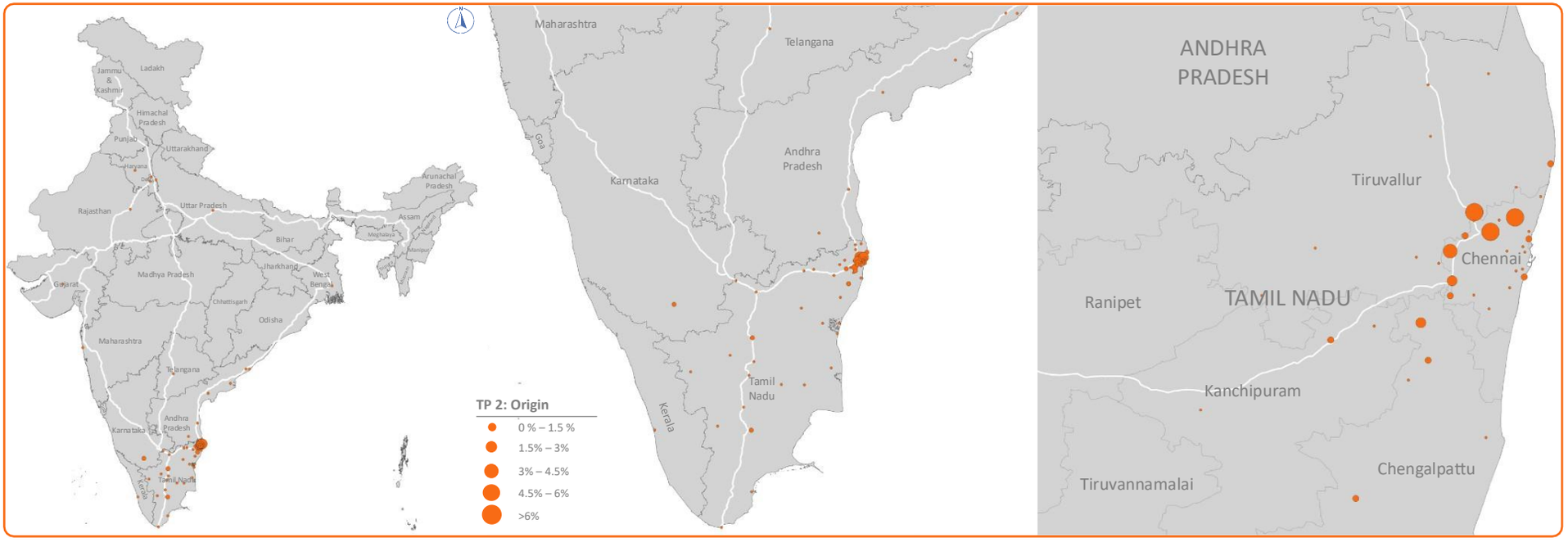



Source: TIC analysis (map not to scale)

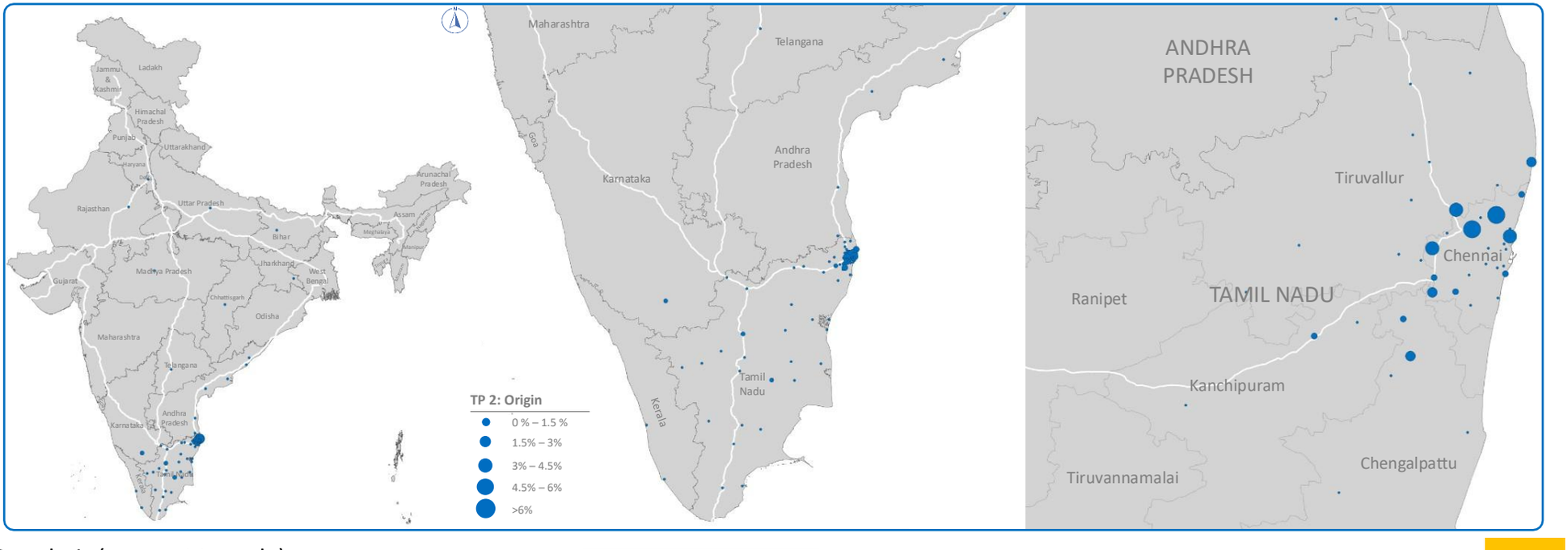
# Vehicle category-wise visual representation of OD (3A): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**




**Destination**

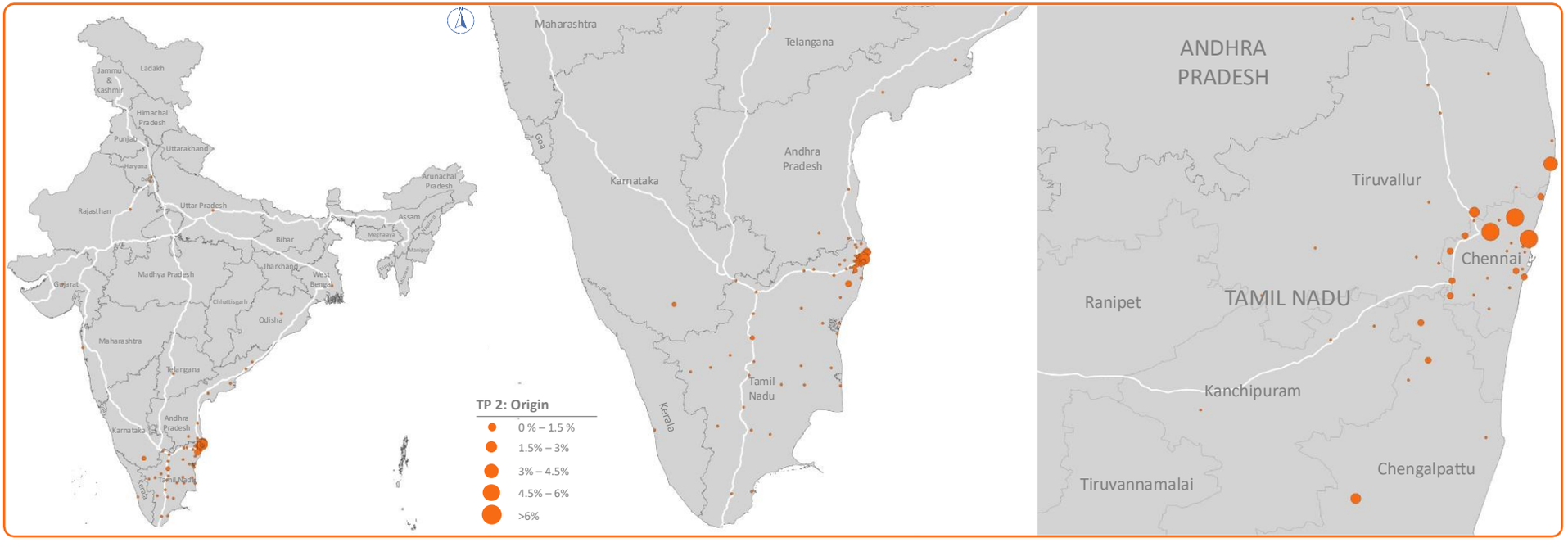



Source: TIC analysis (map not to scale)

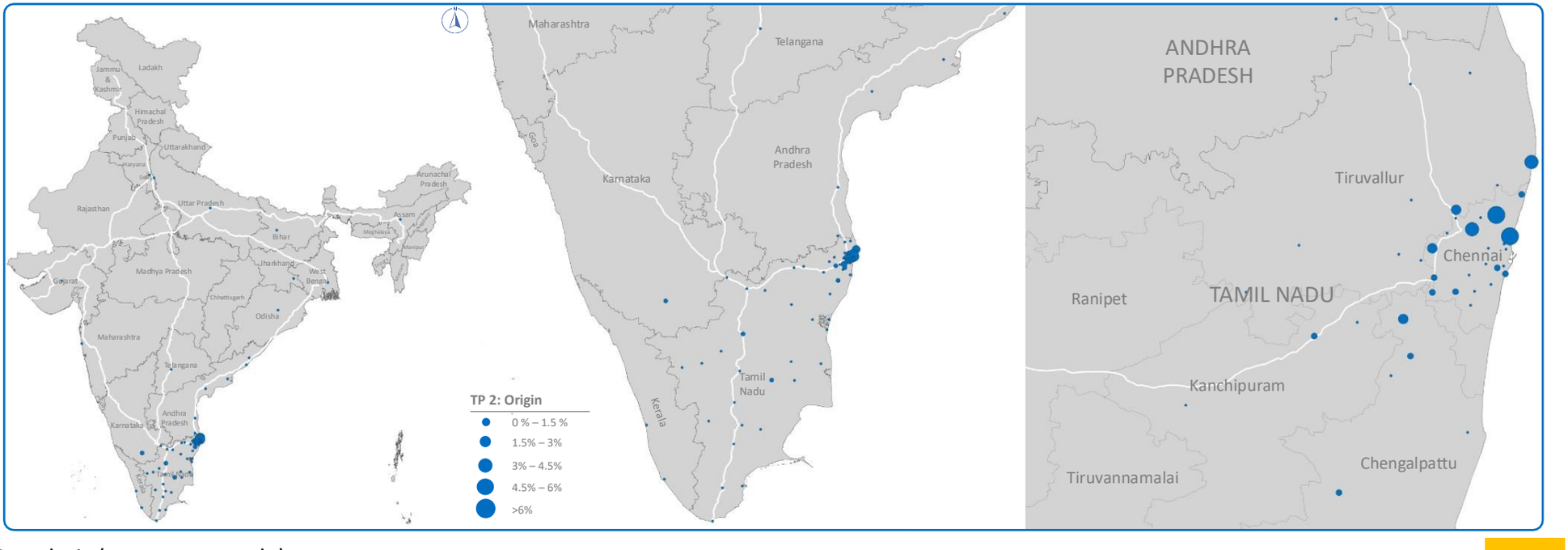
# Vehicle category-wise visual representation of OD (MAV): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Origin**




**Destination**




Source: TIC analysis (map not to scale)

# Vehicle category-wise top OD pairs (1): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**CJV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Tambaram | Ambattur | 6% |
| 2 | Tambaram | Aminjikarai | 4% |
| 3 | Tambaram | Porur | 3% |
| 4 | Ambattur | Tambaram | 3% |
| 5 | Tambaram | K. K. Nagar | 3% |
| 6 | K. K. Nagar | Tambaram | 2% |
| 7 | Porur | Tambaram | 2% |
| 8 | Tambaram | Maduravoyal | 1% |
| 9 | Red Hills | Tambaram | 1% |
| 10 | Tambaram | Red Hills | 1% |

**Mini LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ambattur | Tambaram | 3% |
| 2 | Tambaram | Ambattur | 3% |
| 3 | Tambaram | K. K. Nagar | 3% |
| 4 | Ambattur | Vandalur | 2% |
| 5 | K. K. Nagar | Tambaram | 2% |
| 6 | Tambaram | Aminjikarai | 2% |
| 7 | Red Hills | Tambaram | 2% |
| 8 | Maduravoyal | Tambaram | 2% |
| 9 | Tambaram | Maduravoyal | 2% |
| 10 | Tambaram | Madhavaram | 1% |

**Bus**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Vandalur | K. K. Nagar | 4% |
| 2 | Ambattur | Tambaram | 2% |
| 3 | Madhavaram | Tambaram | 2% |
| 4 | Tambaram | Red Hills | 2% |
| 5 | K. K. Nagar | Tambaram | 2% |
| 6 | Madhavaram | Vandalur | 2% |
| 7 | Tambaram | K. K. Nagar | 2% |
| 8 | Tiruchirappalli | K. K. Nagar | 2% |
| 9 | Vandalur | Madhavaram | 2% |
| 10 | Red Hills | Vandalur | 1% |

**LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ambattur | Tambaram | 3% |
| 2 | K. K. Nagar | Tambaram | 3% |
| 3 | Tambaram | K. K. Nagar | 3% |
| 4 | Ambattur | Vandalur | 2% |
| 5 | K. K. Nagar | Chengalpattu | 2% |
| 6 | Tambaram | Porur | 2% |
| 7 | Maduravoyal | Tambaram | 1% |
| 8 | Madhavaram | Tambaram | 1% |
| 9 | Red Hills | Tambaram | 1% |
| 10 | Ambattur | Chengalpattu | 1% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2): Vanagaram TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**2A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Tambaram | K. K. Nagar | 2% |
| 2 | Ambattur | Tambaram | 2% |
| 3 | Tambaram | Maduravoyal | 2% |
| 4 | Tambaram | Ambattur | 2% |
| 5 | Ambattur | Chengalpattu | 2% |
| 6 | Ambattur | Vandalur | 2% |
| 7 | K. K. Nagar | Vandalur | 1% |
| 8 | Chengalpattu | Ambattur | 1% |
| 9 | Vandalur | Maduravoyal | 1% |
| 10 | Tambaram | Madhavaram | 1% |

**3A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | K. K. Nagar | Tambaram | 2% |
| 2 | Ambattur | Chengalpattu | 1% |
| 3 | Red Hills | Tambaram | 1% |
| 4 | Madhavaram | Tambaram | 1% |
| 5 | Ambattur | Vandalur | 1% |
| 6 | Tambaram | Madhavaram | 1% |
| 7 | Vandalur | K. K. Nagar | 1% |
| 8 | Tiruchirappalli | Madhavaram | 1% |
| 9 | Madhavaram | Chengalpattu | 1% |
| 10 | Red Hills | Vandalur | 1% |

**MAV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ambattur | Tambaram | 2% |
| 2 | Red Hills | Tambaram | 1% |
| 3 | Tambaram | K. K. Nagar | 1% |
| 4 | Ambattur | Chengalpattu | 1% |
| 5 | Harbour Port | Tambaram | 1% |
| 6 | Madhavaram | Vandalur | 1% |
| 7 | Tambaram | Red Hills | 1% |
| 8 | Ambattur | Vandalur | 1% |
| 9 | Manali | Chengalpattu | 1% |
| 10 | Tambaram | Madhavaram | 1% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (1): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**CJV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ambattur | Red Hills | 1% |
| 2 | Porur | Madhavaram | 1% |
| 3 | Porur | Red Hills | 1% |
| 4 | Red Hills | Ambattur | 1% |
| 5 | Red Hills | Porur | 1% |
| 6 | Kundrathur | Mathur | 1% |
| 7 | Kundrathur | Surapattu | 1% |
| 8 | Ambattur | Madhavaram | 1% |
| 9 | Tambaram | Surapattu | 1% |
| 10 | Maduravoyal | Mathur | 1% |

**Mini LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Manali | Ambattur | 2% |
| 2 | Red Hills | Ambattur | 2% |
| 3 | Ambattur | Manali | 2% |
| 4 | Ambattur | Red Hills | 2% |
| 5 | Manali | Maduravoyal | 2% |
| 6 | Madhavaram | Ambattur | 2% |
| 7 | Manali | Porur | 2% |
| 8 | Manali | Kundrathur | 1% |
| 9 | Madhavaram | Maduravoyal | 1% |
| 10 | Red Hills | Porur | 1% |

**Bus**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Red Hills | Ambattur | 5% |
| 2 | Madhavaram | Sriperumbudur | 5% |
| 3 | Ambattur | Ennore Port | 4% |
| 4 | Kerala_Southern | Mathur | 4% |
| 5 | Salem | Red Hills | 4% |
| 6 | Ambattur | Red Hills | 4% |
| 7 | Red Hills | Porur | 3% |
| 8 | Manali | Chengalpattu | 3% |
| 9 | Kolur | Kanchipuram | 3% |
| 10 | Madhavaram | K. K. Nagar | 3% |

**LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Manali | Ambattur | 2% |
| 2 | Ambattur | Madhavaram | 2% |
| 3 | Ambattur | Red Hills | 2% |
| 4 | Manali | Maduravoyal | 2% |
| 5 | Ambattur | Manali | 2% |
| 6 | Porur | Red Hills | 1% |
| 7 | Manali | Kundrathur | 1% |
| 8 | Porur | Madhavaram | 1% |
| 9 | Tambaram | Madhavaram | 1% |
| 10 | Manali | Tambaram | 1% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2): Surapattu TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**2A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Manali | Ambattur | 2% |
| 2 | Ambattur | Manali | 2% |
| 3 | Ambattur | Red Hills | 2% |
| 4 | Ambattur | Madhavaram | 2% |
| 5 | Madhavaram | Maduravoyal | 1% |
| 6 | Manali | Kundrathur | 1% |
| 7 | Red Hills | Ambattur | 1% |
| 8 | Porur | Manali | 1% |
| 9 | Porur | Madhavaram | 1% |
| 10 | Kundrathur | Madhavaram | 1% |

**3A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ambattur | Red Hills | 2% |
| 2 | Manali | Ambattur | 2% |
| 3 | Manali | Kundrathur | 1% |
| 4 | Ambattur | Manali | 1% |
| 5 | Ambattur | Madhavaram | 1% |
| 6 | Madhavaram | Porur | 1% |
| 7 | Madhavaram | Kundrathur | 1% |
| 8 | Manali | Salem | 1% |
| 9 | Madhavaram | Ambattur | 1% |
| 10 | Porur | Red Hills | 1% |

**MAV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Kundrathur | Harbour Port | 1% |
| 2 | Ambattur | Manali | 1% |
| 3 | Manali | Chengalpattu | 1% |
| 4 | Ennore Port | Ambattur | 1% |
| 5 | Ennore Port | Chengalpattu | 1% |
| 6 | Ennore Port | Kundrathur | 1% |
| 7 | Harbour Port | Hosur | 1% |
| 8 | Porur | Madhavaram | 1% |
| 9 | Kundrathur | Red Hills | 1% |
| 10 | Ambattur | Madhavaram | 1% |

Source: TIC analysis

## Appendix C:

- Detailed traffic and revenue forecast – most likely scenario without overloading

# Vanagaram / Tiruneermalai TP (1): Traffic forecast (AADT)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Vanagaram / Tiruneermalai TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 29,235 | 4,546 | 2,049 | 2,945 | 1,060 | 551 | 2,015 | **42,400** | **59,587** |
| **FY27** | 33,399 | 5,142 | 2,101 | 3,030 | 1,110 | 555 | 2,070 | **47,407** | **65,092** |
| **FY28** | 38,005 | 5,871 | 2,159 | 3,118 | 1,185 | 573 | 2,183 | **53,094** | **71,566** |
| **FY29** | 43,297 | 6,653 | 2,215 | 3,210 | 1,215 | 577 | 2,231 | **59,398** | **78,317** |
| **FY30** | 48,620 | 7,436 | 2,266 | 3,294 | 1,242 | 581 | 2,274 | **65,712** | **85,036** |
| **FY31** | 54,856 | 8,292 | 2,317 | 3,422 | 1,270 | 585 | 2,375 | **73,119** | **93,147** |
| **FY32** | 61,125 | 9,232 | 2,369 | 3,510 | 1,315 | 589 | 2,445 | **80,586** | **1,01,157** |
| **FY33** | 68,058 | 10,272 | 2,421 | 3,599 | 1,370 | 593 | 2,507 | **88,820** | **1,09,930** |
| **FY34** | 74,972 | 11,308 | 2,469 | 3,681 | 1,419 | 597 | 2,563 | **97,009** | **1,18,609** |
| **FY35** | 82,884 | 12,559 | 2,522 | 3,773 | 1,449 | 601 | 2,672 | **1,06,461** | **1,28,721** |
| **FY36** | 90,992 | 13,844 | 2,573 | 3,904 | 1,502 | 605 | 2,742 | **1,16,162** | **1,39,066** |
| **FY37** | 95,360 | 14,401 | 2,594 | 3,939 | 1,514 | 606 | 2,773 | **1,21,187** | **1,44,309** |
| **FY38** | 98,177 | 14,782 | 2,607 | 3,963 | 1,522 | 607 | 2,794 | **1,24,452** | **1,47,718** |
| **FY39** | 99,864 | 15,064 | 2,617 | 3,980 | 1,532 | 608 | 2,815 | **1,26,480** | **1,49,880** |
| **FY40** | 1,00,711 | 15,206 | 2,622 | 3,988 | 1,536 | 608 | 2,821 | **1,27,492** | **1,50,942** |
| **FY41** | 1,01,151 | 15,274 | 2,624 | 3,994 | 1,537 | 608 | 2,825 | **1,28,014** | **1,51,494** |

Source: TIC estimate

# Vanagaram / Tiruneermalai TP (2): Traffic AADT growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Vanagaram / Tiruneermalai TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 14.2% | 13.1% | 2.5% | 2.9% | 4.7% | 0.8% | 2.7% | **11.8%** | **9.2%** |
| **FY28** | 13.8% | 14.2% | 2.8% | 2.9% | 6.7% | 3.1% | 5.5% | **12.0%** | **9.9%** |
| **FY29** | 13.9% | 13.3% | 2.6% | 2.9% | 2.5% | 0.8% | 2.2% | **11.9%** | **9.4%** |
| **FY30** | 12.3% | 11.8% | 2.3% | 2.6% | 2.2% | 0.7% | 1.9% | **10.6%** | **8.6%** |
| **FY31** | 12.8% | 11.5% | 2.3% | 3.9% | 2.3% | 0.7% | 4.5% | **11.3%** | **9.5%** |
| **FY32** | 11.4% | 11.3% | 2.2% | 2.6% | 3.5% | 0.7% | 2.9% | **10.2%** | **8.6%** |
| **FY33** | 11.3% | 11.3% | 2.2% | 2.5% | 4.1% | 0.7% | 2.5% | **10.2%** | **8.7%** |
| **FY34** | 10.2% | 10.1% | 2.0% | 2.3% | 3.6% | 0.6% | 2.2% | **9.2%** | **7.9%** |
| **FY35** | 10.6% | 11.1% | 2.2% | 2.5% | 2.1% | 0.7% | 4.3% | **9.7%** | **8.5%** |
| **FY36** | 9.8% | 10.2% | 2.0% | 3.5% | 3.7% | 0.6% | 2.6% | **9.1%** | **8.0%** |
| **FY37** | 4.8% | 4.0% | 0.8% | 0.9% | 0.8% | 0.2% | 1.1% | **4.3%** | **3.8%** |
| **FY38** | 3.0% | 2.7% | 0.5% | 0.6% | 0.5% | 0.2% | 0.7% | **2.7%** | **2.4%** |
| **FY39** | 1.7% | 1.9% | 0.4% | 0.4% | 0.7% | 0.1% | 0.7% | **1.6%** | **1.5%** |
| **FY40** | 0.8% | 0.9% | 0.2% | 0.2% | 0.2% | 0.1% | 0.2% | **0.8%** | **0.7%** |
| **FY41** | 0.4% | 0.5% | 0.1% | 0.2% | 0.1% | 0.0% | 0.1% | **0.4%** | **0.4%** |

Source: TIC estimate

# Vanagaram / Tiruneermalai TP (3): Revenue forecast (INR Crore)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Vanagaram / Tiruneermalai TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **96.6** |
| **FY28** | 61.8 | 9.5 | 6.1 | 9.9 | 6.8 | 3.7 | 20.6 | **118.4** |
| **FY29** | 75.0 | 11.3 | 6.5 | 10.5 | 7.2 | 3.8 | 21.9 | **136.2** |
| **FY30** | 85.6 | 13.0 | 6.7 | 11.2 | 7.7 | 4.0 | 23.1 | **151.4** |
| **FY31** | 98.2 | 14.9 | 7.2 | 12.0 | 8.1 | 4.2 | 24.9 | **169.4** |
| **FY32** | 116.1 | 17.3 | 7.7 | 12.9 | 8.8 | 4.4 | 26.9 | **194.0** |
| **FY33** | 130.8 | 19.8 | 8.3 | 13.7 | 9.5 | 4.6 | 28.6 | **215.2** |
| **FY34** | 154.0 | 23.1 | 8.8 | 14.5 | 10.1 | 4.8 | 30.2 | **245.4** |
| **FY35** | 181.2 | 27.1 | 9.1 | 15.5 | 10.8 | 5.0 | 32.8 | **281.5** |
| **FY36** | 202.1 | 30.8 | 9.8 | 16.7 | 11.7 | 5.2 | 35.0 | **311.2** |
| **FY37** | 221.1 | 33.0 | 10.1 | 17.4 | 12.1 | 5.4 | 36.7 | **335.8** |
| **FY38** | 230.5 | 34.5 | 10.5 | 18.1 | 12.6 | 5.6 | 38.2 | **350.2** |
| **FY39** | 247.7 | 37.0 | 11.0 | 19.0 | 13.3 | 5.8 | 39.9 | **373.7** |
| **FY40** | 253.4 | 38.2 | 11.4 | 19.8 | 13.8 | 6.1 | 41.8 | **384.5** |
| **FY41** | 267.2 | 40.1 | 11.9 | 20.4 | 14.2 | 6.3 | 43.3 | **403.4** |

Source: TIC estimate

# Vanagaram / Tiruneermalai TP (4): Revenue growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Vanagaram / Tiruneermalai TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 25.5% | 27.7% | 16.8% | 16.5% | 21.1% | 15.0% | 18.3% | **22.5%** |
| **FY29** | 21.3% | 19.8% | 7.0% | 5.9% | 5.3% | 4.6% | 6.3% | **15.1%** |
| **FY30** | 14.2% | 14.7% | 4.1% | 6.9% | 6.6% | 4.2% | 5.7% | **11.1%** |
| **FY31** | 14.7% | 14.4% | 6.7% | 6.9% | 5.2% | 4.5% | 7.7% | **11.9%** |
| **FY32** | 18.2% | 16.3% | 6.8% | 7.7% | 8.8% | 5.3% | 7.7% | **14.5%** |
| **FY33** | 12.7% | 14.1% | 7.6% | 6.1% | 7.8% | 4.6% | 6.5% | **10.9%** |
| **FY34** | 17.7% | 16.9% | 5.8% | 5.7% | 6.9% | 4.0% | 5.5% | **14.0%** |
| **FY35** | 17.7% | 17.5% | 3.7% | 6.8% | 6.4% | 4.6% | 8.7% | **14.7%** |
| **FY36** | 11.5% | 13.3% | 7.4% | 8.0% | 8.2% | 4.7% | 6.7% | **10.6%** |
| **FY37** | 9.4% | 7.2% | 4.0% | 3.9% | 3.9% | 4.1% | 4.8% | **7.9%** |
| **FY38** | 4.2% | 4.7% | 3.8% | 4.4% | 4.3% | 3.6% | 4.2% | **4.3%** |
| **FY39** | 7.4% | 7.1% | 4.9% | 4.7% | 4.9% | 3.5% | 4.4% | **6.7%** |
| **FY40** | 2.3% | 3.4% | 3.5% | 4.0% | 4.0% | 4.9% | 4.7% | **2.9%** |
| **FY41** | 5.4% | 4.9% | 4.0% | 3.3% | 3.2% | 3.3% | 3.5% | **4.9%** |

Source: TIC estimate

# Surapattu TP (1): Traffic forecast (AADT)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Surapattu TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 14,081 | 3,579 | 2,791 | 265 | 1,332 | 1,007 | 3,778 | **26,833** | **46,659** |
| **FY27** | 16,058 | 4,036 | 2,922 | 273 | 1,376 | 1,015 | 3,883 | **29,564** | **49,943** |
| **FY28** | 18,235 | 4,608 | 3,066 | 281 | 1,432 | 1,031 | 4,053 | **32,705** | **53,908** |
| **FY29** | 20,723 | 5,207 | 2,725 | 289 | 1,214 | 875 | 3,454 | **34,487** | **52,696** |
| **FY30** | 23,225 | 5,804 | 2,332 | 297 | 994 | 722 | 2,841 | **36,215** | **51,349** |
| **FY31** | 26,167 | 6,457 | 2,430 | 308 | 1,008 | 727 | 2,974 | **40,070** | **55,780** |
| **FY32** | 29,277 | 7,171 | 2,529 | 316 | 1,033 | 732 | 3,063 | **44,122** | **60,269** |
| **FY33** | 32,558 | 7,959 | 2,632 | 324 | 1,064 | 737 | 3,141 | **48,415** | **64,975** |
| **FY34** | 35,827 | 8,743 | 2,729 | 332 | 1,092 | 741 | 3,211 | **52,674** | **69,606** |
| **FY35** | 39,566 | 9,687 | 2,838 | 340 | 1,105 | 746 | 3,354 | **57,636** | **75,177** |
| **FY36** | 43,387 | 10,654 | 2,943 | 352 | 1,135 | 751 | 3,443 | **62,665** | **80,663** |
| **FY37** | 47,502 | 11,698 | 3,051 | 360 | 1,149 | 755 | 3,544 | **68,059** | **86,516** |
| **FY38** | 51,464 | 12,707 | 3,148 | 367 | 1,161 | 759 | 3,634 | **73,242** | **92,111** |
| **FY39** | 55,840 | 13,890 | 3,257 | 375 | 1,191 | 764 | 3,775 | **79,091** | **98,591** |
| **FY40** | 60,522 | 15,164 | 3,368 | 383 | 1,209 | 768 | 3,868 | **85,282** | **1,05,224** |
| **FY41** | 65,741 | 16,500 | 3,478 | 395 | 1,222 | 772 | 3,971 | **92,080** | **1,12,496** |

Source: TIC estimate

# Surapattu TP (2): Traffic AADT growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Surapattu TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 14.0% | 12.8% | 4.7% | 2.9% | 3.3% | 0.8% | 2.8% | **10.2%** | **7.0%** |
| **FY28** | 13.6% | 14.2% | 4.9% | 2.9% | 4.0% | 1.6% | 4.4% | **10.6%** | **7.9%** |
| **FY29** | 13.6% | 13.0% | (11.1%) | 2.9% | (15.2%) | (15.1%) | (14.8%) | **5.4%** | **(2.2%)** |
| **FY30** | 12.1% | 11.5% | (14.4%) | 2.6% | (18.1%) | (17.5%) | (17.8%) | **5.0%** | **(2.6%)** |
| **FY31** | 12.7% | 11.2% | 4.2% | 3.9% | 1.4% | 0.7% | 4.7% | **10.6%** | **8.6%** |
| **FY32** | 11.9% | 11.1% | 4.1% | 2.6% | 2.5% | 0.7% | 3.0% | **10.1%** | **8.0%** |
| **FY33** | 11.2% | 11.0% | 4.1% | 2.5% | 2.9% | 0.7% | 2.6% | **9.7%** | **7.8%** |
| **FY34** | 10.0% | 9.8% | 3.7% | 2.3% | 2.6% | 0.6% | 2.2% | **8.8%** | **7.1%** |
| **FY35** | 10.4% | 10.8% | 4.0% | 2.5% | 1.3% | 0.7% | 4.5% | **9.4%** | **8.0%** |
| **FY36** | 9.7% | 10.0% | 3.7% | 3.5% | 2.7% | 0.6% | 2.7% | **8.7%** | **7.3%** |
| **FY37** | 9.5% | 9.8% | 3.6% | 2.3% | 1.2% | 0.6% | 2.9% | **8.6%** | **7.3%** |
| **FY38** | 8.3% | 8.6% | 3.2% | 2.0% | 1.1% | 0.5% | 2.6% | **7.6%** | **6.5%** |
| **FY39** | 8.5% | 9.3% | 3.5% | 2.1% | 2.5% | 0.6% | 3.9% | **8.0%** | **7.0%** |
| **FY40** | 8.4% | 9.2% | 3.4% | 2.1% | 1.5% | 0.6% | 2.5% | **7.8%** | **6.7%** |
| **FY41** | 8.6% | 8.8% | 3.3% | 3.1% | 1.0% | 0.5% | 2.7% | **8.0%** | **6.9%** |

Source: TIC estimate

# Surapattu TP (3): Revenue forecast (INR Crore)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Surapattu TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **108.9** |
| **FY28** | 38.2 | 10.9 | 11.6 | 1.2 | 11.3 | 8.7 | 52.8 | **134.7** |
| **FY29** | 44.2 | 12.5 | 10.6 | 1.3 | 9.9 | 7.7 | 46.9 | **133.1** |
| **FY30** | 52.4 | 14.6 | 9.5 | 1.4 | 8.4 | 6.6 | 39.9 | **132.8** |
| **FY31** | 59.6 | 16.6 | 10.2 | 1.5 | 8.9 | 6.8 | 43.4 | **146.9** |
| **FY32** | 70.5 | 19.3 | 11.1 | 1.6 | 9.5 | 7.2 | 46.6 | **165.7** |
| **FY33** | 82.1 | 22.4 | 11.8 | 1.7 | 10.1 | 7.5 | 49.5 | **185.1** |
| **FY34** | 91.2 | 25.1 | 12.7 | 1.8 | 10.7 | 7.9 | 52.3 | **201.7** |
| **FY35** | 105.5 | 29.0 | 13.9 | 1.9 | 11.3 | 8.2 | 56.8 | **226.6** |
| **FY36** | 121.4 | 33.2 | 15.0 | 2.1 | 12.1 | 8.6 | 60.6 | **253.0** |
| **FY37** | 139.3 | 38.5 | 16.0 | 2.2 | 12.7 | 8.9 | 64.9 | **282.6** |
| **FY38** | 157.2 | 43.3 | 17.3 | 2.4 | 13.3 | 9.3 | 68.9 | **311.8** |
| **FY39** | 171.9 | 48.1 | 18.5 | 2.5 | 14.1 | 9.8 | 74.5 | **339.3** |
| **FY40** | 195.5 | 55.2 | 19.8 | 2.6 | 14.9 | 10.2 | 79.1 | **377.4** |
| **FY41** | 219.9 | 62.1 | 21.2 | 2.8 | 15.6 | 10.6 | 84.1 | **416.3** |

Source: TIC estimate

# Surapattu TP (4): Revenue growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Surapattu TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 32.6% | 33.1% | 21.1% | 17.6% | 18.9% | 15.7% | 19.3% | **23.7%** |
| **FY29** | 15.7% | 14.8% | (8.5%) | 6.6% | (12.3%) | (11.6%) | (11.1%) | **(1.2%)** |
| **FY30** | 18.5% | 17.2% | (10.5%) | 6.4% | (15.1%) | (14.3%) | (15.0%) | **(0.3%)** |
| **FY31** | 13.8% | 13.6% | 7.3% | 7.6% | 5.0% | 3.9% | 8.7% | **10.7%** |
| **FY32** | 18.2% | 16.7% | 8.8% | 6.9% | 6.8% | 5.4% | 7.4% | **12.8%** |
| **FY33** | 16.5% | 15.7% | 6.7% | 6.4% | 6.9% | 3.9% | 6.2% | **11.7%** |
| **FY34** | 11.0% | 12.0% | 7.7% | 6.1% | 6.3% | 4.7% | 5.7% | **9.0%** |
| **FY35** | 15.8% | 15.5% | 9.5% | 6.2% | 4.8% | 4.6% | 8.5% | **12.3%** |
| **FY36** | 15.0% | 14.8% | 7.7% | 8.0% | 7.2% | 4.7% | 6.8% | **11.6%** |
| **FY37** | 14.8% | 15.7% | 7.0% | 6.0% | 5.0% | 3.8% | 7.1% | **11.7%** |
| **FY38** | 12.9% | 12.7% | 8.0% | 5.9% | 5.0% | 4.7% | 6.1% | **10.3%** |
| **FY39** | 9.3% | 11.0% | 6.8% | 5.3% | 5.6% | 4.4% | 8.1% | **8.8%** |
| **FY40** | 13.7% | 14.7% | 6.9% | 6.5% | 5.9% | 4.5% | 6.3% | **11.2%** |
| **FY41** | 12.4% | 12.5% | 7.3% | 7.0% | 4.9% | 3.8% | 6.2% | **10.3%** |

Source: TIC estimate

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# Chennai Tada section of NH16 in Tamil Nadu




**Traffic Due Diligence – Final Report**

**National Highways Authority of India**

January 2026

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# Control information

| | |
|---|---|
| **Contract Reference:**<br>Letter of Commencement - FINDIV-16014(11)/1/2024-O/o CGM (Finance-II)/e-265207/116 dated 7th August 2025 | **Identification & Traceability:**<br>TIC/401/TF/TDD/R1-Final Report |
| **Assignment Title:** Traffic Due Diligence – Chennai Tada section of NH16 in Tamil Nadu | |
| **Client** | **National Highways Authority of India**<br>Sector 10, Dwarka, New Delhi 110075 |
| **Consultant** | **Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited**<br>1103, I Square Corporate Park<br>Science City Road, Ahmedabad 380060 |

**Issue and Revision Records**

| Date | Revisions | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| 09.01.2026 | R1 | Darshan Doshi<br>Dhruv Panchal<br>Rutvik Dhameliya | Rinku Kanani<br>Karan Dave | Tejas Patel | Traffic Due Diligence – Final Report |

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**Appendices**

**Appendix A:** Vehicle category-wise visual representation of origin-destination zones

Vehicle category-wise top origin-destination pairs

**Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

# Abbreviations (1)

| | |
|---|---|
| **AADC** | Annual Average Daily Collection |
| **AADT** | Annual Average Daily Traffic |
| **ADB** | Asian Development Bank |
| **ADT** | Average Daily Traffic |
| **AL** | Axle Load |
| **AP** | Andhra Pradesh |
| **APC** | Annual Potential Collection |
| **BFSI** | Banking, Financial Services, and Insurance |
| **BOT** | Build-Operate-Transfer |
| **BPO** | Business Process Outsourcing |
| **CAGR** | Compound Annual Growth Rate |
| **CBIC** | Chennai – Bengaluru Industrial Corridor |
| **CFS** | Container Freight Station |
| **CJV** | Car/ Jeep/ Van |
| **CPI** | Consumer Price Index |
| **CPRR** | Chennai Peripheral Ring Road |
| **CTVC** | Classified Traffic Volume Count |
| **CUMTA** | Chennai Unified Metropolitan Transport Authority |
| **DBFOT** | Design, Build, Finance, Operate, and Transfer |
| **DPR** | Detailed Project Report |
| **DTA** | Domestic Tariff Area |
| **EPC** | Engineering, Procurement and Construction |
| **ETC** | Electronic Toll Collection |
| **EV** | Electric Vehicle |
| **FMCG** | Fast Moving Consumer Goods |

| | |
|---|---|
| **FY** | Financial Year |
| **GDP** | Gross Domestic Product |
| **GSDP** | Gross State Domestic Product |
| **GST** | Goods and Services Tax |
| **GVA** | Gross Value Added |
| **HAM** | Hybrid Annuity Mode |
| **HCV** | Heavy Commercial Vehicle |
| **HQ** | Headquarter |
| **IEA** | International Energy Agency |
| **IHMCL** | Highways Management Company Limited |
| **IMF** | International Monetary Fund |
| **INR** | Indian Rupee |
| **IRC** | Indian Road Congress |
| **ISRO** | Indian Space Research Organisation |
| **IT** | Information technology |
| **ITES** | Information Technology Enabled Services |
| **IWAI** | Inland Waterways Authority of India |
| **JV** | Joint Venture |
| **Km** | Kilometer |
| **LCV** | Light Commercial Vehicle |
| **LNG** | Liquefied Natural Gas |
| **LPG** | Liquefied Petroleum Gas |
| **MADT** | Monthly Average Daily Traffic |
| **MAV** | Multi Axle Vehicle |
| **MLFF** | Multi Lane Free Flow |

# Abbreviations (2)

| | |
|---|---|
| **MMBT** | Madhavaram Mofussil Bus Terminus |
| **MMLP** | Multimodal Logistics Park |
| **MMTPA** | Million Metric Tonnes Per Annum |
| **MoFHW** | Ministry of Health and Family Welfare |
| **MoRTH** | Ministry of Road Transport and Highways |
| **MoSPI** | Ministry of Statistics and Programme Implementation |
| **MRF** | Madras Rubber Factory |
| **MRO** | Maintenance, Repair, and Operations |
| **MSME** | Micro, Small, and Medium Enterprises |
| **MT** | Million Tonnes |
| **MTPA** | Million Tonnes Per Annum |
| **NE** | National Expressway |
| **NH** | National Highway |
| **NHAI** | National Highways Authority of India |
| **NHIT** | National Highways Infra Trust |
| **NMP** | National Monetisation Pipeline |
| **NW** | National Waterway |
| **OD** | Origin – Destination |
| **OECD** | Organisation for Economic Co-operation and Development |
| **OSV** | Oversized Vehicle |
| **PCI** | Per Capita Income |
| **PCU** | Passenger Car Unit |
| **PIA** | Project Influence Area |
| **PIU** | Project Implementation Unit |
| **PPP** | Public-Private Partnership |
| **PSU** | Public Sector Undertaking |
| **QADT** | Quarterly Average Daily Traffic |
| **RBI** | Reserve Bank of India |
| **RO** | Regional Office |
| **RoS** | Rest of State |
| **RTO** | Regional Transport Office |
| **SaaS** | Software as a Service |
| **SCF** | Seasonal Correction Factor |
| **SEZ** | Special Economic Zone |
| **SH** | State Highway |
| **SIAM** | Society of Indian Automobile Manufacturers |
| **SIPCOT** | State Industries Promotion Corporation of Tamil Nadu |
| **TAZ** | Traffic Analysis Zone |
| **TIC** | Translink Infrastructure Consultants Private Limited |
| **TMT** | Thermo-Mechanically Treated |
| **TN** | Tamil Nadu |
| **TNRDC** | Tamil Nadu Road Development Company Ltd |
| **TOT** | Toll, Operate, Transfer |
| **TP** | Toll Plaza |
| **UNESCO** | United Nations Educational, Scientific and Cultural Organization |
| **VCIC** | Vishakhapatnam – Chennai Industrial Corridor |
| **WADT** | Weekly Average Daily Traffic |
| **WPI** | Wholesale Price Index |
| **2A** | 2 Axle |
| **3A** | 3 Axle |

# Chapter 1: Introduction

- The assignment
- Objective and Scope of Work
- Approach and methodology
- Organisation of the report

This chapter outlines assignment background, scope of work, approach and methodology employed to ensure successful execution of the assignment.

Approach and methodology section highlights the structured approach which has been followed to gather data, conduct analysis, and make informed decisions throughout the project lifecycle. By employing a robust methodology, the consultant aims to ensure the accuracy, efficiency and reliability of the assignment’s outcomes.

# The assignment

**Ministry of Road Transport and Highways** (MoRTH) has entrusted **National Highways Authority of India** (hereinafter referred to as '**NHAI'** or '**client'**) for monetisation of public funded operational national highway projects under the framework of National Monetisation Pipeline (NMP).

In this context, NHAI has commissioned Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited (hereinafter referred to as '**TIC'** or '**consultant'**) to carry out traffic due diligence for following national highway section in Tamil Nadu (hereinafter referred to as '**project highway**').

**Project highway under asset monetization programme**

| National highway section | Toll plaza | Concerned NHAI field office |
|---|---|---|
| **Chennai Tada section of NH16** | Nallur (Tiruvallur district)<br>Durainallur (Tiruvallur district)* | Project Implementation Unit – Chennai 1<br>Regional Office – Chennai |

Source: Client

* existing toll plaza at Nallur will be shifted to Durainallur from 1st October 2027 (H2 FY2028)

This document is the final report incorporating traffic data updates received up to October 2025 and confirmation from the client dated 15th December 2025 for recommended scenario. The report presents our understanding of the project highway, trend analysis of traffic and revenue, primary data analysis and traffic and revenue forecast for a concession period of 15 years.

# Objective and Scope of Work

The principal objective of the study is to determine traffic and revenue forecast for 15 years. This assessment provides input to stakeholders to evaluate viable monetization options for the project highway.

The broad **scope of the work** of the assignment is as follows:

- Review of available historical traffic and revenue data and relevant document received from the client
- Carrying out traffic survey and analysis at the project highway :
  - 7 days continuous and direction-wise classified traffic volume count
  - 3 days origin-destination
  - 3 days axle load
  - Any other surveys on the project highway and alternate corridors as per the need
- Site visit and stakeholder consultation to understand traffic characteristics and network dynamics
- Review of observed growth trends of the project highway and corridor subject to availability of data
- Estimate vehicle category-wise traffic and revenue for the base year
- Determine future toll rates
- Assessing diversion due to competing transportation modes and routes, network development, future development plans in the region, etc.
- Vehicle category and ticket distribution-wise traffic and revenue forecast for concession period
- Scenario development: most likely, optimistic and pessimistic

# Approach

The consultant adopted comprehensive approach to address the need of this assignment with key five focus areas as summarised in below figure.

**Approach for the assignment**



| Expertise in motion | Forecasting forward flow | Economy drive highways | Data drives decisions; paves road to resilience | Trust in travel |
|---|---|---|---|---|
| Team with transportation engineering expertise and experience | Encapsulate all possible exogeneous impacts on traffic growth | Models integrating economic indicators for traffic growth projections | Using statistical techniques and tools for accurate insights and risk assessments | Maintain integrity, transparency, and ethical practices |

Source: TIC

# Methodology (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Project highway appreciation** | ▪ Assess the macro and micro road network, considering the overall road infrastructure and its specific sections<br>▪ Identify homogeneous/tollable sections with similar traffic patterns<br>▪ Evaluate any developments in the vicinity of the project highway that may impact economic growth and traffic volume<br>▪ Finalize survey locations and formats for data collection |
| **Secondary data collection** | ▪ Gather relevant past detailed project report / traffic study report and draft concession agreement as per availability<br>▪ Collect historical monthly traffic data for the toll plazas of the project highway and neighbouring toll plazas on the corridor, both upstream and downstream<br>▪ Source vehicle category/mapper class wise electronic toll collection (ETC) data as most reliable dataset from Indian Highways Management Company Limited (IHMCL) through the client for toll plazas under study and on the corridor and alternate corridors as well as across the country (subject to receipt from the client or as per availability in the public domain) for understanding of the various trends of economy as well as modal / vehicle technology shift<br>▪ Gather economic indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), per capita income, national, state and district Gross Domestic Product (GDP), employment rates and specific commodities related sales e.g., automobile, agriculture production etc.<br>▪ Gather demographic profiles and population data<br>▪ Collect secondary data related to alternative routes and modal shift developments if applicable |
| **Primary data collection** | ▪ 7-day continuous videography-based classified traffic volume count survey to gather independent traffic volume data<br>▪ 3-day origin-destination and commodity survey to understand travel patterns, trip purposes, influence region, growth drivers etc.<br>▪ 3-day axle load survey to determine the load characteristics of vehicles<br>▪ 1-day vehicle registration number plate survey to estimate ticket segmentation of local commercial vehicle without national permit if required<br>▪ Stakeholder consultation through interviews and focused group discussions |

Source: TIC

# Methodology (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Data analysis** | ▪ Review historical traffic and revenue data to understand growth trend, seasonality variation, elasticities for identified growth drivers through regression analysis subject to data availability and benchmark analysis of corridor<br>▪ Conduct data hygiene checks to identify errors, biases and inconsistencies in the collected data<br>▪ Analyse Weekly Average Daily Traffic (WADT) including peak hour, day and night traffic variances, as well as directional distribution of traffic for further input to various analysis<br>▪ Identify Traffic Analysis Zones (TAZ) and Primary Influence Areas (PIA)<br>▪ Determine vehicle category-wise origin-destination matrices, trip lengths and purposes<br>▪ Develop geographical distribution diagrams of traffic to visualize travel patterns<br>▪ Perform commodity and loading analysis<br>▪ Analyse historical journey tickets, including single, 24-hour return, daily multiple, monthly, local pass tickets and annual pass for passenger cars and understand the ground level situations for underlying patterns especially forced exemption if any in the case specific region and possibilities of reduction through proposed technological and administrative measures<br>▪ Estimate Annual Average Daily Traffic (QADT/AADT) for the base and future years as per case specific requirement<br>▪ Develop a traffic diversion model using IRC:SP:30 modality |
| **Forecasting** | ▪ Utilize an econometric model based on IRC: 108-2015 guidelines to analyse the relationship between vehicle traffic/PIA and socio-economic parameters such as Per Capita Income (PCI), Gross Domestic Product (GDP) of district/state/national, population, specific economic activities etc. as relevant with the identified growth drivers<br>▪ Calculate growth rates for each vehicle category. Adjust the growth rates based on induced traffic and traffic diversion effects, if applicable<br>▪ Perform traffic forecasting for 15 years period - normal traffic followed by generated and diverted traffic due to network and developmental impacts<br>▪ Conduct capacity analysis to assess the adequacy of the project highway<br>▪ Forecast annual toll revenue for 15 years based on traffic and toll rates projections |
| **Sensitivity and risk analysis** | ▪ Identify variables (macro-economic, growth drivers and relationships, scale and timeline of diversions, etc.) that significantly impact annual toll revenue and assess their sensitivity<br>▪ Develop scenarios for identified risks |

Source: TIC

# Organisation of the report

**Report structure**

| Sr. No. | Chapter | Particulars |
|---|---|---|
| 1 | **Introduction** | Scope of the assignment, approach and methodology |
| 2 | **Project highway profile** | Characteristics of the project highway like network understanding, socio-economic background of the region and proposed infrastructure developments in the influence region and network |
| 3 | **Traffic analysis** | Past performance of the project highway based on historical traffic and revenue data, traffic survey data analysis |
| 4 | **Economic context and traffic growth** | Economic context of influence region, determination of traffic growth drivers and associated travel demand elasticities |
| 5 | **Baseline traffic and revenue forecast** | Elaborates method adopted for determining base year AADT, toll ticket distribution and revenue reconciliation |
| 6 | **Diversion analysis** | Impacts on the project highway due to proposed infrastructure developments in the influence region and network, assessment of induced traffic demand |
| 7 | **Final traffic and revenue forecast** | Traffic and revenue forecasts including diversions, scenario cases: most likely with and without overloading, optimistic and pessimistic |

Source: TIC

# Chapter 2: Project highway profile

- Location and key details
- Economic activities in the region
- Understanding of network and traffic corridors
- Proposed road network and infrastructure development in the influence region

This chapter exhibits our understanding of the project highway and key details, economic activities in the region and strategic network context based on site visit and stakeholder consultation. It covers list of infrastructure project development in the region and network which would have impact on the performance of the project highway.

# Location of the project highway

**Project highway location in national and state context**




Source: TIC analysis (map not to scale)

- **Located at the southern end of the country's ~1,500 km east–coast corridor (NH16)**, this point serves as gateway to Chennai maritime and industrial clusters and observes traffic from states on eastern coast, northern and western part of the country. Chennai maritime cluster includes Chennai, Ennore (Kamarajar) and Kattupalli ports which contributes ~20% in container traffic of India, being second largest container traffic cluster western India.
- **Integral part of inter-state traffic** corridor connecting Tamil Nadu and Andhra Pradesh as neighbouring states. NH719B (old NH32/NH45) extends the connectivity to southern Tamil Nadu (Trichy, Madurai, Tuticorin).
- **~43 km section connecting Chennai maritime cluster and Gummidipoondi industrial area** as one of the key growth engine of the region and state being operational since 1980. This 43 km belt observed major logistics and warehousing hub.

# Project snapshot (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Key project details**

| Particulars | Chennai Tada section of NH16 |
|---|---|
| **Length** | **Present length:** 43.400 km<br>**Revised length:** 33.00 km for asset monetization proposal<br>Initial section of km 11.000 to km 21.400 (10.400 km length, highlighted separately in map on earlier page) is to be de-notified and handed over to the state government in near future considering 4 lane configuration and urbanization along the section. Hence, this 10.400 km length to be excluded for asset monetization proposal. |
| **Lane and pavement** | 6-lane divided carriageway, flexible pavement / rigid at toll plaza |
| **Chainage** | km 21.400 (NH16 interaction with Chennai Outer Ring Road) to km 54.400 (TN/AP Border) |
| **History** | ▪ Chennai Tada section was under 4 to 6 lane DBFOT (Toll) concession from April 2009 by Larson & Toubro Limited for 15 years but terminated in 2016 due to land acquisition issues.<br>▪ Later SPL Infrastructure Private Limited completed 4 to 6 lane work in February 2022 for 33 km of length i.e., km 21.400 (NH16 interaction with Chennai Outer Ring Road) to km 54.400 (TN/AP Border).<br>▪ Post BOT concession termination, section was managed under public funded modality with short term toll contract. |
| **Nos. of toll plaza and location** | 1 ETC enabled |
| **Toll plaza locations** | Nallur at km 21.625<br>**Nallur toll plaza will be shifted to Durainallur at km 34.180 from 1st October 2027** (H2 FY28) in context of development of Chennai Peripheral Ring Road |
| **District** | Physically located within Tiruvallur district – the northern most district of Tamil Nadu<br>Socio-economic activities and traffic patterns are significantly influenced by Tiruvallur district and secondary influenced from districts under Chennai Unified Metropolitan Transport Authority (CUMTA) i.e., Chennai, Chengalpattu, Kancheepuram, Ranipet. |
| **Tolling start date** | 3rd April 2009 |
| **Tolling length (km)** | 43.278 (after de-scoping 10.400 km) |
| **Overloading penalty** | No overloading penalty / fee is being levied at present based on understanding from site visit and PIU Chennai 1 |
| **Micro-diversions at present toll plaza location** | Local CJV/Mini LCV vehicles uses internal village road located nearby toll plaza location but limited to residents residing within nearby villages. No such micro leakage is observed at Durainallur location. |

Source: NHAI

# Project snapshot (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Key project details**

| Particulars | Chennai Tada section of NH16 |
|---|---|
| **Toll plaza locations** | **Nallur TP** |
| **ETC Traffic (FY26 till October 2025)** | 7 months ADT: 32,471<br>PCU corresponding 7 months ADT: 65,764 |
| **ETC Traffic composition (FY26 till October 2025)** | 55% CJV/Mini LCV 19% 2A/LCV<br>3% Bus 23% 3A/MAV |
| **ETC Revenue** | FY25: INR 163 Crore FY26 till Oct'25: INR 106 Crore |
| **ETC Revenue composition (FY26 till October 2025)** | 22% CJV/Mini LCV 20% 2A/LCV<br>4% Bus 54% 3A/MAV |
| **Present toll operator with Annual Potential Collection (APC) and quoted remittance** | **M/s. Vinod Kumar Jain**<br>**Duration** : May 2025 to April 2026 (1 Year)<br>**Annual Potential Collection** : INR 166.24 Crore<br>**Quoted remittance** : INR 163.83 Crore (FY25 tolling rates)<br>Revised to INR 169.10 on 1st April 2025 with FY26 tolling rates |
| **Previous tolling operator** | **Skylark Infer Engineering Private Limited**<br>**Duration** : Feb 2024 to Jan 2025 (1 Year); extended to May 2025<br>**Annual Potential Collection** : INR 149.79 Crore<br>**Quoted remittance** : INR 159.13 Crore |

Source: NHAI

# Project snapshot (3)

**Base Year FY26 traffic composition for Nallur TP and Durainallur TP**



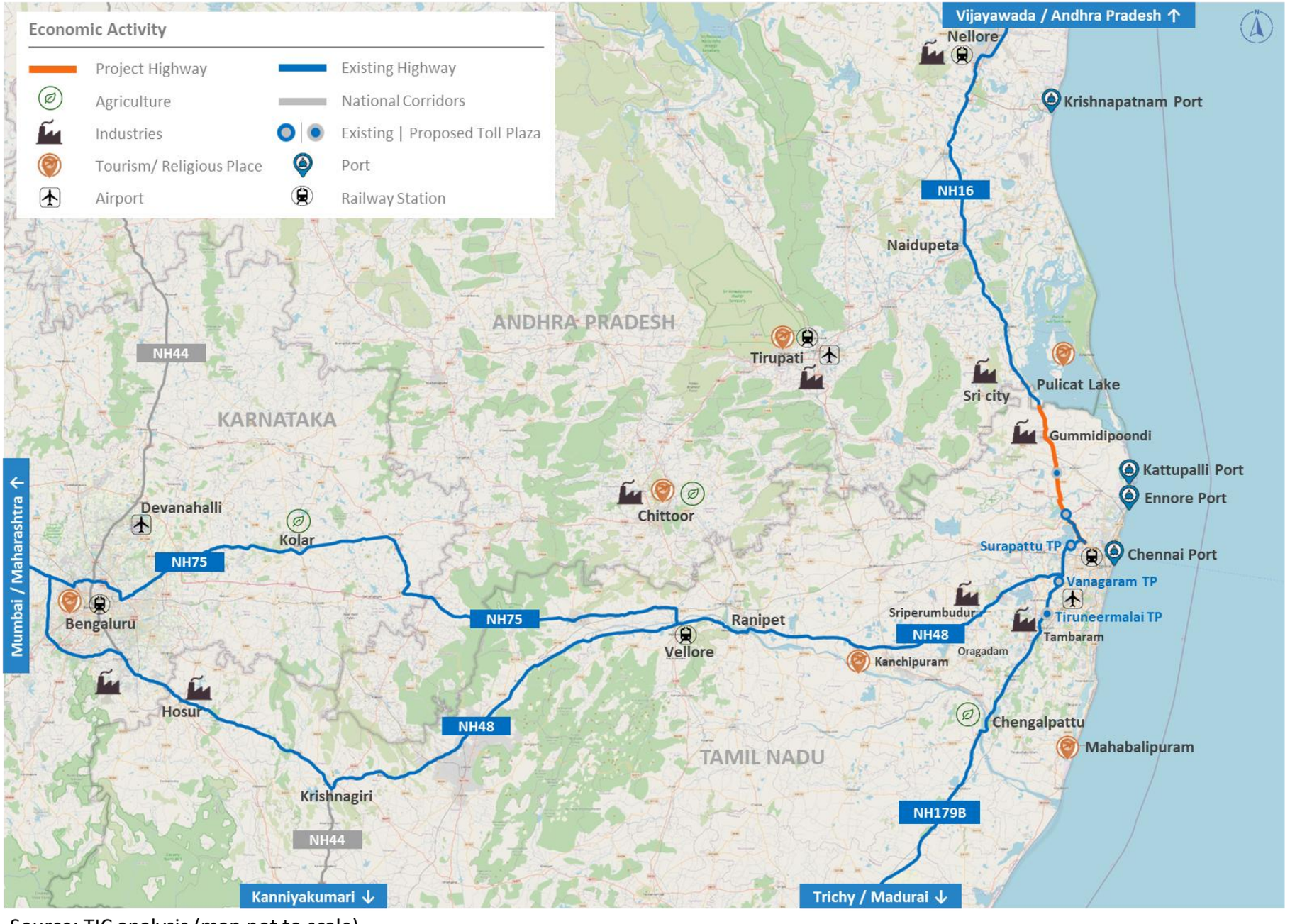

Source: TIC analysis (map not to scale)

Major variance in CJV category between Nallur and Durainallur locations is due to proximity to Chennai.

# Economic activities in influence region (1)

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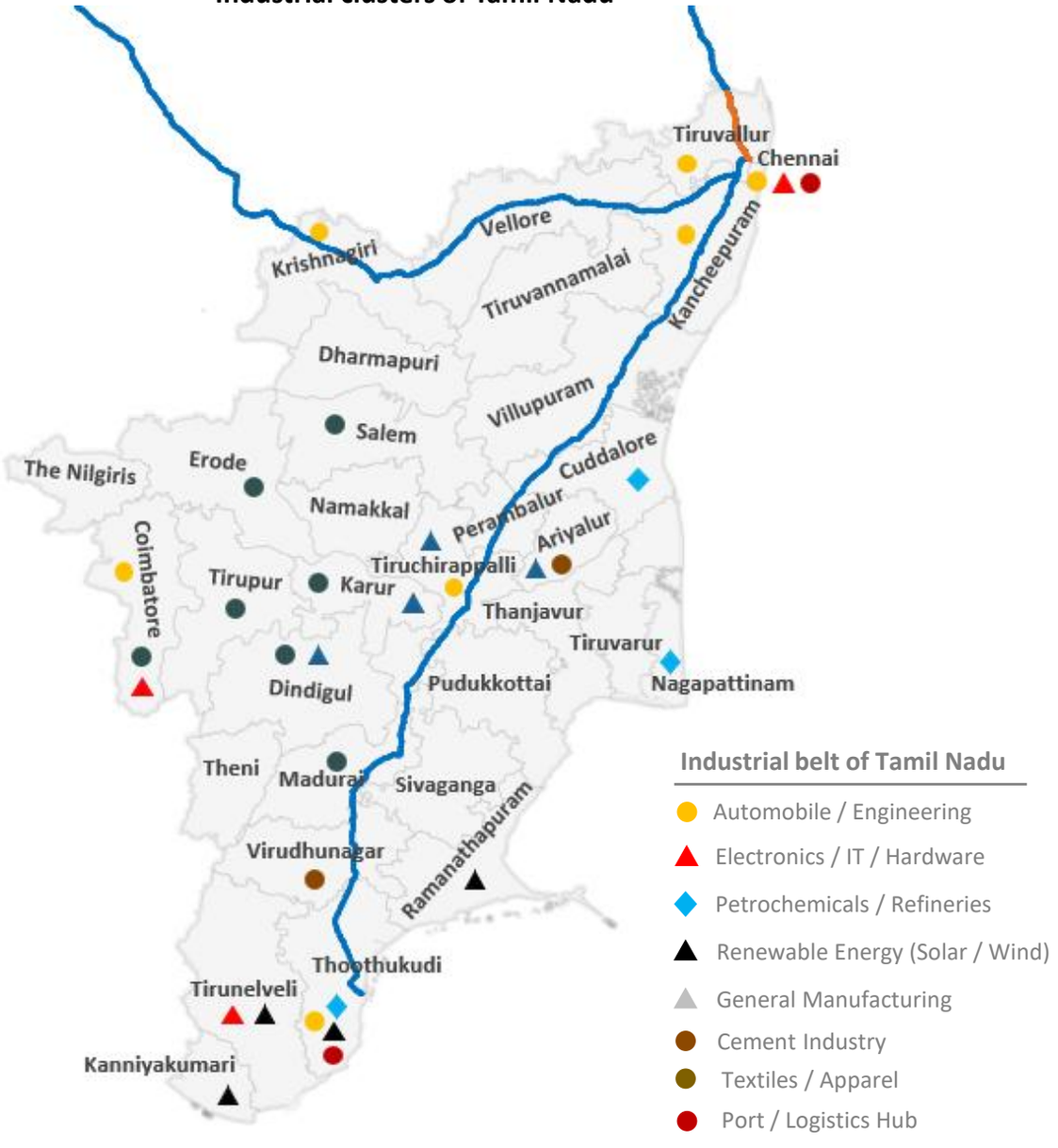
**Economic activities in influence region**




Source: TIC analysis (map not to scale)

# Economic activities in influence region (2)

**Industrial clusters of Tamil Nadu**




Source: TIC analysis (map not to scale); illustrative reference

- Tamil Nadu is one of India's most industrialized state with a diversified economy driven by manufacturing, services and agriculture.
- The state's strategic coastal location along the bay of Bengal supports strong maritime trade through Chennai, Ennore, Kattupalli and Thoothukudi ports.
- Gummidipoondi industrial area, established on northern end of the project highway in 1980s, is home to one of Tamil Nadu's oldest SIPCOT industrial complexes.
- It has been a major center for steel manufacturing and power generation. Strategically located along NH-16, it offers excellent connectivity to Chennai, ports, and major markets, making it ideal for industrial growth.
- Along with Thervoy Kandigai SIPCOT and Manellore SIPCOT, Gummidipoondi is set to form a key industrial corridor in north Chennai, driving economic growth, employment and infrastructure development.
- Major cluster-wise industrial capabilities are:
  - **Chennai:** Automotive, Precision Manufacturing, Electronics, Warehousing
  - **Hosur:** Automobiles and MRO
  - **Salem:** Technical Textiles, Polymers, General Engineering
  - **Tiruchirappalli:** Fabrication, general Engineering
  - **Coimbatore:** General Engineering, Space Technology and Precision Manufacturing

# Economic activities in influence region (3)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

1 **Industries in and around Chennai**

- **North Chennai cluster**
  - **Gummidipoondi industrial area:** industry and warehousing zone
  - **Manali:** home to chemical, general engineering, logistics and manufacturing units
  - **Ennore:** key port-related industries, auto (Ashok Leyland, MRF), Oil PSU – bottling/distribution terminals
  - **Redhills:** features Horizon Industrial Parks with plug-and-play facilities
  - **Outside Tamil Nadu:** Sri City – integrated multi-sector SEZ and DTA zones with residential and social facilities (part of Andhra Pradesh but situated on border of TN/AP). It has presence of manufacturing facilities of companies such as Pepsi, Mondelez, Panasonic, Foxconn etc.
- **South West cluster (Automotive and Electronic):**
  - **Sriperumbudur:** SIPCOT Industrial Park, includes areas like Pillaipakkam, Sunguvarchatram, and Araneri
  - **Oragadam:** huge auto hub with global names (BMW, Nissan), logistics, and energy sectors
  - **Irungattukottai:** significant cluster with modern infrastructure
- **West cluster: Ambattur** and **Puzhal** host engineering and small-scale industries
- **South cluster**
  - **Madras Export Processing Zone:** SEZ in Tambaram with presence of IT, ITES, electronics, logistics and manufacturing (leather and footwear, agro, pharma, plastics, textiles)
  - **Maraimalai Nagar:** home to automotive, pharmaceutical and chemicals
  - **Mahindra World City:** India's first integrated business and residential township having IT/ITeS, manufacturing (auto ancillaries, Electronics), and logistics, with major firms like BMW, Infosys, Pegatron, BASF, and TVS Group operating within its multi-sector SEZ and DTA zones
  - **Ariyalur Cement Manufacturing cluster** (near Trichy) supplies cement to Chennai and nearby region.
- **Sriperumbudur - Maduravoyal** stretch serves as a logistics and warehousing corridor, with multiple CFSs and distribution hubs supporting port-based trade.
- **Porur and Chennai Metropolitan Region periphery,** Rapidly growing commercial and service sectors, with rising movement of goods, construction materials, and workforce through the bypass.
- Chennai Bypass acts as a key industrial and logistics connector, integrating manufacturing, warehousing, and port operations within the Chennai Metropolitan Region.

Source: TIC secondary research

# Economic activities in influence region (4)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

2

**Chennai Maritime Cluster**

- **Chennai Maritime Cluster** comprises three ports i.e., **Chennai, Ennore (Kamarajar) and Kattupalli**. Chennai maritime cluster is preferred choice for Far East origin/destinations for hinterland identified.
- **Hinterland served by Chennai Tada section of NH16:** Gummidipoondi industrial cluster including Thervoy Kandigai and Manellore SIPCOT Parks, Andhra Pradesh, Telangana
- **Major commodities handled:**
  - **Chennai Port:** mainly import cargo which includes **Container Cargo (~63%)**, Petroleum, Oil, Lubricants and LPG/LNG (~25%), Dry and Break Bulk Cargo (~10%)
  - **Ennore Port:** both export-import cargo which includes **Container Cargo (~25%)**, Petroleum, Oil, Lubricants and LPG/LNG (~12%), **Coal (~50% Thermal, Steam, Coking)**, Dry and Break Bulk Cargo (~10%)
  - **Kattupalli Port:** Container Cargo, Soda Ash (major contribution), Black Oil Products (including Bitumen)
- Gradual container cargo traffic from Krishnapatnam port was observed shifting to Chennai port cluster during 2021 to 2023 because of closure of container operations at Krishnapatnam port.
- **Capacity utilisation:** Chennai (36%) and Ennore (57%) in FY25 with designed capacity of 136 MMTPA and 97 MMTPA respectively.
- Port traffic especially container cargo is heavily dependent on road logistics.
- **Container cargo and petroleum products are major items observed at the project highway** as regular movement between hinterland and maritime cluster which is highly volatile in monthly trend.
- Area nearby port cluster (Manali, Ennore Port Road, Redhill) is hub of logistics facilities like Container Freight Stations, warehousing/container yards, truck terminals, lodging/boarding for truckers.
- Chennai Multimodal Logistics Park (MMLP) is under construction at Mappedu (accessible through NH48 and at west of Chennai). Phase 1 commercial operations is expected by start of FY27. This will improve freight efficiency, reduce last-mile delivery challenges, link ports (Chennai, Ennore, Kattupalli) with industries and boost economic growth.
- Well established container ecosystem of this cluster and planned capacity expansion of container berths will ensure the associated traffic from hinterland on the project highway.

Source: TIC secondary research

# Economic activities in influence region (5)

**3 Agriculture and allied activities**

- **Paddy (rice)** is the primary crop grown in Tiruvallur, Kanchipuram and Chengalpattu districts, supported by irrigation from Poondi and Chembarambakkam reservoirs, while groundnut, sugarcane, millets and pulses are major secondary crops contributing to local agri-based processing.
- **Horticulture** and **floriculture** including banana, tomato, brinjal, mango and jasmine are commercially cultivated, supplying fresh produce to Koyambedu Market and surrounding urban centers.
- Allied activities such as dairy, poultry, and inland aquaculture are prominent near Red Hills and Minjur, driven by high urban demand and proximity to the Chennai Metropolitan Region.
- **Koyambedu Wholesale Market Complex**, located along the Chennai Bypass, spans about 295 acres and houses over 3,000 shops. It is one of the largest hubs for perishable goods in India, handling thousands of tonnes of fruits, vegetables, and flowers every day. The market supplies produce to the entire region and attracts heavy volume of business travelers and vehicles daily. It draws traffic from all directions, including southern Tamil Nadu, areas north of Chennai/Andhra Pradesh, and as far as Kolar and western Karnataka for fruits and vegetables.
- Nelloer is known as 'Shrimp capital of India' with aquaculture influence in the region.

**4 Tourism**

- **Chennai** offers a mix of coastline, history, spirituality, and wildlife experiences for visitors which attracts a large volume of domestic and international tourists e.g., historic Fort St. George, cultural hubs like Kalakshetra, Kapaleeshwarar Temple, spiritual sites - Santhome Basilica and unique Madras Crocodile Bank.
- **Sri Venkateshwara Swami Vaari Temple at Tirupati** (richest temple in the world) attracts thousands of devotees from across India. IN addition to the same, Mypadu beach, Pulikat lake, ISRO center etc. are locate on the north of Chennai.
- **Kanchipuram**, known as the City of Thousand Temples, is a key spiritual and heritage destination, also famous for its traditional silk weaving.
- **Mahabalipuram**, a UNESCO World Heritage Site, promotes heritage and coastal tourism, collectively enhancing the region's religious, cultural, and leisure tourism along the Chennai Bypass corridor.

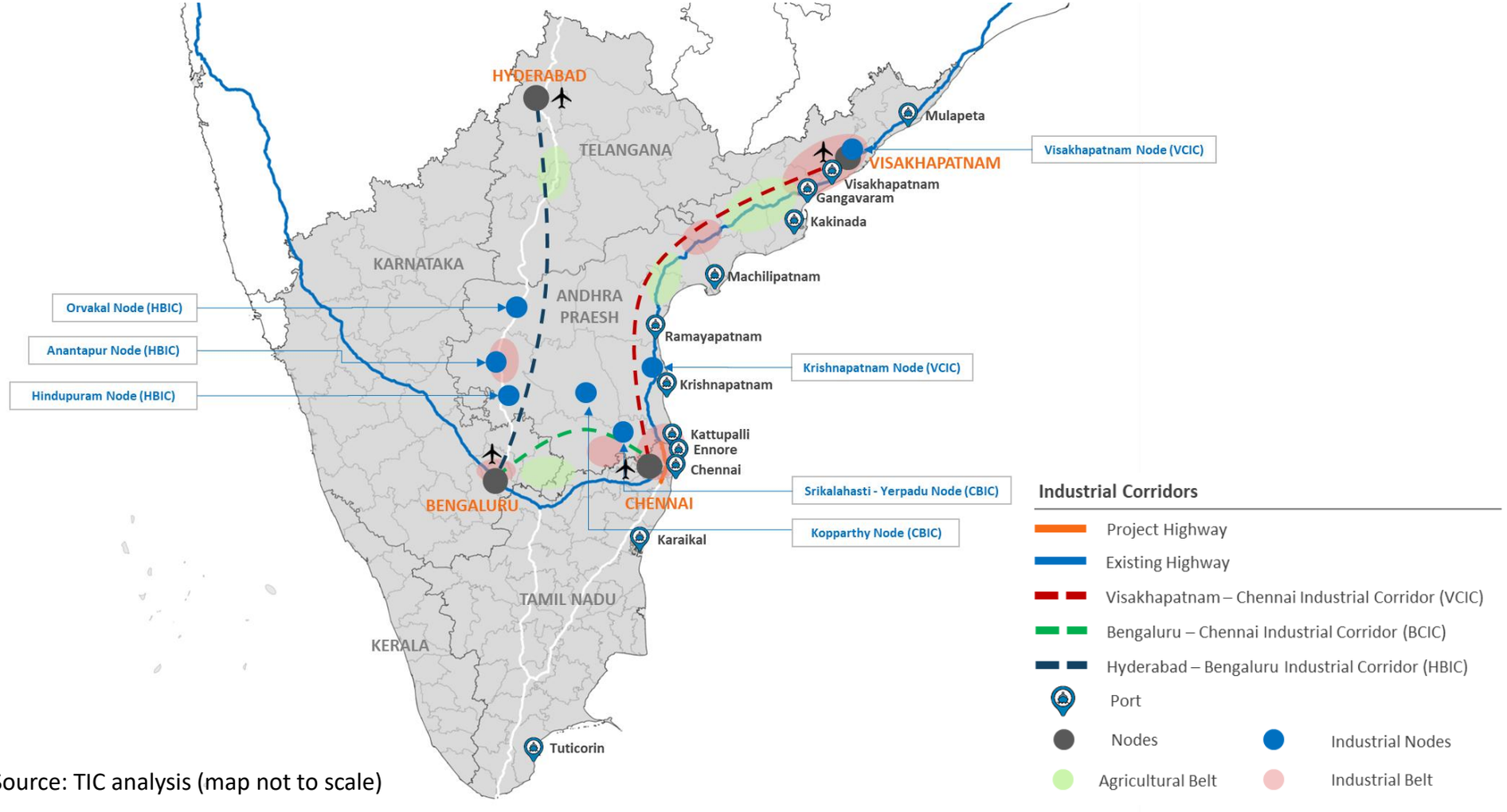
**5 Social / Educational**

- Towns/villages adjoining to the project highway are dependent on Chennai for their business and social needs. Madhavaram Mofussil Bus Terminus (MMBT) near end point facilitates regular bus services which ureses the project highway.

Source: TIC secondary research

# Economic activities in influence region (6)

**Industrial corridors under development**




Source: TIC analysis (map not to scale)

- **Chennai – Bengaluru Industrial Corridor (CBIC)** and **Vishakhapatnam – Chennai Industrial Corridor (VCIC)** proposes high impact / market driven nodes at **Ponneri in Tamil Nadu (NH16), Krishnapatnam/Nellore in Andhra Pradesh (NH16) and Tumkur in Karnataka (NH48).**
- Industrial hubs and logistics with improved road/rail links, connecting Andhra Pradesh and Chennai through strategic locations like Nelloer/Krishnapatnam - leveraging proximity to Chennai Maritime Cluster for East Asia trade.

# Our understanding of traffic corridor and road network (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**National corridor (long-distance traffic)**

- Forms the southern terminal stretch of NH16 under the Golden Quadrilateral, providing east coast connectivity between Chennai, Andhra Pradesh, Odisha and West Bengal and further towards eastern and north-eastern India.
- Carries substantial long-haul passenger and freight traffic, linking Chennai with major cities such as Nellore, Ongole, Vijayawada, Rajahmundry, Visakhapatnam (Andhra Pradesh), Bhubaneswar, Puri, Balasore (Odisha) and Kharagpur, Kolkata/Dankuni (West Bengal).
- Handles significant port-oriented freight including containers, automobiles, petroleum products, coal and bulk cargo from the Chennai Port Cluster (Chennai, Kamarajar/Ennore and Kattupalli ports).
- The project highway acts as a key link in the Chennai–Kolkata and Chennai–Delhi freight corridors, supporting national-level trade and logistics.

**Regional linkages (medium-distance traffic)**

- Connects Chennai metropolitan region with Tirupati, Chittoor, Nellore, Kadapa, Anantapur, and Kurnool and other urban and industrial centres of southern Andhra Pradesh.
- Supports medium-distance movement of industrial goods, cement, construction materials, petroleum distribution and power-plant inputs serving the north Chennai–Manali–Ennore industrial belt and Nellore region.
- Facilitates regional access to Tirupati, Nellore and interior Andhra Pradesh through well-developed NH and SH linkages.

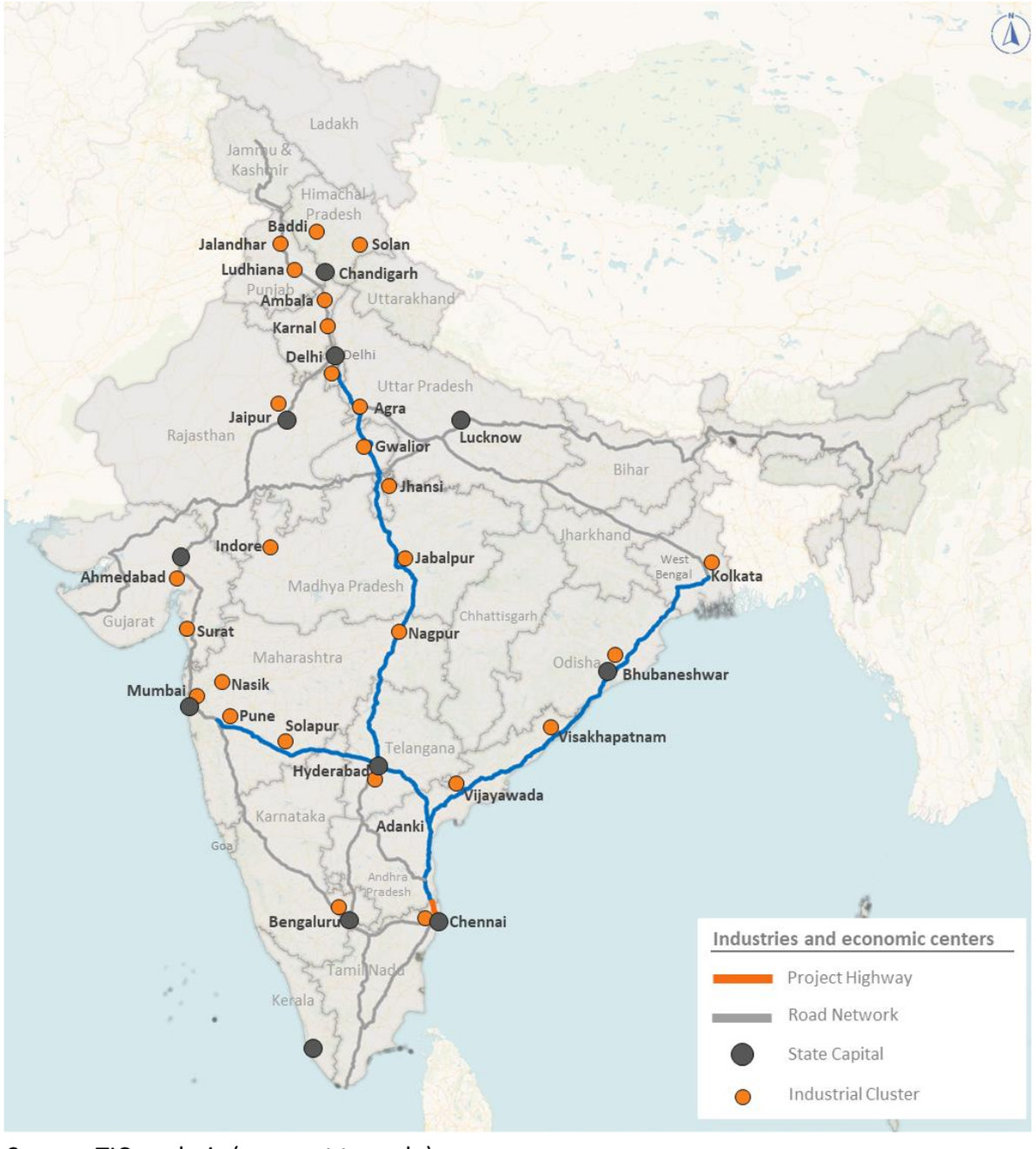
**Local connectivity (short-distance traffic)**

- Accommodates daily commuter and local commercial traffic between north Chennai suburbs, industrial areas like Gummidipoondi and nearby towns such as Tada and Sullurpeta.
- Supports frequent movement of industrial workforce, port-related services and local logistics vehicles.
- Plays a vital role in transporting perishable goods, construction materials and service traffic, supporting urban expansion and industrial activities along the northern fringe of Chennai.

