

May 15, 2023

| | |
|--|---|
| Corporate Relationship Department, BSE Ltd P.J. Towers, 1 st Floor, Dalal Street, Mumbai - 400 023 | National Stock Exchange of India Limited Exchange Plaza Bandra – Kurla Complex, Bandra (East) Mumbai – 400 051 |
|--|---|

Dear Sir/ Madam,

Re - Scrip Code : 540526; Symbol : IRBINVIT

Sub – Valuation Report & Toll Revenue and O & M Cost Projection Report for the financial year ended March 31, 2023

We are enclosing herewith the Valuation Report dated May 8, 2023, as issued by the Valuer, i.e. Mr. S Sundararaman (IBBI Registration Number - IBBI/RV/06/2018/10238) for the financial year ended March 31, 2023.

We are also enclosing herewith the Toll Revenue and O & M Cost Projection Report issued by M/s GMD Consultants, Technical Consultant, for each Project SPV.

The Net Asset Value pursuant to Regulation 10 of SEBI (Infrastructure Investment Trusts) Regulations, 2014 based on the Valuation Report issued by the Valuer is as follows:

Statement of Net Assets at Fair Value as at March 31, 2023

| Particulars | Amount in lakhs |
|-------------------------------------|------------------------|
| A. Assets | 14,83,021.44 |
| B. Liabilities | 9,00,234.95 |
| C. Net Assets | 5,82,786.49 |
| Outstanding units (in lakhs) | 5,805.00 |
| NAV at Fair Value (Per Unit) | 100.39 |

Further, the Trust has engaged DHC International Private Limited (Formerly known as Baker Tilly DHC Business Private Limited) to serve as an independent advisor to provide a review opinion on the Valuation Report of the Assets of the Trust prepared by Mr. S Sundararaman. We are enclosing herewith the review opinion by DHC International Private Limited.

You are requested to take note of the same.

For IRB Infrastructure Private Limited
(Investment Manager to IRB InvIT Fund)

Vinod Kumar Menon

Whole time Director & CEO

Encl.: As above

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Prepared for:
IRB InvIT Fund ("the Trust")

IRB Infrastructure Private Limited ("the Investment Manager")

Valuation as per SEBI (Infrastructure Investment Trusts) Regulations, 2014 as amended

Fair Enterprise Valuation:

Valuation Date: 31st March 2023

Mr. S Sundararaman
Registered Valuer,
IBBI Registration No – IBBI/RV/06/2018/10238

S. SUNDARARAMAN

Registered Valuer

Registration No – IBBI/RV/06/2018/10238

RV/SSR/R/2024/06

Date: 08th May 2023

The Board of Directors

IRB Infrastructure Private Limited

3rd Floor, IRB Complex,
Chandivali Farm, Chandivali Village,
Andheri (E), Mumbai - 400 072,
Maharashtra, India.

The Board of Directors

IRB InvIT Fund

(IDBI Trusteeship Services Limited acting on behalf of the Trust)

IRB Complex,
Chandivali Farm, Chandivali Village,
Andheri (E), Mumbai - 400 072,
Maharashtra, India.

Sub: Financial Valuation as per SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended ("the SEBI InvIT Regulations")

Dear Sirs/Madams,

I, Mr. S. Sundararaman ("**Registered Valuer**" or "**RV**" or "**I**" or "**My**" or "**Me**") bearing IBBI registration number IBBI/RV/06/2018/10238, have been appointed vide letter dated 18th July 2022 as an independent valuer, as defined under the SEBI InvIT Regulations, by **IRB Infrastructure Private Limited** ("**the Investment Manager**" or "**IRBIM**"), acting as the investment manager for **IRB InvIT Fund** ("**the Trust**" or "**InvIT**"), and IDBI Trusteeship Services Limited ("**the Trustee**") acting as the trustee for the Trust, for the purpose of the financial valuation of the special purpose vehicles (defined hereinafter below) as per the requirements of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, as amended ("**SEBI InvIT Regulations**").

The Trust operates and maintains following special purpose vehicles (together referred to as "**SPVs**"):

| Sr. No. | Name of the SPV |
|---------|--|
| 1 | MVR Infrastructure & Tollways Limited ("MVR") |
| 2 | IRB Pathankot Amritsar Toll Road Limited ("IRBPA") |
| 3 | IRB Talegaon Amravati Tollway Limited ("IRBTA") |
| 4 | IRB Tumkur Chitradurga Tollway Limited ("IRBTC") |
| 5 | IRB Jaipur Deoli Tollway Limited ("IRBJD") |
| 6 | VK1 Expressway Limited ("VEL") |

The SPVs were acquired by the Trust and are to be valued as per Regulation 21(4) contained in the Chapter V of the SEBI InvIT Regulations.

I have relied on explanations and information provided by the Investment Manager. Although, I have reviewed such data for consistency, those are not independently investigated or otherwise verified. My team and I have no present or planned future interest in the Trust, the SPVs or the Investment Manager except to the extent of this appointment as an independent valuer and the fee for this Valuation Report ("**Report**") which is not contingent upon the values reported herein. The valuation analysis should not be construed as investment advice, specifically, I do not express any opinion on the suitability or otherwise of entering into any financial or other transaction with the Trust.



Mr. S Sundararaman, Registered Valuer

Registered Valuer Registration No - IBBI/RV/06/2018/10238

5B, "A" Block, 5th Floor, Mena Kampala Arcade, New #18 & 20, Thiagaraya Road, T.Nagar, Chennai – 600 017, India

Telephone No.: +91 44 2815 4192

S. SUNDARARAMAN

Registered Valuer

Registration No – IBBI/RV/06/2018/10238

I am enclosing the Report providing opinion on the fair enterprise value of the SPVs on a going concern basis as at 31st March 2023 (“**Valuation Date**”). Enterprise Value (“**EV**”) is described as the total value of the equity in a business plus the value of its debt and debt related liabilities, minus any cash or cash equivalents to meet those liabilities. The attached Report details the valuation methodologies used, calculations performed and the conclusion reached with respect to this valuation.

The analysis must be considered as a whole. Selecting portions of any analysis or the factors that are considered in this Report, without considering all factors and analysis together could create a misleading view of the process underlying the valuation conclusions. The preparation of a 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.

The information provided to me by the Investment Manager in relation to the SPVs included but not limited to historical financial statements, forecasts/projections, other statements and assumptions about future matters like forward-looking financial information prepared by the Investment Manager. The forecasts and projections as supplied to me are based upon assumptions about events and circumstances which are yet to occur.

By nature, valuation is based on estimates, however, considering the outbreak of COVID-19 Pandemic and the consequent economic slowdown, the risks and uncertainties relating to the events occurring in the future, the actual figures in future may differ from these estimates and may have an impact on the valuation of the SPVs.

Further, considering the current crisis in relation to COVID-19 in India and across the globe, I have been informed by the Investment Manager, that the forecasts / projections provided for the valuation exercises are prepared after reasonably evaluating and incorporating the impact of outbreak of COVID-19 pandemic as per prevalent conditions as on date.

I have not tested individual assumptions or attempted to substantiate the veracity or integrity of such assumptions in relation to the forward-looking financial information, however, I have made sufficient enquiry to satisfy myself that such information has been prepared on a reasonable basis.

Notwithstanding anything above, I cannot provide any assurance that the forward looking financial information will be representative of the results which will actually be achieved during the cash flow forecast period.

The valuation provided by RV and the valuation conclusion are included herein and the Report complies with the SEBI InvIT Regulations and guidelines, circular or notification issued by the Securities and Exchange Board of India (“SEBI”) thereunder.

Please note that all comments in the Report must be read in conjunction with the caveats to the Report, which are contained in Section 10 of this Report. This letter, the Report and the summary of valuation included herein can be provided to Trust's advisors and may be made available for the inspection to the public and with the SEBI, the stock exchanges and any other regulatory and supervisory authority, as may be required.



Mr. S Sundararaman, Registered Valuer

Registered Valuer Registration No - IBBI/RV/06/2018/10238

5B, "A" Block, 5th Floor, Mena Kampala Arcade, New #18 & 20, Thiagaraya Road, T.Nagar, Chennai – 600 017, India

Telephone No.: +91 44 2815 4192

S. SUNDARARAMAN

Registered Valuer

Registration No – IBBI/RV/06/2018/10238

RV draws your attention to the limitation of liability clauses in Section 10 of this Report including the clause on Limitation on account of COVID-19 and Significant Uncertainty in Valuation.

This letter should be read in conjunction with the attached Report.

Yours faithfully,



S. Sundararaman

Registered Valuer

IBBI Registration No.: IBBI/RV/06/2018/10238

Place: Chennai

UDIN: 23028423BGYWGS9503

Mr. S Sundararaman, Registered Valuer

Registered Valuer Registration No - IBBI/RV/06/2018/10238

5B, "A" Block, 5th Floor, Mena Kampala Arcade, New #18 & 20, Thiagaraya Road, T.Nagar, Chennai – 600 017, India

Telephone No.: +91 44 2815 4152

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Definition, abbreviation & glossary of terms

| Abbreviations | Meaning |
|-----------------------------------|--|
| BOT | Build, Operate and Transfer |
| Capex | Capital Expenditure |
| CCIL | Clearing Corporation of India Limited |
| COD | Commercial Operation Date |
| DCF | Discounted Cash Flow |
| HAM | Hybrid Annuity Model |
| DBFOT | Design, Build, Finance, Operate and Transfer |
| EBITDA | Earnings Before Interest, Taxes, Depreciation and Amortization |
| ETC | Electronic Toll Collection |
| EV | Enterprise Value |
| FCFF | Free Cash Flow to the Firm |
| FDI | Foreign Direct Investment |
| FY / Financial Year | Financial Year Ended 31 st March |
| GQ | Golden Quadrilateral |
| Ind AS | Indian Accounting Standards |
| INR | Indian Rupee |
| IRB | IRB Infrastructure Developers Limited |
| IRBIM | IRB Infrastructure Private Limited |
| IRBJD | IRB Jaipur Deoli Tollway Limited |
| IRBPA | IRB Pathankot Amritsar Toll Road Limited |
| IRBSD | IRB Surat Dahisar Tollway Limited |
| IRBTA | IRB Talegaon Amravati Tollway Limited |
| IRBTC | IRB Tumkur Chitradurga Tollway Limited |
| IVS | ICAI Valuation Standards 2018 |
| Kms | Kilometres |
| MORTH | Ministry of Road Transport and Highways |
| Mn | Million |
| MVR | MVR Infrastructure & Tollways Limited |
| NAV | Net Asset Value Method |
| NCA | Net Current Assets Excluding Cash and Bank Balances |
| NHAI | National Highways Authority of India |
| NHDP | National Highways Development Project |
| NS-EW | North- South and East-West Corridors |
| O&M | Operation & Maintenance |
| PPP | Public Private Partnership |
| RFID | Radio Frequency Identification |
| RV | Registered Valuer |
| SEBI | Securities and Exchange Board of India |
| SEBI InvIT Regulations the SPV | SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended Special Purpose Vehicle |
| the Trust or InvIT | IRB InvIT Fund |
| VEL | VK1 Expressway Limited |



1. Executive Summary

1.1. Background

The Infrastructure Investment Trust

1.1.1. IRB InvIT Fund (“the **Trust**” or “**InvIT**”) is constituted by “The Indenture of Trust” dated 16th October 2015, registered under the Registration Act, 1908 and is registered as an Indian infrastructure investment trust with the Securities and Exchange Board of India (“**SEBI**”) pursuant to the SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended (“the **SEBI InvIT Regulations**”).

1.1.2. The InvIT has been mainly formed to invest in infrastructure assets primarily being in the road sector in India. All of the Fund’s road projects are implemented and held through special purpose vehicles. The InvIT is currently involved in owning, operating and maintaining a portfolio of five operational toll road assets and one HAM in the Indian states of Maharashtra, Punjab, Karnataka, Tamil Nadu, Rajasthan and Gujarat pursuant to the concessions granted by the National Highways Authority of India (“**NHAI**”). The units issued by the Trust are listed on the National Stock Exchange of India Limited and Bombay Stock Exchange Limited since 18th May 2017.

1.1.3. Unitholding of the Trust as on 31st March 2023 is as under:

| Sr. No. | Particulars | No. of Units | % |
|---------|---------------------------------|---------------------|---------------|
| 1 | Sponsor & Sponsor Group | 10,72,60,000 | 18.5% |
| 2 | Mutual Funds | 3,80,90,000 | 6.6% |
| 3 | Financial Institutions or Banks | 22,00,000 | 0.4% |
| 4 | Insurance Companies | 1,24,50,000 | 2.1% |
| 5 | Provident or pension funds | 3,62,313 | 0.0% |
| 6 | Foreign Portfolio Investors | 143328150 | 24.7% |
| 7 | Non-institutional investors | 27,68,09,537 | 47.7% |
| | Total | 58,05,00,000 | 100.0% |

Source: BSE Limited

The Sponsor

1.1.4. IRB Infrastructure Developers Limited (“**IRB**” or “the **Sponsor**”) is a listed infrastructure development company, undertaking development of various infrastructure projects via the Public Private Partnership (“**PPP**”) model in the toll road sector. It is one of the largest private roads and highways infrastructure developers in India. The equity shares of IRB are listed on the National Stock Exchange of India Limited and Bombay Stock Exchange Limited since 25th February 2008.

1.1.5. Shareholding of the Sponsor as on 31st March 2023 is as under:

| Sr. No. | Particulars | No. of Shares | % |
|---------|---------------------------------|-----------------------|------------|
| 1 | Promoter & Promoter Group | 2,06,55,75,980 | 34.2 |
| 2 | Mutual Funds | 22,04,87,510 | 3.7 |
| 3 | Financial Institutions or Banks | 5,170 | 0.0 |
| 4 | Insurance Companies | 20,13,96,176 | 3.3 |
| 5 | Foreign Portfolio Investors | 37,94,02,942 | 6.3 |
| 6 | Non-institutional investors | 3,17,21,32,222 | 52.5 |
| | Total | 6,03,90,00,000 | 100 |

Source: BSE Limited

Investment Manager

1.1.6. IRB Infrastructure Private Limited (“the **Investment Manager**” or “**IRBIM**”) is a wholly-owned subsidiary of the Sponsor. The Investment Manager has approximately 19 years of experience in operating road Build Operate Transfer (“**BOT**”) projects and is also experienced in developing, operating and maintaining toll plazas in the infrastructure sector.



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1.1.7. Shareholding of the Investment Manager as on 31st March 2023 is as under:

| Sr. No. | Particulars | % |
|---------|---------------------------------------|--------|
| 1 | IRB Infrastructure Developers Limited | 100.0% |

Source: Investment Manager

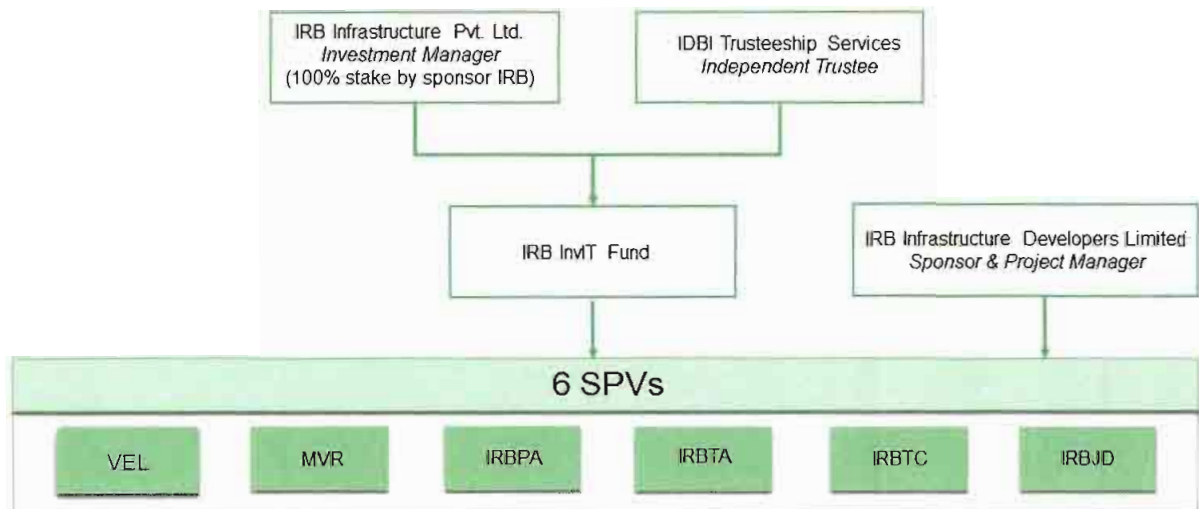
1.1.8. **Financial Assets to be Valued**

Enterprise Value ("EV") is described as the total value of the equity in a business plus the value of its debt and debt related liabilities, minus any cash or cash equivalents to meet those liabilities. The financial assets under consideration are valued at Enterprise Value.

| Sr. No. | Name of the SPV |
|---------|--|
| 1 | MVR Infrastructure & Tollways Limited ("MVR") |
| 2 | IRB Pathankot Amritsar Toll Road Limited ("IRBPA") |
| 3 | IRB Talegaon Amravati Tollway Limited ("IRBTA") |
| 4 | IRB Tumkur Chitradurga Tollway Limited ("IRBTC") |
| 5 | IRB Jaipur Deoli Tollway Limited ("IRBJD") |
| 6 | VK1 Expressway Limited ("VEL") |

(together referred to as "the SPVs")

Structure of the Trust as at 31st March 2023:



1.2. **Purpose and Scope of Valuation**

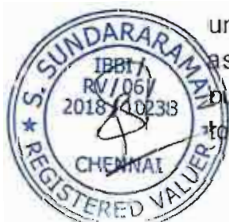
Purpose of Valuation

1.2.1. As per Regulation 21(4) of Chapter V of the SEBI InvIT Regulations,

"A full valuation shall be conducted by the valuer not less than once in every financial year: Provided that such full valuation shall be conducted at the end of the financial year ending March 31st within two months from the date of end of such year."

In this regard, the Investment Manager intends to undertake the fair enterprise valuation of the SPVs as on 31st March 2023.

1.2.2. In this regard, the Investment Manager have appointed Mr. S. Sundararaman ("**Registered Valuer**" or "**RV**" or "**I**" or "**My**" or "**Me**") bearing IBBI registration number IBBI/RV/06/2018/10238 to undertake the fair valuation at the enterprise level of the SPVs as per the SEBI InvIT Regulations as at 31st March 2023. Enterprise Value ("**EV**") is described as the total value of the equity in a business plus the value of its debt and debt related liabilities, minus any cash or cash equivalents to meet those liabilities.



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- 1.2.3. Registered Valuer declares that:
- The RV is competent to undertake financial valuation in terms of SEBI InvIT Regulations;
 - The RV is independent and has prepared the Report on a fair and unbiased basis;
 - RV has valued the SPVs based on the valuation standards as specified / applicable as per the SEBI InvIT Regulations.
- 1.2.4. This Report covers all the disclosures required as per the SEBI InvIT Regulations and the valuation of the SPVs is impartial, true and fair and in compliance with the SEBI InvIT Regulations.

Scope of Valuation

1.2.5. **Nature of the Asset to be Valued**

The RV has been mandated by the Investment Manager to arrive at the Enterprise Value ("EV") of the SPVs. Enterprise Value is described as the total value of the equity in a business plus the value of its debt and debt related liabilities, minus any cash or cash equivalents to meet those liabilities.

1.2.6. **Valuation Base**

Valuation Base means the indication of the type of value being used in an engagement. In the present case, RV has determined the fair value of the SPVs at the enterprise level. Fair Value Bases defined as under:

Fair Value

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 is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction in the principal (or most advantageous) market at the measurement date under current market conditions (i.e. an exit price) regardless of whether that price is directly observable or estimated using another valuation technique. Fair value or Market value is usually synonymous to each other except in certain circumstances where characteristics of an asset translate into a special asset value for the party(ies) involved.

1.2.7. **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 due to changes in the condition of the asset to be valued. 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 SPVs is 31st March 2023 ("**Valuation Date**"). The attached Report is drawn up by reference to accounting and financial information as on 31st March 2023. The RV is not aware of any other events having occurred since 31st March 2023 till date of this Report which he deems to be significant for his valuation analysis.

1.2.8. **Premise of Value**

Premise of Value refers to the conditions and circumstances how an asset is deployed. In the present case, RV has determined the fair enterprise value of the SPVs on a Going Concern Value defined as under:

Going Concern Value

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, necessary licenses, systems, and procedures in place etc.

- 1.2.9. For the amount pertaining to the operating working capital, the Investment Manager has acknowledged to consider the provisional financial statements as on 31st March 2023 to carry out the valuation of the SPVs.



1.3. Summary of Valuation

I have assessed the fair enterprise value of each of the SPVs on a stand-alone basis by using the discounted cash flow method under the income approach. Following table summarizes my explanation on the usage or non usage of different valuation methods:

| Valuation Approach | Valuation Methodology | Used | Explanation |
|--------------------|-------------------------|------|---|
| Cost Approach | Net Asset Value | No | NAV does not capture the future earning potential of the business. Hence, NAV method has been considered for background reference only. |
| Income Approach | Discounted Cash Flow | Yes | The revenue of the projects are defined for a certain period of years as provided by M/s GMD Consultants in its Toll Revenue and O&M Cost Projection Report. As all the SPVs under considerations have executed projects under the BOT model, the ownership of the underlying assets shall be transferred after the expiry of the concession period. In case of all the SPVs, the total concession period is between 14 years to ~32 years. Hence, the growth potential of the SPVs and the true worth of its business would be reflected in its future earnings potential and therefore, DCF Method under the income approach has been considered as an appropriate method for the present valuation exercise. |
| Market Approach | Market Price | No | The equity shares of the SPVs are not listed on any recognized stock exchange in India. Hence, I was unable to apply the market price method. |
| | Comparable Companies | No | In the absence of any exactly comparable listed companies with characteristics and parameters similar to that of the SPVs, I am unable to consider this method for the current valuation. |
| | Comparable Transactions | No | In the absence of adequate details about the Comparable Transactions, I was unable to apply the CTM method. |

Under the Discounted Cash Flow (DCF) Method, the Free Cash Flow to Firm (FCFF) has been used for the purpose of valuation of each of the SPVs. In order to arrive at the fair EV of the individual SPVs under the DCF Method, I have relied on provisional financial statements as at 31st March 2023 prepared in accordance with the Indian Accounting Standards (Ind AS) and the financial projections of the respective SPVs prepared by the Investment Manager as at the Valuation Date based on their best judgement.

The discount rate considered for the respective SPVs for the purpose of this valuation exercise is based on the Weighted Average Cost of Capital for each of the SPVs. As all the SPVs under considerations have executed projects under the BOT model, the ownership of the underlying assets shall be transferred after the expiry of the concession period. At the end of the agreed concession period, the ownership of the road, the obligation to maintain the road and the right to collect tolls from the vehicles using the road revert to the government entity that granted the concession by the SPVs. Accordingly, terminal period value i.e. value on account of cash flows to be generated even after the expiry of concession period has not been considered.

Based on the methodology and assumptions discussed further, RV has arrived at the Fair Enterprise Value of the SPVs as on the Valuation Date:



| Sr. No. | SPVs | Projection Period (Balance Concession Period) | WACC | Fair EV (INR Mn) |
|--------------|--------|--|-------|---------------------|
| 1 | MVR | ~ 3 Years 9 Months | 9.7% | 3,503 |
| 2 | IRBPA* | ~ 14 Years 9 Months | 11.1% | 16,308 |
| 3 | IRBTA | ~ 14 Years 2 Months | 10.7% | 9,316 |
| 4 | IRBTC | ~ 14 Years 9 Months | 10.6% | 20,724 |
| 5 | IRBJD | ~ 17 Years 7 Months | 10.6% | 18,812 |
| 6 | VEL | ~ 14 Years 0 Months | 7.3% | 13,779 |
| Total | | | | 82,442 |

**In the current projections, the Investment Manager has revised the likely concession period end date of IRBPA to 2nd January 2038 from 2nd December 2037 as provided in the projections considered for the March 2023 valuation exercise, because toll collection was suspended from 16th December 2022 to 15th January 2023 due to farmers agitation in state of Punjab. In line with earlier claims, the concessionaire has filed claims for extension in concession period for 31 days for complete toll suspension period.*

This extension is subject to receiving approval from NHAI authorities. I have relied on the information provided by the Investment Manager in this regard.