Refer map on next page for traffic corridors for the project highway and their contribution.

# Our understanding of traffic corridor and road network (2)

**Traffic corridors and their contribution**




Source: TIC analysis (map not to scale)

- **Adanki** acts as merging point for traffic from east-coast locations, northern and western India.
- ~65% traffic is from Tamil Nadu which includes ~50% is being generated from Gummidipoondi industrial and warehousing belt.
- Andhra Pradesh contributes ~20% traffic for the project highway.
- ~4% traffic is observed from Telangana and Kolkata each as regular trade relationship with Chennai.
- Balance ~7% is from northern and western India.
- Western India traffic is divided among three routes i.e., via NH48 Pune-Bengaluru, via NH65/SH3 Pune-Solapur-Hyderabad-Adanki and via NH65/NH716 via Pune-Solapur-Hyderabad-Kurnool-Tirupati. NH48 and NH16 routes have about equal contribution for Chennai bound traffic.

**The noteworthy point is that ~85% traffic is of captive nature for the project highway which has sustainable longevity.**

# Corridor traffic summary (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Kolkata Chennai corridor of NH16 and NH719B (old NH32/NH45)**

| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Dhankuni – Kharagpur** | BOT (Toll) – Maple Highways | 80,000 |
| **Kharagpur – Baleshwar** | BOT (Toll) – IL&FS | 18,000 |
| **Baleshwar – Bhadrak** | Toll - Public Funded | 32,000 |
| **Bhadrak – Chandikhole** | Toll - Public Funded | 35,000 |
| **Chandikhol – Bhubaneshwar** | BOT (Toll) – Maple Highways | 45,000 |
| **Bhubaneshwar – Sunakhala** | Toll - Public Funded | 25,000 |
| **Sunakhala – Puintola** | Toll - Public Funded | 25,000 |
| **Puintola – Icchapuram** | TOT (Toll) – Safeway Concession/Macquire | 21,000 |
| **Icchapuram – Nandigaon** | TOT (Toll) – Safeway Concession/Macquire | 20,000 |
| **Nandigama – Srikakulam** | NHIT (Private InvIT Bundle 4) | 28,000 |
| **Champavati/ Kopperla – Visakhapatnam** | NHIT (Private InvIT Bundle 4) | 32,000 |
| **Anakapall – Anandapuram** | NHIT (Private InvIT Bundle 4) | 25,000 |
| **Anandapuram – Tuni** | Toll - Public Funded | 44,000 |
| **Ankapalli – Tuni** | Public Funded | 44,000 |
| **Tuni – Diwancheruvu** | Public Funded | 40,000 |

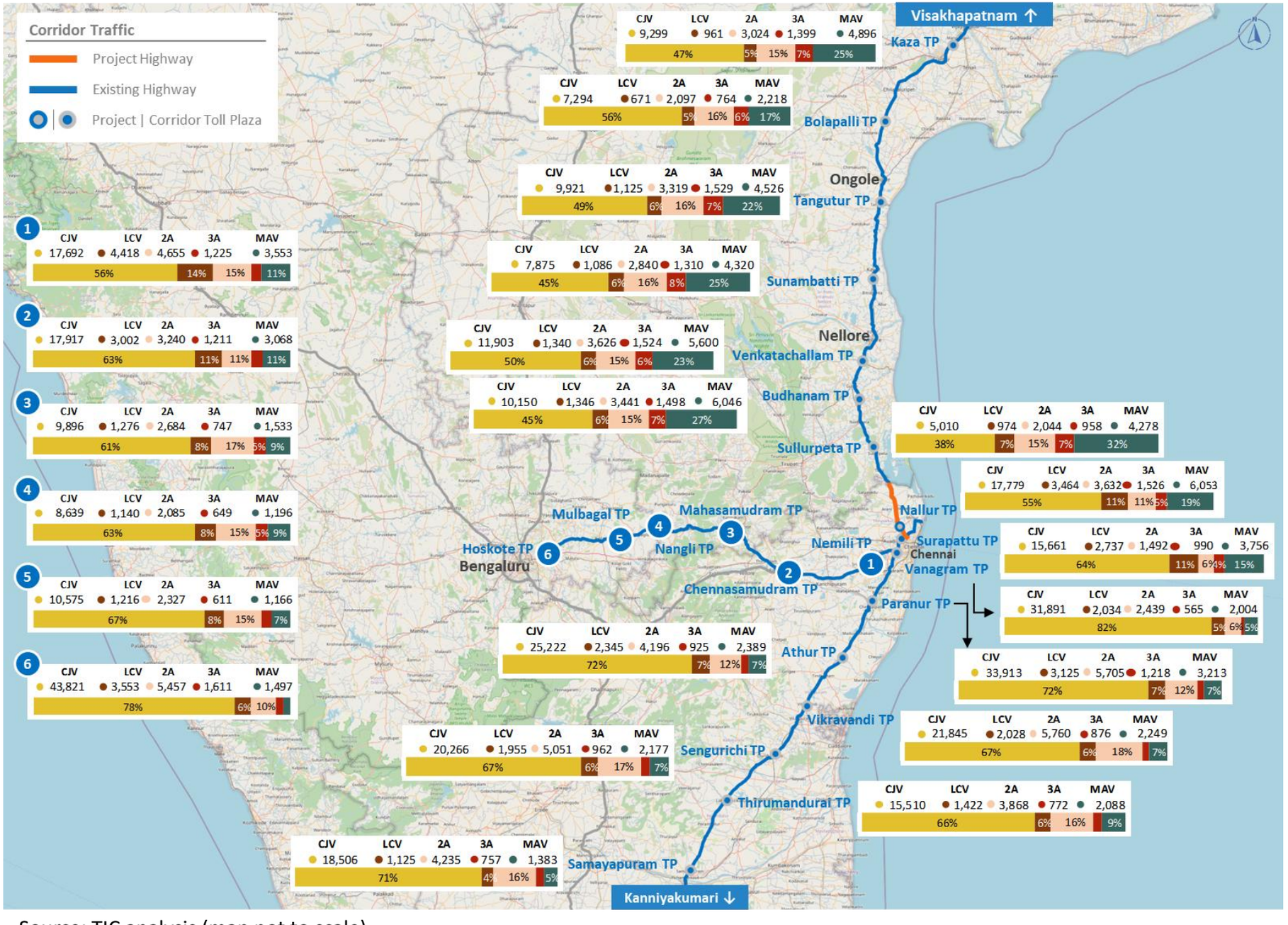
| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Gundugolanu – Devarapalli – Kovvuru** | NHIT (Private InvIT 4) | 33,000 |
| **Gundugolanu – Vijayawada** | Public Funded – Under Monetization (Pvt InvIT 5) | 50,000 |
| **Vijayawada – Chilakaluripet** | Toll - Public Funded | 60,000 |
| **Chilkaluripet – Nellore** | BOT (Toll) – Interise (CPPIB) | 30,000 / 50,000 / 45,000 |
| **Nellore – Tada** | BOT (Toll) – Vertis (KKR) | 52,000 / 33,000 |
| **Tada – Chennai** | Toll - Public Funded | 62,000 |
| **Chennai Bypass** | Toll - Public Funded | 45,000 / 52,000 |
| **Tambaram – Tindivanam** | Public Funded | 77,000 / 55,000 |
| **Tindivanam – Ulundurpet** | BOT (Toll) – Vertis (KKR) | 53,000 |
| **Ulundurpet – Padalur** | BOT (Toll) – Abertis India | 50,000 |
| **Padalur – Trichy** | BOT (Toll) – Uniquest Infra Ventures | 40,000 |
| **Trichy – Madurai** | Public Funded | 24,000 |
| **Madurai – Thoothukudi** | Public Funded – TOT 19 (Under Bidding) | 25,000 |

Source: TIC analysis

# Corridor traffic summary (2)

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**Traffic composition on the corridor: 7 months ADT of FY26 till October 2025**




Source: TIC analysis (map not to scale)

# Site photographs

**Nallur Toll Plaza (km 21.625)**




**Modern Integrated Check Post**




**Cross section**




**Start Point**




**End Point**




**Industrial Belt**




Source: TIC site visit

# Proposed infrastructure development in the region (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Network and infrastructure development in the influence region (refer map on Pg 33)**

| Particulars of the development | Authority / Mode of Development / Developer | Description / status / expected completion | Possible impact |
|---|---|---|---|
| **Chennai Peripheral Ring Road (CPRR) (6 lane + PS with Service Road )** | Tamil Nadu Road Development Corporation / EPC<br>5 Sections with multiple packages and developers | **Section 1:**<br>Northern port access road (Ennore Port to Thatchur on NH16 (25.40 Km)<br>Under construction; expected completion in FY28<br>**Section 2:**<br>Thatchur on NH16 to start of Thiruvallur Bypass (26.10 Km)<br>**Section 3:**<br>Start of Thiruvallur Bypass to Sriperumbudur on NH48 (30.10 Km)<br>Only Package 3: Start of Thiruvallur Bypass to Vengathur (10.40 Km)<br>Under construction<br>**Section 4:**<br>Sriperumbudur NH48 to Singaperumalkoli on NH38/NH719B (23.80 Km)<br>**Section 5:**<br>Singaperumalkoli on NH38/NH719B to Mamallapuram (28.24 Km)<br>Under bidding process | **Nil**<br>CPRR Section 1 will provide last mile connectivity to Chennai Port Cluster.<br>Nallur toll plaza will be shifted at Durainallur (outside boundary of CPRR) |
| **Bengaluru Chennai Expressway (4 lane)** | NHAI / HAM<br>Multiple phases/packages and developers | **Phase 1 of NE7 (Karnataka):** operational<br>**Phase 2 of NE7 (Andhra Pradesh):** Total 3 packages; under construction and expected to be operational by mid FY28<br>**Phase 3 of NE7 (Tamil Nadu):** Total 3 packages; under construction and expected to be operational by mid FY28<br>**Chittoor Thatchur section of NH716B:** Total 4 packages; under construction and expected to be operational by end of FY28 | |
| **Chittoor Thatchoor section NH716B (6 lane)** | NHAI / HAM<br>Multiple packages and developers | Total 4 packages; under construction and expected to be operational by end of FY28 | |

Source: TIC research and analysis

# Proposed infrastructure development in the region (2)

**Network and infrastructure development in the influence region (refer map on Pg 33)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Chennai Port Maduravoyal elevated corridor (Double tier 4-lane elevated corridor)** | NHAI / 4 EPC Packages<br>J. Kumar Infra Projects Limited in JV with Azvirt LLC | Under construction<br>Expected completion in FY29<br>▪ NHAI is developing elevated corridor exclusively for Chennai Port (Maduravoyal to Chennai Port Gate No. 10) strengthen external evacuation infrastructure.<br>▪ Double tier 4-lane elevated corridor along the Coum River as part of NH48 and will land inside premise of Chennai Port.<br>▪ Further, Chennai Port is implementing strengthening program of internal roads for ease on movement between Gate No. 1 to 10 followed by internal elevated corridor as long-term solution to ease out internal congestion.<br>▪ This development will provide ease to port-bound traffic, improve freight access, and reduce congestion. | **Nil**<br>Traffic needs to cross the plaza to use the proposed direct connectivity to Chennai Port. |
| **Surat Nashik Chennai Expressway** | NHAI / HAM<br>Multiple packages and developers | ▪ Key greenfield sections includes:<br>– Surat – Nashik – Ahmednagar stretch in Gujarat and Maharashtra<br>– Ahmednagar – Solapur – Akkalkot – MH/KA Border section<br>– MH/KA Border – Mahabubnagar section<br>– The remaining sections will involve upgrading existing two-lane roads into four-lane.<br>▪ Recently, MoRTH cancelled Surat – Nashik section of proposed development due to persistent challenges in securing environmental clearances. To address the intended connectivity objective, Maharashtra State Road Development Corporation (MSRDC) will develop greenfield expressway connecting Bharvir Khurd on Smruddhi Marg to Tawa village on NH48.<br>▪ Reference discussion with the client (field offices across corridor), the entire corridor is expected to be developed by FY31. | **Negative**<br>Traffic movement between Solapur/west and Chennai/south<br>Traffic movement between Hyderabad/north and Chennai/south |

Source: TIC research and analysis

# Proposed infrastructure development in the region (3)

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**Network and infrastructure development in the influence region (refer map on Pg 33)**

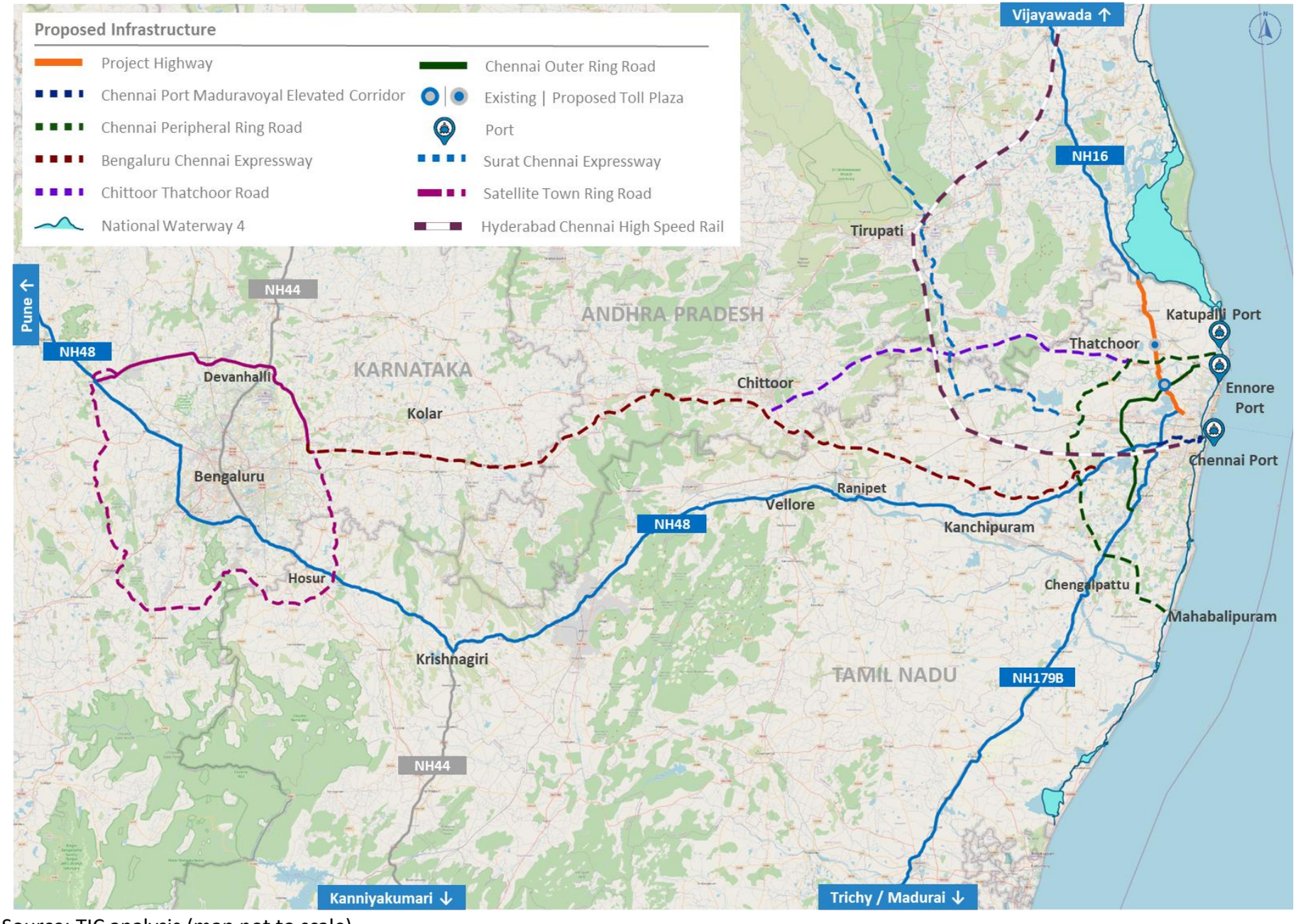
| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Chennai Hyderabad high-speed rail** | National High Speed Rail Corporation Limited in support with concerned state governments | South Central Railway submitted final alignment to be included in the detailed project report (DPR) to State Government of Tamil Nadu and requested approvals in November 2025 to keep the survey work on track. Expected to be operational in FY38 | **Negative**<br><br>Traffic movement from/ to Hyderabad, Vijayawada and Chennai |
| **Bengaluru Vijayawada Expressway** | NHAI / HAM Multiple packages and developers | **Brownfield section:**<br>NH44 Bengaluru to Kodikonda (73 km) &<br>NH16 Addanki to Vijayawada (113 km)<br><br>**Greenfield section:**<br>Kodikonda to Addanki (343 km)<br>Likely expected to be completion in FY28 | **Nil**<br><br>Traffic diverted long-back to Bengaluru – Kolar – Chittor – Tirupati – Naidupeta (on NH16) route |
| **National Waterway 4 (NW4)** | Inland Waterway Authority of India (IWAI) | Kakinada to Puducherry through canal which is integrated with Bhadrachalam Rajahmundry section of Godavari River and Wazira Vijayawada section of Krishna River<br><br>Additional reaches:<br>Godavari River: Bhadrachalam to Nashik<br>Krishna River: Wazirabad to Galagali<br><br>Canal system to be strengthened in next 5 – 6 years to extend the reach up to Tamil Nadu | **Negative**<br><br>Port connectivity parallel to NH16 and intermediate locations |
| **Ramayapatnam Port** | Andhra Pradesh Maritime Board through Ramayapatnam Port Development Corporation Limited | About 65% work of Phase-1 completed as of June 2025 including 4 km of dredging. Expected to be operational by end of FY27.<br><br>Target traffic: exports of agricultural goods, granite and seafood and imports of coal and fertilizers. | **Minor negative**<br><br>The same has been considered for forecast of Chennai Port Cluster as growth driver for freight traffic. |

Source: TIC research and analysis

# Proposed infrastructure development in the region (4)

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**Network and infrastructure development in the influence region**




Source: TIC analysis (map not to scale)

# Chapter 3: Traffic analysis

- Historical data sources
- Historical traffic and revenue trends
- Seasonality variation
- Historical ticket distribution
- Commodity analysis
- Zonal influence and trip distance

This chapter covers various datasets received from NHAI followed by assessment of historical performance of the project highway. This analysis helps to understand baseline traffic patterns comprising traffic and revenue growth rates, seasonality variations, trip factors, ticket distribution and overloading characteristics.

Survey analysis helps to validate traffic volume, commodity movement pattern, network understanding received from site visit, inputs for ticket distribution, overloading pattern based on independent survey exercise.

# Historical datasets

- The project highway is currently being operated under the public-funded mode where toll is collected by third party tolling agencies through short-term contracts. Third party tolling agencies submit traffic and revenue report on monthly basis which is titled as Schedule V.
- The consultant observes that availability and accuracy of these reports are many times under question due to inadequate quality of technology interventions and record keeping during short term contracts by tolling agencies.
- Hence, availability followed by reliability of these datasets is essential to be addressed for historical analysis as well as further processing for base year and future traffic forecasts.
- ETC data is independently system generated and hence more reliable. The client sourced vehicle category-wise traffic data which doesn't include toll ticket distribution.
- Monthly reports submitted by contractors / tolling agencies to NHAI field offices (Schedule M/G/V) which is start point to validate the toll ticket distributing including cash components, violation/exemptions, overloading fee etc.

**Summary of the historical traffic and revenue data available for Nallur Toll Plaza**

| Data sources | Duration of data | Observations |
|---|---|---|
| **Schedule M/V - Part A & B (monthly)** | FY10 : All months except Apr'09<br>FY11, FY12 : Full Year<br>FY13 : All months except Nov'12<br>FY14 to FY19 : Full year<br>FY20 : All months except Nov'12 except Oct'19 to Dec'19<br>FY21 : except Jun'20 to Aug'20 and Oct'20 to Jan'21<br>FY22 to FY25 : Full year<br>FY26 : Apr-Oct'25 (7 months) | **Part A:** Vehicle category-wise total user fee collection<br>**Part B:** Vehicle category and ticket distribution-wise traffic data<br>No split between 3A and MAV for FY10 to FY20<br>Ticket distribution data: Yes<br>Exemption/violation/ cash traffic data: Yes; for FY24 |
| **ETC Data (monthly)** | FY23 to FY25 : Full year<br>FY26 : Apr-Oct'25 (7 months) | Vehicle category-wise ETC transactions covering total traffic and user fee collection<br>Ticket Distribution Details: No |
| **Overloading Reports (weekly)** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU Chennai 1 | |
| **Neighbouring highways** | Historical traffic data to determine corridor growth trend | |

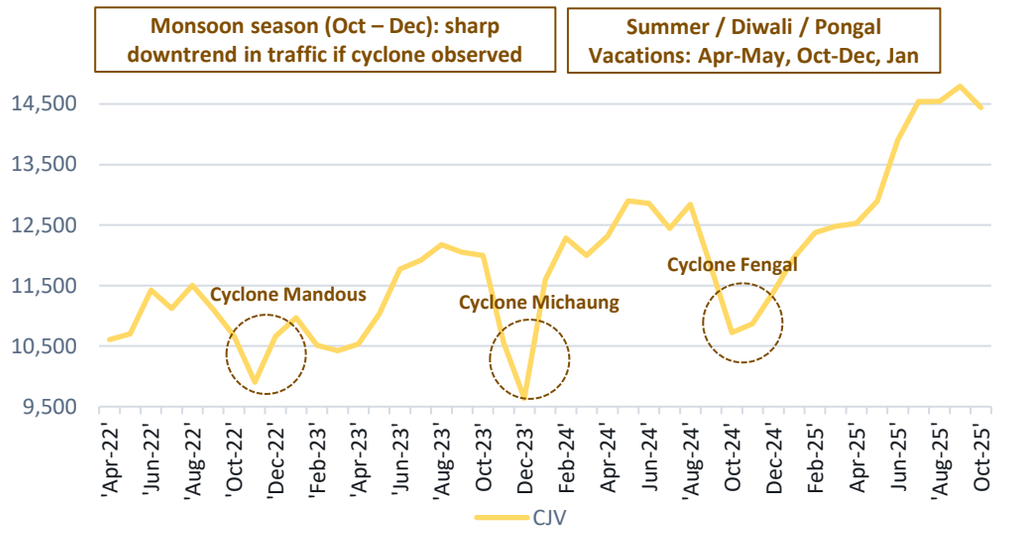
Source: TIC compilation of data received from NHAI

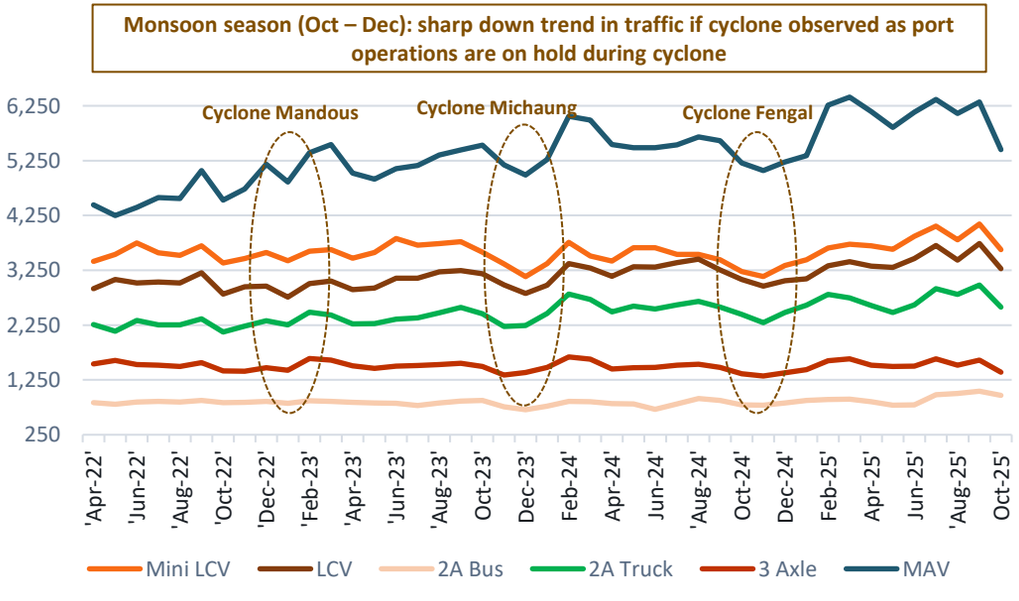
ETC data was reviewed for historical analysis as it is reliable. Schedule M/V dataset observed intermittent anomalies but useful at broad level for analysing long-term growth trend.

# Historical traffic analysis (1)

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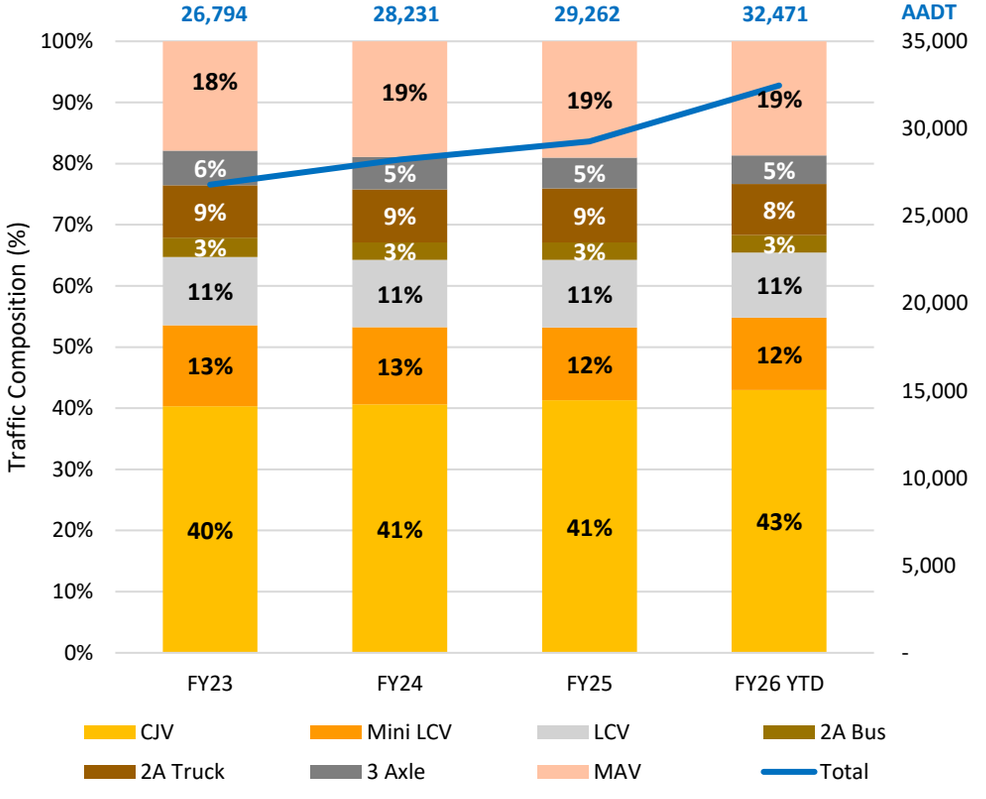
### Vehicle category-wise monthly traffic trend - ETC




Source: TIC analysis

### Vehicle category-wise yearly traffic composition - ETC




- Traffic has trended in the range of 30,000 – 32,000 AADT (65,000 PCUs) in recent past with CJVs (~40%) and MAV (~20%) as major contributors.
- High volume of CJVs is observed due to proximity to Chennai and regular business traffic between Gummidipoondi and Chennai. This higher volume will be decreased by ~45% on shifting of toll plaza to Durainallur.
- Approx. 45%+ of freight traffic is observed which is mainly contributed by port led development and industrial/logistics belt around Gummidipoondi.

# Historical traffic analysis (2)

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**Vehicle category-wise traffic growth trend - ETC**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 10,803 | 3,546 | 2,984 | 846 | 2,287 | 1,518 | 4,810 | **26,794** | **54,424** |
| **FY24** | 11,461 | 3,566 | 3,094 | 816 | 2,437 | 1,504 | 5,352 | **28,231** | **58,025** |
| **FY25** | 12,079 | 3,481 | 3,233 | 835 | 2,574 | 1,471 | 5,589 | **29,262** | **60,201** |
| **FY26 till Oct'25** | 13,953 | 3,826 | 3,464 | 919 | 2,713 | 1,526 | 6,070 | **32,471** | **65,764** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 6.1% | 0.6% | 3.7% | (3.5%) | 6.6% | (0.9%) | 11.3% | **5.4%** | **6.6%** |
| **FY25 vs FY24** | 5.4% | (2.4%) | 4.5% | 2.3% | 5.6% | (2.2%) | 4.4% | **3.7%** | **3.7%** |
| **FY26* vs FY25** | 13.7% | 9.4% | 5.7% | 12.2% | 5.7% | 3.7% | 9.8% | **10.4%** | **9.4%** |
| **CAGR (FY23 – FY26 YTD)** | 10.8% | 3.1% | 6.1% | 3.4% | 7.1% | 0.2% | 9.8% | **8.0%** | **7.9%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

**Corridor growth trends (project highway and neighbouring sections)**

| CAGR | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Chennai Tada section of NH16 (Nallur TP)** | | | | | | | | | |
| **Long-term** | ~9% (CJV+Mini LCV) | | ~6% | ~7% (Bus+2A Truck) | | ~9 %– 10% (3A+MAV) | | **~14%** | **~12%** |
| **Neighbouring highwyas** | | | | | | | | | |
| **Short-term** | 8.6% | 11.4% | 8.6% | 2.5% | 7.9% | (0.4%) | 6.8% | **7.0%** | **6.3%** |
| **Medium-term (Pre-Covid)** | ~6% (CJV+Mini LCV) | | ~5.5% | ~10% | Overall goods ~5.5 – 6.0% ** | | | **~5%** | **~4%** |
| **Long-term** | ~7.5% (CJV+Mini LCV) | | (~1%) | ~5% | Overall goods ~3.5% ** | | | **~4.5%** | **~5.5%** |

Source: TIC analysis ** data is available in form of articulated and non-articulated freight traffic and hence lower growth is observed due to inter-category transfer over the period

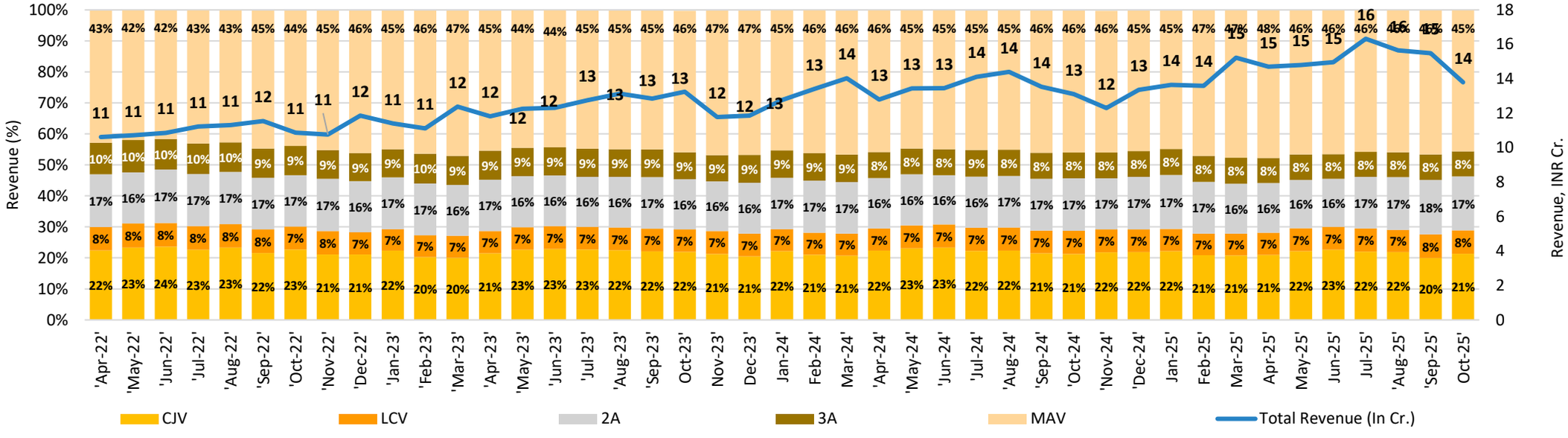
# Historical traffic analysis (3)

- Container cargo and petroleum products are major items observed at the project highway as regular movement between hinterland and maritime cluster which is highly volatile in monthly trend. Traffic gets affected as and when port operations are temporarily shutdown due to cyclone. Decrease in port traffic is visible on weekend compared to weekdays.
- Gradual container cargo traffic from Krishnapatnam port was observed shifting to Chennai port cluster during 2021 to 2023 because of closure of container operations at Krishnapatnam port.
- Cyclone has affected the traffic in past due to lower social/business movement as well as temporary shutdown of port operations.
  - **FY2025:** Cyclone Fengel in November-December 2024
  - **FY2024:** Cyclone Michaung in December 2023
  - **FY2023:** Cyclone Mandous in December 2022
  - **FY2021:** Cyclone Nivar in November 2020
  - **FY2019:** Cyclone Gaza in November 2018
  - **FY2017:** Cyclone Vardah in December 2016
  - **FY2016:** Tamil Nadu recorded an exceptionally heavy rainfall during November - December 2015 due to the north-east Monsoons. This unprecedented rainfall took place in four spells, and which has badly affected traffic across Tamil Nadu mainly Chennai and adjoining districts.
- Key characteristics for CJVs traffic are as follows in addition to discussed in last couple of pages:
  - Traffic observed on higher during festivity / school vacations / marriage seasons i.e., April-May, Jan-Feb, Oct-Nov.
  - Toll plaza observed forced exemption in CJV/Mini LCV categories during heavy congestion at toll plaza. Traffic police requests toll operating agency to open boom barrier for faster evacuation of traffic. This challenge will be eliminated on shifting of toll plaza to new location of Durainallur and hence improvement in forced exemption/violation is expected.
- Vegetable/Fruits traffic of Mini LCV / LCV / 2A from Andhra Pradesh is of captive nature in context of Koyambedu Wholesale Market.
- Across Tamil Nadu, all vehicle categories observes higher traffic during months of January and May due to Pongal and Jalikattu Festivity / vacations / marriage season (after 14$^{th}$ January) which leads to higher social travel of passenger vehicles. This also contributes to increase in consumption at urban centers.
- May observes higher real estate and construction material movement as pre-monsoon completion of work.

# Historical revenue analysis

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**Vehicle category-wise monthly revenue composition and trend - ETC**




| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) and Annual Average Daily Collection (in INR Lakh)** | | | | | | | | | |
| **FY23** | 22.6 | 7.0 | 10.0 | 5.5 | 17.0 | 12.9 | 59.6 | **134.7** | **36.90** |
| **FY24** | 25.6 | 7.6 | 11.0 | 5.7 | 19.3 | 13.6 | 69.4 | **152.2** | **41.58** |
| **FY25** | 28.0 | 7.8 | 11.9 | 6.0 | 21.0 | 13.7 | 74.6 | **162.9** | **44.64** |
| **FY26 till Oct'25** | 17.7 | 5.1 | 7.8 | 4.0 | 13.5 | 8.6 | 49.1 | **105.7** | **49.40** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 13.1% | 8.9% | 10.8% | 4.7% | 13.0% | 5.2% | 16.3% | **13.0%** | **12.7%** |
| **FY25 vs FY24** | 9.2% | 2.6% | 7.6% | 5.1% | 9.0% | 0.7% | 7.5% | **7.1%** | **7.4%** |
| **FY26* vs FY25** | 7.1% | 10.8% | 11.3% | 16.3% | 10.5% | 7.4% | 13.9% | **11.5%** | **11.5%** |

Source: TIC analysis

* against FY25 for 7 months i.e., April-October

# Ticket distribution (1)

Schedule V (Part B) is a monthly statement presenting vehicle category and ticket distribution-wise traffic data including exemption, local concession / other discounted details.
Toll ticket distribution refers to share of total revenue with respect to various journey types and related discounts applicable. This distribution depends on vehicle category, trip lengths, trip frequency and percentage of local traffic.
As per Toll Plaza Gazette Notification and Toll Rate Revision Circular of FY26 for Kulgo TP, types of toll tickets are being issued are presented in the below table.

| Ticket Category | Description |
|---|---|
| **Single Ticket** | One-way journey on the project highway is considered as single journey. For such journeys, users are required to pay the complete notified one-way fee. |
| **Return Ticket** | Two one-way journeys on the Project highway within 24 hours are covered under this category. For such journeys, users are required to pay one and half times of the fee payable for one-way journey. |
| **Monthly Pass** | Fifty one-way journeys on the Project highway within a month covered under this category. The concessionaire shall, upon request from any person, issue a monthly pass for fifty one-way journeys at a discounted rate equivalent to two-thirds of fifty one-way journeys. |
| **Local Pass (Local Personal)** | Road user who owns a mechanical vehicle registered for non-commercial purposes and resides within a distance of 20 km from the toll plaza can get local monthly pass. |
| **Commercial vehicle registered within district of plaza (Local Commercial)** | Commercial vehicles (excluding vehicles plying under national permit) registered in the district where the toll plaza is located.<br>Fee shall be 50% prescribed rate for that category of vehicle provided no service road or alternative road is available for use of such commercial vehicles. |
| **Exempted** | This journey ticket category is for all users (like Police, Fire Brigade, Ambulance, Defence, etc.) which are exempted from paying toll as per NHAI Toll rules. |
| **Annual Pass for private non-commercial CJV vehicles** | On June 18, 2025, MoRTH introduced a FASTag-based annual pass to facilitate seamless highway travel. This pass is valid for non-commercial private vehicles such as cars, jeeps, and vans, and remains effective for one year from the date of activation or up to 200 trips—whichever comes first for INR 3,000. Trip counting method is as follows:<br>Open Tolling: Each entry / exit counts as one trip<br>Closed Tolling: One entry to exit trip counts as one |

Source: DCA, NH Fee Rules 2008 and subsequent amendments and existing gazette notifications

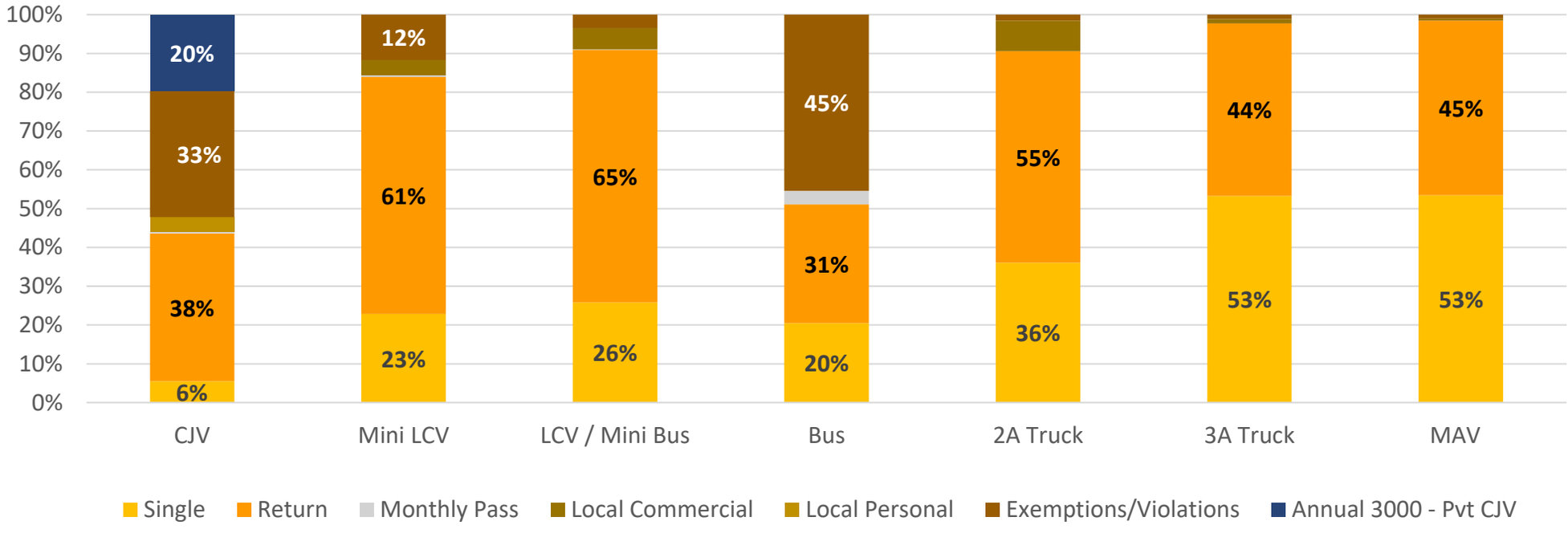
# Ticket distribution (2)

Currently it is envisaged that annual passes will be issued directly by concerned authority and hence revenue from sale of annual passes will not accrue to the concessionaire. NHAI has issued advisory for reimbursement of loss of revenue due to annual pass usage to the concessionaire which is part of Draft Concession Agreement as Clause 27.1.5 and described below:

- The concessionaire acknowledges and agrees that any user owning a non-commercial vehicle and holding a valid and functional Fastag Pass in accordance with MoRTH Gazette Notification No. G.S.R. 388(E) dated 17th June 2025shall be entitled to use the project highway without any restrictions, except to the extent specified in any applicable law, applicable permit or the provisions of the draft concession agreement.
- In respect of such vehicle crossing the toll plaza(s), the concessionaire shall be entitled to receive compensation from the authority equivalent to the product of:
  - The number of non-commercial vehicles crossing the toll plaza(s) with such pass; and
  - 90% of the applicable fee for single journey of such vehicle.
- Provided, however, that for the purpose of computation of such compensation, the counting of any particular vehicle shall be limited 2 crossing per day, notwithstanding that such vehicle may cross the toll plaza(s) multiple times on that day.
- The compensation payable under this clause shall be due and payable in monthly instalments within 7 days of the close of the month.

# Ticket distribution (3)

**Nallur TP**




Source: TIC analysis

- Ticketing patterns for CJVs, Mini LCVs and LCVs reflect urban characteristics of traffic due to proximity to Chennai, with the return ticket forming a higher share than single journey tickets indicating frequent short-distance trips.
- Annual Pass of INR 3,000 adoption among CJVs is around 20% as on 31st October 2025 and this proportion is expected to increase with awareness.
- Bus category experiences a notable quantum of exemptions/violations (45%) due to TNSTC government buses in Tamil Nadu, opting for monthly pass which is valid for 50 trips yet exceeding this limit as per benchmark cases. While approximately 31% of private/semi-private bus traffic uses return tickets, reflecting inter-district and inter-state movement.
- Goods vehicles (2A, 3A and MAV) show broadly similar ticketing pattern, with about 45% return tickets indicating substantial intra-state short/medium distance freight movement between Chennai port cluster and Gummidipoondi industrial belt.

# Commodity analysis (1)

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**Direction-wise Commodity Distribution**

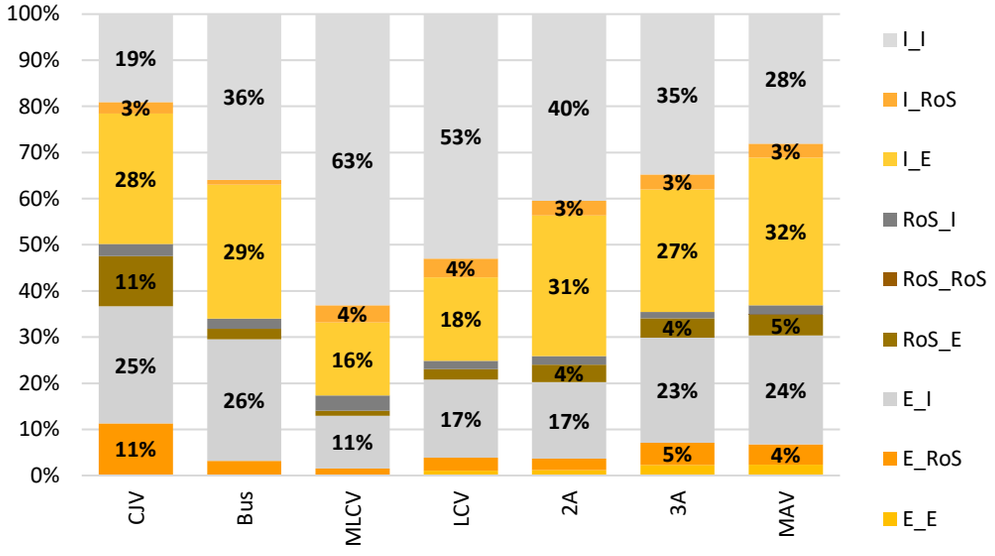
| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Chennai to Tada | Tada to Chennai | Chennai to Tada | Tada to Chennai | Chennai to Tada | Tada to Chennai | Chennai to Tada | Tada to Chennai | Chennai to Tada | Tada to Chennai |
| Agriculture / Animal Husbandry | 0% | 1% | 1% | 1% | 1% | 3% | 1% | 4% | 2% | 6% |
| Fruits and Vegetables | 6% | 1% | 1% | 4% | 3% | 3% | 3% | 3% | 3% | 5% |
| FMCG / Food Products | 7% | 11% | 3% | 6% | 4% | 4% | 3% | 5% | 4% | 4% |
| Building & Construction Material | 0% | 1% | 2% | 4% | 2% | 5% | 2% | 7% | 4% | 11% |
| Minerals & Minig Commodities | -- | -- | 0% | 0% | -- | -- | 0% | 0% | 0% | 0% |
| Coal | -- | -- | 1% | -- | 1% | 1% | 1% | 0% | 4% | 1% |
| Manufacturing | 9% | 13% | 10% | 9% | 10% | 7% | 13% | 7% | 11% | 8% |
| Automobile and Spares | 1% | 0% | 1% | 1% | 4% | 2% | 3% | 1% | 5% | 4% |
| Chemicals / Fertilisers | 0% | 1% | 1% | 2% | 1% | 1% | 2% | 1% | 2% | 2% |
| Steel / Metal Products | 6% | 6% | 5% | 6% | 7% | 9% | 9% | 8% | 10% | 12% |
| Petroleum Products | 5% | 3% | 6% | 5% | 9% | 8% | 9% | 10% | 9% | 9% |
| Parcel / E-commerce | 10% | 10% | 16% | 13% | 11% | 13% | 15% | 9% | 6% | 6% |
| Miscellaneous | 0% | -- | 3% | 2% | 2% | 3% | 5% | 1% | 3% | 3% |
| Empty | 54% | 53% | 49% | 46% | 46% | 41% | 34% | 43% | 36% | 30% |

Source: TIC analysis *0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

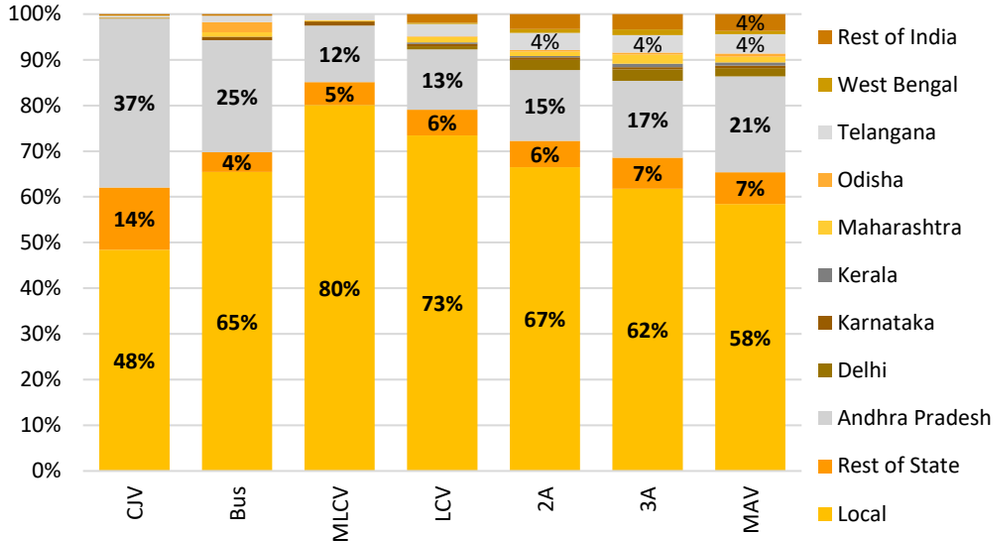
Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

# Zonal influences and trip distances

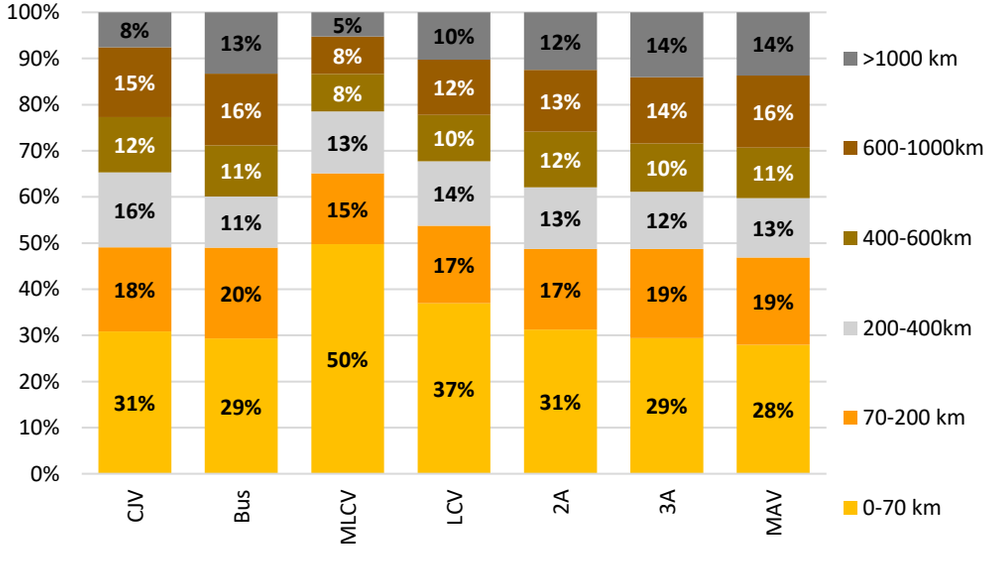
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distances




| Vehicle Category | Distances (in km) |
|---|---|
| CJV | 362 |
| Bus | 416 |
| Mini LCV | 269 |
| LCV | 403 |
| 2A | 461 |
| 3A | 475 |
| MAV | 491 |

Vehicle category-wise visual representation of origin-destination zones and top pairs are provided in Appendix A.

Source: TIC analysis

# Chapter 4: Economic context and traffic growth

- Economic context of influence region
- Determination of traffic growth drivers
- Estimation of demand elasticities
- Forecasts for growth drivers

IRC-108:2015 mentions that traffic growth is typically driven by a combination of macro-economic trends and industry/commodity specific factors, known as independent variables or traffic growth drivers.

These growth drivers have two critical characteristics:

1) the rate at which it increases i.e., forecasts of independent variable
2) the project highway's relationship with the growth driver to attract, capture and retain the traffic over the forecast horizon i.e., travel demand elasticity

Growth drivers are typically identified through analysis of origin–destination data, site visits and a detailed understanding of the highway.

Travel demand elasticity is influenced by socio-economic conditions both within the region served by the project highway and across the wider national area of influence.

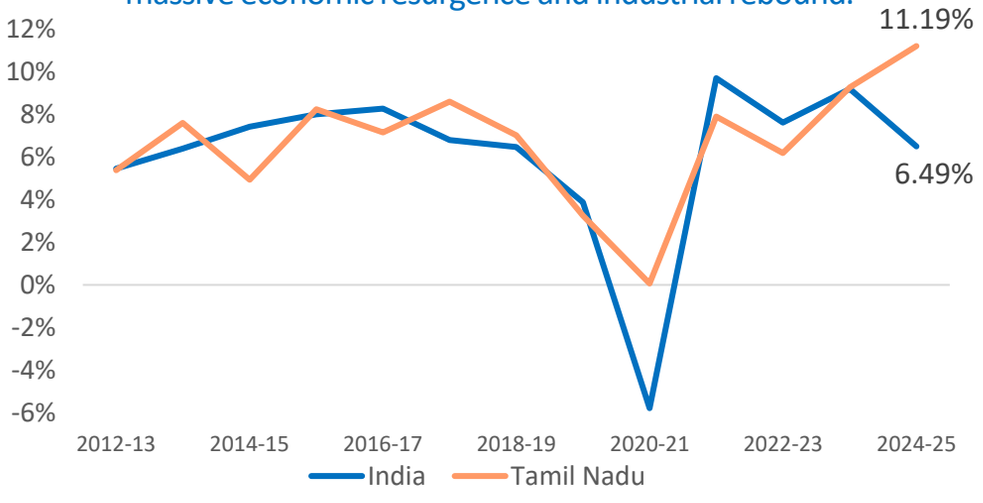
This chapter explains the growth drivers and elasticity in context of economic snapshot of primary districts / state and their correlation with the country.

# Beating the national curve: Tamil Nadu's growth story in numbers

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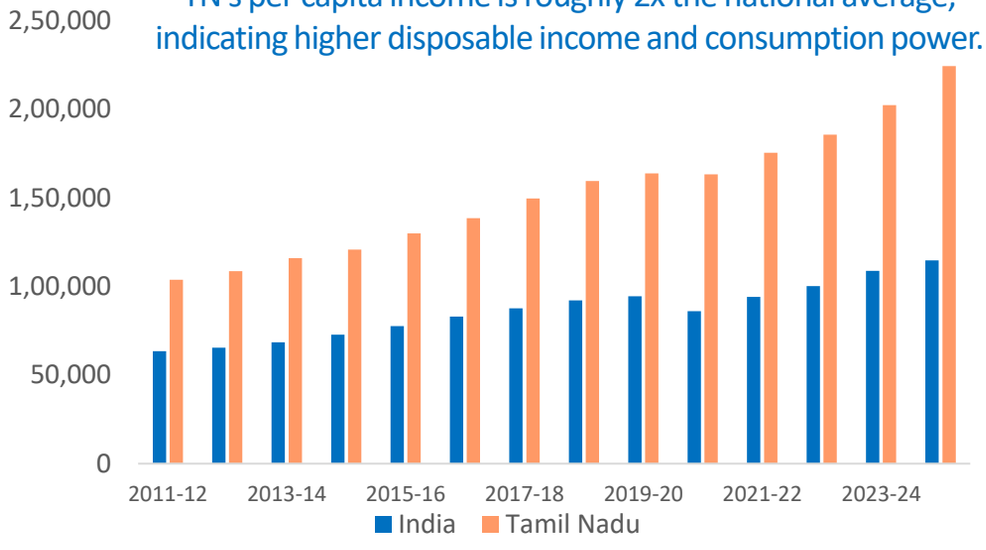
**Real GDP growth rate: India vs Tamil Nadu**

TN is2x faster than the national average in FY25, signaling a massive economic resurgence and industrial rebound.

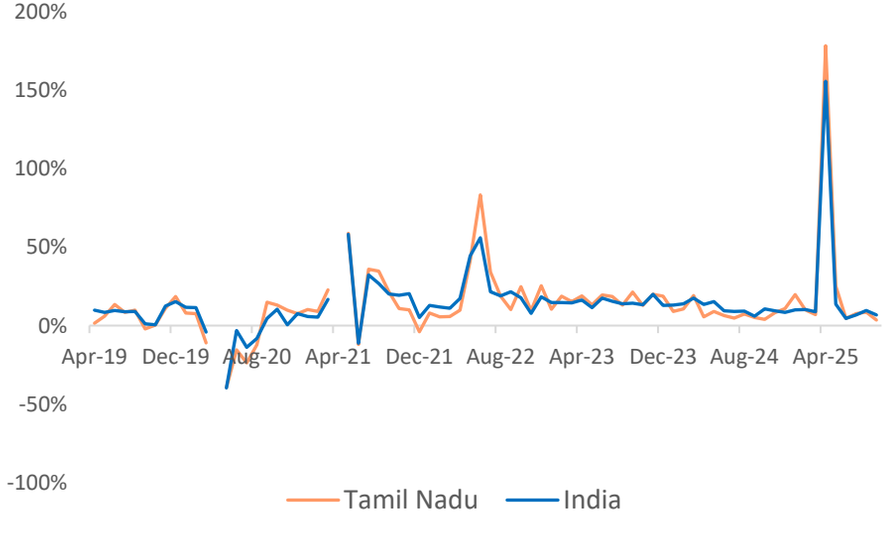



**Per Capita Income (in INR): India vs Tamil Nadu**

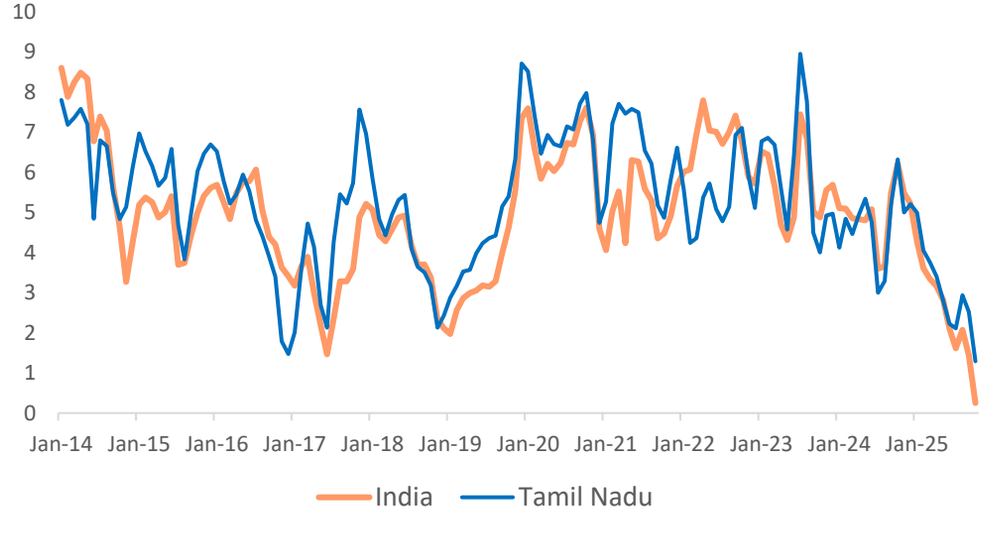
TN's per capita income is roughly 2x the national average, indicating higher disposable income and consumption power.




**GST growth rate: India vs Tamil Nadu**




**Consumer Price Indiex: India vs. Tamil Nadu**




Source: MoSPI, GST Council, TIC analysis

**GST and CPI show that TN tracks all-India pattern very closely, confirming that state is tightly integrated with the national business cycle.**

# Sectoral contribution to Tamil Nadu's economic output

**Tamil Nadu's GVA split**

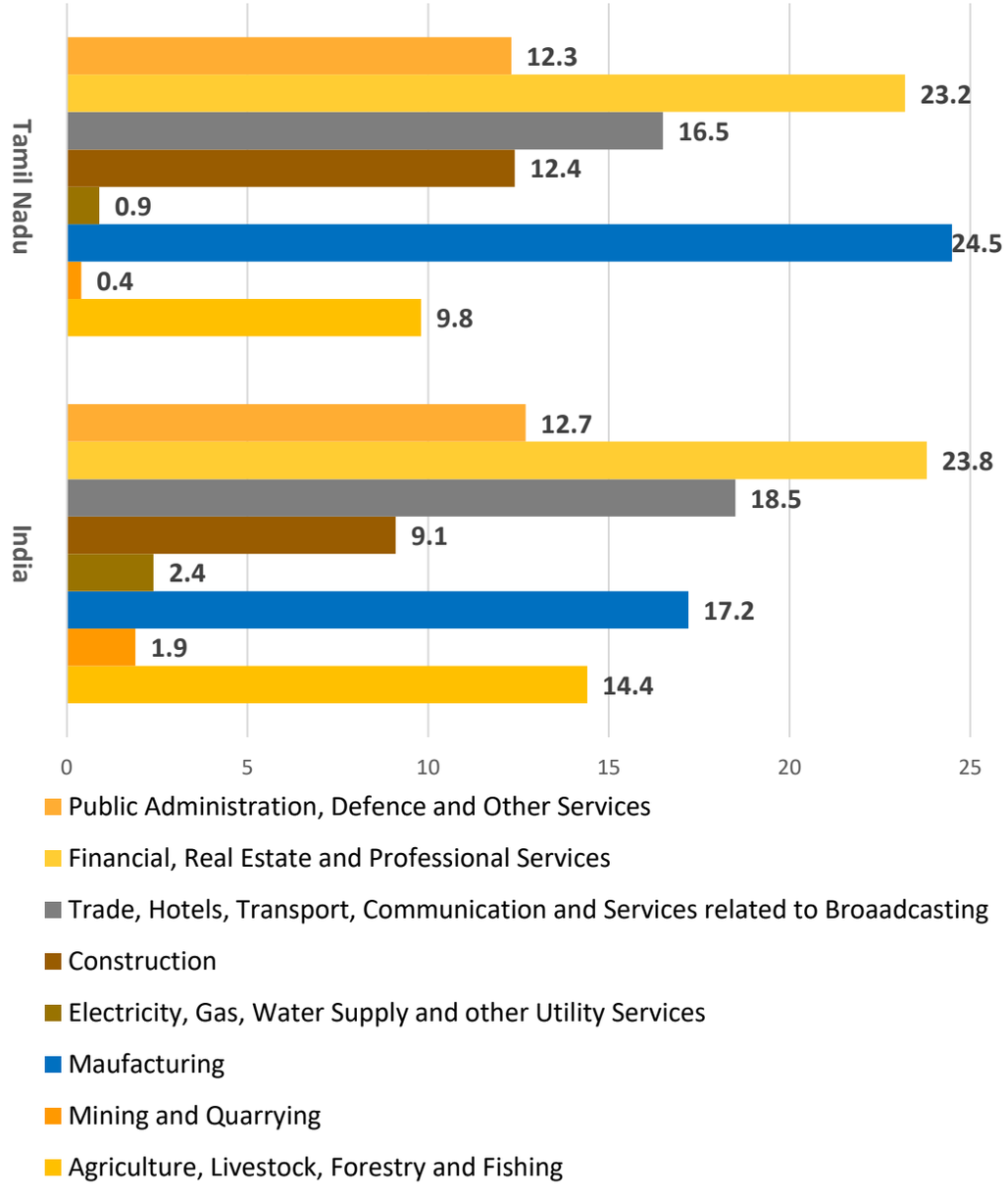
| | 2017-18 | 2024-25 | CAGR | Share of GVA(2024-25) |
|---|---|---|---|---|
| Agriculture, forestry and fishing | 111,270.61 | 151,804 | 4.5 | 9.8 |
| Mining and quarrying | 4,859.62 | 6,914 | 5.2 | 0.4 |
| Manufacturing | 248,985 | 376,911 | 6.1 | 24.5 |
| Electricity, gas, water supply & other utility services | 9,514.42 | 14,622 | 6.3 | 0.9 |
| Construction | 117,806 | 190,591 | 7.1 | 12.4 |
| Trade, repair, hotels and restaurants | 118,017.44 | 173,287 | 5.6 | 11.2 |
| Transport, storage, communication & services related to broadcasting | 66,365.54 | 80,649 | 2.8 | 5.2 |
| Financial services | 63,873.07 | 88,346 | 4.7 | 5.7 |
| Real estate, ownership of dwelling & professional services | 167,515.67 | 269,279 | 7 | 17.5 |
| Public administration | 29,428.67 | 40,030 | 4.5 | 2.6 |
| Other services | 76,854.7 | 149,119 | 9.9 | 9.7 |
| TOTAL GSVA at basic prices | 1,014,491 | 1,541,551 | 6.2 | 100 |

Source: MoSPI and TIC analysis

- 'Manufacturing, Real Estate Ownership and professional Services' and 'Construction' contribute more than 50% of the total state GVA.
- 'Manufacturing industries' contributing to the GVA includes Manufacturing of Motor Vehicles, Machinery and Equipment, Textiles, Wearing Apparels and Food Products.

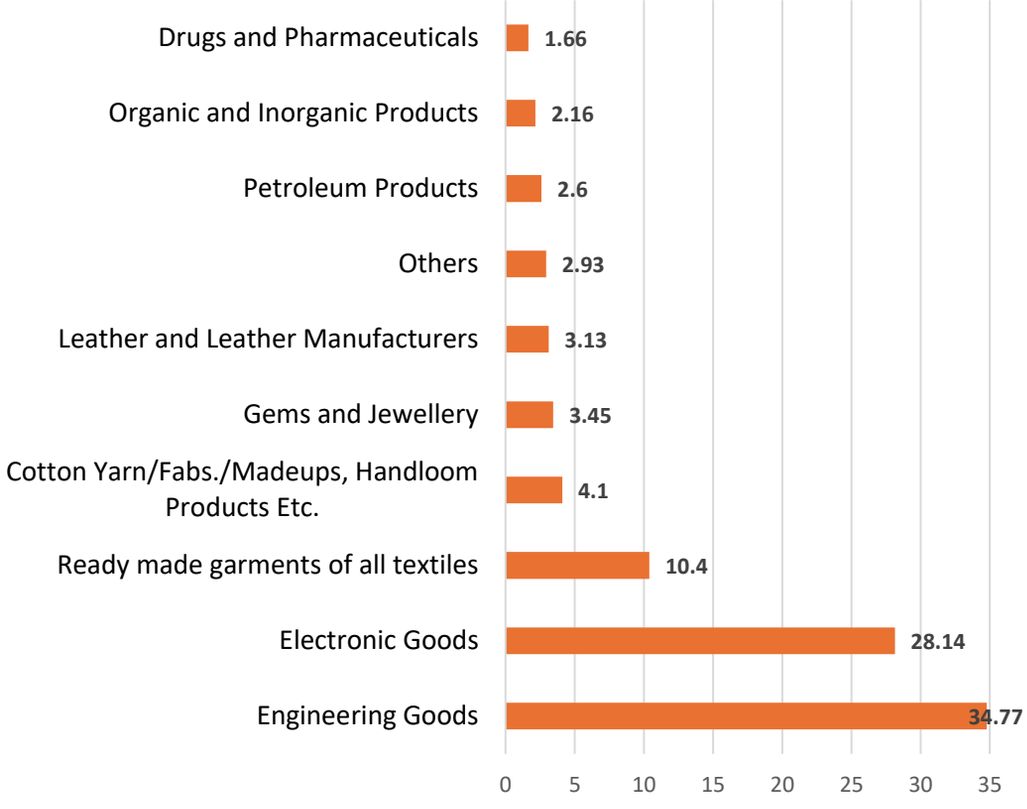
# Tamil Nadu's industrial base and export performance

**Share of GVA across sectors: India vs Tamil Nadu**




Source: MoSPI, TIC analysis

**% share in Tamil Nadu's export**




Source: MoSPI, TIC Analysis

- TN has a **significantly higher industrial base** (Secondary Sector) of 37.7% than the national average of 28.7% , driven by manufacturing and construction.
- TN earned Exports worth US$52.07Bn, **11.9% of Total Indian Exports** in FY25.
- **Engineering Goods, Electronic Goods and Ready-made garments were the top exported commodities.**

# Tamil Nadu is a major player in key manufacturing

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**Tamil Nadu's Manufacturing Sector: Output and National Share**

| Industry group | All India output (INR Crore) | Tamil Nadu output (INR Crore) | TN share in India |
|---|---|---|---|
| **Basic metals** | 21,53,243 | 66,446 | 3.09% |
| **Coke and refined petroleum products** | 20,30,771 | 91,117 | 4.49% |
| **Food products** | 17,90,378 | 1,38,749 | 7.75% |
| **Chemicals and chemical products** | 13,15,603 | 62,573 | 4.76% |
| **Motor vehicles, trailers and semi-trailers** | 11,32,869 | 2,69,415 | 23.78% |

Source: Annual Survey of Industries –Tamil Nadu, 2022-23, TIC analysis

- TN is a major player in key manufacturing sectors such as leather products, engineering goods, automotive components, castings, pumps and readymade garments.
- The State is also emerging as a hub for many sunrise sectors like Electric Vehicles and Startups in the areas of FinTech and Software as a Service (SaaS).

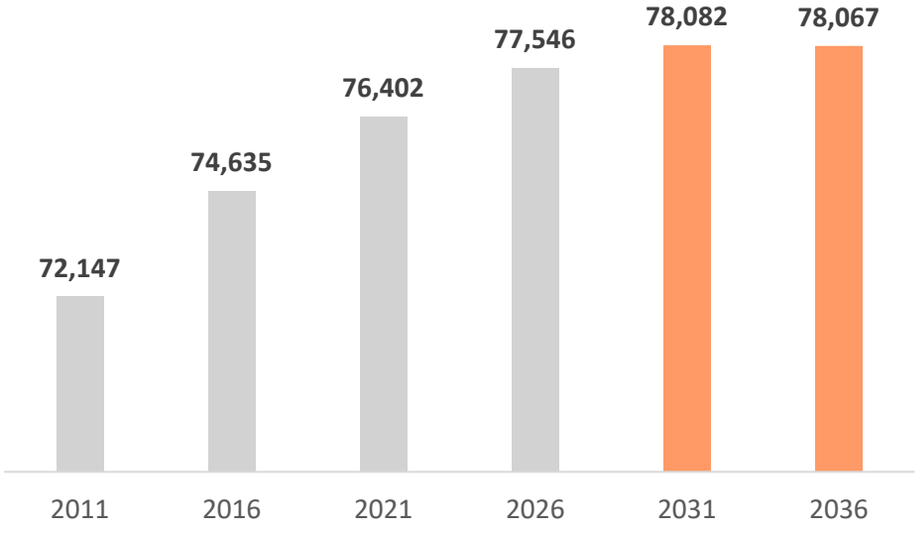
**Summary of Tamil Nadu's economic performance**

| Parameter | Key evidence (data-backed) | Interpretation / Implication |
|---|---|---|
| **Manufacturing-led state (vs India)** | Manufacturing share: **24.5% (TN)** vs **17.2% (India)**; Agriculture: **9.8% (TN)** vs **14.4% (India)** | Tamil Nadu is structurally **industrial and value-added**, not primary-sector dependent; reflects mature manufacturing base and productivity-led growth. |
| **Strong construction and industrial ecosystem** | Construction share: **12.4% (TN)** vs **9.1% (India)**; Manufacturing + Construction = **36.9% of GVA** | Indicates sustained **capex, urbanisation and infrastructure build-out**, supporting industrial expansion, employment, and logistics demand. |
| **Production-linked services dominance** | Financial, real estate & professional services: **23.2% (TN)** vs **23.8% (India)** | Services depth comparable to India, but **less consumption-heavy** and more **manufacturing- and asset-linked**, reinforcing industrial supply chains. |
| **High-value export basket** | Engineering goods **34.8%** + Electronics **28.1%** = **~62.9% of exports** | Export profile is **technology- and capital-goods driven**, with strong global integration; textiles, leather, gems add diversification but are secondary. |
| **Trade- and freight-intensive growth model** | Manufacturing-heavy GVA + engineering/electronics exports | Structural drivers point to **high freight intensity**, supporting strong demand for **container traffic, ports, industrial corridors, and highway logistics**. |

Source: MoSPI, TIC analysis

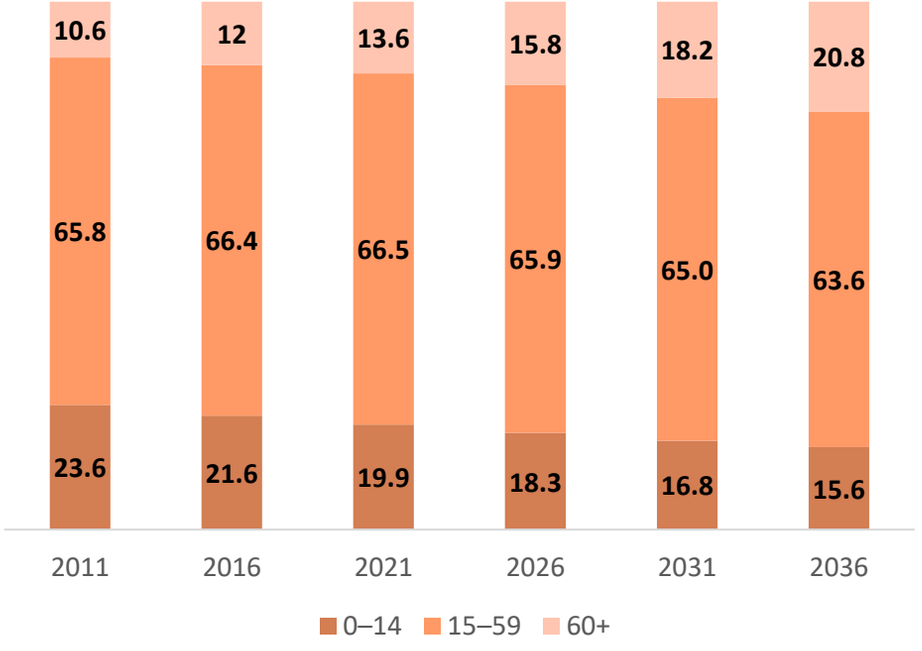
# Demographics

**Population growth ('000s)**




Source: MoFHW, TIC analysis

**Population share (%)**



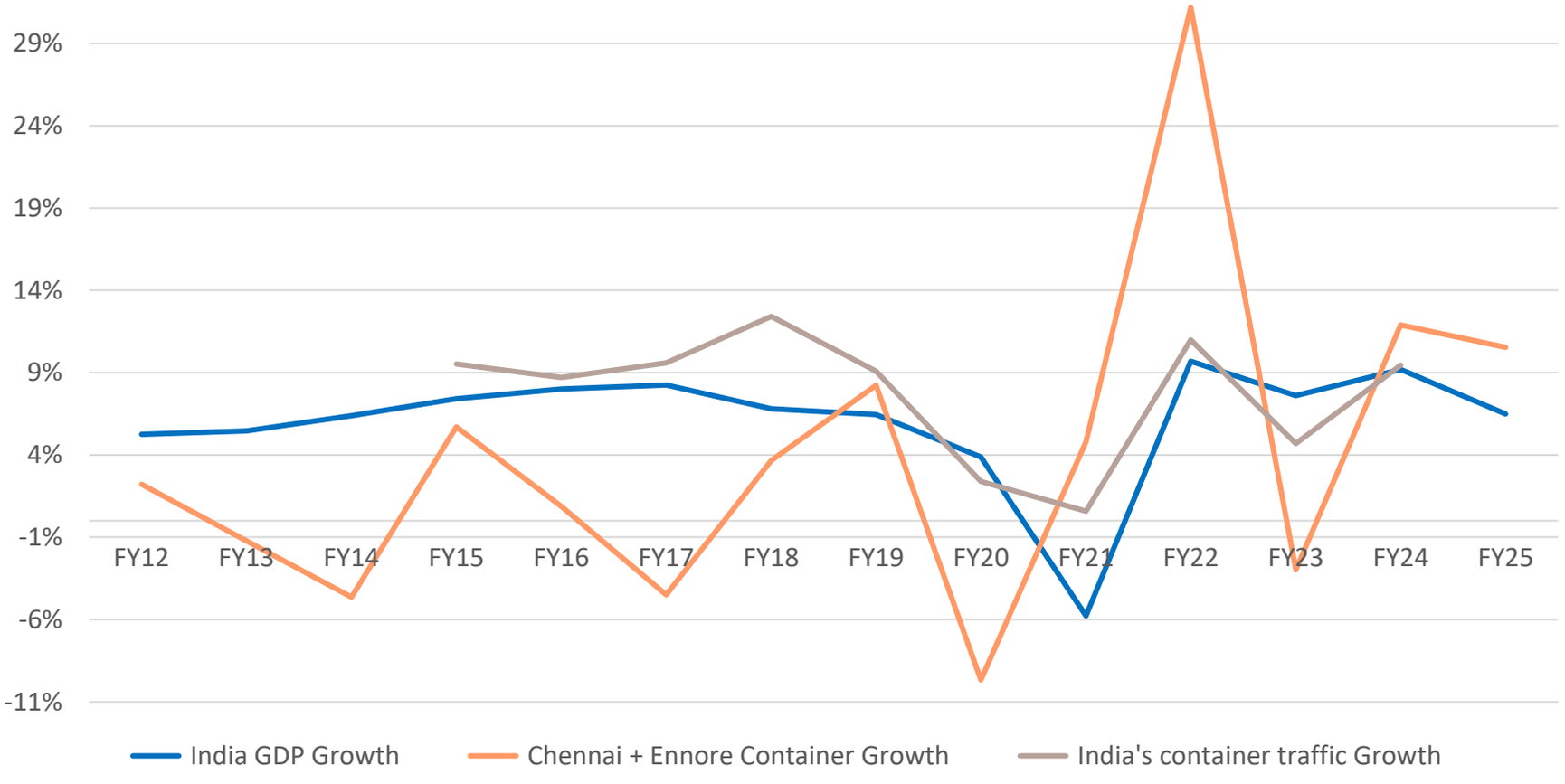

**Implication for Toll Traffic**

| Parameter | Impact | Target plaza | Direction | Evidence |
|---|---|---|---|---|
| **Population** | Increased state liability<br>Shift to agrarian economy for 60+ age group after two decades<br>Moderate decrease in consumption base | Nallur (NH16)<br>Surapattu and Vanagram (Chennai Bypass) | Moderate in longer run of 20 years | Tamil Nadu's population grew at CAGR 0.48% between 2026 and 2011 as per MoFHW estimates, lower than India's population at 1.1% in the same period.<br>The trend also shows that Tamil Nadu has high aging population (60+) of 15.8%, much higher than India estimates of 11.4%. |

Source: TIC analysis

# Chennai maritime cluster – container traffic

**Container traffic trend at Chennai maritime cluster (Chennai and Ennore Port)**




Source: Indian Port Association, TIC analysis

**Implication for Toll Traffic**

| Parameter | Impact | Target plaza | Direction | Evidence |
|---|---|---|---|---|
| **Port throughput** | Causes MAV traffic swings | Nallur (NH16)<br>Surapattu (Chennai Bypass) | Volatile | Linked to seasonal shipping & EXIM cycles |

Source: TIC analysis

# Economic variables and impact on toll traffic

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**Economic variables and impact on toll traffic**

| Economic Indicator (Tamil Nadu) | Latest Data/Trend | Implication for Toll Traffic |
|---|---|---|
| **IIP – Manufacturing** (Index of Industrial Production) | Index **157** (Apr-Jun 2025), up from 153.9 a year prior (~**2%** increase) | **Steady goods traffic:** Manufacturing index shows modest 2% growth. Manufacturing growth supports current LCV/Truck volumes. Observed traffic (average growth rate of ~10%) exceeds manufacturing growth, indicating other factors (urbanization, services) also drive traffic. |
| **IIP – Electricity** (power generation index) | Index **163.68** (Apr-Jun 2025), down from 179.9 a year prior (**-8,9%** YoY) | **↓ Decline, followed by modest rise in heavy freight:** YoY decline of 8.9% but June 2025 showed +16.7% MoM recovery. Coal transport to power plants affects Ennore Port Cargo and Surapattu TP commercial traffic. |
| **GSDP growth (Real)** | **+11.9%** Real GDP growth rate in FY25 > national GDP (6.49%) | **↑ Overall traffic:** Strong economic growth drives higher travel demand – more freight shipments and passenger trips on toll roads. |
| **Manufacturing GVA & growth** | Manufacturing output **₹3.769 lakh Cr** (2024–25), **14.7%** growth; Industry ~24.5% o GVA (Industry ~37.7% share) | **↑ Goods traffic, primarily intra-district:** 14.7% manufacturing growth drives commercial vehicles. |
| **Road infrastructure expansion** | State and National Highway length **6,805 km** as per 2024–25 report | **↑ Traffic capacity:** New/expanded roads improve connectivity, inducing more traffic. Added NH mileage encourages inter-district travel and freight movement, raising toll road usage. |
| **Agriculture trends** (Agri GVA, Horticulture) | Agri GVA growth **~2.5%** (2024–25); Tamil Nadu **exported 1.34 lakh tonnes of fish products**, generating ₹6,854 crore in foreign exchange in 2023-24. | **↑ Seasonal freight:** Steady agri growth and high horticultural produce volume drive produce shipments (e.g., vegetables to markets). Expect more **LCV/2A truck traffic** during harvest peaks (perishables to cities). |
| **Exports contribution** | Exports grew by ~20% in FY25 to US$52.07 led by electronic goods, engineering goods, ready made garments | **↑ Long-haul trucks:** 20% export growth generates outbound freight to Chennai/Ennore ports. This is also visible in Chennai Container growth rate of 10.5% in FY25 despite high base of 11.9% in FY24. |
| **MSME base** | **58.13 lakh** MSME units registered in Tamil – vibrant small industry ecosystem | **↑ Local distribution:** A large MSME sector implies dispersed production and consumption, leading to more **LCV and small-truck trips** ferrying raw materials and finished goods between industrial estates, warehouses, and markets. |
| **Port throughput volatility** | Causes MAV traffic swings | Linked to seasonal shipping & EXIM cycles |

Source: MoSPI, Directorate of Economics and Statistics, TIC analysis

# District-Level growth and manufacturing focus

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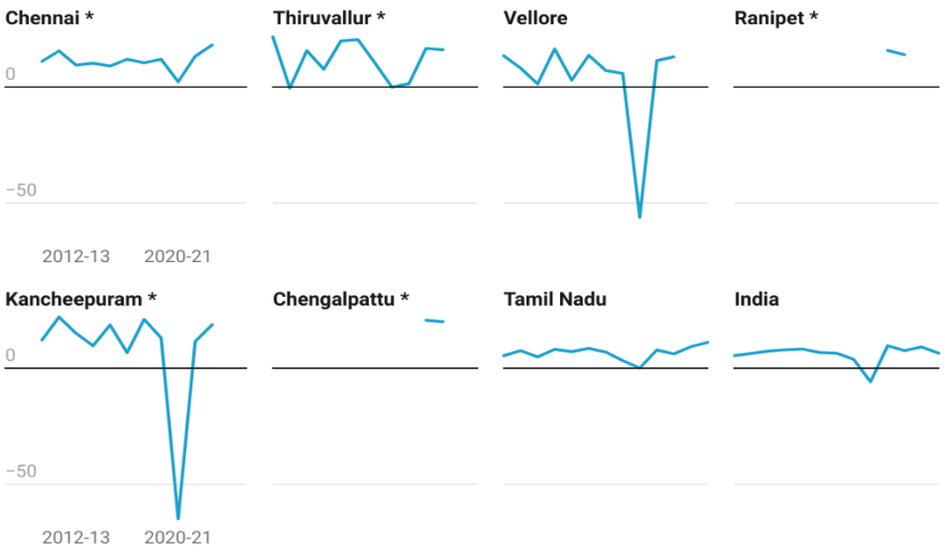
**District level economic snapshot**

| District | GDP (INR Crore) | Growth Rate (FY22-23) | Share in State GDP | PCI (INR) | Growth focus | Strategic Role |
|---|---|---|---|---|---|---|
| **Chennai*** | 1,78,898 | 18.20% | 12.30% | 5,85,501 | Services, finance, IT hub (77% services in District GVA) | Gateway for port-linked services, financial center, and IT/BPO employment |
| **Thiruvallur*** | 1,05,781 | 16.10% | 7.30% | 4,30,950 | Balanced manufacturing-services; fastest growing district | Heavy engineering hub (INR 51,952 Crore fixed capital), auto components, SIPCOT estates with spillover from Chennai |
| **Vellore** | 24,700 | 13.10% | 1.70% | 1,43,808 | Educational hub with emerging manufacturing | Functions as educational hub (VIT) supporting skilled labour needs; 388 factories, INR 564 Crore fixed capital |
| **Kancheepuram*** | 59,514 | 18.80% | 4.10% | 7,44,980 | Manufacturing powerhouse; automotive & electronics leader | Contributes ~20% of Tamil Nadu's fixed capital and ~24% of industrial output; hosts Hyundai, Renault-Nissan, Samsung, Foxconn |
| **Chengalpattu*** | 1,30,965 | 20.10% | 9.00% | 7,46,994 | Manufacturing-services mix; IT corridor + industrial zones | IT/ITES hub (Siruseri), automotive suppliers, balanced industrial growth with highest PCI in region |
| **Ranipet*** | 18,439 | 14.00% | 1.30% | 2,40,069 | Chemical & pharmaceutical manufacturing base | Specialty chemicals, pharmaceutical exporters, transitioning from traditional industries |
| **Districts part of Chennai Metropolitan Area** | **4,93,598** | **17.40%** | **34.00%** | **5,49,699** | **Diversified manufacturing-services engine** | **State's economic powerhouse; balances high-end services with advanced manufacturing** |
| **Tamil Nadu** | **14,51,929** | | **100.00%** | | **Service-led (52%) with strong industrial base (37.7%)** | **2x national GDP growth; 11.9% of India's exports; 2x national PCI** |

Source: Statistical Handbook of Tamil Nadu (2022-23), TIC analysis

# District-Level growth and manufacturing focus

**GDP growth rate: district vs State/India**




- Since FY24, Tamil Nadu's real growth has been above the India average, and within the focus districts Thiruvallur is the fastest growing at around 13%, driven by large SIPCOT Gummidipoondi Industrial Estates, auto and electronics manufacturing and strong spill overs from Chennai.
- **The Six focus districts contribute ~36% to Tamil Nadu's GDP** FY23. ~44% of total Manufacturing GDP and ~56% of Financial Services of Tamil Nadu comes from this region. Chennai has the highest contribution of 12.32%, due to high Financial service industry base and Port infrastructure

Source: Statistical Handbook of Tamil Nadu (2022-23), TIC analysis

* The expanded Chennai Metropolitan Area (CMA)MA falls in five Districts of Tamil Nadu State, viz. Chennai District, parts of Thiruvallur District, Kancheepuram District, Chengalpattu District, and part of Arakkonam Taluk of Ranipet District.