(Refer Appendix 1 & 2 for the detailed workings)

Further to above considering that present valuation exercise is based on the future financial performance and based on opinions on the future credit risk, cost of debt assumptions, etc., which represent reasonable expectations at a particular point of time, but such information, estimates or opinions are not offered as predictions or as assurances that a particular level of income or profit will be achieved, a particular event will occur or that a particular level of income or profit will be achieved, a particular event will occur or that a particular price will be offered or accepted. Actual results achieved during the period covered by the prospective financial analysis will vary from these estimates and variations may be material. Accordingly, a quantitative sensitivity analysis is considered on the following unobservable inputs:

1. Weighted Average Cost of Capital (WACC) by increasing / decreasing it by 1.0%
2. Revenue by increasing / decreasing it by 10%
3. Expenses by increasing / decreasing it by 20%

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1. Fair Enterprise Valuation Range based on WACC parameter (1.0%)

| INR Mn | | | | | | | |
|--------|-------|---------------|---------------|--------------|--------|---------------|---------------|
| Sr. No | SPVs | WACC +1.0% | EV | Base WACC | EV | WACC -1.0% | EV |
| 1 | MVR | 10.7% | 3,441 | 9.7% | 3,503 | 8.7% | 3,567 |
| 2 | IRBPA | 12.1% | 15,278 | 11.1% | 16,308 | 10.1% | 17,443 |
| 3 | IRBTA | 11.7% | 8,753 | 10.7% | 9,316 | 9.7% | 9,935 |
| 4 | IRBTC | 11.6% | 18,466 | 10.6% | 20,724 | 9.6% | 23,319 |
| 5 | IRBJD | 11.6% | 17,442 | 10.6% | 18,812 | 9.6% | 20,346 |
| 6 | VEL | 8.3% | 13,158 | 7.3% | 13,779 | 6.3% | 14,455 |
| | | | 76,538 | | | 82,442 | 89,065 |

2. Fair Enterprise Valuation Range based on Revenue parameter (10%)

| INR Mn | | | | |
|---------|-------|-------------------------|-----------------------|-------------------------|
| Sr. No. | SPVs | EV at Revenue -10.0% | EV at Base Revenue | EV at Revenue +10.0% |
| 1 | MVR | 3,130 | 3,503 | 3,876 |
| 2 | IRBPA | 14,435 | 16,308 | 18,301 |
| 3 | IRBTA | 8,000 | 9,316 | 10,593 |
| 4 | IRBTC | 14,527 | 20,724 | 26,553 |
| 5 | IRBJD | 16,207 | 18,812 | 21,250 |
| 6 | VEPL | 12,501 | 13,779 | 15,044 |
| | | 68,799 | 82,442 | 95,618 |

3. Fair Enterprise Valuation Range based on Expense parameter (20%)

| INR Mn | | | | |
|---------|-------|--------------------------|------------------------|-----------------------------|
| Sr. No. | SPVs | EV at Expenses +20.0% | EV at Base Expenses | EV at Expenses -20.0% |
| 1 | MVR | 3,401 | 3,503 | 3,605 |
| 2 | IRBPA | 15,717 | 16,308 | 16,899 |
| 3 | IRBTA | 8,824 | 9,316 | 9,808 |
| 4 | IRBTC | 20,265 | 20,724 | 21,182 |
| 5 | IRBJD | 17,838 | 18,812 | 19,734 |
| 6 | VEL | 13,576 | 13,779 | 13,982 |
| | | 79,621 | 82,442 | 85,209 |

The above represents reasonable range of fair enterprise valuation of the SPVs.

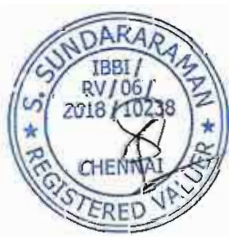


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2. Procedures adopted for current valuation exercise

- 2.1. I have performed the valuation analysis, to the extent applicable, in accordance with ICAI Valuation Standards 2018 ("IVS") issued by the Institute of Chartered Accountants of India read with SEBI InvIT Regulations.
- 2.2. In connection with this analysis, I have adopted the following procedures to carry out the valuation analysis:
- 2.2.1. Requested and received financial and qualitative information relating to the SPVs;
 - 2.2.2. Obtained and analyzed data available in public domain, as considered relevant by me;
 - 2.2.3. Discussions with the Investment Manager on:
 - Understanding of the business of the SPVs – business and fundamental factors that affect its earning-generating capacity including strengths, weaknesses, opportunities and threats analysis and historical and expected financial performance;
 - 2.2.4. Undertook industry analysis:
 - Research publicly available market data including economic factors and industry trends that may impact the valuation;
 - Analysis of key trends and valuation multiples of comparable companies/comparable transactions, if any, using proprietary databases subscribed by me;
 - 2.2.5. Analysis of other publicly available information;
 - 2.2.6. Selection of valuation approach and valuation methodology/(ies), in accordance with IVS, as considered appropriate and relevant by me;
 - 2.2.7. Determination of fair EV of the SPVs.

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3. **Overview of the InvIT and the SPVs**

The Trust

- 3.1. The Trust is registered with SEBI pursuant to the SEBI InvIT Regulations. The Trust was established on 16th October 2015 by IRB Infrastructure Developers Limited as the Sponsor.
- 3.2. It is mainly established to invest in infrastructure assets primarily being in the road sector in India. The units of the Trust are listed on the National Stock Exchange Limited and BSE Limited since 18th May 2017.
- 3.3. The InvIT comprises of six operational road projects having length of 3,665 lane Kms with four of the road projects forming part of Golden quadrilateral and one being part of East-West corridor. It has presence across six states in India.

Following is the historical valuation summary of the SPVs of the Trust:

| Valuation (INR Mn) | IRBTA | IRBJD | IRBTC | MVR | IRBPA |
|---------------------|--------|--------|--------|-------|--------|
| Stake held by Trust | 100% | 100% | 100% | 100% | 100% |
| Acquisition Value | 6,576 | 14,847 | 13,290 | 3,400 | 14,857 |
| 30-Sep-17 | 7,415 | 21,047 | 14,485 | 4,121 | 18,253 |
| 31-Mar-18 | 7,749 | 19,509 | 13,690 | 4,132 | 16,452 |
| 30-Sep-18 | 8,155 | 16,271 | 13,267 | 4,285 | 14,350 |
| 31-Mar-19 | 8,664 | 16,244 | 14,410 | 4,334 | 14,845 |
| 30-Sep-19 | 9,486 | 15,826 | 14,912 | 4,702 | 14,837 |
| 31-Mar-20 | 8,637 | 14,187 | 13,114 | 4,246 | 13,723 |
| 30-Sep-20 | 10,385 | 16,553 | 15,346 | 4,681 | 16,095 |
| 31-Mar-21 | 11,399 | 18,467 | 16,462 | 4,524 | 17,275 |
| 30-Sep-21 | 11,088 | 17,989 | 20,965 | 4,083 | 16,340 |
| 31-Mar-22 | 10,279 | 18,483 | 21,024 | 4,151 | 17,142 |
| 30-Sep-22 | 9,961 | 18,563 | 21,561 | 3,847 | 16,185 |

Note: I have conducted valuation from the period 30-Sep-20 onwards.



Following is a map of India showing the area covered by the SPVs of the Trust:



Source: Investment Manager

Background of the SPVs

3.4. MVR Infrastructure & Tollways Limited ("MVR")

3.4.1. Summary of details of MVR are as follows:

| Parameters | Details |
|--|-------------------------------|
| Total Length | 275 Lane Kms |
| Nos. of Lanes | 4 |
| NH / SH | NH 7 |
| States Covered | Tamilnadu |
| Area (Start and End) | Salem – Namakkal |
| Project Cost | INR 3,076 Mn |
| PPP Model | BOT |
| Concession Granted by | NHAI |
| Appointed Date | 14 th August 2006 |
| Tolling Start Date | 14 th August 2009 |
| Original Concession Period (CP) | 20 years from Appointed Date |
| Extension (if any) | 152 days |
| Likely End of CP (including extension) | 12 th January 2027 |
| Trust's stake | 100% |

Source: Investment Manager

3.4.2. NH 7 is one of India's busiest traffic routes, connecting the north and south of India via commercial hubs like Varanasi, Rewa, Jabalpur, Nagpur, Adilabad, Nirmal, Armoor in (Nizamabad), Kamareddy, Hyderabad, Kurnool, Anantapur, Chikkaballapur, Bangalore, Krishnagiri, Salem, Madurai, Tirunelveli and Kanyakumari.



3.4.3. The map below illustrates the location of the Project and the corridor it covers:



Source: Investment Manager

3.4.4. MVR project covers the Omalur and Namakkal section of NH 7 from 180.0 km to 248.6 km. The project has been implemented on a BOT basis by the NHA and is a combination of construction and maintenance packages as given under:

- Maintenance package - From 180 km to 207.5 km
- Construction & Maintenance Package - From 207.5 km to 248.625 km

3.4.5. The project covers the stretch from Omalur to Namakkal and passes through two districts namely Salem and Namakkal. This project has been awarded for a concession period of 20 years starting from 14th August 2006. The project has been commissioned and is currently in the operation / maintenance phase. The project includes 1 Toll Fee Plaza, 8 Vehicular Underpasses, 36 Culverts, 11 pedestrian underpasses, 5 Flyovers & Railways Overbridges, 14 Minor bridges, and 16 Major Intersections. It has 68.625 Km Four-Lane Service Carriageway.

3.4.6. Projections provided by the Investment Manager considers an extension of 152 days from original concession end date, due to following:

- 15 days of extension due to floods in Chennai.
- 24 days of extension due to demonetization.
- 90 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. F. 18/4/2020-PPD dated 13 May 2020) which got triggered due to suspension in toll operations owing to COVID-19 pandemic.
- 23 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. COVID-19/RoadMap/JS(H)/2020 dated 26th August, 2021) which got triggered due to suspension in toll operations owing to second wave of COVID-19 pandemic.

3.4.7. My team had conducted physical site visit of the road stretch of MVR on 03rd May 2023. Refer below for the pictures of the road stretch:





3.5. **IRB Pathankot Amritsar Toll Road Limited (“IRBPA”)**

3.5.1. Summary of details of IRBPA are as follows:

| Parameters | Details |
|----------------------|----------------------|
| Total Length | 410 Lane Kms |
| Nos. of Lanes | 4 |
| NH / SH | NH 15 |
| States Covered | Punjab |
| Area (Start and End) | Pathankot – Amritsar |



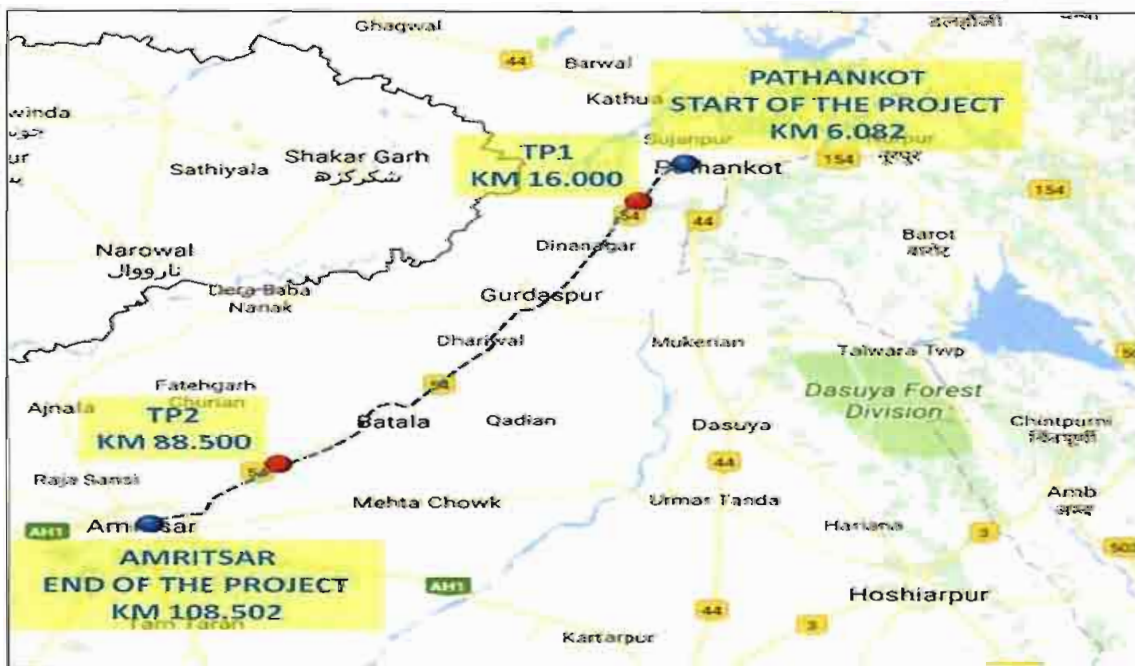
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| | |
|--|--------------------------------|
| Project Cost | INR 14,453 Mn |
| PPP Model | DBFOT |
| Concession Granted by | NHAI |
| Appointed Date | 31 st December 2010 |
| Tolling Start Date | 27 th November 2014 |
| Original Concession Period (CP) | 20 years from Appointed Date |
| Extension (if any) | 2,559 days |
| Likely End of CP (including extension) | 2 nd January 2038 |
| Trust's stake | 100% |

Source: Investment Manager

3.5.2. NH 15 is a two to four lane National Highway in India. The NH 15 is one of the major highways of northwestern India, starting at Pathankot in the state of Punjab and traversing through the states of Punjab, Rajasthan and ending at Samakhiali of Gujarat. Important cities and towns, en-route, are Amritsar, Bhatinda, Ganganagar, Bikaner, Jaisalmer and Barmer. In the state of Punjab, NH 15 passes through the districts of Gurudaspur, Amritsar, Firozpur, Faridkot, Moga, Mukatsar and Bhatinda. The Pathankot – Amritsar NH 15 Project is part of the high-density traffic corridor, catering to various types of traffic, including urban, suburban and regional traffic.

3.5.3. The map below illustrates the location of the Project and the corridor it covers:



Source: Investment Manager

3.5.4. IRBPA project covers the Pathankot and Amritsar section of NH 15 from 6.082 km to 108.502 km. The project has been awarded to IRBPA for a concession period of 20 years starting from 31st December 2010 on the basis of grant given by NHAI of INR 1,269.0 Mn.

3.5.5. The project is in the state of Punjab, and passes through the districts of Gurudaspur, Amritsar, Firozpur, Faridkot, Moga, Mukatsar & Bhatinda. The project stretch provides connectivity for traffic from the states of Punjab and Rajasthan to Jammu and Kashmir. The project has been commissioned and is currently in the operation/ maintenance phase.

3.5.6. The project includes 2 Toll Fee Plaza, 30 Bus Bays, 317 Culverts, 5 Truck Lay Bys, 14 Vehicular Underpasses, 5 Flyovers, 5 Railways Over bridges, 6 Minor bridges, 4 Major Bridges and 168 Major Intersections. It has 102.420 Km Four-Lane Service Carriageway and 44.180Km.

Projections provided by the Investment Manager considers an extension of 2,559 days from original concession end date, due to following:



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- 24 days of extension due to demonetization.
- 1,460 days of extension owing to the target traffic clause as per Concession Agreement and the same has been approved by NHAI vide letter dated 5th March, 2021. (Kindly refer point no 3.5.8)
- 90 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. F. 18/4/2020-PPD dated 13 May 2020) which got triggered due to suspension in toll operations owing to COVID-19 pandemic.
- 467 days of extension due to suspension in toll operations owing to Farmer's Protest. (Kindly refer point no 3.5.9)
- 518 days of extension due to delay in completion of construction of the project on account of the reasons not attributable to IRBPA.

3.5.8. Modification in the Concession Period due to target traffic clause as per Concession Agreement

As per the Clause 29 of the concession agreement between NHAI and IRBPA provided to us by the Investment Manager, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein. The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

| Particulars | Unit | Details |
|--|-------|------------|
| Target date as per CA | Date | 01-Jan-19 |
| Target traffic as per CA | PCUs | 34,498 |
| Actual Average Traffic | PCUs | 25,087 |
| Comparison of average traffic at test date with target | % | -27% |
| Original concession period | Years | 20.0 |
| Increase in concession period (Max. upto 20%) | % | 20% |
| Change in concession period | days | 1,460 |
| Revised concession period | years | 24.0 |
| Appointed date | Date | 31-Dec-10 |
| Additional days due to Toll Suspension | Days | 24 |
| Additional days due to pandemic (First wave) | Days | 90 |
| Additional days due to farmers protest | Days | 441 |
| Original concession end date | Date | 30-Dec-30 |
| Revised concession end date | Date | 06-July-36 |

As informed to us by the Investment Manager, the actual traffic volume has fallen short of the target traffic as on the target date. This warranted for an extension of the concession period by 4 years (1,460 days).

3.5.9. Extension due to Farmer's Protest Force Majeure

During the period October 2020 to December 2021 the user Toll collection of IRBPA were forcefully suspended on account of the farmer's civil commotion (agitation) against the farmer reform bill passed by Parliament of India.

The Concessionaire had notified the occurrence of Force Majeure event under Indirect Political Event as per provisions of the Concession Agreement wherein the concessionaire is eligible for extension of time and reimbursement 50% of operation and maintenance expenses and interest expenses.

Further, as per the NHAI Policy Circular No. NHAI/PD/PIU-ASR/11012/2022/1891 dated 27th August 2022 NHAI HQ had conveyed the approval of the Competent Authority for release of Rs. 36.03 Cr. to the Concessionaire towards Force Majeure costs due to Farmer's Agitation as per Cl. 4.7.2 of CA and extension of Concession period equal to the period affected by Force Majeure



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(i.e from 06.10.2020 to 15.12.2021 i.e. 436 days). The approval was accordingly conveyed to the Independent Engineer vide this office letter no. NHAI/PD/PIU-ASR/11012/2022/1851 dated 11.08.2022.

During the current year, toll collection was suspended from 16th December 2022 to 15th January 2023 due to farmers' agitation in the state Punjab. In line with earlier claim, the concessionaire has filed claims for extension in concession period for 31 days for complete toll suspension period.

3.5.10. We understand from the Investment Manager that the farmers' agitation in Punjab and Haryana which had led to toll suspension of the tolls of IRBPA since October 2020 came to an end after the government decided to repeal the three contentious farm laws in the month of November 2021 and resulted into normalcy in road operations. IRBPA has resumed Toll collection from the month of December 2021.

3.5.11. Extension due to delay in completion of construction

IRBPA had initiated arbitration proceedings against National Highways Authority of India ("NHAI") before the Hon'ble Arbitration Tribunal for extension of the Concession Period by 518 days for delay in completion of construction of the project on account of the reasons not attributable to IRBPA.

Further, in July 2021 the Hon'ble Arbitration Tribunal has announced award in favour of IRBPA. I have been informed by the Investment Manager that the extension to concession period would entirely accrue to the benefit of IRBPA and the Trust.

I have been further informed that the petition filed by NHAI challenging the said Arbitral Award has been dismissed by the Hon'ble Delhi High Court in March 2022 and the Arbitral Award has been upheld.

I have considered extension ,and 1% CSRP until NHAI approval for same is accorded to the Concessionaire (IRBPA)

3.5.12. My team had conducted physical site visit of the road stretch of IRBPA on 24th June 2022. Refer below for the pictures of the road stretch:





3.6. **IRB Talegaon Amravati Toll Road Limited (“IRBTA”)**

3.6.1. Summary of details of IRBTA are as follows:

| Parameters | Details |
|--|--------------------------------|
| Total Length | 267 Lane Kms |
| Nos. of Lanes | 4 |
| NH / SH | NH 6 |
| States Covered | Maharashtra |
| Area (Start and End) | Talegaon – Amravati |
| Project Cost | INR 8,926 Mn |
| PPP Model | DBFOT |
| Concession Granted by | NHAI |
| Appointed Date | 3 rd September 2010 |
| Tolling Start Date | 24 th April 2013 |
| Original Concession Period (CP) | 22 years from Appointed Date |
| Extension (if any) | 1,734 days |
| Likely End of CP (including extension) | 2 nd June 2037 |
| Trust's stake | 100% |

Source: Investment Manager

3.6.2. NH 6 connects Hazira and Kolkata via Surat, Dhule, Amravati, Nagpur, Raipur, and Sambalpur. It intersects with several other national highways, including NH 3 near Dhule, NH 5 near Jharkoparia, NH 7 near Nagpur and NH 8 near Surat. NH 6 passes through five states, namely Gujarat, Madhya Pradesh, Orissa, Chhattisgarh and West Bengal. The Talegaon–Amravati NH 6 Project caters to various types of traffic such as urban, suburban and regional traffic. IRBTA project covers the Talegaon and Amravati section of NH-6 from 100 km to 166.7 km.

3.6.3. The map below illustrates the location of the Project and the corridor it covers:



Source: Investment Manager



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- 3.6.4. This project has been awarded to IRBTA for a concession period of 22 years starting from 3rd September 2010 on the basis of a grant of INR 2,160 Mn receivable from the NHAI during the construction period. The project includes 66 Entry/Exit Ramps, 38 Bus Bays, 20 pedestrian underpasses, 21 Minor bridges, 3 Major bridges and 36 Major Intersections. It has 114.45 Km Four-Lane Service Carriageway and 4.2 Km long Service road.
- 3.6.5. The project includes 1 Toll Fee Plaza, 15 Bus Bays, 1 Rail over Bridge, 11 Vehicular Underpasses, 11 pedestrian underpasses, 2 Flyovers, 25 Minor bridges, 1 Major bridge and 36 Major Intersections. It has 66.7 Km Four-Lane Service Carriageway and 26.5 Km long Service Road.
- 3.6.6. The project is in the state of Maharashtra and passes through Amravati district. En-route, it passes few major/minor urban centres, viz. Nandgaon Peth, Mozri, Tivsa, and Ramdara etc. before reaching end of project stretch at Talegaon. The corridor of the project is also known as Amravati — Nagpur Highway. The project has been commissioned and is currently in the operation / maintenance phase.
- 3.6.7. Projections provided by the Investment Manager considers an extension of 1,734 days from original concession end date, due to following:
- 24 days of extension due to demonetization.
 - 1,606 days of extension owing to the target traffic clause as per Concession Agreement and the traffic survey conducted by SPV has been filed with NHAI vide letters dated 2nd April 2021, 14th October, 2020 and 25th September, 2020. NHAI approval for the same is pending as on Report date.
 - 90 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. F. 18/4/2020-PPD dated 13 May 2020) which got triggered due to suspension in toll operations owing to COVID-19 pandemic.
 - 13 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. COVID-19/RoadMap/JS(H)/2020 dated 26th August, 2021) which got triggered due to suspension in toll operations owing to second wave of COVID-19 pandemic.
- 3.6.8. Modification in the Concession Period due to target traffic clause as per Concession Agreement

As per the Clause 29 of the concession agreement between NHAI and IRBTA provided to us by the Investment Manager, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein. The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

| Particulars | Unit | Details |
|--|-------|-----------|
| Target date as per CA | Date | 01-Apr-20 |
| Target traffic as per CA | PCUs | 41,052 |
| Actual Average Traffic | PCUs | 20,306 |
| Comparison of average traffic at test date with target | % | -51% |
| Original concession period | Years | 22.0 |
| Increase in concession period (Max. upto 20%) | % | 20% |
| Change in concession period | Days | 1,606 |
| Revised concession period | Years | 26.4 |
| Appointed date | Date | 03-Sep-10 |
| Additional days due to Toll Suspension | Days | 24 |
| Additional days due to pandemic (First wave) | Days | 90 |
| Additional days due to pandemic (Second wave) | Days | 13 |
| Original concession end date | Date | 02-Sep-32 |
| Revised concession end date | Date | 02-Jun-37 |

As informed to us by the Investment Manager, the actual traffic volume has fallen short of the target traffic as on the target date. This warranted for an extension of the concession period by 4.4 years (1,606 days).

My team had conducted virtual site visit of the road stretch of IRBTA to the extent appropriate. My team shall conduct physical site visit of the road stretch of IRBTA by 17th October, 2022.



3.7. **IRB Tumkur Chitradurga Tollway Limited (“IRBTC”)**

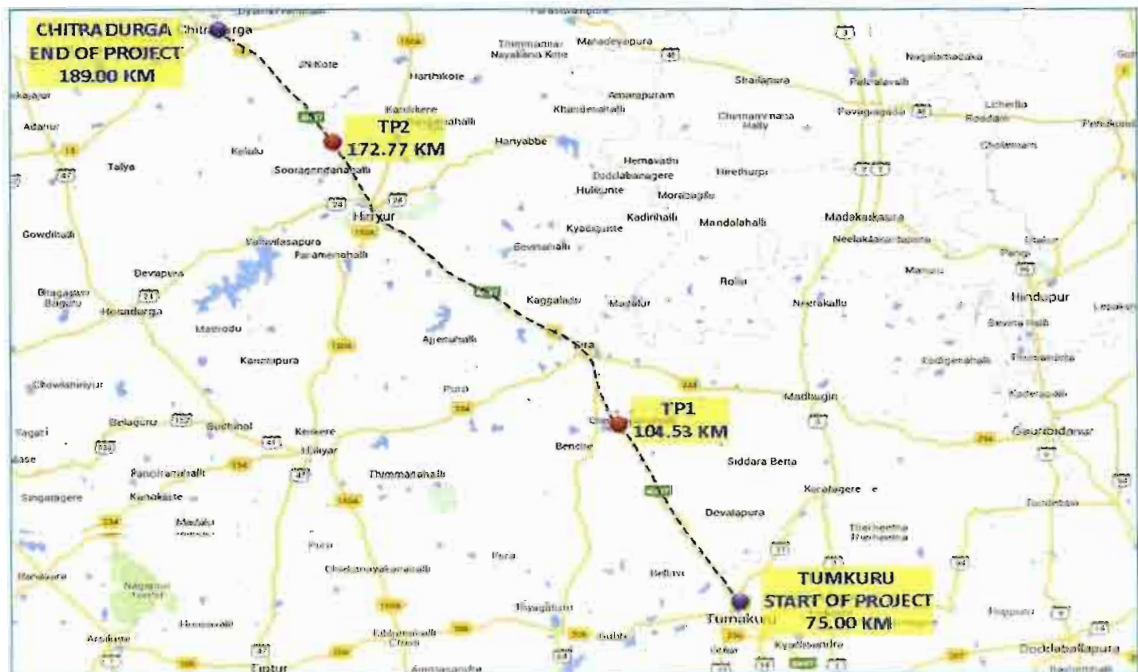
3.7.1. Summary of details of IRBTC are as follows:

| Parameters | Details |
|--|--------------------------------|
| Total Length | 684 Lane Kms |
| Nos. of Lanes | 6 |
| NH / SH | NH 4 |
| States Covered | Karnataka |
| Area (Start and End) | Tumkur – Chitradurga |
| Project Cost | INR 11,420 Mn |
| PPP Model | DBFOT |
| Concession Granted by | NHA |
| Appointed Date | 4 th June 2011 |
| Tolling Start Date | 4 th June 2011 |
| Original Concession Period (CP) | 26 years from Appointed Date |
| Extension (if any) | 2,034 days |
| Likely End of CP (including extension) | 29 th December 2042 |
| Trust's stake | 100% |

Source: Investment Manager

3.7.2. NH 4 is a four- to six-lane National highway in India. It connects Mumbai and Chennai via Pune, Kolhapur and Belgaum and intersects NH 9 at Pune, NH 4A at Belgaum, NH 63 and NH 218 at Dharwad, NH 13 at Chitradurga, NH 206 at Tumkur, NH 48 and NH 207 at Nelamangala. NH 4 passes through three states, namely, Maharashtra, Karnataka and Tamil Nadu. Between Thane and Chennai, it connects major urban centres and state capitals, such as Thane, Pune, Kolhapur, Belgaum, Dharwad, Hubli, Chitradurga, Tumkur, Bangalore and Chennai. The Tumkur-Chitradurga NH 4 Project caters to various types of traffic, including urban, suburban and regional traffic. IRBTC project covers the Tumkur and Chitradurga section of NH-4 from 75.0 km to 189.0 km.