* Kancheepuram district was split to create Chengalpattu district, which was formed in 2019; Vellore district was split into three districts: Vellore, Ranipet, and Tirupattur, in August 2019

**Six districts drive ~35% of state GDP through an integrated industrial corridor spanning services, manufacturing, and export excellence**

**Service & Knowledge Core**

**Chennai & Chengalpattu** lead as the financial capital and tech hub, anchoring SaaS, BFSI, and R&D sectors across the state

**Manufacturing Powerhouse**

**Kancheepuram & Thiruvallur** form Asia's auto corridor, hosting global OEMs and generating the highest industrial output at ₹3.34 lakh crore

**Export & Engineering Belt**

**Ranipet & Vellore** provide specialised manufacturing clusters and workforce infrastructure, pivoting towards future mobility and EV production

# District-wise risks and opportunities

| District | Key opportunities | Key risks |
|---|---|---|
| **Chennai** | ▪ Port-led trade growth supported by expressway and metro expansion<br>▪ Strong BFSI, IT and corporate services base<br>▪ Improved regional connectivity via metro expansion and proposed Parandur airport, strengthening talent access | ▪ Urban flooding and monsoon vulnerability in low-lying areas<br>▪ Severe inner-city congestion near port zones until de-bottlenecking is completed<br>▪ Rising cybersecurity and data-governance compliance risks for BFSI and tech firms |
| **Thiruvallur** | ▪ Western industrial cluster (Sriperumbudur–Oragadam) driving auto, FMCG and 3PL demand<br>▪ Strong growth in Grade-A warehousing and logistics<br>▪ Strategic positioning along key industrial corridors | ▪ Rapid land price escalation affecting project viability<br>▪ High exposure to global automotive demand cycles<br>▪ Freight bottlenecks until corridor upgrades are fully operational |
| **Kancheepuram** | ▪ Core auto, EV and electronics manufacturing hub (Oragadam–Sriperumbudur)<br>▪ Large-format industrial and warehouse parks<br>▪ Corridor extensions improving hinterland connectivity | ▪ Infrastructure strain from heavy truck movement<br>▪ Cyclical risks linked to automotive exports<br>▪ Increasing environmental and regulatory compliance requirements |
| **Chengalpattu** | ▪ Engineering, textiles, apparel and precision manufacturing growth<br>▪ Rising 3PL and FMCG warehousing demand<br>▪ Proximity to ports and proposed airport enhances logistics attractiveness | ▪ Peak-hour congestion along GST Road<br>▪ Land-use pressure from rapid urbanisation<br>▪ Competition with Kancheepuram for large industrial projects |
| **Ranipet** | ▪ Expanding industrial–logistics corridor linking Chennai to western Tamil Nadu<br>▪ Established engineering and legacy manufacturing base<br>▪ Relatively lower land costs enable scalable industrial expansion | ▪ Environmental compliance challenges in legacy industries<br>▪ Lower skilled-labour density compared to Chennai core<br>▪ Growth dependent on timely completion of corridor infrastructure |

Source: TIC analysis

# PESTEL Analysis

| Factor | State-level insight | District-level implication |
|---|---|---|
| **Political / Policy** | ▪ **Corridor development:** The state is advancing industrial corridors like Chennai-Bengaluru Industrial Corridor (CBIC) to integrate manufacturing hubs<br>▪ **Governance and stability**: Tamil Nadu is recognized for "Good Governance" and maintaining peaceful labour relations, a key attractor for FDI<br>▪ **Proactive policy:** Specific policies for sunrise sectors (EV, FinTech) and a target to become a $1 Trillion economy | ▪ **Ranipet/Vellore:** These districts are critical nodes on the industrial corridor, benefiting from infrastructure upgrades.<br>▪ **Greater Chennai:** Policy stability supports the massive long-term capital commitments in this region (e.g., INR 32,861 Crore in Oragadam) |
| **Economic** | ▪ **Hyper-urbanization:** The state has a high industrial density with 31,859 factories (Rank 1 in India)<br>▪ **Growth engines:** A dual-engine economy driven by Services (53.63% of GVA) and Industry (33.37% of GVA)<br>▪ **Capital investment:** High fixed capital investment, particularly in heavy engineering and auto sectors | ▪ **Chennai:** The service & financial capital with the highest GDDP contribution (12.30%)<br>▪ **Thiruvallur:** The heavy industry hub with massive fixed capital investment (INR 51,952 Crore)<br>▪ **Kancheepuram:** The manufacturing leader with the highest total output (INR 3.34 Lakh Crore) |
| **Social** | ▪ **Urban workforce:** High urbanization rate (~49%) supports a deep pool of skilled labour for services and industry<br>▪ **Human development:** High rankings in Human Development Index (HDI) and literacy ensure a steady supply of "employable" talent | ▪ **Chengalpattu:** High concentration of knowledge workers for the IT corridor<br>▪ **Vellore**: Functions as an educational hub (VIT) supporting the skilled labour needs of the Ranipet industrial belt |
| **Technological** | ▪ **Electronics hardware:** A strategic shift from assembly to high-value component manufacturing (e.g., Foxconn, Dell)<br>▪ **Future mobility:** Rapid growth in Electric Vehicle (EV) technology and manufacturing<br>▪ **SaaS & IT**: Chennai and Chengalpattu are established global hubs for SaaS/ITeS | ▪ **Kancheepuram (Sriperumbudur):** The "Electronics Corridor" hosting major mobile and hardware OEMs<br>▪ **Chengalpattu (Siruseri):** The tech R&D hub with the largest IT park (407 acres allotted)<br>▪ Implementation support to MLFF from state |
| **Environmental** | ▪ **Sustainable mobility:** Push for EV manufacturing aligns with green energy goals<br>▪ **Climate resilience:** Coastal industrial zones require robust planning against climate risks<br>▪ **Resource management:** Focus on water supply and waste management within SIPCOT parks | ▪ **Thiruvallur/Chennai:** As coastal districts, infrastructure resilience is key for long-term sustainability<br>▪ **Ranipet:** Transitioning from traditional tanning (high pollution risk) to cleaner engineering and non-leather footwear industries |
| **Legal / Regulatory** | ▪ **Land Acquisition:** SIPCOT plays a central role in acquiring land (over 33,000 acres acquired state-wide) to provide legally clear titles to industries<br>▪ **Regulatory Ease:** Single-window clearances and transparent regulatory frameworks facilitate ease of doing business | ▪ **All focus districts:** SIPCOT has developed specific industrial complexes (e.g., Oragadam, Ranipet SEZ, Gummidipoondi,) to handle land and zoning legally, shielding investors from acquisition hurdles |

Source: TIC analysis

# Determination of growth drivers and elasticity (1)

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**Potential socio-economic indicators as growth drivers in context of IRC: 108-2015 and benchmark studies**

| Socio-economic indicators | Observations for availability/reliability of historical and forecast data |
|---|---|
| **Vehicle registration / Automobile Sales** | Sourcing vehicle registration data from concerned Regional Transport Office (RTO) within influence region is herculean task. In addition, it is not mandatory that Project Influence Area (PIA) matches with vehicle registration cases at ground level so not useful.<br>Society of Indian Automobile Manufacturers (SIAM) publishes automobile sales at region level but not at granular level. Can be used as proxy data to validate specific trends.<br>The consultant includes regional dealers' association of freight vehicles (if any) and local financing agencies to understand and validate specific trends observed in traffic. |
| **Per Capita Income** | Can be used as proxy data which reflects demand composition but not specific to commodities / vehicle category. Underlying forces are complex and changing at every strata of administrative structure i.e., districts, state, national. Historical data at state / national level available in public domain but not for district level. Further, availability of forecast data is major constraint in India. |
| **Population** | Population data are compiled on a decennial basis, with the latest census conducted in 2011, and do not provide a robust annual time series suitable for econometric modelling. In addition, migration trends across socio-economic segments and income-based geographies are highly volatile and difficult to forecast with confidence. Accordingly, population growth has not been adopted as a driver for forecasting future travel demand on the project highway. |
| **GDP / GSDP / GDDP** | Dataset from national and international publications and government agencies which are highly reliable in context of forecast e.g., Focus Economics, RBI / RBI's Survey of Professional Forecasters (96$^{th}$ Round), SBI Research, CII, multilateral banks (ADB, World Bank etc.), IMF, OECD, Oxford etc.<br>The consultant typically uses Focus Economics monthly subscription and in-house/empaneled economists for correlation for state and district level GDP and industry specific aspects.<br>The client provides views on the consultant's draft and recommends the final forecast. |

Source: TIC research and analysis

# Determination of growth drivers and elasticity (2)

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- For any potential indicator (economic, commodity, or industry-related) to be used as a traffic growth driver, availability and reliability of both historical data and credible forecasts are critical success factors.
- Among the key socio-economic indicators discussed above, Gross Domestic Product (GDP) at the national level and Gross State Domestic Product (GSDP) at the state level are the only indicators for which robust historical data and reliable forecasts are consistently available. Accordingly, GDP/GSDP have been adopted as the primary growth drivers for traffic forecasting.
- In addition, port traffic (general and container traffic) have been incorporated as project-specific growth drivers.
- The consultant held discussions with regional dealers' associations of freight vehicles, agricultural wholesale yards (popularly known as mandis), pilgrimage trusts where tourist footfall data are well organised, and inter-city bus terminals in the immediate influence region to validate specific traffic trends such as seasonality and growth patterns.
- In many cases, historical data show varying traffic trends due to various external events in the economy and region. In addition, variations in data recording by third-party tolling agencies and the presence of historical data gaps, as observed in this business case, necessitated further validation.
- Accordingly, validation of the historical data was carried out using traffic data from neighbouring toll plazas on the corridor and benchmark highway sections.
- Traffic growth may not be uniform during the forecasting period, considering factors such as increasing total traffic volumes relative to the capacity of the corridor and the project highway, technological advancements in the automotive industry, cost–tonnage ratios of specific commodity–vehicle combinations, and overloading trends versus strict government enforcement in the region.
- In India, the freight vehicle mix has been changing over the last decade, favouring multi-axle vehicles (MAVs) over 2-axle and 3-axle vehicles for long-distance traffic, given the operational efficiencies achievable with larger vehicles. At the same time, Mini LCVs and LCVs have become more popular for short-distance traffic and more localised supply movements compared to 2-axle vehicles.
- Considering ongoing technological advancements in the automotive industry, standard 2-axle and 3-axle trucks have been increasingly replaced by 6-tyre LCVs over the last couple of years, a trend that is expected to continue.
- The projected elasticity values are typically assumed to remain constant over the concession period in the Indian context; however, they may vary over time due to factors such as increasing traffic volumes relative to corridor capacity, technological advancements in the automotive industry, changes in cost–tonnage ratios of specific commodity–vehicle combinations, overloading trends versus enforcement intensity, and correction of regional imbalances.
- Considering all these aspects, vehicle category-wise elasticities have been estimated.

# Determination of growth drivers and elasticity (3)

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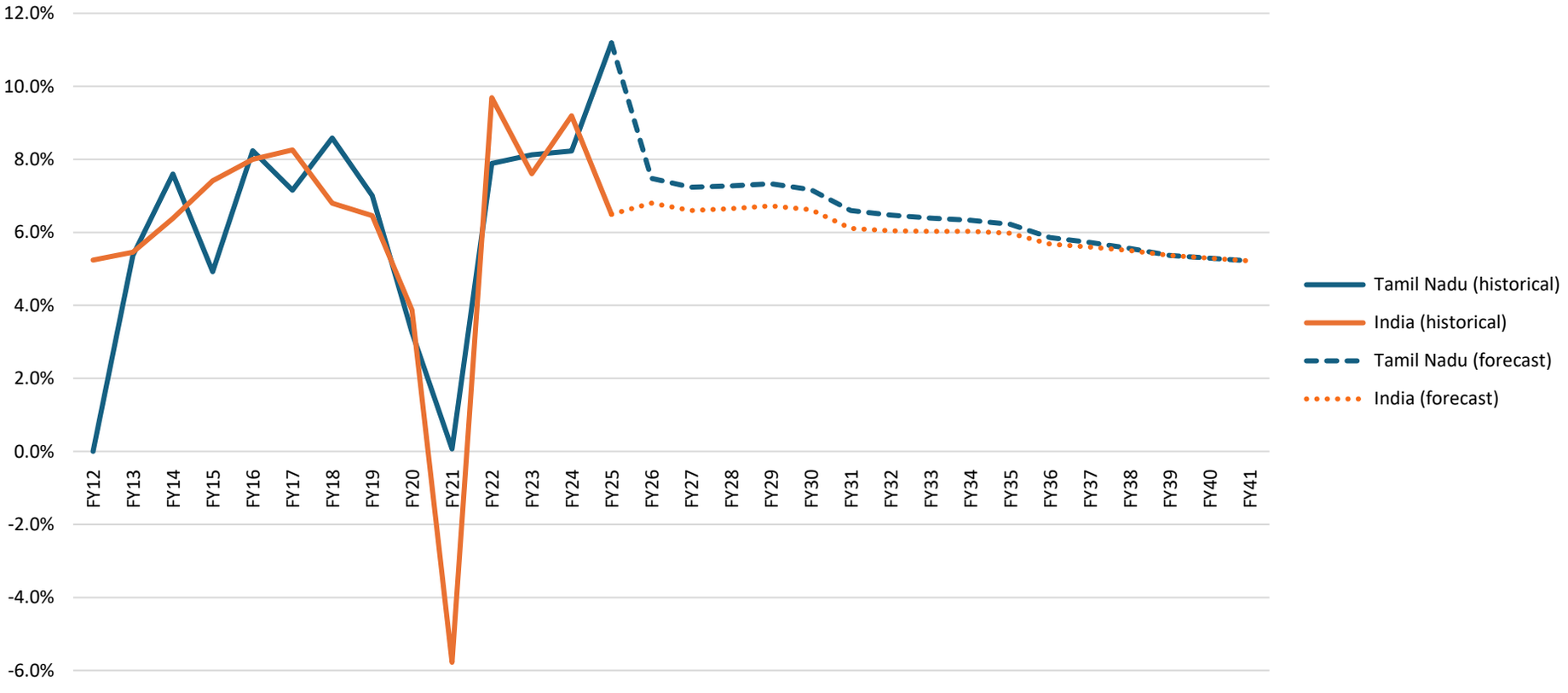
**Vehicle category-wise adopted elasticity**

| Vehicle Category | Nallur TP (old location) | Durainallur TP (new location) | Independent variable |
|---|---|---|---|
| **CJV** | 1.10 | 1.05 – 1.10 | Weighted average of GSDP of Tamil Nadu, Andhra Pradesh |
| **Mini LCV** | 0.70 | 0.60 – 0.65 | Weighted average of GSDP of Tamil Nadu, Andhra Pradesh |
| **Bus** | 0.40 | 0.40 | Weighted average of GSDP of Tamil Nadu, Andhra Pradesh |
| **LCV / Mini Bus** | 0.60 – 0.65 | 0.60 – 0.65 | Weighted average of GSDP of Tamil Nadu, Andhra Pradesh |
| **2 Axle** | 0.75 – 1.00 | 0.75 – 1.00 | Weighted average of GDP, GSDP of Tamil Nadu, Andhra Pradesh and Chennai port cluster – container and general traffic |
| **3 Axle** | 0.30 | 0.30 | |
| **MAV** | 0.85 – 1.15 | 0.85 – 1.15 | |

Source: TIC estimate using historical traffic data for the project highway and benchmark references of up-stream /downstream toll plazas

# Forecasts for growth drivers (1)

**GDP and GSDP forecast**




Source: Client input and TIC estimates

- Tamil Nadu's growth is **institution-led, not personality-led**, which sharply limits political downside risk to economic momentum.
- Even when political leadership changes, **industrial approvals, land allotments, port expansion, and corridor projects continue largely uninterrupted**. This is *critical* for long-gestation assets like highways, toll roads, ports, and logistics parks.
- Tamil Nadu politics is often described as "populist", but **this has not translated into anti-growth outcomes**. Welfare-heavy politics **boosts passenger traffic** (buses, 2W/4W), while industry policy continuity sustains **freight traffic**.
- WPI will be 3.24% throughout the concession period except 0.25% for FY27 to revise toll rates as provided by the Client.

# Forecasts for growth drivers (2)

**Chennai maritime cluster – container and general traffic**

- In context of Chennai Port Cluster discussion in earlier sections (Pg 22) and Chennai Port Authority Comprehensive Master Plan 2047 (February 2023), the consultant believes that Chennai Port's cargo is projected to rise steadily from ~49 MT in FY22 to ~76 MT by FY35, driven by 3.3%–3.5% CAGR anchored to the Port's Master Plan forecasts. Ennore Port resembles the similar growth trajectory.
- The growth trajectory reflects ongoing capacity upgrades and improved evacuation infrastructure outlined in the Master Plan.
- Container traffic is expected to grow at ~5% - 6% CAGR with volatile nature like trend discussed in earlier sections (Pg 51) as linked to seasonal shipping and EXIM cycles for Chennai maritime cluster (Chennai, Ennore and Kattupalli ports).

# Chapter 5: Baseline traffic and revenue forecast

- Base year AADT (FY26)
- Toll ticket distribution
- Revenue reconciliation

This chapter presents our approach to reach baseline forecast. The consultant estimated base year AADT and toll ticket distribution to reconcile base year traffic and revenue.

# Base year AADT estimate

- The consultant reviewed H1 FY26 ETC traffic data received from the client. Based on which traffic profiling for balance half of FY26 has been estimated using seasonality correction factors followed by estimation of FY26 AADT.
- An independent CTVC survey was undertaken to validate the ETC reported traffic data. The variance between CTVC and ETC data is comparatively higher for Car/Jeep/Van, Mini LCV, and Bus categories. For CJV/Mini LCV, this is attributed to local vehicles from nearby urban centre of Chennai and villages in surrounding area like Red hills, Puzhal, Koyambedu and T.Nagar at Nallur toll plaza. For Bus, higher forced exemption was observed across the corridor in Tamil Nadu. Conversely, the variance for LCV, Truck 2A, Truck 3A, and MAV categories remains marginal and within acceptable industry standards.
- Hence, the consultant multiplied variance factor with ETC AADT to determine the corrected FY26 AADT.
- Traffic surveys at the Durainallur Toll Plaza were conducted during October 2025. The base year traffic for the plaza has been estimated by applying the appropriate Seasonal Correction Factor, corresponding to the survey month, to the Weekly Average Daily Traffic (WADT).

**Base Year AADT (FY26)**

| Particulars | ETC AADT | Variance factor | Corrected Base Year AADT (Nallur TP) | Base Year AADT (Durainallur TP) |
|---|---|---|---|---|
| **Car/Jeep/Van** | 13,408 | 1.3204 | 17,704 | 10,246 |
| **Mini LCV** | 3,787 | 1.1134 | 4,216 | 2,526 |
| **Mini Bus/LCV** | 3,462 | 1.0537 | 3,648 | 3,359 |
| **Bus** | 887 | 2.0854 | 1,850 | 1,048 |
| **2A Truck** | 2,767 | 1.0152 | 2,809 | 2,638 |
| **3A Truck** | 1,525 | 1.0131 | 1,545 | 1,394 |
| **MAV** | 6,137 | 1.0094 | 6,195 | 6,099 |
| **OSV** | 25 | 1.0000 | 25 | 18 |
| **Total AADT** | **31,999** | | **37,992** | **27,329** |
| **Total PCU** | **65,656** | | **73,994** | **60,578** |

Source: TIC estimate

# Ticket distribution

**Nallur TP**

| Vehicle categories | | Car/Jeep/Van | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|---|
| Ticket types | FY26 | FY27 – FY28 H1 | From FY26 – FY28 H1 | | | | | |
| Single | 5.5% | 3.8% | 22.9% | 20.5% | 25.8% | 36.1% | 53.3% | 53.5% |
| Return | 38.0% | 29.3% | 61.1% | 30.7% | 65.1% | 54.5% | 44.5% | 45.0% |
| Monthly Pass | 0.4% | 0.4% | 0.4% | 3.5% | 0.1% | - | - | - |
| Local Commercial | - | - | 4.0% | - | 5.5% | 7.9% | 1.1% | 0.6% |
| Local Personal | 3.9% | 3.9% | - | - | - | - | - | - |
| Exemptions/Violations | 32.5% | 32.5% | 11.7% | 45.4% | 3.5% | 1.5% | 1.1% | 1.0% |
| Annual Pass - Pvt CJV | 19.6% | 30.2% | - | - | - | - | - | - |

**Durainallur TP**

| Vehicle categories | Car/Jeep/Van | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|
| Ticket types | FY28 H2 onwards | FY28 H2 onwards | | | | | |
| Single | 3.8% | 22.9% | 20.5% | 25.8% | 36.1% | 53.3% | 53.5% |
| Return | 29.3% | 61.1% | 30.7% | 65.1% | 54.5% | 44.5% | 45.0% |
| Monthly Pass | 0.4% | 0.4% | 3.5% | 0.1% | - | - | - |
| Local Commercial | - | 5.7% | - | 5.5% | 7.9% | 1.1% | 0.6% |
| Local Personal | 3.9% | - | - | - | - | - | - |
| Exemptions/Violations | 32.5% | 10.0% | 45.4% | 3.5% | 1.5% | 1.1% | 1.0% |
| Annual Pass - Pvt CJV | 30.2% | - | - | - | - | - | - |

Source: TIC estimate

- ~19% of CJV traffic is being observed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to increase by ~1.5 times in future through gradual awareness among road users.
- The consultant did not consider penetration of annual pass from estimated exemption/violation in future.
- For all vehicle categories, prevailing exemption/violation has considered for future. As per discussion with the client, prevailing forced exemption is likely to reduce post-implementation of Multi Lane Free Flow (MLFF) tolling system.

# Validation of base year traffic and revenue

- The Consultant calculated base year revenue by multiplying traffic AADT with prevailing toll rates in accordance with estimated toll ticket distribution.
- Comparison summary with quoted remittance by tolling agency is presented in the below table.
- Quoted daily remittance should be lower than estimated revenue by approx. 5%-10% considering profit margins of tolling agencies.

**Traffic and revenue reconciliation for base year (all values are estimated with FY26 toll rate with old linking factor)**

| Toll Plaza | Base year revenue estimate by the Consultant (INR Crore) | Annual Potential Collection estimate by NHAI (INR Crore) | FY26 estimate vs NHAI APC | Quoted remittance By tolling agency (INR Crore) | Consultant estimate vs Quoted remittance |
|---|---|---|---|---|---|
| **Nallur** | 182.16 | 171.59 | 6.1% | 163.83 | 11.2% |

Source: TIC estimate

# Chapter 6: Diversion analysis

- Surat – Nashik – Chennai Expressway
- Chennai Hyderabad highspeed rail
- National Waterway 4

This chapter elaborates impacts of proposed infrastructure developments in the project influence and network in form of positive/negative diversion to/from the project highway. Analysis has been exercised using IRC: 108-2015 and IRC: SP: 30-2019.

# Surat – Nashik – Chennai Expressway (1)

- Surat Nashik Chennai Expressway is ~1200 km long 6-lane, partially access-controlled highway being developed by NHAI through HAM.
- The corridor will connect Surat in Gujarat with Chennai in Tamil Nadu, passing through major cities such as Nashik, Ahmednagar, Solapur, Kalaburagi, Kurnool, Kadapa, and Tirupati, spanning four states Gujarat, Maharashtra, Telangana, and Tamil Nadu. This will enhance connectivity between western ports and southern industrial regions to promote seamless freight movement.
- The project is part of two major economic corridors i.e., 513 km Surat – Nashik – Ahmednagar – Solapur corridor and 707 km. Solapur – Kurnool – Chennai corridor integrating both greenfield and brownfield stretches.
- Key greenfield sections includes:
  - Surat – Nashik – Ahmednagar stretch in Gujarat and Maharashtra
  - Ahmednagar – Solapur – Akkalkot – MH/KA Border section
  - MH/KA Border – Mahabubnagar section
  - The remaining sections will involve upgrading existing two-lane roads into four-lane.
- Recently, MoRTH cancelled Surat – Nashik section of proposed development due to persistent challenges in securing environmental clearances. To address the intended connectivity objective, Maharashtra State Road Development Corporation (MSRDC) will develop greenfield expressway connecting Bharvir Khurd on Smruddhi Marg to Tawa village on NH48.
- Reference discussion with the client (field offices across corridor), the entire corridor is expected to be developed by FY31.

**Diversion due to Surat – Nashik – Chennai Expressway**

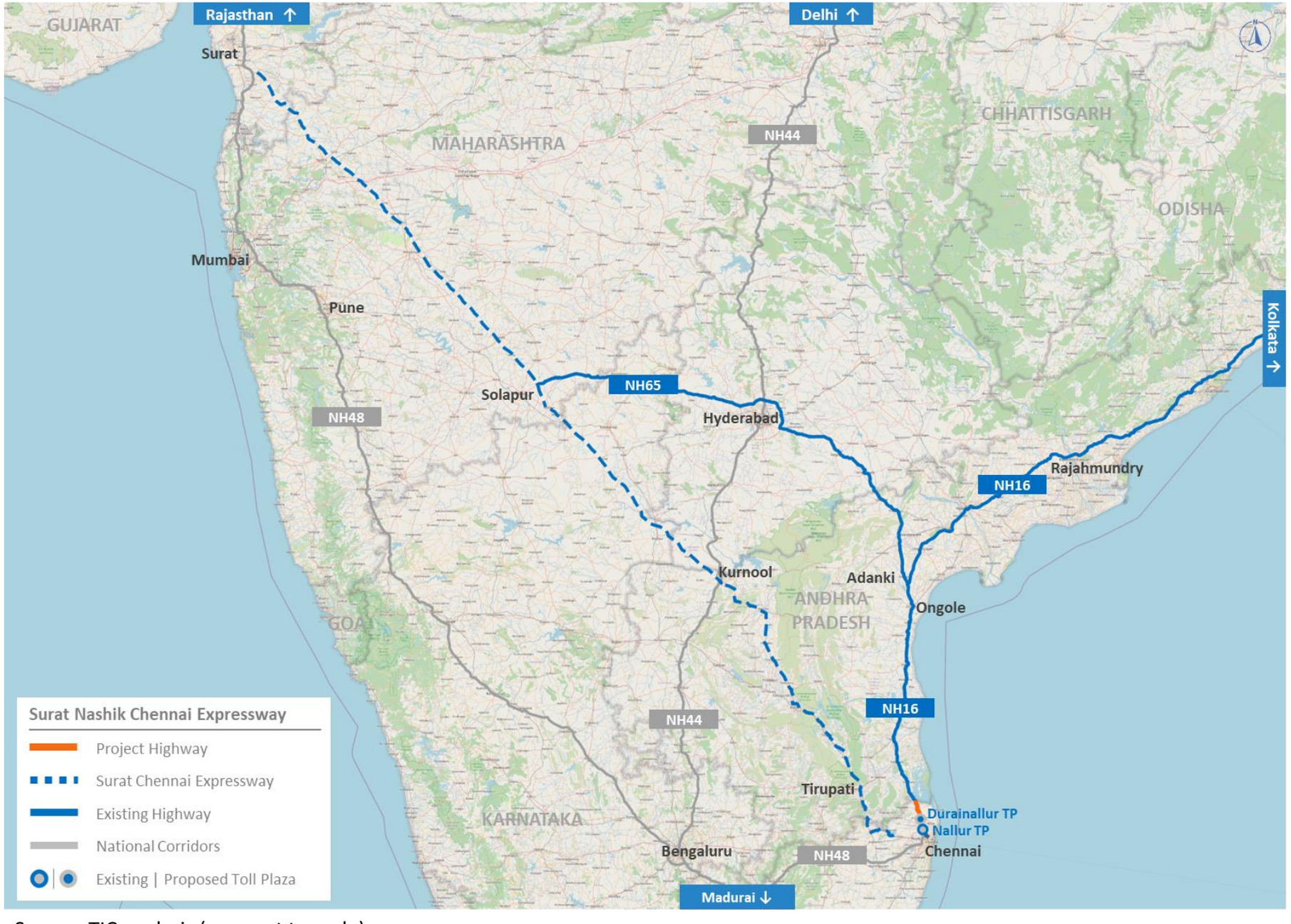
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Solapur/west and Chennai/south | FY31 (50%) FY32 (100%) onwards | Nallur / Durainallur | (0.25%) | - | (1.77%) | (2.23%) | (3.05%) | (2.59%) |
| | Traffic movement between Hyderabad/north and Chennai/south | FY31 (40%) FY32 (80%) FY33 (100%) onwards | Nallur / Durainallur | (0.55%) | - | (1.56%) | (2.47%) | (2.79%) | (2.93%) |

Source: TIC estimate

# Surat – Nashik – Chennai Expressway (2)

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**Surat Nashik Chennai Expressway alignment and project highway context**




Source: TIC analysis (map not to scale)

# Chennai Hyderabad high-speed rail (1)

- Chennai–Hyderabad High Speed Rail Corridor is a proposed 778 km high-speed rail link connecting Chennai Central, Minjur (on Chennai Ring Road), Tirupati, Amaravati/Vijayawada, and Hyderabad across Tamil Nadu, Andhra Pradesh and Telangana.
- Proposed development will transform regional connectivity, boosts trade, tourism, and economic growth, becoming a key part of India's high-speed network.
- Upon completion, it is expected to reduce the current Chennai–Hyderabad travel time from approximately 12 hours to about ~3 hours.
- South Central Railway submitted final alignment to be included in the detailed project report (DPR) to State Government of Tamil Nadu and requested approvals in November 2025 to keep the survey work on track.
- Latest media reports suggest that:
  - Chennai Unified Metropolitan Transport Authority (CUMTA) confirmed that DPR for the highspeed rail corridor will be finalized within a month after the state government grants its approval as the alignment had been revised to include a station at Tirupati, replacing the earlier plan to pass through Gudur.
  - In a letter to the state transport department earlier this week, the South Central Railway sought early finalization of the alignment and station locations, in-principle approval for the acquisition of land, and incorporation of the rail corridor into Tamil Nadu's long-term infrastructure master plan.
- The consultant considered that proposed development will be operational in FY38 with benchmark case of Ahmedabad Mumbai high-speed rail and present political leadership at Telangana, Andhra Pradesh and Tamil Nadu.

**Diversion due to Chennai Hyderabad high-speed rail**

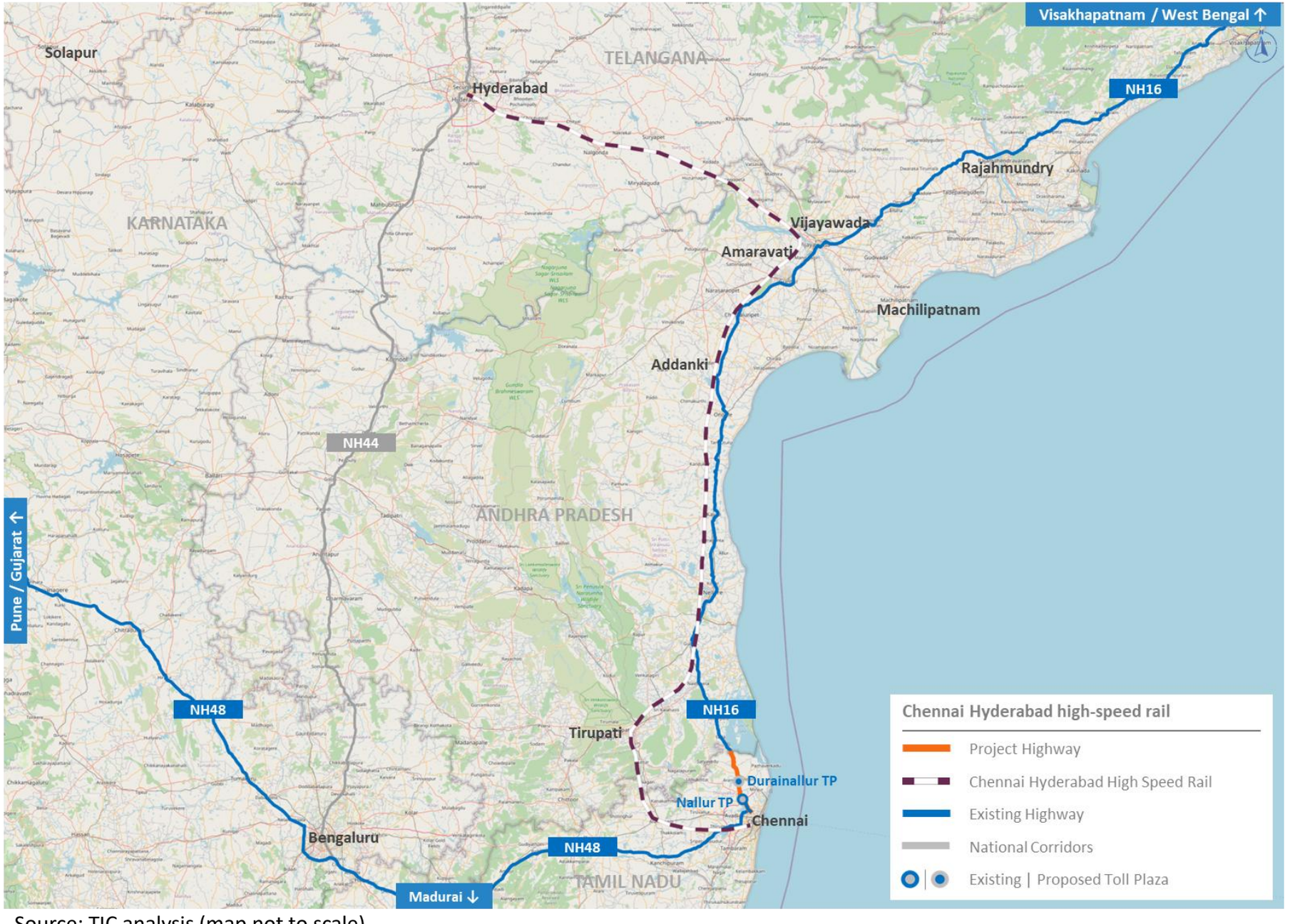
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | LCV | Bus | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement from Chennai to Hyderabad / Vijayawada / interim locations on route | FY38 (70%) FY39 (100%) onwards | Nallur / Durainallur | (2.22%) | - | (1.46%) | - | - | - |

Source: TIC estimate

# Chennai Hyderabad high-speed rail (2)

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**Chennai Hyderabad high-speed rail alignment and project highway context**




Source: TIC analysis (map not to scale)

# National Waterway 4 (1)

- National Waterway 4 (NW4) is a major plan to use rivers and canals as a large transportation route in South India. It connects the states of Andhra Pradesh, Tamil Nadu, Telangana, and the territory of Puducherry.
- Alignment follows several important waterways, including parts of the Godavari and Krishna rivers, as well as several man-made canals. In total, the planned route is nearly 2,900 kilometers long.
- Inland Waterways Authority of India (IWAI), is currently working on the first sections, making rivers deeper and building docks for loading and unloading goods. The aim is to create a cheaper and more environmentally friendly way to move heavy cargo like coal, cement, and food, reducing traffic from roads and railways.
- NW 4 is a plan to build a large canal water transport system connecting South Indian states for moving goods efficiently.

**Diversion due to National Waterway 4**

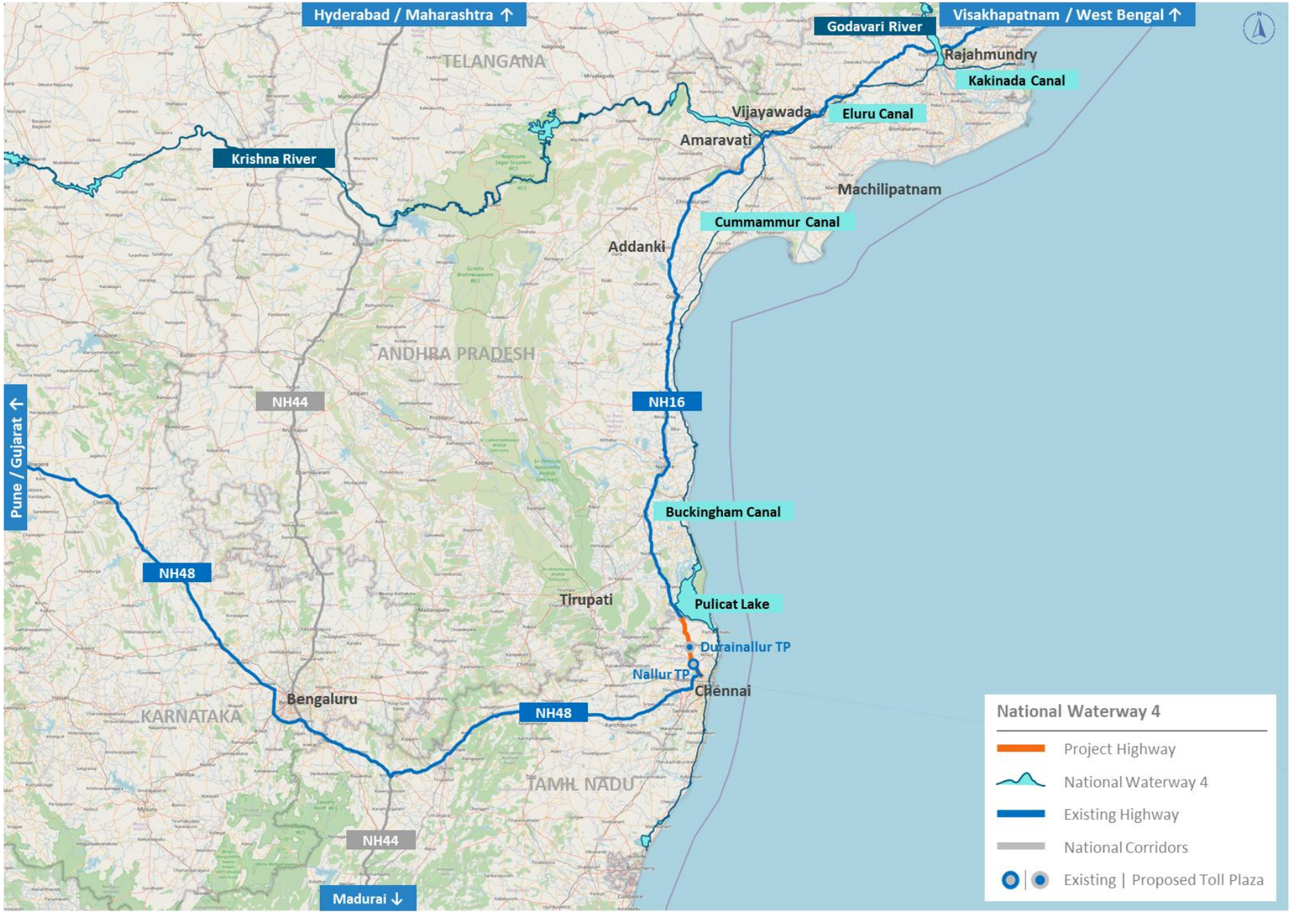
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | LCV | Bus | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Port connectivity parallel to NH16 and intermediate locations | FY33 (50%)<br>FY34 (75%)<br>FY35 (100%) onwards | Nallur / Durainallur | - | - | - | - | (0.40%) | (0.57%) |

Source: TIC estimate

# National Waterway 4 (2)

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**National Waterway 4 alignment and project highway context**




Source: TIC analysis (map not to scale)

# Chapter 7: Final traffic and revenue forecast

- Traffic growth forecast
- Traffic and revenue forecast
- Scenario development

Following pre-diversion traffic forecast and diversion analysis, this chapter presents final traffic and revenue forecast for various scenarios: most likely with and without overloading, pessimistic and optimistic.

# Transactional Support Agreement and FY27 revenue estimate

- The project highway is proposed to be included in NHAI's Public InvIT.
- A Transactional Support Agreement will be executed between NHAI and the Public InvIT for the management of toll plaza operations for FY27.
- Tolling operations during FY27 will be undertaken by NHAI under the prevailing short-term contract modality.
- Accordingly, FY27 revenue has been estimated based on historical bidding trends for tolling contracts and is assumed to be 5%–10% lower than the estimated actual revenue.
- Consistent with this arrangement, manpower-related expenses for tolling operations have been excluded from O&M costs as confirmed by the client.

# Traffic and revenue forecast: Nallur TP / Durainallur TP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 8.1% | 7.8% | 7.6% | 7.1% | 7.2% | 7.4% | 6.7% | 5.7% | 6.5% |
| Mini LCV | 5.1% | 5.2% | 4.6% | 4.2% | 4.1% | 4.4% | 4.1% | 3.6% | 4.0% |
| LCV | 4.7% | 4.5% | 4.6% | 4.3% | 4.3% | 4.5% | 4.0% | 3.4% | 3.9% |
| Bus | 3.0% | 3.0% | 3.0% | 2.8% | 2.7% | 2.9% | 2.6% | 2.2% | 2.5% |
| 2A Truck | 6.2% | 6.3% | 6.5% | 6.0% | 5.8% | 6.2% | 5.7% | 4.9% | 5.5% |
| 3A Truck | 2.0% | 1.9% | 1.8% | 1.7% | 1.2% | 1.7% | 0.8% | 0.6% | 1.0% |
| MAV | 7.2% | 7.3% | 7.9% | 7.4% | 6.6% | 7.3% | 6.4% | 5.5% | 6.3% |
| **AADT** | **6.6%** | **6.5%** | **6.5%** | **6.1%** | **5.9%** | **6.2%** | **5.7%** | **4.9%** | **5.5%** |
| **PCU** | **6.3%** | **6.3%** | **6.6%** | **6.2%** | **5.8%** | **6.2%** | **5.7%** | **4.9%** | **5.5%** |

**Post-diversion growth rate**

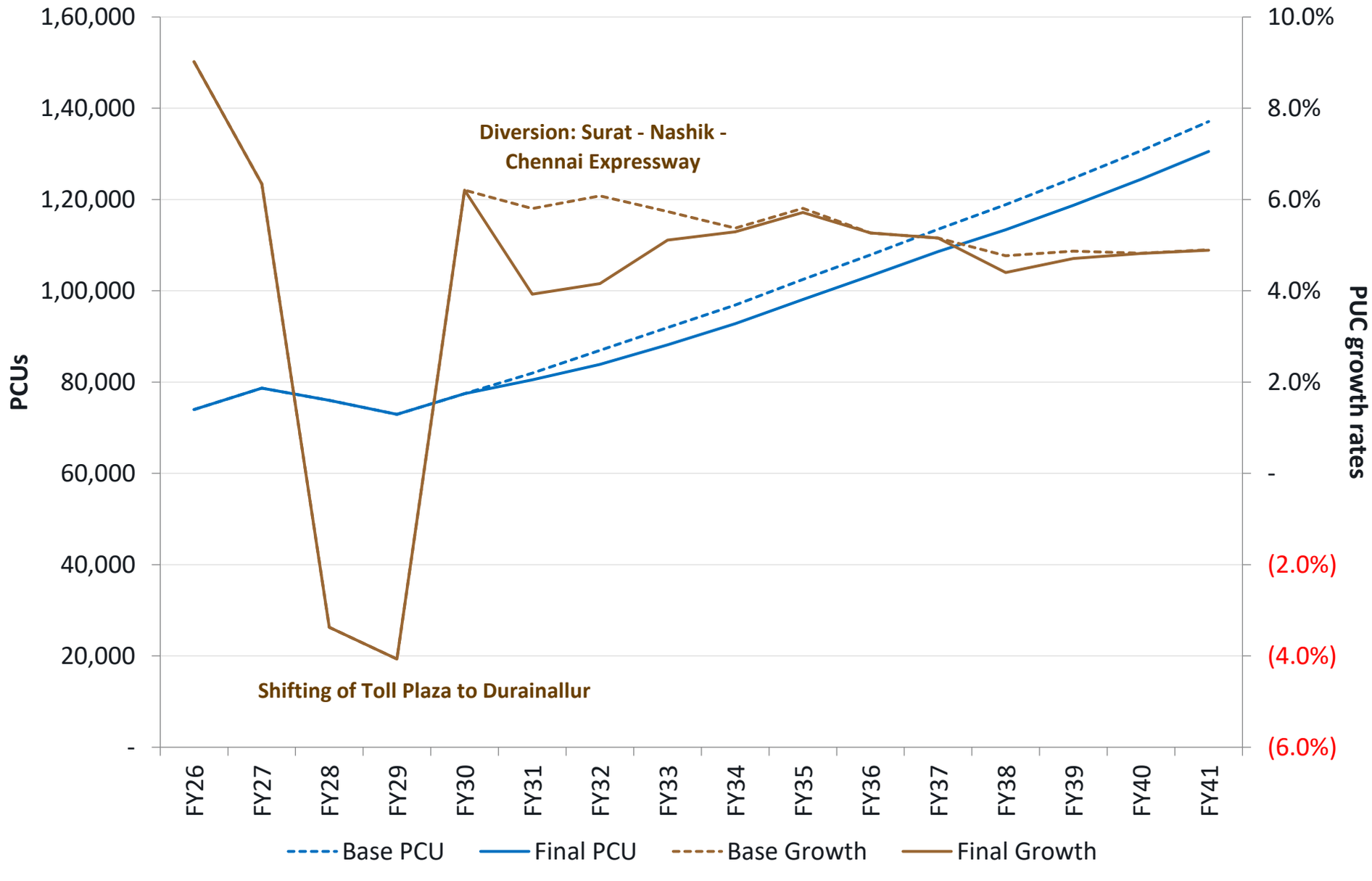
| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 8.1% | 7.8% | 7.6% | 7.1% | 6.8% | 7.4% | 6.6% | 5.2% | 6.3% |
| Mini LCV | 5.1% | 5.2% | 4.6% | 4.2% | 4.1% | 4.4% | 4.1% | 3.6% | 4.0% |
| LCV | 4.7% | 4.5% | 4.6% | 4.3% | 2.7% | 4.2% | 3.7% | 3.4% | 3.7% |
| Bus | 3.0% | 3.0% | 3.0% | 2.8% | 2.7% | 2.9% | 2.6% | 1.9% | 2.4% |
| 2A Truck | 6.2% | 6.3% | 6.5% | 6.0% | 3.5% | 5.7% | 5.1% | 4.9% | 5.2% |
| 3A Truck | 2.0% | 1.9% | 1.8% | 1.7% | (1.5%) | 1.2% | 0.0% | 0.6% | 0.5% |
| MAV | 7.2% | 7.3% | 7.9% | 7.4% | 3.9% | 6.7% | 5.6% | 5.5% | 5.8% |
| **AADT** | **6.6%** | **6.5%** | **6.5%** | **6.1%** | **4.6%** | **6.0%** | **5.3%** | **4.7%** | **5.3%** |
| **PCU** | **6.3%** | **6.3%** | **6.6%** | **6.2%** | **3.9%** | **5.9%** | **5.1%** | **4.8%** | **5.2%** |

Source: TIC estimate

# Traffic and revenue forecast: Nallur TP / Durainallur TP (2)

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**Pre- and Post-diversion growth rate snapshot**



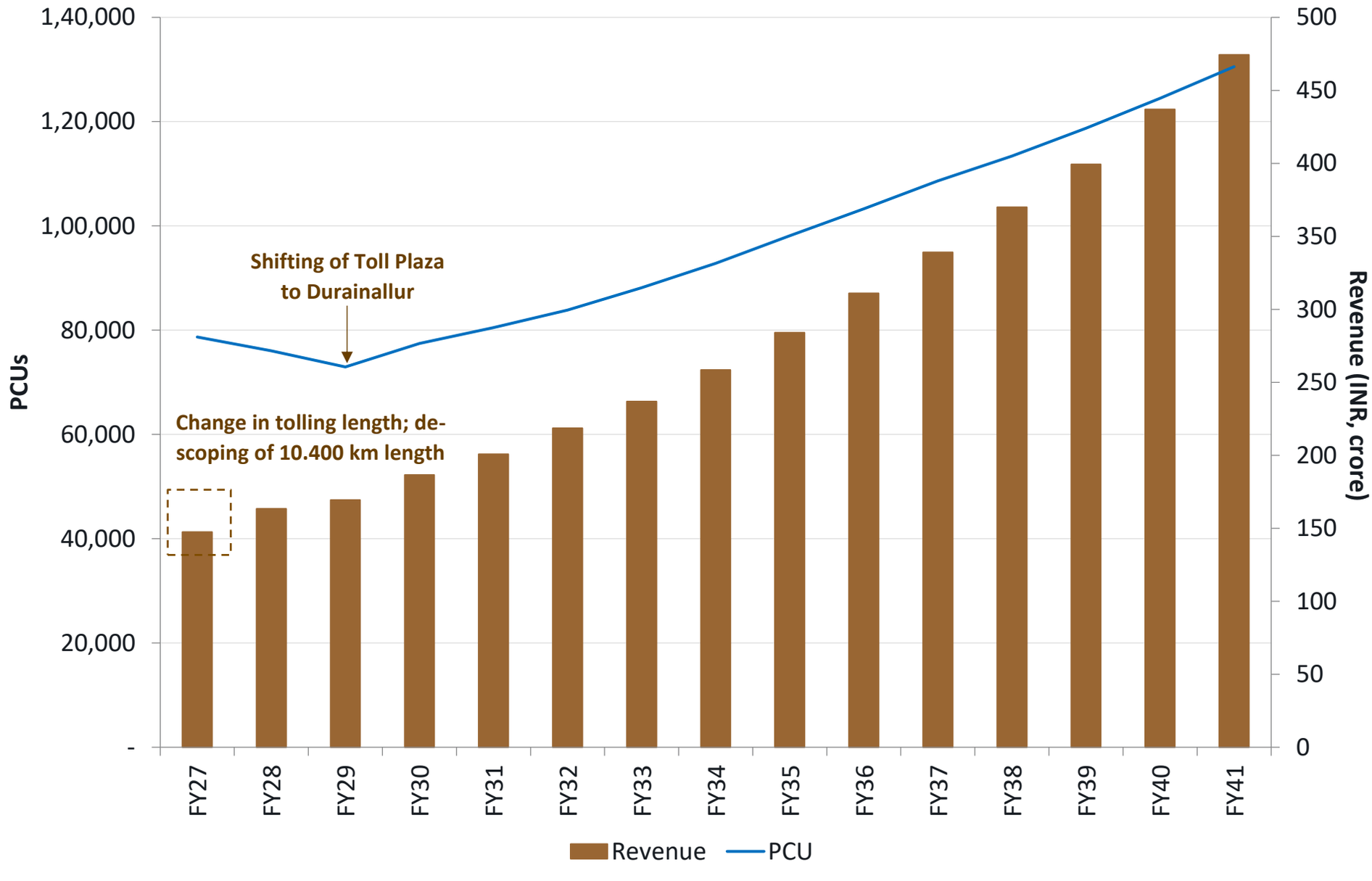

Source: TIC estimate

Nallur TP: till H1 FY28 and Durainallur TP: H2 FY28 till end of concession period

# Traffic and revenue forecast: Nallur TP / Durainallur TP (2)

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**Revenue and PCU snapshot**




Source: TIC estimate Nallur TP: till H1 FY28 and Durainallur TP: H2 FY28 till end of concession period

# Scenario development definition

**Most Likely Scenario without overloading**

- No overloading penalty/fees is considered at present based on understanding from site visit. In context of present ground situation and possibility of diversion in case of collecting overloading fees, the consultant did not consider overloading fee collection in most likely scenario.

**Most Likely Scenario with overloading**

The consultant considered following changes from the most likely (with overloading) case to determine most likely (with overloading) scenario:

- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey.

**Optimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine optimistic scenario:

- GDP: increase (addition) of 0.25% from FY27 to FY35
- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey
- Delayed the impact due to Surat Chennai expressway and Chennai Hyderabad High Speed Rail by 1 and 2 years respectively

**Pessimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine pessimistic scenario:

- GDP: decrease (subtraction) of 0.25% from FY27 to FY35
- No overloading penalty/fees is being levied
- Prompt the impact due to Surat Chennai expressway and Chennai Hyderabad High Speed Rail by 1 and 2 years respectively

Detailed traffic and revenue forecast for ‘Most likely scenario without overloading’ is exhibited in Appendix B.

# Scenario summary: Nallur TP / Durainallur TP (1)

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| | Most likely without overloading | | | Most likely with overloading | | | Optimistic scenario | | | Pessimistic scenario | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FY** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** |
| **FY27** | 78,689 | 6.3% | 147 | 78,790 | 6.3% | 147 | 79,374 | 6.6% | 147 | 78,511 | 6.1% | 147 |
| **FY28 H1** | 83,664 | 6.3% | 87 | 83,772 | 6.3% | 95 | 84,585 | 6.6% | 88 | 83,287 | 6.1% | 86 |
| **FY28 H2*** | 68,410 | - | 77 | 68,515 | - | 85 | 69,246 | - | 78 | 68,105 | - | 76 |
| **FY29** | 72,944 | 6.6% | 169 | 73,058 | 6.6% | 188 | 74,013 | 6.9% | 172 | 72,449 | 6.4% | 168 |
| **FY30** | 77,472 | 6.2% | 187 | 77,593 | 6.2% | 207 | 78,298 | 5.8% | 209 | 75,414 | 4.1% | 181 |
| **FY31** | 80,515 | 3.9% | 201 | 80,691 | 4.0% | 222 | 83,083 | 6.1% | 228 | 78,171 | 3.7% | 195 |
| **FY32** | 83,864 | 4.2% | 219 | 84,205 | 4.4% | 235 | 86,944 | 4.6% | 243 | 82,358 | 5.4% | 215 |
| **FY33** | 88,152 | 5.1% | 237 | 88,567 | 5.2% | 252 | 90,396 | 4.0% | 257 | 86,746 | 5.3% | 233 |
| **FY34** | 92,817 | 5.3% | 258 | 93,314 | 5.4% | 272 | 95,033 | 5.1% | 277 | 91,137 | 5.1% | 254 |
| **FY35** | 98,126 | 5.7% | 284 | 98,716 | 5.8% | 296 | 1,00,775 | 6.0% | 302 | 96,120 | 5.5% | 278 |
| **FY36** | 1,03,294 | 5.3% | 311 | 1,03,982 | 5.3% | 321 | 1,06,160 | 5.3% | 327 | 1,00,824 | 4.9% | 304 |
| **FY37** | 1,08,619 | 5.2% | 339 | 1,09,414 | 5.2% | 346 | 1,11,715 | 5.2% | 353 | 1,05,853 | 5.0% | 331 |
| **FY38** | 1,13,399 | 4.4% | 370 | 1,14,234 | 4.4% | 377 | 1,17,052 | 4.8% | 386 | 1,10,888 | 4.8% | 362 |
| **FY39** | 1,18,739 | 4.7% | 399 | 1,19,617 | 4.7% | 407 | 1,22,763 | 4.9% | 418 | 1,16,276 | 4.9% | 391 |
| **FY40** | 1,24,460 | 4.8% | 437 | 1,25,383 | 4.8% | 446 | 1,28,241 | 4.5% | 456 | 1,21,869 | 4.8% | 428 |
| **FY41** | 1,30,545 | 4.9% | 474 | 1,31,519 | 4.9% | 484 | 1,34,323 | 4.7% | 494 | 1,27,819 | 4.9% | 464 |
| **Total (FY27-FY46)** | | | **4,196** | | | **4,382** | | | **4,437** | | | **4,114** |

Source: TIC estimate  * Shifting of toll plaza to Durainallur

**Benchmark cases:**
Gujarat: Ahmedabad Mumbai Corridor (Mandva Toll) – 1,45,000 PCU
Gujarat: Ahmedabad Mumbai Corridor (Choryasi Toll) – 1,22,000 PCU
Haryana: Delhi Panipat Corridor (Bhagan Toll) – 1,07,000 PCU

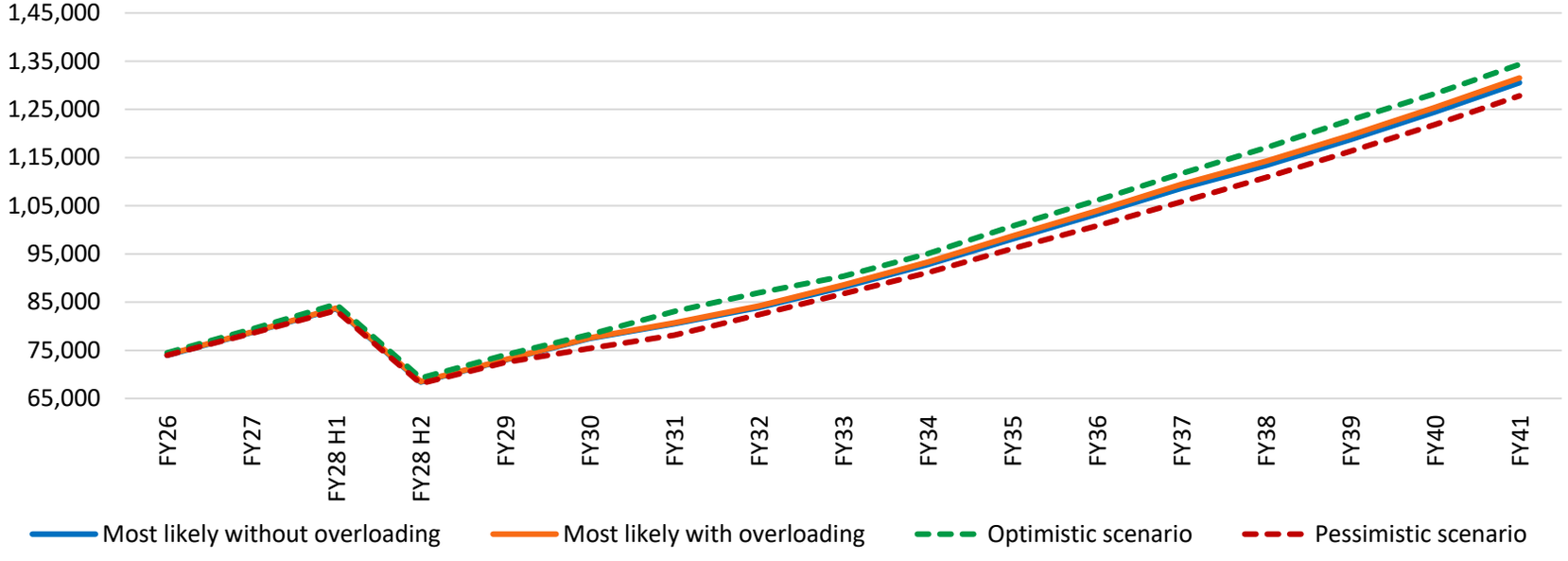
Reaches LOS B of 6-Laning 60,000 PCU/day

Reaches LOS C and D

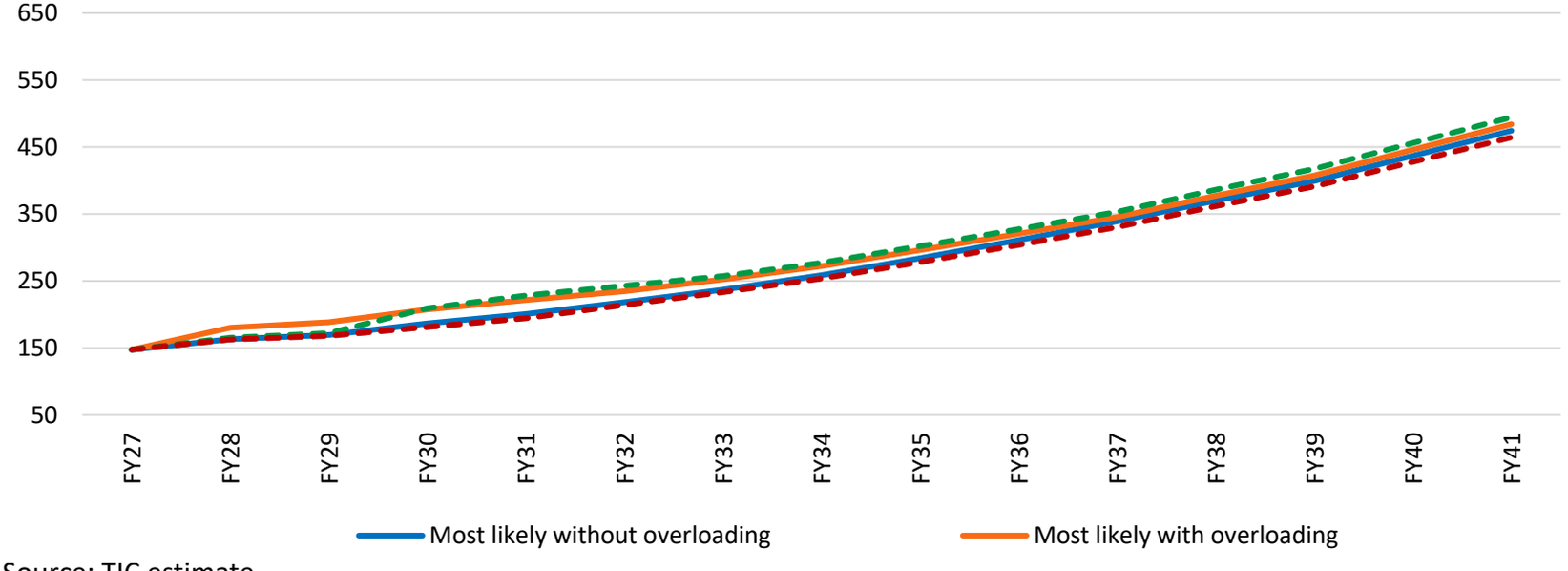
Design capacity for 6-lane National Highway is determined as per as per IRC: 106 and IRC: SP 87 and standard industry practice for determining Level of Service C/D/E.

# Scenario summary: Nallur TP / Durainallur TP (2)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# List of Appendices

**Appendix A:** Vehicle category-wise visual representation of origin-destination zones and top origin-destination pairs

**Appendix B:** Detailed traffic and revenue forecast – most likely scenario without overloading

## Appendix A:

- Vehicle category-wise visual representation of origin-destination zones
- Vehicle category-wise top origin-destination pairs

# Vehicle category-wise visual representation of OD (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin** | **Destination**

**CJV**







**Mini LCV**







Source: TIC analysis (map not to scale)

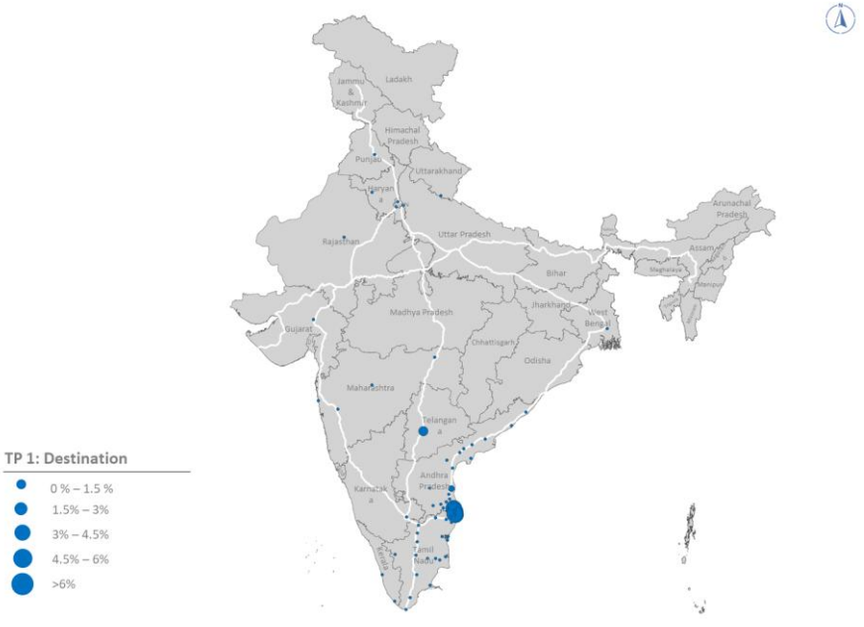
# Vehicle category-wise visual representation of OD (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin** | **Destination**

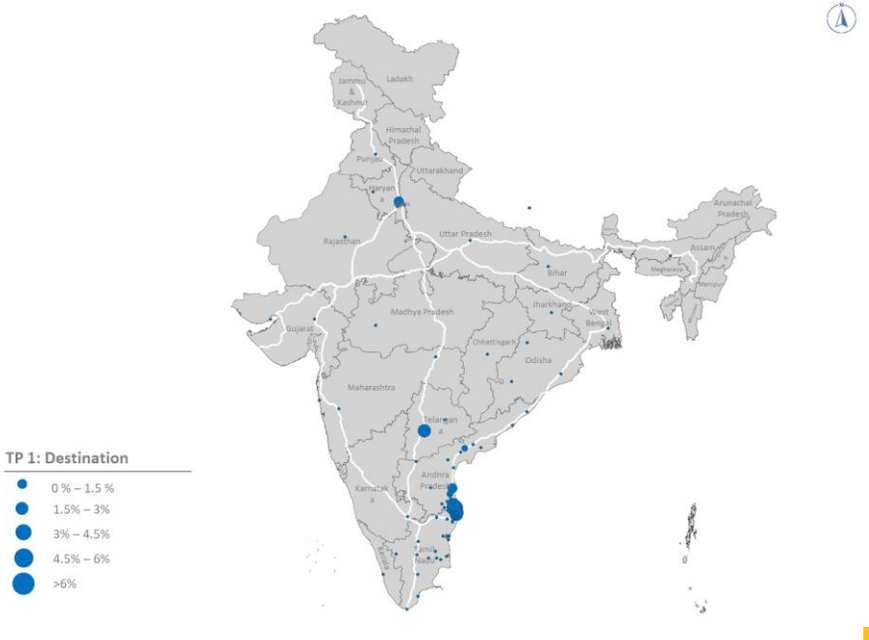
**LCV**




**2A**




Source: TIC analysis (map not to scale)

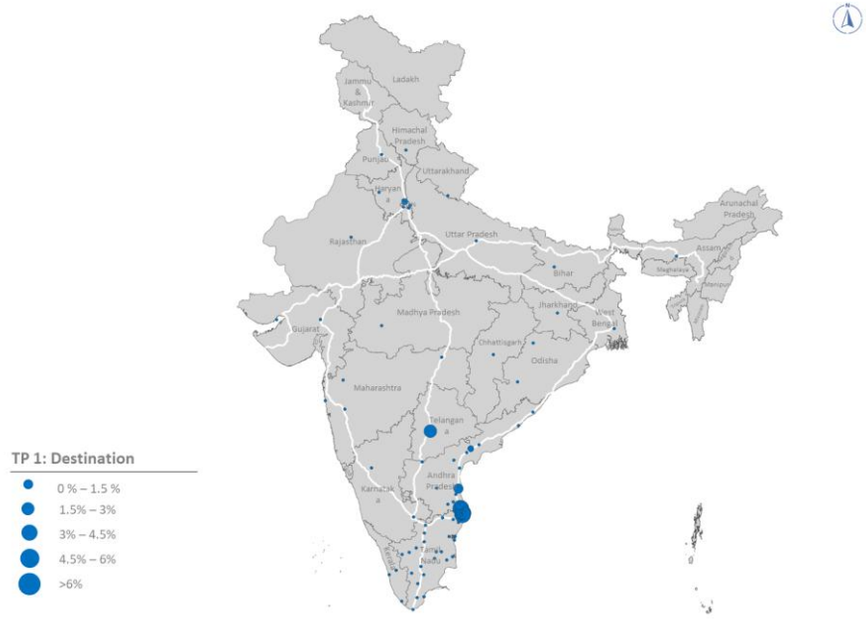
# Vehicle category-wise visual representation of OD (3)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin** | **Destination**

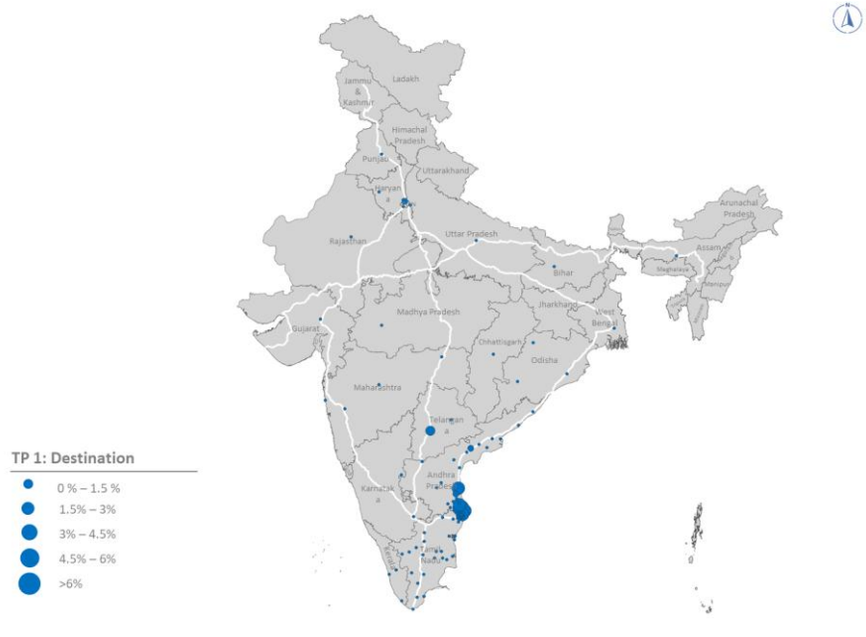
**3A**




**MAV**




Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (4)

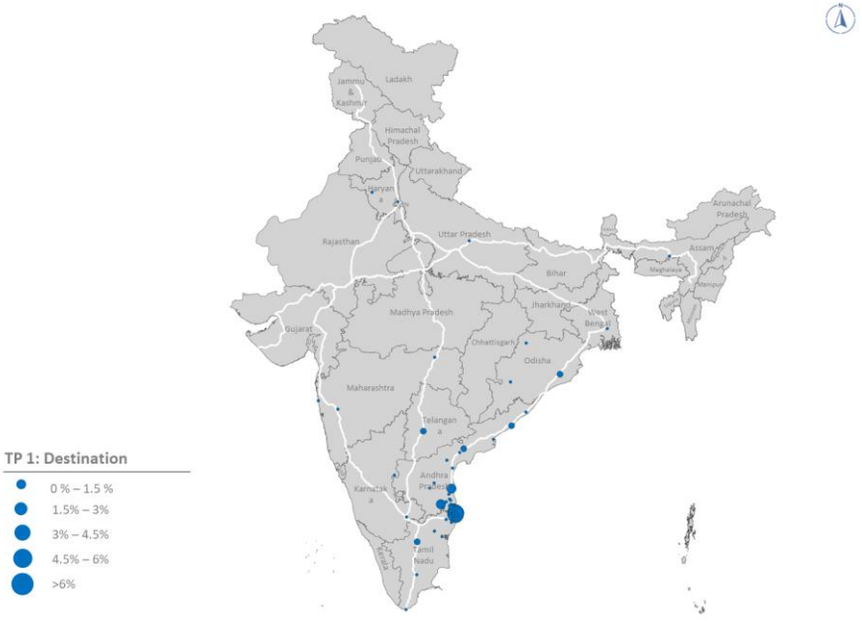
TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**

**Destination**

**Bus**



# Vehicle category-wise top OD pairs (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**CJV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | YSR | Adyar | 2% |
| 2 | YSR | Chennai | 1% |
| 3 | Adyar | YSR | 1% |
| 4 | Chennai | YSR | 1% |
| 5 | YSR | Kanchipuram | 1% |
| 6 | Kanchipuram | YSR | 1% |
| 7 | Srikalahasti | Adyar | 1% |
| 8 | Adyar | Srikalahasti | 1% |
| 9 | Kanchipuram | Srikalahasti | 1% |
| 10 | Chennai | Kadapa | 1% |

**Mini LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Colony Allimedu | Alinjivakkam | 4% |
| 2 | Alinjivakkam | Colony Allimedu | 3% |
| 3 | Anna Nagar | Colony Allimedu | 2% |
| 4 | Gummidipoondi | Anna Nagar | 2% |
| 5 | Alinjivakkam | Gummidipoondi | 2% |
| 6 | Anna Nagar | Gummidipoondi | 2% |
| 7 | Assisi Nagar | Gummidipoondi | 2% |
| 8 | Gummidipoondi | Alinjivakkam | 2% |
| 9 | Periyapalayam | Ambattur | 1% |
| 10 | Gummidipoondi | Ambattur | 1% |

**Bus**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Tirupati | Anna Nagar | 1% |
| 2 | Alinjivakkam | Gummidipoondi | 1% |
| 3 | Nellore | Anna Nagar | 1% |
| 4 | Alinjivakkam | Periyapalayam | 1% |
| 5 | Anna Nagar | Gudur | 1% |
| 6 | Kadirvedu | Bandikavanoor | 1% |
| 7 | Periyapalayam | Alinjivakkam | 1% |
| 8 | Tada | Anna Nagar | 1% |
| 9 | Assisi Nagar | Nellore | 1% |
| 10 | Anna Nagar | Sricity | 1% |

**LCV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ambattur | Gummidipoondi | 3% |
| 2 | Gummidipoondi | Assisi Nagar | 2% |
| 3 | Colony Allimedu | Alinjivakkam | 2% |
| 4 | Anna Nagar | Gummidipoondi | 2% |
| 5 | Alinjivakkam | Gummidipoondi | 2% |
| 6 | Gummidipoondi | Alinjivakkam | 2% |
| 7 | Assisi Nagar | Gummidipoondi | 1% |
| 8 | Colony Allimedu | Anna Nagar | 1% |
| 9 | Gummidipoondi | Ambattur | 1% |
| 10 | Gummidipoondi | Anna Nagar | 1% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**2A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Gummidipoondi | Assisi Nagar | 2% |
| 2 | Assisi Nagar | Gummidipoondi | 2% |
| 3 | Gummidipoondi | Anna Nagar | 2% |
| 4 | Anna Nagar | Gummidipoondi | 1% |
| 5 | Ambattur | Gummidipoondi | 1% |
| 6 | Alinjivakkam | Gummidipoondi | 1% |
| 7 | Gummidipoondi | Alinjivakkam | 1% |
| 8 | Tada | Alinjivakkam | 1% |
| 9 | Delhi | Assisi Nagar | 1% |
| 10 | Gummidipoondi | Ambattur | 1% |

**3A**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Gummidipoondi | Assisi Nagar | 3% |
| 2 | Assisi Nagar | Gummidipoondi | 2% |
| 3 | Gummidipoondi | Alinjivakkam | 2% |
| 4 | Hyderabad | Assisi Nagar | 1% |
| 5 | Alinjivakkam | Gummidipoondi | 1% |
| 6 | Anna Nagar | Gummidipoondi | 1% |
| 7 | Ambattur | Gummidipoondi | 1% |
| 8 | Assisi Nagar | Colony Allimedu | 1% |
| 9 | Anna Nagar | Tada | 1% |
| 10 | Vijayawada | Assisi Nagar | 1% |

**MAV**

| Sr. No. | Origin-Destination Pairs | | Share |
|---|---|---|---|
| 1 | Ennore Port | Gummidipoondi | 2% |
| 2 | Gummidipoondi | Ennore Port | 1% |
| 3 | Gummidipoondi | Assisi Nagar | 1% |
| 4 | Tada | Alinjivakkam | 1% |
| 5 | Alinjivakkam | Nellore | 1% |
| 6 | Assisi Nagar | Gummidipoondi | 1% |
| 7 | Gummidipoondi | Alinjivakkam | 1% |
| 8 | Nellore | Assisi Nagar | 1% |
| 9 | Nellore | Alinjivakkam | 1% |
| 10 | Anna Nagar | Nellore | 1% |

Source: TIC analysis

## Appendix B:

- Detailed traffic and revenue forecast – most likely scenario without overloading

# Nallur TP / Durainallur TP (1): Traffic forecast (AADT)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 17,704 | 4,216 | 3,648 | 1,850 | 2,809 | 1,545 | 6,220 | **37,992** | **73,994** |
| **FY27** | 19,130 | 4,433 | 3,819 | 1,905 | 2,985 | 1,577 | 6,667 | **40,514** | **78,689** |
| **FY28 H1** | 20,618 | 4,661 | 3,991 | 1,961 | 3,172 | 1,607 | 7,150 | **43,161** | **83,664** |
| **FY28 H2** | 11,870 | 2,758 | 3,675 | 1,111 | 2,979 | 1,450 | 7,033 | **30,876** | **68,410** |
| **FY29** | 12,778 | 2,884 | 3,845 | 1,145 | 3,171 | 1,477 | 7,585 | **32,886** | **72,944** |
| **FY30** | 13,685 | 3,007 | 4,009 | 1,178 | 3,363 | 1,502 | 8,142 | **34,885** | **77,472** |
| **FY31** | 14,613 | 3,130 | 4,119 | 1,210 | 3,482 | 1,480 | 8,462 | **36,496** | **80,515** |
| **FY32** | 15,587 | 3,264 | 4,228 | 1,242 | 3,610 | 1,454 | 8,834 | **38,219** | **83,864** |
| **FY33** | 16,650 | 3,401 | 4,391 | 1,276 | 3,803 | 1,453 | 9,316 | **40,290** | **88,152** |
| **FY34** | 17,737 | 3,536 | 4,563 | 1,307 | 4,012 | 1,462 | 9,857 | **42,474** | **92,817** |
| **FY35** | 18,933 | 3,680 | 4,748 | 1,341 | 4,241 | 1,471 | 10,496 | **44,910** | **98,126** |
| **FY36** | 20,134 | 3,822 | 4,929 | 1,373 | 4,468 | 1,481 | 11,105 | **47,314** | **1,03,294** |
| **FY37** | 21,360 | 3,966 | 5,110 | 1,406 | 4,703 | 1,492 | 11,739 | **49,776** | **1,08,619** |
| **FY38** | 22,205 | 4,104 | 5,282 | 1,422 | 4,930 | 1,501 | 12,357 | **51,802** | **1,13,399** |
| **FY39** | 23,309 | 4,249 | 5,463 | 1,448 | 5,171 | 1,511 | 13,022 | **54,173** | **1,18,739** |
| **FY40** | 24,619 | 4,400 | 5,648 | 1,479 | 5,420 | 1,520 | 13,713 | **56,800** | **1,24,460** |
| **FY41** | 25,951 | 4,551 | 5,832 | 1,510 | 5,669 | 1,530 | 14,482 | **59,524** | **1,30,545** |

Source: TIC estimate

# Nallur TP / Durainallur TP (2): Traffic AADT growth rates

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | - | - |
| **FY27** | 8.1% | 5.1% | 4.7% | 3.0% | 6.2% | 2.0% | 7.2% | 6.6% | 6.3% |
| **FY28 H1** | 7.8% | 5.2% | 4.5% | 3.0% | 6.3% | 1.9% | 7.3% | 6.5% | 6.3% |
| **FY28 H2** | - | - | - | - | - | - | - | - | - |
| **FY29** | 7.6% | 4.6% | 4.6% | 3.0% | 6.5% | 1.8% | 7.9% | 6.5% | 6.6% |
| **FY30** | 7.1% | 4.2% | 4.3% | 2.8% | 6.0% | 1.7% | 7.4% | 6.1% | 6.2% |
| **FY31** | 6.8% | 4.1% | 2.7% | 2.7% | 3.5% | (1.5%) | 3.9% | 4.6% | 3.9% |
| **FY32** | 6.7% | 4.3% | 2.6% | 2.7% | 3.7% | (1.8%) | 4.4% | 4.7% | 4.2% |
| **FY33** | 6.8% | 4.2% | 3.8% | 2.7% | 5.4% | (0.0%) | 5.5% | 5.4% | 5.1% |
| **FY34** | 6.5% | 4.0% | 3.9% | 2.5% | 5.5% | 0.6% | 5.8% | 5.4% | 5.3% |
| **FY35** | 6.7% | 4.1% | 4.1% | 2.6% | 5.7% | 0.6% | 6.5% | 5.7% | 5.7% |
| **FY36** | 6.3% | 3.8% | 3.8% | 2.4% | 5.4% | 0.7% | 5.8% | 5.4% | 5.3% |
| **FY37** | 6.1% | 3.8% | 3.7% | 2.4% | 5.2% | 0.7% | 5.7% | 5.2% | 5.2% |
| **FY38** | 4.0% | 3.5% | 3.4% | 1.1% | 4.8% | 0.6% | 5.3% | 4.1% | 4.4% |
| **FY39** | 5.0% | 3.5% | 3.4% | 1.8% | 4.9% | 0.6% | 5.4% | 4.6% | 4.7% |
| **FY40** | 5.6% | 3.6% | 3.4% | 2.2% | 4.8% | 0.6% | 5.3% | 4.8% | 4.8% |
| **FY41** | 5.4% | 3.4% | 3.2% | 2.1% | 4.6% | 0.6% | 5.6% | 4.8% | 4.9% |

Source: TIC estimate

# Nallur TP / Durainallur TP (3): Revenue forecast (INR Crore)

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **147.5** |
| **FY28 H1** | 14.0 | 4.1 | 6.2 | 3.8 | 10.8 | 6.4 | 41.3 | **86.5** |
| **FY28 H2** | 10.0 | 2.4 | 5.7 | 2.1 | 10.1 | 5.8 | 40.6 | **76.8** |
| **FY29** | 21.9 | 5.3 | 12.4 | 4.6 | 22.3 | 12.2 | 90.7 | **169.4** |
| **FY30** | 24.9 | 5.8 | 13.4 | 4.8 | 24.4 | 12.9 | 100.3 | **186.6** |
| **FY31** | 27.1 | 6.3 | 14.2 | 5.2 | 26.3 | 13.2 | 108.5 | **200.8** |
| **FY32** | 30.6 | 6.9 | 15.1 | 5.5 | 28.4 | 13.5 | 118.5 | **218.5** |
| **FY33** | 33.2 | 7.3 | 16.4 | 5.9 | 31.0 | 13.9 | 129.3 | **236.9** |
| **FY34** | 36.6 | 7.8 | 17.6 | 6.2 | 33.9 | 14.6 | 141.7 | **258.4** |
| **FY35** | 41.1 | 8.5 | 19.1 | 6.7 | 37.4 | 15.2 | 156.2 | **284.1** |
| **FY36** | 44.5 | 9.0 | 20.7 | 7.1 | 41.0 | 15.9 | 172.8 | **311.0** |
| **FY37** | 49.3 | 9.7 | 22.2 | 7.5 | 44.4 | 16.6 | 189.2 | **339.0** |
| **FY38** | 54.3 | 10.8 | 23.9 | 7.9 | 48.6 | 17.4 | 207.0 | **369.9** |
| **FY39** | 57.9 | 11.4 | 25.7 | 8.4 | 52.8 | 18.1 | 225.2 | **399.4** |
| **FY40** | 63.9 | 12.3 | 27.2 | 8.9 | 57.8 | 19.0 | 247.9 | **437.0** |
| **FY41** | 69.9 | 13.1 | 29.3 | 9.4 | 62.6 | 19.7 | 270.3 | **474.5** |

Source: TIC estimate

# Nallur TP / Durainallur TP (4): Revenue growth rates

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 2.4% | (9.1%) | 10.2% | (10.6%) | 14.2% | 7.1% | 17.4% | **10.7%** |
| **FY29** | (8.6%) | (19.0%) | 3.5% | (23.0%) | 6.6% | 0.2% | 10.9% | **3.7%** |
| **FY30** | 13.6% | 9.8% | 8.1% | 6.2% | 9.5% | 5.6% | 10.6% | **10.1%** |
| **FY31** | 8.8% | 7.7% | 6.4% | 6.9% | 7.8% | 2.2% | 8.1% | **7.6%** |
| **FY32** | 13.0% | 9.7% | 6.4% | 7.0% | 8.0% | 2.0% | 9.2% | **8.9%** |
| **FY33** | 8.4% | 6.7% | 8.4% | 6.2% | 9.0% | 3.1% | 9.1% | **8.4%** |
| **FY34** | 10.4% | 6.0% | 7.2% | 6.2% | 9.3% | 5.4% | 9.6% | **9.1%** |
| **FY35** | 12.2% | 9.2% | 8.5% | 7.0% | 10.2% | 4.3% | 10.2% | **9.9%** |
| **FY36** | 8.3% | 6.7% | 8.3% | 6.7% | 9.8% | 4.1% | 10.7% | **9.5%** |
| **FY37** | 10.8% | 7.8% | 7.5% | 5.4% | 8.3% | 4.7% | 9.5% | **9.0%** |
| **FY38** | 10.2% | 10.4% | 7.6% | 5.6% | 9.4% | 4.8% | 9.4% | **9.1%** |
| **FY39** | 6.5% | 5.7% | 7.5% | 5.4% | 8.7% | 3.8% | 8.8% | **8.0%** |
| **FY40** | 10.4% | 8.0% | 6.0% | 6.6% | 9.3% | 5.1% | 10.1% | **9.4%** |
| **FY41** | 9.4% | 6.8% | 7.7% | 5.8% | 8.3% | 4.0% | 9.0% | **8.6%** |

Source: TIC estimate

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# Nelamangala Tumakuru section of NH48 in Karnataka









**Traffic Due Diligence – Final Report**

**National Highways Authority of India**

January 2026

TRANSLINK®
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*Smart Consulting*

# Control information

| | |
|---|---|
| **Contract Reference:**<br>Letter of Commencement - FINDIV-16014(11)/1/2024-O/o CGM (Finance-II)/e-265207/116 dated 7th August 2025 | **Identification & Traceability:**<br>TIC/401/TF/TDD/R1-Final Report |
| **Assignment Title:** Traffic Due Diligence – Nelamangala Tumakuru section of NH48 in Karnataka | |
| **Client** | **National Highways Authority of India**<br>Sector 10, Dwarka, New Delhi 110075 |
| **Consultant** | **Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited**<br>1103, I Square Corporate Park<br>Science City Road, Ahmedabad 380060 |

**Issue and Revision Records**

| Date | Revisions | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| 09.01.2026 | R1 | Darshan Doshi<br>Gaurav Chotaliya<br>Dhruv Panchal<br>Rutvik Dhameliya | Rinku Kanani<br>Yagnesh Dave | Tejas Patel | Traffic Due Diligence – Final Report |

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**Appendix A:** Vehicle category-wise visual representation of origin-destination zones and top origin-destination pairs

**Appendix B:** Origin-Destination Survey Analysis for proposed toll plaza locations

**Appendix C:** Detailed traffic and revenue forecast – most likely scenario without overloading

# Abbreviations (1)

| | |
|---|---|
| **AADC** | Annual Average Daily Collection |
| **AADT** | Annual Average Daily Traffic |
| **ADB** | Asian Development Bank |
| **ADT** | Average Daily Traffic |
| **AL** | Axle Load |
| **APC** | Annual Potential Collection |
| **BFSI** | Banking, Financial Services, and Insurance |
| **BOT** | Build-Operate-Transfer |
| **BPO** | Business Process Outsourcing |
| **CAGR** | Compound Annual Growth Rate |
| **CBIC** | Chennai – Bengaluru Industrial Corridor |
| **CJV** | Car/ Jeep/ Van |
| **CP** | Check Plaza |
| **CPI** | Consumer Price Index |
| **CTVC** | Classified Traffic Volume Count |
| **DBFOT** | Design, Build, Finance, Operate, and Transfer |
| **DPR** | Detailed Project Report |
| **EoDB** | Ease of Doing Business |
| **EPC** | Engineering, Procurement and Construction |
| **ETC** | Electronic Toll Collection |
| **EV** | Electric Vehicle |
| **FMCG** | Fast Moving Consumer Goods |
| **FY** | Financial Year |
| **GDP** | Gross Domestic Product |
| **GSDP** | Gross State Domestic Product |
| **GST** | Goods and Services Tax |
| **GVA** | Gross Value Added |
| **HAM** | Hybrid Annuity Mode |
| **HCV** | Heavy Commercial Vehicle |
| **HQ** | Headquarter |
| **ICD** | Inland Container Depot |
| **IHMCL** | Highways Management Company Limited |
| **INR** | Indian Rupee |
| **IRC** | Indian Road Congress |
| **IT** | Information technology |
| **ITES** | Information Technology Enabled Services |
| **KIADB** | Karnataka Industrial Areas Development Board |
| **Km** | Kilometer |
| **KWIN** | Knowledge, Wellbeing, Innovation |
| **LCV** | Light Commercial Vehicle |
| **LOS** | Level of Service |
| **MADT** | Monthly Average Daily Traffic |
| **MAV** | Multi Axle Vehicle |
| **MCW** | Main Carriageway |
| **MLFF** | Multi Lane Free Flow |
| **MMLP** | Multimodal Logistics Park |
| **MoRTH** | Ministry of Road Transport and Highways |
| **MoSPI** | Ministry of Statistics and Programme Implementation |

# Abbreviations (2)

| | |
|---|---|
| **MSME** | Micro, Small, and Medium Enterprises |
| **MT** | Million Tonnes |
| **MTPA** | Million Tonnes Per Annum |
| **NE** | National Expressway |
| **NH** | National Highway |
| **NHAI** | National Highways Authority of India |
| **NHIT** | National Highways Infra Trust |
| **NMP** | National Monetisation Pipeline |
| **OD** | Origin – Destination |
| **OECD** | Organisation for Economic Co-operation and Development |
| **OSV** | Oversized Vehicle |
| **PCI** | Per Capita Income |
| **PCU** | Passenger Car Unit |
| **PIA** | Project Influence Area |
| **PIU** | Project Implementation Unit |
| **PPP** | Public-Private Partnership |
| **QADT** | Quarterly Average Daily Traffic |

| | |
|---|---|
| **RBI** | Reserve Bank of India |
| **RO** | Regional Office |
| **RoS** | Rest of State |
| **RTO** | Regional Transport Office |
| **SCF** | Seasonal Correction Factor |
| **SH** | State Highway |
| **SIAM** | Society of Indian Automobile Manufacturers |
| **STRR** | Satellite Town Ring Road |
| **TAZ** | Traffic Analysis Zone |
| **TIC** | Translink Infrastructure Consultants Private Limited |
| **TOT** | Toll, Operate, Transfer |
| **TP** | Toll Plaza |
| **WADT** | Weekly Average Daily Traffic |
| **WPI** | Wholesale Price Index |
| **2A** | 2 Axle |
| **3A** | 3 Axle |
| **3PL** | Third-Party Logistics |

# Chapter 1: Introduction

- The assignment
- Objective and Scope of Work
- Approach and methodology
- Organisation of the report

This chapter outlines assignment background, scope of work, approach and methodology employed to ensure successful execution of the assignment.

Approach and methodology section highlights the structured approach which has been followed to gather data, conduct analysis, and make informed decisions throughout the project lifecycle. By employing a robust methodology, the consultant aims to ensure the accuracy, efficiency and reliability of the assignment’s outcomes.

# The assignment

**Ministry of Road Transport and Highways** (MoRTH) has entrusted **National Highways Authority of India** (hereinafter referred to as '**NHAI'** or '**client'**) for monetisation of public funded operational national highway projects under the framework of National Monetisation Pipeline (NMP).

In this context, NHAI has commissioned Translink Infrastructure Consultants Private Limited in association with Infra Brainiacs Private Limited (hereinafter referred to as '**TIC'** or '**consultant'**) to carry out traffic due diligence for following national highway section in Tamil Nadu. (hereinafter referred to as '**project highway**').

**Project highway under asset monetization programme**

| Highway section | Toll plaza | Concerned NHAI field office |
|---|---|---|
| **Nelamangala Tumakuru section of NH48** | Kulumepalya (Bengaluru Rural district)<br>Chokkenahalli (Tumakuru district)<br>Halenijagal (Tumakuru district)<br>Bharathipura and Honnenahalli - Check Plazas (Bengaluru Rural district)<br>Dobbaspet and Halenijagal - Check Plazas (Tumakuru district) | Project Implementation Unit – Tumakuru<br>Regional Office – Bengaluru |

Source: Client

This document is the final report incorporating traffic data updates received up to October 2025 and confirmation from the client dated 6th January 2026 for recommended scenario. The report presents our understanding of the project highway, trend analysis of traffic and revenue, primary data analysis and traffic and revenue forecast for a concession period of 15 years.

# Objective and Scope of Work

The principal objective of the study is to determine traffic and revenue forecast for 15 years. This assessment provides input to stakeholders to evaluate viable monetization options for the project highway.

The broad **scope of the work** of the assignment is as follows:

- Review of available historical traffic and revenue data and relevant document received from the client
- Carrying out traffic survey and analysis at the project highway :
  - 7 days continuous and direction-wise classified traffic volume count
  - 3 days origin-destination
  - 3 days axle load
  - Any other surveys on the project highway and alternate corridors as per the need
- Site visit and stakeholder consultation to understand traffic characteristics and network dynamics
- Review of observed growth trends of the project highway and corridor subject to availability of data
- Estimate vehicle category-wise traffic and revenue for the base year
- Determine future toll rates
- Assessing diversion due to competing transportation modes and routes, network development, future development plans in the region, etc.
- Vehicle category and ticket distribution-wise traffic and revenue forecast for concession period
- Scenario development: most likely, optimistic and pessimistic

# Approach

The consultant adopted comprehensive approach to address the need of this assignment with key five focus areas as summarised in below figure.

**Approach for the assignment**



| Expertise in motion | Forecasting forward flow | Economy drive highways | Data drives decisions; paves road to resilience | Trust in travel |
|---|---|---|---|---|
| Team with transportation engineering expertise and experience | Encapsulate all possible exogeneous impacts on traffic growth | Models integrating economic indicators for traffic growth projections | Using statistical techniques and tools for accurate insights and risk assessments | Maintain integrity, transparency, and ethical practices |

Source: TIC

# Methodology (1)

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**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Project highway appreciation** | ▪ Assess the macro and micro road network, considering the overall road infrastructure and its specific sections<br>▪ Identify homogeneous/tollable sections with similar traffic patterns<br>▪ Evaluate any developments in the vicinity of the project highway that may impact economic growth and traffic volume<br>▪ Finalize survey locations and formats for data collection |
| **Secondary data collection** | ▪ Gather relevant past detailed project report / traffic study report and draft concession agreement as per availability<br>▪ Collect historical monthly traffic data for the toll plazas of the project highway and neighbouring toll plazas on the corridor, both upstream and downstream<br>▪ Source vehicle category/mapper class wise electronic toll collection (ETC) data as most reliable dataset from Indian Highways Management Company Limited (IHMCL) through the client for toll plazas under study and on the corridor and alternate corridors as well as across the country (subject to receipt from the client or as per availability in the public domain) for understanding of the various trends of economy as well as modal / vehicle technology shift<br>▪ Gather economic indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), per capita income, national, state and district Gross Domestic Product (GDP), employment rates and specific commodities related sales e.g., automobile, agriculture production etc.<br>▪ Gather demographic profiles and population data<br>▪ Collect secondary data related to alternative routes and modal shift developments if applicable |
| **Primary data collection** | ▪ 7-day continuous videography-based classified traffic volume count survey to gather independent traffic volume data<br>▪ 3-day origin-destination and commodity survey to understand travel patterns, trip purposes, influence region, growth drivers etc.<br>▪ 3-day axle load survey to determine the load characteristics of vehicles<br>▪ 1-day vehicle registration number plate survey to estimate ticket segmentation of local commercial vehicle without national permit if required<br>▪ Stakeholder consultation through interviews and focused group discussions |

Source: TIC

# Methodology (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Methodology for the assignment**

| Key sections | Particulars |
|---|---|
| **Data analysis** | ▪ Review historical traffic and revenue data to understand growth trend, seasonality variation, elasticities for identified growth drivers through regression analysis subject to data availability and benchmark analysis of corridor<br>▪ Conduct data hygiene checks to identify errors, biases and inconsistencies in the collected data<br>▪ Analyse Weekly Average Daily Traffic (WADT) including peak hour, day and night traffic variances, as well as directional distribution of traffic for further input to various analysis<br>▪ Identify Traffic Analysis Zones (TAZ) and Primary Influence Areas (PIA)<br>▪ Determine vehicle category-wise origin-destination matrices, trip lengths and purposes<br>▪ Develop geographical distribution diagrams of traffic to visualize travel patterns<br>▪ Perform commodity and loading analysis<br>▪ Analyse historical journey tickets, including single, 24-hour return, daily multiple, monthly, local pass tickets and annual pass for passenger cars and understand the ground level situations for underlying patterns especially forced exemption if any in the case specific region and possibilities of reduction through proposed technological and administrative measures<br>▪ Estimate Annual Average Daily Traffic (QADT/AADT) for the base and future years as per case specific requirement<br>▪ Develop a traffic diversion model using IRC:SP:30 modality |
| **Forecasting** | ▪ Utilize an econometric model based on IRC: 108-2015 guidelines to analyse the relationship between vehicle traffic/PIA and socio-economic parameters such as Per Capita Income (PCI), Gross Domestic Product (GDP) of district/state/national, population, specific economic activities etc. as relevant with the identified growth drivers<br>▪ Calculate growth rates for each vehicle category. Adjust the growth rates based on induced traffic and traffic diversion effects, if applicable<br>▪ Perform traffic forecasting for 15 years period - normal traffic followed by generated and diverted traffic due to network and developmental impacts<br>▪ Conduct capacity analysis to assess the adequacy of the project highway<br>▪ Forecast annual toll revenue for 15 years based on traffic and toll rates projections |
| **Sensitivity and risk analysis** | ▪ Identify variables (macro-economic, growth drivers and relationships, scale and timeline of diversions, etc.) that significantly impact annual toll revenue and assess their sensitivity<br>▪ Develop scenarios for identified risks |

Source: TIC

# Organisation of the report

**Report structure**

| Sr. No. | Chapter | Particulars |
|---|---|---|
| 1 | **Introduction** | Scope of the assignment, approach and methodology |
| 2 | **Project highway profile** | Characteristics of the project highway like network understanding, socio-economic background of the region and proposed infrastructure developments in the influence region and network |
| 3 | **Traffic analysis** | Past performance of the project highway based on historical traffic and revenue data, traffic survey data analysis |
| 4 | **Economic context and traffic growth** | Economic context of influence region, determination of traffic growth drivers and associated travel demand elasticities |
| 5 | **Baseline traffic and revenue forecast** | Elaborates method adopted for determining base year AADT, toll ticket distribution and revenue reconciliation |
| 6 | **Diversion analysis** | Impacts on the project highway due to proposed infrastructure developments in the influence region and network, assessment of induced traffic demand |
| 7 | **Final traffic and revenue forecast** | Traffic and revenue forecasts including diversions, scenario cases: most likely with and without overloading, optimistic and pessimistic |

Source: TIC

# Chapter 2: Project highway profile

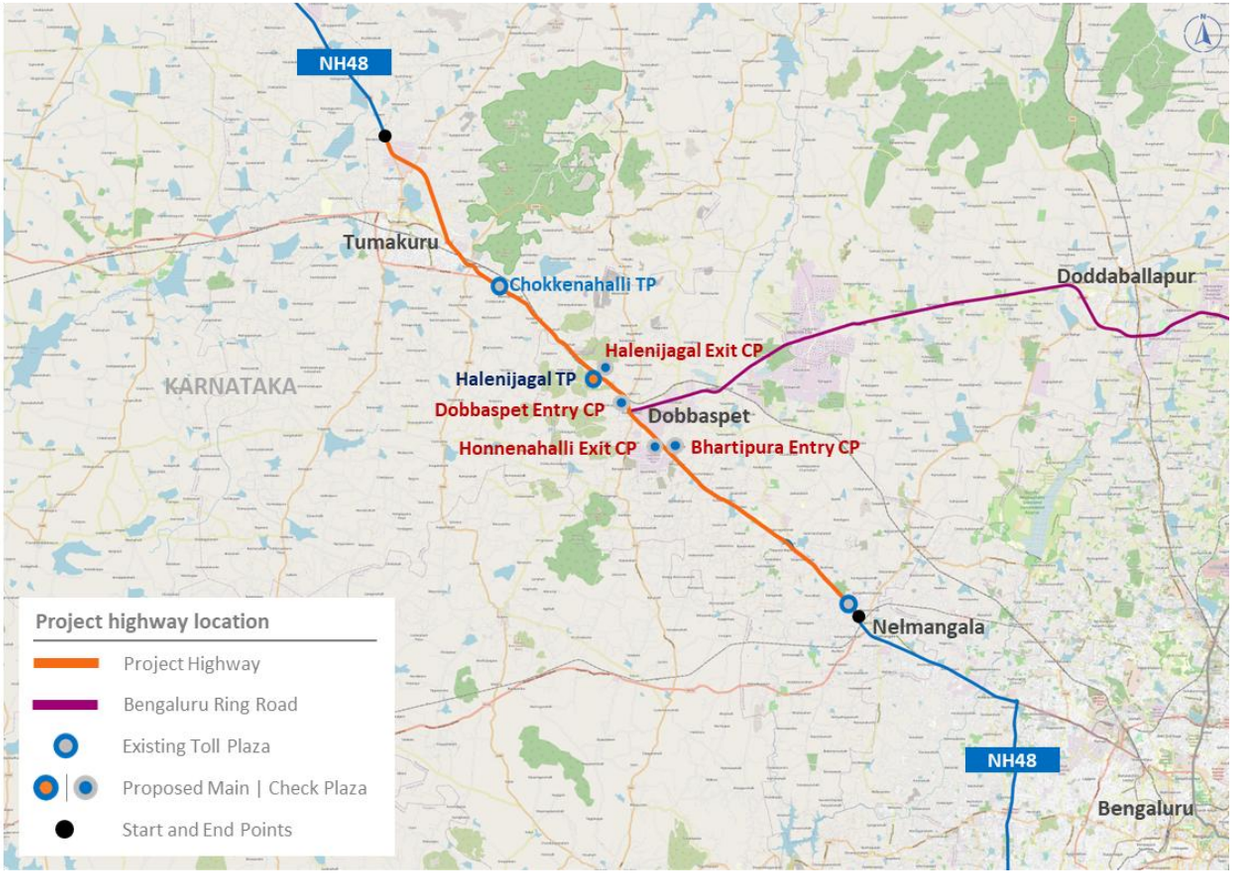
- Location and key details
- Economic activities in the region
- Understanding of network and traffic corridors
- Proposed road network and infrastructure development in the influence region

This chapter exhibits our understanding of the project highway and key details, economic activities in the region and strategic network context based on site visit and stakeholder consultation. It covers list of infrastructure project development in the region and network which would have impact on the performance of the project highway.

# Location of the project highway

**Project highway location in national and state context**






Source: TIC analysis (map not to scale)

- **Located at the southern end of golden quadrilateral's ~1,000 km Mumbai – Bengaluru corridor (NH48)**, this point serves as gateway to Bengaluru and handles high volume of freight traffic moving towards western and northern India and neighbouring state of Tamil Nadu, supporting inter-state trade movement.
- The project highway **extends intra-state reach to Hassan/Mangaluru and Mysuru** of western Karnataka, through NH73/NH75 and NH984A/275 respectively, helping regional economy to grow with support of state capital.
- **~30 km section connecting Nelmangala (outskirts of Bengaluru) and Tumakuru,** increasingly seen as interconnected urban centers. The state government proposals aiming to develop Tumakuru as an extension or "Greater Bengaluru" through infrastructure like industrial corridors, smart city projects, and potential metro links, aiming to decongest Bengaluru and foster growth in the satellite town, creating a twin-city dynamic for economic and residential expansion.

# Project snapshot (1)

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**Key project details**

| Particulars | Nelamangala Tumakuru section of NH48 |
|---|---|
| **Length (km)** | **Present length:** 32.500 km<br>**Revised length:** 44.668 km for asset monetization proposal<br>Tolling of Tumakuru Bypass* (km 62.000 to km 74.168, length 12.168 km) is currently being exercised at adjacent Karjeevanahalli toll plaza (under BOT concession) and reimbursed to NHAI by BOT concessionaire. This section will be added for this monetization bundle. Hence, this 12.168 km length to be added for asset monetization proposal. |
| **Lane and pavement** | 4-lane divided carriageway, flexible pavement / rigid at toll plaza (4 to 6 lane widening is under implementation) |
| **Chainage** | km 29.500 (Nelmangala) to km 74.168 (Tumakuru Bypass end) |
| **History** | ▪ Nelamangala Tumakuru section was under 2 to 4 lane DBFOT (Toll) concession from June 2002 by JAS Toll Road Company Limited for 19 years. Concessionaire invoked arbitration in May 2017 in respect of various claims and finally the concession got terminated in April 2022.<br>▪ Post DBFOT concession termination, section was managed under public funded modality with short term toll contract **with NH Fee Rule 1997 which was revised to NH Fee Rules 2008 from 25th August 2025.**<br>▪ H G Infra Engineering Limited has been awarded 4 to 6 lane work in May 2022 under EPC mode for full length of 44.668 km (km 29.500 to km 74.168). Out of which km 49.900 to km 61.520 (11.62 km length) of section was de-scoped from EPC Contract and bid invited for revision in DPR.<br>– **Nelmangala to Dobbaspet:** 4 to 6 lane widening construction ongoing; expected completion by March 2027<br>– **Dobbaspet to Tumakuru:** bid invited for revision in 4 to 6 lane widening DPR; expected completion by September 2028<br>– **Tumakuru to Tumakuru Bypass End:** 4 to 6 lane widening construction ongoing; expected completion by March 2027 |
| **Present tolling modality** | 2 ETC enabled toll plazas<br>▪ **Kulumepalya** (km 30.000): for tollable section between Nelmangala (km 29.500) to Dobbaspet (km 50.000)<br>▪ **Chokkenahalli** (km 61.500): for tollable section between Dobbaspet (km 50.000) to Tumakuru (km 62.000)<br>▪ Tolling of Tumakuru Bypass (km 62.000 to km 74.168, length 12.168 km) is currently being exercised at adjacent Karjeevanahalli toll plaza (under BOT concession) and reimbursed to NHAI by BOT concessionaire. |

Source: PIU Tumakuru and NHAI HQ

* Tumakuru Bypass is only a name and does not meet the characteristics of a bypass for determining the tolling length i.e., 1.5 times of linear length rule is not applicable

# Project snapshot (2)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Key project details**

| Particulars | Nelamangala Tumakuru section of NH48 | | |
|---|---|---|---|
| **Tollable sections** | **Nelmangala to Dobbaspet** | **Dobbaspet to Tumakuru** | **Tumakuru Bypass*** |
| **Toll plaza locations** | **Kulumepalya** (km 30.000) | **Chokkenahalli** (km 61.500) | Toll being exercised at adjacent Karjeevanahalli toll plaza (km 105+530) as interim arrangement. |
| **District** | Bengaluru Rural | Tumakuru | Tumakuru |
| **Tolling start date** | 10th February 2004 | 10th February 2004 | 20th January 2015 |
| **Length (km)** | 20.500 | 12.000 | 12.168 |
| **Present tolling length (km)** | 22.444 | 13.350 | 12.848 |
| **ETC Traffic (FY26 till October 2025)** | 7 months ADT: 39,367<br>PCU corresponding 7 months ADT: 74,707 | 7 months ADT: 34,778<br>PCU corresponding 7 months ADT: 70,612 | Toll being collected for traffic of Karjeevanahalli toll plaza and tolling length of Tumakuru Bypass.<br><br>FY26 till 22nd Jun'25:<br>INR 11.79 Crore received by NHAI<br>INR 12.15 Crore collection by concessionaire |
| **ETC Traffic composition (FY26 till October 2025)** | 55% CJV/Mini LCV 20% 2A/LCV<br>9% Bus 16% 3A/MAV | 52% CJV/Mini LCV 19% 2A/LCV<br>10% Bus 19% 3A/MAV | |
| **ETC Revenue** | FY25 : INR 62 Crore<br>FY26 till Oct'25 : INR 39 Crore | FY25 : INR 58 Crore<br>FY26 till Oct'25 : INR 35 Crore | |
| **ETC Revenue composition (FY26 till October 2025)** | 29% CJV/Mini LCV 24% 2A/LCV<br>16% Bus 32% 3A/MAV | 26% CJV/Mini LCV 23% 2A/LCV<br>16% Bus 35% 3A/MAV | |
| **Micro-diversions at toll plaza location** | Nil | Nil | Nil |
| **Overloading penalty** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU Tumakuru / toll operators | | |

Source: PIU Tumakuru and NHAI HQ

* Tumakuru Bypass is only a name and does not meet the characteristics of a bypass for determining the tolling length i.e., 1.5 times of linear length rule is not applicable

# Project snapshot (3)

**Key project details**

| Particulars | Nelamangala Tumakuru section of NH48 | | |
|---|---|---|---|
| **Tollable sections** | **Nelmangala to Dobbaspet** | **Dobbaspet to Tumakuru** | **Tumakuru Bypass*** |
| **Toll plaza locations** | **Kulumepalya** (km 30.000) | **Chokkenahalli** (km 61.500) | Toll being exercised at adjacent Karjeevanahalli toll plaza (km 105+530) as interim arrangement. |
| **Present toll operator with Annual Potential Collection (APC) and quoted remittance** | Toll contract is awarded at project level which includes both toll plazas of Kulumepalya and Chokkenahalli<br><br>**Sri Sai Enterprise**<br>**Duration** : November 2025 to November 2026 (1 Year)<br>**Annual Potential Collection** : INR 121.17 Crore<br>**Quoted remittance** : INR 123.67 (FY26 tolling rates) | | -- |
| **Previous tolling operator with Annual Potential Collection (APC) and Quoted Remittance** | **Prakash Asphalts & Toll Highways (India) Limited**<br>**Duration** : October 2024 to October 2025 (1 Year)<br>**Annual Potential Collection** : INR 122.60 Crore (NH Fee Rules 1997)<br>**Quoted remittance** : INR 118.12 (FY25 tolling rates) | | -- |

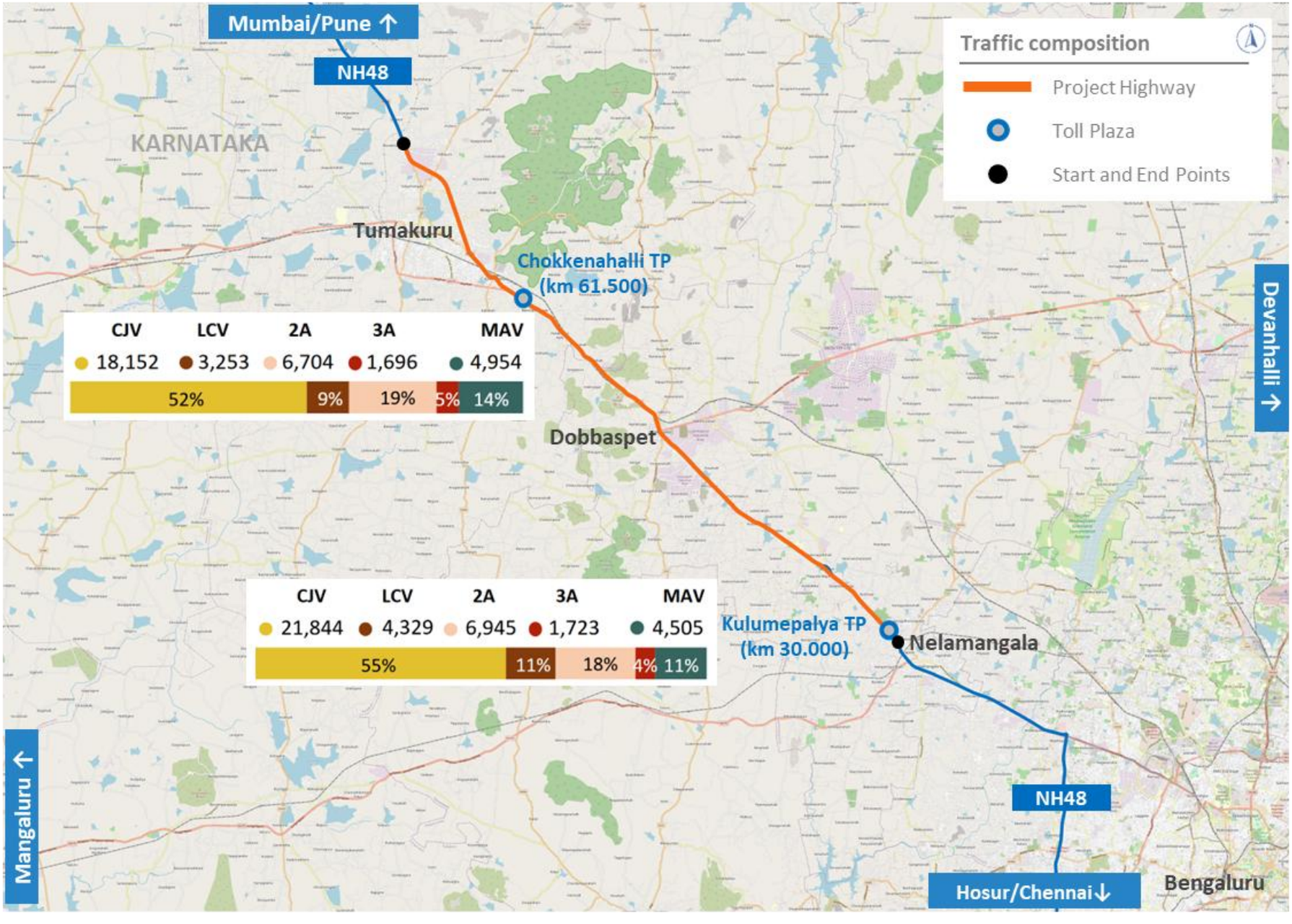
Source: PIU Tumakuru and NHAI HQ

* Tumakuru Bypass is only a name and does not meet the characteristics of a bypass for determining the tolling length i.e., 1.5 times of linear length rule is not applicable

- Post 4 to 6 lane completion of all tollable sections, the project highway (km 29.500 Nelmangala to km 74.168 Tumakuru Bypass end) will be **access-controlled with service road on both side and limited entry/exit on main carriage way** as conceptualised by the client during 4 to 6 lane approval.
- Future tolling modality post completion of 4 to 6 lane widening is explained on Pg 20.

# Project snapshot (4)

**ETC Traffic composition of FY26 till October 2025**




Source: TIC analysis (map not to scale)

# Future tolling modality post completion of 4 to 6 lane widening (1)

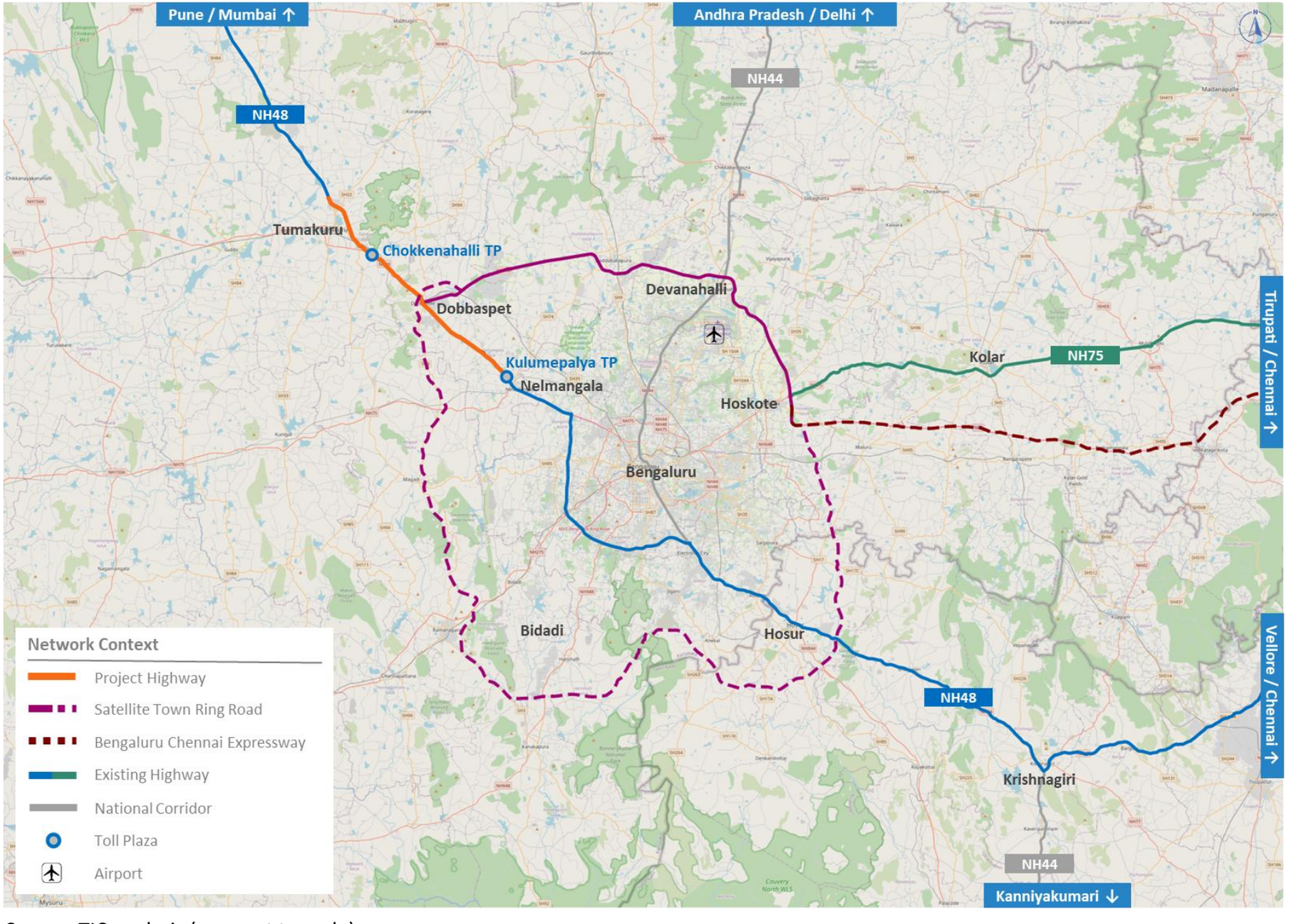
Post 4 to 6 lane completion of all tollable sections, the project highway (km 29.500 Nelmangala to km 74.168 Tumakuru Bypass end) will be **access-controlled with service road on both side with limited entry/exit on main carriage way** as conceptualised by the client during 4 to 6 lane approval.

- **Existing toll plazas: Kulumepalya (km 30.000) and Chokkenahalli (km 61.500)** will be dismantled on completion of 4 to 6 lane widening.
- **New Single Mainline Plaza:** Instead of two mainline plazas within 60 km of distance at present, there will be single mainline plaza at **Halenijagal (km 53.100)** where toll will be collected for entire project highway.
- In context of present and future road network development, Dobbaspet will be major junction where traffic will have options to choose the further routes for entering/exiting Bengaluru Ring Road (north ring) and Satellite Town Ring Road (STRR, south ring).
- Road users belong to Dobbaspet, and nearby Sompura Industrial Area will enter/exit at Dobbaspet form either side i.e. Nelmangala or Tumakuru.
- For road users availing facility between Dobbaspet and either side i.e. Nelmangala or Tumakuru, the client has **proposed two Entry/Exit Check Plazas for each direction of travel considering Dobbaspet as junction.**
  - **Two Entry/Exit Check Plazas for traffic movement between Tumakuru/west and Dobbaspet/north-west/south-east i.e. Dobbaspet Entry CP (km 49.900) and Halenijagal Exit CP (km 53.100)**
  - **Two Entry/Exit Check Plazas for traffic movement between Nelmangala/east and Dobbaspet/north-west/south-east i.e. Bharathipura Entry CP (km 46.375) and Honnenahalli Exit CP (km 47.425)**
- Timeline of commencement / closure of mentioned toll plazas / check plazas are as follows:
  - **Kulumepalya (km 30.000):** will be terminated on 31st March 2027 (FY27) on completion of 4 to 6 laning of Nelmangala to Dobbaspet section
  - **Halenijagal (km 53.100):** will be operational from 1st April 2027 (FY28)
  - **Bharathipura Entry CP (km 46.375) and Honnenahalli Exit CP (km 47.425):** will be operational from 1st April 2027 (FY28) along with Halenijagal TP for Nelamangala to Dobbaspet section
  - **Chokkenahalli (km 61.500):** will be terminated on 30th September 2028 (H1 FY29) on completion of 4 to 6 laning of Dobbaspet to Tumakuru and entire project highway length will be charged at Halenijagal TP
  - **Dobbaspet Entry CP (km 49.900) and Halenijagal Exit CP (km 53.100):** will be operational from 1st October 2028 (H2 FY29)

# Future tolling modality post completion of 4 to 6 lane widening (2)

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**Future road network development and Dobbaspet as critical junction**

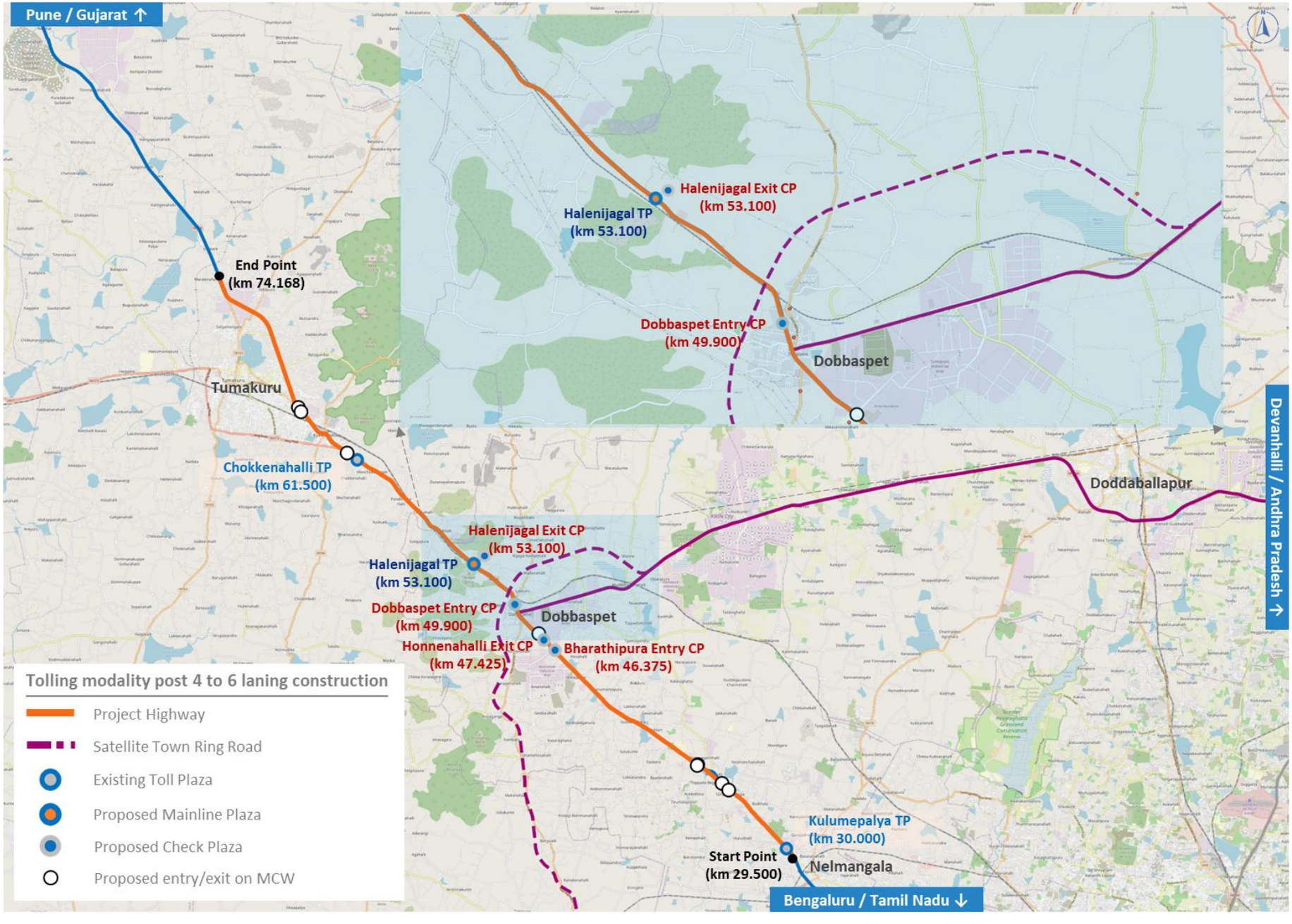



Source: TIC analysis (map not to scale)

# Future tolling modality post completion of 4 to 6 lane widening (3)

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**Future tolling modality post completion of 4 to 6 lane widening: 1 Mainline Plaza and 4 Check Plazas**

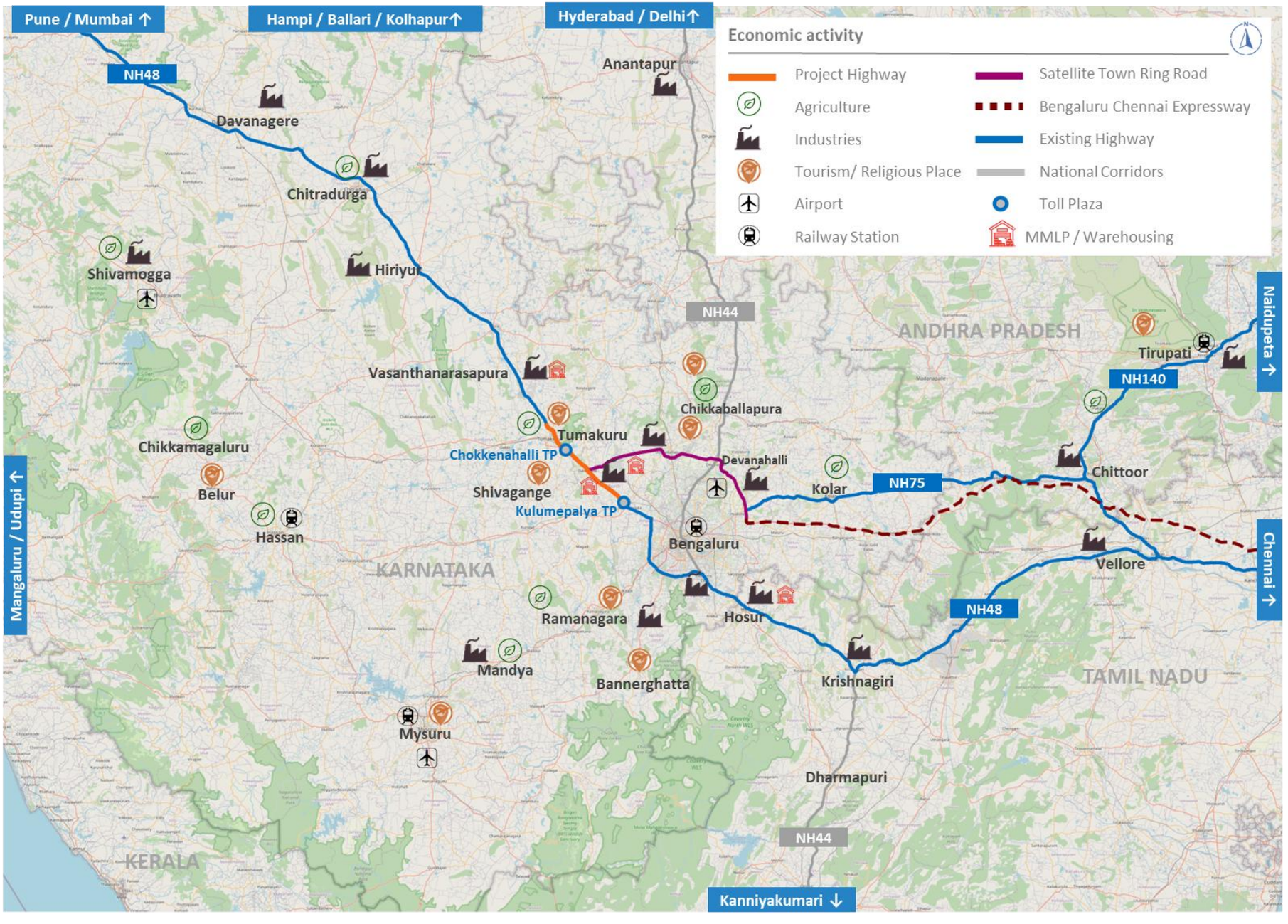



Source: TIC analysis (map not to scale)

# Economic activities in influence region (1)

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**Economic activities in influence region**




Source: TIC analysis (map not to scale)

# Economic activities in influence region (2)

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1 **Industry in the region**

- **Nelamangala–Dobbaspet–Tumakuru** section serves as a vital industrial and logistics backbone along the Bengaluru–Pune–Mumbai corridor, carrying steady freight traffic generated by automobile components, engineering goods, steel, cement and organised logistics operations.
- Industrial clusters at **Dobbaspet and Vasanthanarasapura** host major automobile, machinery, fabrication, and food-processing units, generating regular inbound raw material and outbound finished goods movement, primarily oriented toward Bengaluru and northern markets.
- A wide base of **ancillary industries and MSMEs** along the corridor supplies parts and services to Bengaluru-based manufacturers, resulting in frequent short- and medium-distance goods movement.
- Section supports heavy movement of construction materials such as **cement, steel** and **aggregates,** driven by industrial expansion, real estate growth and ongoing infrastructure projects in Tumakuru and the Bengaluru periphery. Cement and Steel is being supplied from **Chitradurga/Ballari** and surroundings region.
- The corridor provides **first- and last-mile connectivity** for industrial units, linking factories, warehouses, ICDs, and logistics parks on NH48 for onward movement to ports and consumption centres.
- With the growth of **e-commerce, third-party logistics (3PL)** and **organised warehousing sector,** the section increasingly caters time-sensitive freight traffic, resulting in higher usage by LCVs and MAVs.
- Karnataka Industrial Areas Development Board (KIADB) is in-process of development of industrial area across Bengaluru Ring Road i.e., **Dobbaspet – Doddaballapur – Hoskote belt**. Projects like **KWIN City (Knowledge, Wellbeing, Innovation City), Multimodal Logistics Park** etc. Proposed Foxconn Manufacturing Facility is in the same belt.
- KWIN City is envisioned as a futuristic 5,800-acre hub with focused areas as life sciences and healthcare, future mobility (EV manufacturing), semiconductors and advanced materials, aerospace technology.
- **Hosur industrial area:** Though part of Tamil Nadu in context of state administration but important part of Bengaluru industrial ecosystem. Strong presence of **automobiles, electronics and manufacturing** and home to giants like Ashok Leyland, TVS Motors, Titan etc.

**Overall, Nelamangala–Tumakuru stretch acts as a dependable industrial lifeline, enabling smooth logistics flow, supporting employment and sustaining long-term industrial growth across central Karnataka.**

Source: TIC secondary research

# Economic activities in influence region (3)

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**2 Agriculture and allied activities**

- Section forms agricultural hinterland, with regular movement of grains, pulses and millets, commercial crops, fruits and vegetables, towards Bengaluru's wholesale markets, mandis and food processing centers.
- **Grains, pulses and millets:**
  - **Ragi:** Hassan, Chikkamagaluru
  - **Jowar and maize:** common in northern, arid zones like Bijapur (Vijayapura), Belagavi
  - **Rice:** cultivated across many areas, though yield varies
  - **Wheat:** majorly in Belagavi, Vijayapura, Dharwad
- **Commercial crops:**
  - **Coffee and Black Pepper:** Hassan, Chikkamagaluru, Kodagu (Coorg)
  - **Sugarcane:** high production in drought-prone northern areas, including Belagavi
  - **Cotton:** significant in districts like Yadgir, Kalaburagi
  - **Groundnut and Sunflower**: Major oilseeds grown throughout the state
- **Horticulture**-driven traffic is prominent along the corridor, as **mango, banana, tomato, supari** and **coconut** are transported daily in LCVs to Bengaluru, Tumakuru and nearby agro-processing units. Kolar has Agricultural producers' Marketing committee, which is known for one of the largest supply place of Tomato.
- Section supports significant input supply traffic, including **fertilizers, seeds, pesticides** and **farm machinery** moving from Bengaluru and Tumakuru to rural production clusters.
- **Sericulture-related** movements generate steady short- and medium-haul traffic, with **raw silk cocoons** transported to reeling units and finished silk products moving toward textile markets.
- **Floriculture** activities in surrounding villages contribute to time-sensitive, early-morning vehicle movement, especially toward Bengaluru's flower markets, reflecting the corridor's role in perishable goods transport.
- Presence of **cold storage units,** collection centers and small agro-processing facilities along the stretch adds to consistent two-way freight movement, particularly by LCVs.
- Seasonal harvest cycles result in peaks in agricultural freight traffic, reinforcing the importance of this corridor in supporting rural livelihoods and linking farms (western Karnataka) with urban consumption centers like Bengaluru and surroundings.

Source: TIC secondary research

# Economic activities in influence region (4)

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**3 Tourism**

- The project highway connects Bengaluru to Chitradurga which serves as a tourist belt. **Hampi** which is a UN designated protected site, and a major tourist destination attracts visitors across the world.
- **Bengaluru,** serves as a major tourism hub with attractions like Lalbagh, Cubbon Park, Vidhana Soudha, and Bengaluru Palace, drawing both leisure and business visitors.
- **Tumakuru** is known for Shree Siddaganga Mutt, Devarayanadurga Hills, and Namada Chilume, making it a key center for religious and eco-tourism.
- **Nelmangala Dobbaspet** section provides access to nearby hill temples and scenic spots, promoting short-distance and weekend tourism from Bengaluru.
- **Shivagange Hills**, a popular trekking and pilgrimage site, further strengthens the corridor's spiritual and recreational tourism potential.

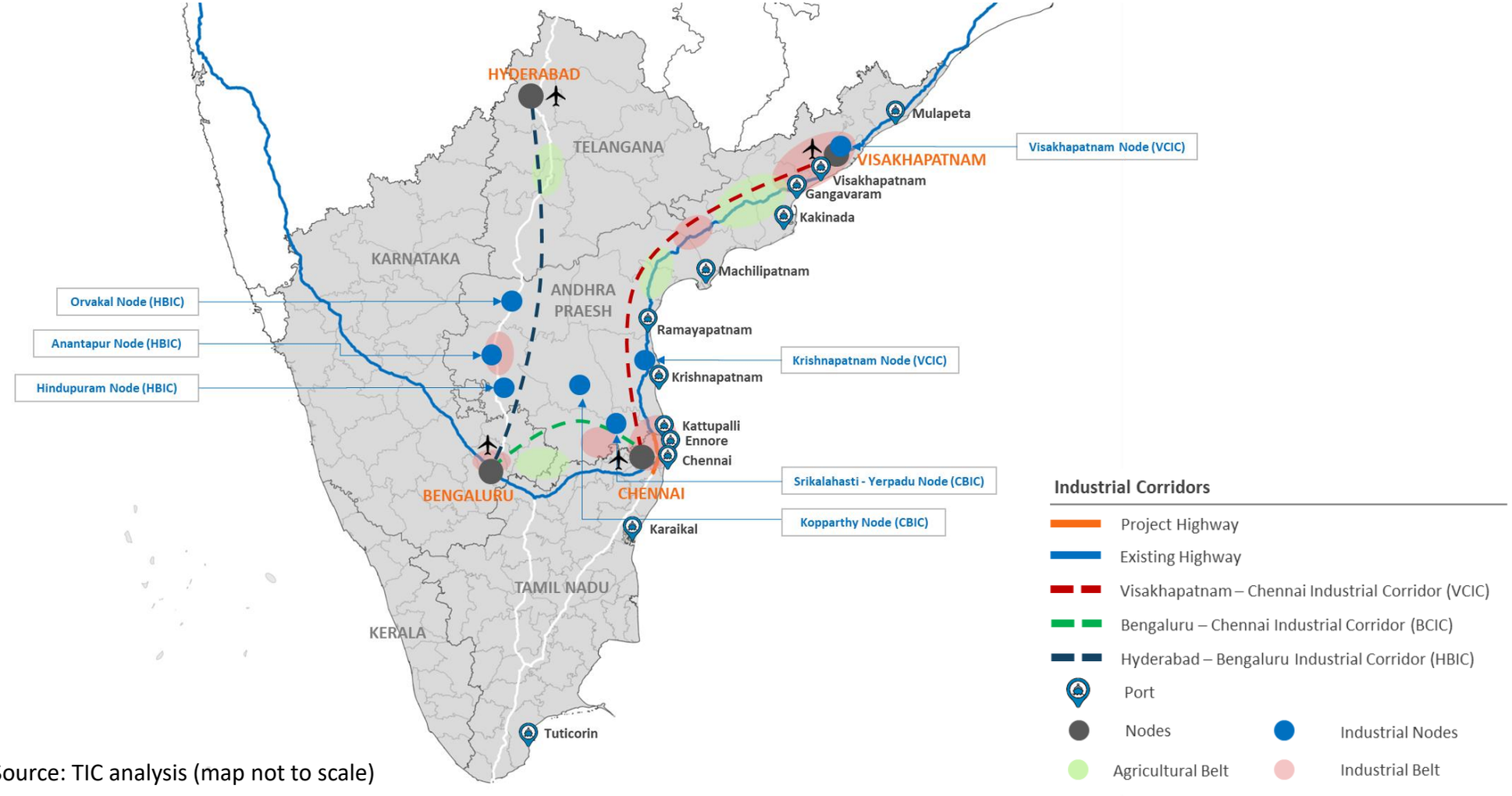
**4 Social / Educational / Recreational**

- Thousands of people travel daily between Tumakuru and Bengaluru for business and social need, relying heavily on road transport. Tumakuru is famous for religious and educational institutes.
- Tumakuru and Bengaluru are not formally designated as **'twin cities'**; however, they exhibit increasing economic and transport interdependence. This is driven by Bengaluru's rapid metropolitan expansion and Tumakuru's emergence as an industrial hub and potential satellite city, resulting in growing commuter movement, freight traffic, and shared transport infrastructure.
- Recognizing these trends, the government has proposal for integrating the two urban regions to support coordinated transport planning, improve regional connectivity, optimize corridor development, and ensure efficient movement of people and goods.
- A new **international cricket stadium** is proposed near the Vasanthanarasapura Industrial Township in Tumakuru. The foundation stone was laid by the Hon'ble Chief Minister of Karnataka on 3 December 2024, and completion is expected within two years. This will add the passenger traffic as and when any event will be realized at the venue.

Source: TIC secondary research

# Economic activities in influence region (5)

**Industrial corridors under development**




Source: TIC analysis (map not to scale)

- **Chennai – Bengaluru Industrial Corridor (CBIC)** proposes high impact / market driven nodes at **Tumkur in Karnataka (NH48), Ponneri in Tamil Nadu (NH16), Krishnapatnam/Nellore in Andhra Pradesh (NH16).**
- **Tumakuru Industrial Node** under Chennai–Bengaluru Industrial Corridor (CBIC) is rapidly emerging as a major manufacturing and warehousing hub, with investments in electronics, defence manufacturing, food processing and renewable energy, significantly increasing multi-axle and container traffic on the project highway.

# Our understanding of traffic corridor and road network (1)

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**Traffic corridors and their contribution**




Source: TIC analysis (map not to scale)

**National corridor (long-distance traffic)**

The project highway forms a part of Golden Quadrilateral NH48 and establishes link among states of Rajasthan, Gujarat, Maharashtra, Karnataka, Goa and Tamil Nadu and acts as a national connector.

**Major industrial and commercial centers:**

- Gujarat: Ahmedabad, Vadodara, Surat
- Maharashtra: Mumbai, Pune
- Karnataka: Belgavi, Hubli, Dharwad, Davangere, Bengaluru
- Tamil Nadu: Hosur, Vellore, Chennai

**Linking textile clusters across NH48:**

- Rajasthan: Balotra, Pali
- Gujarat: Ahmedabad, Surat
- Maharashtra: Kolhapur/Gandhinagar, Ichalkaranji, Bhiwandi
- Tamil Nadu: Coimbatore, Erode, Tirupur
- Significant volumes of textile-related freight traffic therefore traverse the project highway.

**Transport and logistics hub:** Ahmedabad, Mumbai (Bhiwandi), Pune, Kolhapur, Hubli, Nelmangala (Bengaluru), Chennai are well established logistics zones on this network.

# Our understanding of traffic corridor and road network (2)

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**Mumbai/Pune – Chennai corridor**

- Western India traffic destined/originated from Chennai region is divided among three routes i.e.,
  - **Route 1:** via NH48 Pune-Bengaluru-Chennai (the project highway)
  - **Route 2:** via NH65/SH3 Pune-Solapur-Hyderabad-Adanki-Chennai
  - **Route 3:** via NH65/NH716 via Pune-Solapur-Hyderabad-Kurnool-Tirupati-Chennai
- Historically, Mumbai/Pune – Chennai traffic movement was using only NH48 Golden Quadrilateral route via Mumbai-Belgaum-Bengaluru-Chennai for west - south movements.
- Due to ongoing 4 to 6 lane construction activities at Kagal-Satara section and Hubli-Chitradurga section of NH48 in last two years, traffic has diverted to Route 2. Route 3 was least preferred due to ongoing construction activities as part of Surat Chennai Expressway development.
- For Route 1 (the project highway), another network change was observed when **Bengaluru Ring Road (north ring) was commenced around June'24.** Hence, Kolar / Chennai bound traffic opted for Bengaluru Ring Road (north ring).

**Regional linkages (medium and short-distance traffic)**

- The project highway, being a part of NH48, acts as a spinal cord for Karnataka which includes Belagavi, Dharwad, Haveri, Davangere, Chitradurga, Tumakuru, Bengaluru Urban and Rural districts. District's trade relations and economy are aligned with state capital of Bengaluru.
- NH48 regional network and the project highway together establishes important regional connectivity between Karnataka and neighbouring states i.e., Maharashtra, Goa and Tamil Nadu. This facilitates the movement of goods and raw materials between Pune, Belagavi, Hubballi, Bengaluru and Hosur, supporting inter-state industrial supply chains and distribution networks.
- Connects key industrial and logistics hubs, such as Dobbaspet Industrial Area and the Tumakuru Industrial Node (under the Chennai–Bengaluru Industrial Corridor), boosting regional manufacturing and export activity.
- Provides strong local connectivity between Bengaluru's western outskirts, Nelamangala, Dobbaspet, and Tumakuru, acting as a major conduit for goods from local industries to larger markets as well as passenger and employee commute along the Bengaluru–Tumakuru growth corridor.

**With the ongoing industrial expansion and suburban development, the section has evolved into a dual-function corridor, efficiently balancing long-distance freight movement with regional commuter and industrial traffic. Enhances access to local markets, warehousing zones, and small-scale industries, strengthening rural-urban linkages and last-mile freight distribution.**

# Corridor traffic summary (1)

**Pune-Bengaluru corridor of NH48**

| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Katraj – Satara** | BOT (Toll) – Cube Highways | 66,000 / 51,000 |
| **Satara – Kagal** | BOT (Toll) – Adani Group | 46,000 / 38,000 |
| **MH/KA Border – Belgaum** | NHIT (Private InvIT Bundle 1) | 28,000 / 31,000 |
| **Belgaum – Dharwad** | BOT (Toll) – Maple Highways | 27,000 |
| **Hubbali – Haveri – Davangere – Chitradurga** | NHIT (Private InvIT Bundle 3) | 27,000 |
| **Chitradurga – Tumakuru** | BOT (Toll) – IRB Infrastructure | 57,000 / 63,000 |
| **Tumakuru – Nelmangala** | Toll - Public Funded | 68,000 / 72,000 |
| **Nelmangala – Bengaluru** | Toll - Public Funded | 1,20,000 |

Source: TIC analysis

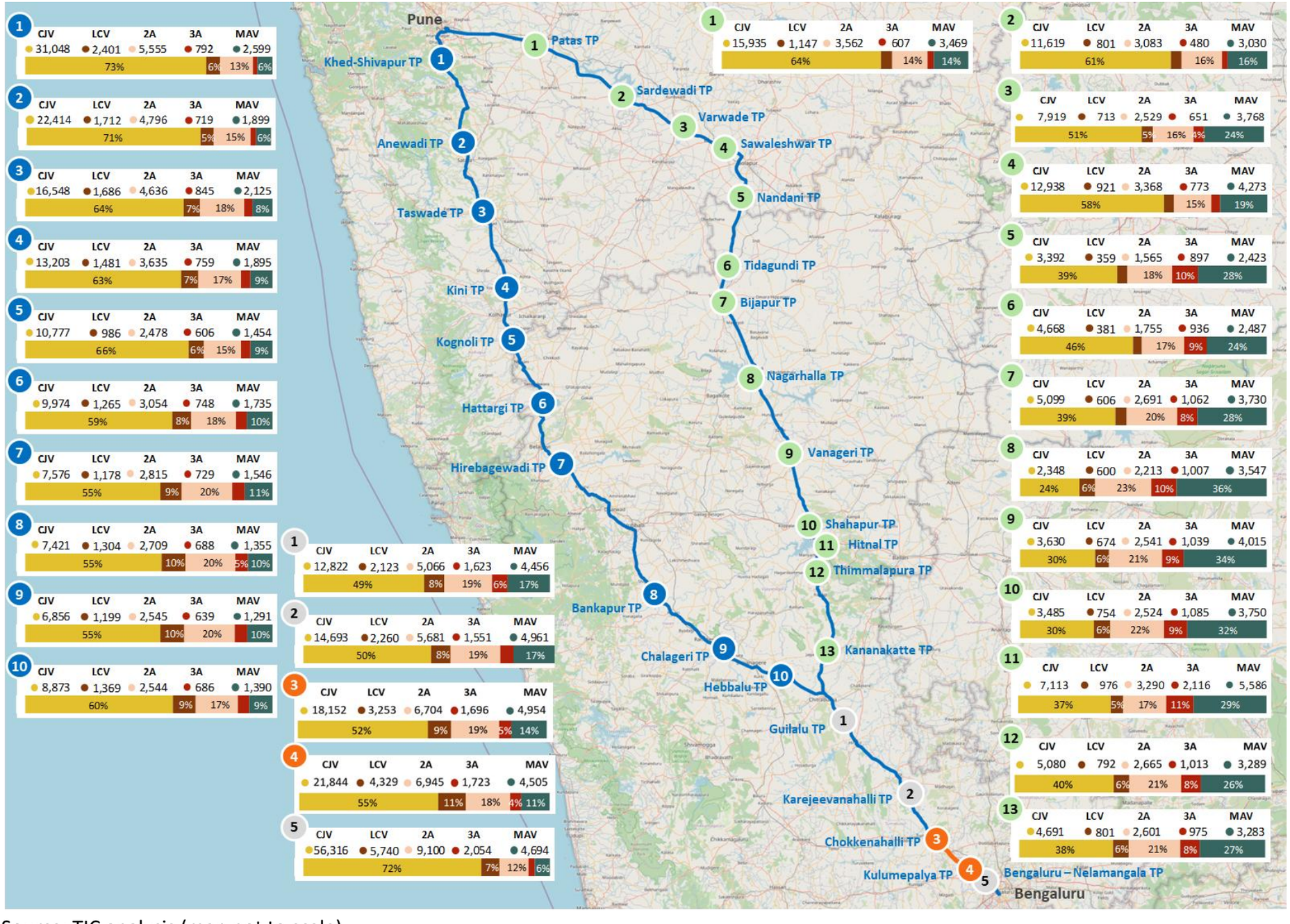
**Pune-Chitradurga corridor of NH65/NH52**

| Highway section | Concessionaire / Operator | Average PCU (approx.) |
|---|---|---|
| **Pune – Solapur** | BOT (Toll) – IRB Infrastructure | 46,000 |
| **Solapur – Bijapur** | BOT (Toll) – IJM (India) Infrastructure Limited | 25,000 |
| **Bijapur – Hungund** | BOT (Toll) – Interise (CPPIB | 34,000 / 29,000 |
| **Hungund – Hospet** | BOT (Toll) – Oriental Structure Engineering (OSE) | 39,000 / 50,000 |
| **Hospet – Chitradurga** | BOT (Toll) - TRIL | 32,000 |

# Corridor traffic summary (2)

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**Traffic composition on the corridor: AADT of FY26 till October 2025**




Source: TIC analysis (map not to scale)

# Site photographs

**Start Point (km 29.500)**




**Kulumepalya Toll Plaza (km 30.000)**




**Nelmangala to Dobbaspet – Ongoing Construction Activity (6 lanning)**




**Betel nut (Supari) Cultivation**




**Chokkenahalli Toll Plaza (km 61.470)**




**Tumakuru Bypass – ongoing 4 to 6 lane construction activities**




Source: TIC site visit

# Proposed infrastructure development in the region (1)

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**Network and infrastructure development in the influence region (refer map on Pg 36)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **NH66 Upgradation** | NHAI<br>Upgradation of multiple sections to 6 lane | Under construction<br>FY28 for Kerala stretches connecting till Belagavi | **Negative**<br>Traffic movement between Kagal/north and Kochi / south<br>Only hazardous cargo traffic like propane gas and other chemical and petroleum products traffic using NH48 as safety precautions. |
| **Satellite Town Ring Road / Bengaluru Ring Road (North and South Ring)** | NHAI / HAM<br>Multiple packages and developers | **North Ring:**<br>Dobbaspet – Hoskote: Operational<br>Hoskote – Hosur: Expected completion by FY28<br>**South Ring:**<br>Dobbaspet – Ramanagara – Hosur: Expected completion by FY30 | **Negative**<br>**North Ring of STRR / Bengaluru Ring Road**<br>Traffic movement between Dobbaspet/north-west and Hosur/south-east<br>**South Ring of STRR**<br>Traffic movement between Dobbaspet/north and Mysuru/north Kerala |
| **Surat – Nashik – Chennai Expressway** | NHAI / HAM<br>Multiple packages and developers | Expected completion by FY30 | **Negative**<br>Traffic movement between Solapur/west and Chennai/ south<br>Traffic movement between Hyderabad/north and Chennai/ south |
| **Pune Bengaluru Expressway** | NHAI | No development since last year post discussion on initial alignment options. | **Nil**<br>Indicatively not moving ahead considering various constraints as per guidelines form line ministry to the client. |
| **Bengaluru Tumakuru Metro line** | Bangalore Metro Rail Corporation Limited (BMRCL) | Feasibility stage approval received and DPR is expected to start.<br>Expected commencement of operations is in FY32. | **Negative**<br>Traffic movement between Bengaluru and Tumakuru |

Source: TIC research and analysis

# Proposed infrastructure development in the region (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Network and infrastructure development in the influence region (refer map on Pg 36)**

| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Bengaluru Chennai Expressway (4 lane)**<br><br>**Chittoor Thatchoor section of NH716B** | NHAI / HAM<br><br>Multiple phases/packages and developers | **Phase 1 of NE7 (Karnataka):** operational<br><br>**Phase 2 of NE7 (Andhra Pradesh):** Total 3 packages; under construction and expected to be operational by mid FY28<br><br>**Phase 3 of NE7 (Tamil Nadu):** Total 3 packages; under construction and expected to be operational by mid FY28<br><br>**Chittoor Thatchoor section of NH716B:** Total 4 packages; under construction and expected to be operational by end of FY28 | **Nil**<br><br>These development will further enhance Bengaluru-Chennai corridor as well as last mile connectivity to Chennai Port Cluster.<br>Part of diversion due to Satellite Town Ring Road / Bengaluru Ring Road (North and South Ring). No separate impact expected. |
| **Shivamogga / Tumakuru Bypass** | NHAI / HAM<br>Multiple packages | Under construction<br>Expected completion in FY28/FY29 | **Nil**<br>Proposed access-controlled with open tolling modality and mainline plaza at Halenijagal (km 53.100) will eliminate any diversion possibility.<br>This alternate route will help in future during congestion on the concerned tollable sections. |

Source: TIC research and analysis

# Proposed infrastructure development in the region (1)

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**Network and infrastructure development in the influence region (refer map on Pg 36)**

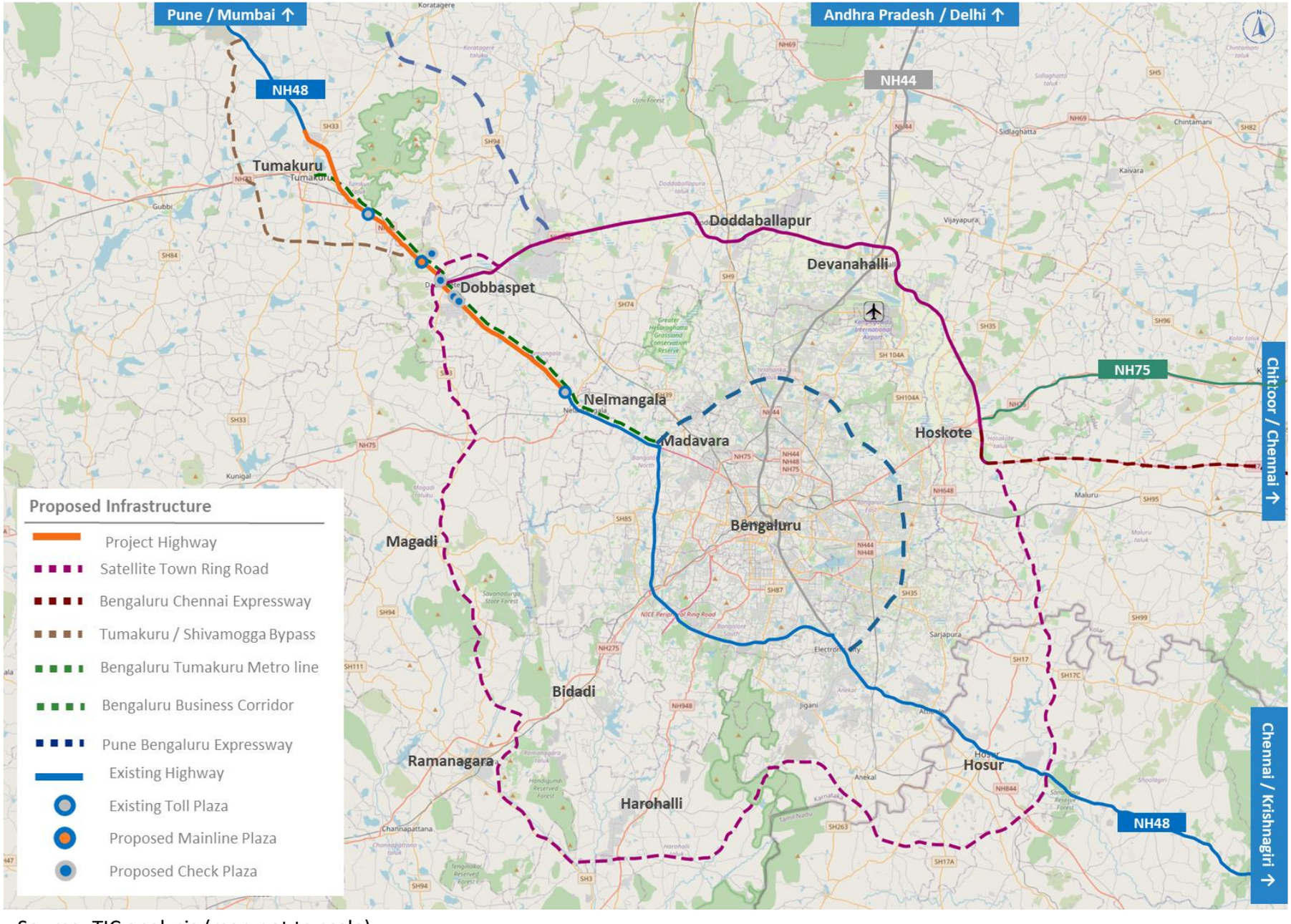
| Particulars of the development | Authority / Mode of Development / Developer | Status / expected completion | Possible impact |
|---|---|---|---|
| **Bengaluru Business Corridor** | State Government / Multiple or Single Package Mode of development is not yet decided but tolling will be exercised. | **Peripheral Ring Road (PRR), proposed nearly 20 years ago, is now rebranded as Bengaluru Business Corridor.**<br><br>The proposed development will be likely of mirror semi-circle to NICE Road with ~117 km length, starting from junction of NH48/NICE Road to Electronic City via Yelahanka/Whitefield.<br>Land acquisition under progress<br>Expected to take minimum 6-8 years to complete in case. | **Nil**<br><br>The consultant did not consider any impact of this development in line with discussion with client.<br>▪ Uncertainty for implementation viability/timeline base on historical events and challenges associated with land acquisition<br>▪ Objective for this development is to provide alternate option for city traffic and to decongest exiting trunk line<br>▪ Alternate option for NICE road considering challenges associated with NICE Road<br>▪ Expected to be operational after 6 years with optimistic timeline. BY that time, STRR/Bengaluru Ring Road will be operational, and which will be far better option for through traffic to avoid city congestion. Both option will have toll.<br>Even if gets developed, it will have positive impact on the project highway as total potential divertible traffic of STRR/Bengaluru Ring Road will not get diverted. Hence, it will be upside and not consider as part of central case considering uncertainty associated with proposed development and being conservative in such business case. |

Source: TIC research and analysis

# Proposed infrastructure development in the region (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd
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**Proposed infrastructure development**




Source: TIC analysis (map not to scale)

# Chapter 3: Traffic analysis

- Historical data sources
- Historical traffic and revenue trends
- Seasonality variation
- Historical ticket distribution
- Commodity analysis
- Zonal influence and trip distance

This chapter covers various datasets received from NHAI followed by assessment of historical performance of the project highway. This analysis helps to understand baseline traffic patterns comprising of traffic and revenue growth rates, seasonality variations, trip factors, ticket distribution and overloading characteristics if any.