3.7.3. The map below illustrates the location of the Project and the corridor it covers:



Source: Investment Manager

This project has been awarded for a concession period of 26 years starting from 4th June 2011 on the basis of a premium of INR 1,404.0 Mn payable to the NHA in the first year of concession period



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increased annually at 5%. The actual premium payment for the project is agreed upon with the Authority basis Deferred Premium policy.

- 3.7.5. The project includes 2 Toll Fee Plazas, 66 Entry/ Exit Ramps, 7 Truck Lay Bys, 147 Culverts, 6 Flyovers, 38 Bus Bays, 20 pedestrian underpasses, 21 Minor bridges, 3 Major bridges and 36 Major Intersections. It has 114.45 Km Four-Lane Service Carriageway and 4.2 Km long Service road.
- 3.7.6. The project is in the state of Karnataka and passes through districts, viz. Tumkur and Chitradurga. En-route, it passes few major/minor urban centres, viz. Tumkur, Sira, Hiriyur and Chitradurga. The project has been commissioned and is currently in the operation/ maintenance phase.
- 3.7.7. Projections provided by the Investment Manager considers an extension of 2,034 days from original concession end date, due to following:
- 24 days of extension due to demonetization.
 - 90 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. F. 18/4/2020-PPD dated 13 May 2020) which got triggered due to suspension in toll operations owing to COVID-19 pandemic.
 - 1,899 days of extension owing to the target traffic clause as per Concession Agreement though it has been intimated to NHAI vide letter dated 14th April, 2021, approval for the same is pending as on report date.
 - 22 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. COVID-19/RoadMap/JS(H)/2020 dated 26th August, 2021) which got triggered due to suspension in toll operations owing to second wave of COVID-19 pandemic.

3.7.8. Modification in the Concession Period due to target traffic clause as per Concession Agreement

As per the Clause 29 of the concession agreement between NHAI and IRBTC provided to us by the Investment Manager, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein.

The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

| Particulars | Unit | Details |
|--|-------|-----------|
| Target date as per CA | Date | 01-Apr-20 |
| Target traffic as per CA | PCUs | 54,558 |
| Actual Average Traffic | PCUs | 40,951 |
| Comparison of average traffic at test date with target | % | -25% |
| Original concession period | Years | 26 |
| Increase in concession period | % | 20% |
| Change in concession period | Days | 1,899 |
| Revised concession period | Years | 31.2 |
| Appointed date | Date | 04-Jun-11 |
| Additional days due to Toll Suspension | Days | 24 |
| Additional days due to pandemic (First wave) | Days | 90 |
| Additional days due to pandemic (Second wave) | Days | 22 |
| Original concession end date | Date | 03-Jun-37 |
| Revised concession end date | Date | 29-Dec-42 |

As informed to us by the Investment Manager, the actual traffic volume has fallen short of the target traffic as on the target date. This warranted for an extension of the concession period by 5.2 years (1,899 days).

My team had conducted physical site visit of the road stretch of IRBTC on 24th April 2023. Refer below for the pictures of the road stretch:





3.8. **IRB Jaipur Deoli Tollway Limited (“IRBJD”)**

3.8.1. Summary of details of IRBJD are as follows:

| Parameters | Details |
|--|---------------------------------|
| Total Length | 595 Lane Kms |
| Nos. of Lanes | 4 |
| NH / SH | NH 12 |
| States Covered | Rajasthan |
| Area (Start and End) | Jaipur – Deoli |
| Project Cost | INR 17,747 Mn |
| PPP Model | DBFOT |
| Concession Granted by | NHAI |
| Appointed Date | 14 th June 2010 |
| Tolling Start Date | 27 th September 2013 |
| Original Concession Period (CP) | 25 years from Appointed Date |
| Extension (if any) | 1,957 days |
| Likely End of CP (including extension) | 21 st October 2040 |
| Trust's stake | 100% |

Source: Investment Manager

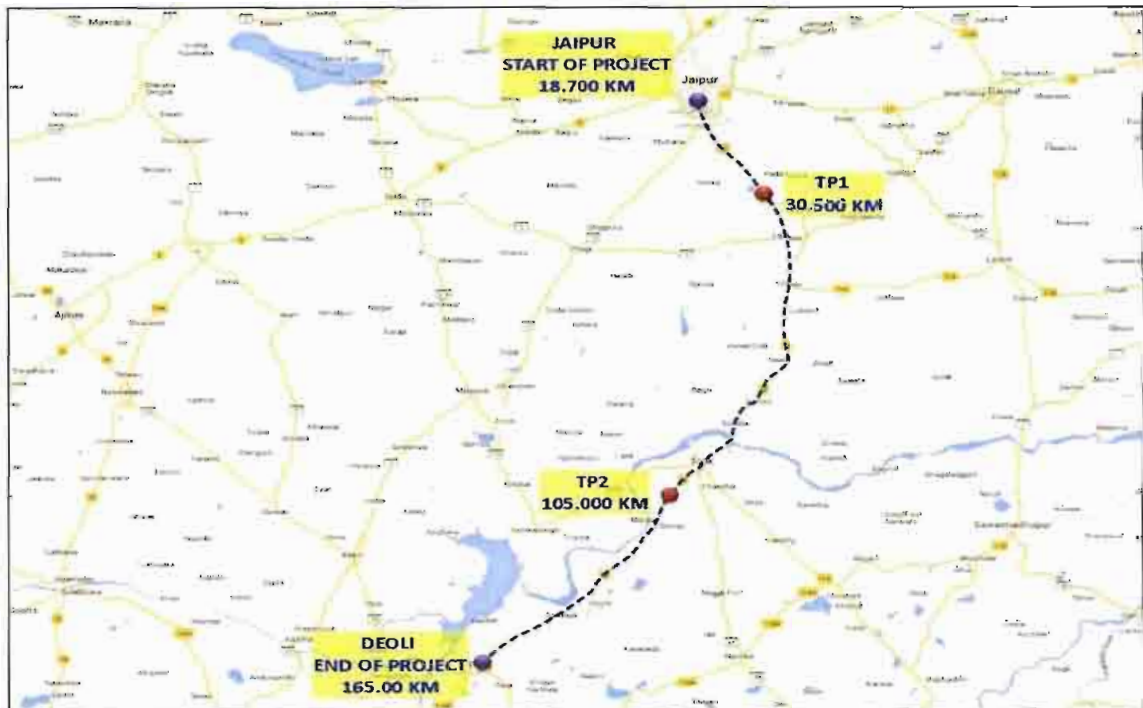


NH 12 connects Jaipur and Jabalpur via Tonk, Kota, and Bhopal. It intersects with several other national highways like NH 3 at Biora, NH 7 at Jabalpur, NH 8 at Jaipur, NH 11 at Jaipur, and NH 69 at Bhopal. NH 12 passes through two states via Rajasthan and Madhya Pradesh. IRBJD project covers the Jaipur and Deoli section of NH-12 from km 18.7 to km 165.0. The project is in the state

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of Rajasthan and passes through districts, viz. Jaipur and Tonk. En-route, it passes few major/minor urban centres, viz. Shivdaspura, Chaksu, Tonk, and Deoli.

3.8.3. The map below illustrates the location of the Project and the corridor it covers:



Source: Investment Manager

- 3.8.4. The project includes 2 toll fee plaza, 3 pedestrian underpasses, 11 vehicular underpasses, 5 cattle underpasses, 124 Culverts, 32 Bus Bays, 4 Flyovers, 23 Minor bridges, 1 Major bridges and 25 Major Intersections. It has 148.77Km Four-Lane Service Carriageway and 36.76 Km long Service road.
- 3.8.5. This project has been awarded to IRBJD for a concession period of 25 years starting from 14th June 2010 on the basis of a grant given by NHAI of INR 3,060.0 Mn during the concession period. The project has been commissioned and is currently in the operation / maintenance phase.
- 3.8.6. Projections provided by the Investment Manager considers an extension of 1,957 days from original concession end date, due to following:
- 24 days of extension due to demonetization.
 - 1,826 days of extension owing to the target traffic clause as per Concession Agreement and the same has been approved by NHAI vide letter dated 18th March, 2020.
 - 90 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. F. 18/4/2020-PPD dated 13 May 2020) which got triggered due to suspension in toll operations owing to COVID-19 pandemic.
 - 17 days of extension based on the Government of India notification on Force Majeure Clause (Notification No. COVID-19/RoadMap/JS(H)/2020 dated 26th August, 2021) which got triggered due to suspension in toll operations owing to second wave of COVID-19 pandemic.
- 3.8.7. We understand from the Investment Manager that the ongoing sand mining ban in Rajasthan imposed since the year 2017 has been relaxed by the Supreme Court of India vide order dated 11th November 2021. The Investment Manager is of the opinion that the abovementioned order shall positively affect the project route traffic.

Modification in the Concession Period due to target traffic clause as per Concession Agreement

As per the Clause 29 of the concession agreement between NHAI and IRBJD provided to us by the Investment Manager, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein. The target date and



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target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

| Particulars | Unit | Details |
|--|-------|-----------|
| Target date as per CA | Date | 01-Oct-18 |
| Target traffic as per CA | PCUs | 30,344 |
| Actual Average Traffic | PCUs | 16,611 |
| Comparison of average traffic at test date with target | % | -45% |
| Original concession period | Years | 25 |
| Increase in concession period (Max. upto 20%) | % | 20% |
| Change in concession period | Days | 1,826 |
| Revised concession period | Years | 30 |
| Appointed date | Date | 14-Jun-10 |
| Additional days due to Toll Suspension | Days | 24 |
| Additional days due to pandemic (First wave) | Days | 90 |
| Additional days due to pandemic (Second wave) | Days | 17 |
| Original concession end date | Date | 13-Jun-35 |
| Revised concession end date | Date | 21-Oct-40 |

As informed to us by the Investment Manager, the actual traffic volume has fallen short of the target traffic as on the target date. This warranted for an extension of the concession period by 5 years (1,826 days).

3.8.9. My team had conducted physical site visit of the road stretch of IRBJD on 28th April 2023. Refer below for the pictures of the road stretch:





3.9. **VK1 Expressway Private Limited (“VEL” or the “Project” or the “SPV”)**

3.9.1 Summary of details of VEL is as follows:

| Parameters | Details |
|------------------------|--------------------------------------|
| Total Length | 208.4 lane Kms |
| Nos. of Lanes | 8 |
| NH / SH | NH-8 |
| State Covered | Gujarat |
| Area (Start and End) | Padra to Vadodara |
| Bid Project Cost | INR 20,430 Mn |
| PPP Model | Hybrid Annuity Mode |
| Project Type | Annuity |
| Concession Granted by | NHAI |
| Actual COD | 2 nd April 2022 |
| Nos. of Annuities | 30 Annuities over period of 15 years |
| Concession Period (CP) | 730 days + 15 Years |

Source: Investment Manager

3.9.2 The Project Alignment runs parallel to NH-8, crossing it at Ahmedabad – Vadodara section at Km 374+355 near Vadodara.

3.9.3 The corridor forms a part of the existing road kilometre 355.00 to kilometre 378.74 of Padra-Vadodara section of Vadodara Mumbai Expressway.

| Sr. No. | Salient Features | Count/ units |
|---------|-------------------------------------|----------------|
| 1 | Total Length of the Project Highway | 208.4 Lane Kms |
| 2 | Toll Plaza | 2 Nos. |
| 3 | Bus Bays / Bus Shelters | Nil |
| 4 | Truck Lay Bays | Nil |
| 5 | Rest Area | Nil |
| 6 | Major/ Minor Junction | Nil |
| 7 | Rail Over Bridge | 2 Nos. |



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| | | |
|----|------------------------------------|---------|
| 8 | Vehicular Underpass | 5 Nos. |
| 9 | Light Vehicular Underpass | 2 Nos. |
| 10 | Pedestrian Underpass (PUP/CUP) | 11 Nos. |
| 11 | Flyover | 8 Nos. |
| 12 | Major Bridges | 3 Nos. |
| 13 | Minor Bridges for Main Carriageway | 8 Nos. |
| 14 | Box/ Slab Culverts | 47 Nos. |
| 15 | Pipe Culverts | 18 Nos. |

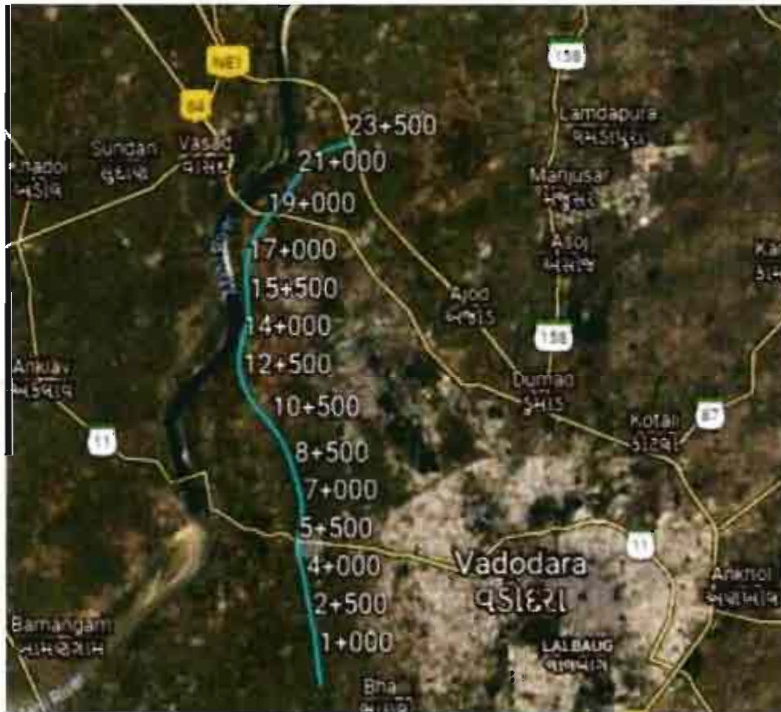
3.9.4 The shareholding of VEL as on the Valuation Date is as follows:

| Sr. No. | Particulars | No. of Shares | % |
|--------------|-----------------|---------------------|----------------|
| 1 | IRB Inv IT Fund | 12,24,99,994 | 99.99% |
| 2 | Others* | 6 | 0.01% |
| Total | | 12,25,00,000 | 100.00% |

*Held by Nominees of IRB InvIT Fund

I have been represented by the Investment Manager that there is no change in shareholding pattern from the Valuation Date till the date of this Report.

3.9.5 The map below illustrates the location of the Project and the corridor it covers:



Source: Investment Manager



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3.9.5 My team had conducted physical site visit of the road stretch of VEL on 2nd August 2022. Refer below for pictures of the road stretch of the Project:



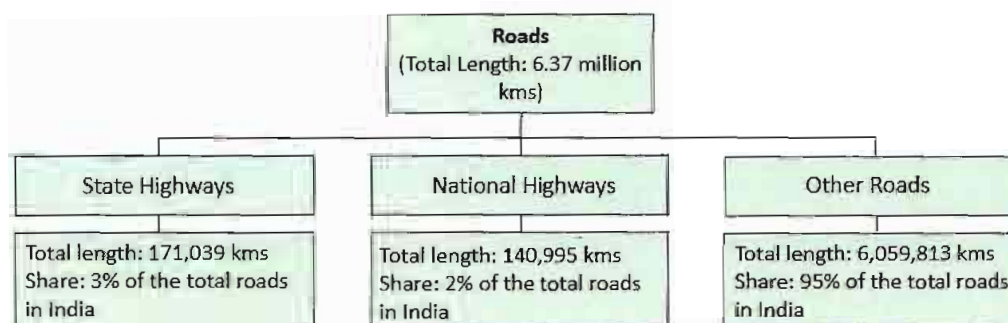
4. Overview of the Industry

4.1 Introduction

- 4.1.1 The road infrastructure is an important determinant of economic growth in India and it plays a significant role in the economy's overall development process.
- 4.1.2 Creation and operation of quality road infrastructure continue to be major requirements for enabling overall growth and development of India in a sustained manner.
- 4.1.3 Bridging of existing infrastructure gaps and creating additional facilities to cater to the increasing population are equally important. Apart from providing connectivity in terms of enabling movement of passengers and freight, roads act as force multipliers in the economy.
- 4.1.4 Further, roads play a significant role in times of natural calamities, wars and other such events in terms of timely evacuation of the impacted population, carriage of relief material and other associated movements. Government takes cognisance of this requirement and road infrastructure remains to be a focus area.

4.2 Road Network in India

- 4.2.1 India has the second largest road network in the world, spanning over 5.8 million kms. Over 64.5% of all goods in the country are transported through roads, while 90% of the total passenger traffic uses road network to commute.



Source: IBEF Roads Report, July 2022

- 4.2.2 Out of this around 1.41 lakh km are National Highways (“NHs”). Significantly, NHs constitute around 2 per cent of the total road network in the country but carry about 40% of the road traffic. The density of India’s highway network at 1.89 km of roads per square kilometer of land – is similar to that of the France (1.98) and much greater than China’s (0.49) or USA’s (0.68).

4.3 Government Agencies for Road Development

- 4.3.1 The Ministry of Road Transport & Highway (“**MoRTH**”) is responsible for development of Road Transport and Highways in general and construction & maintenance of National Highways.
- 4.3.2 The National Highways Authority of India (“**NHAI**”) is an autonomous agency of the Government of India, set up in 1988 and is responsible for implementation of National Highways Development Project (“**NHDP**”).
- 4.3.3 The NHDP in the context of NHs is nearing completion- in seven phases. Later, the other highway development programmes like Special Accelerated Road Development Programme for Development of Road Network in North Eastern States (SARDP- NE) and National Highways Interconnectivity Improvement Project (NHIIIP) were also taken up by MoRTH. Further, Bharatmala Pariyojana is ongoing. For majority of the projects under NHDP and Bharatmala Pariyojana, NHAI is the implementation agency. Other NH related programmes/works are being implemented through agencies like National Highways Infrastructure Development Corporation Limited

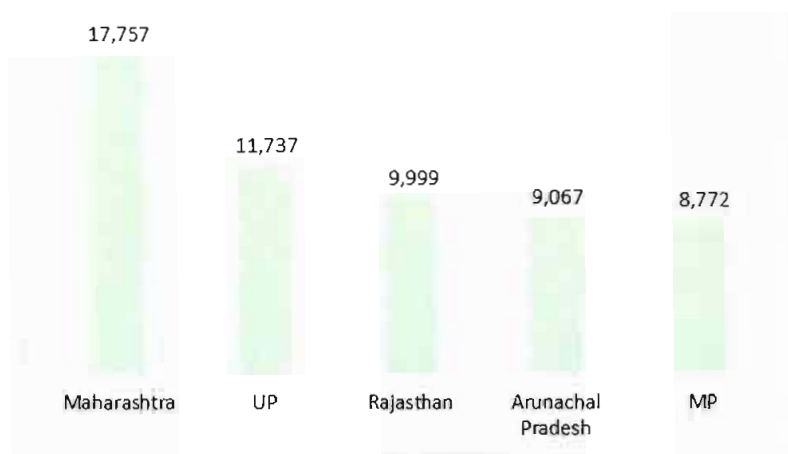


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(NHIDCL), State Public Works Departments (PWDs), State Road Development Corporations and the Border Road Organizations

- 4.3.4 Roads in the jurisdiction of state governments are under different categories like State Highways (“SHs”) and Major District Roads. They are being developed/ upgraded through State PWDs and State Road Development Corporations. Pradhan Mantri Gramm Sadak Yojana is being implemented for rural roads through the Ministry of Rural Affairs with active participation by state governments. Further, roads within urban areas mostly with PWDs and Urban Local Bodies.
- 4.3.5 State Governments have a significant role to play in developing the SHs, Major District Roads, Other District Roads to ensure the last mile connectivity. States have varying levels of maturity in terms of road infrastructure development due to issues such as inadequate identification and prioritization of projects, funding shortfall, limited institutional capacity to implement projects, etc.

Top 5 states by length of NHs in India (in Km)



4.4 Trend of Road and Highways Construction

- 4.4.1 The length of National Highways awarded has almost doubled in the years FY15 to FY18 compared to FY11 to FY14. Length of NHs constructed has increased by 70% during the same period. This pace is expected to gain further ground, with the ambitious targets set by the ministry and the implementation of the Bharatmala Pariyojana as MORTH is planning to construct around 65,000 km of national highways at a cost of Rs 5.35 trillion (US\$ 74.15 billion) by 2022.
- 4.4.2 India has become the fastest highway developer in the world with 27 kms of highways built each day in 2017-18 and plans to construct 25,000 kilometres of national highways in 2022-23 at a pace of 50 km per day.
- 4.4.3 Under the Union Budget 2022-23, the Government of India has allocated Rs. 199,107 crore (US\$ 26.04 billion) to the Ministry of Road Transport and Highways.
- 4.4.4 The GST on construction equipment has been reduced to 18% from 28%, which is expected to give a boost to infrastructure development in the country.
- 4.4.5 The NHDP is a project to upgrade, rehabilitate and widen major highways in India to a higher standard. The project was started in 1998 to be implemented in 7 phases.
- 4.4.6 With the launch of Bharatmala project, 10,000 km of highway construction left under NHDP was merged with Phase I of the Bharatmala project.

The Indian government launched Gati Shakti-National Master Plan, which has consolidated a list of 81 high impact projects, out of which road infrastructure projects were the top priority. The major

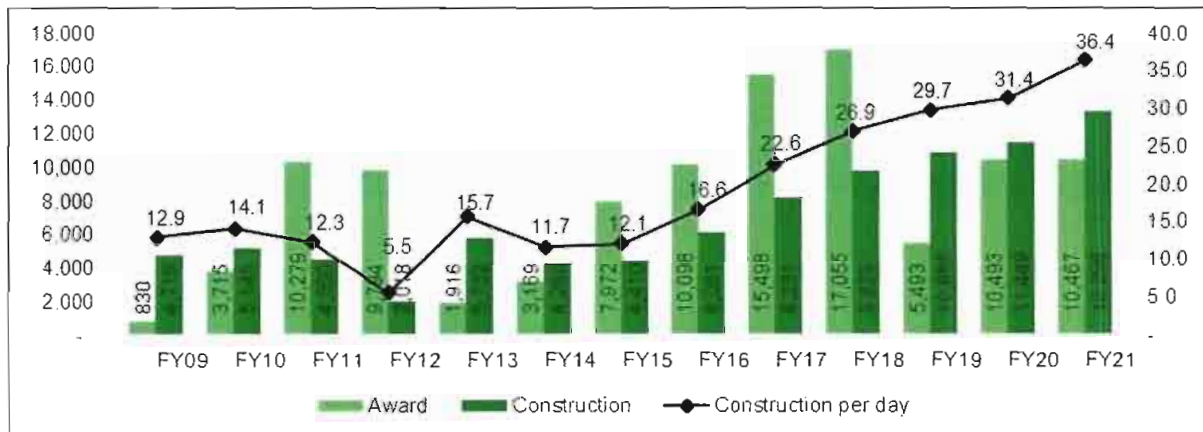


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highway projects include the Delhi-Mumbai expressway (1,350 kilometres), Amritsar-Jamnagar expressway (1,257 kilometres) and Saharanpur-Dehradun expressway (210 kilometres).

- 4.4.8 The main aim of this program is a faster approval process which can be done through the Gati shakti portal and digitized the approval process completely.
- 4.4.9 In December 2021, the government set a highway monetization target of Rs. 2 trillion (US\$ 26.20 billion) for the next 3 years.
- 4.4.10 The Ministry of Road Transport and Highways awarded road projects with a total length of 10,467 kms in FY21.
- 4.4.11 5,835 kms of highways have been constructed until October 2021, while 13,298 kms of highway was constructed in FY21 across India.
- 4.4.12 The Government of India has allocated Rs. 111 lakh crore (US\$ 13.14 billion) under the National Infrastructure Pipeline for FY 2019-25. The Roads sector is expected to account for 18% capital expenditure over FY 2019-25.
- 4.4.13 NHA is planning to raise Rs. 40,000 crore (US\$ 5.72 billion) to monetise its highway assets through Infrastructure Investment Trust (InvIT).
- 4.4.14 The development of market for roads and highways is projected to exhibit a CAGR of 36.16% during 2016-2025, on account of growing government initiatives to improve transportation infrastructure in the country.