Survey analysis helps to understand and validate traffic volume, commodity movement pattern, network understanding received from site visit, inputs for ticket distribution, overloading pattern based on independent survey exercise.

# Historical datasets (1)

- The project highway is currently being operated under the public-funded mode where toll is collected by third party tolling agencies through short-term contracts. Third party tolling agencies submit traffic and revenue report on monthly basis which is titled as Schedule V.
- The consultant observes that availability and accuracy of these reports are many times under question due to inadequate quality of technology interventions and record keeping during short term contracts by tolling agencies.
- Hence, availability followed by reliability of these datasets is essential to be addressed for historical analysis as well as further processing for base year and future traffic forecasts.
- ETC data is independently system generated and hence more reliable. The client sourced vehicle category-wise traffic data which doesn't include toll ticket distribution.
- Monthly reports submitted by contractors / tolling agencies to NHAI field offices (Schedule M/G/V) which is start point to validate the toll ticket distributing including cash components, violation/exemptions, overloading fee etc.
- Summary of historical traffic and revenue data received form the client is presented on next page with possible application.

# Historical datasets (2)

**Summary of the historical traffic and revenue data available for Kulumepalya and Chokkenahalli Toll Plazas**

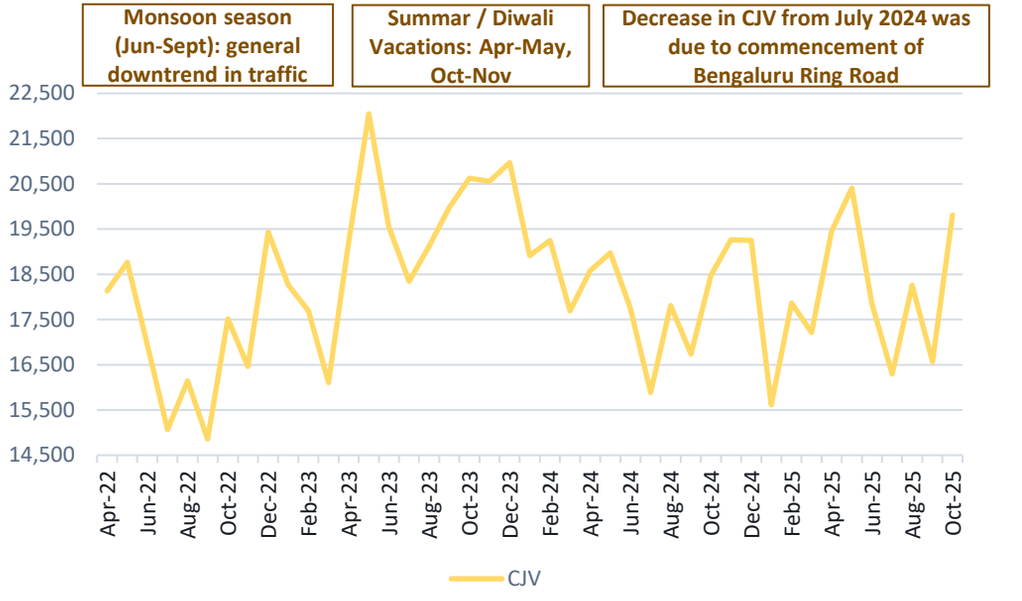
| Data sources | Duration of data | Observations |
|---|---|---|
| **Schedule M (monthly)** | **H2 FY14 to H1 FY21** (BOT Concession) | ▪ Total 7 years of traffic data in form of total of two toll plazas and traffic recorded under **three vehicle categories only: CJV, LCV, Bus/Trucks**<br>▪ **Individual toll plaza-wise traffic data is not available**<br>▪ Ticket distribution data: No<br>▪ Exemption/violation/ cash traffic data: No<br>▪ Useful for broad long-term trend analysis for three categories only |
| | **H2 FY21 to H1 FY23** (BOT Concession) | ▪ Traffic data is in form of total of two toll plazas and traffic recorded under **four vehicle categories: CJV, LCV, 2A Bus/Trucks, 3A Bus/Trucks**<br>▪ **Individual toll plaza-wise traffic data is not available**<br>▪ Ticket distribution data: No<br>▪ Exemption/violation/ cash traffic data: No<br>▪ Useful for broad long-term trend analysis for three categories only |
| **Schedule V - Part A & B (monthly)** | H2 FY23 onwards public funded<br>**H2 FY23:** months except Oct'22<br>**FY24:** months except Jun -Nov'23<br>**FY25:** months except Jun -Sep'24<br>**FY26:** Apr-Oct'25 (7 months) | ▪ Available with intermittent anomalies<br>▪ **Toll rates revised from NH Fee Rules, 1997 to NH Fee Rules, 2008 from 25th August 2025**<br>▪ Only Sept-Oct'25 monthly dataset is useful for ticket distribution analysis<br>▪ Exemption/violation/ cash traffic data: Yes; Sept-Oct'25 |
| **ETC Data (monthly)** | FY23: Full year<br>FY24: Full year<br>FY25: Full year<br>FY26: Apr-Oct'25 (7 months) | ▪ Vehicle category-wise ETC transactions covering total traffic and user fee collection<br>▪ Ticket distribution data: No |
| **Overloading Reports (weekly)** | No overloading penalty / fee is being levied at present based on understanding from site visit and discussion with PIU/toll operators | |
| **Neighbouring highways** | Historical traffic data to determine corridor growth trend | |

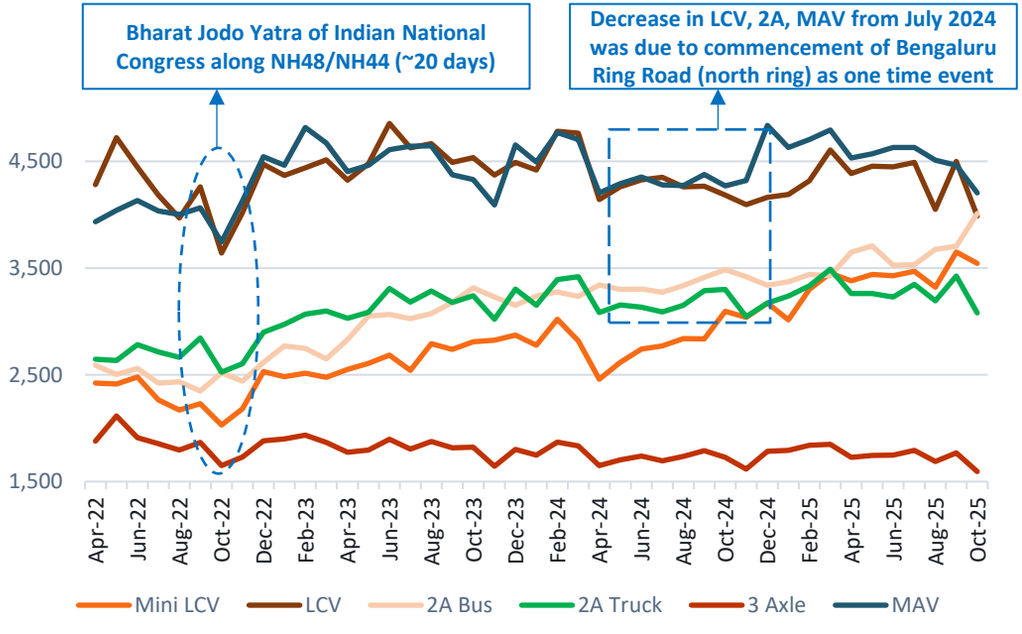
Source: TIC compilation of data received from NHAI

ETC data was reviewed for historical analysis, as it is considered reliable. Schedule M dataset showed intermittent anomalies, but it remains useful for broad long-term trend analysis for three categories only CJV, LCV, 2A Bus/Trucks, 3A Bus/Trucks.

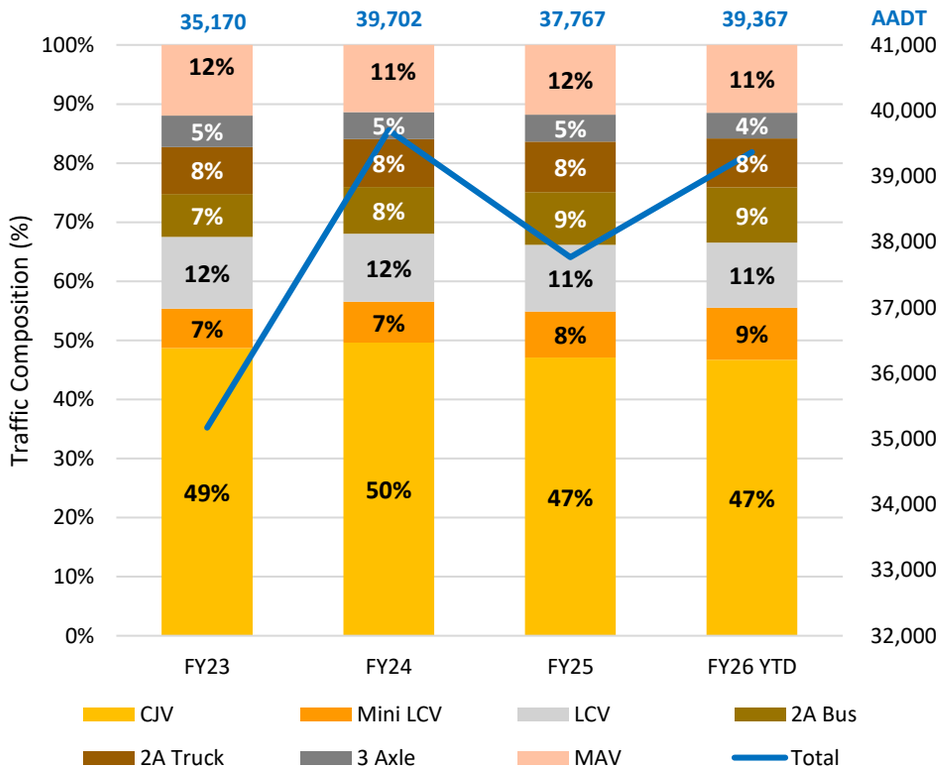
# Historical traffic analysis (1): Kulumepalya TP

### Vehicle category-wise monthly traffic trend - ETC




### Vehicle category-wise annual traffic composition - ETC




- Traffic has trended in the range of 36,000 – 38,000 AADT (50,000 PCUs) in recent past with ~55% contribution of passenger vehicles (CJV and Bus) while balance ~45% is of freight vehicles.
- High volume of CJVs is observed due to proximity to Bengaluru and regular business/social traffic between Tumakuru/Dobbaspet and Bengaluru city.
- High volume and growth of bus traffic is in line with observed characteristics on Pune – Bengaluru corridor. Overnight and premium bus services is popular among business and leisure travelers.

Source: TIC analysis

# Historical traffic analysis (2): Kulumepalya TP

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**Vehicle category-wise traffic growth trend**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 17,117 | 2,349 | 4,276 | 2,549 | 2,787 | 1,865 | 4,227 | **35,170** | **66,506** |
| **FY24** | 19,685 | 2,752 | 4,566 | 3,139 | 3,217 | 1,807 | 4,536 | **39,702** | **74,187** |
| **FY25** | 17,780 | 2,944 | 4,264 | 3,371 | 3,206 | 1,743 | 4,459 | **37,767** | **72,145** |
| **FY26 till Oct'25** | 18,382 | 3,462 | 4,329 | 3,688 | 3,257 | 1,723 | 4,525 | **39,367** | **74,707** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 15.0% | 17.2% | 6.8% | 23.1% | 15.5% | (3.1%) | 7.2% | **12.9%** | **11.5%** |
| **FY25 vs FY24** | (9.7%) | 6.9% | (6.6%) | 7.4% | (0.3%) | (3.5%) | (1.6%) | **(4.9%)** | **(2.8%)** |
| **FY26* vs FY25** | 3.6% | 25.1% | 1.7% | 10.1% | 2.7% | 0.2% | 5.0% | **5.5%** | **5.2%** |
| **CAGR (FY23 – FY26 YTD)** | 2.9% | 16.8% | 0.5% | 15.9% | 6.4% | (3.1%) | 2.8% | **4.6%** | **4.8%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

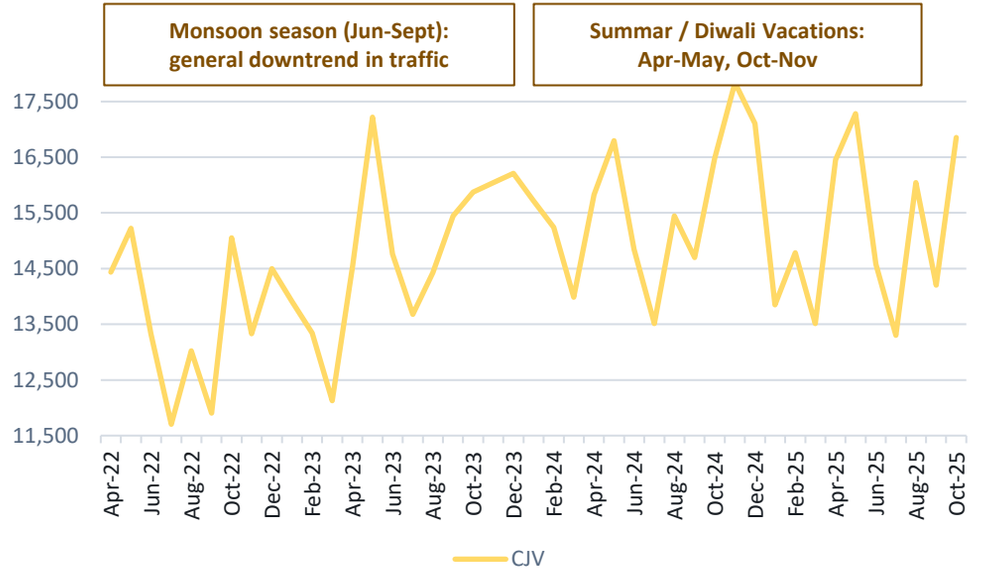
**Corridor growth trends (project highway and neighbouring sections)**

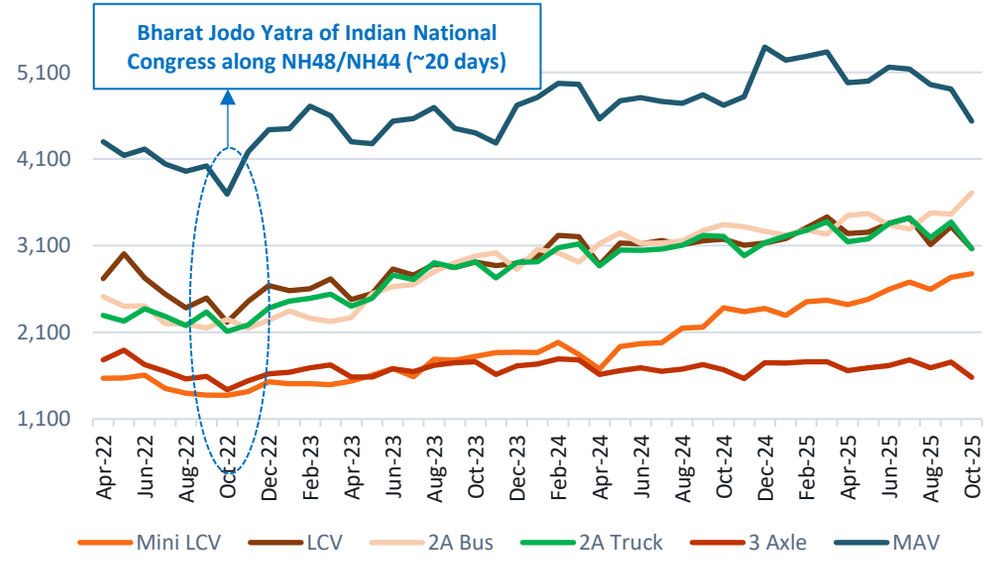
| CAGR | CJV + Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|
| **Project highway: Nelmangala - Tumakuru section of NH48** | | | | | | | | |
| **Long-term (FY15 – FY22)** | 18.0% | 11.1% | 9.5% (Bus+2A+3A+MAV) | | | | **13.8%** | -- |
| **Long-term (FY15 – FY19)** | 5.3% | 7.3% | 8.1% (Bus+2A+3A+MAV) | | | | **6.8%** | -- |
| **Neighbouring highway sections** | | | | | | | | |
| **Short-term (FY23 – FY26)*** | 6.7% | 11.6% | 3.3% | 12.4% | 7.0% | (3.1%) | 2.3% | **5.7%** | **4.8%** |
| **Short-term (FY22 – FY25)^** | 11.2% (CJV + Mini LCV) | | 3.3% | 21.1% | 12.4% | 3.2% (3A + MAV) | | **9.4%** | **6.6%** |

Source: TIC analysis * ETC ^available in public domain

# Historical traffic analysis (3): Chokkenahalli TP

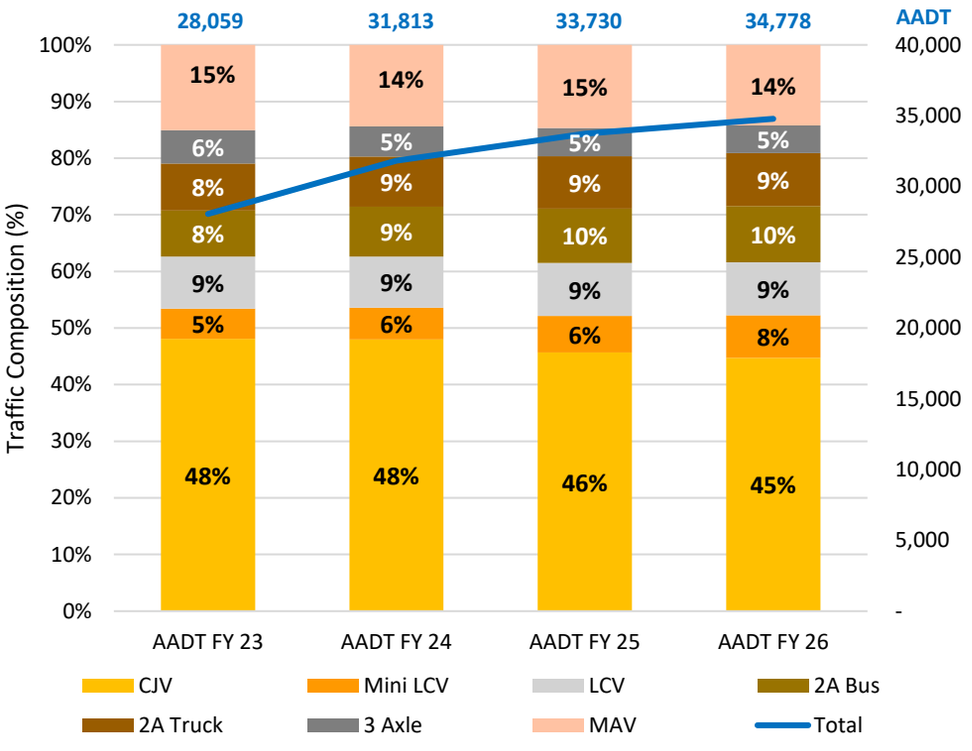
### Vehicle category-wise monthly traffic trend - ETC




Source: TIC analysis

### Vehicle category-wise annual traffic composition - ETC




- Chokkenahalli TP observed lower volume of CJV (~15% of Kulumepalya TP) and Mini LCV/LCV (~25% of Kulumepalya TP) which is due to difference in traffic characteristics between tollable sections.
- CJVs are due to proximity to city and Mini LCV / LCV is due to last mile connectivity to city from warehousing belt between Dobbaspet to Nelamangala.
- Warehousing belt of Nelmangala to Dobbaspet sustains contribution of Mini LCV, LCV, 2A for e-commerce and courier/parcel.

# Historical traffic analysis (4): Chokkenahalli TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Vehicle category-wise traffic growth trend**

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Average Daily Traffic (AADT)** | | | | | | | | | |
| **FY23** | 13,492 | 1,483 | 2,590 | 2,278 | 2,321 | 1,654 | 4,240 | **28,059** | **56,701** |
| **FY24** | 15,262 | 1,769 | 2,868 | 2,801 | 2,814 | 1,696 | 4,604 | **31,813** | **63,981** |
| **FY25** | 15,393 | 2,181 | 3,157 | 3,226 | 3,128 | 1,689 | 4,956 | **33,730** | **68,739** |
| **FY26 till Oct'25** | 15,538 | 2,613 | 3,253 | 3,458 | 3,246 | 1,696 | 4,974 | **34,778** | **70,612** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 13.1% | 19.3% | 10.7% | 23.0% | 21.2% | 2.6% | 8.4% | **13.4%** | **12.8%** |
| **FY25 vs FY24** | 0.9% | 23.3% | 10.1% | 15.2% | 11.2% | (0.4%) | 7.8% | **6.0%** | **7.4%** |
| **FY26* vs FY25** | 1.1% | 28.3% | 4.7% | 8.1% | 5.4% | 1.6% | 4.4% | **4.7%** | **4.9%** |
| **CAGR (FY23 – FY26 YTD)** | 5.8% | 25.4% | 9.5% | 18.2% | 14.4% | 1.0% | 6.6% | **9.0%** | **9.2%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

**Corridor growth trends (project highway and neighbouring sections)**

| CAGR | CJV + Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | PCU |
|---|---|---|---|---|---|---|---|---|
| **Project highway: Nelmangala - Tumakuru section of NH48** | | | | | | | | |
| **Long-term (FY15 – FY22)** | 18.0% | 11.1% | 9.5% (Bus+2A+3A+MAV) | | | | **13.8%** | -- |
| **Long-term (FY15 – FY19)** | 5.3% | 7.3% | 8.1% (Bus+2A+3A+MAV) | | | | **6.8%** | -- |
| **Neighbouring highway sections** | | | | | | | | |
| **Short-term (FY23 – FY26)*** | 6.7% | 11.6% | 3.3% | 12.4% | 7.0% | (3.1%) | 2.3% | **5.7%** | **4.8%** |
| **Short-term (FY22 – FY25)^** | 11.2% (CJV + Mini LCV) | | 3.3% | 21.1% | 12.4% | 3.2% (3A + MAV) | | **9.4%** | **6.6%** |

Source: TIC analysis * ETC ^available in public domain

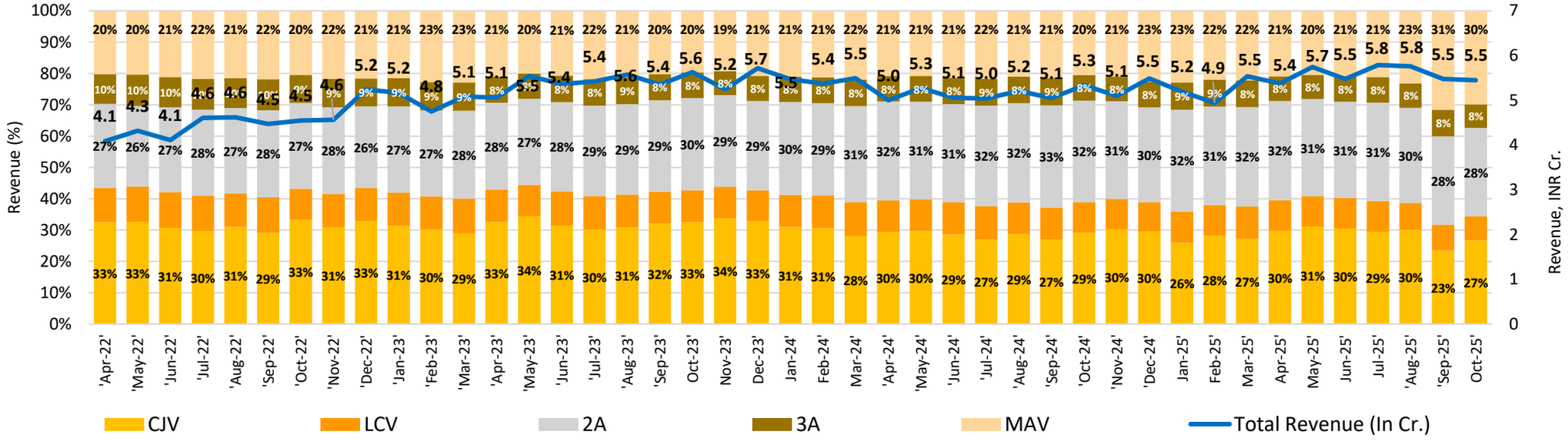
# Historical traffic analysis (5)

- The decline in 3A traffic indicates a structural shift in freight vehicle composition, as operators increasingly replace 3A vehicles with 2A and MAV configurations, driven by the higher payload capacity and lower cost per tonne-kilometre of MAVs.
- Conversely, the increase in 2A volumes is supported by revisions in legally permissible axle loads, which have enhanced their operational efficiency, as well as by their suitability for e-commerce and express logistics involving high-value, low-volume consignments over medium to long haul distances.
- Findings from consultations with transporters and OEMs across multiple regions corroborate this trend, indicating a clear preference for 2A and MAV (especially 5A vehicle) categories based on superior unit economics and operational flexibility.

# Historical revenue analysis (1): Kulumepalya TP

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Vehicle category-wise monthly revenue composition and trend - ETC**



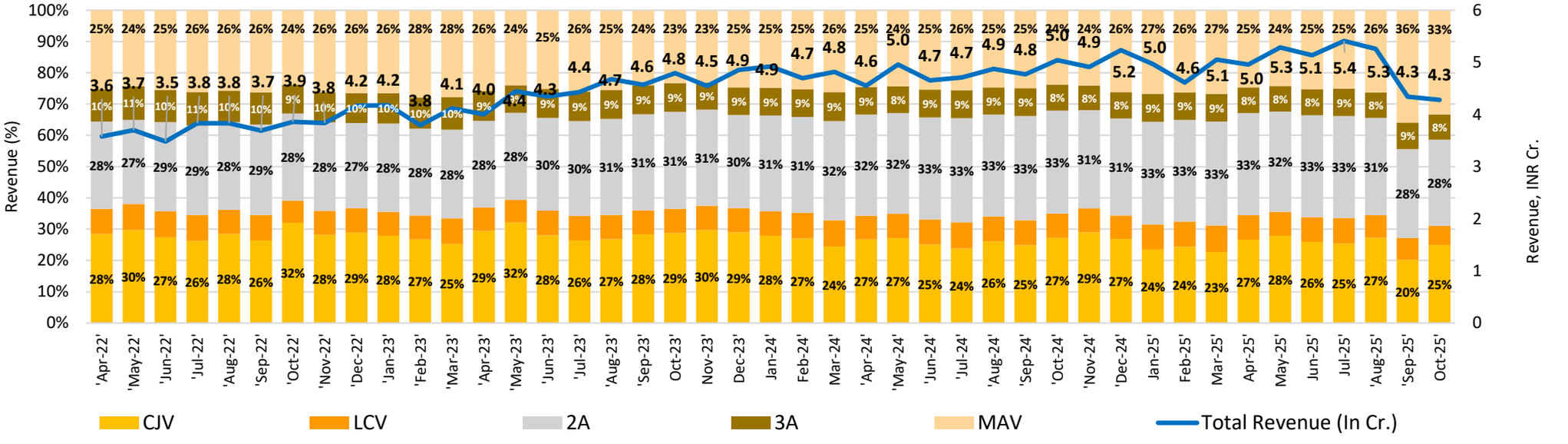

| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) and Annual Average Daily Collection (in INR Lakh)** | | | | | | | | | |
| **FY23** | 14.0 | 3.3 | 6.0 | 7.2 | 7.9 | 5.2 | 12.0 | **55.6** | **15.22** |
| **FY24** | 16.7 | 3.9 | 6.8 | 9.3 | 9.6 | 5.4 | 13.5 | **65.2** | **17.82** |
| **FY25** | 15.1 | 2.5 | 6.2 | 10.1 | 9.6 | 5.2 | 13.4 | **65.2** | **17.04** |
| **FY26 till Oct'25** | 9.0 | 2.2 | 3.5 | 6.1 | 5.7 | 3.1 | 9.4 | **39.1** | **18.26** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 19.7% | 18.8% | 12.0% | 29.3% | 21.5% | 3.1% | 13.2% | **17.4%** | **17.1%** |
| **FY25 vs FY24** | (9.5%) | (35.3%) | (7.9%) | 8.2% | 0.2% | (3.0%) | (0.9%) | **(4.6%)** | **(4.4%)** |
| **FY26* vs FY25** | 1.5% | 60.0% | (2.6%) | 4.1% | 2.3% | 2.9% | 23.5% | **8.7%** | **8.7%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

# Historical revenue analysis (2): Chokkenahalli TP

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Vehicle category-wise monthly revenue composition and trend - ETC**




| Vehicle Category | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total | AADC |
|---|---|---|---|---|---|---|---|---|---|
| **Annual Revenue (in INR Crore) and Annual Average Daily Collection (in INR Lakh)** | | | | | | | | | |
| **FY23** | 10.8 | 2.1 | 3.6 | 6.4 | 6.5 | 4.6 | 12.0 | **46.1** | **12.62** |
| **FY24** | 13.0 | 2.5 | 4.3 | 8.3 | 8.4 | 5.0 | 13.7 | **55.1** | **15.05** |
| **FY25** | 13.1 | 1.9 | 4.6 | 9.7 | 9.3 | 5.0 | 14.8 | **58.3** | **15.98** |
| **FY26 till Oct'25** | 7.3 | 1.6 | 2.6 | 5.4 | 5.4 | 2.9 | 9.5 | **34.7** | **16.20** |
| **Growth trends** | | | | | | | | | |
| **FY24 vs FY23** | 20.2% | 21.4% | 18.0% | 29.4% | 28.0% | 7.9% | 14.1% | **19.6%** | **19.3%** |
| **FY25 vs FY24** | 0.8% | (26.1%) | 7.7% | 16.8% | 11.5% | 0.6% | 7.8% | **5.9%** | **6.1%** |
| **FY26* vs FY25** | (5.3%) | 59.5% | (3.3%) | (3.0%) | (0.3%) | (1.4%) | 14.7% | **3.3%** | **3.3%** |

Source: TIC analysis * against FY25 for 7 months i.e., April-October

# Ticket distribution (1)

Schedule V (Part B) is a monthly statement presenting vehicle category and ticket distribution -wise traffic data including exemption, local concession / other discounted details.
Toll ticket distribution refers to share of total revenue with respect to various journey types and related discounts applicable. This distribution depends on vehicle category, trip lengths, trip frequency and percentage of local traffic.
As per Toll Plaza Gazette Notification and Toll Rate Revision Circular of FY26 for Kulgo TP, types of toll tickets are being issued are presented in the below table.

| Ticket Category | Description |
|---|---|
| **Single Ticket** | One-way journey on the project highway is considered as single journey. For such journeys, users are required to pay the complete notified one-way fee. |
| **Return Ticket** | Two one-way journeys on the Project highway within 24 hours are covered under this category. For such journeys, users are required to pay one and half times of the fee payable for one-way journey. |
| **Monthly Pass** | Fifty one-way journeys on the Project highway within a month covered under this category. The concessionaire shall, upon request from any person, issue a monthly pass for fifty one-way journeys at a discounted rate equivalent to two-thirds of fifty one-way journeys. |
| **Local Pass (Local Personal)** | Road user who owns a mechanical vehicle registered for non-commercial purposes and resides within a distance of 20 km from the toll plaza can get local monthly pass. |
| **Commercial vehicle registered within district of plaza (Local Commercial)** | Commercial vehicles (excluding vehicles plying under national permit) registered in the district where the toll plaza is located.<br>Fee shall be 50% prescribed rate for that category of vehicle provided no service road or alternative road is available for use of such commercial vehicles. |
| **Exempted** | This journey ticket category is for all users (like Police, Fire Brigade, Ambulance, Defence, etc.) which are exempted from paying toll as per NHAI Toll rules. |
| **Annual Pass for private non-commercial CJV vehicles** | On June 18, 2025, MoRTH introduced a FASTag-based annual pass to facilitate seamless highway travel. This pass is valid for non-commercial private vehicles such as cars, jeeps, and vans, and remains effective for one year from the date of activation or up to 200 trips—whichever comes first for INR 3,000. Trip counting method is as follows:<br>Open Tolling: Each entry / exit counts as one trip<br>Closed Tolling: One entry to exit trip counts as one |

Source: DCA, NH Fee Rules 2008 and subsequent amendments and existing gazette notifications

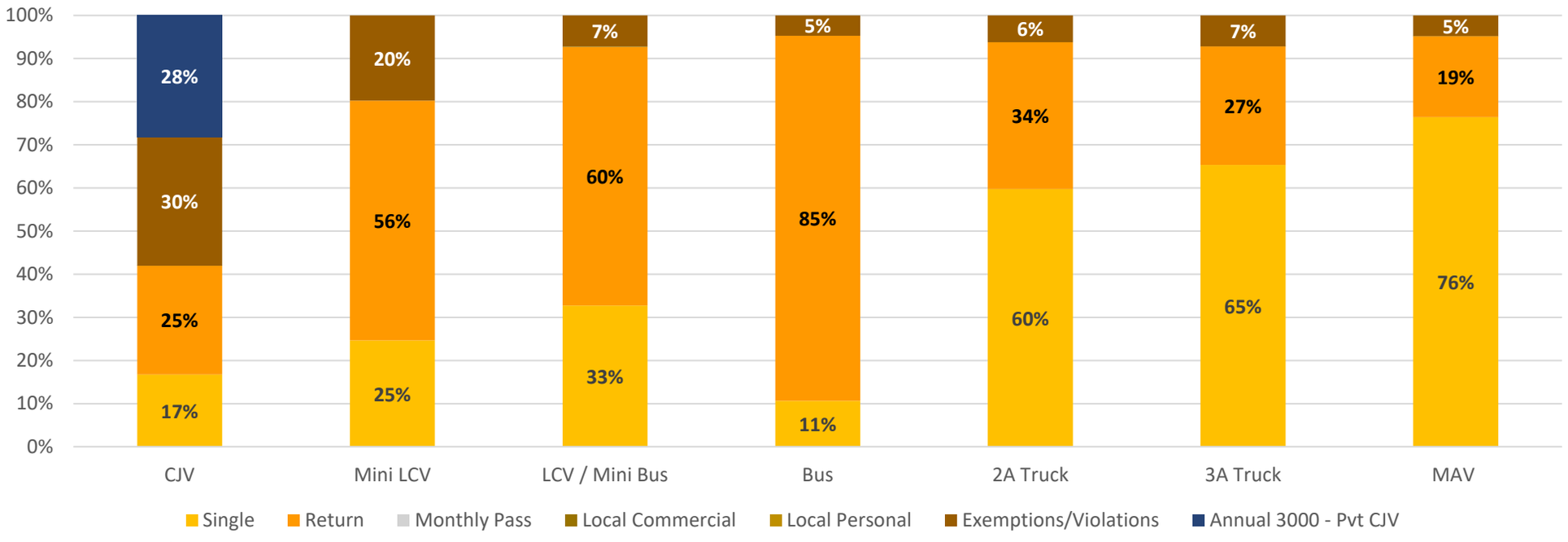
# Ticket distribution (2)

Currently it is envisaged that annual passes will be issued directly by concerned authority and hence revenue from sale of annual passes will not accrue to the concessionaire. NHAI has issued advisory for reimbursement of loss of revenue due to annual pass usage to the concessionaire which is part of Draft Concession Agreement as Clause 27.1.5 and described below:

- The concessionaire acknowledges and agrees that any user owning a non-commercial vehicle and holding a valid and functional Fastag Pass in accordance with MoRTH Gazette Notification No. G.S.R. 388(E) dated 17th June 2025shall be entitled to use the project highway without any restrictions, except to the extent specified in any applicable law, applicable permit or the provisions of the draft concession agreement.
- In respect of such vehicle crossing the toll plaza(s), the concessionaire shall be entitled to receive compensation from the authority equivalent to the product of:
  - The number of non-commercial vehicles crossing the toll plaza(s) with such pass; and
  - 90% of the applicable fee for single journey of such vehicle.
- Provided, however, that for the purpose of computation of such compensation, the counting of any particular vehicle shall be limited 2 crossing per day, notwithstanding that such vehicle may cross the toll plaza(s) multiple times on that day.
- The compensation payable under this clause shall be due and payable in monthly instalments within 7 days of the close of the month.

# Ticket distribution (3): Kulumepalya TP

**Ticket distribution**

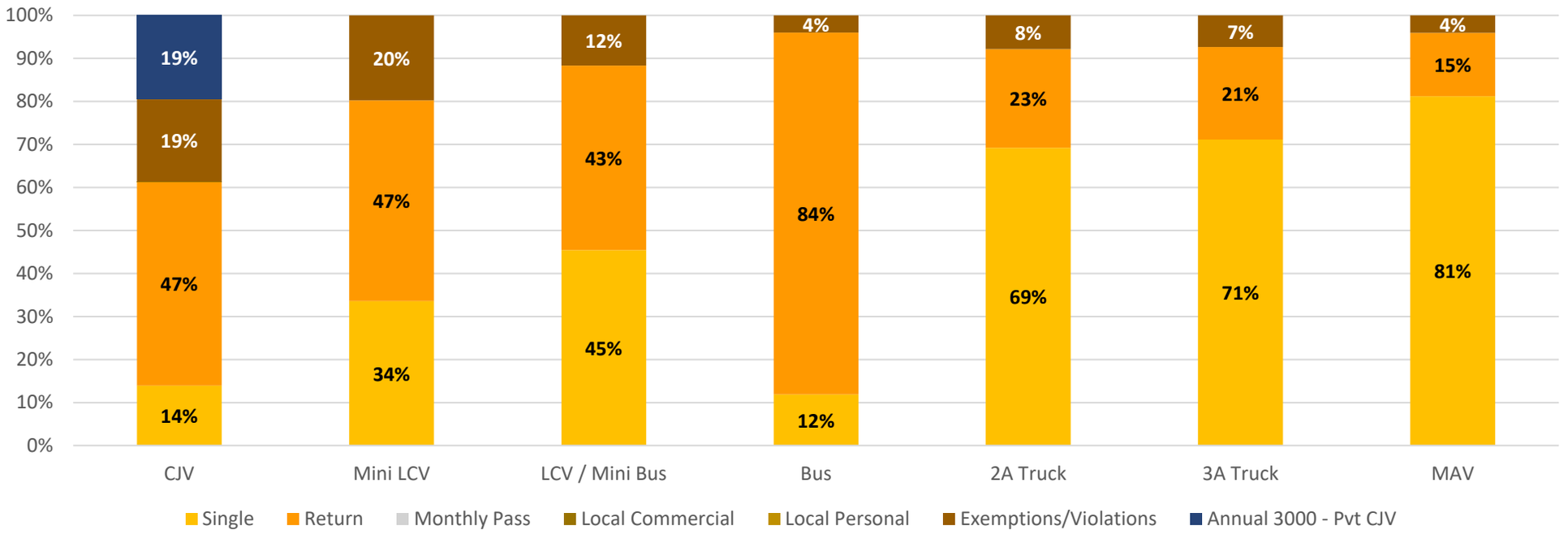



Source: TIC analysis

- CJV traffic on the project highway is largely local in nature with return tickets (~25%) and exemptions/violations (~30%) together forming a substantial share and indicating dominant short-distance movements.
- Notable annual pass usage (~28%) reflects the inter-urban travel pattern.
- Goods vehicles (2A, 3A, and MAV) show a strong inclination toward single journeys which highlights long-haul freight movements to industrial hubs at Nelmangala, Dobbaspet and Tumakuru.
- Relatively higher proportion of local traffic between Tumakuru – Dobbaspet – Bengaluru leads to exemptions and violations of ~25% in Mini LCV categories.

# Ticket distribution (4): Chokkenahalli TP

**Ticket distribution**




Source: TIC analysis

- CJV movement is mainly short-range, as seen from the high share of return tickets (~47%) and exemptions/violations (~19%). About 19% of CJV users have opted for the Annual Pass of INR 3,000 as on 31st October 2025 and is expected to increase further with awareness and adoption.
- Freight traffic across 2A, 3A, and MAV categories is dominated by single-journey tickets (~69% for 2A, ~71% for 3A, and ~81% for MAV), underscoring sustained long-distance goods movement linked to the industrial clusters of Nelmangala, Dobbaspet, and Tumakuru.
- Relatively higher proportion of local traffic between Tumakuru – Dobbaspet – Bengaluru leads to exemptions and violations of ~20% in Mini LCV categories

# Commodity analysis (1) : Kulumepalya TP

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**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala |
| Agriculture / Animal Husbandry | 4% | 4% | 3% | 4% | 2% | 4% | 5% | 7% | 5% | 8% |
| Fruit and Vegetables | 5% | 10% | 3% | 5% | 2% | 5% | 4% | 3% | 3% | 3% |
| FMCG / Food Products | 7% | 7% | 9% | 9% | 5% | 8% | 8% | 10% | 6% | 7% |
| Building & Construction Material | 1% | 0% | 1% | 2% | 1% | 1% | 2% | 0% | 2% | 3% |
| Cement | 1% | 0% | 1% | 1% | 0% | 0% | 2% | 1% | 3% | 2% |
| Sand | -- | 0% | 0% | 0% | 0% | 1% | 2% | 3% | 0% | 1% |
| Aggregates / Stone | -- | -- | 0% | 0% | -- | 1% | 0% | 1% | -- | 1% |
| Minerals & Minig Commodities | 0% | -- | 0% | 0% | 0% | 0% | 0% | -- | 0% | 0% |
| Iron Ore / Products | 1% | -- | 0% | 0% | 1% | 1% | 2% | 1% | 3% | 1% |
| Manufacturing | 20% | 11% | 16% | 14% | 20% | 13% | 14% | 13% | 15% | 12% |
| Automobile and Spares | 1% | 1% | 3% | 3% | 6% | 5% | 7% | 5% | 15% | 18% |
| Chemicals / Fertilisers | 1% | 2% | 1% | 2% | 2% | 1% | 3% | 4% | 5% | 5% |
| Steel / Metal Products | 4% | 4% | 7% | 6% | 6% | 6% | 7% | 7% | 7% | 8% |
| Petroleum Products | 1% | 3% | 1% | 1% | 2% | 4% | 2% | 2% | 4% | 3% |
| Parcel / E-commerce | 11% | 18% | 18% | 29% | 24% | 29% | 21% | 27% | 10% | 19% |
| Miscellaneous | 7% | 1% | 4% | 2% | 3% | 2% | 2% | 2% | 3% | 1% |
| Empty | 37% | 37% | 32% | 19% | 26% | 20% | 20% | 13% | 21% | 6% |

Source: TIC analysis *0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

# Commodity analysis (2) : Chokkenahalli TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala | Nelamangala to Tumakuru | Tumakuru to Nelamanagala |
| Agriculture / Animal Husbandry | 2% | 4% | 3% | 5% | 4% | 5% | 5% | 6% | 6% | 10% |
| Fruit and Vegetables | 11% | 26% | 6% | 7% | 4% | 5% | 5% | 4% | 4% | 5% |
| FMCG / Food Products | 12% | 5% | 10% | 7% | 6% | 8% | 8% | 9% | 5% | 6% |
| Building & Construction Material | 1% | 0% | 2% | 1% | 1% | 1% | 2% | 3% | 3% | 6% |
| Cement | 1% | 1% | 1% | 1% | 1% | 1% | 2% | 1% | 3% | 3% |
| Sand | -- | 0% | -- | 0% | 0% | 0% | 4% | 1% | 1% | 0% |
| Aggregates / Stone | 0% | 0% | 1% | 0% | 0% | 1% | 0% | 0% | 0% | 0% |
| Minerals & Minig Commodities | 0% | -- | 0% | 0% | 0% | -- | 0% | -- | 0% | 0% |
| Iron Ore / Products | 1% | 1% | 1% | 1% | 1% | 0% | 2% | 2% | 3% | 3% |
| Manufacturing | 13% | 6% | 15% | 12% | 17% | 11% | 13% | 11% | 14% | 11% |
| Automobile and Spares | 3% | 1% | 3% | 2% | 8% | 4% | 5% | 3% | 9% | 8% |
| Chemicals / Fertilisers | 1% | 1% | 1% | 1% | 1% | 0% | 2% | 2% | 3% | 3% |
| Steel / Metal | 2% | 2% | 5% | 4% | 4% | 5% | 5% | 5% | 5% | 9% |
| Petroleum Products | 1% | 2% | 3% | 3% | 3% | 3% | 5% | 4% | 6% | 5% |
| Parcel / E-commerce | 10% | 14% | 18% | 31% | 26% | 37% | 21% | 35% | 12% | 23% |
| Miscellaneous | 2% | 1% | 2% | 1% | 2% | 2% | 2% | 2% | 2% | 1% |
| Empty | 38% | 35% | 30% | 24% | 21% | 18% | 18% | 14% | 25% | 9% |

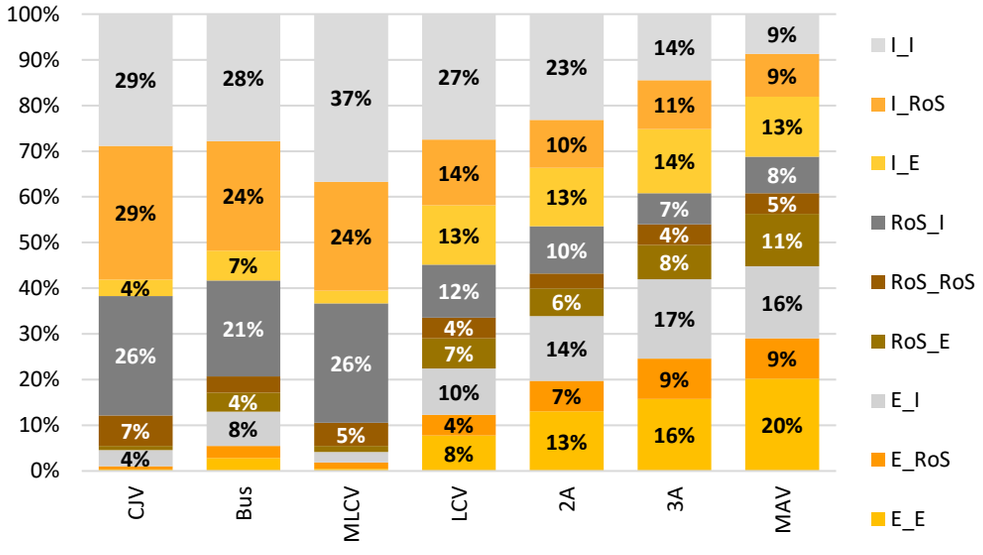
Source: TIC analysis *0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

Commodity distribution exhibits characteristics that are in line with corridor and economic activities observed in the influence region.

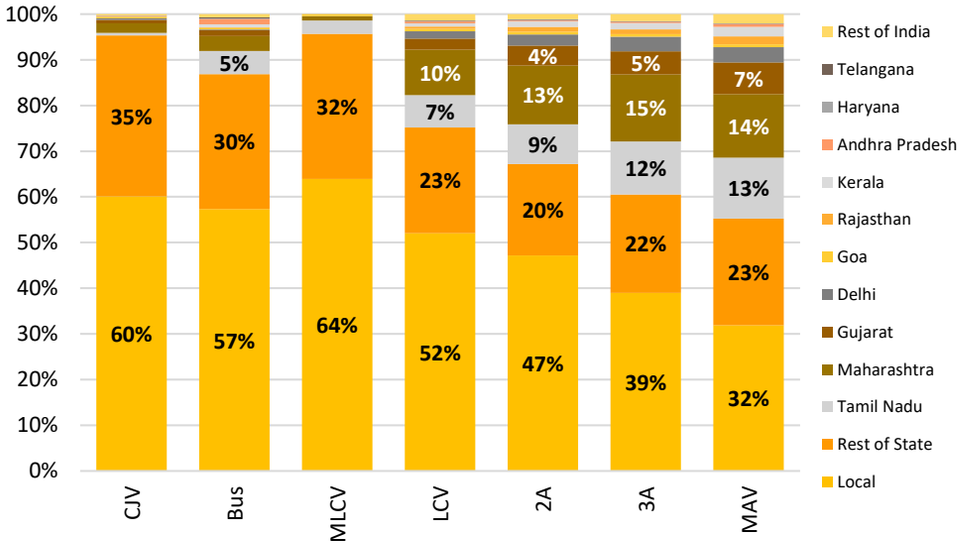
# Zonal influences and trip distances (1): Kulumepalya TP

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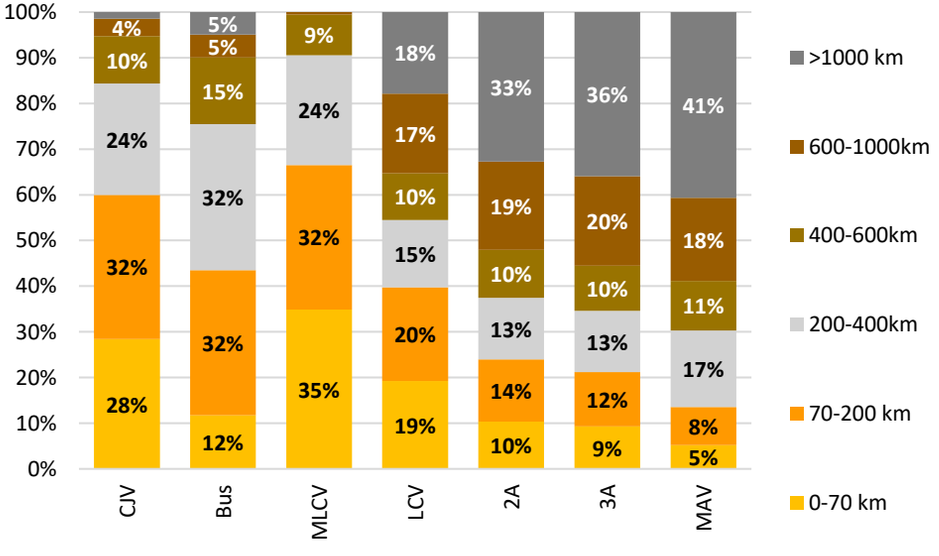
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance




Source: TIC analysis

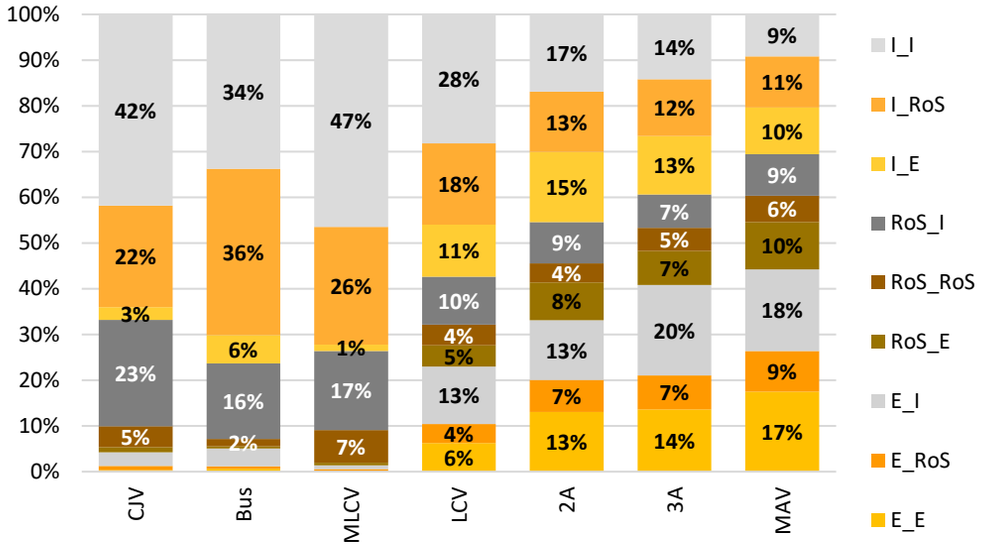
| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 261 |
| Bus | 451 |
| Mini LCV | 231 |
| LCV | 584 |
| 2A | 731 |
| 3A | 860 |
| MAV | 987 |

Vehicle category-wise visual representation of origin-destination zones and top pairs are exhibited in Appendix A.

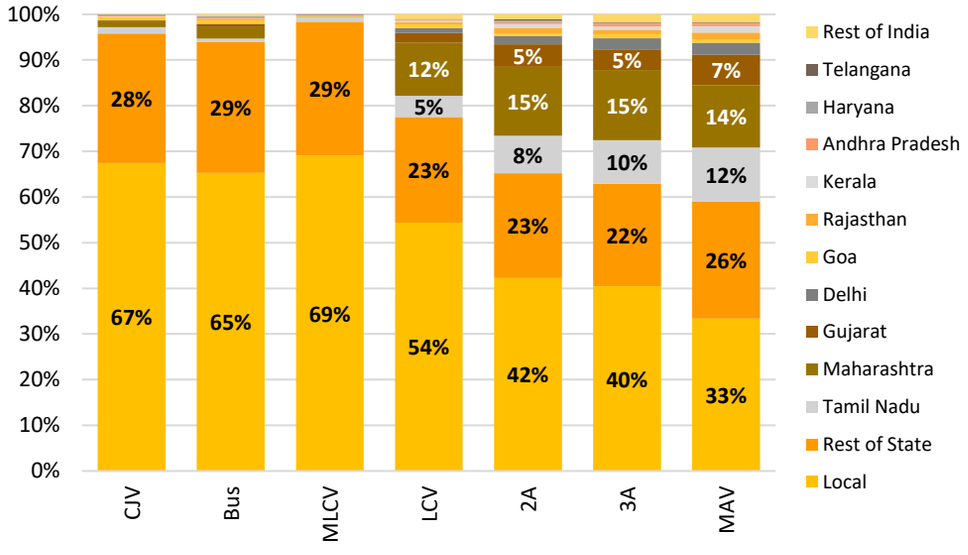
# Zonal influences and trip distances (2) : Chokkenahalli TP

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

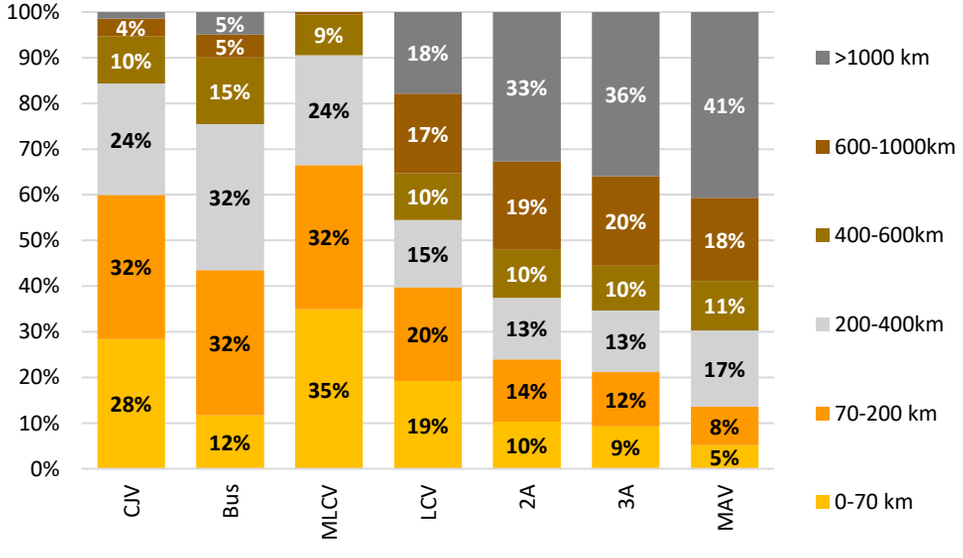
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance




| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 222 |
| Bus | 295 |
| Mini LCV | 167 |
| LCV | 544 |
| 2A | 789 |
| 3A | 824 |
| MAV | 926 |

Vehicle category-wise visual representation of origin-destination zones and top pairs are exhibited in Appendix A.

Source: TIC analysis

# Chapter 4: Economic context and traffic growth

- Economic context of influence region
- Determination of traffic growth drivers
- Estimation of demand elasticities
- Forecasts for growth drivers

IRC-108:2015 mentions that traffic growth is typically driven by a combination of macro-economic trends and industry/commodity specific factors, known as independent variables or traffic growth drivers.

These growth drivers have two critical characteristics:

1) the rate at which it increases i.e., forecasts of independent variable
2) the project highway's relationship with the growth driver to attract, capture and retain the traffic over the forecast horizon i.e., travel demand elasticity

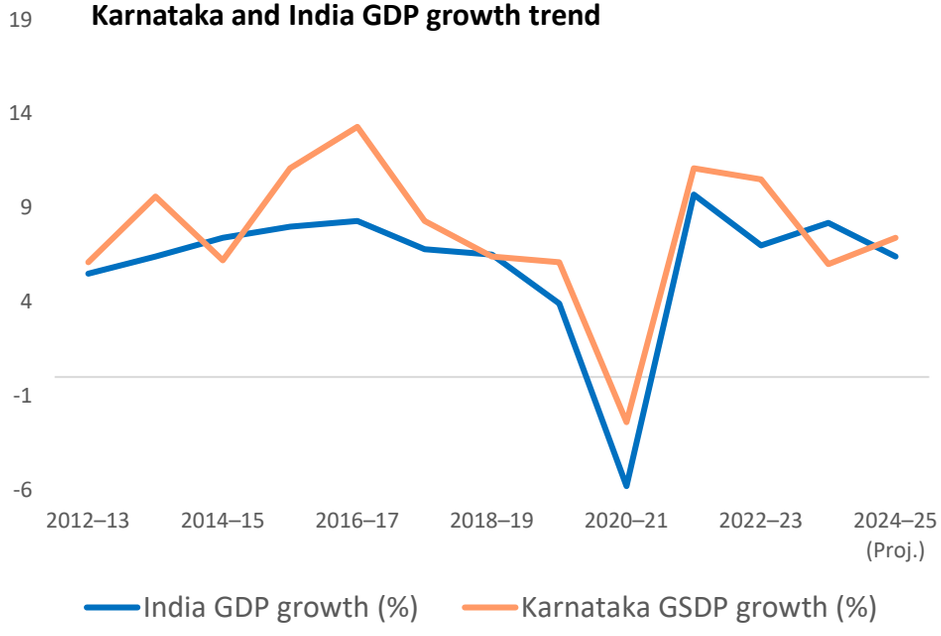
Growth drivers are typically identified through analysis of origin–destination data, site visits and a detailed understanding of the highway.

Travel demand elasticity is influenced by socio-economic conditions both within the region served by the project highway and across the wider national area of influence.

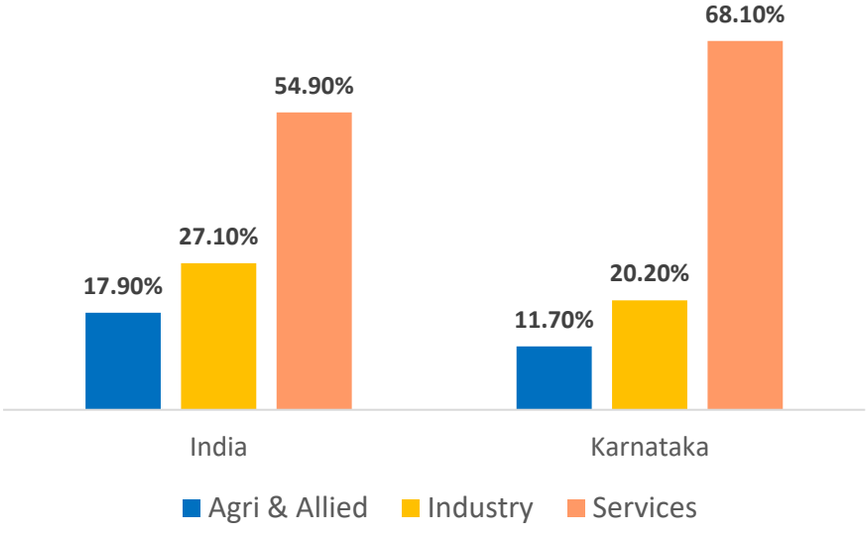
This chapter explains the growth drivers and elasticity in context of economic snapshot of primary districts / state and their correlation with the country.

# Karnataka: Outperforming growth with differentiated sectoral base

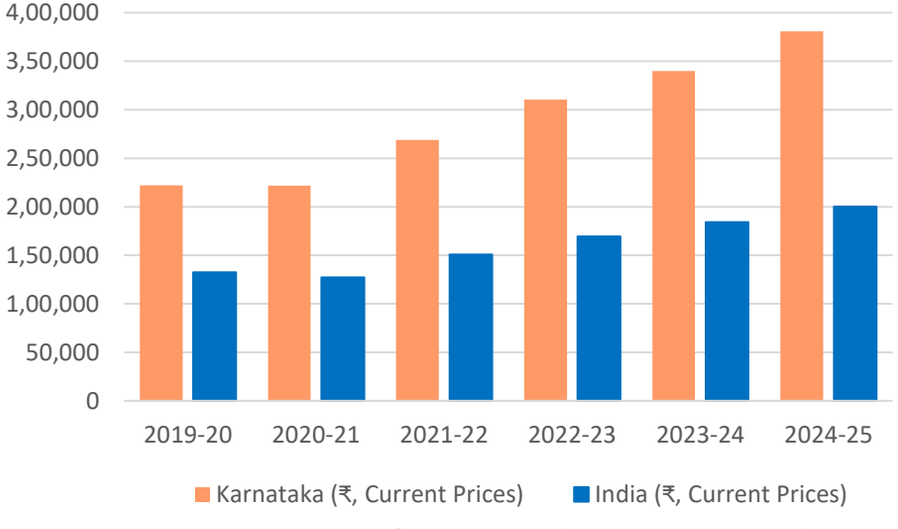
**Karnataka and India GDP growth trend**




**Sectoral composition shift: India vs Karnataka**



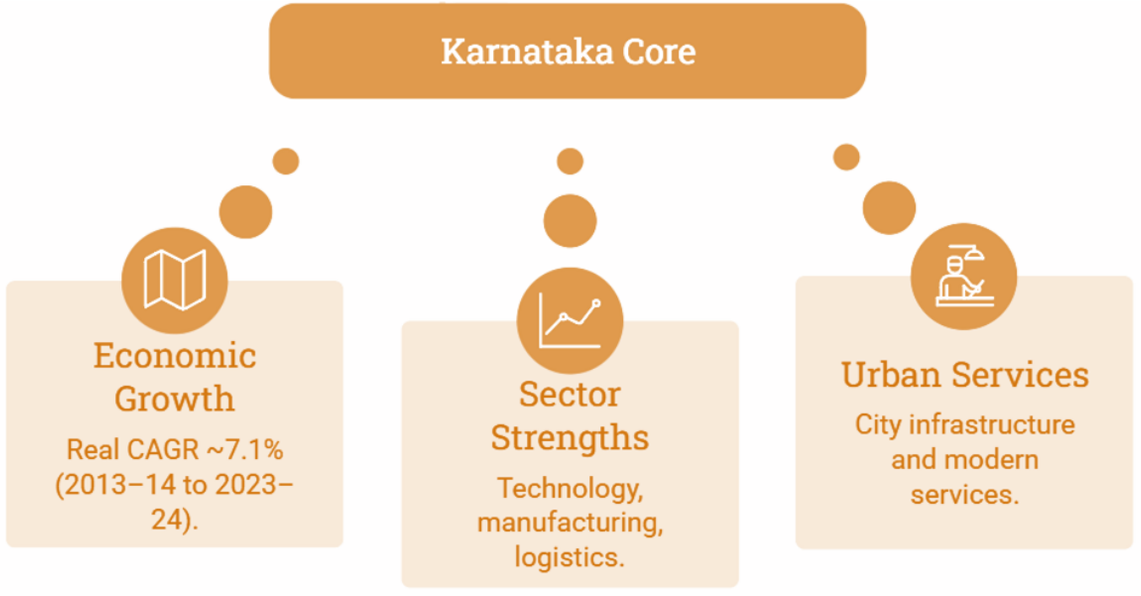

**Per Capita Income (in INR): India vs Karnataka**




- Karnataka's growth outperformance is driven by a **structurally higher services share**, reflecting stronger productivity and value-added economic activity than India.
- This sectoral advantage has **translated into faster per-capita income growth** and a widening income gap with the national average over the past five years.
- While services anchored Bengaluru drove resilience, **Tumakuru's emerging industrial base will power the next leg of growth.**

Source: MoSPI, Directorate of Economics & Statistics Karnataka, TIC analysis

# The Service Engine: driving 68% of Karnataka's economy




Karnataka's economy is overwhelmingly services-driven. Within services, real estate and professional services contribute ~39 % of GSVA, computer services and R&D about 30 %. On the industry side, about 18% of the 20% comes from manufacturing and construction sector

**Bengaluru Region = Services at core (Urban: Tech & Services) + Industry at periphery (Rural/Tumakuru: manufacturing and logistics)**

### Bengaluru Rural

Transitioning toward an **industrial–logistics belt**, driven by warehousing clusters (Nelamangala–Dobbaspet), airport-linked manufacturing, and textile/garment units.

### Tumakuru

A **mixed industrial–agrarian district**, now accelerating due to HAL's helicopter plant, machine-tool clusters, Japan Industrial Park, and the Tumakuru Industrial Township.

- The **dual-track model** ensures broad-based economic resilience even when national or global conditions soften.
- Going forward, **strategic infrastructure (NH48 upgradation, CBIC node, MMLP Dobbaspet), industrial townships, defence manufacturing, and digital services** will shape Karnataka's sustained high-growth trajectory.
- While services anchored Bengaluru drove resilience, **Tumakuru's emerging industrial base will power the next leg of growth.**

# Districts in immediate influence region (1)

**Sectoral contribution in district and state GDP (FY2024)**

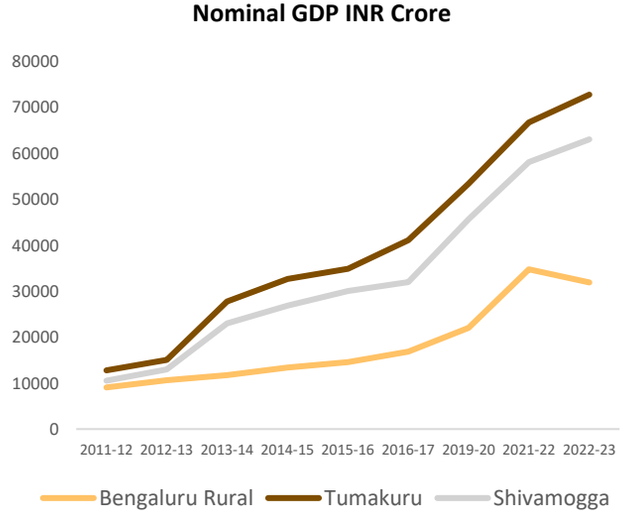
| District | Agriculture and Mining (Primary) | Industry (Secondary) | Services (Tertiary) |
|---|---|---|---|
| **Bangalore Urban** | 0.5% | 15.1% | 84.4% |
| **Tumakuru** | 19.1% | 30.4% | 50.6% |
| **Shivamogga** | 22.3% | 23.2% | 54.5% |
| **Bangalore Rural** | 33.7% | 22.9% | 43.4% |
| **Kolar** | 19.2% | 25.5% | 55.4% |
| **Ramanagara** | 16.6% | 31.6% | 51.9% |
| **Chikkaballapur** | 25.1% | 21.0% | 53.9% |

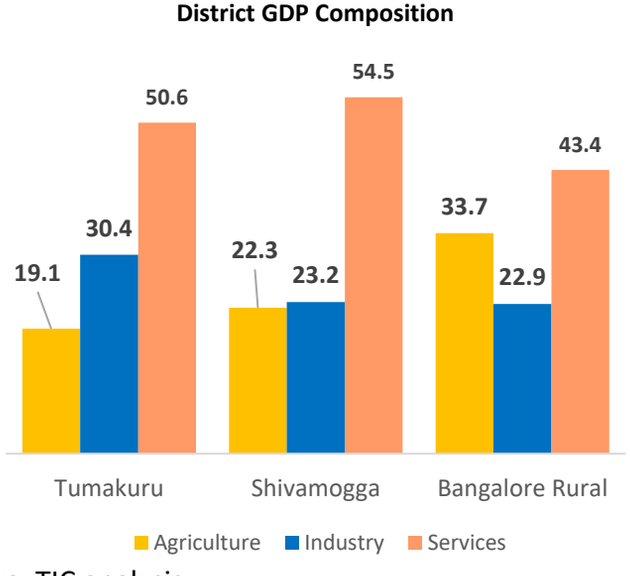
**Contribution in state GDP**

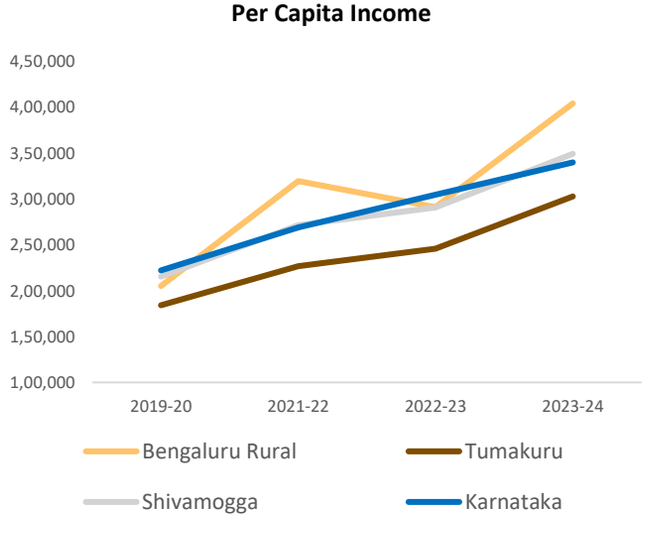
| District | Contribution in State GDP | Per Capita Income |
|---|---|---|
| **Bangalore Urban** | 39.1% | 7,38,910 |
| **Bangalore Rural** | 1.9% | 4,04,138 |
| **Tumakuru** | 3.6% | 3,02,707 |

Economic scale is concentrated in Bengaluru Urban, while income outcomes across surrounding districts are primarily shaped by population dynamics and spillover effects rather than output alone.

**Bengaluru–Tumakuru–Shivamogga corridor strengthens as an emerging consumption–industrial belt**




Source: Department of Economic Survey of Karnataka, TIC analysis

Tumakuru's overall economic output is larger than Bengaluru Rural (due to higher industries, manufacturing and agriculture). However, PCI is lower because Tumakuru has a much larger population base than Bengaluru Rural.

# Districts in immediate influence region (2)

**District level economic snapshot**

| District | Bangalore Urban | Bangalore Rural | Tumakuru | Shivamogga |
|---|---|---|---|---|
| **Economic profile** | Karnataka's primary **services-led growth engine**; dominant IT-ITeS, startups, BFSI, real estate, and corporate services; Accounts for a disproportionate share of state GSDP and capital inflows. | **Peri-urban spillover economy**; closely integrated with Bengaluru's logistics, warehousing, MSMEs, and real estate-led industrial activity. | **Industrial expansion frontier** of the Bengaluru region; diversified economy with manufacturing, food processing, textiles, electronics; emerging satellite industrial hub along NH48. | **Resource-linked regional economy**; agriculture, forestry, hydropower, and trading services form the base; limited large-scale industrialization. |
| **GVA / sector structure** | **Services-dominant** (IT, professional services, finance, real estate); high-value manufacturing (electronics, precision) with minimal agriculture. | **Industry-leaning** district; manufacturing, logistics, and agriculture together form the core; services expanding via urban spillovers. | **Balanced structure** with rising industry share; manufacturing & construction lead growth alongside services; agriculture still meaningful but declining. | **Agri-services led** mix; agriculture & allied and public services dominate; small industrial base with agro-processing and power. |
| **Income position** | **Highest per-capita income in Karnataka**; reflects high productivity services and skilled workforce concentration. | **High per-capita income relative to size**; benefits from proximity to Bengaluru with lower population pressure. | **Mid-range per-capita income**; large population base keeps PCI lower despite higher absolute output. | **Lower-middle income district**; income levels tied to primary sector volatility and limited industrial depth. |
| **Growth profile** | **Structurally strong but maturing growth**; cyclical moderation offset by digital economy, global services demand, and steady capital inflows. | **Fast-growing spillover district**; growth driven by infrastructure build-out, housing, logistics parks, MSME expansion, and urban decentralisation. | **High growth optionality**; next-decade acceleration driven by CBIC node, industrial townships, defence manufacturing, NH48 and MMLP-led logistics. | **Steady, moderate growth**; dependent on agriculture cycles, hydropower capacity, and incremental industrial development. |

Source: TIC analysis

# Districts in immediate influence region (3)

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**District-wise summary of risk and opportunities**

| Parameter | Bengaluru Urban | Bengaluru Rural | Tumakuru | Shivamogga |
|---|---|---|---|---|
| **Primary driver** | High-value services economy driven by IT-ITeS, BFSI, startups, corporate HQs, and real estate. | Spillover-led growth from Bengaluru: logistics, warehousing, MSMEs, real estate, and peri-urban industry. | Manufacturing-led expansion along NH48; emerging industrial and logistics hub for Bengaluru. | Agriculture, hydropower, forestry, and regional trade-services driven economy. |
| **Key resource** | Skilled human capital, global connectivity, innovation ecosystem, capital inflows. | Strategic location, land availability, connectivity to Bengaluru and industrial corridors. | Land availability, industrial estates, NH48 connectivity, labour base. | Natural resources (water, forests), hydropower capacity, agricultural base. |
| **Major risk** | Infrastructure saturation, congestion, high costs, urban stress limiting marginal productivity gains. | Dependence on Bengaluru's growth cycle; limited independent demand drivers. | Execution risk of industrial projects; slower ecosystem development compared to core metros. | High dependence on monsoon and primary sectors; limited private capex inflow. |
| **Growth opportunity** | Continued dominance in R&D, AI, digital, fintech, GCCs, high-end services despite maturity. | Rapid peri-urbanisation, logistics parks, housing, MSME clusters, and supply-chain decentralisation. | Industrial corridor-led growth (manufacturing, logistics, defence, warehousing). | Value-added agro-processing, renewable energy, regional consumption-led growth. |
| **Predicted strong growth segment** | IT-ITeS, global capability centres, fintech, real estate and professional services. | Logistics, warehousing, light manufacturing, housing & construction. | Manufacturing, industrial logistics, construction, freight movement. | Agro-processing, power, trade & transport services. |
| **Conclusion** | **Mature but resilient growth engine; high productivity offsets infrastructure constraints.** | **High-growth spillover district with strong income potential despite smaller economic base.** | **Medium-term high-growth district; key beneficiary of industrial decentralisation.** | **Stable but moderate growth district; needs diversification beyond primary sectors.** |
| **Profile & metrics (GVA share / growth)** | ~39–40% of Karnataka GDDP; highest PCI and productivity. | ~2% of GDDP but high PCI due to low population base and spillovers. | ~3–4% of GDDP; larger output than Bengaluru Rural but lower PCI. | ~2–3% of GDDP; slower growth, lower PCI. |
| **Toll traffic implication** | **High commuter traffic; service-led passenger and commercial vehicle movement.** | **Rising freight + commuter traffic due to logistics parks, industrial expansion and housing expansion across Bengaluru Ring Road.** | **Strong freight traffic growth driven by manufacturing and NH48 industrial flows.** | **Moderate, seasonal freight traffic linked to agriculture output and regional trade.** |

Source: TIC analysis

# Baseline vs Conservative growth scenarios – traffic impact

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**Baseline vs Conservative growth scenarios – traffic impact**

| Key Driver | Baseline Scenario (Optimistic) | Conservative Scenario (Lower Growth) | Expected traffic impact |
|---|---|---|---|
| **Industrial Output (IIP)** | **+5%** manufacturing growth (robust factory activity) | **+2%** growth (sluggish manufacturing) | **Baseline:** Strong freight demand → **LCV ↑**, **MLCV ↑**, **MAV ↑**.<br>**Conservative:** Only essential freight moves → **LCV ↔** (moderate), **MAV/MLCV ↔** (flat) |
| **Agriculture GVA** | **+4%** (normal monsoon, good harvest) | **+2%** (weak agriculture growth) | Good harvest boosts produce transport → **LCV ↑** (farm-to-market)<br>Low agriculture growth → **LCV ↔** (minimal change in produce truck volumes) |
| **Infrastructure Spending** | **High ↑** (e.g., Government capital outlay +15%) | **Reduced ↓** (e.g., capex +5% only) | Big projects drive construction freight → **MAV ↑**, **3A trucks ↑** (cement, steel, aggregates loads)<br>Slower spend → **MAV ↔** (fewer new projects = fewer heavy loads) |
| **Export Demand** | **Strong** (global demand, exports +8%) | **Soft** (exports +2% or flat) | Export surge → **MLCV/MAV ↑** (more long-haul/container trucks)<br>Weak exports → **MAV ↔/↓** (idle capacity if factories export less) |
| **Overall GDP / Services** | **Fast growth** (~7–8% GDP; services booming) | **Modest growth** (~5% GDP; services slow) | High incomes → **CJV ↑**, **Bus ↑** (more travel, commuting); freight also grows with consumption<br>Slower economy → **CJV ↔**, **Bus ↔** (travel demand plateaus; freight limited by lower spending) |

Source: TIC analysis

# PESTLE Analysis

| Dimension | Key Strengths / Drivers | Constraints / Risks | Implication for Industrial Growth |
|---|---|---|---|
| **Political** | ▪ Stable policy continuity across governments<br>▪ Pro-industry reforms: Industrial Policy 2020–25, Land Reform amendments<br>▪ Single-window clearance, one of the top achiever in EoDB<br>▪ Support for mega infrastructure: CBIC, suburban rail<br>▪ Regional incentives for backward areas (Kalyana Karnataka) | ▪ Policy uncertainty in SEZ/textile sector changes at times<br>▪ **Upcoming elections → possible incentives re-prioritization** | **Positive**: Strong governance enables manufacturing shift beyond Bengaluru; policy certainty attracts global investors (e.g., Japan, EV, Aerospace). |
| **Economic** | ▪ High GSDP growth, resilient macro fundamentals<br>▪ Large urban consumer base drives demand (Autos, Housing, FMCG, Electronics)<br>▪ High FDI & PLI leverage: electronics, EV, aerospace<br>▪ Surplus power availability supports heavy industry | ▪ Logistics bottlenecks in Bengaluru (congestion)<br>▪ Land + water costs rising near capital | **Strong tailwind**: Manufacturing expansion likely in Tumakuru, Kolar, Mysuru due to lower costs + infra connectivity. |
| **Social** | ▪ Young, skilled talent pool (200+ engineering colleges)<br>▪ Cosmopolitan culture suits expats + high-skill labour<br>▪ Higher urbanization (~40%) supports services + consumption | ▪ Large regional inequality (Bengaluru vs North Karnataka)<br>▪ Periodic linguistic/regional protests | **High workforce readiness** supports advanced manufacturing & R&D; labor reforms enable 24×7 operations. |
| **Technological** | ▪ India's tech capital: 40% of unicorns, strong R&D ecosystem<br>▪ Advanced supply chain for aerospace, machine tools<br>▪ Industry 4.0 readiness: IoT, automation adoption<br>▪ Semiconductor & EV ecosystem building | ▪ Skill gaps in non-metro districts need ongoing upskilling | **Major driver**: Enables high-value production — defence, precision tools, electronics, ESDM, med-tech. |
| **Legal** | ▪ Streamlined approvals (Udyog Mitra authority)<br>▪ Commercial courts reduce dispute timelines<br>▪ Land Bank with >45,000 acres via KIADB<br>▪ Flexible labour laws (fixed-term employment etc.) | ▪ Environmental approvals slow in Tier-2 eco-sensitive zones | **Stable + Efficient** regulatory environment → low friction entry and faster industrial setup. |
| **Environmental** | ▪ 25+ GW renewable capacity (Solar+Wind), RE-centric grid<br>▪ ESG-friendly for global firms<br>▪ Green industrial parks & EV policy in place | ▪ Water scarcity in multiple districts (Kolar, Bengaluru outskirts)<br>▪ Pollution & waste stress in Bengaluru | **Dual-edge**: Green energy attracts clean industry; resource constraints must be solved (integrated water manangement + ZLD norms). |

Source: TIC analysis

# Determination of growth drivers and elasticity (1)

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**Potential socio-economic indicators as growth drivers in context of IRC: 108-2015 and benchmark studies**

| Socio-economic indicators | Observations for availability/reliability of historical and forecast data |
|---|---|
| **Vehicle registration / Automobile Sales** | Sourcing vehicle registration data from concerned Regional Transport Office (RTO) within influence region is herculean task. In addition, it is not mandatory that Project Influence Area (PIA) matches with vehicle registration cases at ground level so not useful.<br>Society of Indian Automobile Manufacturers (SIAM) publishes automobile sales at region level but not at granular level. Can be used as proxy data to validate specific trends.<br>The consultant includes regional dealers' association of freight vehicles (if any) and local financing agencies to understand and validate specific trends observed in traffic. |
| **Per Capita Income** | Can be used as proxy data which reflects demand composition but not specific to commodities / vehicle category. Underlying forces are complex and changing at every strata of administrative structure i.e., districts, state, national. Historical data at state / national level available in public domain but not for district level. Further, availability of forecast data is major constraint in India. |
| **Population** | Population data are compiled on a decennial basis, with the latest census conducted in 2011, and do not provide a robust annual time series suitable for econometric modelling. In addition, migration trends across socio-economic segments and income-based geographies are highly volatile and difficult to forecast with confidence. Accordingly, population growth has not been adopted as a driver for forecasting future travel demand on the project highway. |
| **GDP / GSDP / GDDP** | Dataset from national and international publications and government agencies which are highly reliable in context of forecast e.g., Focus Economics, RBI / RBI's Survey of Professional Forecasters (96$^{th}$ Round), SBI Research, CII, multilateral banks (ADB, World Bank etc.), IMF, OECD, Oxford etc.<br>The consultant typically uses Focus Economics monthly subscription and in-house/empaneled economists for correlation for state and district level GDP and industry specific aspects.<br>The client provides views on the consultant's draft and recommends the final forecast. |

Source: TIC research and analysis

# Determination of growth drivers and elasticity (2)

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- For any potential indicator (economic, commodity, or industry-related) to be used as a traffic growth driver, availability and reliability of both historical data and credible forecasts are critical success factors.
- Among the key socio-economic indicators discussed above, Gross Domestic Product (GDP) at the national level and Gross State Domestic Product (GSDP) and Gross District Domestic Product (GSDP) are the only indicators for which robust historical data and reliable forecasts are consistently available. Accordingly, GDP/GSDP/GDDP have been adopted as the primary growth drivers for traffic forecasting.
- The consultant held discussions with regional dealers' associations of freight vehicles, agricultural wholesale yards (popularly known as mandis), inter-city bus terminals and port trusts/logistics facility providers in the immediate influence region to validate specific traffic trends such as seasonality and growth patterns.
- In many cases, historical data show varying traffic trends due to various external events in the economy and region. In addition, variations in data recording by third-party tolling agencies and the presence of historical data gaps, as observed in this business case, necessitated further validation.
- Accordingly, validation of the historical data was carried out using traffic data from neighbouring toll plazas on the corridor and benchmark highway sections.
- Traffic growth may not be uniform during the forecasting period, considering factors such as increasing total traffic volumes relative to the capacity of the corridor and the project highway, technological advancements in the automotive industry, cost–tonnage ratios of specific commodity–vehicle combinations, and overloading trends versus strict government enforcement in the region.
- In India, the freight vehicle mix has been changing over the last decade, favouring multi-axle vehicles (MAVs) over 2-axle and 3-axle vehicles for long-distance traffic, given the operational efficiencies achievable with larger vehicles. At the same time, Mini LCVs and LCVs have become more popular for short-distance traffic and more localised supply movements compared to 2-axle vehicles.
- Considering ongoing technological advancements in the automotive industry, standard 2-axle and 3-axle trucks have been increasingly replaced by 6-tyre LCVs over the last couple of years, a trend that is expected to continue.
- The projected elasticity values are typically assumed to remain constant over the concession period in the Indian context; however, they may vary over time due to factors such as increasing traffic volumes relative to corridor capacity, technological advancements in the automotive industry, changes in cost–tonnage ratios of specific commodity–vehicle combinations, overloading trends versus enforcement intensity, and correction of regional imbalances.
- Considering all these aspects, vehicle category-wise elasticities have been estimated.

# Determination of growth drivers and elasticity (3)

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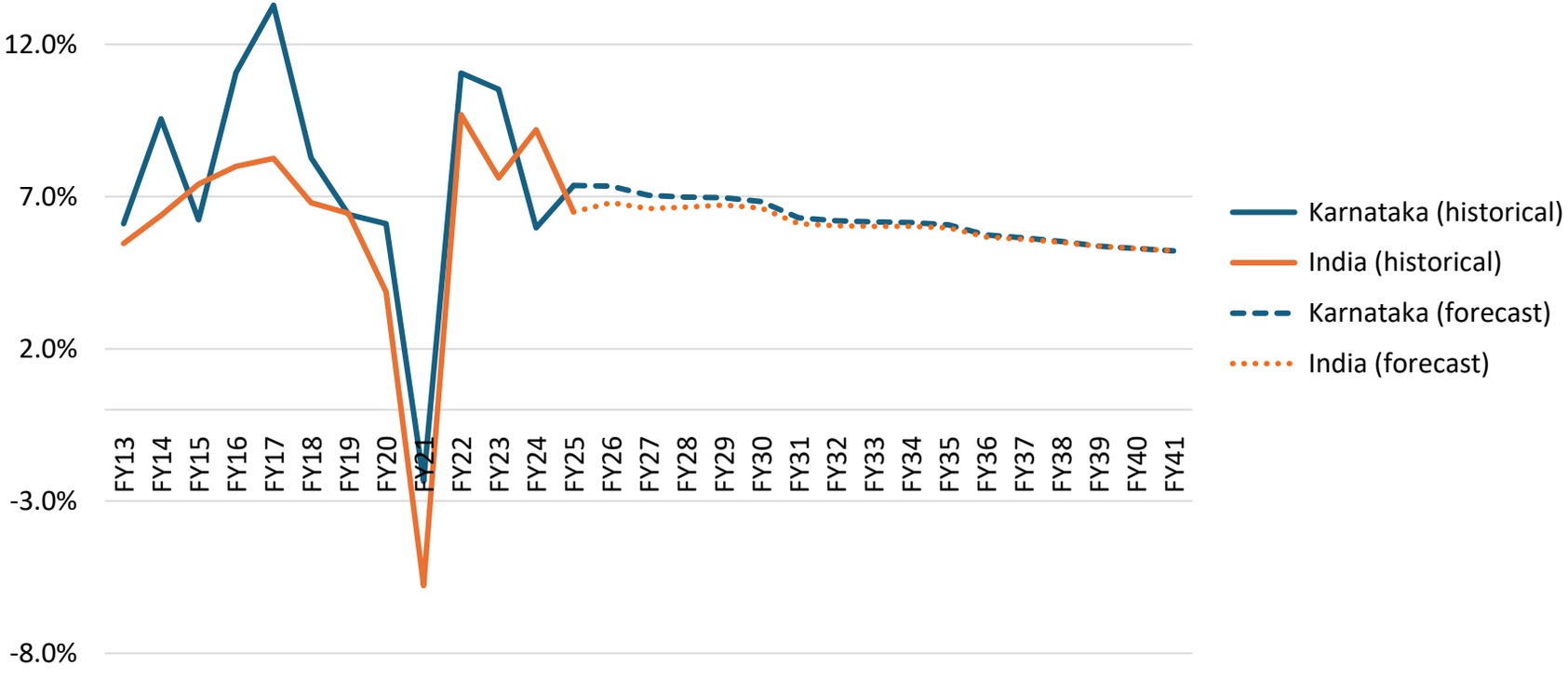
**Vehicle category-wise adopted elasticity**

| Vehicle Category | Kulumepalya TP | Chokkenahalli TP | Halenijagal TP (Mainline Plaza) | Bharathipura & Honnenahalli (Check Plaza) | Dobbaspet & Halenijagal (Check Plaza) | Independent variable |
|---|---|---|---|---|---|---|
| **CJV** | 1.02 | 1.00 | 1.00 | 0.70 | 0.65 | GSDP Karnataka |
| **Mini LCV** | 0.80 | 0.75 | 0.75 | 0.50 | 0.50 | |
| **Bus** | 0.50 | 0.50 | 0.50 | 0.15 | 0.15 | |
| **LCV / Mini Bus** | 0.50 – 0.57 | 0.80 | 0.70 – 0.80 | 0.35 – 0.40 | 0.70 | Weighted average of GDP, GSDP of Karnataka and Tamil Nadu |
| **2 Axle** | 0.90 – 0.95 | 0.90 – 0.95 | 0.90 – 0.95 | 0.50 | 0.80 | |
| **3 Axle** | 0.20 | 0.30 | 0.25 | 0.15 | 0.15 | |
| **MAV** | 1.02 | 1.00 – 1.05 | 0.95 | 0.35 | 0.75 | |
| **OSV** | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | GDP |

Source: TIC estimate using historical traffic data for the project highway and benchmark references of up-stream / downstream toll plazas

# Forecasts for growth drivers (1)

**GDP and GSDP forecast**




Source: Client input and TIC estimates

- The **dual-track model** of Karnataka ensures broad-based economic resilience even when national or global conditions soften.
- Going forward, **strategic infrastructure (NH48 upgradation, CBIC node, MMLP Dobbaspet), industrial townships, defence manufacturing, and digital services** will shape Karnataka's sustained high-growth trajectory.
- While services anchored Bengaluru drove resilience, **Tumakuru's emerging industrial base will power the next leg of growth.**
- WPI will be 3.24% throughout the concession period except 0.25% for FY27 to revise toll rates as provided by the Client.

# Chapter 5: Baseline traffic and revenue forecast

- Base year AADT (FY26)
- Toll ticket distribution
- Revenue reconciliation

This chapter presents our approach to reach baseline forecast. The consultant estimated base year AADT and toll ticket distribution to reconcile base year traffic and revenue.

# Base year AADT estimate (1)

- The consultant reviewed H1 FY26 ETC traffic data received from the client. Based on which traffic profiling for balance half of FY26 has been estimated using seasonality correction factors followed by estimation of FY26 AADT.
- An independent CTVC survey was undertaken to validate the ETC reported traffic data. The variance between CTVC and ETC data is comparatively higher for Car/Jeep/Van, Mini LCV, and Bus categories.
- For CJV/Mini LCV, this is attributed to local vehicles from nearby urban centres. Variance for Bus, LCV, Truck 2A, Truck 3A, and MAV categories are also on higher side compared to country's benchmark. This can be attributed to toll plaza's proximity to major transport and warehousing zone and language issue while running toll operations through short term contracts.
- Hence, the consultant multiplied variance factor with ETC AADT to determine the corrected FY26 AADT.

**Base Year AADT (FY26)**

| Particulars | Kulumepalya TP | | | Chokkenahalli TP | | |
|---|---|---|---|---|---|---|
| | ETC AADT | Variance factor | Corrected Base Year AADT | ETC AADT | Variance factor | Corrected Base Year AADT |
| **Car/Jeep/Van** | 18,974 | 1.3817 | 26,217 | 15,988 | 1.2558 | 20,078 |
| **Mini LCV** | 3,091 | 1.2908 | 3,990 | 2,293 | 1.2935 | 2,966 |
| **Mini Bus/LCV** | 4,358 | 1.0904 | 4,725 | 3,321 | 1.1476 | 3,811 |
| **Bus** | 3,667 | 1.0499 | 3,850 | 3,466 | 1.0415 | 3,610 |
| **2A Truck** | 3,416 | 1.0725 | 3664 | 3,331 | 1.0936 | 3,642 |
| **3A Truck** | 1,733 | 1.0812 | 1,874 | 1,712 | 1.0856 | 1,859 |
| **MAV** | 4,714 | 1.0479 | 4,940 | 5,175 | 1.0414 | 5,389 |
| **OSV** | 25 | 1.0000 | 25 | 23 | 1.0000 | 23 |
| **Total AADT** | **39,979** | | **49,312** | **35,308** | | **41,378** |
| **Total PCU** | **76,376** | | **87,839** | **72,180** | | **80,448** |

Source: TIC estimate

# Base year AADT estimate (2)

- For proposed new mainline toll plaza at Halenijagal TP, the consultant determined 2-weeks ADT through 14-days independent count and multiplied by seasonal correction factors.
- While in case of 4 Check Plazas, 7-days of turning movement count (all movements which will use proposed check plazas on either side for Tumakuru and Bengaluru) at Dobbaspet junction and Sompura Industrial junction along with 3-days OD surveys have been carried out.
- From OD survey data of all directions including Sompura Industrial Junctions, the traffic have been split in two categories – either intended to use main carriageway or service road separately considering dynamics like level of service, toll charges, last mile connectivity etc.
- Based on these survey data and analysis, 7-days ADT determined for all 4 entry/exit check plazas followed by application of benchmark seasonality correction factors to determine AADT for FY26 individually for all four check plazas.
- The derived volume has been validated with neighbouring toll plazas and through OD surveys carried out at three mainline plazas.

**Base Year AADT (FY26)**

| Particulars | Kulumepalya TP | Chokkenahalli TP | Halenijagal TP (Mainline Plaza) | Bharathipura and Honnenahalli CP (Check Plaza) | Dobbaspet and Halenijagal CP (Check Plaza) |
|---|---|---|---|---|---|
| **Car/Jeep/Van** | 26,217 | 20,078 | 24,551 | 7,933 | 4,936 |
| **Mini LCV** | 3,990 | 2,966 | 4,609 | 1,956 | 822 |
| **Mini Bus/LCV** | 4,752 | 3,811 | 4,221 | 1,552 | 842 |
| **Bus** | 3,850 | 3,610 | 3,709 | 630 | 214 |
| **2A Truck** | 3,664 | 3,642 | 4,217 | 1,137 | 1,174 |
| **3A Truck** | 1,874 | 1,859 | 1,920 | 779 | 437 |
| **MAV** | 4,940 | 5,389 | 5,342 | 1,120 | 1,395 |
| **OSV** | 25 | 23 | 11 | 2 | 1 |
| **Total AADT** | **49,312** | **41,378** | **48,579** | **15,110** | **9,820** |
| **Total PCU** | **87,839** | **80,448** | **89,116** | **24,909** | **18,777** |

Source: TIC estimate

# Ticket Distribution (1)

**Kulumepalya TP**

| Vehicle categories | Car/Jeep/Van | | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|---|
| Ticket types | FY26 | FY27 | FY26 onwards | | | | | |
| Single | 16.7% | 8.6% | 24.6% | 10.6% | 32.7% | 59.8% | 65.3% | 76.4% |
| Return | 25.3% | 22.4% | 55.6% | 84.7% | 60.0% | 34.0% | 27.5% | 18.8% |
| Monthly Pass | - | - | - | - | - | - | - | - |
| Local Commercial | - | - | - | - | 0.1% | - | 0.0% | 0.0% |
| Local Personal | 0.0% | 0.0% | - | - | - | - | - | - |
| Exemptions/Violations | 29.8% | 29.8% | 19.8% | 4.7% | 7.2% | 6.2% | 7.2% | 4.8% |
| Annual Pass - Pvt CJV | 28.2% | 39.2% | - | - | - | - | - | - |

Source: TIC estimate

**Chokkenahalli TP**

| Vehicle categories | Car/Jeep/Van | | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|---|
| Ticket types | FY26 | FY27 | FY26 onwards | | | | | |
| Single | 13.9% | 2.3% | 33.6% | 11.9% | 45.5% | 69.2% | 71.2% | 81.2% |
| Return | 47.4% | 44.4% | 46.7% | 84.1% | 42.9% | 22.9% | 21.5% | 14.7% |
| Monthly Pass | - | - | - | - | - | - | - | - |
| Local Commercial | - | - | - | - | - | - | - | - |
| Local Personal | 0.0% | 0.0% | - | - | - | - | - | - |
| Exemptions/Violations | 19.2% | 19.2% | 19.7% | 4.0% | 11.6% | 7.9% | 7.3% | 4.1% |
| Annual Pass - Pvt CJV | 19.5% | 34.1% | - | - | - | - | - | - |

Source: TIC estimate

- At Kulumepalya TP, ~30% of CJV traffic is being observed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to increase to ~40% in future through gradual awareness among road users.
- Similarly, at Chokkenahalli TP, ~20% of CJV traffic is being observed using Annual Pass of INR 3,000 as on 31st October 2025 which is expected to increase to ~35% in future through gradual awareness among road users.
- The consultant did not consider penetration of annual pass from estimated exemption/violation in future.
- For all vehicle categories, prevailing exemption/violation has considered for future.
- As per discussion with the client, prevailing forced exemption is likely to reduce post-implementation of Multi Lane Free Flow (MLFF) tolling system.

# Ticket Distribution (2)

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**Halenijagal TP**

| Vehicle categories | Car/Jeep/Van | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|
| **Ticket types** | **FY28 Onwards** | | | | | | |
| **Single** | 2.3% | 33.6% | 11.9% | 45.5% | 69.2% | 71.2% | 81.2% |
| **Return** | 44.4% | 46.7% | 84.1% | 42.9% | 22.9% | 21.5% | 14.7% |
| **Monthly Pass** | - | - | - | - | - | - | - |
| **Local Commercial** | - | - | - | - | - | - | - |
| **Local Personal** | 0.0% | - | - | - | - | - | - |
| **Exemptions/Violations** | 19.2% | 19.7% | 4.0% | 11.6% | 7.9% | 7.3% | 4.1% |
| **Annual Pass - Pvt CJV** | 34.1% | - | - | - | - | - | - |

Source: TIC estimate

**Bharathipura and Honnenahalli Check Plazas**

| Vehicle categories | Car/Jeep/Van | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|
| **Ticket types** | **FY28 Onwards** | | | | | | |
| **Single** | 16.7% | 24.6% | 10.6% | 40.5% | 53.3% | 57.1% | 68.1% |
| **Return** | 25.3% | 55.6% | 74.7% | 55.9% | 43.6% | 38.1% | 29.2% |
| **Monthly Pass** | - | - | 10.0% | - | - | - | - |
| **Local Commercial** | - | - | - | 0.1% | - | 0.0% | 0.0% |
| **Local Personal** | 11.8% | - | - | - | - | - | - |
| **Exemptions/Violations** | 6.2% | 19.8% | 4.7% | 3.5% | 3.1% | 4.8% | 2.7% |
| **Annual Pass - Pvt CJV** | 40.0% | - | - | - | - | - | - |

Source: TIC estimate

# Ticket Distribution (3)

**Dobbaspet and Halenijagal (Check Plaza) TP**

| Vehicle categories | Car/Jeep/Van | MLCV | Bus | LCV | 2A | 3A | MAV |
|---|---|---|---|---|---|---|---|
| Ticket types | FY29 H2 Onwards | | | | | | |
| Single | 2.3% | 33.6% | 11.9% | 45.5% | 69.2% | 71.2% | 81.2% |
| Return | 44.4% | 46.7% | 84.1% | 42.9% | 22.9% | 21.5% | 14.7% |
| Monthly Pass | - | - | - | - | - | - | - |
| Local Commercial | - | - | - | - | - | - | - |
| Local Personal | 0.0% | - | - | - | - | - | - |
| Exemptions/Violations | 19.2% | 19.7% | 4.0% | 11.6% | 7.9% | 7.3% | 4.1% |
| Annual Pass - Pvt CJV | 34.1% | - | - | - | - | - | - |

Source: TIC estimate

# Validation of base year traffic and revenue

- The Consultant calculated base year revenue by multiplying traffic AADT with prevailing toll rates in accordance with estimated toll ticket distribution.
- Comparison summary with quoted remittance by tolling agency is presented in the below table.
- Quoted daily remittance should be lower than estimated revenue by approx. 5%-10% considering profit margins of tolling agencies.

**Traffic and revenue reconciliation for base year (all values are estimated with FY26 toll rate with old linking factor)**

| Toll Plaza | Base year revenue estimate by the Consultant (INR Crore)* | Annual Potential Collection estimate by NHAI (INR Crore) | FY26 estimate vs NHAI APC | Quoted remittance By tolling agency (INR Crore) | Consultant estimate vs Quoted remittance |
|---|---|---|---|---|---|
| **Project highway as a whole (Kulumepalya and Chokkenahalli)** | 123.77 | 121.17 | 2.1% | 123.66 | 0.08% |

Source: TIC estimate

# Chapter 6: Diversion analysis

- Upgradation of NH66
- Satellite Town Ring Road / Bengaluru Ring Road
- Surat Nashik Chennai Expressway
- Bengaluru Tumakuru Metro line
- Diversion of local traffic to Service Road on implementation of access-controlled
- Diversion of Dobbaspet and Halenijagal (Check Plaza) traffic

This chapter elaborates impacts of proposed infrastructure developments in the project influence and network in form of positive/negative diversion to/from the project highway. Analysis has been exercised using IRC: 108 - 2015 and IRC: SP: 30 - 2019.

# Upgradation of NH66 (1)

- NH66 upgradation is envisioned to decongest the existing corridor, strengthen regional and inter-state connectivity, and serve as a strong catalyst for economic growth, logistics efficiency, and tourism development along the western coastline.
- Project is under implementation since long with various set of construction related challenges and is targeted for completion by March 2027.
- Mumbai Goa section is nearing completion, and once fully operational, it is expected to substantially reduce travel time and improve the reliability of long-distance trips. In Kerala, although considerable progress has been achieved, execution is being carried out in phases due to land acquisition challenges and dense urban development. Several upgraded stretches are, however, expected to open to traffic by early 2028.
- Hazardous cargo traffic has been diverted to NH48 (movement between Kochi and Mumbai/Surat) due to ongoing construction activities on NH66. This mainly include traffic carrying propane gas and other chemical and petroleum products. Once the under construction NH66 sections become operational, the diverted traffic is expected to return to shortest route, thereby having a negative diversion from the project highway.

**Diversion due to Upgradation of NH66**

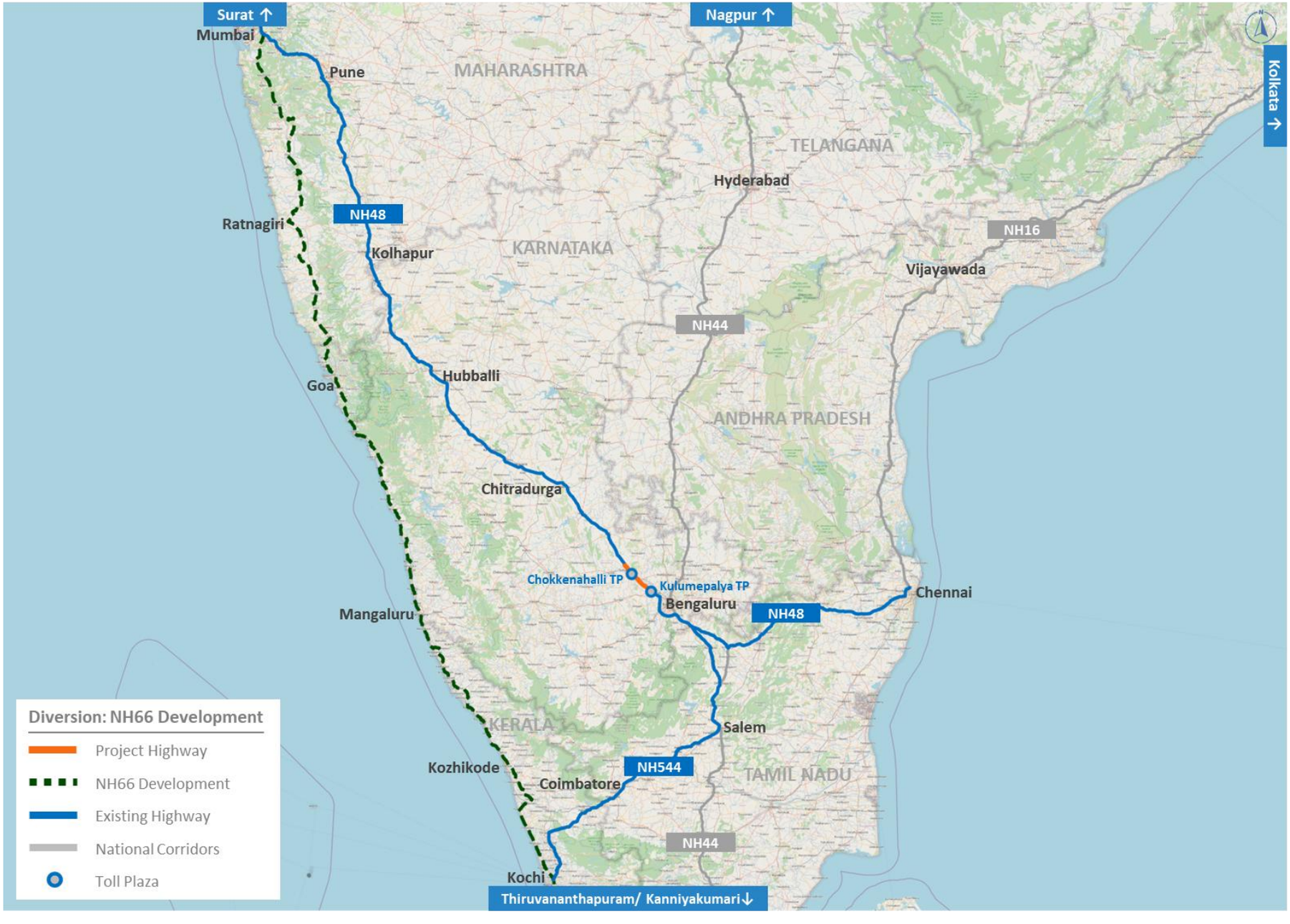
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Kagal/north and Kochi / south | FY28 (50%) FY29 (100%) onwards | Kulumepalya | - | - | - | (0.22%) | (0.42%) | (0.97%) |
| | | | Chokkenahalli | - | - | - | (0.23%) | (0.46%) | (0.92%) |
| | | | Halenijagal | - | - | - | (0.23%) | (0.46%) | (0.92%) |
| | | | Bharathipura / Honnenahalli (Check Plazas) | - | - | - | - | - | - |
| | | | Dobbaspet / Halenijagal (Check Plazas) | - | - | - | - | - | - |

Source: TIC estimate

# Upgradation of NH66 (2)

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**Upgradation of NH66 and project highway context**




Source: TIC analysis (map not to scale)

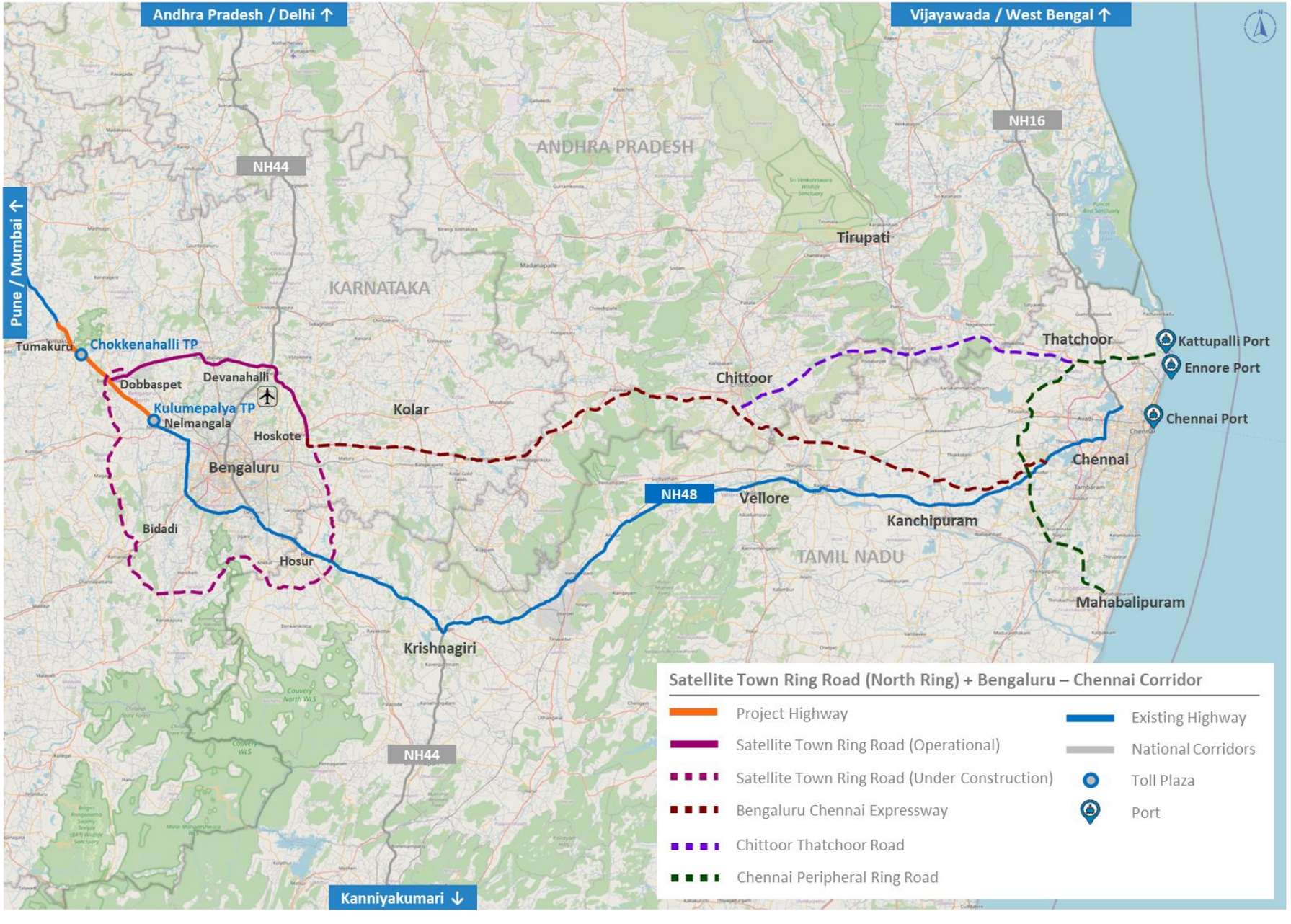
# Satellite Town Ring Road (1)

- Satellite Town Ring Road (STRR), officially designated as NH948A and partly as NH648, is a greenfield expressway project being developed by NHAI. Planned as a 4–6 lane, access-controlled corridor, the STRR is envisioned as an orbital road around Bengaluru, to ease the pressure on the city's congested road network.
- Primary objective of the STRR is to create a regional transportation framework by connecting 12 satellite towns surrounding Bengaluru, while allowing through traffic to bypass the congested core city area.
- In addition to easing traffic, the corridor is also expected to stimulate economic development, encourage industrial growth in peripheral areas, and support more balanced urban expansion.
- STRR is being implemented in multiple phases. A major milestone was achieved with the completion of the northeastern arc, from Dobbaspet to Hoskote via Doddaballapur and Devanahalli, which was inaugurated in March 2024. The partially operational north ring is also known as Bengaluru Ring Road.
- This operational section has already begun to demonstrate its benefits by facilitating smoother freight movement and improving connectivity to the Kempegowda International Airport, Agriculture Produce Market Committee at Kolar and nearby industrial hubs.
- However, the project is still a work in progress. Hoskote Hosur section is currently under construction and is expected to play a critical role in connectivity toward Tamil Nadu once completed along with Bengaluru Chennai Expressway and Chittor Thatchoor section in Tamil Nadu or either of them in FY29.
- Southwestern arc of the STRR is also being built in phases, with the overall project expected to be completed by the end of 2030. Once this section becomes operational, it will provide a smoother bypass around Bengaluru for vehicles coming from Mysuru and the northern districts of Kerala, reducing travel time and congestion on existing highways.

# Satellite Town Ring Road (2)

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**Satellite Town Ring Road/Bengaluru Ring Road alignment and project highway context – macro view**

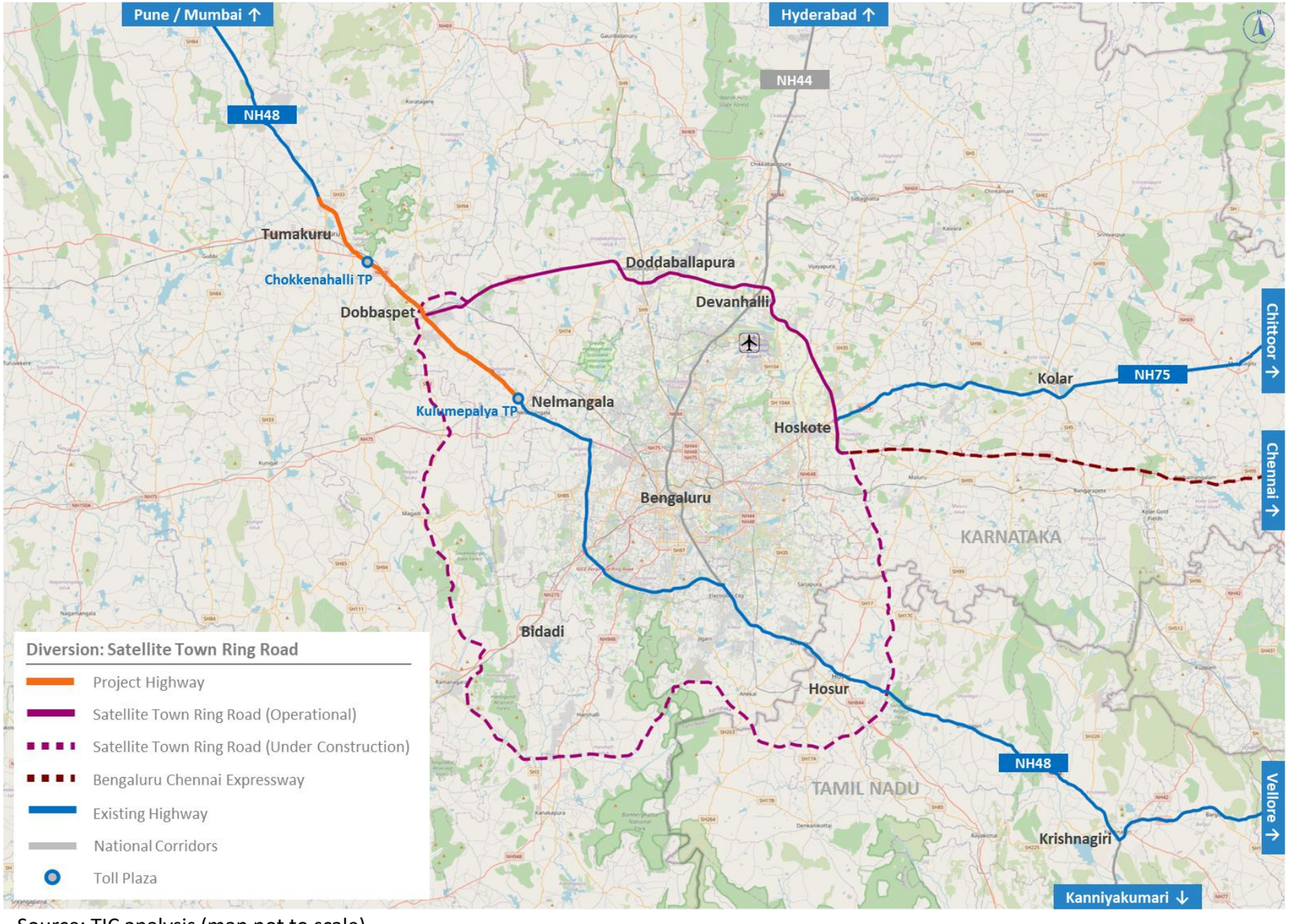



Source: TIC analysis (map not to scale)

# Satellite Town Ring Road (3)

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**Satellite Town Ring Road/Bengaluru Ring Road alignment and project highway context – micro view**




Source: TIC analysis (map not to scale)

# Satellite Town Ring Road (4)

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**Diversion due to Satellite Town Ring Road / Bengaluru Ring Road**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | **North Ring of STRR / Bengaluru Ring Road** | | | | | | | | |
| | **North Ring of STRR / Bengaluru Ring Road**<br>Traffic movement between Dobbaspet/north-west and Hosur/south-east | FY29 (50%)<br>FY30 (100%) onwards | Kulumepalya | Will be terminated on 31st March 2027 (FY27) | | | | | |
| | | | Chokkenahalli | - | - | - | - | - | - |
| | | | Halenijagal | (4.62%) | (4.35%) | (16.60%) | (18.89%) | (31.07%) | (37.35%) |
| | | | Bharathipura / Honnenahalli (Check Plaza) | (8.70%) | - | - | (10.74%) | (7.82%) | (16.42%) |
| | **South Ring of STRR** | | | | | | | | |
| | **South Ring of STRR**<br>Traffic movement between Dobbaspet/north and Mysuru/north Kerala | FY31 (50%)<br>FY32 (100%) onwards | Kulumepalya | Will be terminated on 31st March 2027 (FY27) | | | | | |
| | | | Halenijagal | (3.37%) | (0.62%) | (1.80%) | (1.85%) | (3.02%) | (2.07%) |
| | | | Bharathipura / Honnenahalli (Check Plaza) | (3.04%) | - | - | (2.89%) | (1.96%) | (2.74%) |
| **Positive diversion*** | Traffic movement between Dobbaspet/north-west and Hosur/south-east | FY29 (50%)<br>FY30 (100%) onwards | Dobbaspet / Halenijagal (Check Plaza) | 22.27% | - | 41.43% | 70.02% | 139.22% | 144.69% |
| | Traffic movement between Dobbaspet/north and Mysuru/north Kerala | FY31 (50%)<br>FY32 (100%) onwards | Dobbaspet / Halenijagal (Check Plaza) | 18.43% | - | 6.09% | 8.06% | 14.85% | 10.49% |

Source: TIC estimate

*Diversion from Halenijagal Main Plaza will be gain for Bharathipura / Honnenahalli (Check Plaza). Base year traffic volume at Check Plazas is very low compared to expected gain on start of access-controlled / check plazas.

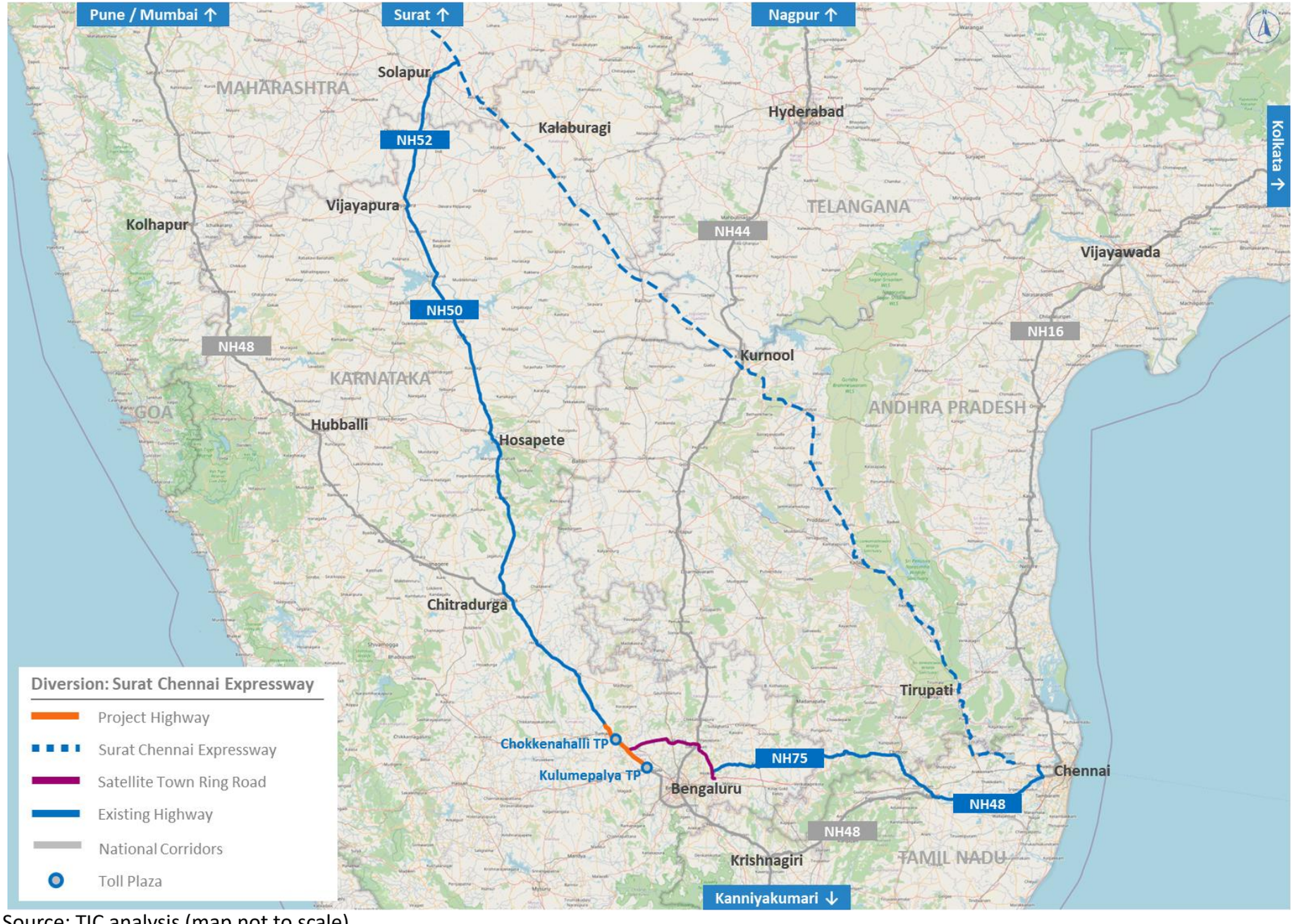
# Surat – Nashik – Chennai Expressway (1)

- Surat Chennai Expressway is ~1200 km long 6-lane, partially access-controlled highway being developed by NHAI through HAM.
- The corridor will connect Surat in Gujarat with Chennai in Tamil Nadu, passing through major cities such as Nashik, Ahmednagar, Solapur, Kalaburagi, Kurnool, Kadapa, and Tirupati, spanning four states Gujarat, Maharashtra, Telangana, and Tamil Nadu. This will enhance connectivity between western ports and southern industrial regions to promote seamless freight movement.
- The project is part of two major economic corridors i.e., 513 km Surat – Nashik – Ahmednagar – Solapur corridor and 707 km. Solapur – Kurnool – Chennai corridor integrating both greenfield and brownfield stretches.
- Key greenfield sections includes:
  - Surat – Nashik – Ahmednagar stretch in Gujarat and Maharashtra
  - Ahmednagar – Solapur – Akkalkot – MH/KA Border section
  - MH/KA Border – Mahabubnagar section
  - The remaining sections will involve upgrading existing two-lane roads into four-lane.
- Recently, MoRTH cancelled Surat – Nashik section of proposed development due to persistent challenges in securing environmental clearances. To address the intended connectivity objective, Maharashtra State Road Development Corporation (MSRDC) will develop greenfield expressway connecting Bharvir Khurd on Smruddhi Marg to Tawa village on NH48.
- Reference discussion with the client (field offices across corridor), the entire corridor is expected to be developed by FY31.
- The consultant analysed potential diversion for two markets interacting with Chennai/south:
  - Solapur/west
  - Hyderabad/north

# Surat – Nashik – Chennai Expressway (2)

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**Surat Nashik Chennai Expressway alignment and project highway context**




Source: TIC analysis (map not to scale)

# Surat – Nashik – Chennai Expressway (3)

**Diversion due to Surat – Nashik – Chennai Expressway**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Traffic movement between Solapur/west and Chennai/ south<br><br>Traffic movement between Hyderabad/north and Chennai/ south | FY31 (40%)<br>FY32 (80%)<br>FY33 (100%)<br>Onwards | Kulumepalya | Will be terminated on 31st March 2027 (FY27) | | | | | |
| | | | Chokkenahalli | Will be terminated on 30th September 2028 (H1 FY29) | | | | | |
| | | | Halenijagal | (0.09%) | - | (0.67%) | (2.78%) | (3.61%) | (4.42%) |
| | | | Bharathipura / Honnenahalli (Check Plaza) | - | - | - | - | - | - |
| | | | Dobbaspet and Halenijagal (Check Plaza) | (0.06%) | - | - | (3.21%) | (3.21%) | (4.11%) |

Source: TIC estimate

# Bengaluru Tumakuru Metro line (1)

- The proposed extension of the Namma Metro along the north-western corridor aims to connect Bengaluru with Tumakuru, marking Karnataka's first inter-city metro corridor and a major step towards Bengaluru – Tumakuru twin city planning.
- Corridor is planned to span approximately 59.6 km, extending from Madavara (terminal station of the Green Line) to Tumakuru, thereby linking the Bengaluru metropolitan area with an important industrial and educational hub of the state via Dobbaspet.
- As per the feasibility assessment, the metro line is proposed as a fully elevated corridor with around 25 stations, providing convenient access to intermediate towns, industrial clusters and developing suburban areas along the alignment.
- The plan also includes two metro depots, one proposed near Nelamangala to serve the suburban and industrial belt, and another near Tumakuru to support terminal operations and maintenance requirements.
- Feasibility stage approval received and DPR is expected to start. Expected commencement of operations is in FY32.

**Diversion due to Bengaluru Tumakuru Metro line**

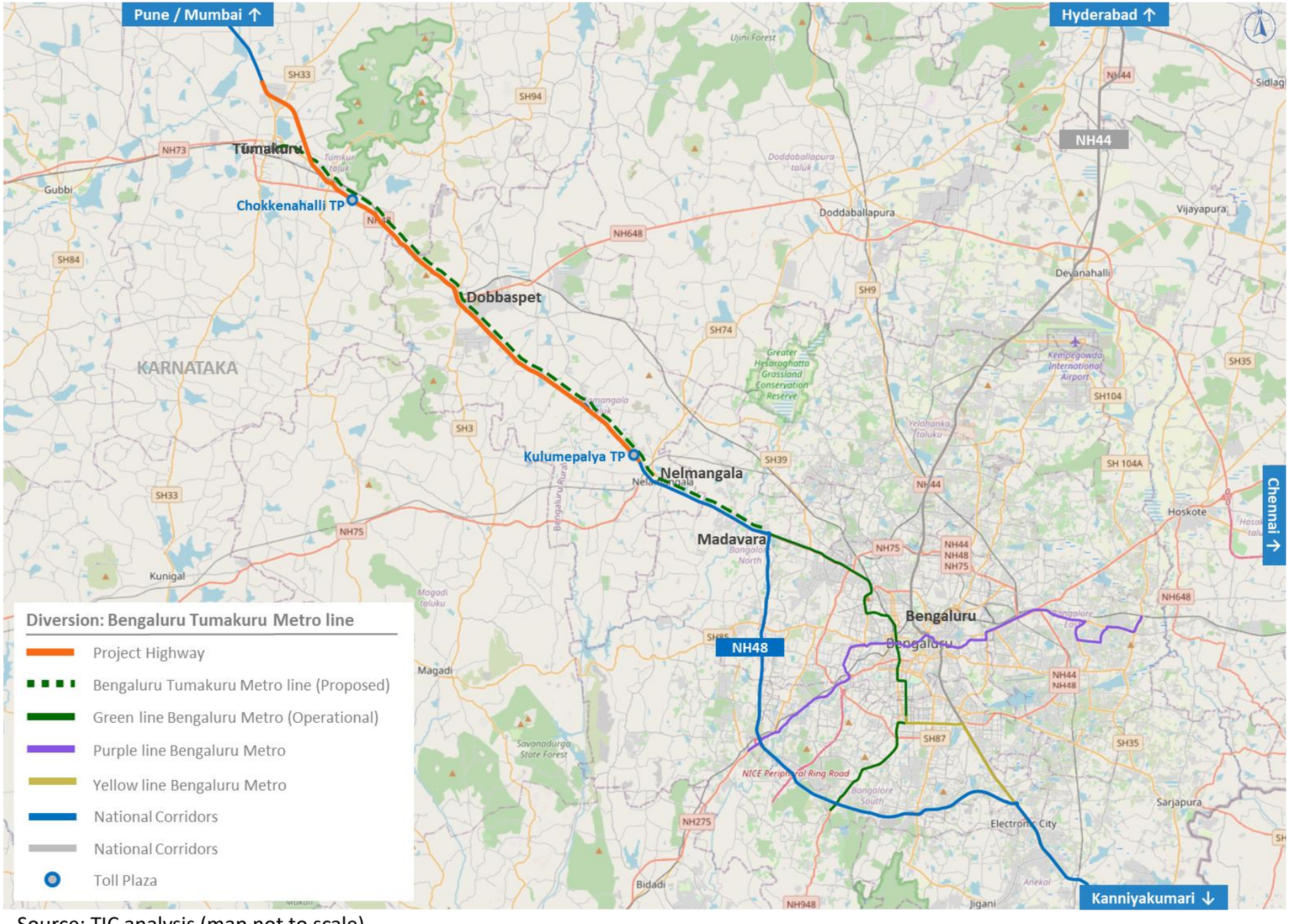
| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Bus | LCV | 2A Trucks | 3A Trucks | MAV |
| **Bengaluru Tumakuru Metro line** | | | | | | | | | |
| **Negative diversion** | Traffic movement between Bengaluru and Tumakuru | FY32 (40%) FY33 (100%) Onwards | Kulumepalya | (10.08%) | (4.44%) | - | - | - | - |
| | | | Chokkenahalli | (9.77%) | (4.44%) | - | - | - | - |
| | | | Halenijagal | (9.77%) | (4.44%) | - | - | - | - |
| | | | Bharathipura/ Honnenahalli (Check Plaza) | (10.08%) | (4.44%) | - | - | - | - |
| | | | Dobbaspet/ Halenijagal (Check Plaza) | (3.26%) | (1.48%) | - | - | - | - |

Source: TIC estimate

# Bengaluru Tumakuru Metro line (2)

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**Bengaluru Tumakuru Metro line alignment and project highway context**




Source: TIC analysis (map not to scale)

# Diversion of local traffic to Service Road on implementation of access-controlled

Proposed access-controlled modality will be implemented on completion of 4 to 6 lane widening of entire stretch i.e. start of H2 FY29. In context of local traffic movement especially between Dobbaspet and Tumkur as well as intermediate locations, service road option will be available.

**Diversion of local traffic to Service Road on implementation of access-controlled**

| Diversion | Affected traffic movement | Years of impact | Toll Plaza | Diversion as % of Base Year AADT | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | Bus | LCV | 2A Trucks | 3A Trucks | MAV |
| **Negative diversion** | Local traffic movement between Dobbaspet and Tumakuru | H2 FY29 (100%) Onwards | Kulumepalya | Will be terminated on 31st March 2027 (FY27) | | | | | | |
| | | | Chokkenahalli | Will be terminated on 30th September 2028 (H1 FY29) | | | | | | |
| | | | Halenijagal | (3.89%) | (4.82%) | (6.51%) | (0.89%) | (1.66%) | (1.21%) | (0.76%) |
| | | | Bharathipura / Honnenahalli (Check Plaza) | - | - | - | - | - | - | - |
| | | | Dobbaspet / Halenijagal (Check Plaza) | - | - | - | - | - | - | - |

Source: TIC estimate

# Diversion due to Dobbaspet and Halenijagal (Check Plaza) traffic

Dobbaspet and Halenijagal (Check Plaza) will be implemented in mid FY29 and because of which traffic movement between Tumkur/north and Dobbaspet/further towards north-east ring and south-west ring of Bengaluru / Satellite Town Ring Road will use proposed check plazas as Entry/Exit. Hence, the same will be eliminated from the main carriage way.

**Diversion due to Dobbaspet and Halenijagal (Check Plaza) traffic**

| Diversion | Affected traffic movement | Timeline | Toll Plaza | Diversion as % of Base Year AADT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CJV | Mini LCV | Bus | LCV | 2A Trucks | 3A Trucks | MAV | OSV |
| **Negative diversion** | Traffic movement between Dobbaspet and Tumakuru | FY29 (100%) Onwards | Kulumepalya | Will be terminated on 31st March 2027 (FY27) | | | | | | | |
| | | | Chokkenahalli | Will be terminated on 30th September 2028 (H1 FY29) | | | | | | | |
| | | | Halenijagal | (20.10%) | (17.83%) | (19.94%) | (5.77%) | (27.85%) | (22.78%) | (26.11%) | (7.08%) |
| | | | Bharathipura / Honnenahalli (Check Plaza) | - | - | - | - | - | - | - | - |
| | | | Dobbaspet / Halenijagal (Check Plaza) | - | - | - | - | - | - | - | - |

Source: TIC estimate

# Chapter 7: Final traffic and revenue forecast

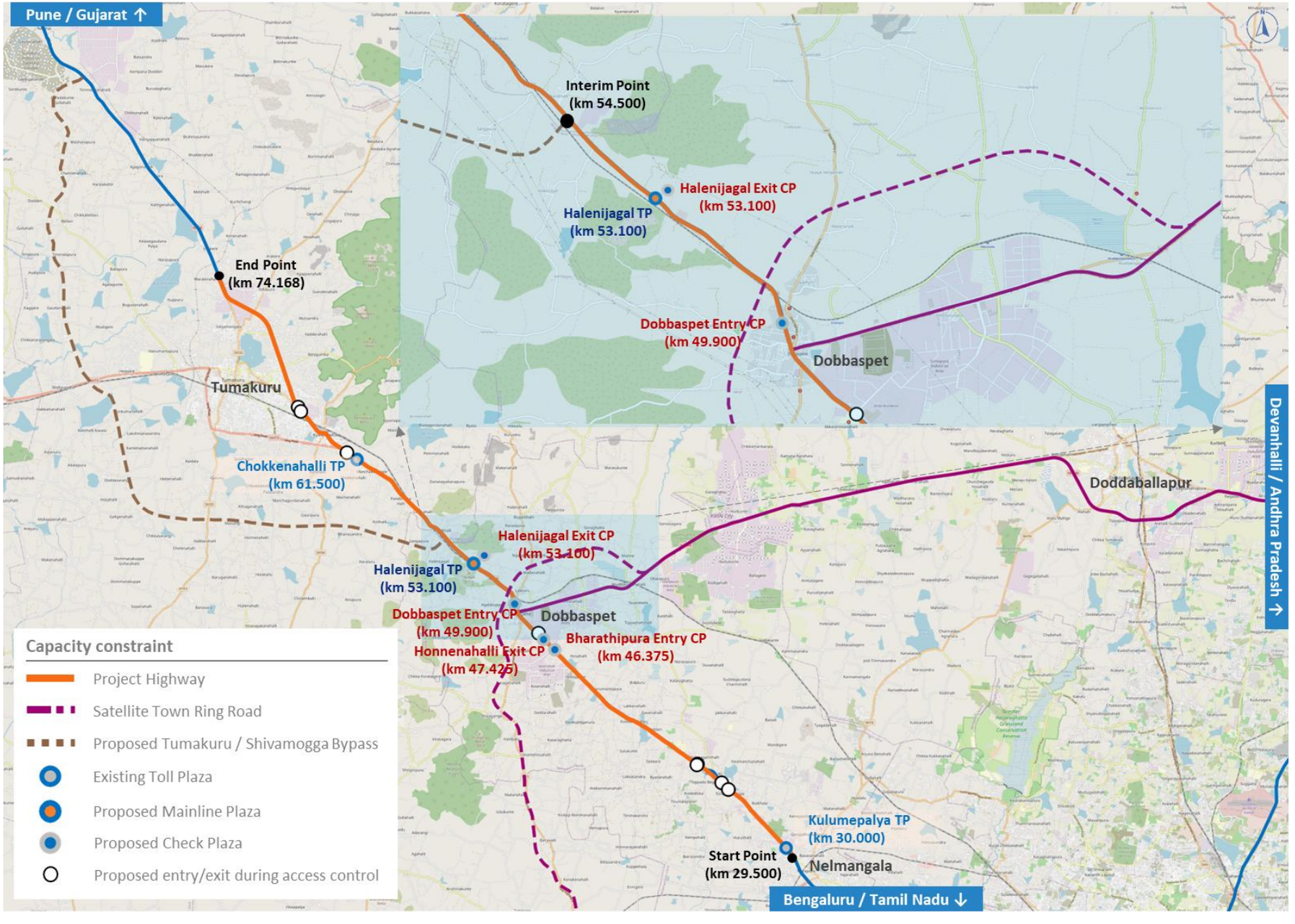
- Traffic growth forecast
- Traffic and revenue forecast
- Scenario development

Following baseline traffic forecast and diversion analysis, this chapter presents method for revision of toll fee followed by final traffic and revenue forecast for various scenarios: most likely with and without overloading, pessimistic and optimistic.

# Capacity analysis (1)

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**Capacity analysis context**




Source: TIC analysis (map not to scale)

# Capacity analysis (2)

**Assumption for design capacity determination and tollable section-wise capacity analysis**

| Tollable sections | Nelmangala - Dobbaspet (Bharathipura and Honnenahalli CP) | Dobbaspet - Tumakuru (Halenijagal TP / Dobbaspet and Halenijagal CP) |
|---|---|---|
| **Lane configuration** | 6 Lane | 6 Lane |
| **Level of Service B** | 60,000 | 60,000 |
| **Level of Service C** | 84,000 | 84,000 |
| **Level of Service D** | 1,34,000 | 1,34,000 |
| **Level of Service E** | 2,41,000 | 2,41,000 |
| **PCU (FY41)*** | 1,16,872 | 1,43,306 |
| **Capacity Saturation (LOS B)** | **Yes** | **Yes** |
| **Capacity Saturation (LOS C)** | **Yes** | **Yes** |
| **Capacity Saturation (LOS D)** | **No** | **Yes** |
| **Capacity Saturation (LOS E)** | **No** | **No** |
| **Capacity Saturation (LOS F)** | **No** | **No** |

Source: TIC estimate * post capacity restrictions on growth
Design capacity for 6-lane National Highway is determined as per as per IRC: 106 and IRC: SP 87 and standard industry practice for determining Level of Service C/D/E

**Benchmark cases:**
Gujarat: Ahmedabad Mumbai Corridor (Mandva Toll) – 1,45,000 PCU
Gujarat: Ahmedabad Mumbai Corridor (Choryasi Toll) – 1,22,000 PCU
Haryana: Delhi Panipat Corridor (Bhagan Toll) – 1,07,000 PCU

# Capacity analysis (3)

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**Nelmangala – Dobbaspet section (Bharathipura and Honnenahalli CP)**

- Nelmangala – Dobbaspet section will cater through traffic from Halenijagal TP in addition to merging/leaving traffic from proposed entry/exit check plazas (Bharathipura and Honnenahalli) during access-controlled modality.
- Nelmangala – Dobbaspet section will observe traffic of 1,28,533 PCUs in FY41 which is closed to LoS D for 6 lane highway.
- This section will have options of service road for local traffic and further likely to have marginal possibilities of redistribution of traffic and/or readjustment of peak hours considering socio-economic strata of the region.
- Hence, in context of 6-lane main carriage way (MCW) and service road configuration, ease of travel can be expected up to LOS D.
- Nos. of tolling lanes at proposed entry/exit check plazas (Bharathipura and Honnenahalli) and design of check plaza's connectivity with slip/service road is critical aspect to be considered during implementation of ongoing 4 to 6 lane widening. NHAI field offices during 4 to 6 lane construction will ensure implementation of the solution to achieve desired outcome in future as per discussion with the client.

**Dobbaspet – Tumakuru (Halenijagal TP / Dobbaspet and Halenijagal CP)**

- Dobbaspet – Tumakuru section will cross LOS D in FY37 with 1,37,156 PCU and 1,62,203 PCU in FY41 even after allocation of reasonable local traffic to service road.
- This section will have minimal probability of redistribution of traffic and/or readjustment of peak hours considering socio-economic strata of the region.
- Overall, the section will have effect of capacity constraint on the traffic. Hence, the consultant has considered capacity constraints and growth of traffic would be gradually restricted from FY37 to FY41 with assumption of any alternate route/mode will be proposed by that time.
- In addition to this, nos. of tolling lanes at Halenijagal TP / Dobbaspet and Halenijagal CP to be dynamically adjusted as per traffic diversion to Satellite Town Rind Road / Bengaluru Ring Road in future. Design of check plaza's connectivity with slip/service road and further with proposed Satellite Town Rind Road are critical aspect to be considered. The same will be taken care by NHAI field offices during 4 to 6 lane construction as per discussion with the client.

# Transactional Support Agreement and FY27 revenue estimate

- The project highway is proposed to be included in NHAI's Public InvIT.
- A Transactional Support Agreement will be executed between NHAI and the Public InvIT for the management of toll plaza operations for FY27.
- Tolling operations during FY27 will be undertaken by NHAI under the prevailing short-term contract modality.
- Accordingly, FY27 revenue has been estimated based on historical bidding trends for tolling contracts and is assumed to be 5%–10% lower than the estimated actual revenue.
- Consistent with this arrangement, manpower-related expenses for tolling operations have been excluded from O&M costs as confirmed by the client.

# Traffic and revenue forecast: Halenijagal TP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 6.8% | 7.0% | 7.7% | 6.8% | 6.9% | 7.0% | 6.3% | 1.2% | 4.7% |
| Mini LCV | 5.8% | 5.8% | 5.2% | 5.6% | 4.7% | 5.4% | 4.6% | 0.9% | 3.5% |
| LCV | 5.5% | 5.5% | 5.5% | 5.4% | 5.0% | 5.4% | 4.8% | 4.3% | 4.8% |
| Bus | 3.5% | 3.5% | 3.1% | 3.4% | 3.1% | 3.3% | 3.0% | 0.8% | 2.3% |
| 2A Truck | 6.5% | 6.5% | 6.5% | 6.4% | 5.9% | 6.4% | 5.7% | 5.1% | 5.7% |
| 3A Truck | 0.7% | 1.7% | 1.7% | 1.7% | 1.6% | 1.5% | 1.3% | 0.3% | 1.0% |
| MAV | 6.1% | 6.5% | 6.5% | 6.7% | 5.9% | 6.3% | 5.7% | 1.6% | 4.4% |
| **AADT** | **6.0%** | **6.2%** | **6.5%** | **6.1%** | **5.9%** | **6.1%** | **5.6%** | **1.8%** | **4.4%** |
| **PCU** | **5.6%** | **5.9%** | **6.0%** | **5.9%** | **5.5%** | **5.8%** | **5.3%** | **2.0%** | **4.3%** |

**Post-diversion growth rate**

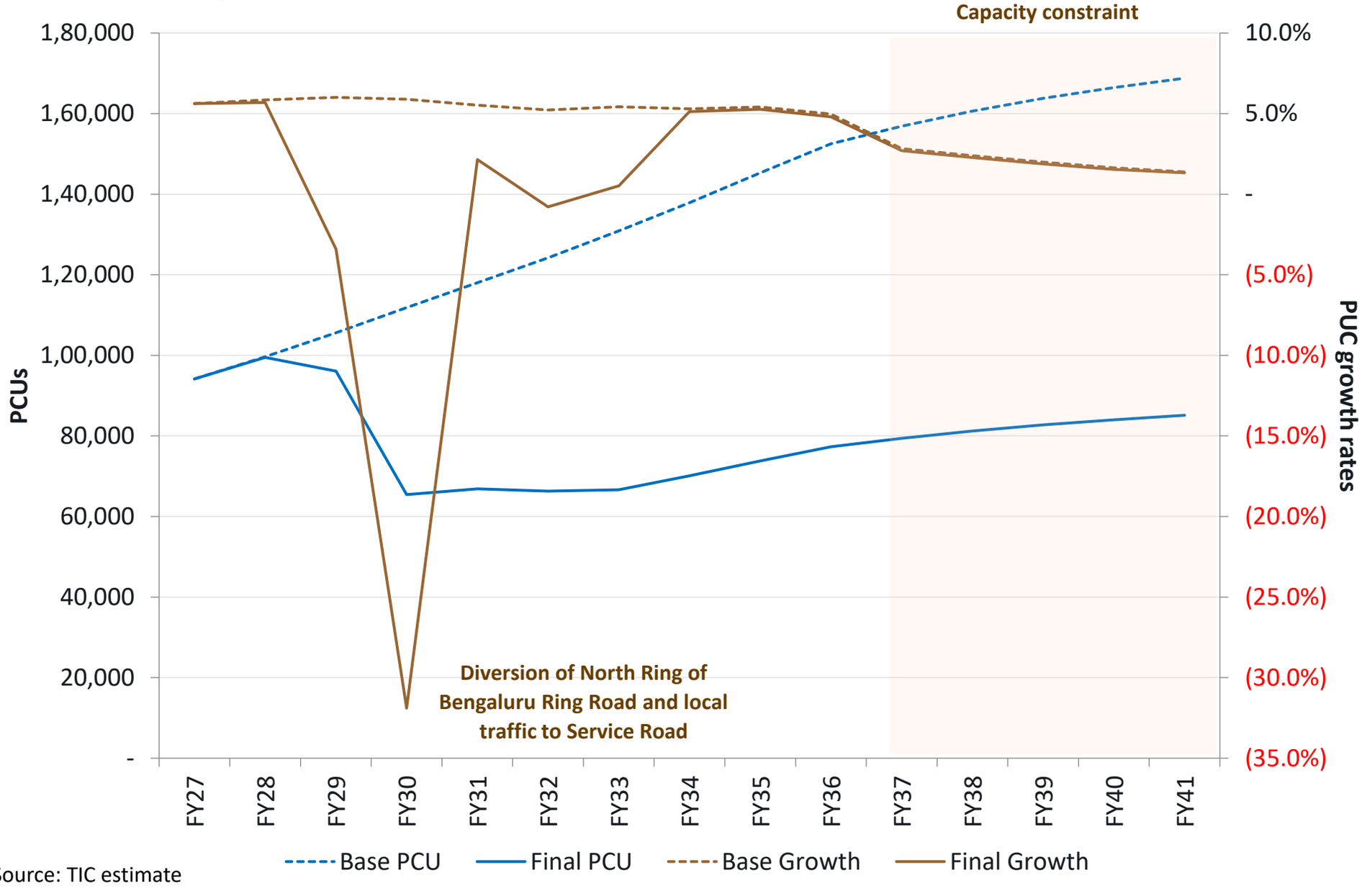
| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 6.8% | 7.0% | 5.2% | (21.9%) | 4.4% | (0.4%) | 2.5% | 1.2% | 0.7% |
| Mini LCV | 5.8% | 5.8% | 2.9% | (21.2%) | 4.3% | (1.1%) | 4.6% | 0.9% | 1.1% |
| LCV | 5.5% | 5.5% | (3.2%) | (34.5%) | 2.8% | (6.2%) | 4.3% | 4.3% | 0.3% |
| Bus | 3.5% | 3.5% | 3.1% | (3.5%) | 3.1% | 1.9% | 2.0% | 0.8% | 1.4% |
| 2A Truck | 6.5% | 6.4% | (3.7%) | (39.5%) | 1.7% | (7.7%) | 4.6% | 5.1% | 0.1% |
| 3A Truck | 0.7% | 1.5% | (14.3%) | (46.1%) | (5.2%) | (14.9%) | (0.6%) | 0.3% | (5.7%) |
| MAV | 6.1% | 6.0% | (14.0%) | (53.7%) | (2.6%) | (15.3%) | 3.2% | 1.6% | (4.6%) |
| **AADT** | **6.0%** | **6.1%** | **0.5%** | **(26.7%)** | **3.3%** | **(3.1%)** | **3.0%** | **1.7%** | **0.1%** |
| **PCU** | **5.6%** | **5.7%** | **(3.4%)** | **(31.9%)** | **2.1%** | **(5.6%)** | **3.0%** | **1.9%** | **(0.7%)** |

Source: TIC estimate

# Traffic and revenue forecast: Halenijagal TP (2)

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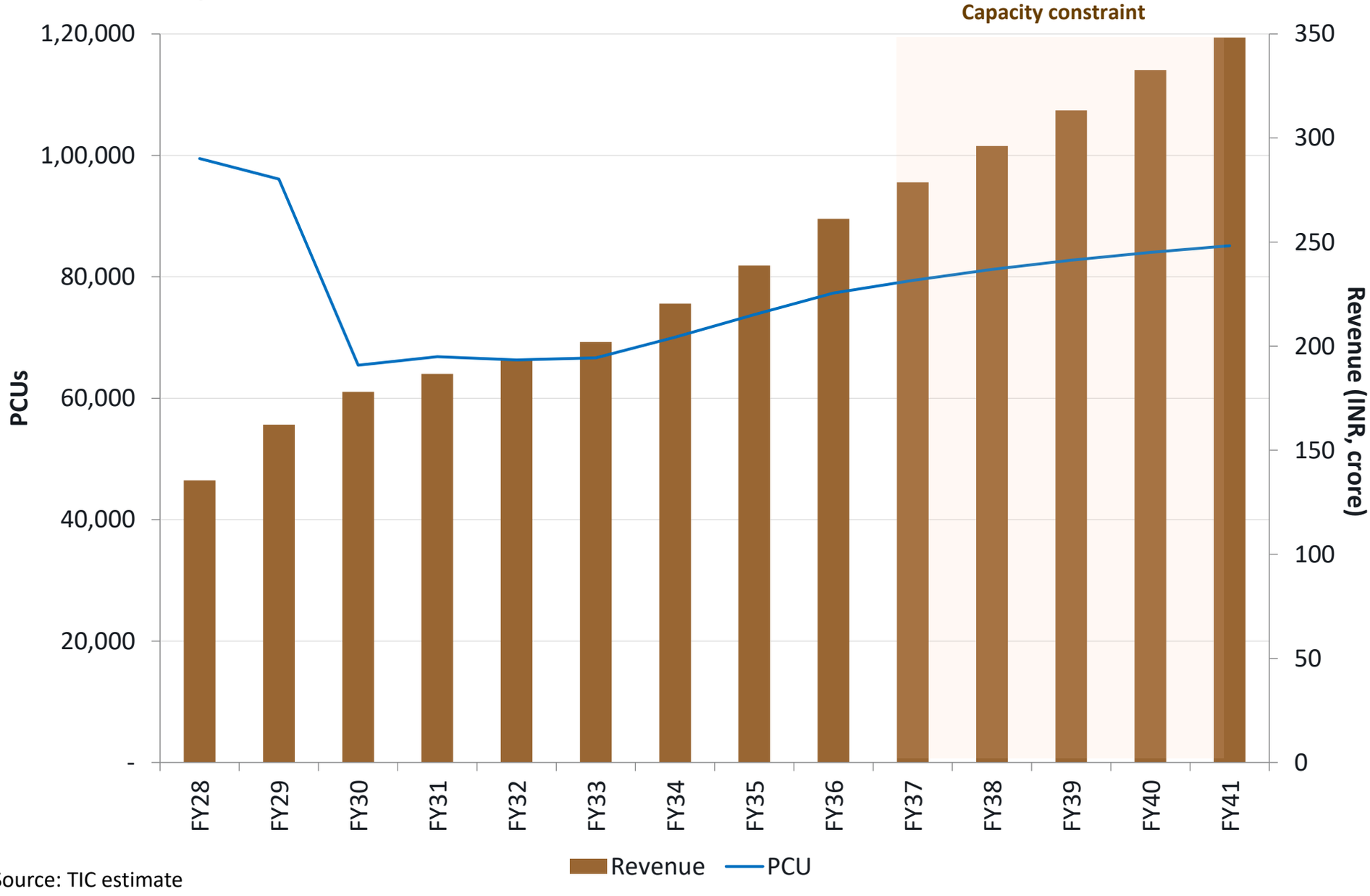
**Pre- and Post-diversion growth rate snapshot**




Source: TIC estimate

# Traffic and revenue forecast: Halenijagal TP (3)

**Revenue and PCU snapshot**




Source: TIC estimate

# Traffic and revenue forecast: Dobbaspet and Halenijagal CP (1)

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**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 4.4% | 4.5% | 5.0% | 4.4% | 4.5% | 4.6% | 4.1% | 1.3% | 3.2% |
| Mini LCV | 3.5% | 3.5% | 3.5% | 3.4% | 3.1% | 3.4% | 3.0% | 0.9% | 2.4% |
| LCV | 4.9% | 4.9% | 4.9% | 4.8% | 4.4% | 4.7% | 4.2% | 1.6% | 3.4% |
| Bus | 1.1% | 1.0% | 1.0% | 1.0% | 0.9% | 1.0% | 0.9% | 0.3% | 0.7% |
| 2A Truck | 5.5% | 5.5% | 5.5% | 5.4% | 5.0% | 5.4% | 4.8% | 1.9% | 3.9% |
| 3A Truck | 0.4% | 1.0% | 1.0% | 1.0% | 0.9% | 0.9% | 0.8% | 0.1% | 0.6% |
| MAV | 4.8% | 5.1% | 5.1% | 5.3% | 4.7% | 5.0% | 4.5% | 1.8% | 3.7% |
| **AADT** | **4.4%** | **4.5%** | **4.7%** | **4.5%** | **4.3%** | **4.5%** | **4.0%** | **1.4%** | **3.2%** |
| **PCU** | **4.4%** | **4.6%** | **4.7%** | **4.6%** | **4.3%** | **4.5%** | **4.1%** | **1.5%** | **3.3%** |