Details of national highways awarded (by NHA) and constructed in India (KMs):



4.5 Implementation of important projects and expressways:

4.5.1 Bharatmala Pariyojna

Bharatmala Pariyojana is a new umbrella program 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 expressway.

The Bharatmala Pariyojana envisages development of about 26,000 km length of Economic Corridors, which along with Golden Quadrilateral (GQ) and North-South and East-West (NS-EW) Corridors are expected to carry majority of the Freight Traffic on roads.



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A total length of 34,800 km in road projects have been proposed to be constructed with an estimated outlay of Rs 5.35 trillion (US\$ 74.15 billion) under Bharatmala Pariyojana Phase-I over a five year period (2017-18 to 2021-22).

Components under Bharatmala Pariyojana Phase-I are as given below:

| Component | Length (Km) | Cost (INR Crore) |
|-------------------------------------|---------------|------------------|
| Economic corridors development | 9,000 | 1,20,000 |
| Inter-corridor & feeder roads | 6,000 | 80,000 |
| National Corridors Efficiency | 5,000 | 1,00,000 |
| Border & International connectivity | 2,000 | 25,000 |
| Coastal & port connectivity roads | 2,000 | 20,000 |
| Expressways | 800 | 40,000 |
| Sub Total | 24,800 | 3,85,000 |
| Other works - under NHDP | 10,000 | 1,50,000 |
| Total | 34,800 | 5,35,000 |

Source: Ministry of Road Transport and Highways, Government of India

More than 20,000 km length of roads has already been awarded under the Bharatmala Pariyojana project of which ~7,375 kms have been constructed till December 2021.

4.5.2 Char Dham Vikas Mahamarg Pariyojna:

This project envisages development of easy access to the four dhams in India – Gangotri, Yamunotri, Kedarnath and Badrinath. Development of this route of 889 km route is expected at an estimated cost of INR 12,000 Crores.

4.5.3 Eastern peripheral and western peripheral expressway

These two projects will connect NH-1 and NH-2 from western and eastern side of Delhi.

4.5.4 Setu Bharatam:

This project aims to replace crossings on NHs with Road Over Bridges and Road Under Bridges. It is projected to construct 174 such structures.

4.5.5 To further augment road infrastructure, more economic corridors are also being planned by Government of India as revealed in Budget 2021-22.

- 3,500 km of National Highway works in the state of Tamil Nadu at an investment of INR 1.03 lakh Crores. These include Madurai-Kollam corridor, Chittoor-Thatchur corridor. Construction will start next year.
- 1,100 km of National Highway works in the State of Kerala at an investment of INR 65,000 Crores including 600 km section of Mumbai Kanyakumari corridor in Kerala.
- 675 km of highway works in the state of West Bengal at a cost of INR 25,000 Crores including upgradation of existing road-Kolkata –Siliguri.
- National Highway works of around INR 19,000 Crores are currently in progress in the State of Assam. Further works of more than INR 34,000 Crores covering more than 1300 kms of National Highways will be undertaken in the State in the coming three years.
- In the Union Budget of 2022-23, the increase in Budget was a whopping 68% compared to the last year.
- In the Union Budget of 2022-23, the government plans to complete 25,000 kilometres of National highways.



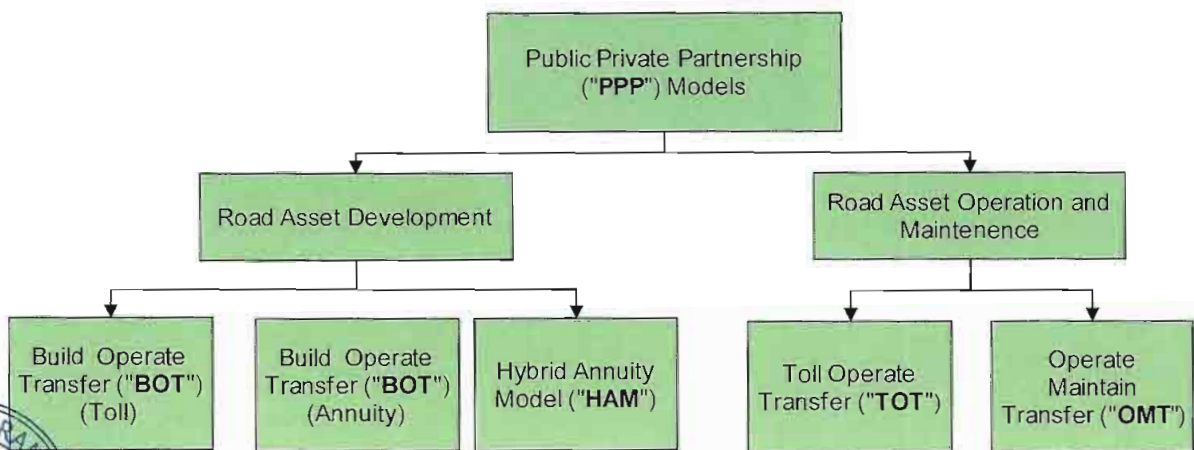
4.6 Opportunities in road development & maintenance in India

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- a. India has joined the league of 15 of global alliance which will work towards the ethical use of smart city technologies
- b. The Government aims to construct 65,000 kms of national highways at a cost of Rs. 5.35 lakh crore (US\$ 741.51 billion).
- c. The government also aims to construct 23 new national highways by 2025.
- d. Road building in India is second least expensive in Asia.
- e. Andhra Pradesh will spend US\$ 296.05 million to build 8,970 kms of roads.
- f. In February 2022, NHAI rolled out a plan to construct 5,795 kilometres of highways that will connect 117 districts. The plan was worth Rs. 1 trillion (US\$ 13.09 billion).

4.7 Public Private Partnership (“PPP”) Models of road development and maintenance in India

- 4.7.1 India has a well-developed framework for Public-Private-Partnerships (PPP) in the highway sector. PPP has been a major contributor to the success story of the roads and highway sector in India. With the emergence of private players over the last decade, the road construction market has become fragmented and competitive. Players bidding for projects also vary in terms of size. PPP modes have been used in India for both development and operation & maintenance of road assets.
- 4.7.2 In FY21, there were 125 PPP projects worth US\$ 23.25 billion in India.
- 4.7.3 NHAI targets 450 kilometres of the Build-operate-transfer (BOT) projects in FY22 and is looking forward to bidding out 600-1000 kilometres of highway stretch under the Build-operate-transfer (BOT) model as of November 2021.
- 4.7.4 In August 2020, the Government of India revised the Model Concession Agreement for BOT projects to plug delays by imposing a deadline on the NHAI and incentivising timely work by concessionaires. According to revised norms, the NHAI will have to hand over 90% of the project land (vacant and ready to build) to private developers, thus creating a more market-friendly sector and attracting more private players.
- 4.7.5 PPP modes have been used in India for both development and operation & maintenance of road assets.



Road Asset Development Models

- BOT Toll

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- In a BOT toll project, the concessionaire is responsible for designing, building, financing, operating, maintaining, tolling and transferring the project to the relevant authority at the end of the concession period. The concession period is project specific but is usually for 30 years. In BOT Toll model, the concessionaire earns revenue primarily in the form of toll revenue which in turns depends on the traffic on the road stretch. Toll rates are regulated by the government through rules.
- **BOT Annuity**
 - Similar to a BOT Toll projects, in BOT Annuity project, the concessionaire is responsible for designing, building, financing, operating, maintaining, tolling and transferring the project to the relevant authority at the end of the concession period. However, in these projects, the responsibility of tolling on road stretch lies with the government. The concessionaire earns revenue in the form of pre-determined semi-annual annuity payments.
- **HAM**
 - Similar to a BOT projects, in HAM project, the concessionaire is responsible for designing, building, financing, operating, maintaining, tolling and transferring the project to the relevant authority at the end of the concession period. However, in these projects, the responsibility of tolling on road stretch lies with the government. The construction period for HAM projects is project specific and a fixed operation period of 15 years.

4.8 Government Investment in the Sector

- 4.8.1 Under Union Budget 2022-23, the Government of India has allocated Rs. 199,107 crore (US\$ 26.04 billion) to the Ministry of Road Transport and Highways.
- 4.8.2 During 2019-23, NHAI is expected to generate Rs. 1 trillion (US\$ 14.30 billion) annually from toll and other sources.
- 4.8.3 NHAI is planning to raise Rs. 40,000 crore (US\$ 5.72 billion) to monetize its highway assets through Infrastructure Investment Trust (InvIT). Five operational roads with an estimated enterprise value of INR 5,000 crores are being transferred to the NHAI InvIT.

4.9 Growth Drivers

4.9.1 Robust Demand :

Growing domestic trade flows have led to rise in commercial vehicles and freight movement; supported by rise in production of commercial vehicles to 752,022 in FY20 which commands stronger road network in India. Higher individual discretionary spending has led to increased spending on two and four wheelers. Domestic sales of passenger vehicles, three-wheelers and two-wheelers, reached 254,287, 24,091, and 1,128,293 units, respectively, in January 2022. Road's traffic share of the total traffic in India has grown from 13.8% to 65% in freight traffic and from 32% to 90% in passenger traffic over 1951–2019.

4.9.2 Increasing Investment :

Huge investment have been made in the sector with total investment increasing more than three times from Rs. 51,914 crore (US\$ 7.43 billion) in 2014-15 to Rs. 158,839 crore (US\$ 22.73 billion) in 2018- 19. Between FY16 and FY21, budget outlay for road transport and highways increased at a robust CAGR of 13.10%. Under the Union Budget 2022-23, the Government of India has allocated Rs. 199,107.71 crore (US\$ 26.04 billion) to the Ministry of Road Transport and Highways.

4.9.3 Policy Support :

100% FDI is allowed under automatic route subject to applicable laws and regulations, standardized process for bidding and tolling. Under Union Budget 2020-21, the Government of



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India has allocated Rs. 19,500 crore (US\$ 2.79 billion) for Pradhan Mantri Gram Sadak Yojana (PMGSY) which is a scheme for development of rural roads in India. Government of India has set up India Infrastructure Finance Company (IIFCL) to provide long-term funding for infrastructure projects.

4.10 Challenges & Issues in the Sector

4.10.1 Land Acquisition Delays & Cost :

- Land acquisition cost has increased more than 30% since 2017, primarily due to enhanced compensation payment requirements as per 'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013'.
- Delay in pre-construction activities (such as land acquisition, relocation) affects project timelines. Land acquisition for road projects involves various stages. Each stage involves a number of stakeholders and regulatory bodies. Thus processes consume considerable time.

4.10.2 Regulatory Approvals & Disputes :

- Road development process requires a number of approvals such as environmental clearance, forest clearance, railways clearance, etc. Each of these activities takes considerable time and non-adherence to timelines result in cost overruns due to delays.
- Claims arising out of disputes between the concessionaire/ contractor and the government authorities are also a significant cost which can lead to large liabilities.

4.10.3 Operational Issues :

- Uncertainty of toll revenue collection and variation of collected toll revenue compared to projected levels as Actual traffic is much less than the anticipated traffic.
- Often unforeseen weather conditions require unplanned O&M, over and above the routine and periodic maintenance activities. This results in enhanced O&M expenses. The increase in O&M costs is also affecting the project returns.

4.10.4 Financing road construction projects :

- In the case of toll motorways, the challenge of financing construction projects is different but still remains. Traditionally, the construction of toll motorways is a profitable investment but in the times of recession, funding may be rare or non-existent.
- Powerful national economies may be able to efficiently tackle the problem but weaker economies can hardly find the financing sources for road construction projects.

5.10.5 Climate Change

- The road sector is vulnerable to climate change impacts. Climate change and extreme weather events pose a significant challenge to the safety, reliability, effectiveness and sustainability of road transportation systems. Tsunami waves, wildfires, floods and hurricanes constitute a big risk for passengers, vehicles and goods, as well as for the integrity of the transport infrastructure.
- Since reliable road transport is an essential driver of economic growth and social wellbeing worldwide, national road authorities and motorway operators must adapt the infrastructure to climate change and increase the resilience of road transport to extreme weather

5.10.6 Economy and cost effectiveness :

- Among all transport modes, road transport occupies a significant place in short- and medium distance travel operations. However, the unit cost of transportation (per ton × km), compared with



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other modes of transport, remains high and is getting higher and cost-ineffective as the travel distance increases.

- Road transport cost comprises direct costs (fuel, capital depreciation, maintenance, motorway tolls, ferry fares and wages) and external costs (noise, congestion, infrastructure damages, health and environmental issues).

19.1 Recent Initiatives by Government

19.1.1 Bhoomi Rashi – Land Acquisition Portal

The ministry has corroborated with the National Informatics Centre, to create Bhoomirashi, a web portal which digitises the cumbersome land acquisition process, and also helps in processing notifications relating to land acquisition online. Processing time, which was earlier two to three months has come down to one to two weeks now.

19.1.2 FASTag – Electronic Toll Collection

National Electronic Toll Collection (NETC) system, has been implemented on pan India basis in order to remove bottlenecks and ensure seamless movement of traffic and collection of user fee as per the notified rates, using passive Radio Frequency Identification (RFID) technology. In Q2 2022, NETC processed about 829 million transactions worth INR 129 billion. The transactions volume increased by 89% while value increased by 72% as compared to Q2 2021. As of March 2022, the total number of banks live with NETC FASTag were 36 while about 52.9 million NETC FASTags have been issued since the inception of the NETC program.

19.1.3 Revival of languishing projects

Projects which were languishing for a number of years have been attempted to be revived, with the help of a number of policy measures taken by the government. Some of the policy measures like Premium deferment in stressed projects, extension of concession period for languishing projects to the extent of delay not attributable to concessionaires, One Time Capital Support for physical completion of languishing projects that have achieved at least 50 per cent physical progress, through one time fund infusion by NHAI, subject to adequate due diligence on a case to case basis.

5.10.7 Rural development

Under the Union Budget 2021-22, the Government of India allocated Rs. 19,000 (US\$ 2.37 billion) for Pradhan Mantri Gram Sadak Yojana (PMGSY), a 36% rise over the earlier estimate of 2021-22. Under the Union Budget 2020-21, the Government of India has allocated Rs. 19,500 crore (US\$ 2.79 billion) for Pradhan Mantri Gram Sadak Yojana (PMGSY).

5.10.8 Improve safety standards

In October 2021, the government announced rules to improve road safety, such as fixed driving hours for commercial truck drivers and a mandate to install sleep detection sensors in commercial vehicles. In October 2020, a memorandum of understanding (MoU) has been signed with the National Highways Authority of India (NHAI) by Guru Nanak Dev University (GNDU) to conduct advanced research on various aspects, including highway architecture, protection and revitalisation. The GNDU will undertake studies on ~137 km length of the National Highways passing through Pathankot, Gurdaspur and Amritsar districts.

5.10.9 Portfolios in roads & highways sector

In October 2020, the National Investment and Infrastructure Fund (NIIF) is making progress towards integrating its road and highway portfolio. The NIIF has acquired Essel Devanahalli Tollway and Essel Dichpally Tollway through the NIIF master fund. These road infra-projects will



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be supported by Athaang Infrastructure, NIIF's proprietary road network, assisted by a team of established professionals with diverse domain expertise in the transport field.

5.10.10 International Tie-ups

In December 2020, the Ministry of Road Transport and Highways signed an MoU with the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology of the Republic of Austria on technology cooperation in the road infrastructure sector.

5.10.11 Encourage private funding to reduce finance constraints

- Cumulative FDI inflows in construction development stood at US\$ 26.21 billion between April 2000 - March 2022. Maif 2 Investments India Pvt. Ltd. became the first-largest foreign investment in Indian roads sector under toll-operate-transfer (TOT) mode worth Rs. 9,681.5 crore (US\$ 1.50 billion).
- In October 2020, the Asian Development Bank (ADB) and the Government of India signed a US\$ 177 million loan to upgrade 450 kms of state highways and major district roads in Maharashtra.
- In January 2021, the Government of India and New Development Bank (NDB) signed two loan agreements for US\$ 646 million for upgrading the state highway and district road networks in Andhra Pradesh.
- In August 2020, the Government of India revised the Model Concession Agreement for BOT projects to plug delays by imposing a deadline on the NHAI and incentivising timely work by concessionaires.
- According to revised norms, the NHAI will have to hand over 90% of the project land (vacant and ready to build) to private developers, thus creating a more market-friendly sector and attracting more private players.

Sources: IBEF Roads Report, March 2022; KPMG Report - Roads and Highway Sector; website of Ministry of Road Transport and Highways, Government of India.

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5. Valuation Methodology and Approach

- 5.1. The present valuation exercise is being undertaken in order to derive the fair EV of the SPVs.
- 5.2. The valuation exercise involves selecting a method suitable for the purpose of valuation, by exercise of judgment by the valuers, based on the facts and circumstances as applicable to the business of the company to be valued.
- 5.3. There are three generally accepted approaches to valuation:
 - (a) "Cost" approach
 - (b) "Market" approach
 - (c) "Income" approach

5.4. Cost Approach

The cost approach values the underlying assets of the business to determine the business value. This valuation method carries more weight with respect to holding companies than operating companies. Also, cost value approaches are more relevant to the extent that a significant portion of the assets are of a nature that could be liquidated readily if so desired.

Net Asset Value ("NAV") Method

The NAV Method under Cost Approach considers the assets and liabilities, including intangible assets and contingent liabilities. The Net Assets, after reducing the dues to the preference shareholders, if any, represent the value of a company.

The NAV Method is appropriate in a case where the main strength of the business is its asset backing rather than its capacity or potential to earn profits. This valuation approach is also used in cases where the firm is to be liquidated, i.e. it does not meet the "going concern" criteria.

As an indicator of the total value of the entity, the NAV method has the disadvantage of only considering the status of the business at one point in time.

Additionally, NAV does not properly take into account the earning capacity of the business or any intangible assets that have no historical cost. In many aspects, NAV represents the minimum benchmark value of an operating business.

5.5. Market Approach

Under the Market approach, the valuation is based on the market value of the company in case of listed companies, and comparable companies' trading or transaction multiples for unlisted companies. The Market approach generally reflects the investors' perception about the true worth of the company.

Comparable Companies Multiples ("CCM") Method

The value is determined on the basis of multiples derived from valuations of comparable companies, as manifest in the stock market valuations of listed companies. This valuation is based on the principle that market valuations, taking place between informed buyers and informed sellers, incorporate all factors relevant to valuation. Relevant multiples need to be chosen carefully and adjusted for differences between the circumstances.

Comparable Transactions Multiples ("CTM") Method

Under the CTM Method, the value is determined on the basis of multiples derived from valuations of similar transactions in the industry. Relevant multiples need to be chosen carefully and adjusted for differences between the circumstances. Few of such multiples are EV/Earnings before Interest, Taxes, Depreciation & Amortization ("EBITDA") multiple and EV/Revenue multiple.



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Market Price Method

Under this method, the market price of an equity share of the company as quoted on a recognized stock exchange is normally considered as the fair value of the equity shares of that company where such quotations are arising from the shares being regularly and freely traded. The market value generally reflects the investors' perception about the true worth of the company.

5.6. Income Approach

The income approach is widely used for valuation under "Going Concern" basis. It focuses on the income generated by the company in the past as well as its future earning capability. The Discounted Cash Flow Method under the income approach seeks to arrive at a valuation based on the strength of future cash flows.

Discounted Cash Flow ("DCF") Method

Under DCF Method value of a company can be assessed using the Free Cash Flow to Firm Method ("FCFF") or Free Cash Flow to Equity Method ("FCFE"). Under the DCF method, the business is valued by discounting its free cash flows for the explicit forecast period and the perpetuity value thereafter. The free cash flows represent the cash available for distribution to both, the owners and creditors of the business. The free cash flows in the explicit period and those in perpetuity are discounted by the Weighted Average Cost of Capital ("WACC"). The WACC, based on an optimal vis-à-vis actual capital structure, is an appropriate rate of discount to calculate the present value of future cash flows as it considers equity-debt risk by incorporating debt-equity ratio of the firm.

The perpetuity (terminal) value is calculated based on the business' potential for further growth beyond the explicit forecast period. The "constant growth model" is applied, which implies an expected constant level of growth for perpetuity in the cash flows over the last year of the forecast period.

The discounting factor (rate of discounting the future cash flows) reflects not only the time value of money, but also the risk associated with the business' future operations. The EV (aggregate of the present value of explicit period and terminal period cash flows) so derived, is further reduced by the value of debt, if any, (net of cash and cash equivalents) to arrive at value to the owners of the business.

Conclusion on Valuation Approach

- 5.7. It is pertinent to note that the valuation of any company or its assets is inherently imprecise and is subject to certain uncertainties and contingencies, all of which are difficult to predict and are beyond my control. In performing my analysis, I have made numerous assumptions with respect to industry performance and general business and economic conditions, many of which are beyond the control of the SPVs. In addition, this valuation will fluctuate with changes in prevailing market conditions, and prospects, financial and otherwise, of the SPVs, and other factors which generally influence the valuation of companies and their assets.
- 5.8. The goal in selection of valuation approaches and methods for any financial instrument is to find out the most appropriate method under particular circumstances on the basis of available information. No one method is suitable in every possible situation. Before selecting the appropriate valuation approach and method, I have considered various factors, inter-alia, the basis and premise of current valuation exercise, purpose of valuation exercise, respective strengths and weaknesses of the possible valuation approach and methods, availability of adequate inputs or information and its reliability and valuation approach and methods considered by the market participants.

Cost Approach

The existing book value of EV of the SPVs comprising of the value of its Net fixed assets, Net intangible assets and working capital based on the unaudited financial statements as at 31st March



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2023 and based on the audited financial statements as at 31st March 2023 prepared as per Indian Accounting Standards (Ind AS) are as under:

| Book EV (INR Mn) | 30-Sep-22 | 31-Mar-23 |
|---------------------|-----------------|-----------------|
| MVR | 1,684.0 | 1,475.0 |
| IRBPA | 12,484.9 | 12,359.1 |
| IRBTA | 5,615.2 | 5,611.1 |
| IRBTC | 10,710.6 | 10,621.9 |
| IRBJD | 13,212.9 | 12,934.8 |
| VEL | - | 12,058.3 |
| Total | 43,707.6 | 55,014.5 |

In the present case, The SPVs operate and maintain the project facilities in accordance with the terms and conditions under the relevant concession agreement. During the concession period, the SPVs operate and maintain the road asset and earn revenues through charges, fees or tolls generated from the asset. The amount of charges, fees or tolls that they may collect are notified by the relevant government agency, which are usually revised annually as specified in the relevant concessions and toll notifications. In such scenario, the true worth of the business is reflected in its future earning capacity rather than the cost of the project. Accordingly, I have not considered the cost approach for the current valuation exercise.

Market Approach

The present valuation exercise is to undertake fair EV of the SPVs engaged in the road infrastructure projects for a predetermined tenure. Further, the tariff revenue and expenses are very specific to the SPVs depending on the nature of their geographical location, stage of project, terms of profitability. In the absence of any exactly comparable listed companies with characteristics and parameters similar to that of the SPVs, I have not considered CCM method in the present case. In the absence of adequate details about the Comparable Transactions, I was unable to apply the CTM method. Currently, the equity shares of the SPVs are not listed on any recognized stock exchange of India. Hence, I was unable to apply market price method.

Income Approach

Each of the SPVs operates under a BOT or DBFOT concession agreement with the NHAI. Government authorities in India typically award highway infrastructure development projects under BOT concessions, which are characterized by three distinct phases:

1. Build: upon successfully securing a project concession through a competitive bid, a concessionaire secures financing for, and completes construction, of a road;
2. Operate: during the agreed concession period, the concessionaire operates, manages and maintains the road at its own expense and earns revenues by collecting tolls from vehicles using the road; and
3. Transfer: at the end of the agreed concession period, the ownership of the road, the obligation to maintain the road and the right to collect tolls from the vehicles using the road revert to the government entity that granted the concession.

A DBFOT project involves, in addition to the activities required under a BOT project, the provision of engineering design and financing for such project.

Currently, each of the SPVs are completed and are revenue generating SPVs. The revenue of the SPVs is based on tenure, traffic volumes, operations and other factors that are unique to each of the SPVs. The growth potential of the SPVs and the true worth of its business would be reflected



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in future earnings of each of the SPVs. I have been provided with the projected financial information for each of the SPVs under consideration, by the Investment Manager. Accordingly, DCF Method under the income approach has been considered as an appropriate method for the present valuation exercise.

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6. Valuation of the SPVs

6.1. I have estimated the EV of the SPVs using the DCF Method. While carrying out this engagement, I have relied extensively on the information made available to me by the Investment Manager. I have considered projected financial statement of the SPVs as provided by the Investment Manager.

Valuation

6.2. The key assumptions of the projections provided to us by the Investment Manager are:

Key Assumptions:

6.2.1. **Toll Revenue:** As per the concession agreements for the respective SPVs, each SPV is allowed to levy, demand, collect and appropriate the fees (called as toll fees) from vehicles and persons liable to payment of fees for using their respective road asset or any part thereof and refuse entry of any vehicle to the road asset if the due fee is not paid. Toll revenues depend on toll receipts, which in turn depend on traffic volumes and toll fees on the toll roads.