**Post-diversion growth rate**

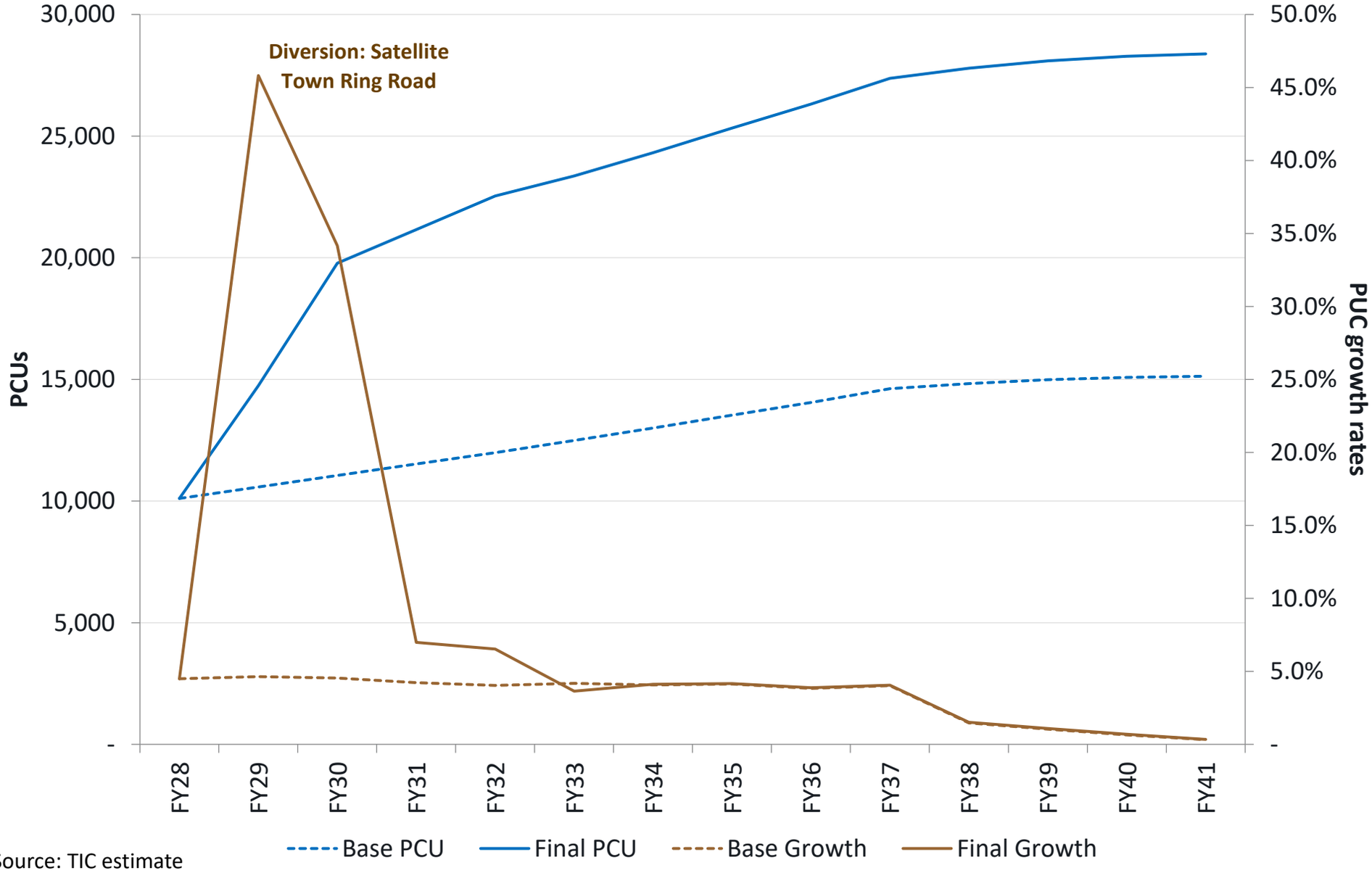
| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 4.4% | 4.5% | 16.7% | 14.9% | 12.4% | 10.5% | 5.0% | 1.3% | 5.6% |
| Mini LCV | 3.5% | 3.5% | 3.5% | 3.4% | 3.1% | 3.4% | 3.0% | 0.9% | 2.4% |
| LCV | 4.9% | 4.9% | 26.6% | 22.7% | 6.6% | 12.7% | 4.7% | 1.6% | 6.3% |
| Bus | 1.1% | 1.0% | 1.0% | 1.0% | 0.9% | 1.0% | 0.6% | 0.3% | 0.6% |
| 2A Truck | 5.5% | 5.5% | 42.5% | 32.8% | 6.7% | 17.6% | 5.1% | 1.9% | 8.2% |
| 3A Truck | 0.4% | 1.0% | 71.4% | 42.5% | 3.5% | 20.7% | 1.2% | 0.1% | 7.4% |
| MAV | 4.8% | 5.1% | 81.2% | 49.5% | 6.2% | 26.0% | 4.7% | 1.8% | 10.7% |
| **AADT** | **4.4%** | **4.5%** | **31.1%** | **25.6%** | **8.5%** | **14.3%** | **4.6%** | **1.4%** | **6.8%** |
| **PCU** | **4.4%** | **4.6%** | **47.3%** | **35.0%** | **7.1%** | **18.4%** | **4.5%** | **1.6%** | **8.2%** |

Source: TIC estimate

# Traffic and revenue forecast: Dobbaspet and Halenijagal CP (2)

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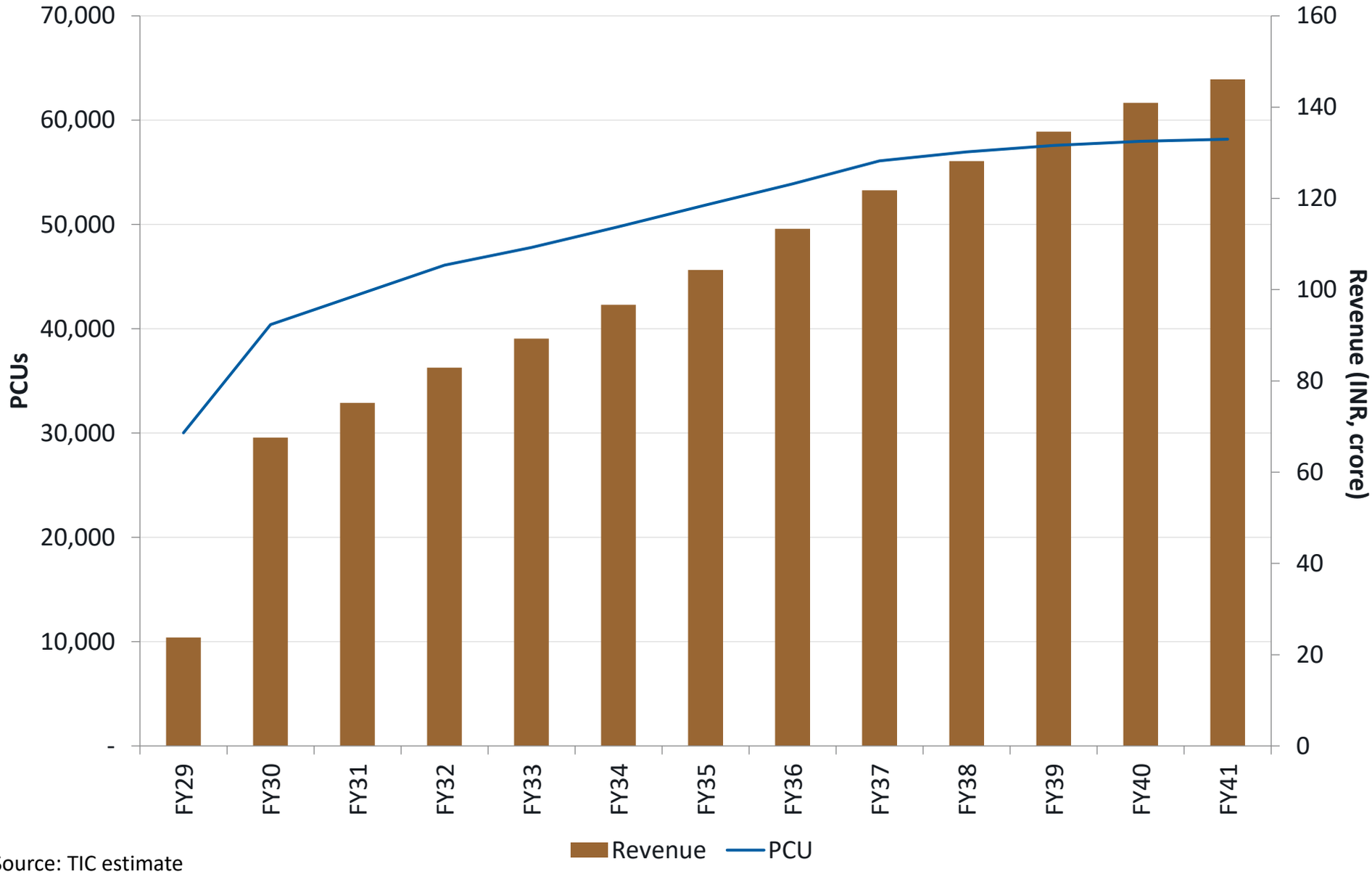
**Pre- and Post-diversion growth rate snapshot**




Source: TIC estimate

# Traffic and revenue forecast: Dobbaspet and Halenijagal CP (3)

**Revenue and PCU snapshot**




Source: TIC estimate

# Traffic and revenue forecast: Bhartipura and Honnenahalli CP (1)

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Pre-diversion growth rate**

| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 4.9% | 4.9% | 5.4% | 4.8% | 4.9% | 5.0% | 4.4% | 3.9% | 4.4% |
| Mini LCV | 3.5% | 3.5% | 3.5% | 3.4% | 3.1% | 3.4% | 3.0% | 2.7% | 3.0% |
| LCV | 2.5% | 2.5% | 2.5% | 2.4% | 2.2% | 2.4% | 2.2% | 1.9% | 2.2% |
| Bus | 1.1% | 1.0% | 0.9% | 1.0% | 0.9% | 1.0% | 0.9% | 0.8% | 0.9% |
| 2A Truck | 3.5% | 3.5% | 3.5% | 3.4% | 3.2% | 3.4% | 3.0% | 2.7% | 3.0% |
| 3A Truck | 0.5% | 1.1% | 1.1% | 1.0% | 1.0% | 0.9% | 0.8% | 0.7% | 0.8% |
| MAV | 1.9% | 2.0% | 2.3% | 2.4% | 2.2% | 2.2% | 2.1% | 1.9% | 2.1% |
| **AADT** | **3.8%** | **3.8%** | **4.1%** | **3.8%** | **3.8%** | **3.9%** | **3.5%** | **3.2%** | **3.5%** |
| **PCU** | **3.1%** | **3.2%** | **3.4%** | **3.2%** | **3.1%** | **3.2%** | **3.0%** | **2.7%** | **3.0%** |

**Post-diversion growth rate**

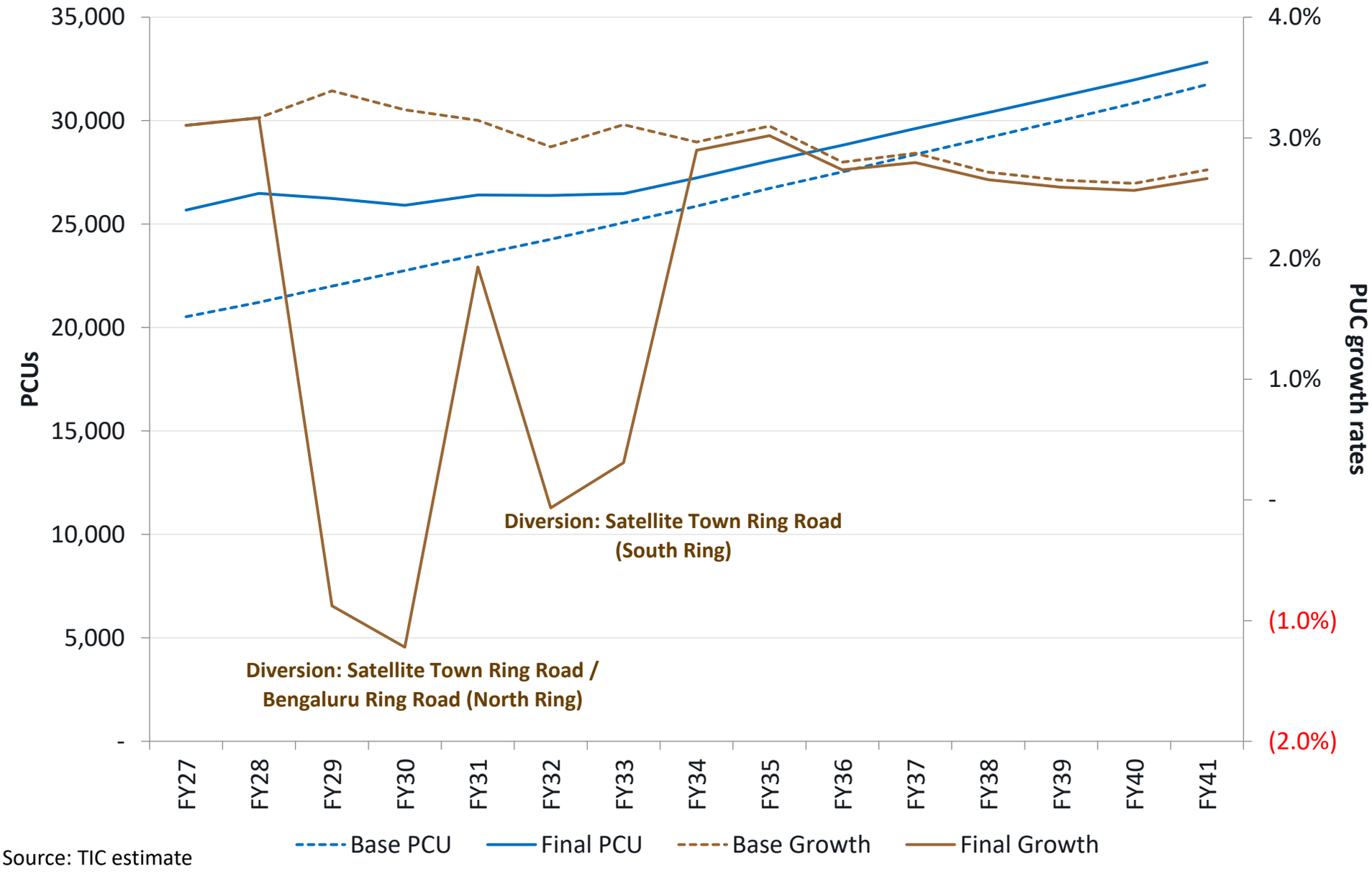
| Vehicle Category | FY26 FY27 | FY27 FY28 | FY28 FY29 | FY29 FY30 | FY30 FY31 | FY26 FY31 | FY31 FY36 | FY36 FY41 | FY27 FY41 |
|---|---|---|---|---|---|---|---|---|---|
| CJV | 4.9% | 4.9% | 0.8% | 0.0% | 3.1% | 2.7% | 1.6% | 3.9% | 2.6% |
| Mini LCV | 3.5% | 3.5% | 3.5% | 3.4% | 3.1% | 3.4% | 3.0% | 2.7% | 3.0% |
| LCV | 2.5% | 2.5% | 2.5% | 2.4% | 2.2% | 2.4% | 2.2% | 1.9% | 2.2% |
| Bus | 1.1% | 1.0% | 0.9% | 1.0% | 0.9% | 1.0% | (0.0%) | 0.8% | 0.6% |
| 2A Truck | 3.5% | 3.5% | (2.1%) | (2.4%) | 1.5% | 0.8% | 2.7% | 2.7% | 2.0% |
| 3A Truck | 0.5% | 1.1% | (2.9%) | (3.1%) | (0.1%) | (0.9%) | 0.6% | 0.7% | 0.1% |
| MAV | 1.9% | 2.0% | (6.1%) | (6.7%) | 0.5% | (1.8%) | 1.8% | 1.9% | 0.5% |
| **AADT** | **3.8%** | **3.8%** | **0.4%** | **0.0%** | **2.5%** | **2.1%** | **1.8%** | **3.1%** | **2.2%** |
| **PCU** | **3.1%** | **3.2%** | **(0.9%)** | **(1.2%)** | **1.9%** | **1.2%** | **1.8%** | **2.7%** | **1.8%** |

Source: TIC estimate

# Traffic and revenue forecast: Bhartipura and Honnenahalli CP (2)

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**Pre- and Post-diversion growth rate snapshot**

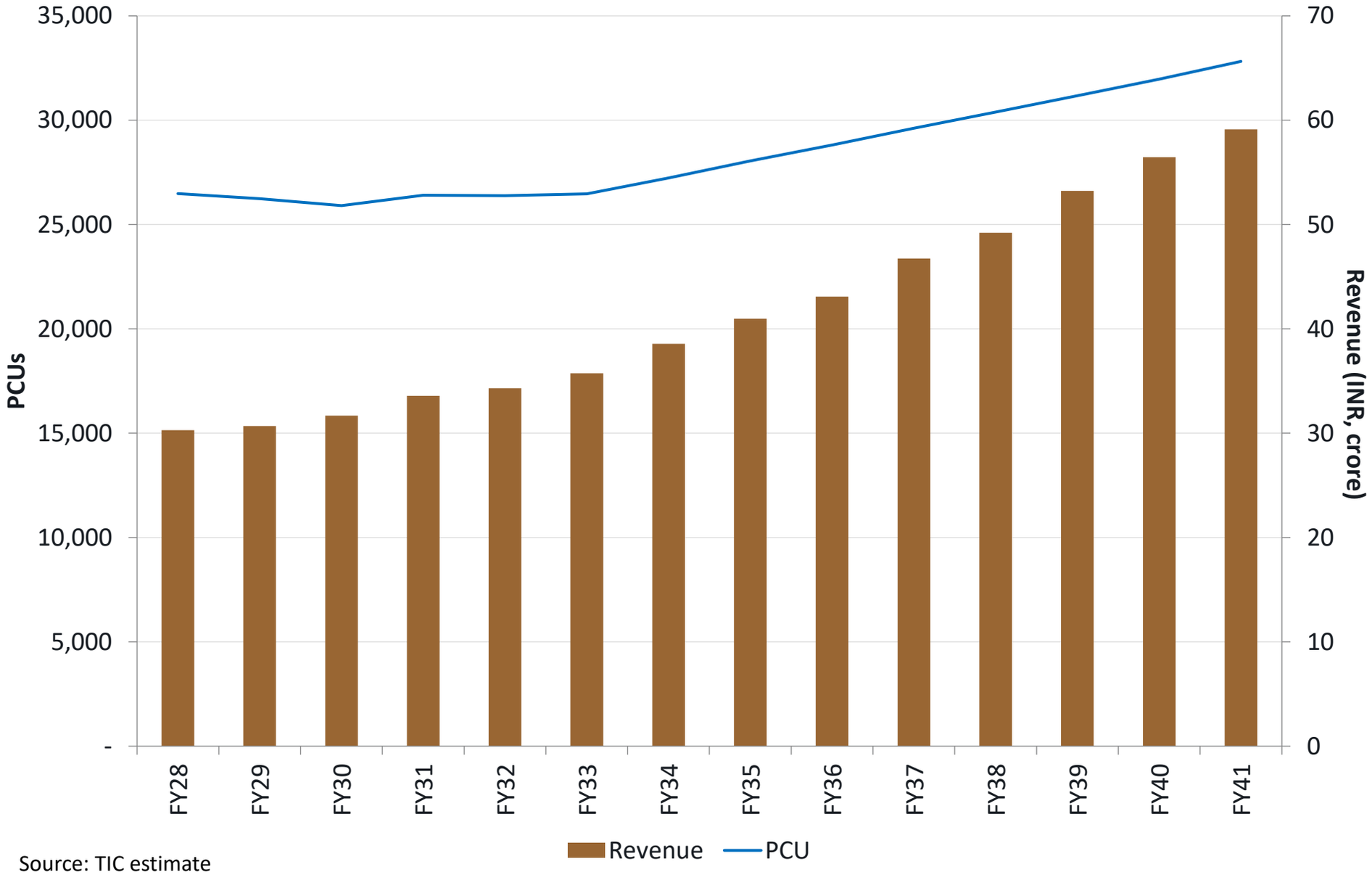



Source: TIC estimate

# Traffic and revenue forecast: Bhartipura and Honnenahalli CP (3)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Revenue and PCU snapshot**




Source: TIC estimate

# Scenario development definition

**Most Likely Scenario without overloading**

- No overloading penalty/fees is considered at present based on understanding from site visit. In context of present ground situation and possibility of diversion in case of collecting overloading fees, the consultant did not consider overloading fee collection in most likely scenario.
- The consultant has considered no reduction in toll rates during capacity augmentation implementation i.e., 4 to 6 lane construction of Nelmangala to Dobbaspet section (FY26 H2 – FY27 H2) & Dobbaspet Tumakuru section (FY28 H1 – FY29 H1).
- Concession Agreement mentions that if the concessionaire incurs any financial loss due to modification in toll rates during capacity augmentation which is initiated post-handover of the project highway to the concessionaire, the authority (NHAI) shall pay the difference amount to the concessionaire on a quarterly basis considering no toll reduction during capacity augmentation and traffic census as per Article 19.

**Most Likely Scenario with overloading**

The consultant considered following changes from the most likely (with overloading) case to determine most likely (with overloading) scenario:

- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey.

**Optimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine optimistic scenario:

- GDP: increase (addition) of 0.25% from FY27 to FY35
- Overloading penalty/fees will be levied in future as per the overloading characteristics observed in axle load survey
- Delayed the impact due to Surat Chennai expressway and Bengaluru Tumakuru metro Rail by 1 and 2 years respectively

**Pessimistic Scenario**

The consultant considered following changes from the most likely (with overloading) case to determine pessimistic scenario:

- GDP: decrease (subtraction) of 0.25% from FY27 to FY35
- No overloading penalty/fees is being levied
- Preponement of the impact due to Surat Chennai expressway by a year

Detailed traffic and revenue forecast for ‘Most likely scenario without overloading’ is exhibited in Appendix B.

# Scenario summary: Halenijagal TP (1)

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| | Most likely without overloading | | | Most likely with overloading | | | Optimistic | | | Pessimistic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FY** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** | **PCU** | **PCU growth** | **Revenue (INR Cr)** |
| FY26 | 89,116 | - | - | 89,331 | - | - | 89,331 | - | - | 89,116 | - | - |
| FY27 | 94,128 | 5.6% | - | 94,354 | 5.6% | - | 94,544 | 5.8% | - | 93,938 | 5.4% | - |
| FY28 H1 | 99,485 | 5.7% | 67.8 | 99,723 | 5.7% | 73.8 | 1,00,133 | 5.9% | 74.1 | 99,077 | 5.5% | 67.5 |
| FY28 H2 | 99,485 | 5.7% | 67.8 | 99,723 | 5.7% | 73.8 | 1,00,133 | 5.9% | 74.1 | 99,077 | 5.5% | 67.5 |
| FY29 H1 | 96,090 | (3.4%) | 66.8 | 96,311 | (3.4%) | 73.4 | 96,912 | (3.2%) | 73.9 | 95,493 | (3.6%) | 66.4 |
| FY29 H2 | 71,101 | (28.5%) | 95.4 | 71,252 | (28.6%) | 101.2 | 71,691 | (28.4%) | 101.8 | 95,493 | (3.6%) | 66.1 |
| FY30 | 65,440 | (31.9%) | 178.1 | 65,504 | (32.0%) | 205.9 | 66,043 | (31.9%) | 207.6 | 64,065 | (32.9%) | 173.8 |
| FY31 | 66,845 | 2.1% | 186.6 | 66,933 | 2.2% | 214.2 | 68,533 | 3.8% | 219.6 | 65,274 | 1.9% | 181.6 |
| FY32 | 66,316 | (0.8%) | 193.1 | 66,479 | (0.7%) | 213.5 | 69,956 | 2.1% | 223.7 | 65,039 | (0.4%) | 189.1 |
| FY33 | 66,657 | 0.5% | 202.0 | 66,853 | 0.6% | 220.8 | 72,840 | 4.1% | 237.2 | 65,706 | 1.0% | 199.2 |
| FY34 | 70,076 | 5.1% | 220.4 | 70,310 | 5.2% | 237.1 | 74,345 | 2.1% | 248.5 | 68,933 | 4.9% | 216.9 |
| FY35 | 73,765 | 5.3% | 238.8 | 74,040 | 5.3% | 252.8 | 75,428 | 1.5% | 257.5 | 72,405 | 5.0% | 234.4 |
| FY36 | 77,307 | 4.8% | 261.2 | 77,626 | 4.8% | 272.0 | 79,086 | 4.8% | 277.0 | 75,878 | 4.8% | 256.4 |
| FY37 | 79,400 | 2.7% | 278.8 | 79,758 | 2.7% | 285.3 | 81,261 | 2.7% | 290.6 | 77,930 | 2.7% | 273.7 |
| FY38 | 81,210 | 2.3% | 296.2 | 81,576 | 2.3% | 303.1 | 83,115 | 2.3% | 308.7 | 79,705 | 2.3% | 290.8 |
| FY39 | 82,740 | 1.9% | 313.3 | 83,111 | 1.9% | 320.6 | 84,680 | 1.9% | 326.6 | 81,205 | 1.9% | 307.6 |
| FY40 | 84,016 | 1.5% | 332.6 | 84,391 | 1.5% | 340.3 | 85,985 | 1.5% | 346.6 | 82,457 | 1.5% | 326.5 |
| FY41 | 85,126 | 1.3% | 348.3 | 85,504 | 1.3% | 356.2 | 87,120 | 1.3% | 362.9 | 83,546 | 1.3% | 341.9 |
| **Total (FY27 – FY41)** | | | **3,347** | | | **3,544** | | | **3,630** | | | **3,259** |

Source: TIC estimate

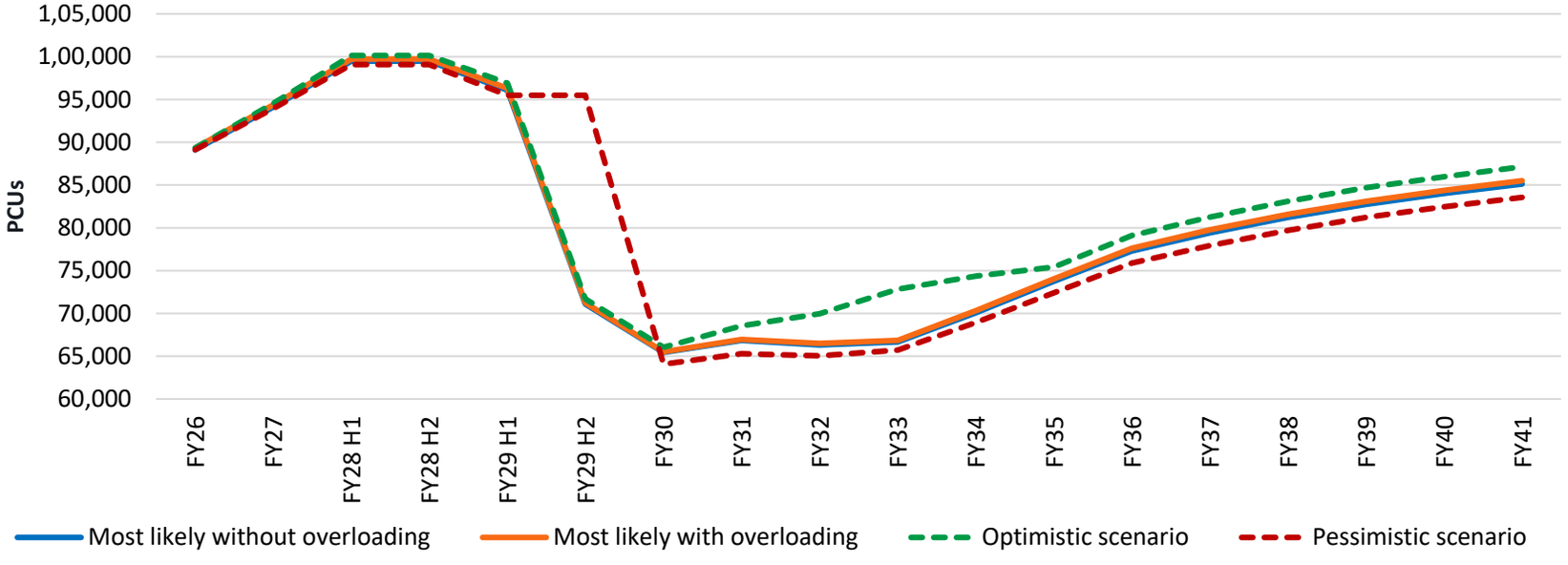
**Note for LOS representation by highlighting cells:**
Capacity analysis for LOS B/C/D is carried out for tollable section and not at toll plaza level for which traffic of Mainline Plaza and Dobbaspet & Halenijagal CP are added above.

Reaches LOS B of 6-Laning 60,000 PCU/day  Reaches LOS C and D

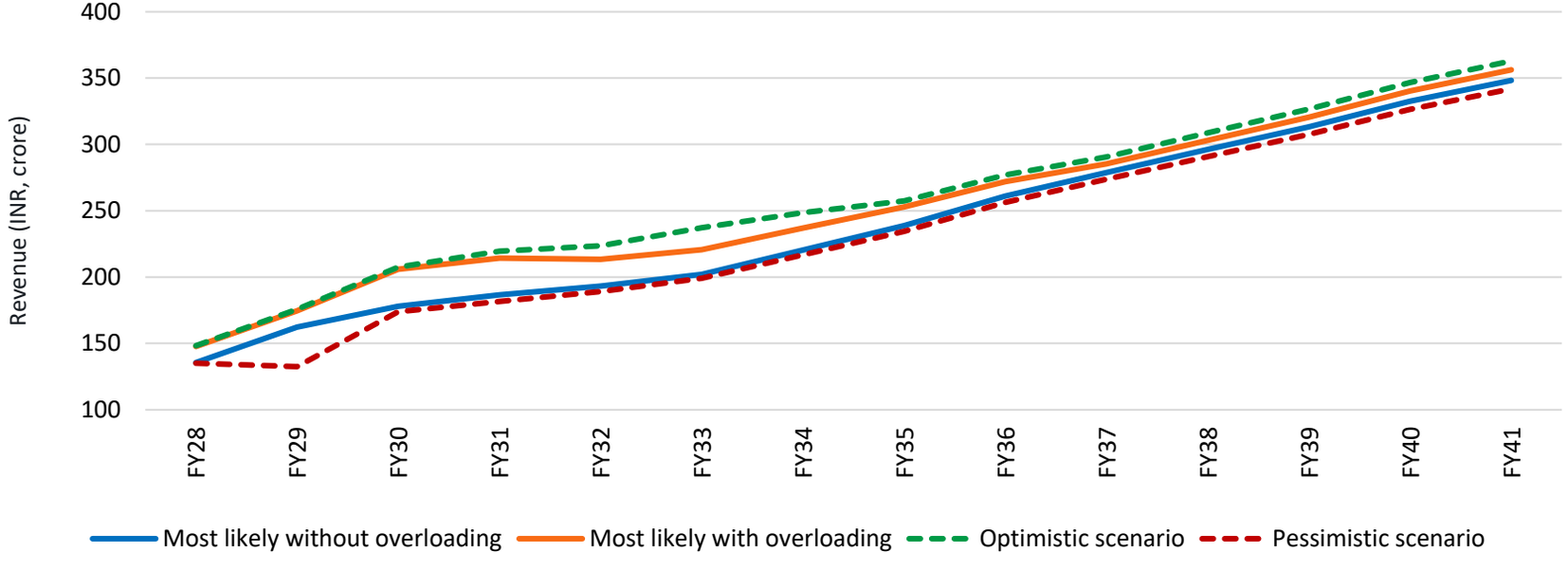
**Benchmark cases:**
Gujarat: Ahmedabad Mumbai Corridor (Mandva Toll) – 1,45,000 PCU
Gujarat: Ahmedabad Mumbai Corridor (Choryasi Toll) – 1,22,000 PCU
Haryana: Delhi Panipat Corridor (Bhagan Toll) – 1,07,000 PCU

# Scenario summary: Halenijagal TP (1)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# Scenario summary: Dobbaspet & Halenijagal CP (1)

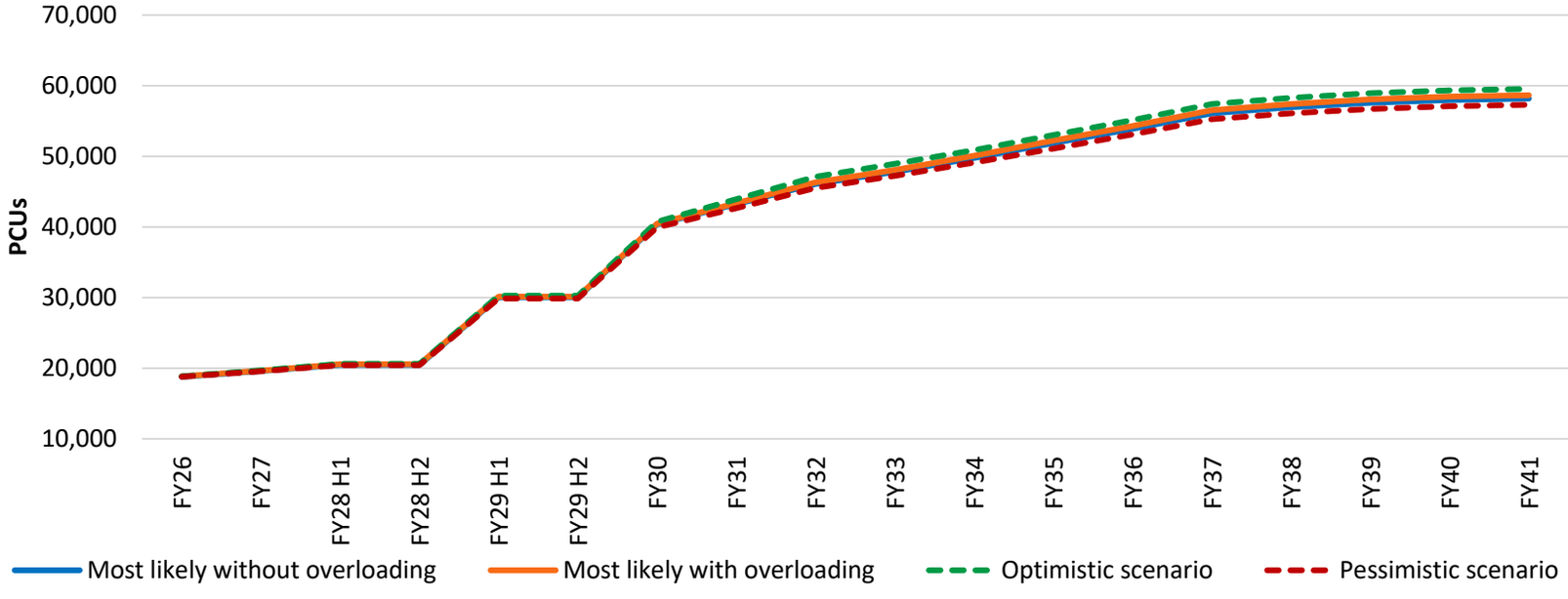
TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

| | Most likely without overloading | | | Most likely with overloading | | | Optimistic | | | Pessimistic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FY | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) |
| FY26 | 18,777 | - | - | 18,831 | - | - | 18,831 | - | - | 18,777 | - | - |
| FY27 | 19,595 | 4.4% | - | 19,651 | 4.4% | - | 19,682 | 4.6% | - | 19,564 | 4.2% | - |
| FY28 H1 | 20,484 | 4.6% | - | 20,543 | 4.6% | - | 20,609 | 4.8% | - | 20,418 | 4.4% | - |
| FY28 H2 | 20,484 | 4.6% | - | 20,543 | 4.6% | - | 20,609 | 4.8% | - | 20,418 | 4.4% | - |
| FY29 H1 | 30,019 | 47.3% | - | 30,118 | 47.3% | - | 30,266 | 47.5% | - | 29,872 | 47.0% | - |
| FY29 H2 | 30,019 | 47.3% | 23.8 | 30,118 | 47.3% | 23.9 | 30,266 | 47.5% | 24.0 | 29,872 | 47.0% | - |
| FY30 | 40,398 | 35.0% | 67.5 | 40,468 | 34.8% | 70.3 | 40,737 | 35.0% | 70.8 | 39,932 | 34.1% | 66.7 |
| FY31 | 43,243 | 7.1% | 75.2 | 43,348 | 7.2% | 78.0 | 43,922 | 7.9% | 79.0 | 42,677 | 6.9% | 74.2 |
| FY32 | 46,093 | 6.6% | 82.9 | 46,299 | 6.9% | 85.2 | 47,074 | 7.2% | 86.6 | 45,527 | 6.7% | 81.9 |
| FY33 | 47,792 | 3.7% | 89.3 | 48,039 | 3.8% | 91.4 | 48,951 | 4.0% | 93.1 | 47,236 | 3.8% | 88.2 |
| FY34 | 49,777 | 4.2% | 96.7 | 50,068 | 4.3% | 98.8 | 50,886 | 4.0% | 100.3 | 49,115 | 4.0% | 95.4 |
| FY35 | 51,864 | 4.2% | 104.3 | 52,204 | 4.3% | 106.2 | 52,997 | 4.2% | 107.8 | 51,087 | 4.1% | 102.7 |
| FY36 | 53,893 | 3.9% | 113.3 | 54,283 | 4.0% | 115.1 | 55,110 | 4.0% | 116.8 | 53,083 | 3.9% | 111.6 |
| FY37 | 56,098 | 4.1% | 121.8 | 56,543 | 4.2% | 123.3 | 57,407 | 4.2% | 125.2 | 55,254 | 4.1% | 119.9 |
| FY38 | 56,955 | 1.5% | 128.2 | 57,407 | 1.5% | 129.8 | 58,285 | 1.5% | 131.7 | 56,096 | 1.5% | 126.2 |
| FY39 | 57,579 | 1.1% | 134.6 | 58,037 | 1.1% | 136.3 | 58,925 | 1.1% | 138.4 | 56,711 | 1.1% | 132.6 |
| FY40 | 57,980 | 0.7% | 141.0 | 58,441 | 0.7% | 142.7 | 59,336 | 0.7% | 144.9 | 57,105 | 0.7% | 138.8 |
| FY41 | 58,179 | 0.3% | 146.1 | 58,641 | 0.3% | 147.9 | 59,540 | 0.3% | 150.2 | 57,301 | 0.3% | 143.9 |
| **Total (FY27 – FY41)** | | | **1,325** | | | **1,349** | | | **1,369** | | | **1,282** |

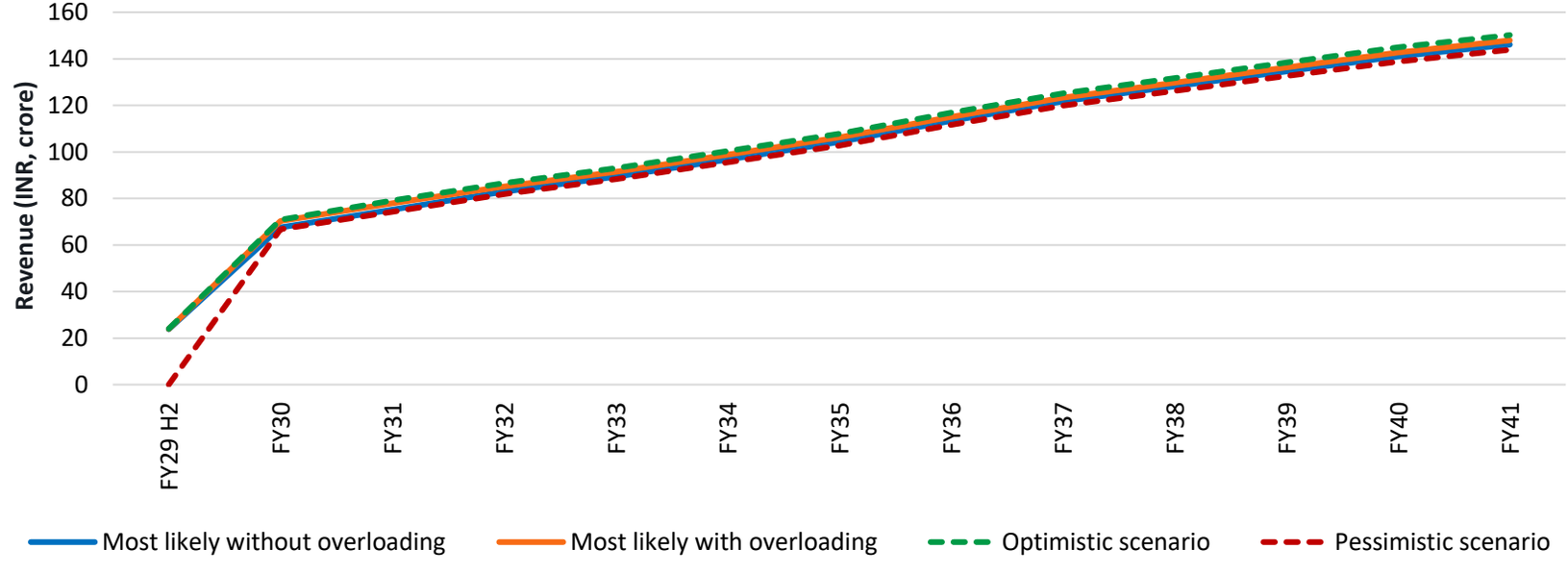
Source: TIC estimate

# Scenario summary: Dobbaspet & Halenijagal CP (2)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

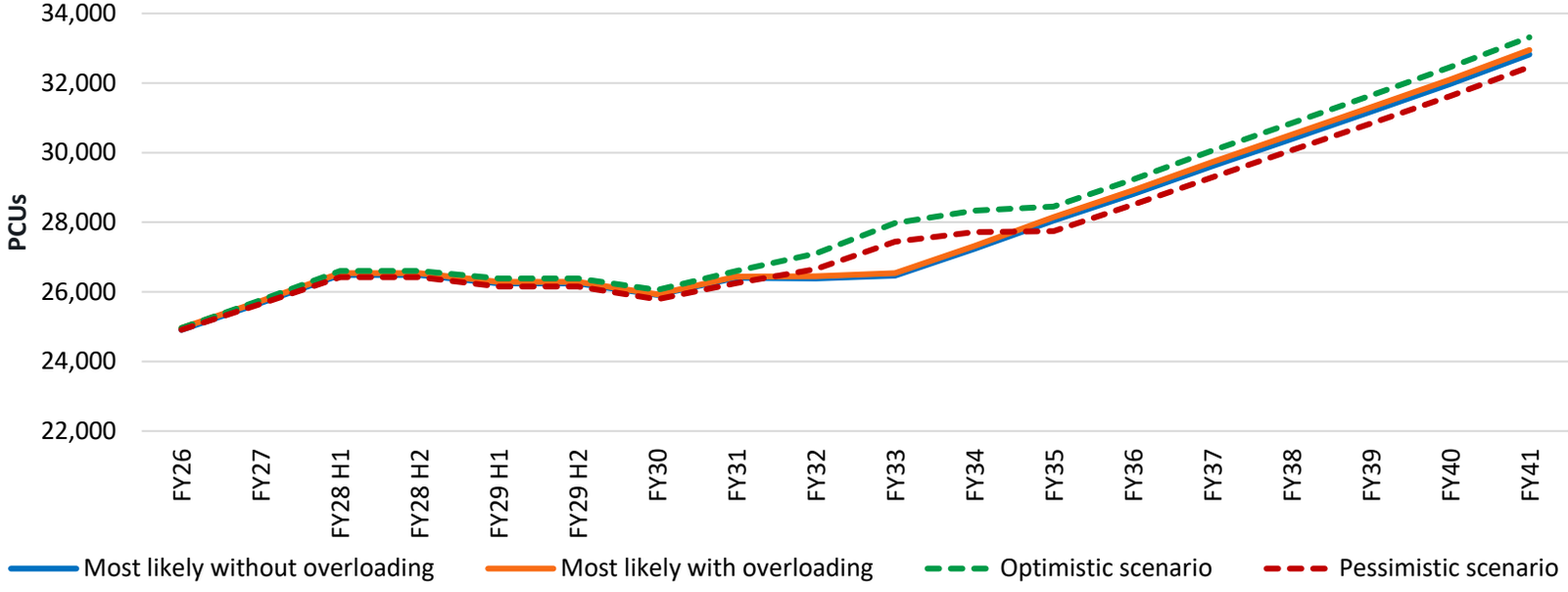
# Scenario summary: Bhartipura & Honnenahalli CP (1)

| | Most likely without overloading | | | Most likely with overloading | | | Optimistic | | | Pessimistic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FY | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) | PCU | PCU growth | Revenue (INR Cr) |
| FY26 | 24,909 | - | - | 24,960 | - | - | 24,960 | - | - | 24,909 | - | - |
| FY27 | 25,678 | 3.1% | - | 25,729 | 3.1% | - | 25,758 | 3.2% | - | 25,649 | 3.0% | - |
| FY28 H1 | 26,485 | 3.2% | 15.1 | 26,537 | 3.2% | 15.9 | 26,598 | 3.3% | 15.9 | 26,425 | 3.0% | 15.1 |
| FY28 H2 | 26,485 | 3.2% | 15.1 | 26,537 | 3.2% | 15.9 | 26,598 | 3.3% | 15.9 | 26,425 | 3.0% | 15.1 |
| FY29 H1 | 26,241 | (0.9%) | 15.4 | 26,290 | (0.9%) | 16.2 | 26,383 | (0.8%) | 16.2 | 26,149 | (1.0%) | 15.3 |
| FY29 H2 | 26,241 | (0.9%) | 15.3 | 26,290 | (0.9%) | 16.1 | 26,383 | (0.8%) | 16.1 | 26,149 | (1.0%) | 15.3 |
| FY30 | 25,909 | (1.2%) | 31.7 | 25,932 | (1.3%) | 33.3 | 26,055 | (1.2%) | 33.4 | 25,787 | (1.3%) | 31.5 |
| FY31 | 26,404 | 1.9% | 33.6 | 26,437 | 2.0% | 35.2 | 26,595 | 2.1% | 35.4 | 26,247 | 1.8% | 33.4 |
| FY32 | 26,386 | (0.1%) | 34.3 | 26,448 | 0.0% | 35.5 | 27,102 | 1.9% | 36.2 | 26,655 | 1.6% | 34.6 |
| FY33 | 26,467 | 0.3% | 35.8 | 26,541 | 0.3% | 36.8 | 27,979 | 3.3% | 38.5 | 27,439 | 3.0% | 36.8 |
| FY34 | 27,231 | 2.9% | 38.6 | 27,315 | 2.9% | 39.5 | 28,337 | 1.3% | 40.8 | 27,715 | 1.0% | 39.1 |
| FY35 | 28,048 | 3.0% | 41.0 | 28,144 | 3.1% | 41.8 | 28,448 | 0.4% | 42.2 | 27,748 | 0.1% | 40.6 |
| FY36 | 28,812 | 2.7% | 43.1 | 28,920 | 2.8% | 43.7 | 29,233 | 2.8% | 44.2 | 28,502 | 2.7% | 42.6 |
| FY37 | 29,613 | 2.8% | 46.7 | 29,733 | 2.8% | 47.2 | 30,057 | 2.8% | 47.7 | 29,293 | 2.8% | 46.3 |
| FY38 | 30,395 | 2.7% | 49.2 | 30,517 | 2.7% | 49.7 | 30,852 | 2.7% | 50.2 | 30,066 | 2.6% | 48.7 |
| FY39 | 31,179 | 2.6% | 53.2 | 31,303 | 2.6% | 53.7 | 31,647 | 2.6% | 54.3 | 30,840 | 2.6% | 52.7 |
| FY40 | 31,975 | 2.6% | 56.4 | 32,101 | 2.6% | 57.0 | 32,455 | 2.6% | 57.6 | 31,625 | 2.6% | 55.9 |
| FY41 | 32,822 | 2.7% | 59.1 | 32,950 | 2.7% | 59.7 | 33,316 | 2.7% | 60.3 | 32,462 | 2.7% | 58.5 |
| **Total (FY27 –FY41)** | | | **584** | | | **597** | | | **605** | | | **582** |

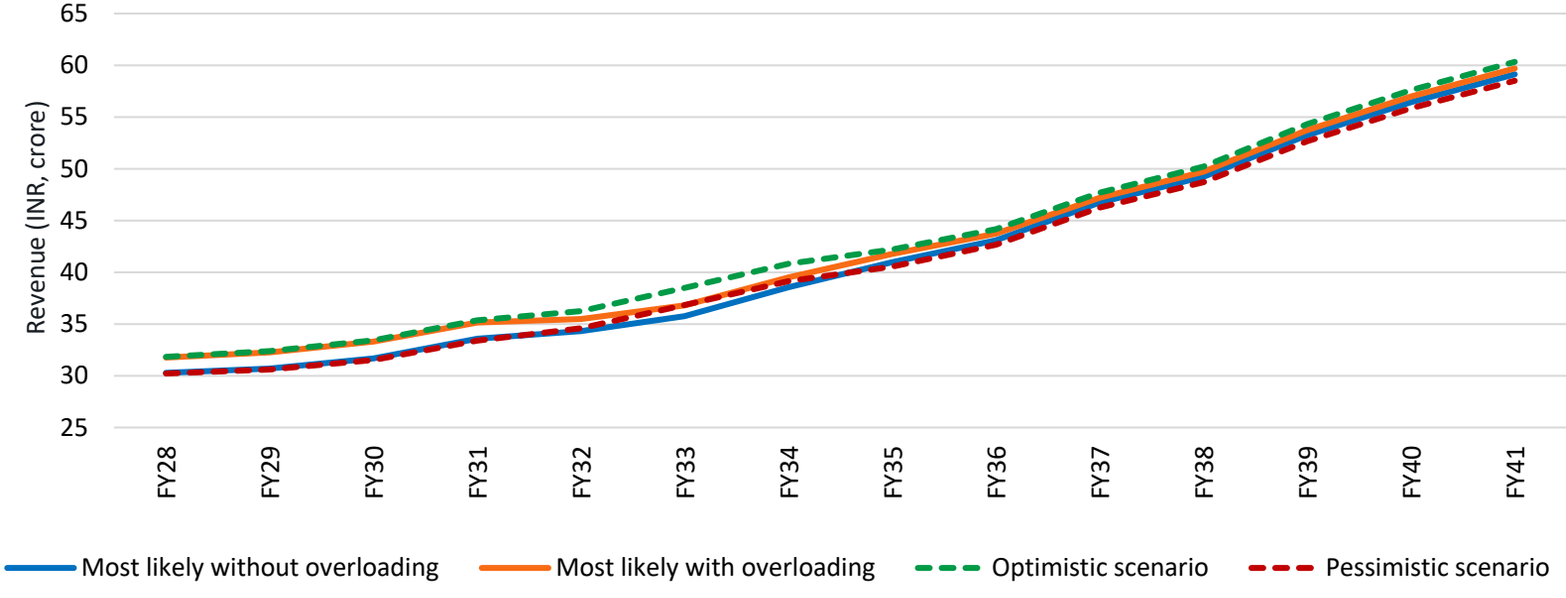
Source: TIC estimate

# Scenario summary: Bhartipura & Honnenahalli CP (2)

**PCU comparison**




**Revenue comparison**




Source: TIC estimate

# Revenue summary

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**Most likely without overloading (Revenue (INR Cr)**

| FY | Kulumepalya TP | Chokkenahalli TP | Halenijagal TP | Bharathipura & Honnenahalli TP (Two Check Plaza) | Dobbaspet & Halenijagal TP (Two Check Plaza) | Total |
|---|---|---|---|---|---|---|
| FY27 | 90 | 102 | - | - | - | **192** |
| FY28 | - | 120 | 136 | 30 | - | **286** |
| FY29 | - | 65 | 162 | 31 | 24 | **282** |
| FY30 | - | - | 178 | 32 | 68 | **277** |
| FY31 | - | - | 187 | 34 | 75 | **295** |
| FY32 | - | - | 193 | 34 | 83 | **310** |
| FY33 | - | - | 202 | 36 | 89 | **327** |
| FY34 | - | - | 220 | 39 | 97 | **356** |
| FY35 | - | - | 239 | 41 | 104 | **384** |
| FY36 | - | - | 261 | 43 | 113 | **418** |
| FY37 | - | - | 279 | 47 | 122 | **447** |
| FY38 | - | - | 296 | 49 | 128 | **474** |
| FY39 | - | - | 313 | 53 | 135 | **501** |
| FY40 | - | - | 333 | 56 | 141 | **530** |
| FY41 | - | - | 348 | 59 | 146 | **553** |
| **Total (FY27 - FY41)** | **90** | **288** | **3,347** | **584** | **1,325** | **5,633** |

Source: TIC estimate

# List of Appendices

**Appendix A:** Vehicle category-wise visual representation of origin-destination zones and top origin-destination pairs

**Appendix B:** Origin-Destination Survey Analysis for proposed toll plaza locations

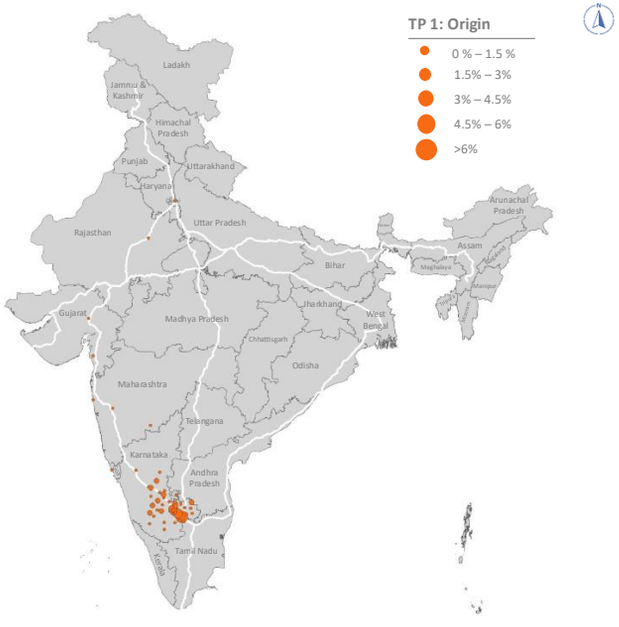
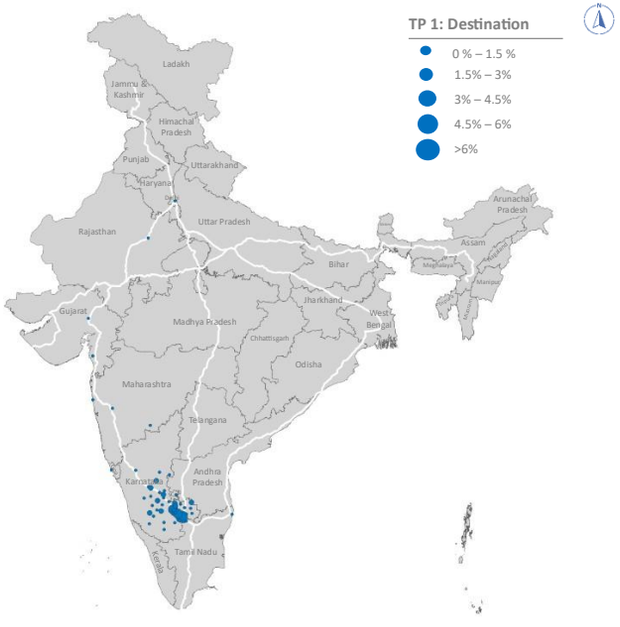
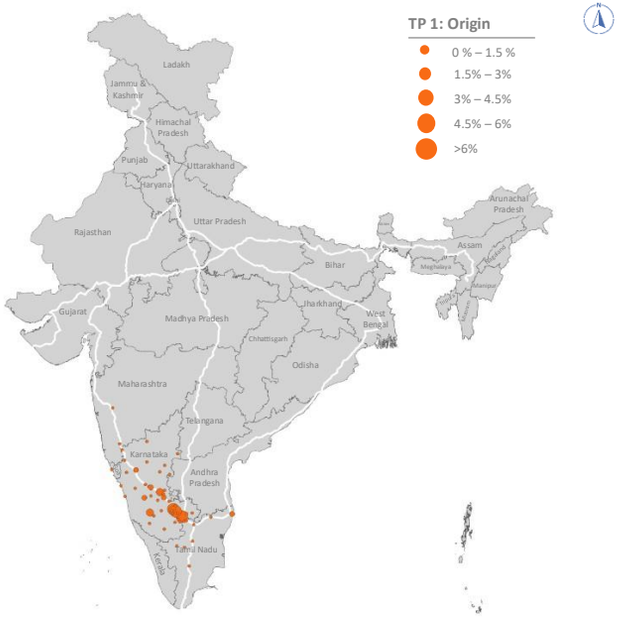
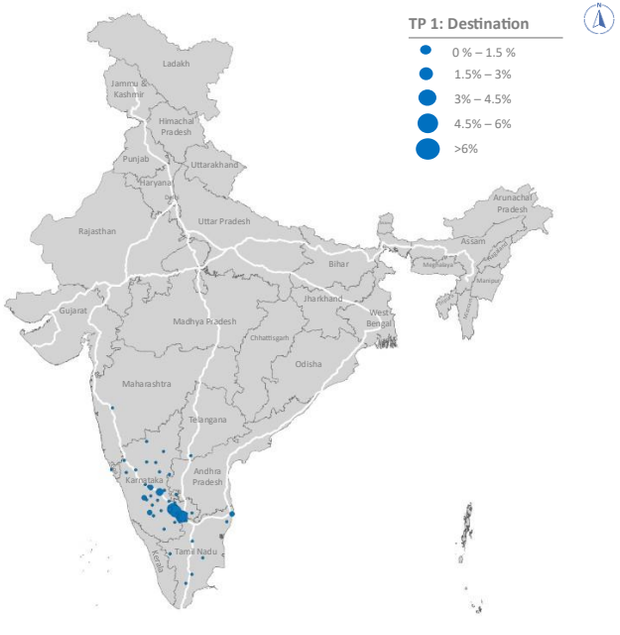
**Appendix C:** Detailed traffic and revenue forecast – most likely scenario without overloading

## Appendix A:

- Vehicle category-wise visual representation of origin-destination zones
- Vehicle category-wise top origin-destination pairs

# Vehicle category-wise visual representation of OD (1) : Kulumepalya TP

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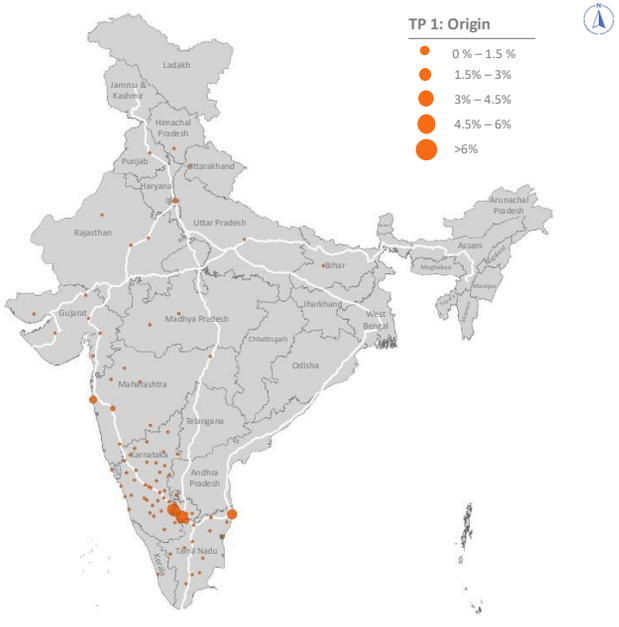
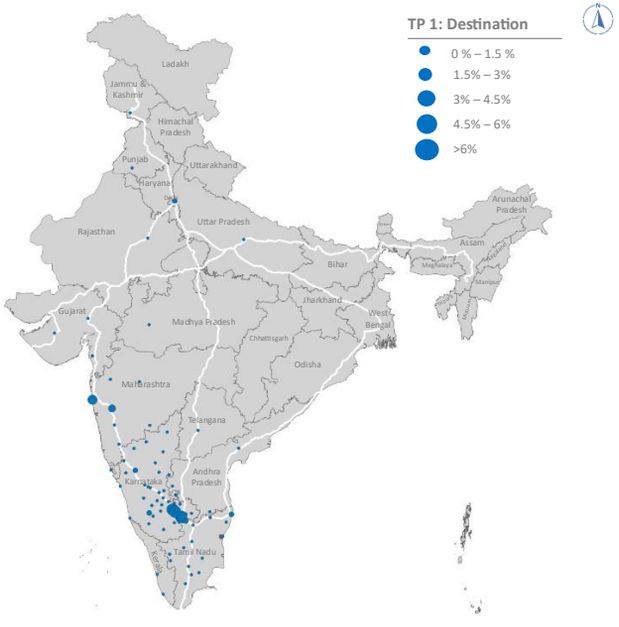
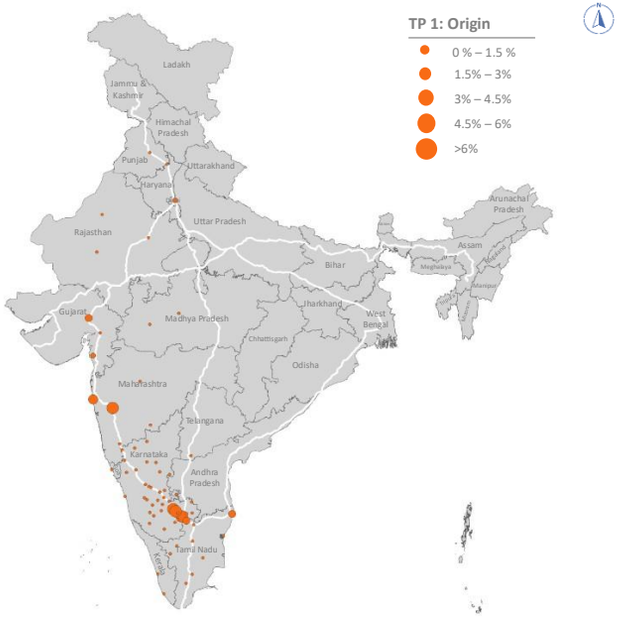
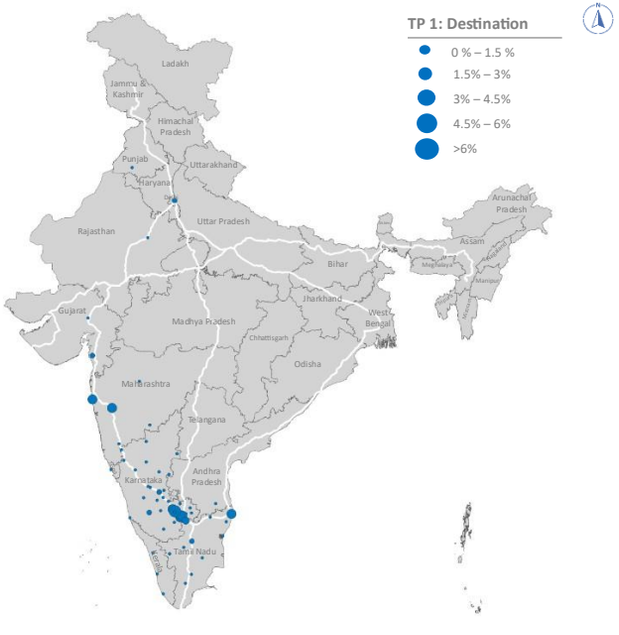
| | Origin | Destination |
|---|---|---|
| CJV |  |  |
| Mini LCV |  |  |



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (2) : Kulumepalya TP

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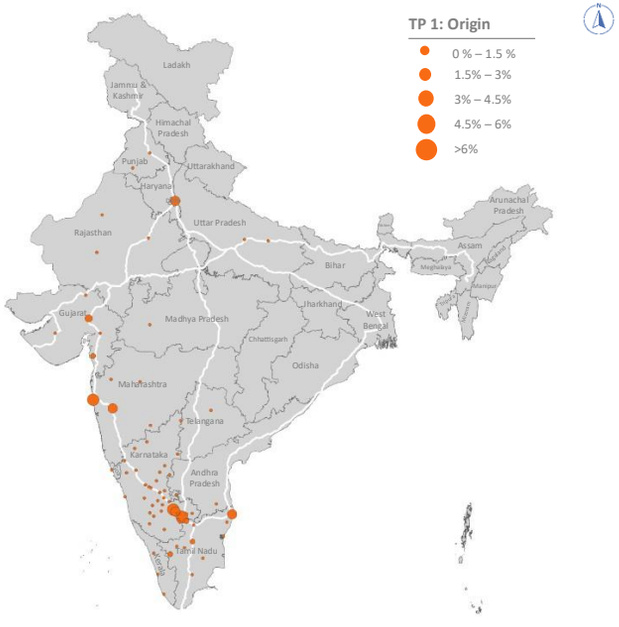
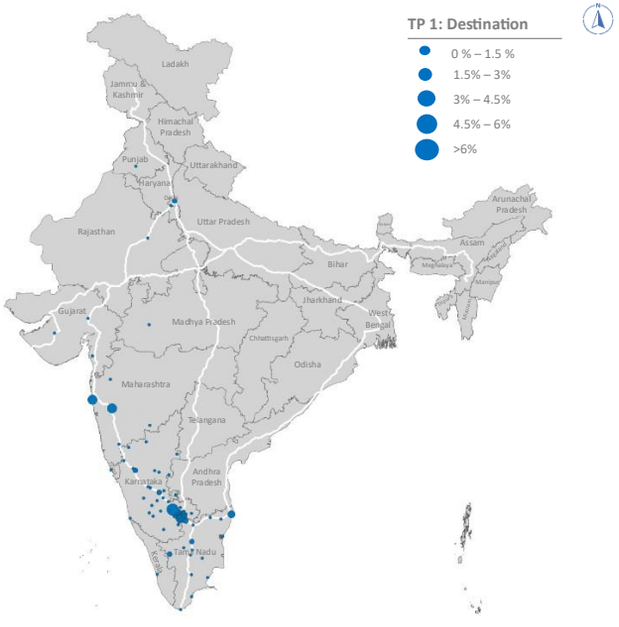
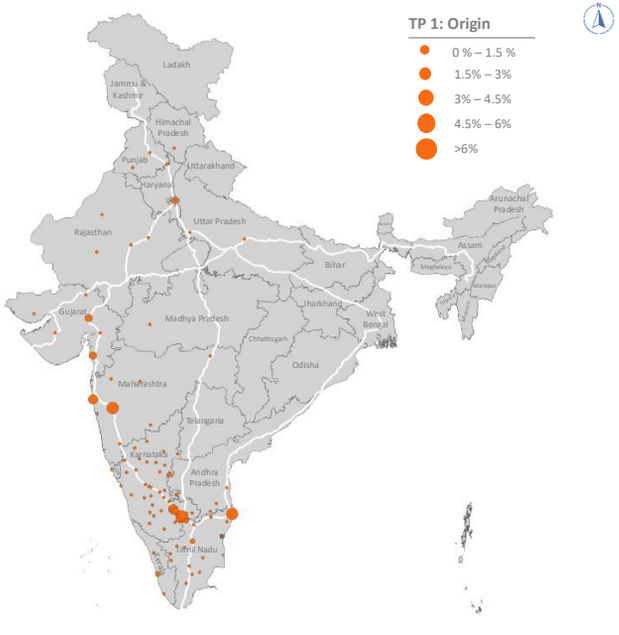
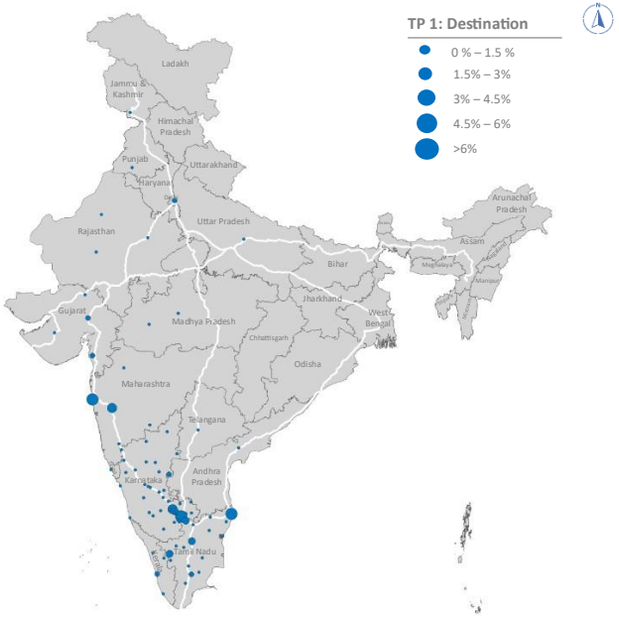
| | Origin | Destination |
|---|---|---|
| LCV |  |  |
| 2A |  |  |



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (3) : Kulumepalya TP

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| | Origin | Destination |
|---|---|---|
| 3A |  |  |
| MAV |  |  |



Source: TIC analysis (map not to scale)

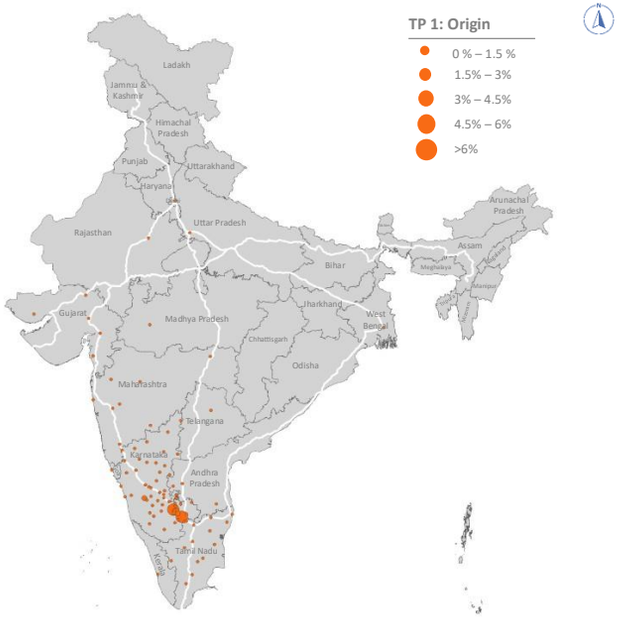
# Vehicle category-wise visual representation of OD (4) : Kulumepalya TP

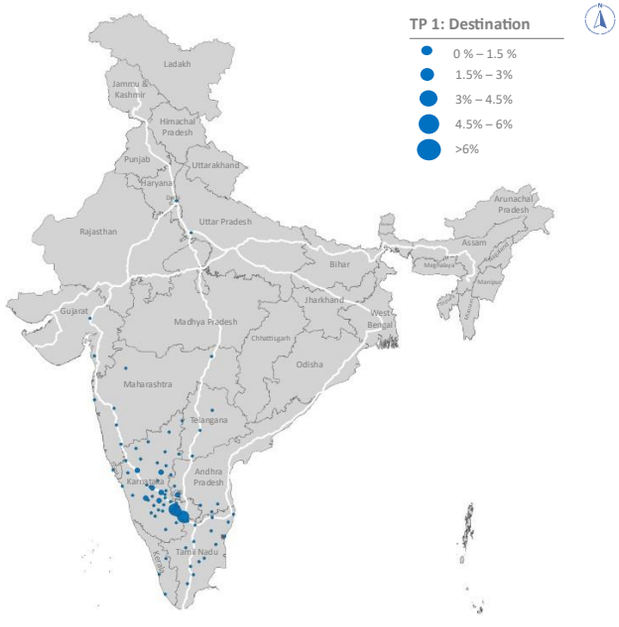
TRANSLINK® Infrastructure Consultants Pvt Ltd
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**Origin**

**Destination**

**Bus**

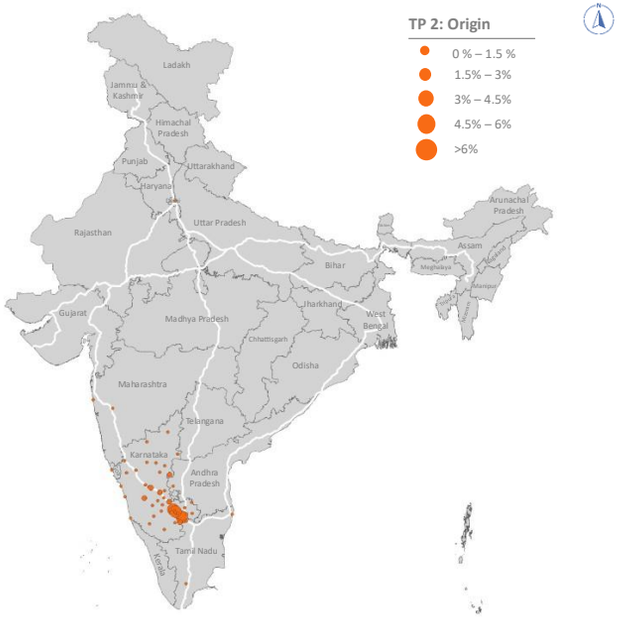
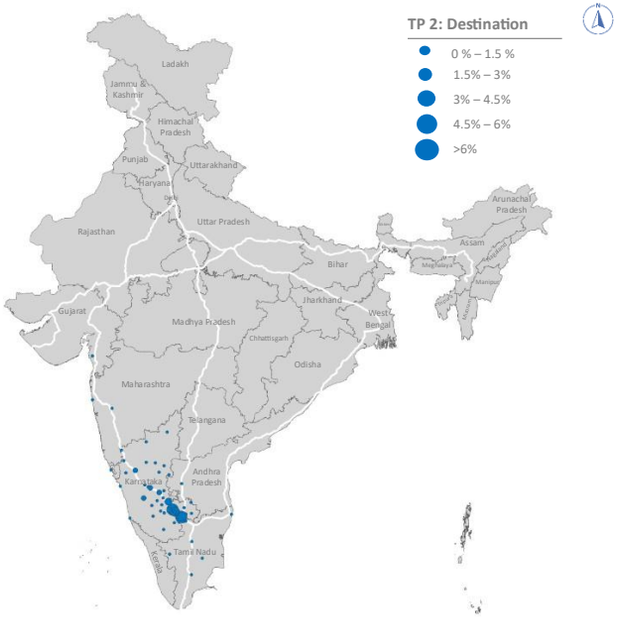
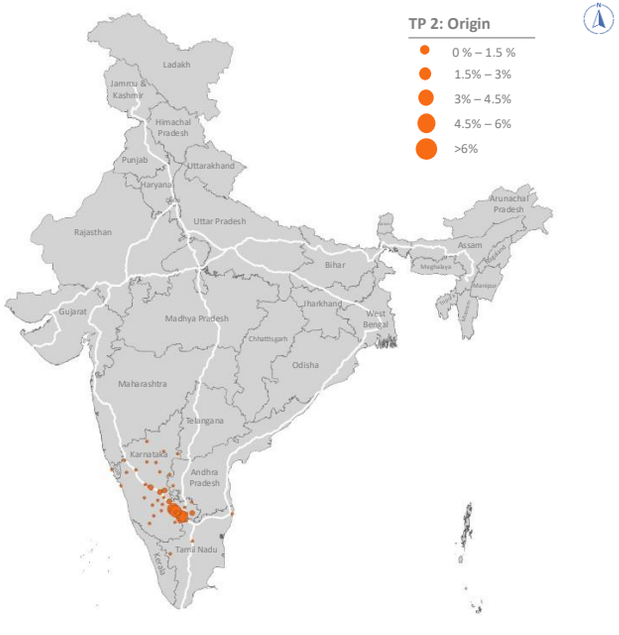
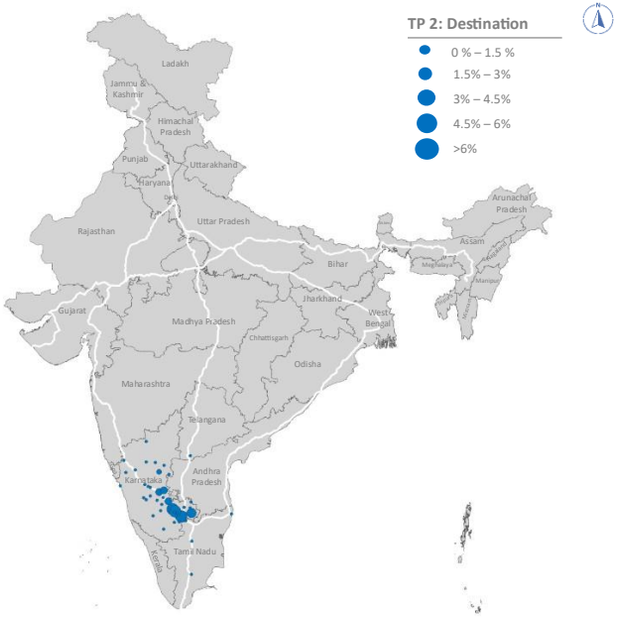



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (1) : Chokkenahalli TP

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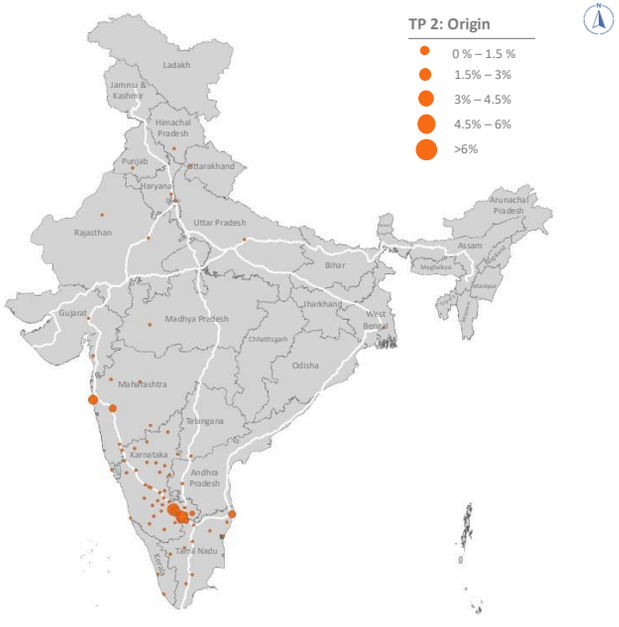
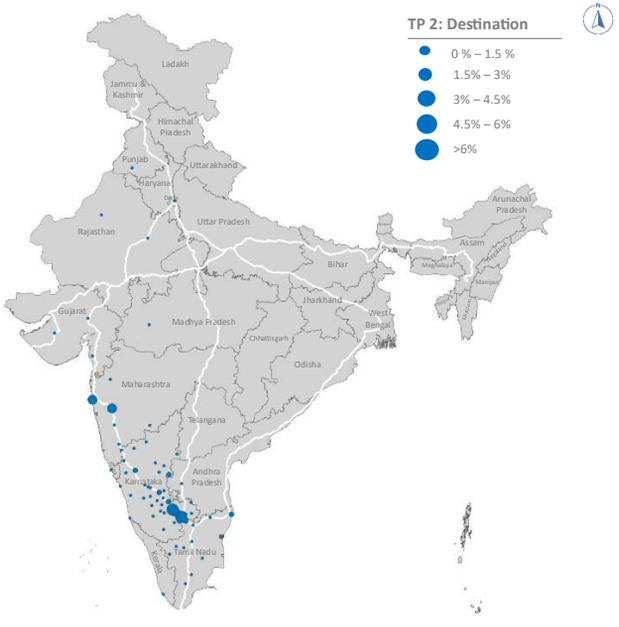
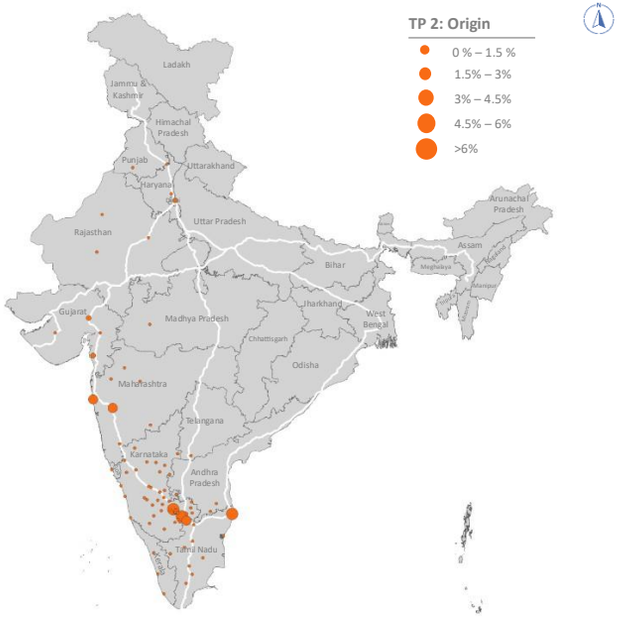
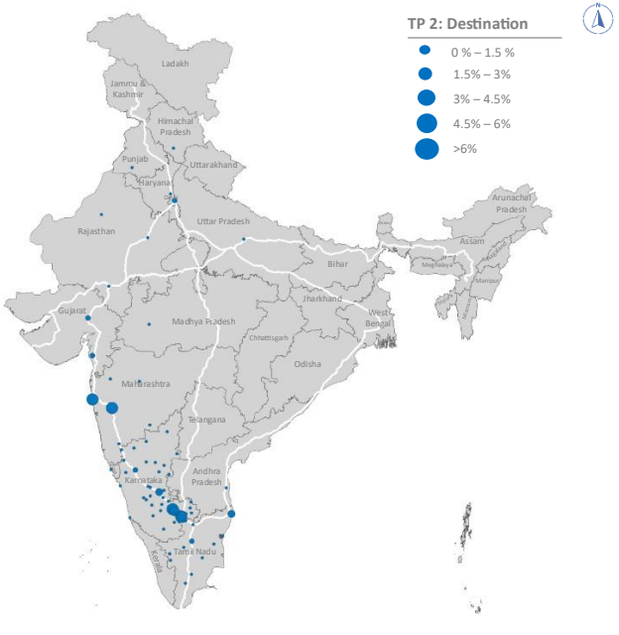
| | Origin | Destination |
|---|---|---|
| CJV |  |  |
| Mini LCV |  |  |



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (2) : Chokkenahalli TP

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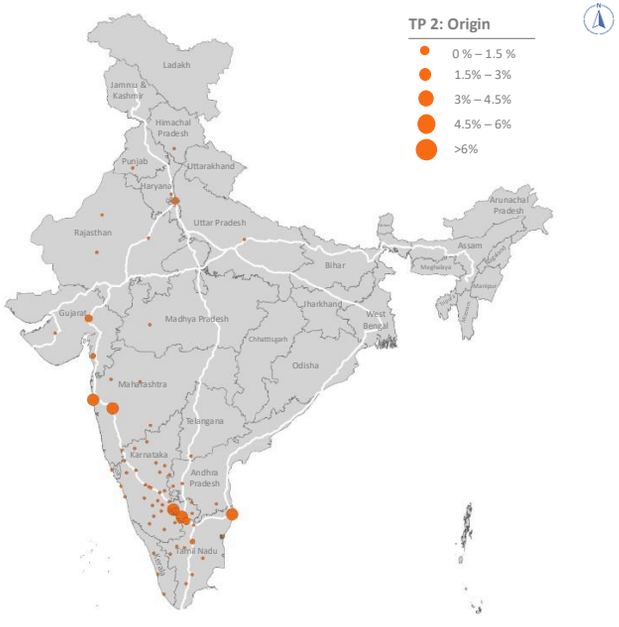
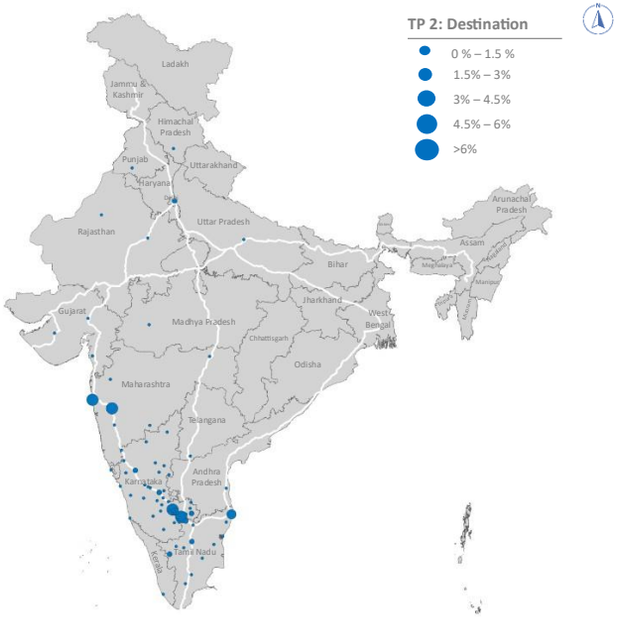
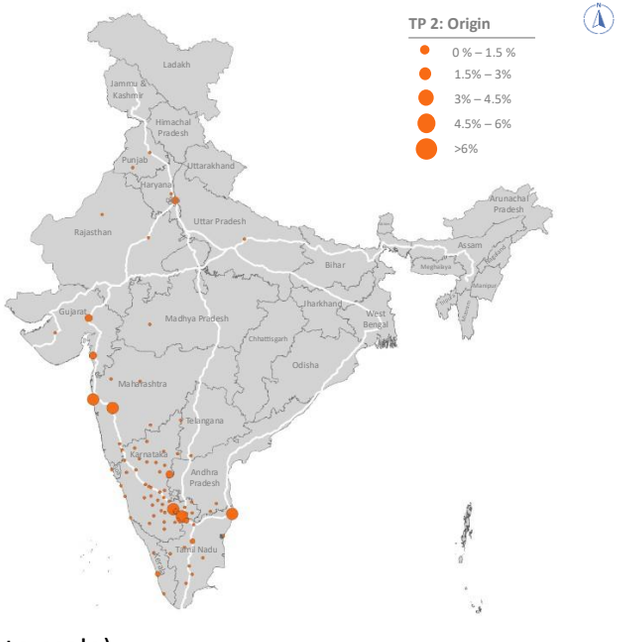
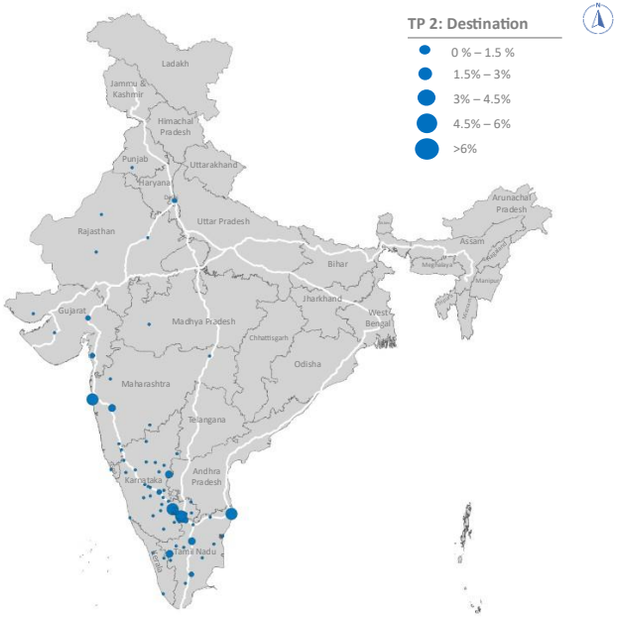
| | Origin | Destination |
|---|---|---|
| LCV |  |  |
| 2A |  |  |



Source: TIC analysis (map not to scale)

# Vehicle category-wise visual representation of OD (3) : Chokkenahalli TP

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Smart Consulting

| | Origin | Destination |
|---|---|---|
| 3A |  |  |
| MAV |  |  |



Source: TIC analysis (map not to scale)

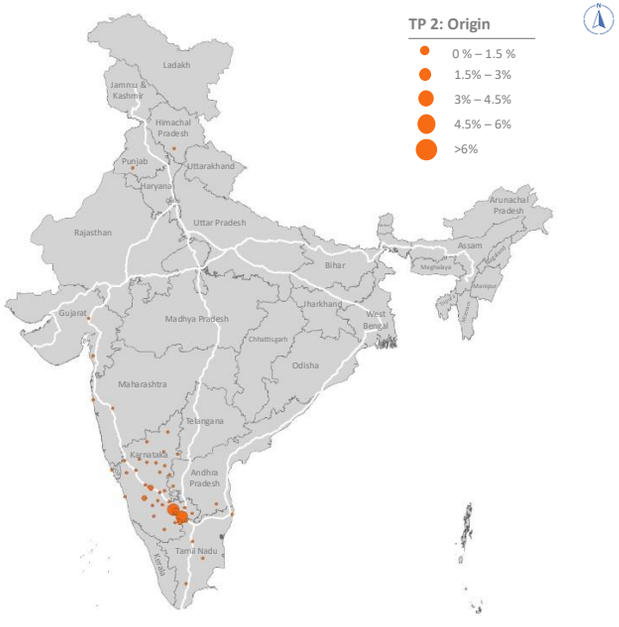
# Vehicle category-wise visual representation of OD (4) : Chokkenahalli TP

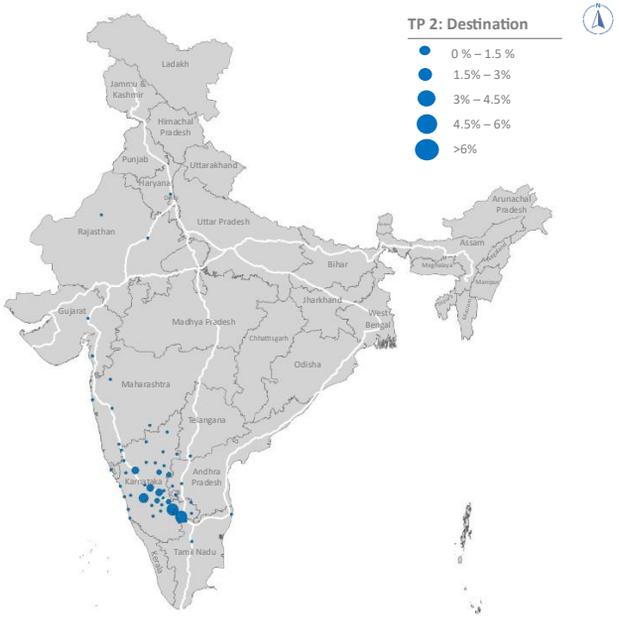
TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Origin**

**Destination**

**Bus**




Source: TIC analysis (map not to scale)

# Vehicle category-wise top OD pairs (1) : Kulumepalya TP

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**CJV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 5% |
| 2 | Bengaluru | Budihal | 4% |
| 3 | Tumakuru | Bengaluru | 4% |
| 4 | Dobbaspet | Bengaluru | 4% |
| 5 | Budihal | Bengaluru | 4% |
| 6 | Bengaluru | Dobbaspet | 3% |
| 7 | Bengaluru | Madhugiri | 2% |
| 8 | Bengaluru | Bengaluru | 2% |
| 9 | Bengaluru | Kotturu | 2% |
| 10 | Bengaluru | Tiptur | 2% |

**Mini LCV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Tumakuru | Bengaluru | 10% |
| 2 | Dobbaspet | Bengaluru | 10% |
| 3 | Bengaluru | Dobbaspet | 8% |
| 4 | Bengaluru | Tumakuru | 6% |
| 5 | Belur | Bengaluru | 4% |
| 6 | Bengaluru | Chitradurga | 3% |
| 7 | Chitradurga | Bengaluru | 3% |
| 8 | Bengaluru | Shivamogga | 2% |
| 9 | Bengaluru | Davanagere | 2% |
| 10 | Shivamogga | Bengaluru | 2% |

**Bus**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Tumakuru | Bengaluru | 10% |
| 2 | Bengaluru | Tumakuru | 7% |
| 3 | Bengaluru | Dobbaspet | 4% |
| 4 | Dobbaspet | Bengaluru | 3% |
| 5 | Bengaluru | Shivamogga | 2% |
| 6 | Shivamogga | Bengaluru | 2% |
| 7 | Bengaluru | Chitradurga | 2% |
| 8 | Bengaluru | Hubballi | 2% |
| 9 | Bengaluru | Pavagada | 2% |
| 10 | Bengaluru | Hosadurga | 1% |

**LCV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 8% |
| 2 | Bengaluru | Dobbaspet | 6% |
| 3 | Tumakuru | Bengaluru | 6% |
| 4 | Dobbaspet | Bengaluru | 4% |
| 5 | Bengaluru | Mumbai | 3% |
| 6 | Bengaluru | Pune | 2% |
| 7 | Bengaluru | Belur | 2% |
| 8 | Mumbai | Bengaluru | 2% |
| 9 | Pune | Bengaluru | 2% |
| 10 | Bengaluru | Hubballi | 1% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2) : Kulumepalya TP

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**2A**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Tumakuru | Bengaluru | 7% |
| 2 | Bengaluru | Dobbaspet | 5% |
| 3 | Bengaluru | Tumakuru | 5% |
| 4 | Dobbaspet | Bengaluru | 5% |
| 5 | Pune | Bengaluru | 3% |
| 6 | Mumbai | Bengaluru | 3% |
| 7 | Bengaluru | Mumbai | 3% |
| 8 | Bengaluru | Pune | 2% |
| 9 | Ahmedabad | Bengaluru | 2% |
| 10 | Delhi | Bengaluru | 2% |

**3A**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Mumbai | Bengaluru | 4% |
| 2 | Tumakuru | Bengaluru | 4% |
| 3 | Dobbaspet | Bengaluru | 4% |
| 4 | Bengaluru | Mumbai | 3% |
| 5 | Bengaluru | Tumakuru | 3% |
| 6 | Bengaluru | Dobbaspet | 3% |
| 7 | Bengaluru | Pune | 3% |
| 8 | Delhi | Bengaluru | 3% |
| 9 | Pune | Bengaluru | 2% |
| 10 | Ahmedabad | Bengaluru | 2% |

**MAV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Pune | Bengaluru | 3% |
| 2 | Bengaluru | Dobbaspet | 3% |
| 3 | Bengaluru | Mumbai | 3% |
| 4 | Bengaluru | Tumakuru | 2% |
| 5 | Mumbai | Bengaluru | 2% |
| 6 | Bengaluru | Pune | 2% |
| 7 | Tumakuru | Bengaluru | 2% |
| 8 | Delhi | Bengaluru | 2% |
| 9 | Ahmedabad | Bengaluru | 2% |
| 10 | Chennai | Mumbai | 2% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (1) : Chokkenahalli TP

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**CJV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 17% |
| 2 | Tumakuru | Bengaluru | 13% |
| 3 | Dobbaspet | Tumakuru | 6% |
| 4 | Tumakuru | Dobbaspet | 3% |
| 5 | Bengaluru | Sira | 3% |
| 6 | Harohalli | Tumakuru | 3% |
| 7 | Bengaluru | Chitradurga | 2% |
| 8 | Bengaluru | Davanagere | 2% |
| 9 | Bengaluru | Shivamogga | 2% |
| 10 | Sira | Bengaluru | 2% |

**Mini LCV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 18% |
| 2 | Tumakuru | Bengaluru | 15% |
| 3 | Tumakuru | Dobbaspet | 8% |
| 4 | Dobbaspet | Tumakuru | 5% |
| 5 | Bengaluru | Chitradurga | 3% |
| 6 | Bengaluru | Sira | 3% |
| 7 | Bengaluru | Hosapete | 2% |
| 8 | Challakere | Kolar | 1% |
| 9 | Bengaluru | Challakere | 1% |
| 10 | Davanagere | Bengaluru | 1% |

**Bus**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 18% |
| 2 | Tumakuru | Bengaluru | 8% |
| 3 | Bengaluru | Shivamogga | 5% |
| 4 | Bengaluru | Chitradurga | 4% |
| 5 | Bengaluru | Davanagere | 4% |
| 6 | Bengaluru | Hubballi | 3% |
| 7 | Dobbaspet | Tumakuru | 3% |
| 8 | Bengaluru | Ballari | 3% |
| 9 | Bengaluru | Hosadurga | 2% |
| 10 | Bengaluru | Sira | 2% |

**LCV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 13% |
| 2 | Tumakuru | Bengaluru | 8% |
| 3 | Bengaluru | Pune | 4% |
| 4 | Bengaluru | Mumbai | 3% |
| 5 | Dobbaspet | Tumakuru | 3% |
| 6 | Tumakuru | Dobbaspet | 3% |
| 7 | Mumbai | Bengaluru | 3% |
| 8 | Bengaluru | Chitradurga | 2% |
| 9 | Bengaluru | Sira | 2% |
| 10 | Pune | Bengaluru | 2% |

Source: TIC analysis

# Vehicle category-wise top OD pairs (2) : Chokkenahalli TP

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**2A**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 7% |
| 2 | Tumakuru | Bengaluru | 5% |
| 3 | Bengaluru | Mumbai | 4% |
| 4 | Bengaluru | Pune | 3% |
| 5 | Bengaluru | Chitradurga | 3% |
| 6 | Mumbai | Bengaluru | 3% |
| 7 | Tumakuru | Dobbaspet | 3% |
| 8 | Pune | Bengaluru | 2% |
| 9 | Chennai | Pune | 2% |
| 10 | Bengaluru | South Gujarat | 2% |

**3A**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 5% |
| 2 | Tumakuru | Bengaluru | 5% |
| 3 | Mumbai | Bengaluru | 4% |
| 4 | Bengaluru | Mumbai | 3% |
| 5 | Bengaluru | Pune | 2% |
| 6 | Pune | Bengaluru | 2% |
| 7 | Delhi | Bengaluru | 2% |
| 8 | Bengaluru | Chitradurga | 2% |
| 9 | Chennai | Mumbai | 2% |
| 10 | Chennai | Pune | 2% |

**MAV**

| Sr. No. | OD Pair | | Share |
|---|---|---|---|
| 1 | Bengaluru | Tumakuru | 5% |
| 2 | Tumakuru | Bengaluru | 3% |
| 3 | Pune | Bengaluru | 3% |
| 4 | Bengaluru | Ballari | 2% |
| 5 | Chennai | Mumbai | 2% |
| 6 | Mumbai | Bengaluru | 2% |
| 7 | Bengaluru | Pune | 2% |
| 8 | Ballari | Bengaluru | 2% |
| 9 | South Gujarat | Bengaluru | 2% |
| 10 | Bengaluru | Mumbai | 2% |

Source: TIC analysis

## Appendix B:

- Origin-Destination Survey Analysis for proposed toll plaza locations

# Commodity analysis (1): Halenijagal TP

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**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala |
| Agriculture / Animal Husbandry | 5% | 8% | 5% | 5% | 5% | 5% | 6% | 5% | 5% | 8% |
| Fruits and Vegetables | 14% | 29% | 8% | 14% | 16% | 6% | 6% | 6% | 7% | 6% |
| FMCG / Food Products | 1% | 4% | 2% | 5% | 5% | 2% | 3% | 5% | 2% | 4% |
| Building & Construction Material | 1% | 0% | 4% | 0% | 2% | 0% | 2% | 1% | 4% | 2% |
| Cement | 3% | 0% | 2% | 2% | 1% | 1% | 1% | 1% | 3% | 2% |
| Sand | -- | 1% | 0% | 1% | 0% | 0% | 1% | 2% | 0% | 0% |
| Aggregates / Stone | -- | -- | -- | 0% | -- | 0% | 0% | -- | 0% | 0% |
| Minerals & Minig Commodities | -- | -- | 0% | -- | -- | 0% | 1% | 0% | 0% | 0% |
| Iron Ore / Products | 8% | 3% | 5% | 5% | 10% | 9% | 9% | 11% | 11% | 9% |
| Manufacturing | 9% | 9% | 13% | 11% | 14% | 16% | 16% | 11% | 12% | 13% |
| Automobile and Spares | 3% | 1% | 5% | 2% | 4% | 2% | 4% | 2% | 8% | 10% |
| Chemicals / Fertilisers | 1% | -- | 0% | 0% | 0% | 0% | 1% | 1% | 0% | 1% |
| Steel / Metal | 3% | 2% | 4% | 2% | 3% | 2% | 5% | 4% | 5% | 6% |
| Petroleum Products | 1% | 1% | 1% | 3% | 2% | 7% | 4% | 7% | 3% | 4% |
| Miscellenaeous | 3% | 1% | 0% | 0% | 2% | 0% | 2% | 1% | 1% | 0% |
| Parcel / E-commerce | 10% | 17% | 18% | 21% | 16% | 27% | 26% | 22% | 17% | 19% |
| Empty | 39% | 25% | 34% | 28% | 20% | 21% | 19% | 24% | 20% | 15% |

Source: TIC analysis

*0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

# Commodity analysis (2): Dobbaspet & Halenijagal CP – Slip road

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala |
| Agriculture / Animal Husbandry | 6% | 3% | 0% | 1% | 2% | 2% | 1% | 2% | 2% | 2% |
| Fruits and Vegetables | 28% | 18% | 8% | 4% | 6% | 3% | 5% | 1% | 10% | 2% |
| FMCG / Food Products | 2% | 1% | 2% | 1% | 1% | 2% | 3% | 1% | 4% | 4% |
| Building & Construction Material | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 1% | 1% |
| Cement | 1% | 0% | 0% | 0% | 2% | 2% | 5% | 2% | 10% | 3% |
| Sand | -- | 0% | 0% | 2% | 2% | 4% | 4% | 10% | 1% | 1% |
| Aggregates / Stone | -- | -- | 0% | -- | -- | 0% | 0% | 1% | 0% | 1% |
| Minerals & Minig Commodities | -- | -- | -- | 0% | -- | -- | -- | 0% | 1% | 0% |
| Iron Ore / Products | 3% | 3% | 6% | 4% | 11% | 9% | 4% | 4% | 7% | 6% |
| Manufacturing | 6% | 11% | 14% | 9% | 7% | 16% | 12% | 13% | 7% | 13% |
| Automobile and Spares | 0% | 1% | 6% | 6% | 4% | 3% | 13% | 17% | 14% | 18% |
| Chemicals / Fertilisers | 1% | 0% | 1% | 0% | 2% | 3% | 0% | 1% | 1% | 2% |
| Steel / Metal | 4% | 1% | 3% | 3% | 3% | 1% | 4% | 3% | 1% | 4% |
| Petroleum Products | 2% | 5% | 2% | 8% | 7% | 4% | 7% | 4% | 2% | 2% |
| Miscellenaeous | 3% | 2% | 3% | 2% | 2% | 0% | 1% | 0% | 9% | 1% |
| Parcel / E-commerce | 16% | 8% | 23% | 1% | 22% | 21% | 19% | 11% | 15% | 7% |
| Empty | 29% | 46% | 31% | 61% | 30% | 30% | 22% | 29% | 17% | 35% |

Source: TIC analysis

*0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

# Commodity analysis (3): Bharathipura and Honnenahalli CP – Slip road

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**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala | Nelamangala to Tumakuru | Tumakuru to Nelamangala |
| Agriculture / Animal Husbandry | 8% | 4% | 1% | 2% | 1% | 0% | 1% | 1% | 1% | 2% |
| Fruits and Vegetables | 6% | 27% | 3% | 9% | 1% | 4% | 1% | 4% | 2% | 1% |
| FMCG / Food Products | 4% | 3% | 3% | 4% | 3% | 3% | 2% | 5% | 2% | 1% |
| Building & Construction Material | 0% | 1% | 1% | 1% | 2% | 0% | 4% | 3% | 1% | 1% |
| Cement | 1% | 1% | 4% | 1% | 2% | 0% | 4% | 1% | 4% | 3% |
| Sand | 1% | 0% | 2% | 4% | 4% | 8% | 10% | 23% | 2% | 12% |
| Aggregates / Stone | 1% | 0% | 0% | 0% | 1% | 0% | 0% | 2% | 0% | 4% |
| Minerals & Minig Commodities | -- | -- | 0% | -- | 0% | 1% | 1% | 1% | 0% | 1% |
| Iron Ore / Products | 3% | 1% | 6% | 2% | 14% | 4% | 4% | 2% | 4% | 2% |
| Manufacturing | 16% | 7% | 15% | 11% | 17% | 4% | 12% | 8% | 11% | 8% |
| Automobile and Spares | 0% | 0% | 0% | 5% | 1% | 0% | 1% | 1% | 25% | 21% |
| Chemicals / Fertilisers | 0% | 0% | 0% | 1% | 1% | 1% | 0% | 1% | 1% | 2% |
| Steel / Metal | 0% | 0% | 2% | 1% | 1% | 0% | 1% | 1% | 1% | 0% |
| Petroleum Products | 0% | 1% | 0% | 3% | 6% | 2% | 5% | 3% | 5% | 2% |
| Miscellenaeous | 0% | 1% | 0% | 1% | 1% | 0% | 1% | 2% | 0% | 2% |
| Parcel / E-commerce | 18% | 14% | 24% | 38% | 16% | 23% | 15% | 29% | 7% | 14% |
| Empty | 40% | 41% | 39% | 17% | 32% | 48% | 39% | 14% | 34% | 24% |

Source: TIC analysis

*0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

# Commodity analysis (4): Bharathipura and Honnenahalli CP - Sompura Junction

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**Direction-wise Commodity Distribution**

| Commodity | MLCV | | LCV | | 2A | | 3A | | MAV | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sompura to NH-48 | NH-48 to Sompura | Sompura to NH-48 | NH-48 to Sompura | Sompura to NH-48 | NH-48 to Sompura | Sompura to NH-48 | NH-48 to Sompura | Sompura to NH-48 | NH-48 to Sompura |
| Agriculture / Animal Husbandry | 1% | 0% | 1% | 1% | 2% | 0% | 1% | 2% | 1% | 0% |
| Fruits and Vegetables | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| FMCG / Food Products | 3% | 3% | 2% | 1% | 1% | 2% | 1% | 0% | 0% | 1% |
| Building & Construction Material | 1% | 0% | 1% | 0% | 0% | 0% | 1% | 0% | 0% | 0% |
| Cement | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Sand | -- | 0% | 1% | 1% | 0% | 0% | 0% | 0% | 0% | 0% |
| Aggregates / Stone | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 2% | 0% | 0% |
| Minerals & Minig Commodities | 1% | 7% | 2% | 3% | 0% | 12% | 2% | 4% | 1% | 3% |
| Iron Ore / Products | 5% | 7% | 5% | 6% | 6% | 5% | 5% | 17% | 4% | 3% |
| Manufacturing | 15% | 18% | 21% | 14% | 18% | 20% | 18% | 17% | 14% | 3% |
| Automobile and Spares | 1% | 1% | 1% | 3% | 1% | 7% | 1% | 9% | 35% | 34% |
| Chemicals / Fertilisers | 2% | 0% | 2% | 2% | 2% | 2% | 2% | 7% | 0% | 1% |
| Steel / Metal | 4% | 11% | 5% | 11% | 4% | 12% | 5% | 10% | 1% | 5% |
| Petroleum Products | 5% | 1% | 5% | 3% | 3% | 0% | 1% | 2% | 0% | 1% |
| Miscellenaeous | 2% | 4% | 6% | 1% | 4% | 3% | 3% | 2% | 3% | 2% |
| Parcel / E-commerce | 1% | 8% | 2% | 4% | 2% | 8% | 0% | 3% | 3% | 1% |
| Empty | 58% | 40% | 45% | 50% | 57% | 30% | 59% | 26% | 36% | 46% |

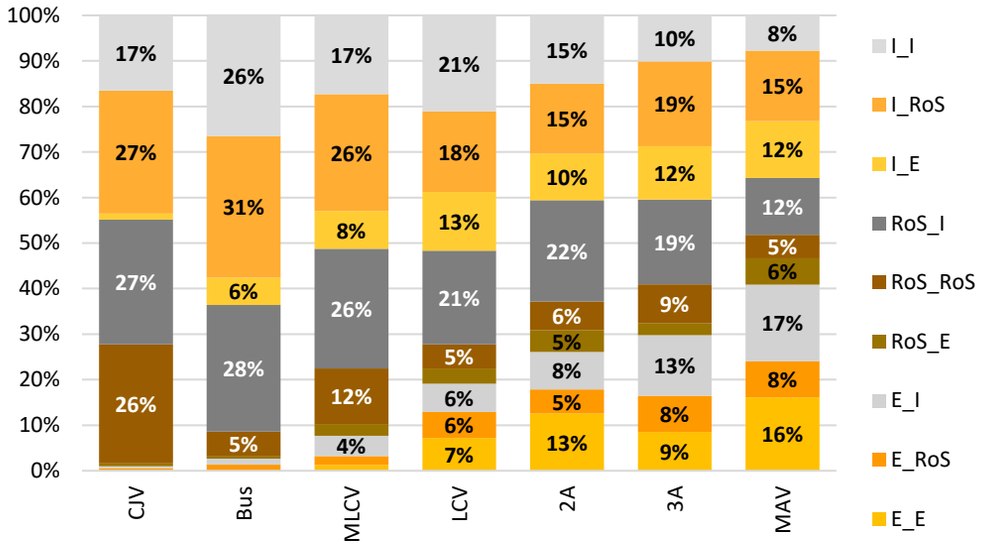
Source: TIC analysis

*0% indicates value less than 1% and -- represents no presence of such commodity for the vehicle category

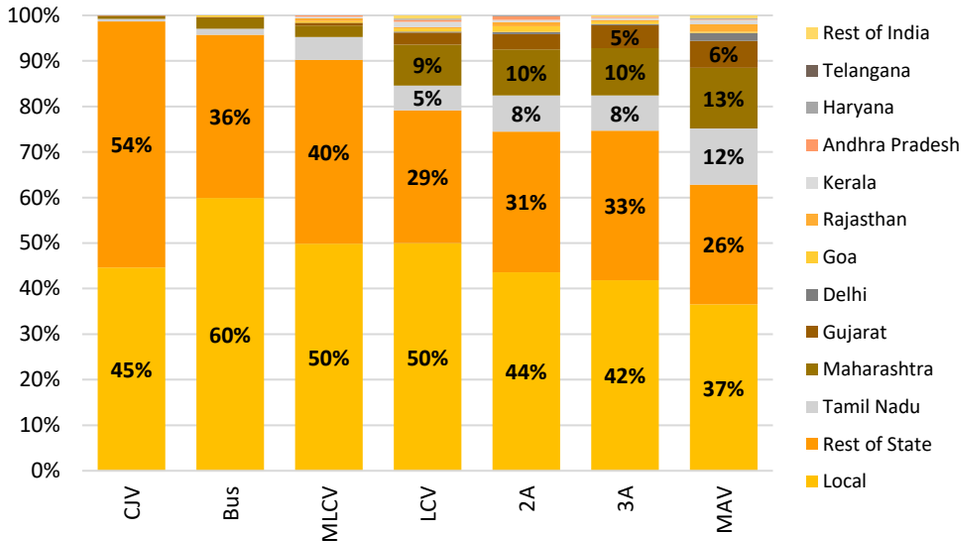
# Zonal influences and trip distances (1): Halenijagal TP

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

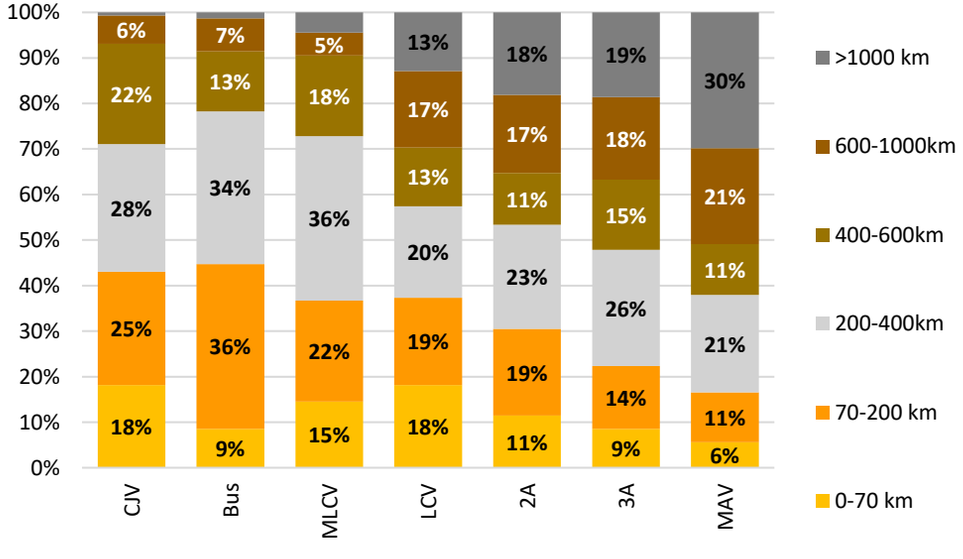
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance



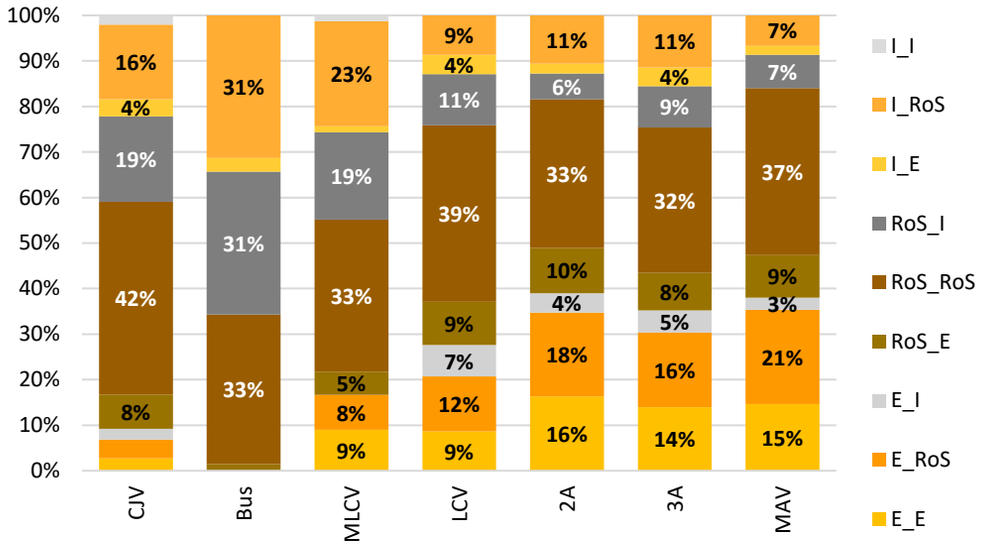

| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 287 |
| Bus | 796 |
| Mini LCV | 342 |
| LCV | 492 |
| 2A | 576 |
| 3A | 603 |
| MAV | 789 |

Source: TIC analysis

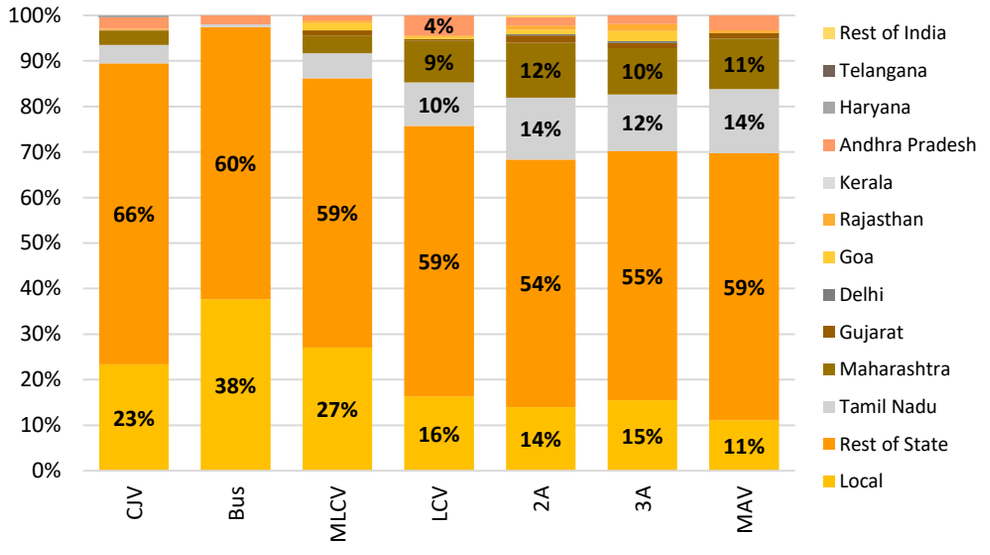
# Zonal influences and trip distances (2): Dobbaspet & Halenijagal CP – Slip road

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

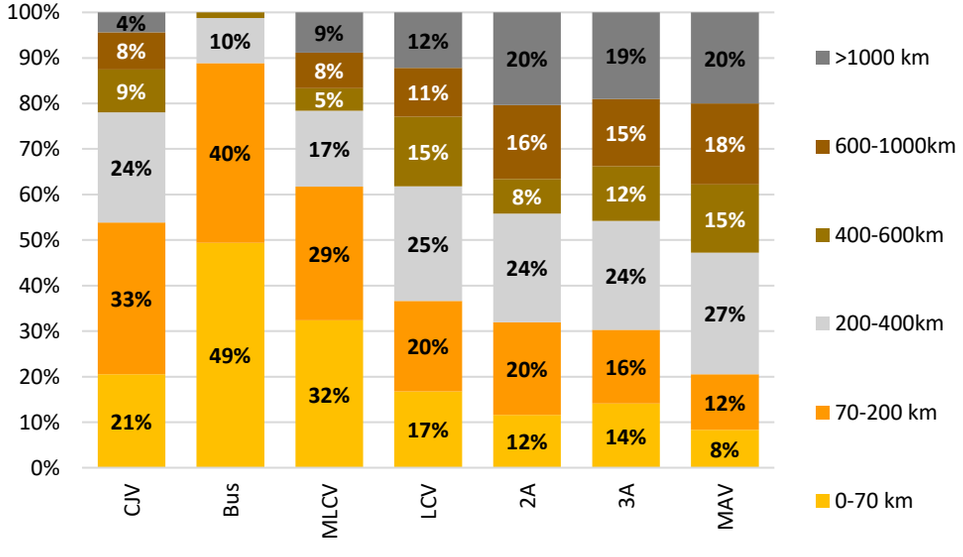
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance



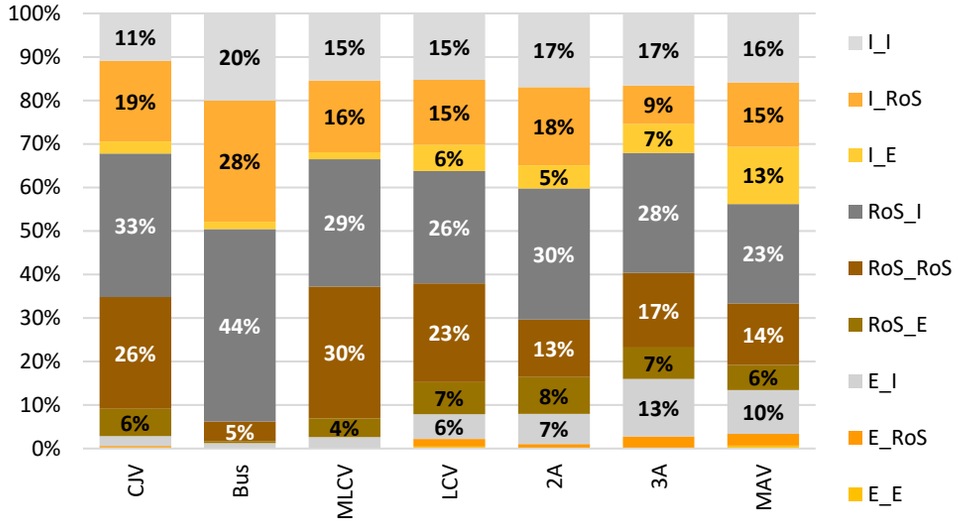

| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 295 |
| Bus | 360 |
| Mini LCV | 301 |
| LCV | 429 |
| 2A | 567 |
| 3A | 575 |
| MAV | 581 |

Source: TIC analysis

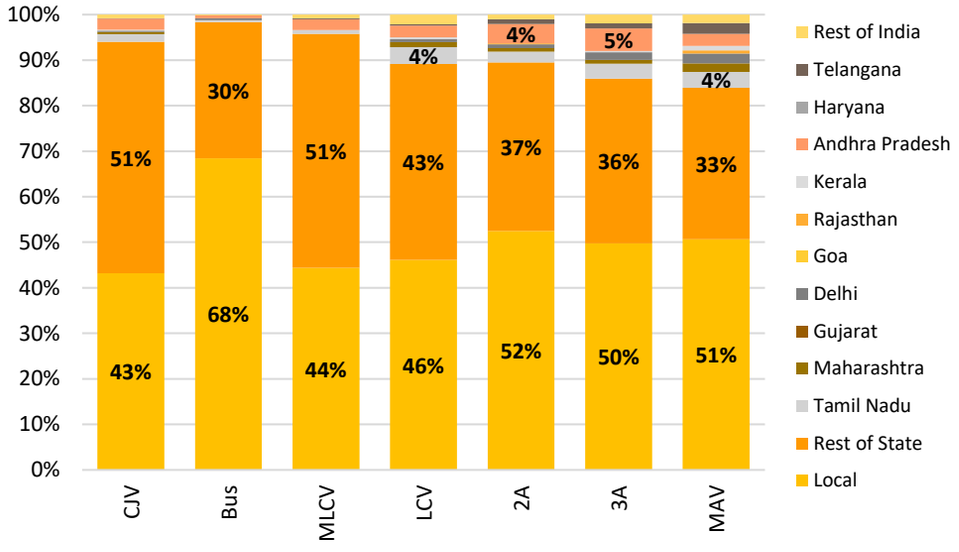
# Zonal influences and trip distances (3): Bharathipura and Honnenahalli CP – Slip road

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

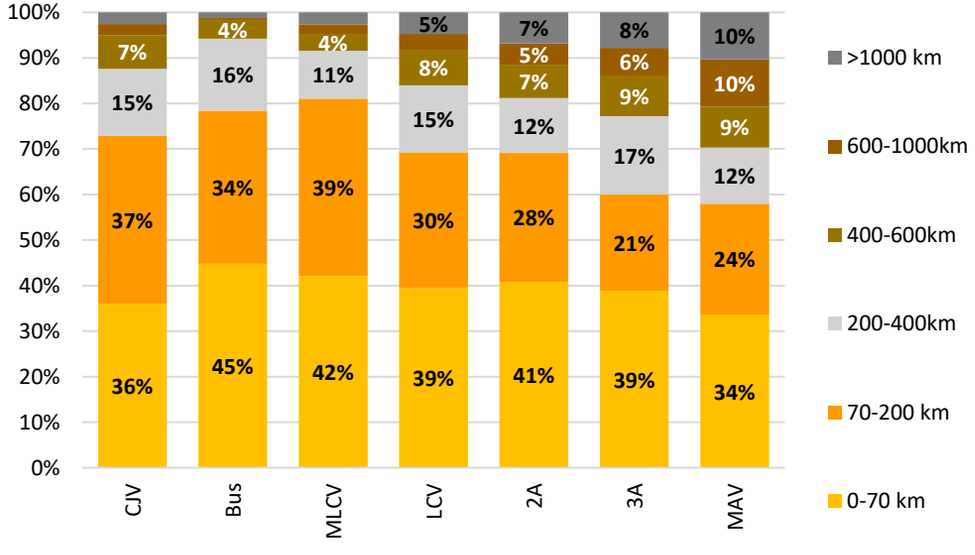
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance



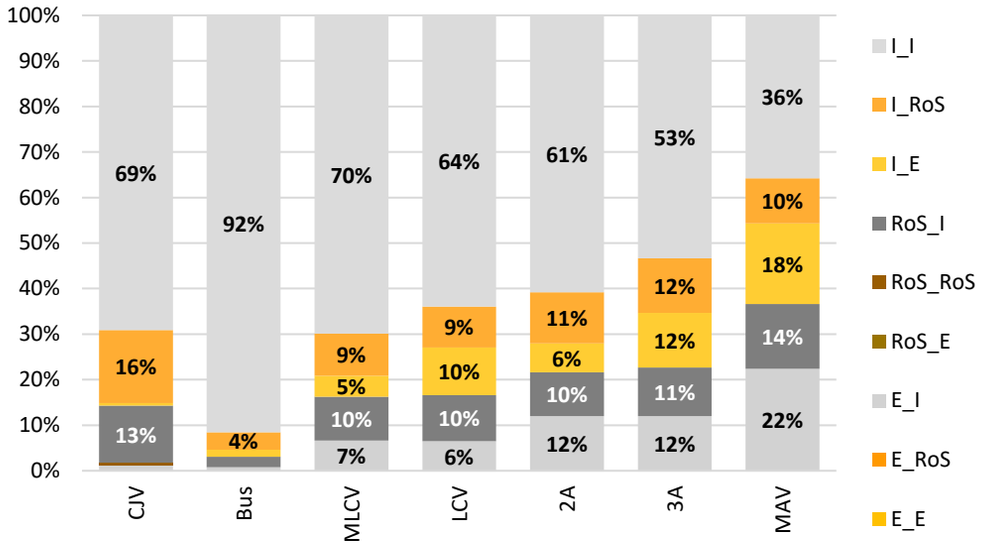

| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 204 |
| Bus | 459 |
| Mini LCV | 182 |
| LCV | 261 |
| 2A | 271 |
| 3A | 340 |
| MAV | 398 |

Source: TIC analysis

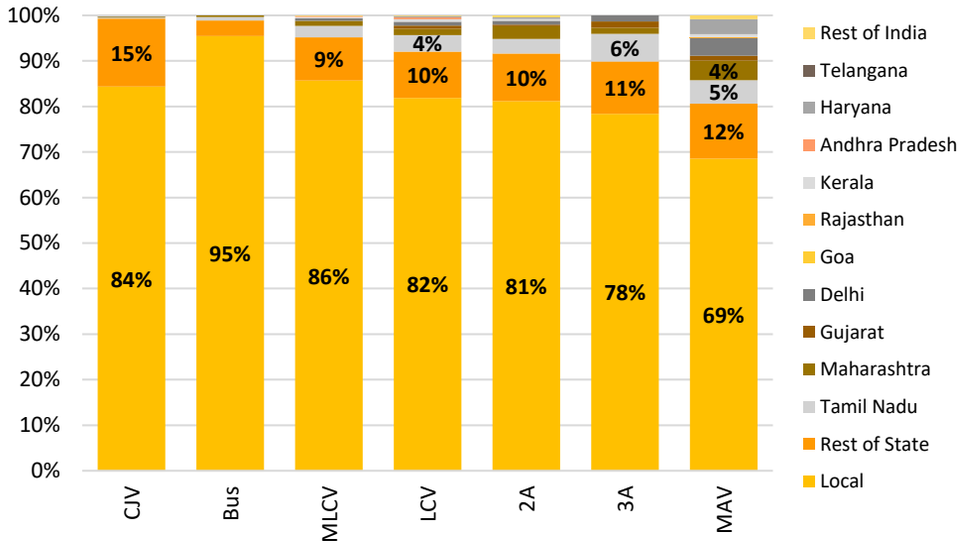
# Zonal influences and trip distances (4): Bharathipura and Honnenahalli – Sompura Junction

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

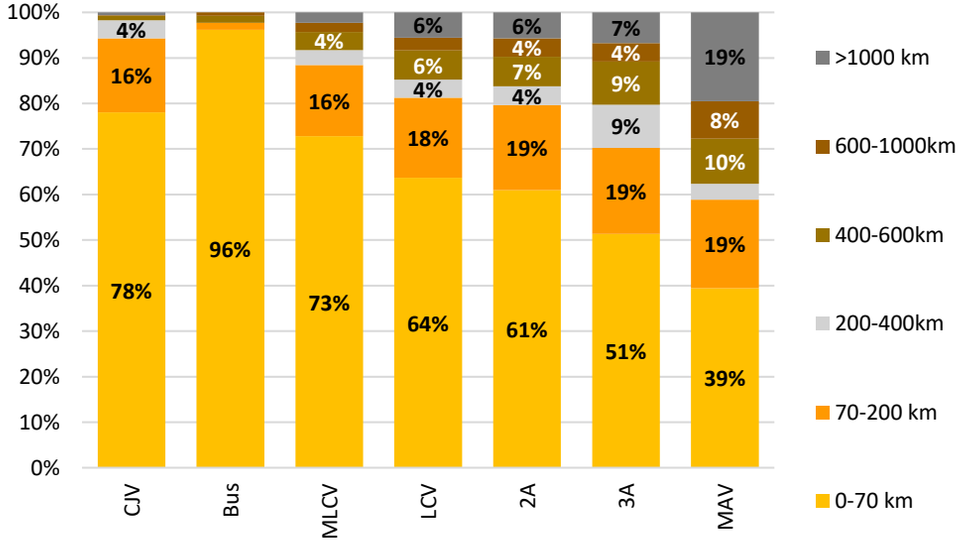
### Vehicle category-wise zone characteristics




### Vehicle category-wise project influence region




### Vehicle category-wise trip lengths and average distance




| Vehicle Category | Distance (in km) |
|---|---|
| CJV | 64 |
| Bus | 111 |
| Mini LCV | 70 |
| LCV | 125 |
| 2A | 234 |
| 3A | 228 |
| MAV | 518 |

Source: TIC analysis

## Appendix C:

- Detailed traffic and revenue forecast – most likely scenario without overloading

# Kulumepalya TP: Traffic and revenue forecast

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**Traffic forecast (AADT)**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 26,217 | 3,990 | 4,752 | 3,850 | 3,664 | 1,874 | 4,964 | **49,312** | **87,839** |
| **FY27** | 28,100 | 4,237 | 4,935 | 3,986 | 3,898 | 1,887 | 5,308 | **52,351** | **92,939** |

**Traffic AADT growth rate**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 7.2% | 6.2% | 3.9% | 3.5% | 6.4% | 0.7% | 6.9% | **6.2%** | **5.8%** |

**Revenue forecast (INR Crore)**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY27** | - | - | - | - | - | - | - | **89.9** |

Source: TIC estimate

# Chokkenahalli TP: Traffic and revenue forecast

TRANSLINK® Infrastructure Consultants Pvt Ltd *Smart Consulting*

**Traffic forecast (AADT)**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 20,078 | 2,966 | 3,811 | 3,610 | 3,642 | 1,859 | 5,412 | **41,378** | **80,448** |
| **FY27** | 21,449 | 3,123 | 4,023 | 3,737 | 3,879 | 1,874 | 5,768 | **43,853** | **85,035** |
| **FY28** | 22,947 | 3,286 | 4,246 | 3,868 | 4,126 | 1,908 | 6,145 | **46,526** | **89,960** |
| **FY29** | 24,706 | 3,458 | 4,482 | 3,989 | 4,389 | 1,943 | 6,547 | **49,515** | **95,316** |

**Traffic AADT growth rate**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 6.8% | 5.3% | 5.6% | 3.5% | 6.5% | 0.8% | 6.6% | **6.0%** | **5.7%** |
| **FY28** | 7.0% | 5.2% | 5.5% | 3.5% | 6.4% | 1.8% | 6.5% | **6.1%** | **5.8%** |
| **FY29** | 7.7% | 5.2% | 5.6% | 3.1% | 6.4% | 1.8% | 6.5% | **6.4%** | **6.0%** |

**Revenue forecast (INR Crore)**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **101.7** |
| **FY28** | 22.3 | 3.3 | 7.9 | 14.9 | 18.3 | 9.1 | 44.7 | **120.5** |
| **H1 FY29** | 12.0 | 1.7 | 4.4 | 7.8 | 9.8 | 4.8 | 24.8 | **65.4** |

Source: TIC estimate

# Halenijagal TP (1): Traffic forecast (AADT)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 24,551 | 4,609 | 4,221 | 3,709 | 4,217 | 1,920 | 5,353 | **48,579** | **89,116** |
| **FY27** | 26,227 | 4,876 | 4,455 | 3,839 | 4,491 | 1,933 | 5,678 | **51,500** | **94,128** |
| **FY28 H1** | 28,060 | 5,157 | 4,701 | 3,973 | 4,777 | 1,962 | 6,018 | **54,648** | **99,485** |
| **FY28 H2** | 28,060 | 5,157 | 4,701 | 3,973 | 4,777 | 1,962 | 6,018 | **54,648** | **99,485** |
| **FY29 H1** | 29,513 | 5,309 | 4,548 | 4,098 | 4,601 | 1,680 | 5,180 | **54,929** | **96,090** |
| **FY29 H2** | 22,264 | 4,080 | 3,236 | 3,825 | 3,098 | 1,201 | 3,452 | **41,155** | **71,101** |
| **FY30** | 23,042 | 4,185 | 2,977 | 3,956 | 2,784 | 905 | 2,403 | **40,252** | **65,440** |
| **FY31** | 24,045 | 4,364 | 3,062 | 4,080 | 2,831 | 858 | 2,341 | **41,582** | **66,845** |
| **FY32** | 23,475 | 4,548 | 3,145 | 4,127 | 2,872 | 800 | 2,262 | **41,229** | **66,316** |
| **FY33** | 22,766 | 4,759 | 3,291 | 4,118 | 3,002 | 797 | 2,321 | **41,054** | **66,657** |
| **FY34** | 24,165 | 5,000 | 3,451 | 4,245 | 3,175 | 809 | 2,455 | **43,300** | **70,076** |
| **FY35** | 25,779 | 5,228 | 3,618 | 4,374 | 3,356 | 822 | 2,595 | **45,771** | **73,765** |
| **FY36** | 27,260 | 5,453 | 3,783 | 4,499 | 3,538 | 833 | 2,735 | **48,102** | **77,307** |
| **FY37** | 27,938 | 5,545 | 3,953 | 4,556 | 3,726 | 835 | 2,808 | **49,361** | **79,400** |
| **FY38** | 28,401 | 5,621 | 4,126 | 4,607 | 3,919 | 839 | 2,867 | **50,381** | **81,210** |
| **FY39** | 28,706 | 5,666 | 4,302 | 4,644 | 4,118 | 843 | 2,911 | **51,190** | **82,740** |
| **FY40** | 28,858 | 5,689 | 4,483 | 4,668 | 4,323 | 845 | 2,941 | **51,808** | **84,016** |
| **FY41** | 28,933 | 5,700 | 4,669 | 4,681 | 4,536 | 846 | 2,956 | **52,321** | **85,126** |

Source: TIC estimate

# Halenijagal TP (2): Traffic AADT growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 6.8% | 5.8% | 5.5% | 3.5% | 6.5% | 0.7% | 6.1% | **6.0%** | **5.6%** |
| **FY28 H1** | 7.0% | 5.8% | 5.5% | 3.5% | 6.4% | 1.5% | 6.0% | **6.1%** | **5.7%** |
| **FY28 H2** | 7.0% | 5.8% | 5.5% | 3.5% | 6.4% | 1.5% | 6.0% | **6.1%** | **5.7%** |
| **FY29 H1** | 5.2% | 2.9% | (3.2%) | 3.1% | (3.7%) | (14.3%) | (14.0%) | **0.5%** | **(3.4%)** |
| **FY29 H2** | (24.6%) | (23.2%) | (28.8%) | (6.7%) | (32.7%) | (28.5%) | (33.4%) | **(24.7%)** | **(28.5%)** |
| **FY30** | (21.9%) | (21.2%) | (34.5%) | (3.5%) | (39.5%) | (46.1%) | (53.7%) | **(26.7%)** | **(31.9%)** |
| **FY31** | 4.4% | 4.3% | 2.8% | 3.1% | 1.7% | (5.2%) | (2.6%) | **3.3%** | **2.1%** |
| **FY32** | (2.4%) | 4.2% | 2.7% | 1.1% | 1.4% | (6.8%) | (3.4%) | **(0.8%)** | **(0.8%)** |
| **FY33** | (3.0%) | 4.6% | 4.6% | (0.2%) | 4.5% | (0.4%) | 2.6% | **(0.4%)** | **0.5%** |
| **FY34** | 6.1% | 5.1% | 4.9% | 3.1% | 5.8% | 1.5% | 5.8% | **5.5%** | **5.1%** |
| **FY35** | 6.7% | 4.6% | 4.8% | 3.0% | 5.7% | 1.5% | 5.7% | **5.7%** | **5.3%** |
| **FY36** | 5.7% | 4.3% | 4.6% | 2.9% | 5.4% | 1.4% | 5.4% | **5.1%** | **4.8%** |
| **FY37** | 2.5% | 1.7% | 4.5% | 1.3% | 5.3% | 0.2% | 2.7% | **2.6%** | **2.7%** |
| **FY38** | 1.7% | 1.4% | 4.4% | 1.1% | 5.2% | 0.6% | 2.1% | **2.1%** | **2.3%** |
| **FY39** | 1.1% | 0.8% | 4.3% | 0.8% | 5.1% | 0.4% | 1.5% | **1.6%** | **1.9%** |
| **FY40** | 0.5% | 0.4% | 4.2% | 0.5% | 5.0% | 0.3% | 1.0% | **1.2%** | **1.5%** |
| **FY41** | 0.3% | 0.2% | 4.1% | 0.3% | 4.9% | 0.1% | 0.5% | **1.0%** | **1.3%** |

Source: TIC estimate

# Halenijagal TP (3): Revenue forecast (INR Crore)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 28.4 | 5.4 | 9.3 | 15.4 | 21.8 | 9.7 | 45.6 | **135.6** |
| **FY29** | 38.9 | 7.3 | 10.9 | 23.4 | 25.0 | 10.3 | 46.5 | **162.3** |
| **FY30** | 50.2 | 9.4 | 12.2 | 32.5 | 26.3 | 9.4 | 38.1 | **178.1** |
| **FY31** | 53.4 | 10.0 | 13.0 | 34.6 | 27.7 | 9.3 | 38.7 | **186.6** |
| **FY32** | 54.6 | 10.9 | 13.8 | 36.6 | 29.5 | 9.0 | 38.6 | **193.1** |
| **FY33** | 55.1 | 11.9 | 14.9 | 37.9 | 31.8 | 9.3 | 41.1 | **202.0** |
| **FY34** | 60.9 | 13.0 | 16.2 | 40.3 | 35.0 | 9.8 | 45.1 | **220.4** |
| **FY35** | 66.1 | 13.9 | 17.9 | 43.1 | 38.1 | 10.3 | 49.5 | **238.8** |
| **FY36** | 72.8 | 15.1 | 19.3 | 46.5 | 42.0 | 10.9 | 54.6 | **261.2** |
| **FY37** | 78.4 | 16.1 | 20.8 | 48.6 | 45.8 | 11.3 | 57.8 | **278.8** |
| **FY38** | 82.5 | 16.9 | 22.7 | 50.9 | 50.0 | 11.8 | 61.4 | **296.2** |
| **FY39** | 86.3 | 17.6 | 24.4 | 53.4 | 54.6 | 12.3 | 64.8 | **313.3** |
| **FY40** | 91.1 | 18.6 | 26.6 | 55.9 | 59.5 | 12.8 | 68.1 | **332.6** |
| **FY41** | 94.0 | 19.1 | 28.5 | 58.0 | 64.5 | 13.3 | 70.8 | **348.3** |

Source: TIC estimate

# Halenijagal TP (4): Revenue growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | - | - | - | - | - | - | - | **-** |
| **FY29** | 37.0% | 35.5% | 16.2% | 52.5% | 14.9% | 6.2% | 2.0% | **19.7%** |
| **FY30** | 29.1% | 28.9% | 12.1% | 38.7% | 5.4% | (8.9%) | (18.1%) | **9.7%** |
| **FY31** | 6.3% | 6.3% | 6.9% | 6.6% | 5.1% | (0.9%) | 1.5% | **4.8%** |
| **FY32** | 2.3% | 9.2% | 6.0% | 5.9% | 6.5% | (3.6%) | (0.0%) | **3.5%** |
| **FY33** | 0.9% | 8.9% | 8.2% | 3.5% | 7.7% | 3.5% | 6.4% | **4.6%** |
| **FY34** | 10.6% | 9.4% | 8.6% | 6.4% | 10.2% | 5.6% | 9.8% | **9.1%** |
| **FY35** | 8.4% | 6.3% | 10.3% | 6.8% | 8.9% | 5.4% | 9.6% | **8.3%** |
| **FY36** | 10.2% | 8.7% | 8.3% | 7.9% | 10.2% | 5.7% | 10.3% | **9.4%** |
| **FY37** | 7.6% | 6.8% | 7.5% | 4.6% | 9.1% | 3.5% | 5.9% | **6.7%** |
| **FY38** | 5.3% | 5.0% | 9.2% | 4.6% | 9.2% | 4.2% | 6.2% | **6.2%** |
| **FY39** | 4.6% | 4.3% | 7.3% | 4.9% | 9.0% | 4.8% | 5.5% | **5.8%** |
| **FY40** | 5.5% | 5.4% | 9.0% | 4.7% | 9.1% | 4.0% | 5.2% | **6.2%** |
| **FY41** | 3.2% | 3.1% | 7.4% | 3.7% | 8.3% | 3.9% | 3.9% | **4.7%** |

Source: TIC estimate

# Bhartipura & Honnenahalli TP (1): Traffic forecast (AADT)

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Bhartipura & Honnenahalli TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 7,933 | 1,956 | 1,552 | 630 | 1,137 | 779 | 1,123 | **15,110** | **24,909** |
| **FY27** | 8,324 | 2,024 | 1,591 | 637 | 1,178 | 784 | 1,144 | **15,682** | **25,678** |
| **FY28 H1** | 8,731 | 2,095 | 1,631 | 643 | 1,219 | 792 | 1,167 | **16,278** | **26,485** |
| **FY28 H2** | 8,731 | 2,095 | 1,631 | 643 | 1,219 | 792 | 1,167 | **16,278** | **26,485** |
| **FY29 H1** | 8,799 | 2,168 | 1,671 | 650 | 1,194 | 769 | 1,096 | **16,346** | **26,241** |
| **FY29 H2** | 8,799 | 2,168 | 1,671 | 650 | 1,194 | 769 | 1,096 | **16,346** | **26,241** |
| **FY30** | 8,801 | 2,242 | 1,712 | 656 | 1,165 | 745 | 1,022 | **16,344** | **25,909** |
| **FY31** | 9,075 | 2,313 | 1,750 | 662 | 1,182 | 744 | 1,028 | **16,755** | **26,404** |
| **FY32** | 8,884 | 2,385 | 1,789 | 657 | 1,199 | 740 | 1,033 | **16,686** | **26,386** |
| **FY33** | 8,637 | 2,458 | 1,829 | 644 | 1,236 | 747 | 1,055 | **16,606** | **26,467** |
| **FY34** | 9,009 | 2,534 | 1,869 | 650 | 1,274 | 754 | 1,078 | **17,167** | **27,231** |
| **FY35** | 9,430 | 2,611 | 1,909 | 656 | 1,313 | 761 | 1,101 | **17,781** | **28,048** |
| **FY36** | 9,809 | 2,686 | 1,948 | 662 | 1,351 | 767 | 1,123 | **18,346** | **28,812** |
| **FY37** | 10,236 | 2,762 | 1,987 | 667 | 1,389 | 770 | 1,146 | **18,957** | **29,613** |
| **FY38** | 10,632 | 2,838 | 2,027 | 672 | 1,428 | 777 | 1,168 | **19,541** | **30,395** |
| **FY39** | 11,031 | 2,914 | 2,065 | 678 | 1,466 | 783 | 1,190 | **20,128** | **31,179** |
| **FY40** | 11,440 | 2,991 | 2,104 | 683 | 1,505 | 789 | 1,212 | **20,725** | **31,975** |
| **FY41** | 11,900 | 3,069 | 2,143 | 688 | 1,544 | 796 | 1,235 | **21,374** | **32,822** |

Source: TIC estimate

# Bhartipura & Honnenahalli TP (2): Traffic AADT growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Bhartipura & Honnenahalli TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 4.9% | 3.5% | 2.5% | 1.1% | 3.5% | 0.5% | 1.9% | **3.8%** | **3.1%** |
| **FY28 H1** | 4.9% | 3.5% | 2.5% | 1.0% | 3.5% | 1.1% | 2.0% | **3.8%** | **3.2%** |
| **FY28 H2** | 4.9% | 3.5% | 2.5% | 1.0% | 3.5% | 1.1% | 2.0% | **3.8%** | **3.2%** |
| **FY29 H1** | 0.8% | 3.5% | 2.5% | 0.9% | (2.1%) | (2.9%) | (6.1%) | **0.4%** | **(0.9%)** |
| **FY29 H2** | 0.8% | 3.5% | 2.5% | 0.9% | (2.1%) | (2.9%) | (6.1%) | **0.4%** | **(0.9%)** |
| **FY30** | 0.0% | 3.4% | 2.4% | 1.0% | (2.4%) | (3.1%) | (6.7%) | **0.0%** | **(1.2%)** |
| **FY31** | 3.1% | 3.1% | 2.2% | 0.9% | 1.5% | (0.1%) | 0.5% | **2.5%** | **1.9%** |
| **FY32** | (2.1%) | 3.1% | 2.2% | (0.9%) | 1.4% | (0.6%) | 0.5% | **(0.4%)** | **(0.1%)** |
| **FY33** | (2.8%) | 3.1% | 2.2% | (1.9%) | 3.1% | 0.9% | 2.2% | **(0.5%)** | **0.3%** |
| **FY34** | 4.3% | 3.1% | 2.2% | 0.9% | 3.1% | 0.9% | 2.2% | **3.4%** | **2.9%** |
| **FY35** | 4.7% | 3.0% | 2.2% | 0.9% | 3.0% | 0.9% | 2.1% | **3.6%** | **3.0%** |
| **FY36** | 4.0% | 2.9% | 2.0% | 0.9% | 2.9% | 0.9% | 2.0% | **3.2%** | **2.7%** |
| **FY37** | 4.3% | 2.8% | 2.0% | 0.8% | 2.8% | 0.4% | 2.0% | **3.3%** | **2.8%** |
| **FY38** | 3.9% | 2.8% | 2.0% | 0.8% | 2.8% | 0.8% | 1.9% | **3.1%** | **2.7%** |
| **FY39** | 3.8% | 2.7% | 1.9% | 0.8% | 2.7% | 0.8% | 1.9% | **3.0%** | **2.6%** |
| **FY40** | 3.7% | 2.6% | 1.9% | 0.8% | 2.7% | 0.8% | 1.9% | **3.0%** | **2.6%** |
| **FY41** | 4.0% | 2.6% | 1.9% | 0.7% | 2.6% | 0.8% | 1.8% | **3.1%** | **2.7%** |

Source: TIC estimate

# Bhartipura & Honnenahalli TP (3): Revenue forecast (INR Crore)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Bhartipura & Honnenahalli TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | 8.7 | 1.8 | 2.7 | 2.1 | 4.6 | 3.2 | 7.1 | **30.3** |
| **FY29** | 8.7 | 1.9 | 3.0 | 2.1 | 4.7 | 3.2 | 7.0 | **30.7** |
| **FY30** | 9.6 | 2.1 | 3.1 | 2.2 | 4.7 | 3.3 | 6.7 | **31.7** |
| **FY31** | 10.1 | 2.2 | 3.4 | 2.4 | 5.0 | 3.4 | 7.1 | **33.6** |
| **FY32** | 10.0 | 2.3 | 3.6 | 2.4 | 5.2 | 3.5 | 7.3 | **34.3** |
| **FY33** | 9.9 | 2.5 | 3.9 | 2.5 | 5.6 | 3.6 | 7.8 | **35.8** |
| **FY34** | 11.2 | 2.7 | 3.9 | 2.6 | 6.0 | 3.8 | 8.3 | **38.6** |
| **FY35** | 12.0 | 2.9 | 4.3 | 2.7 | 6.4 | 4.0 | 8.7 | **41.0** |
| **FY36** | 12.5 | 3.0 | 4.5 | 2.8 | 6.8 | 4.2 | 9.3 | **43.1** |
| **FY37** | 14.3 | 3.3 | 4.8 | 3.0 | 7.2 | 4.3 | 9.8 | **46.7** |
| **FY38** | 14.9 | 3.4 | 5.0 | 3.1 | 7.8 | 4.6 | 10.4 | **49.2** |
| **FY39** | 16.8 | 3.8 | 5.3 | 3.3 | 8.3 | 4.8 | 11.0 | **53.2** |
| **FY40** | 17.8 | 4.1 | 5.7 | 3.4 | 8.8 | 5.1 | 11.6 | **56.4** |
| **FY41** | 18.5 | 4.2 | 5.9 | 3.6 | 9.4 | 5.2 | 12.4 | **59.1** |

Source: TIC estimate

# Bhartipura & Honnenahalli TP (4): Revenue growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Bhartipura & Honnenahalli TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | - | - | - | - | - | - | - | **-** |
| **FY29** | 0.8% | 3.2% | 9.8% | 3.8% | 1.2% | 0.1% | (1.7%) | **1.4%** |
| **FY30** | 10.0% | 8.7% | 2.4% | 4.1% | 1.0% | 0.9% | (4.1%) | **3.2%** |
| **FY31** | 5.5% | 8.9% | 9.3% | 5.9% | 5.9% | 3.8% | 5.6% | **6.0%** |
| **FY32** | (1.6%) | 3.4% | 5.2% | 2.2% | 5.0% | 2.7% | 3.4% | **2.1%** |
| **FY33** | (0.8%) | 8.2% | 8.3% | 2.3% | 7.0% | 4.4% | 6.2% | **4.2%** |
| **FY34** | 13.3% | 7.6% | 2.2% | 5.4% | 7.1% | 4.5% | 6.7% | **7.9%** |
| **FY35** | 6.9% | 7.9% | 8.2% | 3.5% | 6.0% | 6.5% | 4.9% | **6.3%** |
| **FY36** | 4.5% | 3.2% | 4.7% | 5.3% | 6.9% | 3.8% | 6.2% | **5.2%** |
| **FY37** | 14.1% | 11.3% | 7.3% | 4.5% | 6.2% | 3.3% | 5.8% | **8.5%** |
| **FY38** | 4.1% | 2.8% | 4.1% | 5.1% | 8.2% | 6.4% | 5.9% | **5.3%** |
| **FY39** | 12.9% | 10.8% | 7.1% | 4.5% | 6.0% | 3.8% | 5.7% | **8.1%** |
| **FY40** | 5.8% | 6.9% | 7.1% | 4.7% | 6.2% | 5.7% | 6.1% | **6.0%** |
| **FY41** | 4.0% | 2.3% | 3.5% | 4.3% | 7.1% | 3.2% | 6.4% | **4.7%** |

Source: TIC estimate

# Dobbaspet & Halenijagal TP (1): Traffic forecast (AADT)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Dobbaspet & Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | 4,936 | 822 | 842 | 214 | 1,174 | 437 | 1,396 | **9,820** | **18,777** |
| **FY27** | 5,155 | 851 | 883 | 216 | 1,239 | 439 | 1,463 | **10,245** | **19,595** |
| **FY28 H1** | 5,389 | 880 | 926 | 219 | 1,307 | 444 | 1,537 | **10,702** | **20,484** |
| **FY28 H2** | 5,389 | 880 | 926 | 219 | 1,307 | 444 | 1,537 | **10,702** | **20,484** |
| **FY29 H1** | 6,287 | 911 | 1,172 | 221 | 1,863 | 760 | 2,785 | **13,998** | **30,019** |
| **FY29 H2** | 6,287 | 911 | 1,172 | 221 | 1,863 | 760 | 2,785 | **13,998** | **30,019** |
| **FY30** | 7,224 | 942 | 1,438 | 223 | 2,473 | 1,083 | 4,164 | **17,548** | **40,398** |
| **FY31** | 8,118 | 972 | 1,534 | 225 | 2,639 | 1,121 | 4,422 | **19,030** | **43,243** |
| **FY32** | 8,952 | 1,002 | 1,634 | 226 | 2,813 | 1,152 | 4,692 | **20,471** | **46,093** |
| **FY33** | 9,215 | 1,033 | 1,704 | 226 | 2,940 | 1,160 | 4,891 | **21,169** | **47,792** |
| **FY34** | 9,583 | 1,065 | 1,777 | 228 | 3,084 | 1,170 | 5,115 | **22,022** | **49,777** |
| **FY35** | 9,999 | 1,097 | 1,853 | 230 | 3,233 | 1,181 | 5,346 | **22,939** | **51,864** |
| **FY36** | 10,373 | 1,129 | 1,927 | 232 | 3,382 | 1,191 | 5,575 | **23,808** | **53,893** |
| **FY37** | 10,792 | 1,160 | 2,007 | 234 | 3,545 | 1,193 | 5,826 | **24,758** | **56,098** |
| **FY38** | 10,919 | 1,170 | 2,040 | 235 | 3,612 | 1,194 | 5,930 | **25,100** | **56,955** |
| **FY39** | 11,003 | 1,176 | 2,064 | 236 | 3,661 | 1,195 | 6,006 | **25,342** | **57,579** |
| **FY40** | 11,045 | 1,179 | 2,080 | 236 | 3,695 | 1,196 | 6,057 | **25,488** | **57,980** |
| **FY41** | 11,066 | 1,181 | 2,088 | 236 | 3,711 | 1,196 | 6,083 | **25,560** | **58,179** |

Source: TIC estimate

# Dobbaspet & Halenijagal TP (2): Traffic AADT growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd
Smart Consulting

**Dobbaspet & Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | AADT | PCU |
|---|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** | **-** |
| **FY27** | 4.4% | 3.5% | 4.9% | 1.1% | 5.5% | 0.4% | 4.8% | **4.4%** | **4.4%** |
| **FY28 H1** | 4.5% | 3.5% | 4.9% | 1.0% | 5.5% | 1.0% | 5.1% | **4.5%** | **4.6%** |
| **FY28 H2** | 4.5% | 3.5% | 4.9% | 1.0% | 5.5% | 1.0% | 5.1% | **4.5%** | **4.6%** |
| **FY29 H1** | 16.7% | 3.5% | 26.6% | 1.0% | 42.5% | 71.4% | 81.2% | **31.1%** | **47.3%** |
| **FY29 H2** | 16.7% | 3.5% | 26.6% | 1.0% | 42.5% | 71.4% | 81.2% | **31.1%** | **47.3%** |
| **FY30** | 14.9% | 3.4% | 22.7% | 1.0% | 32.8% | 42.5% | 49.5% | **25.6%** | **35.0%** |
| **FY31** | 12.4% | 3.1% | 6.6% | 0.9% | 6.7% | 3.5% | 6.2% | **8.5%** | **7.1%** |
| **FY32** | 10.3% | 3.1% | 6.5% | 0.3% | 6.6% | 2.7% | 6.1% | **7.7%** | **6.6%** |
| **FY33** | 2.9% | 3.1% | 4.3% | 0.0% | 4.5% | 0.7% | 4.2% | **3.4%** | **3.7%** |
| **FY34** | 4.0% | 3.1% | 4.3% | 0.9% | 4.9% | 0.9% | 4.6% | **4.1%** | **4.2%** |
| **FY35** | 4.3% | 3.0% | 4.2% | 0.9% | 4.8% | 0.9% | 4.5% | **4.2%** | **4.2%** |
| **FY36** | 3.7% | 2.9% | 4.0% | 0.9% | 4.6% | 0.9% | 4.3% | **3.8%** | **3.9%** |
| **FY37** | 4.0% | 2.8% | 4.1% | 0.8% | 4.8% | 0.2% | 4.5% | **4.0%** | **4.1%** |
| **FY38** | 1.2% | 0.8% | 1.6% | 0.3% | 1.9% | 0.1% | 1.8% | **1.4%** | **1.5%** |
| **FY39** | 0.8% | 0.5% | 1.2% | 0.2% | 1.4% | 0.1% | 1.3% | **1.0%** | **1.1%** |
| **FY40** | 0.4% | 0.3% | 0.8% | 0.2% | 0.9% | 0.0% | 0.8% | **0.6%** | **0.7%** |
| **FY41** | 0.2% | 0.1% | 0.4% | 0.1% | 0.4% | 0.0% | 0.4% | **0.3%** | **0.3%** |

Source: TIC estimate

# Dobbaspet & Halenijagal TP (3): Revenue forecast (INR Crore)

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Dobbaspet & Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | - | - | - | - | - | - | - | **-** |
| **FY29** | 3.6 | 0.5 | 1.2 | 0.5 | 4.5 | 2.0 | 11.4 | **23.8** |
| **FY30** | 8.3 | 1.1 | 3.1 | 1.0 | 12.5 | 6.1 | 35.6 | **67.5** |
| **FY31** | 9.9 | 1.2 | 3.5 | 1.0 | 13.9 | 6.5 | 39.3 | **75.2** |
| **FY32** | 11.2 | 1.3 | 3.8 | 1.1 | 15.4 | 6.9 | 43.4 | **82.9** |
| **FY33** | 11.8 | 1.4 | 4.1 | 1.1 | 16.8 | 7.2 | 46.8 | **89.3** |
| **FY34** | 12.8 | 1.5 | 4.5 | 1.2 | 18.2 | 7.6 | 51.0 | **96.7** |
| **FY35** | 13.8 | 1.6 | 4.9 | 1.2 | 19.8 | 7.8 | 55.2 | **104.3** |
| **FY36** | 15.1 | 1.7 | 5.3 | 1.3 | 21.6 | 8.3 | 60.0 | **113.3** |
| **FY37** | 16.3 | 1.8 | 5.7 | 1.3 | 23.4 | 8.7 | 64.6 | **121.8** |
| **FY38** | 17.2 | 1.9 | 5.9 | 1.4 | 24.5 | 9.0 | 68.2 | **128.2** |
| **FY39** | 17.6 | 1.9 | 6.3 | 1.4 | 25.9 | 9.3 | 72.1 | **134.6** |
| **FY40** | 18.6 | 2.0 | 6.6 | 1.5 | 27.4 | 9.7 | 75.1 | **141.0** |
| **FY41** | 19.0 | 2.1 | 6.9 | 1.6 | 28.3 | 10.0 | 78.2 | **146.1** |

Source: TIC estimate

# Dobbaspet & Halenijagal TP (4): Revenue growth rates

TRANSLINK® Infrastructure Consultants Pvt Ltd Smart Consulting

**Dobbaspet & Halenijagal TP**

| Financial Year | CJV | Mini LCV | LCV | Bus | 2A Truck | 3A Truck | MAV/OSV | Total |
|---|---|---|---|---|---|---|---|---|
| **FY26** | - | - | - | - | - | - | - | **-** |
| **FY27** | - | - | - | - | - | - | - | **-** |
| **FY28** | - | - | - | - | - | - | - | **-** |
| **FY29** | - | - | - | - | - | - | - | **-** |
| **FY30** | 130.5% | 107.4% | 148.4% | 111.0% | 175.4% | 197.8% | 212.1% | **184.0%** |
| **FY31** | 19.4% | 9.4% | 12.7% | 5.2% | 11.5% | 6.7% | 10.3% | **11.3%** |
| **FY32** | 13.2% | 6.2% | 10.6% | 4.5% | 10.3% | 6.2% | 10.4% | **10.3%** |
| **FY33** | 6.0% | 6.2% | 7.7% | 3.0% | 9.7% | 5.4% | 7.8% | **7.6%** |
| **FY34** | 8.2% | 6.8% | 9.5% | 4.5% | 8.0% | 4.6% | 9.1% | **8.3%** |
| **FY35** | 8.1% | 7.3% | 7.5% | 4.6% | 8.9% | 3.7% | 8.1% | **7.8%** |
| **FY36** | 9.4% | 8.3% | 9.2% | 5.4% | 9.0% | 5.8% | 8.8% | **8.7%** |
| **FY37** | 7.3% | 6.2% | 7.0% | 4.7% | 8.5% | 4.4% | 7.6% | **7.4%** |
| **FY38** | 6.0% | 5.4% | 4.5% | 4.0% | 4.6% | 3.3% | 5.7% | **5.3%** |
| **FY39** | 2.0% | 2.0% | 6.1% | 3.6% | 5.8% | 4.3% | 5.7% | **5.1%** |
| **FY40** | 5.8% | 5.5% | 5.1% | 4.2% | 5.5% | 4.3% | 4.1% | **4.7%** |
| **FY41** | 2.3% | 2.3% | 4.0% | 3.9% | 3.6% | 2.8% | 4.1% | **3.7%** |

Source: TIC estimate

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