Concession Period

The Concession Period refers to the period where the Concessionaire is granted with the exclusive rights, license and authority to demand, collect and appropriate fee, operate, manage and maintain the project highway subject to the terms and conditions mention in their respective concession agreement. The cash flow projection are prepared by the Investment Manager for the balance concession period remaining from the Valuation Date as summarized below:

| SPV | Concession Period End Date | | Extension Period | |
|-------|--------------------------------|--------------------------------|----------------------|-------------------|
| | Original | Revised | For Traffic Variance | For Other Reasons |
| MVR | 13 th August 2026 | 12 th January 2027 | - | 152 |
| IRBPA | 30 th December 2030 | 2 nd January 2038 | 1,460 | 1100 |
| IRBTA | 2 nd September 2032 | 2 nd June 2037 | *1,606 | 127 |
| IRBTC | 3 rd June 2037 | 29 th December 2042 | *1,899 | 136 |
| IRBJD | 13 th June 2035 | 21 st October 2040 | 1,826 | 131 |
| VEL | 29 th March 2037 | 29 th March 2037 | - | - |

**subject to NHA approval*

I understand, as per the extant provisions of the Concession Agreements for the respective SPVs in relation to the traffic variation, the concession period could be modified to take into the account shortfall or excess in actual average traffic vis-à-vis the target traffic ranging beyond 2.5% and such concession extension or truncation shall be subject to a cap of 20% extension for shortfall and 10% for truncation for excess.

Accordingly, in the Investment Manager has considered an extension period based on its calculation which is subject to the approval from the NHA Authorities in case of IRBTA & IRBTC. I have relied on the information provided by the Investment Manager.



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| SPVs | NHAI Approval Order | Description |
|-------|---|--|
| IRBPA | Received | Incremental concession period of 4 years (1,460 days) arising out of variation in traffic has been considered for valuation and NHAI approval for the same is received vide letter dated 5th March, 2021 |
| IRBTA | Not received (Already filed a traffic survey with NHAI vide letters dated 2nd April 2021, 14th October, 2020 and 25th September, 2020 for extension) | Incremental concession period of 4.4 years (1,606 days) arising out of variation in traffic has been considered for valuation. SPV has already filed a traffic survey calculation with NHAI vide letters dated 2nd April 2021, 14th October, 2020 and 25th September, 2020 for extension. However NHAI approval for the same is pending as on report date. |
| IRBTC | Not received (Filed with NHAI vide letter dated 14th April, 2021) | Incremental concession period of 5.2 years (1,899 days) arising out of variation in traffic as per Concession Agreement, though it has been intimated to NHAI vide letter dated 14th April, 2021, approval for the same is pending as on report date. |
| IRBJD | Received | Incremental concession period of 5 years (1,826 days) arising out of variation in traffic has been considered for valuation as per the NHAI approval dated 18th March, 2020 No. NHAI/JPR/J.T.D/Conce./JM/2020/3362. |

Extension for Other Reasons: NHAI vide its various orders has extended the concession period of the BOT Toll Projects for reasons including natural calamities, lockdowns on account of COVID-19, etc.

I have considered the projection period for the current valuation exercise based on the balance concession period as represented by the Investment Manager.

Traffic Volumes

Traffic volumes are directly or indirectly affected by a number of factors, many of which are outside of the control of the SPVs, including: toll fees; fuel prices in India; the frequency of traveller use; the quality, convenience and travel efficiency of alternative routes outside the SPV's network of toll roads; the convenience and extent of a toll road's connections with other parts of the local, state and national highway networks; the availability and cost of alternative means of transportation, including rail networks and air transport; the level of commercial, industrial and residential development in areas served by the SPVs' projects; adverse weather conditions; and seasonal holidays.

Toll Rates

During the concession period, the SPVs operate and maintain the road asset and earn revenues through charges, fees or tolls generated from the asset. The amount of charges, fees or tolls that they may collect are notified by the relevant government agency, which are usually revised annually as specified in the relevant concessions and toll notifications. The revision typically either (i) is linked to the extent of variation in the Wholesale Price Index for all commodities as published by the Ministry of Industry (the "WPI") or (ii) comprises a fixed component, which is three percent and a component linked to variation in the WPI, which is capped at 40% of the variation in the WPI.

The toll rates for the projected period have been derived in the manner stipulated in the individual concession agreements of the SPVs. The variable determinant supporting escalation in toll tariff is WPI which is considered as 5.0% p.a. through the projected period based on the discussion with the Investment Manager.

In the present case, the Investment Manager has appointed M/s GMD Consultants, an independent third-party research agency to forecast the traffic volumes and toll revenues for the SPVs' projects and to prepare traffic reports for the SPVs under consideration. As confirmed by the Investment Manager, the traffic volumes and toll revenues for each SPV has been estimated by the traffic consultant after considering overall structure and condition of the projects including analysis of demand and supply and strategic geographical locations of the individual road projects. This was one of the most important input in projecting the toll revenues.



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6.2.2. **Operating & Maintenance Expenses (Routine maintenance):** A SPV is generally responsible for carrying out operation and maintenance activities at its toll road during its concession period. Within the scope of such operation and maintenance obligations, the 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, prevent any unauthorized entry to and exit from the project as may be required. The Project Manager, together with the SPVs, manages the critical day-to-day operation and maintenance of the SPVs. In the present case, the Investment Manager has relied on the technical study report provided by the external professional agency (M/s GMD Consultants) for estimating the O&M (routine) expenses for the projected period. Further, I have been informed that the SPVs have entered into long term agreement with the Sponsor to provide O&M support with respect to Routine and Periodic maintenance and the cost considered in the projections are in-line with the terms of these contracts.

6.2.3. **Major Maintenance Expenses (Periodic maintenance):**

Estimating the Major Maintenance Expenses

Period maintenance expenses will be incurred on periodic basis say every 2-5 years. These are the costs incurred to bring the road assets back to its earlier condition or keep the road assets in its present condition. Similar to O&M routine maintenance expenses, Investment Manager has relied on the technical study report provided by the external professional agency (M/s GMD Consultants) for estimating major maintenance expenses for the projected period.

Provisions for Major Maintenance Expenses and Cash Flow Adjustments

As per the financial requirements, provision is required for appropriate major maintenance expense over a period until the actual expenditure is incurred. These are non-cash expenses. Hence, for my DCF analysis, such provisions are added back in their respective years and the actual expenditure expected to be incurred during the particular interval of 2-5 years is deducted in those respective years in order to arrive at net cash flows.

The Investment Manager has provided me the estimated Major Maintenance Expenses.

6.2.4. **Depreciation and Amortization:** The toll collection rights (intangible assets) of the SPVs are being amortized using revenue-based amortization method. Under this method, the carrying value of the toll collection rights is amortised in the proportion of the actual toll revenue for the year to the projected revenue for the balance toll period, to reflect the pattern in which the economic benefits of the assets will be consumed. Further, for other fixed assets, depreciation is calculated on written down value method (WDV) using the useful lives prescribed by the Companies Act, 2013.

6.2.5. **NHAI Premium:** NHAI premium is the payment made by the concessionaire to NHAI for bagging the right to finance, develop, maintain and collect tolls from the road project during the concession period. Based on the future traffic estimates, the developers have to bid the premium amount that they pay to NHAI upfront. Further, developers can defer premium payment only if they do not collect enough toll revenue in a year to pay for it after servicing debt and other maintenance costs. They have to pay interest on the premium deferred. For the DCF, the NHAI premium provision (which is expensed out in the Profit & Loss) is added back since it is non-cash expenditure and the actual premium & interest on the same paid in each of the projected years is deducted to arrive at the net cash flows. Based on the representation of the Investment Manager, in case of IRBTC, interest on deferred NHAI premium is assumed at 8.15% per annum throughout the balance project life (based on the bank rate applicable as of 31st March 2023).

Revenue Share: The revenues collected from the toll would be shared annually and paid to the NHAI in the form of a concession fee. The percentage of revenue that the Road Project



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has to share with the NHAI is defined in the Concession Agreement. This is applicable in case of MVR only. The SPVs records revenue on the net of share of revenue basis only. Further, the projections provided by the Investment Manager are on the basis of share of revenue that belongs to the individual SPV only. Accordingly, no additional adjustment in relation to share of revenue that belongs to NHAI is required in order to derive the enterprise values of the SPVs.

- 6.2.7. **Capital Expenditure ("Capex"):** As represented by the Investment Manager, regarding the maintenance Capex, the same has already been considered in the Operations & Maintenance expenditure and Major maintenance expenditure for the projected period and regarding the expansion Capex, the SPVs are not expected to incur any capex in the projected period.
- 6.2.8. **Working Capital:** The entire collection of tolls is in cash and routine expenses are in cash or a credit period is available. In these cases the effective working capital deployed is relatively small or negative in certain instances. Further, I understand the working capital is expected to be stable and is not expected to vary drastically over a period of time. Hence, changes in working capital have been considered as an adjustment for its release or payment in the projected cash flows towards the end of the concession period.
- 6.2.9. **Taxes:** As per the discussions with the Investment Manager, taxes payable by the SPVs for the projected period shall be MAT rates or normal tax rates, whichever is applicable. While projecting the tax numbers, 80-IA benefits under the Income Tax Act, 1961 has been considered to arrive at tax payable by the SPVs.

6.3. Impact of Ongoing Material Litigation on Valuation

As on 31st December 2023, there are ongoing tax litigations as shown in Appendix 4 which are having no deposits paid under dispute/ protest for the SPVs, as informed by the Investment Manager. As represented by the Investment Manager, the Sponsor would indemnify the Trust and its SPVs against any financial losses suffered or incurred in connection with any pending or threatened claims against the Trust made prior to the transfer of the assets to the Trust, hence no impact has been factored on the valuation of the SPVs.

6.4. Modification in Concession Period

As per the Concession Agreement clause between NHAI and SPVs as provided to us by the management of the Sponsors, "In the event Actual Average Traffic shall have fallen short of the target traffic, then for every 1% shortfall as compared to the target traffic, the Concession period shall, subject to payment of Concession Fee in accordance with this Agreement, be increased by 1.5% thereof; provided such increase in Concession period shall not in any case exceed 20% of the Concession period.

6.5. Calculation of Weighted Average Cost of Capital for the SPVs

6.5.1. Cost of Equity:

Cost of Equity (CoE) is a discounting factor to calculate the returns expected by the equity holders depending on the perceived level of risk associated with the business and the industry in which the business operates.

For this purpose, I have used the Capital Asset Pricing Model (CAPM), which is a commonly used model to determine the appropriate cost of equity for the SPVs.

$$K(e) = R_f + [ERP * Beta] + CSRP$$



Wherein:

K(e) = cost of equity

Rf = risk free rate

ERP = Equity Risk Premium

Beta = a measure of the sensitivity of assets to returns of the overall market

CSRP = Company Specific Risk Premium (In general, an additional company-specific risk premium will be added to the cost of equity calculated pursuant to CAPM).

For valuation exercise, I have arrived at adjusted cost of equity of the SPVs based on the above calculation (Refer Appendix 2).

6.5.2. Risk Free Rate:

I have applied a risk free rate of return of 7.3% on the basis of the zero coupon yield curve as on 31st March 2023 for government securities having a maturity period of 10 years, as quoted on the website of Clearing Corporation of India Limited ("CCIL").

6.5.3. Equity Risk Premium ("ERP"):

Equity Risk Premium is a measure of premium that investors require for investing in equity markets rather than bond or debt markets. The equity risk premium is estimated based on consideration of historical realised returns on equity investments over a risk-free rate as represented by 10 year government bonds. Based on the aforementioned, a 7% equity risk premium for India is considered appropriate.

6.5.4. Beta:

Beta is a measure of the sensitivity of a company's stock price to the movements of the overall market index. In the present case, I find it appropriate to consider the beta of companies in similar business/ industry to that of the SPVs for an appropriate period.

Based on my analysis of the listed InvITs and other companies in road infrastructure sectors, I find it appropriate to consider the beta of Ashoka Buildcon Limited and IRB Infrastructure Developers Limited for an appropriate period for the current valuation exercise.

I have further unlevered the beta of such companies based on market debt-equity of the respective company using the following formula:

$$\text{Unlevered Beta} = \text{Levered Beta} / [1 + (\text{Debt} / \text{Equity}) * (1-T)]$$

Further I have re-levered it based on debt-equity at 50:50 based on the average debt:equity ratio of a Road BOT project over its life of concession using the following formula:

$$\text{Re-levered Beta} = \text{Unlevered Beta} * [1 + (\text{Debt} / \text{Equity}) * (1-T)]$$

Accordingly, as per above, I have arrived at re-levered betas of the SPVs. (Refer Appendix 2)

6.5.5. Company Specific Risk Premium ("CSRP"):

Discount Rate is the return expected by a market participant from a particular investment and shall reflect not only the time value of money but also the risk inherent in the asset being valued as well as the risk inherent in achieving the future cash flows. In the present case, considering the length of the explicit period, the basis of deriving the underlying cash flows and basis my discussion with Investment Manager, I found it appropriate to consider the following CSRPs:

| SPVs | CSRP |
|-------|------|
| MVR | 0% |
| IRBPA | 3% |
| IRBTA | 2% |
| IRBTC | 2% |
| IRBJD | 2% |
| VEL | 0% |

Cost of Debt:



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The calculation of Cost of Debt post-tax can be defined as follows:

$$K(d) = K(d) \text{ pre-tax} * (1 - T)$$

Wherein:

K(d) = Cost of debt

T = tax rate as applicable

For valuation exercise, pre-tax cost of debt has been considered as 8.5%, as represented by the Investment Manager.

6.5.7. Debt : Equity Ratio:

In present valuation exercise, I have considered debt: equity ratio of 50:50 based on average debt:equity ratio of a Road BOT project over its life of concession. Accordingly, I have considered the same weightage to arrive at the WACC of the SPVs.

6.5.8. Weighted Average Cost of Capital (WACC):

The discount rate, or the WACC, is the weighted average of the expected return on equity and the cost of debt. The weight of each factor is determined based on the company's optimal capital structure.

Formula for calculation of WACC:

$$WACC = [K(d) * \text{Debt} / (\text{Debt} + \text{Equity})] + [K(e) * (1 - \text{Debt} / (\text{Debt} + \text{Equity}))]$$

Accordingly, as per above, I have arrived the WACC for the explicit period of the SPVs. (Refer Appendix 2).

- 6.6. At the end of the agreed concession period, the ownership of the road, the obligation to maintain the road and the right to collect tolls from the vehicles using the road revert to the government entity that granted the concession by the SPVs. Hence, SPVs are not expected to generate cash flow after the expiry of their respective concession agreements. Accordingly, I found it appropriate not to consider terminal period value, which represents the present value at the end of explicit forecast period of all subsequent cash flows to the end of the life of the asset or into perpetuity if the asset has an indefinite life, in this valuation exercise.

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7. Valuation Conclusion

- 7.1. The current valuation has been carried out based on the discussed valuation methodology explained herein earlier. Further, various qualitative factors, the business dynamics and growth potential of the business, having regard to information base, management perceptions, key underlying assumptions and limitations were given due consideration.
- 7.2. I have been represented by the Investment Manager that there is no potential devolvement on account of the contingent liability as of valuation date; hence no impact has been factored in to arrive at EV of the SPVs.
- 7.3. Based on the above analysis, the EV as on the Valuation Date of the SPVs is as mentioned below: (Refer Appendix 1)

| SPVs | Explicit Projection period | | Enterprise Value (INR Mn) |
|----------------------|--------------------------------|---------------------|---------------------------|
| | End Date | Balance Period | |
| MVR | 12 th Jan 2027 | ~ 3 Years 9 Months | 3,503 |
| IRBPA | 02 nd January 2038 | ~ 14 Years 9 Months | 16,308 |
| IRBTA | 2 nd June 2037 | ~ 14 Years 2 Months | 9,316 |
| IRBTC | 29 th December 2042 | ~ 14 Years 9 Months | 20,724 |
| IRBJD | 21 st October 2040 | ~ 17 Years 7 Months | 18,812 |
| VEL | 29 th March 2037 | ~ 14 Years 0 Months | 13,779 |
| Total of SPVs | | | 82,442 |

- 7.4. EV is described as the total value of the equity in a business plus the value of its debt and debt related liabilities, minus any cash or cash equivalents to meet those liabilities.
- 7.5. The fair EV of the SPVs is estimated using DCF method. The valuation requires Investment Manager to make certain assumptions about the model inputs including forecast cash flows, discount rate, and credit risk.
- 7.6. Valuation is based on estimates of future financial performance or opinions, which represent reasonable expectations at a particular point of time, but such information, estimates or opinions are not offered as predictions or as assurances that a particular level of income or profit will be achieved, a particular event will occur or that a particular price will be offered or accepted. Actual results achieved during the period covered by the prospective financial analysis will vary from these estimates and the variations may be material.
- 7.7. Accordingly, I have conducted sensitivity analysis on certain model inputs, the results of which are as indicated below:
1. Weighted Average Cost of Capital (WACC) by increasing / decreasing it by 1.0%
 2. Revenue by increasing / decreasing it by 10%
 3. Expenses by increasing / decreasing it by 20%

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1. Fair Enterprise Valuation Range based on WACC parameter (1.0%)

| INR Mn | | | | | | | |
|---------|-------|------------|---------------|-----------|--------|---------------|---------------|
| Sr. No. | SPVs | WACC +1.0% | EV | Base WACC | EV | WACC -1.0% | EV |
| 1 | MVR | 10.7% | 3,441 | 9.7% | 3,503 | 8.7% | 3,567 |
| 2 | IRBPA | 12.1% | 15,278 | 11.1% | 16,308 | 10.1% | 17,443 |
| 3 | IRBTA | 11.7% | 8,753 | 10.7% | 9,316 | 9.7% | 9,935 |
| 4 | IRBTC | 11.6% | 18,466 | 10.6% | 20,724 | 9.6% | 23,319 |
| 5 | IRBJD | 11.6% | 17,442 | 10.6% | 18,812 | 9.6% | 20,346 |
| 6 | VEL | 8.3% | 13,158 | 7.3% | 13,779 | 6.3% | 14,455 |
| | | | 76,538 | | | 82,442 | 89,065 |

2. Fair Enterprise Valuation Range based on Revenue parameter (10%)

| INR Mn | | | | |
|---------|-------|----------------------|--------------------|----------------------|
| Sr. No. | SPVs | EV at Revenue -10.0% | EV at Base Revenue | EV at Revenue +10.0% |
| 1 | MVR | 3,130 | 3,503 | 3,876 |
| 2 | IRBPA | 14,435 | 16,308 | 18,301 |
| 3 | IRBTA | 8,000 | 9,316 | 10,593 |
| 4 | IRBTC | 14,527 | 20,724 | 26,553 |
| 5 | IRBJD | 16,207 | 18,812 | 21,250 |
| 6 | VEL | 12,501 | 13,779 | 15,044 |
| | | 68,799 | 82,442 | 95,618 |

3. Fair Enterprise Valuation Range based on Expense parameter (20%)

| INR Mn | | | | |
|---------|-------|-----------------------|---------------------|-----------------------|
| Sr. No. | SPVs | EV at Expenses +20.0% | EV at Base Expenses | EV at Expenses -20.0% |
| 1 | MVR | 3,401 | 3,503 | 3,605 |
| 2 | IRBPA | 15,717 | 16,308 | 16,899 |
| 3 | IRBTA | 8,824 | 9,316 | 9,808 |
| 4 | IRBTC | 20,265 | 20,724 | 21,182 |
| 5 | IRBJD | 17,838 | 18,812 | 19,734 |
| 6 | VEL | 13,576 | 13,779 | 13,982 |
| | | 79,621 | 82,442 | 85,209 |

The above represents reasonable range of fair enterprise valuation of the SPVs.



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8. **Additional Procedures to be complied with in accordance with InvIT regulations**

Scope of Work

- a. The Schedule V of the SEBI InvIT Regulations prescribes the minimum set of mandatory disclosures to be made in the valuation report. In this reference, the minimum disclosures in valuation report may include following information as well, so as to provide the investors with the adequate information about the valuation and other aspects of the underlying assets of the InvIT.

The additional set of disclosures, as prescribed under Schedule V of InvIT Regulations, to be made in the valuation report of the SPVs are as follows:

- List of one-time sanctions/approvals which are obtained or pending;
- List of up to date/overdue periodic clearances;
- Statement of assets included;
- Estimates of already carried as well as proposed major repairs and improvements along with estimated time of completion;
- Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any;
- On-going material litigations including tax disputes in relation to the assets, if any;
- Vulnerability to natural or induced hazards that may not have been covered in town planning/ building control.

Limitations

- b. This Report is based on the information provided by the representatives of the Investment Manager. The exercise has been restricted and kept limited to and based entirely on the documents, records, files, registers and information provided to me. I have not verified the information independently with any other external source.
- c. I have assumed the genuineness of all signatures, the authenticity of all documents submitted to me as original, and the conformity of the copies or extracts submitted to me with that of the original documents.
- d. I have assumed that the documents submitted to me by the representatives of Investment Manager in connection with any particular issue are the only documents related to such issue.
- e. I have reviewed the documents and records from the limited perspective of examining issues noted in the scope of work and I do not express any opinion as to the legal or technical implications of the same.

Analysis of Additional Set of Disclosures for the SPVs

- A. List of one-time sanctions/approvals which are obtained or pending:

The list of such sanctions/ approvals obtained by the SPVs till 31st March 2023 is provided in Appendix 3.

- B. List of up to date/ overdue periodic clearances:

The Investment Manager has confirmed that the SPVs are not required to take any periodic clearances and hence there are no up to date/ overdue periodic clearances as on 31st March 2023.



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C. Statement of assets included:

The details of assets of the SPVs as at 31st March 2023 are as mentioned below:

| Sr. No. | SPVs | INR Mn | | | |
|---------|-------|------------------|-----------------------|----------------------------|----------------|
| | | Net Fixed Assets | Net Intangible Assets | Other Non - Current Assets | Current Assets |
| 1 | MVR | 10 | 1,658 | - | 45 |
| 2 | IRBPA | 0.0 | 12,209 | - | 1,511 |
| 3 | IRBTA | - | 5,631 | - | 23 |
| 4 | IRBTC | 0.0 | 10,747 | - | 53 |
| 5 | IRBJD | 0.0 | 13,256 | - | 17 |
| 6 | VEL | 0.0 | - | 13,454 | 48 |

D. Estimates of already carried as well as proposed major repairs and improvements along with estimated time of completion:

I have been informed that maintenance is regularly carried out by SPVs in order to maintain the working condition of the assets.

Historical major repairs

| SPVs | INR Mn | | | | | |
|-------|--------|-------|-------|-------|-------|-------|
| | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 | FY 23 |
| MVR | 157.6 | 403.8 | 339.8 | 56.2 | - | - |
| IRBPA | - | 127.8 | 53.7 | - | 218.0 | - |
| IRBTA | - | - | 268.4 | 312.7 | 228.2 | 253 |
| IRBTC | - | - | 27.8 | 3.6 | - | - |
| IRBJD | - | - | 185.4 | 85.3 | 437.0 | - |

Source: Investment Manager

Forecasted major repairs

| SPVs | INR Mn | | | | | | |
|-------|--------|-------|-------|-------|-------|---------|-------|
| | FY 24 | FY 25 | FY 26 | FY 27 | FY 28 | FY 29 | FY 30 |
| MVR | 173.7 | 173.7 | - | - | - | - | - |
| IRBPA | - | 326.5 | 295.8 | 81.0 | - | 150.8 | 474.5 |
| IRBTA | - | - | - | - | 335.7 | 416.5 | 50.4 |
| IRBTC | - | 434.8 | - | - | - | - | 553.2 |
| IRBJD | - | - | - | 776.2 | 843.0 | 1,103.7 | 228.4 |

Source: Investment Manager

E. Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:

Investment Manager has informed me that there are no material dues including local authority taxes (such as Municipal Tax, Property Tax, etc.) pending to be payable to the government authorities with respect to the SPVs (InvIT assets).



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F. On-going material litigations including tax disputes in relation to the assets, if any:

As informed by the Investment Manager, no key changes have occurred from the previous valuation report in the list of all material litigations, (including tax litigations, if any) against the SPVs. As informed by the Investment Manager, the status of ongoing litigations are updated in Appendix 4. Investment Manager has informed us that it expects majority of the cases to be settled in favour of SPVs. Further, Investment Manager has informed us that majority of the cases are having low to medium risk and accordingly no material outflow is expected against the litigations. As represented by the Investment Manager, the Sponsor would indemnify the Trust and its SPVs against any financial losses suffered or incurred in connection with any pending or threatened claims against the Trust made prior to the transfer of the assets to the Trust.

I was not provided with the documents for certain cases as mentioned in the below table:

| Sr. No. | SPVs | No. of Cases | Remarks |
|---------|-------|--------------|------------------------|
| 1 | MVR | 2 | Documents not provided |
| 2 | IRBPA | 3 | Documents not provided |
| 3 | IRBTC | 1 | Documents not provided |
| 4 | IRBJD | 3 | Documents not provided |

Hence, I have relied on the Investment Manager with respect to the current status of the abovementioned cases.

G. Vulnerability to natural or induced hazards that may not have been covered in town planning/ building control:

Investment Manager has confirmed to me that there are no such natural or induced hazards which have not been considered in town planning/ building control.

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9. Sources of Information

For the purpose of undertaking this valuation exercise, I have relied on the following sources of information provided by the Investment Manager:

- a. Unaudited provisional financial statements of the SPVs as on 31st March 2023;
- b. Projected financial information for the remaining project life for each of the SPVs;
- c. Toll Revenue And O&M Cost Projection Report prepared by M/s GMD Consultants for all the SPVs;
- d. Details of brought forward losses and MAT credit (as per Income Tax Act) of the SPVs as at 31st March 2023;
- e. Details of Written Down Value (WDV) (as per Income Tax Act) of assets as at 31st March 2023;
- f. Concession Agreement of each of the SPVs with NHA;
- g. Operation & Maintenance Work Order for each of the SPVs with the Sponsor dated 27th May 2019;
- h. List of licenses / approvals, details of tax litigations, civil proceeding and arbitrations of the SPVs;
- i. Details of projected Repairs and Capital Expenditure (Capex);
- j. As on 31st March 2023, IRB InvIT Fund holds equity stake in the SPVs as mentioned in the Section 3 of this Report. As represented to us by the Investment Manager, there are no changes in the shareholding pattern from 31st March 2023 to the date of issuance of this Report;
- k. Management Representation Letter by the Investment Manager dated 04th May 2023;
- l. Relevant data and information about the SPVs provided to us by the Investment Manager either in written or oral form or in the form of soft copy;
- m. Information provided by leading database sources, market research reports and other published data.

The information provided to me by the Investment Manager in relation to the SPVs included but not limited to historical financial statements, forecasts/projections, other statements and assumptions about future matters like forward-looking financial information prepared by the Investment Manager. The forecasts and projections as supplied to me are based upon assumptions about events and circumstances which are yet to occur.

By nature, valuation is based on estimates, however, considering the outbreak of COVID-19 Pandemic and the consequent economic slowdown, the risks and uncertainties relating to the events occurring in the future, the actual figures in future may differ from these estimates and may have a significant impact on the valuation of the SPVs.

I have not tested individual assumptions or attempted to substantiate the veracity or integrity of such assumptions in relation to the forward-looking financial information, however, I have made sufficient enquiries to satisfy myself that such information has been prepared on a reasonable basis.

Notwithstanding anything above, I cannot provide any assurance that the forward looking financial information will be representative of the results which will actually be achieved during the cash flow forecast period.

Further, considering the current crisis in relation to COVID-19 in India and across the globe, I have been informed by the Investment Manager, that the forecasts / projections provided for the valuation exercises are prepared after reasonably evaluating and incorporating the impact of outbreak of COVID-19 pandemic as per prevalent conditions as on date.



10. Exclusions and Limitations

- a. My Report is subject to the limitations detailed hereinafter. This Report is to be read in totality, and not in parts, in conjunction with the relevant documents referred to herein.
- b. Valuation analysis and results are specific to the purpose of valuation and is not intended to represent value at any time other than the valuation date of 31st March 2023 ("Valuation Date") mentioned in the Report and as per agreed terms of my engagement. It may not be valid for any other purpose or as at any other date. Also, it may not be valid if done on behalf of any other entity.
- c. This Report, its contents and the results are specific to (i) the purpose of valuation agreed as per the terms of my engagements; (ii) the Valuation Date and (iii) are based on the financial information of the SPVs till 31st March 2023. The Investment Manager has represented that the business activities of the SPVs have been carried out in normal and ordinary course between 31st March 2023 and the Report Date and that no material changes have occurred in the operations and financial position between 31st March 2023 and the Report date.
- d. I have been informed by the Investment Manager that there will be limited impact of the on-going COVID-19 pandemic outbreak on the operations of the SPVs and the projections provided to me are after considering the same.
- e. The scope of my assignment did not involve me performing audit tests for the purpose of expressing an opinion on the fairness or accuracy of any financial or analytical information that was provided and used by me during the course of my work. The assignment did not involve me to conduct the financial or technical feasibility study. I have not done any independent technical valuation or appraisal or due diligence of the assets or liabilities of the SPVs or any of other entity mentioned in this Report and have considered them at the value as disclosed by the SPVs in their regulatory filings or in submissions, oral or written, made to me.
- f. In addition, I do not take any responsibility for any changes in the information used by me to arrive at my conclusion as set out herein which may occur subsequent to the date of my Report or by virtue of fact that the details provided to me are incorrect or inaccurate.
- g. I have assumed and relied upon the truth, accuracy and completeness of the information, data and financial terms provided to me or used by me; I have assumed that the same are not misleading and do not assume or accept any liability or responsibility for any independent verification of such information or any independent technical valuation or appraisal of any of the assets, operations or liabilities of the SPVs or any other entity mentioned in the Report. Nothing has come to my knowledge to indicate that the material provided to me was misstated or incorrect or would not afford reasonable grounds upon which to base my Report.
- h. This Report is intended for the sole use in connection with the purpose as set out above. It can however be relied upon and disclosed in connection with any statutory and regulatory filing in connection with the provision of SEBI InvIT Regulations. However, I will not accept any responsibility to any other party to whom this Report may be shown or who may acquire a copy of the Report, without my written consent.
- i. 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, please note this 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.
- j. Further, this Report is necessarily based on financial, economic, monetary, market and other conditions as in effect on, and the information made available to me or used by me up to, the date hereof. Subsequent developments in the aforementioned conditions may affect this Report and the assumptions made in preparing this Report and I shall not be obliged to update, revise or reaffirm this Report if information provided to me changes.

This Report is based on the information received from the sources as mentioned in Section 9 of this Report and discussions with the Investment Manager. I have assumed that no information has been withheld that could have influenced the purpose of my Report.



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- l. Valuation is not a precise science and the conclusions arrived at in many cases may be subjective and dependent on the exercise of individual judgment. There is, therefore, no indisputable single value. I have arrived at an indicative EV based on my analysis. While I have provided an assessment of the value based on an analysis of information available to me and within the scope of my engagement, others may place a different value on this business.
- m. Any discrepancies in any table / appendix between the total and the sums of the amounts listed are due to rounding-off.
- n. Valuation is based on estimates of future financial performance or opinions, which represent reasonable expectations at a particular point of time, but such information, estimates or opinions are not offered as predictions or as assurances that a particular level of income or profit will be achieved, a particular event will occur or that a particular price will be offered or accepted. Actual results achieved during the period covered by the prospective financial analysis will vary from these estimates and the variations may be material.
- o. I do not carry out any validation procedures or due diligence with respect to the information provided/extracted or carry out any verification of the assets or comment on the achievability and reasonableness of the assumptions underlying the financial forecasts, save for satisfying ourselves to the extent possible that they are consistent with other information provided to me in the course of this engagement.
- p. My conclusion assumes that the assets and liabilities of the SPVs, reflected in their respective latest balance sheets remain intact as of the Report date.
- q. Whilst all reasonable care has been taken to ensure that the factual statements in the Report are accurate, neither myself, nor any of my associates, officers or employees shall in any way be liable or responsible either directly or indirectly for the contents stated herein. Accordingly, I make no representation or warranty, express or implied, in respect of the completeness, authenticity or accuracy of such factual statements. I expressly disclaim any and all liabilities, which may arise based upon the information used in this Report. I am not liable to any third party in relation to the issue of this Report.
- r. The scope of my work has been limited both in terms of the areas of the business & operations which I have reviewed and the extent to which I have reviewed them. There may be matters, other than those noted in this Report, which might be relevant in the context of the transaction and which a wider scope might uncover.
- s. For the present valuation exercise, I have also relied on information available in public domain; however the accuracy and timelines of the same has not been independently verified by me.
- t. In the particular circumstances of this case, my liability (in contract or under any statute or otherwise) for any economic loss or damage arising out of or in connection with this engagement, however the loss or damage caused, shall be limited to the amount of fees actually received by me from the Investment Manager, as laid out in the engagement letter for such valuation work.
- u. In rendering this Report, I have not provided any legal, regulatory, tax, accounting or actuarial advice and accordingly I do not assume any responsibility or liability in respect thereof.
- v. This Report does not address the relative merits of investing in InvIT as compared with any other alternative business transaction, or other alternatives, or whether or not such alternatives could be achieved or are available.
- w. I am not an advisor with respect to legal, tax and regulatory matters for the proposed transaction. No investigation of the SPVs' claim to title of assets has been made for the purpose of this Report and the 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.
- x. I have no present or planned future interest in the Trustee, Investment Manager or the SPVs and the fee for this Report is not contingent upon the values reported herein. My valuation analysis should not be construed as investment advice; specifically, I do not express any opinion on the



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suitability or otherwise of entering into any financial or other transaction with the Investment Manager or SPVs.

- y. I have submitted the draft valuation report to the Trust and Investment Manager for confirmation of accuracy of the factual data used in my analysis and to prevent any error or inaccuracy in this Report.

z. **Limitation of Liabilities**

- i. It is agreed that, having regard to the RV's interest in limiting the personal liability and exposure to litigation of its personnel, the Sponsor, the Investment Manager and the Trust will not bring any claim in respect of any damage against any of RV personally.
- ii. In no circumstances RV 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 Investment Manager had contemplated and communicated to RV the likelihood of such damages. Any decision to act upon the deliverables (including this Report) is to be made by the Investment Manager and no communication by RV should be treated as an invitation or inducement to engage the Investment Manager to act upon the deliverable(s).
- iii. It is clarified that the Investment Manager 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.
- iv. RV will not be liable if any loss arises due to the provision of false, misleading or incomplete information or documentation by the Investment Manager.

aa. **Limitation on account of COVID-19 and Uncertainty in Valuation**

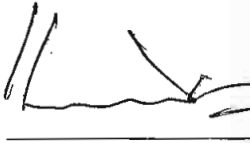
- i. It is important to highlight that the COVID-19 pandemic has created uncertainty in valuation. The mitigation in the spread of COVID-19 and commencement of vaccination process has led to relaxation of restrictions and consequent opening up of the economy. Accordingly, the impact assessment of COVID-19 is a continuing process given the uncertainties associated with its nature and durations.
- ii. I have been informed by the Investment Manager, that the forecasts / projections provided for the valuation exercises are prepared after reasonably evaluating and incorporating the impact of outbreak of COVID-19 pandemic as per prevalent conditions as on date. The estimates and judgement made by the Investment Manager, could vary on future developments, including, among other things, any new information concerning the impact created by the COVID-19 pandemic on the economy and consequent effect on the business and on the customer's ability to make the payment. The Investment Manager continues to monitor any material changes to future economic conditions, which will be given effect, where relevant, in the respective future period.
- iii. Despite efforts to manage the impacts of the pandemic to the SPVs, the ultimate impact of COVID-19 also depends on factors beyond management's knowledge or control, including the duration and severity of this outbreak as well as actions taken to contain its spread and mitigate its public health effects.



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- iv. Further, this Report is necessarily based on financial, economic, monetary, market and other conditions as in effect on, and the information made available to me or used by me up to, the date hereof. Subsequent developments in the aforementioned conditions may affect this Report and the assumptions made in preparing this Report and I shall not be obliged to update, revise or reaffirm this Report if information provided to me changes.

Yours faithfully,



S. Sundararaman

Registered Valuer

IBBI Registration No.: IBBI/RV/06/2018/10238

Place: Chennai

UDIN: 23028423BGYWGS9503

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Appendix 1 – Valuation of SPVs as on 31st March 2023

| Abbreviations | Meaning |
|---------------|--|
| EBITDA | Operating Earnings Before Interest, Taxes, Depreciation and Amortization |
| MME Provision | Provision for Major Maintenance Expenses recorded in SPVs' Books |
| MME | Actual Major Maintenance Expenses incurred during the year |
| Capex | Capital Expenditure |
| Wcap | Incremental Working Capital |
| FCFF | Free Cash Flow to the Firm |
| CAF | Cash Accrual Factor |
| DF | Discounting Factor |
| PVFCFF | Present value of Free Cash Flow to the Firm |

Appendix 1.1 – Valuation of MVR as on 31st March 2023 under the DCF Method

| WACC 9.68% | | | | | | | | | | | | INR Mn |
|------------------|---------|--------|---------|---------------|-------|-------|------|-------|-------|------|------|---------|
| Year | Revenue | EBITDA | EBITDA% | MME Provision | MME | Capex | Wcap | Tax | FCFF | CAF | DF | PV FCFF |
| FY 24 | 1,266 | 1200 | 95% | 79 | (174) | - | - | (134) | 893 | 0.50 | 0.95 | 852 |
| FY 25 | 1,378 | 1309 | 95% | 79 | (174) | - | - | (146) | 989 | 1.50 | 0.87 | 861 |
| FY 26 | 1,497 | 1425 | 95% | - | - | - | - | (172) | 1,253 | 2.50 | 0.79 | 994 |
| FY 27* | 1,271 | 1195 | 94% | - | - | - | 16 | (123) | 1,088 | 3.39 | 0.73 | 795 |
| Enterprise Value | | | | | | | | | | | | 3,503 |

*12 Jan 27



Appendix 1.2 – Valuation of VEL as on 31st March 2023 under the DCF Method

| WACC | | 7.33% | | | | | | | | | |
|------------------|---------|--------|---------|-------|------|-----|------|-------|------|---------|--|
| Year | Revenue | EBITDA | EBITDA% | Capex | Wcap | Tax | FCFF | CAF | DF | PV FCFF | |
| FY24 | 982 | 915 | 93% | - | - | - | 915 | 0.04 | 1.00 | 912 | |
| FY24 | 993 | 939 | 95% | - | - | - | 939 | 0.54 | 0.96 | 904 | |
| FY24 | 988 | 934 | 95% | - | - | - | 934 | 1.04 | 0.93 | 868 | |
| FY25 | 982 | 926 | 94% | - | - | - | 926 | 1.54 | 0.90 | 830 | |
| FY25 | 976 | 920 | 94% | - | - | - | 920 | 2.04 | 0.87 | 796 | |
| FY26 | 969 | 900 | 93% | - | - | - | 900 | 2.54 | 0.84 | 752 | |
| FY26 | 963 | 894 | 93% | - | - | - | 894 | 3.04 | 0.81 | 721 | |
| FY27 | 957 | 860 | 90% | - | - | - | 860 | 3.54 | 0.78 | 669 | |
| FY27 | 950 | 853 | 90% | - | - | - | 853 | 4.04 | 0.75 | 641 | |
| FY28 | 943 | 869 | 92% | - | - | 123 | 746 | 4.54 | 0.73 | 541 | |
| FY28 | 937 | 862 | 92% | - | - | 129 | 733 | 5.04 | 0.70 | 513 | |
| FY29 | 929 | 864 | 93% | - | - | 152 | 713 | 5.55 | 0.68 | 481 | |
| FY29 | 922 | 857 | 93% | - | - | 150 | 707 | 6.04 | 0.65 | 461 | |
| FY30 | 913 | 846 | 93% | - | - | 163 | 683 | 6.55 | 0.63 | 429 | |
| FY30 | 906 | 838 | 93% | - | - | 162 | 677 | 7.04 | 0.61 | 411 | |
| FY31 | 897 | 828 | 92% | - | - | 171 | 657 | 7.55 | 0.59 | 385 | |
| FY31 | 888 | 819 | 92% | - | - | 169 | 650 | 8.04 | 0.57 | 368 | |
| FY32 | 880 | 795 | 90% | - | - | 172 | 623 | 8.55 | 0.55 | 340 | |
| FY32 | 871 | 786 | 90% | - | - | 170 | 616 | 9.04 | 0.53 | 325 | |
| FY33 | 862 | 746 | 87% | - | - | 167 | 579 | 9.55 | 0.51 | 294 | |
| FY33 | 851 | 735 | 86% | - | - | 164 | 571 | 10.04 | 0.49 | 280 | |
| FY34 | 841 | 751 | 89% | - | - | 173 | 578 | 10.55 | 0.47 | 274 | |
| FY34 | 831 | 740 | 89% | - | - | 171 | 570 | 11.04 | 0.46 | 261 | |
| FY35 | 812 | 733 | 90% | - | - | 173 | 561 | 11.55 | 0.44 | 248 | |
| FY35 | 783 | 705 | 90% | - | - | 166 | 539 | 12.04 | 0.43 | 230 | |
| FY36 | 781 | 700 | 90% | - | - | 167 | 533 | 12.55 | 0.41 | 219 | |
| FY36 | 789 | 708 | 90% | - | - | 169 | 539 | 13.05 | 0.40 | 214 | |
| FY27 | 762 | 714 | 94% | - | - | 173 | 541 | 13.55 | 0.38 | 207 | |
| FY27 | 730 | 682 | 93% | - | (32) | 165 | 548 | 14.05 | 0.37 | 203 | |
| Enterprise Value | | | | | | | | | | 13,779 | |

Appendix 1.3 – Valuation of IRBPA as on 31st March 2023 under the DCF Method

| WACC | | 11.06% | | | | | | | | | | INR Mn |
|------------------|---------|--------|---------|---------------|-------|-------|------|---------|-------|-------|------|---------|
| Year | Revenue | EBITDA | EBITDA% | MME Provision | MME | Capex | Wcap | Tax | FCFF | CAF | DF | PV FCFF |
| FY24 | 1,669 | 1419 | 85% | - | - | - | - | (156) | 1,264 | 0.50 | 0.95 | 1,199 |
| FY25 | 1,851 | 1589 | 86% | 326 | (326) | - | - | (178) | 1,085 | 1.50 | 0.85 | 927 |
| FY26 | 2,058 | 1783 | 87% | 296 | (296) | - | - | (203) | 1,284 | 2.50 | 0.77 | 988 |
| FY27 | 2,280 | 1992 | 87% | 81 | (81) | - | - | (231) | 1,680 | 3.50 | 0.69 | 1,164 |
| FY28 | 2,517 | 2211 | 88% | - | - | - | - | (260) | 1,951 | 4.50 | 0.62 | 1,217 |
| FY29 | 2,769 | 2448 | 88% | 151 | (151) | - | - | (291) | 2,006 | 5.50 | 0.56 | 1,127 |
| FY30 | 3,036 | 2699 | 89% | 475 | (475) | - | - | (324) | 1,901 | 6.50 | 0.50 | 961 |
| FY31 | 3,358 | 3064 | 91% | - | - | - | - | (375) | 2,689 | 7.50 | 0.45 | 1,225 |
| FY32 | 3,705 | 3403 | 92% | - | - | - | - | (420) | 2,983 | 8.50 | 0.41 | 1,223 |
| FY33 | 4,030 | 3720 | 92% | - | - | - | - | (462) | 3,258 | 9.50 | 0.37 | 1,203 |
| FY34 | 4,404 | 4086 | 93% | - | - | - | - | (511) | 3,575 | 10.50 | 0.33 | 1,189 |
| FY35 | 4,803 | 4477 | 93% | - | - | - | - | (883) | 3,594 | 11.50 | 0.30 | 1,076 |
| FY36 | 5,271 | 4926 | 93% | - | - | - | - | (1,240) | 3,688 | 12.50 | 0.27 | 994 |
| FY37 | 5,736 | 5393 | 94% | - | - | - | - | (1,357) | 4,036 | 13.50 | 0.24 | 960 |
| FY38* | 4,754 | 4476 | 94% | - | - | - | 421 | (1,127) | 3,772 | 14.38 | 0.22 | 835 |
| Enterprise Value | | | | | | | | | | | | 16,308 |

* 2nd January 2038



Appendix 1.4 – Valuation of IRBTA as on 31st March 2023 under the DCF Method

| IRBTA Model | | | | | | | | | | | | INR Mn | |
|-------------------------|---------|--------|---------|---------------|-------|-------|------|-----|-------|-------|------|--------------|--|
| WACC 10.65 | | | | | | | | | | | | | |
| Year | Revenue | EBITDA | EBITDA% | MME Provision | MME | Capex | Wcap | Tax | FCFF | CAF | DF | PV FCFF | |
| FY24 | 989 | 837 | 85% | - | - | - | - | 91 | 746 | 0.50 | 0.95 | 709 | |
| FY25 | 1,094 | 935 | 85% | - | - | - | - | 105 | 830 | 1.50 | 0.86 | 713 | |
| FY26 | 1,209 | 1042 | 86% | - | - | - | - | 119 | 922 | 2.50 | 0.78 | 716 | |
| FY27 | 1,344 | 1168 | 87% | - | - | - | - | 137 | 1,031 | 3.50 | 0.70 | 724 | |
| FY28 | 1,494 | 1310 | 88% | 336 | (336) | - | - | 157 | 817 | 4.50 | 0.63 | 518 | |
| FY29 | 1,642 | 1449 | 88% | 416 | (416) | - | - | 176 | 856 | 5.50 | 0.57 | 491 | |
| FY30 | 1,815 | 1611 | 89% | 50 | (50) | - | - | 212 | 1,349 | 6.50 | 0.52 | 699 | |
| FY31 | 1,995 | 1727 | 87% | - | - | - | - | 197 | 1,530 | 7.50 | 0.47 | 716 | |
| FY32 | 2,208 | 1927 | 87% | - | - | - | - | 225 | 1,702 | 8.50 | 0.42 | 720 | |
| FY33 | 2,428 | 2134 | 88% | - | - | - | - | 254 | 1,880 | 9.50 | 0.38 | 718 | |
| FY34 | 2,676 | 2367 | 88% | 493 | (493) | - | - | 286 | 1,588 | 10.50 | 0.35 | 548 | |
| FY35 | 2,941 | 2616 | 89% | 575 | (575) | - | - | 321 | 1,720 | 11.50 | 0.31 | 537 | |
| FY36 | 3,233 | 2892 | 89% | - | - | - | - | 397 | 2,495 | 12.50 | 0.28 | 704 | |
| FY37 | 3,531 | 3173 | 90% | - | - | - | - | 436 | 2,737 | 13.50 | 0.25 | 698 | |
| FY38** | 670 | 605 | 90% | - | - | - | (15) | 152 | 437 | 14.09 | 0.24 | 105 | |
| Enterprise Value | | | | | | | | | | | | 9,316 | |

** 2nd June 2037

Appendix 1.5 – Valuation of IRBTC as on 31st March 2023 under the DCF Method

| IRBTC Model | | | | | | | | | | | | INR Mn | | |
|-------------------------|---------|--------|---------|---------------|-------|-------|------|----------------|------------|------|-------|---------------|------|---------|
| WACC 10.55% | | | | | | | | | | | | | | |
| Year | Revenue | EBITDA | EBITDA% | MME Provision | MME | Capex | Wcap | Premium to NHE | Share to I | Tax | FCFF | CAF | DF | PV FCFF |
| FY 24 | 3641 | 3537 | 97% | - | - | - | - | (1,837) | - | 380 | 1320 | 0.5 | 0.95 | 1256 |
| FY 25 | 4042 | 3933 | 97% | 435 | (435) | - | - | (3,417) | - | 425 | -344 | 1.5 | 0.86 | (296) |
| FY 26 | 4479 | 4367 | 97% | - | - | - | - | (3,751) | - | 474 | 141 | 2.5 | 0.78 | 110 |
| FY 27 | 4939 | 4819 | 98% | - | - | - | - | (4,358) | - | 525 | -54 | 3.5 | 0.70 | -45 |
| FY 28 | 5502 | 5374 | 98% | - | - | - | - | (5,931) | - | 588 | -1148 | 4.5 | 0.64 | (730) |
| FY 29 | 6064 | 5928 | 98% | - | - | - | - | (5,237) | - | 651 | 40 | 5.5 | 0.58 | 23 |
| FY 30 | 6676 | 6534 | 98% | 553 | (553) | - | - | (3,461) | - | 720 | 1799 | 6.5 | 0.52 | 937 |
| FY 31 | 7348 | 7168 | 98% | - | - | - | - | (3,552) | - | 779 | 2836 | 7.5 | 0.47 | 1337 |
| FY 32 | 8093 | 7903 | 98% | - | - | - | - | (3,724) | - | 863 | 3316 | 8.5 | 0.43 | 1414 |
| FY 33 | 8865 | 8665 | 98% | - | - | - | - | (3,911) | - | 949 | 3804 | 9.5 | 0.39 | 1467 |
| FY 34 | 9715 | 9505 | 98% | - | - | - | - | (4,107) | - | 1045 | 4353 | 10.5 | 0.35 | 1518 |
| FY 35 | 10740 | 10519 | 98% | 890 | (890) | - | - | (4,312) | - | 1160 | 4157 | 11.5 | 0.32 | 1312 |
| FY 36 | 11749 | 11519 | 98% | - | - | - | - | (4,528) | - | 1305 | 5685 | 12.5 | 0.29 | 1623 |
| FY 37 | 12877 | 12627 | 98% | - | - | - | - | (4,754) | - | 1431 | 6442 | 13.5 | 0.26 | 1863 |
| FY 38 | 14077 | 13815 | 98% | - | - | - | - | (832) | (4,160) | 2100 | 6723 | 14.5 | 0.23 | 1570 |
| FY 39 | 15421 | 15146 | 98% | - | - | - | - | - | (5,242) | 2462 | 7442 | 15.5 | 0.21 | 1572 |
| FY 40 | 16904 | 16613 | 98% | - | - | - | - | - | (5,504) | 2796 | 8314 | 16.5 | 0.19 | 1589 |
| FY 41 | 18399 | 18096 | 98% | - | - | - | - | - | (5,779) | 3100 | 9217 | 17.5 | 0.17 | 1593 |
| FY 42 | 20087 | 19768 | 98% | - | - | - | - | - | (6,068) | 3448 | 10252 | 18.5 | 0.16 | 1603 |
| FY 43 | 16412 | 16162 | 98% | - | - | - | (85) | - | (4,779) | 2865 | 8434 | 19.4 | 0.14 | 1208 |
| Enterprise Value | | | | | | | | | | | | 20,724 | | |

*29 Dec 2012



Appendix 1.6– Valuation of IRBJD as on 31st March 2023 under the DCF Method

| WACC 10.58% | | | | | | | | | | | INR Mn | |
|-------------------------|---------|--------|---------|---------------|---------|-------|------|---------|-------|-------|---------------|---------|
| Year | Revenue | EBITDA | EBITDA% | MME Provision | MME | Capex | Wcap | Tax | FCFF | CAF | DF | PV FCFF |
| FY 24 | 1,723 | 1563 | 91% | - | - | - | - | (150) | 1,413 | 0.50 | 0.95 | 1,344 |
| FY 25 | 1,923 | 1741 | 91% | - | - | - | - | (175) | 1,566 | 1.50 | 0.86 | 1,347 |
| FY 26 | 2,120 | 1924 | 91% | - | - | - | - | (201) | 1,723 | 2.50 | 0.78 | 1,340 |
| FY 27 | 2,335 | 2129 | 91% | 776 | (776) | - | - | (230) | 1,123 | 3.50 | 0.70 | 790 |
| FY 28 | 2,585 | 2369 | 92% | 843 | (843) | - | - | (264) | 1,262 | 4.50 | 0.64 | 803 |
| FY 29 | 2,836 | 2609 | 92% | 1,104 | (1,104) | - | - | (298) | 1,208 | 5.50 | 0.58 | 694 |
| FY 30 | 3,120 | 2882 | 92% | 228 | (228) | - | - | (364) | 2,289 | 6.50 | 0.52 | 1,190 |
| FY 31 | 3,409 | 3049 | 89% | - | - | - | - | (352) | 2,697 | 7.50 | 0.47 | 1,268 |
| FY 32 | 3,738 | 3352 | 90% | - | - | - | - | (395) | 2,958 | 8.50 | 0.43 | 1,258 |
| FY 33 | 4,070 | 3665 | 90% | 131 | (131) | - | - | (439) | 3,096 | 9.50 | 0.38 | 1,190 |
| FY 34 | 4,445 | 4020 | 90% | 1,183 | (1,183) | - | - | (489) | 2,348 | 10.50 | 0.35 | 816 |
| FY 35 | 4,856 | 4410 | 91% | 754 | (754) | - | - | (544) | 3,112 | 11.50 | 0.31 | 979 |
| FY 36 | 5,288 | 4818 | 91% | - | - | - | - | (674) | 4,145 | 12.50 | 0.28 | 1,178 |
| FY 37 | 5,718 | 5225 | 91% | - | - | - | - | (731) | 4,494 | 13.50 | 0.26 | 1,155 |
| FY 38 | 6,200 | 5682 | 92% | - | - | - | - | (1,430) | 4,252 | 14.50 | 0.23 | 989 |
| FY 39 | 6,751 | 6207 | 92% | - | - | - | - | (1,562) | 4,645 | 15.50 | 0.21 | 977 |
| FY 40 | 7,334 | 6762 | 92% | - | - | - | - | (1,702) | 5,060 | 16.50 | 0.19 | 962 |
| FY 41* | 4,410 | 4074 | 92% | - | - | - | (21) | (1,025) | 3,028 | 17.28 | 0.18 | 532 |
| Enterprise Value | | | | | | | | | | | 18,812 | |

*21 Oct 2040



Appendix 2 – Weighted Average Cost of Capital of the SPVs as on 31st March 2023

| Particulars | MVR | IRBPA | IRBTA | IRBTC | IRBJD | VEL | Remarks |
|--------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| Risk Free Rate (Rf) | 7.17% | 7.17% | 7.17% | 7.17% | 7.17% | 7.17% | Risk Free Rate has been considered based on zero coupon yield curve as at 31st March 2023 of Government Securities having maturity period of 10 years, as quoted on CCIL's website |
| Equity Risk Premium (ERP) | 7% | 7% | 7% | 7% | 7% | 7% | Based on historical realised returns on equity investments over a risk free rate represented by 10 years Government bonds, a 7% equity risk premium is appropriate for India. |
| Beta (Relevered) | 0.699 | 0.696 | 0.698 | 0.69 | 0.69 | 0.45 | Beta has been considered based on the beta of companies operating in the similar kind of business in India |
| Base Cost Of Equity (Ke) | 12.07% | 12.04% | 12.06% | 12.01% | 12.03% | 10.30% | Base Ke = Rf + (ERP)* β |
| Company Specific Risk Premium (CSRP) | 0% | 3% | 2% | 2% | 2% | 0% | Based on tenure risk and SPV specific risk(s) |
| Adjusted Cost of Equity (Ke) | 12.07% | 15.04% | 14.06% | 14.01% | 14.03% | 10.30% | Adjusted Ke = Rf + (ERP)* β + CSRP |
| Pre-Tax Cost of Debt (Kd) | 8.84% | 8.84% | 8.84% | 8.84% | 8.84% | 8.10% | As represented by the Investment Manager |
| Tax Rate of SPV | 17.47% | 18.58% | 17.99% | 19.78% | 19.18% | 25.17% | Tax Rate Applicable to SPV is considered |
| Post-Tax Cost of Debt | 7.29% | 7.19% | 7.25% | 7.09% | 7.14% | 6.06% | Post-Tax Kd = Pre-tax Kd * (1-Tax rate) |
| Debt/Debt+Equity | 50.00% | 50.00% | 50.00% | 50.00% | 50.00% | 70.00% | Debt : Equity ratio computed as [D/(D+E)] is considered as 50% for Toll SPV'S and 70% for HAM SPV's |
| WACC | 9.7% | 11.1% | 10.7% | 10.6% | 10.6% | 7.3% | WACC = [Ke * (1 - D/(D+E))] + [Kd * (1 - t) * D/(D+E)] |



Strictly Private and Confidential

Appendix 3.1 – MVR: Summary of approval and licences

| Sr. No. | Description of the permits | Issuing Authority | Validity/ Current status |
|---------|--|---|--------------------------|
| 1 | Licence No. CLRA/ALCCHENNAI-1/2020/L-116 B3 under the Contract Labour (Regulation and Abolition) Act, 1971, dated 21.07.2022 | Regional Labour Commissioner (Central), Chennai | Valid up to 03.08.2023 |
| 2 | Certificate for registration of DG Sets (40KVA and 125KVA no. 03/2012-13) | Government of Tamil Nadu, Electrical Inspector, Salem | Valid upto 02.05.2024 |

Source: Investment Manager

Appendix 3.2 – IRBPA: Summary of approval and licences

| Sr. No. | Description of the permits | Issuing Authority | Validity/ Current status |
|---------|---|--|--------------------------|
| 1 | Labour License for Contract Labours 46 (L-112)/2013/ACH/Pb dated 01.08.2022 | Office of the Assist. Labour Commissioner, Jalandhar | 01-Sep-23 |
| 2 | Inspection Certificate, WIM at Ladpalwan Toll Plaza (9 Nos.) and Receipt No. 220376182, LMUR No.-37202173165, VC S no. 9120220376214 | Controller Legal Metrology, Punjab, Pathankot | 16-Jun-23 |
| 3 | Inspection Certificate, WIM at Ladpalwan Toll Plaza (1 Nos.) and Receipt No. 220376256, LMUR No.37202173165, VC S no. 9120220376287 | Controller Legal Metrology, Punjab, Pathankot | 04-Jul-23 |
| 4 | Inspection Certificate, Static Weigh Bridge at Ladpalwan Toll Plaza PTK & ASR Side LMUR No. 37202071327, VC S. no. 9120220377647 and Fee Receipt No. 220377624 | Controller Legal Metrology, Punjab, Pathankot | 21-Nov-23 |
| 5 | Inspection Certificate, WIM at Waryam Nangal Toll (9 Nos.) LMUR No. 26202165058, VC S no.91202202621356 Fee Receipt 220262259 | Controller Legal Metrology, Punjab, Amritsar | 11-Aug-23 |
| 6 | Inspection Certificate, WIM at Waryam Nangal Toll (1 Nos.) LMUR No. 25202358066, VC S no.91202302563126 Fee Receipt 230251547 | Controller Legal Metrology, Punjab, Amritsar | 16-Mar-24 |
| 7 | Inspection Certificate, Static Weigh Bridge at Waryam Nangal Toll Plaza PTK & ASR Side LMUR No. 26202062518, VC S. no. 91202202622728 and Fee Receipt No. 220262999 | Controller Legal Metrology, Punjab, Amritsar | 13-Oct-23 |

Source: Investment Manager



Appendix 3.3 – IRBTA: Summary of approval and licences

| Sr. No. | Description of the permits | Issuing Authority | Validity/ Current status |
|---------|--|--------------------------------------|--------------------------|
| 1 | Principle employer registration - No. (Labour License No.ALCN/46(L)/158/2010-CL, dated 26.11.2010) | Office the Regional Labour, Nagpur | Valid up to 20.12.2023 |
| 2 | License for Building & Other Construction activities No. (ALCN/42 (R)/150/2010/BOCW, dated 21.12.2010) | Office the Regional Labour, Nagpur | Valid up to 02.09.2032 |
| 3 | Inspection Certificate for WIM installed at Nandagaon Toll Plaza | Inspector, Legal Metrology, Amravati | Valid upto 23.06.2023 |
| 4 | Inspection Certificate for Static Weigh Bridge at Nandagaon Toll Plaza (Amravati Side) | Inspector, Legal Metrology, Amravati | Valid upto 26/01/2024 |
| 5 | Inspection Certificate for Static Weigh Bridge at Nandagaon Toll Plaza (Nagpur Side) | Inspector, Legal Metrology, Amravati | Valid upto 26/01/2024 |

Source: Investment Manager



Appendix 3.4 – IRBTC: Summary of approval and licences

| Sr. No. | Description of the permits | Issuing Authority | Validity/ Current status |
|---------|---|--|---|
| 1 | Certificate of Principle employer registration | Asst. Labour Commissioner (Central), Bangalore | One time permission |
| 2 | Labour License for Local Labours | Asst. Labour Commissioner (Central), Hubli | Valid up to 05.04.2024 |
| 3 | Labour License for Local Labours | Asst. Labour Commissioner (Central), Bangalore | Valid up to 30.03.2024 |
| 4 | License for Generator more than 5 KVA (40kva 62.5 kva and 125 kva) | a) Electrical Inspector, Tumkur (Karjeevanahalli toll) b) Electrical Inspector, Davanagere (Guilalu Toll) c) Electrical Inspector, Chitradurga (Project office, Hiriyur) | a) Valid up to 31.05.2023 b) Valid up to 08.05.2023 c) Valid up to 22.05.2023 |
| 5 | Inspection Certificate for WIM installed at Guilalu Toll | Assistant Controller, Legal Metrology Department, Davangere | a) SS WIM Valid up to 13.09.2023 (4 Nos. indicators restamping work done 188, 192, 193 & 194) b) MS WIM Valid up to 23.02.2024 (02 No.Indicator Indicator Sl.no 0064,0065 new restamping work done) c) SSWIM Valid up to 04.12.2023 (3 Nos. Indicator restamping work done 187, 189 & 196) d) SSWIM Valid up to 05.08.2023 (4 Nos Indicator restamping work done 190, 197, 191, 195) e) MSWIM Valid up to 20.03.2024 (2 Nos. Indicator New restamping work done 0067,066) |
| 6 | Inspection Certificate for WIM installed at Karjeevanahalli Toll/ No. 9120160352273 and 9120160352274 dated 16.03.2016 | Assistant Controller, Legal Metrology Department, Tumkur | a) SSWIM Valid up to 01.08.2023. (9 Nos indicators 199,201,202,203,204,205,207,209,208) b) SSWIM Valid up to 22.11.2023 (2 Nos indicators 198 & 200) c) SSWIM Valid up to 22.11.2023 (1 No indicator 206) d) MSWIM Valid up to 23.03.2024 (2 No indicator 8187,8354 new restamping work done) e) MSWIM Valid Up to 27.02.2023 (2 No indicator 0072,0073 new restamping work done) |
| 7 | a) 01 No of 100 MT Static Weigh Bridge at Guilalu Toll Plaza towards Tumkur side b) 01 No of 100 MT Static Weigh Bridge at Guilalu Toll Plaza towards Chitradurga side | Assistant Controller of Legal Metrology, Chitradurga | Valid up to 04.12.2023 Valid up to 15.04.2023 |
| 8 | a) 01 No of 100 MT Static Weigh Bridge at Karjeevanahally Toll Plaza towards Tumkur side b) 01 No of 100 MT Static Weigh Bridge at Karjeevanahally Toll Plaza towards Chitradurga side | Assistant Controller of Legal Metrology, Tumkur | Valid up to 15.03.2024 Valid up to 14.12.2023 |

Source: Investment Manager



Appendix 3.5 – IRBJD: Summary of approval and licences

| Sr. No. | Description of the permits | Issuing Authority | Validity/ Current status |
|----------|--|--|--|
| 1 | Labour License under Contract Labour (Regulation and Abolition) Act, 1970 and Contract Labour (Regulation and Abolition) Contract Rules, 1971 | | |
| i | Labour License No.JP-46(153)/2013-RLC,dated 03.10.2013 | Regional Labour Commissioner (Central), Jaipur | Valid up to 02.10.2023 |
| 2 | Provisional permission for energization of Installation (DG) set/Captive power) under Rule 63 & 47 A of Indian Electricity Rules, 1956 | | |
| i | Barkheda-Chandlai Toll Plaza | Sr.Electrical Inspector, Jaipur | Valid up to 31.03.2024 |
| ii | Sonwa Toll Plaza | Sr.Electrical Inspector, Jaipur | Valid up to 31.03.2024 |
| 3 | WIM System | | |
| i | Inspection certificate for Barkheda -Chandlai Toll Plaza | Weigh and Measure Department, Jaipur | Stamping Certificate renewed upto 17.01.2022 Applied for Renewal |
| ii | Inspection certificate for Sonwa Toll Plaza | Weigh and Measure Department, Tonk | Stamping Certificate renewed upto 17.02.2022 Applied for Renewal |
| 4 | Static Weigh Bridge | | |
| i | Inspection Certificate for Static Weight Bridge at Barkheda-Chandlai Toll Plaza | Weigh and Measure Department, Jaipur | 1.Stamping of WBE 44 - Renewed upto 16.06.2023 2. Stamping Certificate for WBE 47 (Tonk Side) Renewed upto 16.06.2023 |
| ii | Inspection Certificate for Static Weight Bridge at Sonwa Toll Plaza | Weigh and Measure Department, Tonk | Stamping of WBE 45 (Jaipur Side) & WBE 46 (Tonk Side): Valid up to 26.06.2022. Applied for Renewal |

Source: Investment Manager



Appendix 3.6: VEL: Summary of approval and licences

| Sr. No. | Description of the permits | Date of Issue | Validity up to | Issuing Authority |
|---------|--|---------------|----------------|---|
| 1 | Clearing of Pollution Control Board | 06-Dec-17 | 30-Sep-24 | Gujarat Pollution control board |
| 2 | Permission of state government for cutting of trees | 12-Nov-18 | - | DCF, Chotaudaypur, Vadodara |
| 3 | Permission of state government for cutting of trees | 19-Dec-18 | - | Mamlatdar Vadodara |
| 4 | Labour License | 17-Dec-18 | 19-Dec-23 | Ministry of Labour & Employment |
| 5 | Permission of Village Panchayat and Pollution control board for installation of crushers | 18-Apr-19 | 17-Apr-24 | Gujarat Pollution control board, Vadodara |

Source: Investment Manager



Appendix 4: Summary of Ongoing Litigations (1/4)

| Sr. No | SPVs | Matter | Pending Before | Particulars | Amount Involved (INR Million) |
|--------|------|-----------------------|----------------------|---|--|
| 1 | MVR | Civil Litigation | Madras High Court | <p>Background of the case: Certain colleges in Salem (the "Petitioners") have filed 25 writ petitions before the High Court of Madras, against MVR and others (collectively the "Respondents") alleging the legality of act of collecting entry fee at increased rates from college buses. The Petitioners have sought the directions against Respondents to collect entry fee at toll plaza for educational institution vehicles at par with that of school buses. An order was passed by the High Court of Madras, which took into consideration various petitions filed against MVR regarding the above mentioned issue and held that the discounted rates were only applicable to school buses carrying school students and not to college buses. However, the High Court of Madras passed an order granting an interim stay and ordered MVR to collect entry fee from the college buses of the Petitioners at par with the rates applicable to school buses. The matter is currently pending.</p> <p>Current Status: The writ petitions filed by 7 educations are disposed by the high court till date.</p> | Not quantified |
| 2 | MVR | Arbitration with NHAI | Arbitration Tribunal | <p>Background of the case: MVR initiated arbitration proceedings against NHAI before the Arbitration Tribunal Consisting of Dr. Arijit Pasayat (Presiding Arbitrator) Mr. S. S. Agarwal and Mr. Navin Kumar for its claim to the tune of Rs. 51.4 Mn (towards positive Change of scope for construction of additional arm of flyover) and Rs. 2.6 Mn (negative Change of Scope on account of deletion of 19 hume pipe culverts). The conciliation meeting between NHAI and MVR meeting was concluded. As NHAI did not respond on the matter, MVR invoked Arbitration proceedings against NHAI. MVR had submitted its statement of claims against NHAI. NHAI had filed its counter claim.</p> <p>Current Status: The Hon'ble Arbitral Tribunal has pronounced the Award in favour of MVR on 17/02/2022 and NHAI was directed to pay Rs 4,89,71,505/- . In terms of the Award, MVR requested NHAI for payment of the awarded amount along with interest @ 8% pa from the date of Award i.e. from 17.02.2022. Subsequently, MVR has filed execution application in the Hon'ble Delhi High Court and the matter is pending.</p> | 48.9 + interest @ 8% pa wef 17.02.2022 |
| 3 | MVR | Arbitration with NHAI | Arbitration Tribunal | <p>Background of the case: NHAI had initiated arbitration proceedings against MVR before the Arbitration Tribunal Consisting of Dr. Arijit Pasayat (Presiding Arbitrator) Mr. S. S. Agarwal and Mr. Navin Kumar for its claim to the tune of Rs. 126.1 Mn (towards non construction of second carriageway of a Flyover at km 188.850) and Rs. 77.70 Mn (towards provision of safety barriers in missing location on the Project Highway). The proceedings are in progress.</p> <p>Current Status: The mandate of the Tribunal has been extended upto 07.11.2023. The matter is pending.</p> | 203.8 |
| 4 | MVR | Direct Tax Matters | CIT (A) | <p>Background of the case: MVR has received order u/s 143(3) of Income Tax Act, 1961 ("ITA 1961") dated 18 Feb 2014 for A Y 2011-12. The matter pertains to addition on account of recomputation of Long Term Capital Gains u/s 50C and Disallowance of depreciation. Assessing Officer has also levied Interest u/s 234B and 234D of ITA 1961. However, MVR does not accept the views, findings and contentions of the Assessing Officer and has filed an appeal against the order on 14 Mar 2014. MVR also contends that it was entitled for deduction u/s 80-IA but no such deduction was allowed by the Assessing Officer.</p> <p>Current Status: Appeal to the Commissioner of Income-tax (Appeals) has been filed against the order and the same is under process.</p> | 9.5 |

Source: Investment Manager



Appendix 4: Summary of Ongoing Litigations (2/4)

| Sr. No | SPVs | Matter | Pending Before | Particulars | Amount Involved (INR Million) |
|--------|-------|--------------------------|----------------------|--|---------------------------------------|
| 5 | IRBPA | Civil Litigation | NA | <p>Background of the case: IRBPA has initiated arbitration proceedings against NHAI before Arbitration Tribunal consisting of Mr. Ajit Prakash Shah (Presiding Arbitrator), Mr. S S.Agarwal & Mr. Navin Kumar. The claim is for sum of Rs. 2522.5 Mn and extension in concession period by 518 days. IRBPA had submitted its claim on account of losses and requested NHAI for appointment of other Arbitrator. NHAI had refused the request for appointment of arbitrator. As per the provisions of Concession Agreement, IRBPA requested Indian road congress to appoint arbitrator on behalf of NHAI. Subsequently, on NHAI had appointed Mr Navin Kumar as the Arbitrator.</p> <p>Current Status: The Hon'ble Arbitral Tribunal pronounced unanimous Award on 13/07/2021 (to be read with correction order dated 27/07/2021 in favour of IRBPA i.e. compensation of Rs 252.251 Cr along with 9% interest wef 27/11/2014 till the date of realisation; and extension of 518 days in Concession Period along with the cost of arbitration of Rs 1.58 Crores. The petition challenging the Award (Section 34) was filed by NHAI in the Hon'ble Delhi High Court which was dismissed by the Court on 08.03.2022. IRBPA has served a legal notice for execution of the Award on 30.03.2022. No response received from NHAI. Therefore, IRBPA filed an execution application in the Delhi High Court. As per direction of the Court, NHAI released payment of 75% of the Arbitral Award (i.e. 317.39 Crore) against the submission of Bank Guarantess of equivalent amount. NHAI appealed against the Section 34 order of the Hon'ble Delhi High Court and the matter is pending.</p> | 2522.5 + interest @ 9% wef 27.11.2014 |
| 6 | IRBPA | Regulatory Action (ESIC) | NA | <p>Background of the case: Employees' State Insurance Corporation, sub-regional office Marol ("ESIC") issued a notice to IRBPA demanding payment of Rs. 0.08 Mn towards pending employers contributions and employees' contributions required to be paid by IRBPA, in its capacity as the principal employer, under Section 40 read with Section 39 of the Employees' State Insurance Act, 1948. Further, ESIC has also directed IRBPA to show cause as to why the assessment of an amount of Rs. 5.83 Mn towards contributions payable in respect of the employees should not be recovered from IRBPA. IRBPA has replied to the aforementioned notice.</p> <p>Current Status: No further communication has been received in this regard.</p> | 5.8 |
| 7 | IRBPA | Arbitration with NHAI | Arbitration Tribunal | <p>Background of the case: In the month of September 2020, Government of India passed three new Farm bills in the Parliament. This drew flak among some group of farmers in the state of Haryana who forcefully stopped the operation of the toll plazas in Haryana. IRBPA had notified this event as the Force Majeure under Indirect Political Event and submitted its claim for the period i.e. 01.10.2020 to 15.12.2021 amounting to Rs. 121 crores and consequent extension to Concession Period by 441 days in terms of Clause 34.7.2 (b) and 34.6.2 (b) of the Concession Agreement respectively. Since there was no response received from NHAI, IRBPA crystallised this matter as the dispute and subsequently invoked arbitration as per Clause 44.3 of the Concession Agreement. Thereafter, during 17.11.2023 to 25.11.2022 and 15.12.2022 to 15.01.2023, the toll collection was affected due to Farmer's agitation against the State Govt. IRBPA filed claim for extension of Concession Period by 32.28 days and compensation of Force Majeure cost of Rs 7.19 Crore.</p> <p>Current Status: NHAI released partial amount of Rs. 36.03 Crore on 25.08.2022 and approved extension of Concession Period by 436 days. However, IRBPA has requested NHAI to resume conciliation through CCIE for resolution of the dispute with respect to the balance dues and extension in Concession Period. Till then Arbitration is kept in abeyance and both the above referred claims of IRBPA were taken up with CCIE for conciliation but the conciliation failed. Subsequently, IRBPA reinvoked the arbitration on 16.02.2023 and the arbitration proceedings are in progress.</p> | 856.9 |

XSource: Investment Manager



Appendix 4: Summary of Ongoing Litigations (3/4)

| Sr. No | SPVs | Matter | Pending Before | Particulars | Amount Involved (INR Million) |
|--------|-------|------------------|------------------|--|-------------------------------|
| 8 | IRBTC | Civil Litigation | Delhi High Court | <p>Background of the case: Due to a dispute on the deferred premium calculation of the previous years between the IRBTC and the NHAI, the concessionaire has filed an appeal with the Honorable High Court of Delhi for resolution against the NHAI's demand of advance premium of Rs. 169.8 Mn in aggregate and interest on it. As per the interim order of the Division Bench of Honorable High Court, withdrawals from Escrow Account are not permitted till final order in the matter.</p> <p>Current Status: The Section 37 matters were disposed off on 26.04.2022 with directions that interim relief in terms of order dated 19.12.2019 will continue to operate and also directed Arbitral Tribunal to conduct a hearing on 10.0.5.2022. Subsequently, the Arbitral Tribunal was constituted and the Learned Tribunal by its order dated 14.07.2022 directed NHAI to withdraw Rs. 97.8 Crore as an interim measure and then by interim order dated 09.08.2022 further directed NHAI to withdraw Rs 453.9 Crore and Concessionaire to withdraw Rs 193 Crore. The embargo on the operation of Escrow was also lifted. Arbitration proceedings are in progress</p> | Not quantified |

Source: Investment Manager



Appendix 4: Summary of Ongoing Litigations (4/4)

| Sr. No | SPVs | Matter | Pending Before | Particulars | Amount Involved (INR Million) |
|--------|-------|----------------------------------|----------------------|--|-------------------------------|
| 9 | IRBJD | Criminal Litigation | NA | <p>Background of the case: Pradeep Sogani, Shankar Lal Sharma and certain others (collectively the "Complainants") have lodged 10 first information reports against Virendra Mahiskar, Managing Director, IRB Infrastructure Developers Limited, Vivek Chouhan (the project manager and the authorised signatory of the Sponsor) and certain others (collectively the "Accused") with the Chaksu Police Station. The aforesaid first information reports were lodged on the alleged ground that there was delay in the release of payments on the part of the Accused towards the purchase of various materials from the Complainants.</p> <p>Current Status: No offence have been found to be committed by the Accused. Hence, they are acquitted from all the cases. This matter is closed.</p> | Not quantified |
| 10 | IRBJD | Civil Litigation (Writ Petition) | Rajasthan High Court | <p>Background of the case: Jagannath University (the "Petitioner") had filed a writ petition before the Rajasthan High Court against the project manager of IRBJD and certain others (the "Respondent") seeking that the Respondents be directed to issue monthly pass to the buses/ vehicles of the Petitioner for the toll fee of Rs. 215 per month as per the notification dated 8 April 2013 and any other appropriate relief in favour of the Petitioner which the court deems fit. The said relief has been sought on the alleged grounds that the Respondents had previously issued a monthly pass of a higher denomination without taking into consideration the non-commercial nature of the vehicles of the Petitioner, which was in violation of Clause 3 of the notification dated 8 April 2013. Further, the Petitioner has also filed a stay application before the Rajasthan High Court seeking that during the pendency of the writ petition, the Respondents be directed to permit the vehicles of the Petitioner on the toll fee of Rs. 215 per month. The project manager of IRBJD has filed its reply denying the averments made by the Petitioner</p> <p>Current Status: The matter is currently pending.</p> | Not quantified |
| 11 | IRBJD | Civil Litigation (Writ Petition) | Rajasthan High Court | <p>Background of the case: Girdhari Lal Jat had filed writ petition against IRB Jaipur Deoli Tollway Pvt. Ltd. and others in Rajasthan High Court, Jaipur Bench, with respect to the National Highway 12 (Jaipur – Tonk - Deoli section), praying that directions to be given to respondents to take stern action in the matter of removal of illegal barricades in the villages Khajalpura, Dhar Mod, Barkheda and Bhadarwas, to do enquiry against the wrongdoers who have been involved in installing the said illegal barriers, etc.</p> <p>Current Status: The petition is disposed off as infructuous.</p> | Not quantified |
| 12 | IRBJD | Direct Tax Matters | CIT (A) | <p>Background of the case: IRBJD has received order u/s 143(3) r.w.s 147 of Income Tax Act, 1961 ("ITA 1961") dated 30 Dec 2019 for A Y 2012-13. The matter pertains to addition on account of interest under section 56 of ITA 1961 under Income from other sources. Assessing Officer has also levied Interest u/s 244A and 234D of ITA 1961 and has initiated penalty proceedings u/s.271(1)(c) of ITA 1961. However, IRBJD does not accept the views, findings and contentions of the Assessing Officer and has filed an appeal against the order on 27 Jan 2020. Commissioner of Income-tax (Appeals) was passed in favor of the Company. Department has filed an Appeal with ITAT.</p> <p>Current Status: The ITAT passed an order in favor of the Company.</p> | 27.2 |

Source: Investment Manager



<<End of Report>>



Val-Blr/DHCI-R232401

08th May 2023

| | |
|---|---|
| <p>The Board of Directors, IRB InvIT Fund (IDBI Trusteeship Services Limited acting on behalf of the Trust) IRB Complex, Chandivali Farm, Chandivali Village, Andheri (East), Mumbai – 400 072</p> | <p>The Board of Directors, The Investment Manager, IRB Infrastructure Private Limited 3rd Floor, IRB Complex, Chandivali Farm, Chandivali Village, Andheri (East), Mumbai – 400 072</p> |
|---|---|

Sub: Review opinion on the valuation report for Internal Assessment

Dear Sirs / Madams,

We, DHC International Private Limited (“DHC” or “we”) have been appointed by **IRB Infrastructure Private Limited (“the Investment Manager” or “IRBIM”)**, acting as the investment manager for **IRB InvIT Fund (“the Trust” or “InvIT”)**, and **IDBI Trusteeship Services Limited (“the Trustee”)** acting as the trustee for the Trust, for the purpose as detailed out in this letter (“Engagement”).

Background

IRB Infrastructure Developers Limited (the “Sponsor”) has set up IRB InvIT Fund as an irrevocable trust under the Indian Trusts Act, 1882, and registered the Trust with the Securities and Exchange Board of India (“SEBI”) as an infrastructure investment trust under the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, as amended (“SEBI InvIT Regulations”). The investment manager of the Trust is IRB Infrastructure Private Limited (the “Investment Manager” or “IRBIM”), which is a wholly-owned subsidiary of the Sponsor.

IRB InvIT Fund has acquired the following road projects from the Sponsor (together referred to as “SPVs”):

Sr. No. Name of the SPVs

- 1 MVR Infrastructure & Tollways Limited
- 2 IRB Pathankot Amritsar Toll Road Limited
- 3 IRB Talegaon Amravati Tollway Limited
- 4 IRB Tumkur Chitradurga Tollway Limited
- 5 IRB Jaipur Deoli Tollway Limited
- 6 VK1 Expressway Private Limited (“VEPL”)





Scope and Purpose of the Review Opinion

As per the requirements of the SEBI InvIT Regulations, a half yearly valuation of the assets of the InvIT shall be conducted by the valuer for the half-year ending 31st March for a publicly offered InvIT. In this regard, the Trust and the Investment Manager have appointed Mr. S. Sundararaman, bearing IBBI registration number IBBI/RV/06/2018/10238 (the "Valuer") to perform Fair Enterprise Valuation (the "Valuation") of the SPVs as on 31st March 2023 as per the SEBI InvIT Regulations. The Valuer had provided his Fair Enterprise Valuation of the SPVs as at 31st March 2023 vide his valuation report dated 08th May 2023 (the "Valuation Report") to the Investment Manager and the Trust.

In this regard, the Investment Manager and the Trust, for their internal evaluation, has requested DHC:

1. To undertake an independent valuation of the SPVs;
2. To review the Valuation Report prepared by the Valuer; and
3. Provide a Review Opinion on:
 - a. Whether the Valuation of SPVs, as conducted by the Valuer is reasonable; and
 - b. Whether the Valuation Report of the Valuer is in compliance with requirements of the SEBI InvIT Regulations.

This Review Opinion Report ("Review Opinion") is only for the internal evaluation of the Board of Directors of the Investment Manager and the Trust. This Review Opinion is not prepared for any statutory compliance or requirements of the SEBI InvIT Regulations or any other laws nor can be used for the purpose other than those mentioned in this Review Opinion.

This Review Opinion is subject to the scope, assumptions, exclusions, limitations and disclaimers detailed hereinafter. As such, the report is to be read in totality, and not in parts, in conjunction with the relevant documents referred to therein. This Review Opinion is our deliverable in respect of our Engagement.

Sources of Information

For the purpose of undertaking this exercise, we have relied on the following sources of information provided by the management and representatives of the Investment Manager and the Trust ("Management"):

1. Valuation Report dated 08th May 2023 prepared and submitted by the valuer to the Management;
2. Unaudited provisional financial statements of the SPVs as on 31st March 2023;
3. Projected financial information for the remaining project life for each of the SPVs;
4. Toll Revenue And O&M Cost Projection Report prepared by M/s GMD Consultants for all the SPVs;
5. Details of brought forward losses and MAT credit (as per Income Tax Act) of the SPVs as at 31st March 2023;
6. Details of Written Down Value (WDV) (as per Income Tax Act) of assets as at 31st March 2023;
7. Concession Agreement of each of the SPVs with NHAI;
8. Operation & Maintenance Work Order for each of the SPVs with the Sponsor dated 27th May 2019;
9. List of licenses / approvals, details of tax litigations, civil proceeding and arbitrations of the SPVs;





10. Details of projected Repairs and Capital Expenditure (Capex);
11. As represented to us by the Investment Manager, there are no changes in the shareholding pattern of the SPVs from 31st March 2023 to the date of issuance of this Review Opinion;
12. Management Representation Letter by the Investment Manager dated 4th May 2023;
13. Relevant data and information about the SPVs provided to us by the Investment Manager either in written or oral form or in the form of soft copy;
14. Information provided by leading database sources, market research reports and other published data.
15. The information provided to DHC included forecasts/projections, other statements and assumptions about future matters like forward-looking financial information prepared by the Management. The forecasts and projections as supplied to us are based upon assumptions about events and circumstances which have not occurred. We have not tested individual assumptions or attempted to substantiate the veracity or integrity of such assumptions in relation to the forward-looking financial information, however, we have made sufficient enquiries to satisfy ourselves that such information has been prepared on a reasonable basis. Notwithstanding anything above, DHC cannot provide any assurance that the forward looking financial information will be representative of the results which will actually be achieved during the forecast period.
16. We have prepared this Review Opinion from information supplied by and from discussions with the Management. We have not verified the accuracy, reliability and competence of the information supplied; the procedures that we used to perform the work did not constitute an audit or review made under any generally accepted accounting standard.

Procedures Adopted

In connection with this Review Opinion, we have obtained the Valuation Report and held conversations with the Management about the methodologies and assumptions underlying the valuation analysis. In connection with this exercise, we have adopted the following procedures for providing our Review Opinion:

1. Requested and received financial and qualitative information relating to the SPVs;
2. Obtained the Valuation Report from the Management;
3. Obtained and analyzed data available in public domain, as considered relevant by us;
4. Discussions with the Management on:
Understanding of the businesses of SPVs – business and fundamental factors that affect its income-generating capacity including strengths, weaknesses, opportunities and threats analysis and historical and expected financial performance;
5. Undertook industry analysis:
Research of publicly available market data including economic factors and industry trends that may impact the Valuation; and analysis of key trends and valuation multiples of comparable companies/comparable transactions, if any, using proprietary databases subscribed by us;
6. Selection of internationally accepted valuation approach and valuation methodology/(ies), in accordance with the requirements, as considered appropriate and relevant by us and arriving at a range of Fair Enterprise Values of the SPVs.





We do not carry out any validation procedures or due diligence with respect to the information provided/ extracted or carry out any verification of the assets or comment on the achievability and reasonableness of the assumptions underlying the financial forecasts, except for satisfying ourselves to the extent possible that they are consistent with other information provided to us in the course of this Engagement.

Assumptions, Qualifications and Exclusions & Limitations

a. Assumptions and Reliance:

In performing its analyses and rendering this Review Opinion, DHC, with the Trust's consent:

- Relied upon the accuracy, completeness, and fair presentation of all information, data, advice, opinions and representations obtained from public sources, or provided to it from private sources, including the Management, and did not independently verify such information;
- Assumed that any estimates, evaluations, forecasts and projections furnished to DHC were reasonably prepared and based upon the best currently available information and good faith judgment of the Management, and DHC expresses no opinion with respect to such projections or the underlying assumptions;
- Assumed that the information provided, and representations made by the Management regarding the SPVs and the Trust are substantially accurate;
- Assumed that there has been no material change in the information provided regarding the SPVs since 31st March 2023 till date of this Review Opinion, and that there is no information or facts that would make the information reviewed by DHC incomplete or misleading.

To the extent that any of the foregoing assumptions or any of the facts on which this Review Opinion is based prove to be untrue in any material respect, this Review Opinion cannot and should not be relied upon. Furthermore, in DHC's analysis and in connection with the preparation of the Review Opinion, DHC has made numerous assumptions with respect to industry performance, general business, market & economic conditions and other matters, many of which are beyond the control of any party.

b. Qualifications:

The analysis is qualified by the following:

- DHC has prepared the Review Opinion effective as of the date hereof. This Review Opinion is necessarily based upon on financial, economic, monetary, market and other conditions as in effect on, and the information made available to DHC or used by DHC up to the date hereof. Subsequent developments in the aforementioned conditions may affect this Review Opinion and the assumptions & analysis made for providing this Review Opinion, and DHC shall not be obliged to update, revise or reaffirm this Review Opinion if information provided to DHC changes.
- DHC did not evaluate the SPVs' and/or Trust's solvency or conduct an independent appraisal of any specific assets or liabilities (contingent or otherwise).
- This Review Opinion should not be construed as a credit rating, solvency opinion, a fairness opinion, an analysis of the Trust's / SPVs' credit worthiness, tax advice, regulatory advice or an accounting advice. DHC has not made, and assumes no responsibility to make, any representation, or render any opinion, as to any legal, tax or accounting matter. Accordingly DHC does not assume any responsibility or liability in respect thereof.





- The work performed by DHC was performed in accordance with instructions provided by the Management and was performed exclusively for the Management's use only.
- This Review Opinion is not statutorily mandated under the Companies Act, 2013 ("Companies Act"), the Companies (Registered Valuers and Valuation Rules, 2018) ("Rules") as per any other rules, regulations, standards, bye-laws, ordinance, notifications issued pursuant to such Act or Rules or under the SEBI InvIT Regulations or any other regulations under SEBI Act, 1992 ("SEBI Act"). Accordingly, our Review Opinion Report does not constitute nor can be construed as a valuation carried out by a registered valuer in accordance with such Companies Act or Rules or SEBI Act or as per any rules, regulations, standards, bye-laws, ordinance, notifications issued pursuant to such Companies Act or Rules or SEBI Act and any such use of this Review Opinion is not permitted.

c. Exclusions & Limitations:

- This Review Opinion is furnished to the Management in connection with its consideration of the Valuation report prepared by the Valuer. It is not intended to, and does not, confer any rights or remedies upon any other person, and is not intended to be used, and may not be used, by any other person or for any other purpose, without DHC's consent.
- Providing review opinion on a valuation report is not a precise science and the conclusions arrived at in many cases will, of necessity, be subjective and dependent on the exercise of individual judgement. In the ultimate analysis, our opinion will have to be tempered by the exercise of judicious discretion and judgment taking into accounts all the relevant factors. There is, therefore, no indisputable single value.
- With respect to explanations and information sought from the Management, we have been given to understand by the Management that they have not omitted any relevant and material factors about the SPVs and that they have checked the relevance or materiality of any specific information to the present exercise with us in case of any doubt. Our conclusion is based on the information given on behalf of the SPVs. The Management has indicated to us that they have understood that any omissions, inaccuracies or misstatements may materially affect our Review Opinion.
- DHC assumes that the SPVs comply fully with the relevant laws and regulations applicable in all its areas of operations, and that the SPVs will be managed in a competent and responsible manner. Our Review Opinion assumes that the assets and liabilities of the SPVs, reflected in their respective latest balance sheets remain intact as of the date hereof.
- This Review Opinion 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.
- This Review Opinion:
 - (i) does not address the merits of the underlying business decision to enter into any transaction with the Trust;
 - (ii) is not a recommendation as to how the Unit holders of the Trust should vote or act with respect to any matters relating to the Trust;
 - (iii) should not be construed as creating any fiduciary duty on the part of DHC to any party;
 - (iv) does not indicate the Value at which the Units may be transacted either in the market or otherwise at any point in time in the present or in the future; instead, it merely states whether the Valuation concluded by the Valuer is within the range of our financial analysis.
- The fee for this Review Opinion is not contingent upon the nature of opinion provided herein.





- This Review Opinion should not be construed as investment advice; specifically, DHC does not express any opinion on the suitability or otherwise of entering into any financial or other transaction with the Investment Manager, the Trust or the SPVs.
- This Review Opinion is solely that of DHC, and DHC's liability in connection with this Review Opinion shall be limited in accordance with the terms set forth in the engagement letter between DHC and the Trust dated 19th July 2022 (the "Engagement Letter").
- The use and disclosure of this Review Opinion is strictly limited, as laid out in the Engagement Letter.

Conclusion

Based on our independent calculation and on consideration of all the relevant factors and circumstances including aforementioned assumptions and limitations:

- We believe that the fair enterprise values of the SPVs as recommended by the Valuer in his Valuation Report is reasonable in our opinion; and
- We are of the opinion that the Valuation report prepared by the Valuer is in compliance with the requirements of SEBI InvIT regulations.

Yours sincerely,

For and on behalf of
DHC International Pvt. Ltd.

[Handwritten signature]



JAIPUR TO DEOLI SECTION OF NH-12

(KM 18.700 To 165.00)

IN THE STATE OF RAJASTHAN



APRIL 2023



TOLL REVENUE AND O&M COST PROJECTION REPORT (FINAL)



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**JAIPUR TO DEOLI SECTION OF NH-12
(KM 18.700 To 165.00)
IN THE STATE OF RAJASTHAN**

APRIL 2023



**TOLL REVENUE AND O&M COST
PROJECTION REPORT
(FINAL)**

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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highways Authority of India |
| BOT | - Build Operate Transfer | NHDP | - National Highways Development Project |
| CAGR | - Compound Annual Growth Rate | NSDP | - Net State Domestic Product |
| CTV | - Classified traffic volume | O&M | - Operation & Maintenance |
| DBFOT | - Design, Build, Finance, Operate & Transfer | PCDP | - Per Capita Domestic Product |
| EME | - Earth Moving Equipment | PCI | - Per Capita Income |
| GDP | - Gross Domestic Product | PCU | - Passenger Car Unit |
| GSDP | - Gross State Domestic Product | PSC | - Pre-stressed Concrete |
| HCM | - Heavy Construction Machinery | RCC | - Reinforced cement concrete |
| HCV | - Heavy Commercial Vehicle | RHS | - Right Hand Side |
| HTMS | - Highway Traffic Management System | SH | - State Highway |
| IRC | - Indian Road Congress | TP | - Toll Plaza |
| IRR | - Internal Rate of Return | WPI | - Wholesale Price Index |
| LCV | - Light Commercial Vehicle | SIR | - Special Investment Region |
| LHS | - Left Hand Side | c. | - Circa |
| LGV | - Light Goods Vehicle | ROB | - Railway Over Bridge |
| MAV | - Multi Axle Vehicle | MDR | - Major District Road |
| MORTH | - Ministry of Road Transport and Highways | ODR | - Other District Road |
| NH | - National Highway | CA | - Concession Agreement |
| PCC | - Plain Cement Concrete | RMT | - Running Meter |
| CR | - Coarse Rubble | | |

CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Jaipur - Deoli section of NH-12 from Km 18.700 to km 165.000 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IRB Jaipur Deoli Tollway Ltd.* (Concessionaire) has been awarded the Project for concession period of 25 years starting from 14th June 2010 to 13th June 2035. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged *GMD Consultants* to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as “*Toll Revenue and O&M Cost Projection Report*” mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows:

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgment on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated based on traffic data of year 2017-18 and submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Report was further updated with yearly traffic data of 2019-20 in May 2020. With traffic data from April 2020 to March 2021 report was updated, report was further updated with yearly traffic data from April 2021 to March 2022 and now concessionaire has provided traffic data from April 2022 to March 2023, report is updated taking this latest traffic data into consideration.

CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work, we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project:

- Classified traffic volume counts at the two toll plaza locations on Jaipur-Deoli section of NH-12 for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and annual traffic data from April 2022 to March 2023.
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

The project can be divided into two homogenous sections from traffic point of view.

These sections can be:

1. Jaipur to Tonk
2. Tonk to Deoli

Traffic of both sections is represented by toll plaza in each section. Table below lists provides details of locations from where traffic details have been collected:

Table 2-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Return Pass Traffic | Monthly Pass Traffic | Local Traffic |
|---------------|------------------------------|-------------------------|-------------------------------|----------------------------|-----------------------------|----------------------|
| 1 | Km 30.500 Toll Plaza | AADT for Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 |
| | | AADT for year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for year 2018-2019 | For year 2018-2019 | For year 2018-2019 | For year 2018-2019 | For year 2018-2019 |
| | | AADT for year 2019-2020 | For year 2019-2020 | For year 2019-2020 | For year 2019-2020 | For year 2019-2020 |
| | | AADT for year 2020-2021 | For year 2020-2021 | For year 2020-2021 | For year 2020-2021 | For year 2020-2021 |
| | | AADT for year 2021-2022 | For year 2021-2022 | For year 2021-2022 | For year 2021-2022 | For year 2021-2022 |
| | | AADT for year 2022-2023 | For year 2022-2023 | For year 2022-2023 | For year 2022-2023 | For year 2022-2023 |
| 2 | Km 105.000 Toll Plaza | AADT for Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 |
| | | AADT for year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for year 2018-2019 | For year 2018-2019 | For year 2018-2019 | For year 2018-2019 | For year 2018-2019 |
| | | AADT for year 2019-2020 | For year 2019-2020 | For year 2019-2020 | For year 2019-2020 | For year 2019-2020 |
| | | AADT for year 2020-2021 | For year 2020-2021 | For year 2020-2021 | For year 2020-2021 | For year 2020-2021 |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Return Pass Traffic | Monthly Pass Traffic | Local Traffic |
|--------|----------|-------------------------|------------------------|---------------------|----------------------|--------------------|
| | | AADT for year 2021-2022 | For year 2021-2022 | For year 2021-2022 | For year 2021-2022 | For year 2021-2022 |
| | | AADT for year 2022-2023 | For year 2022-2023 | For year 2022-2023 | For year 2022-2023 | For year 2022-2023 |

The locations of each of the traffic survey are illustrated in Figure 2-1.

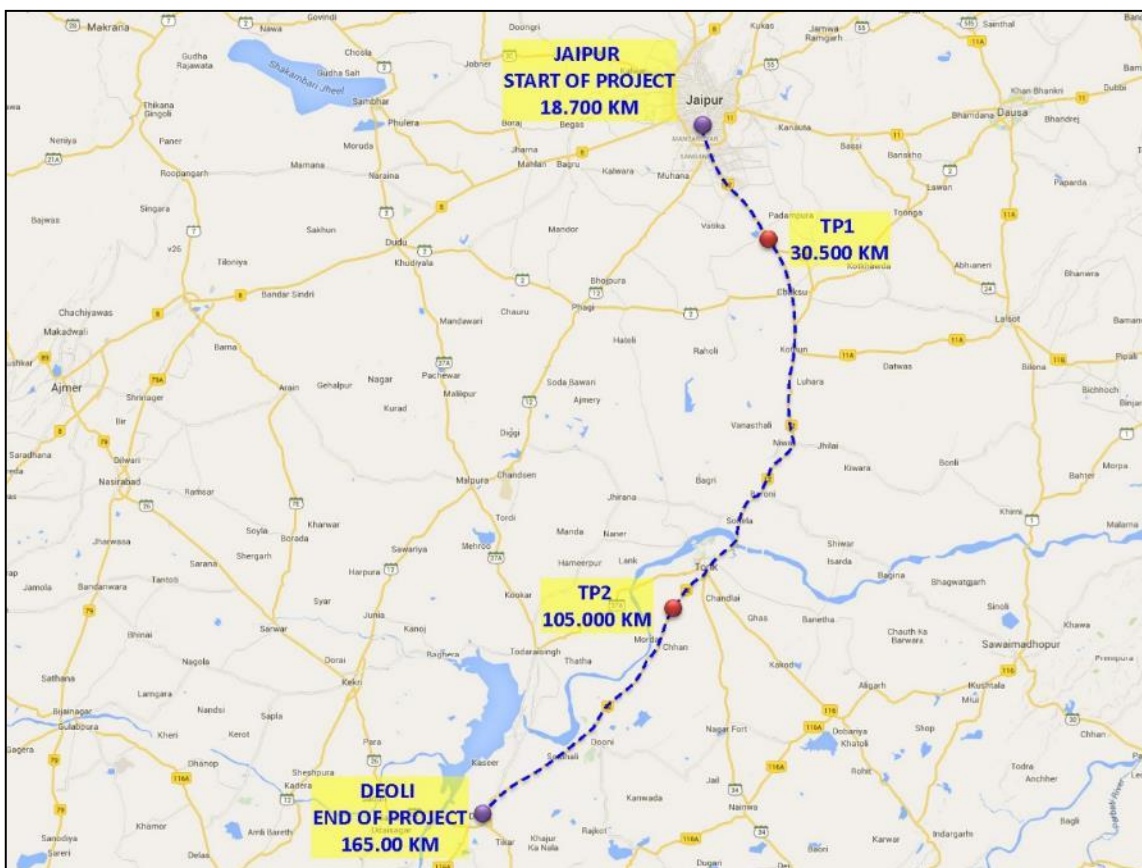


Figure 2-1: Toll Plaza Locations

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHA. These locations are indicated in **Figure 2-1** and listed in **Table 2-1**.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in table below.

Table 2-2 : Vehicle Classification System

| Vehicle Type | |
|----------------|--|
| Auto Rickshaw | |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |
| Bus | Minibus |
| | Standard Bus |
| Truck | Light Goods Vehicle (LCV) |
| | 2 – Axle Truck |
| | 3 Axle Truck (HCV) |
| | Multi Axle Truck (4-6 Axle) |
| | Oversized Vehicles (7 or more axles) |
| Other Vehicles | Agriculture Tractor, Tractor & Trailer |

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement:

- Car / Jeep / van
- Minibus /LCV
- Truck / Bus
- Multi Axle
- Oversize Vehicle

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Components of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report.

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and from April 2022 to March 2023 as under for both toll plazas–

Table 2-3 : Traffic Data at Toll Plaza @ Km 30.500

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) FY 2015-16 | Annual Average Daily Traffic (Nos.) FY 2016-17 | Annual Average Daily Traffic (Nos.) FY 2017-18 | Annual Average Daily Traffic (Nos.) FY 2018-19 | Annual Average Daily Traffic (Nos.) FY 2019-20 | Annual Average Daily Traffic (Nos.) FY 2020-21 | Annual Average Daily Traffic (Nos.) FY 2021-22 | Annual Average Daily Traffic (Nos.) FY 2022-23 |
|--------|--------------------|--|--|--|--|--|--|--|--|
| 1 | Car | 5672 | 7063 | 7360 | 8428 | 8860 | 9044 | 7684 | 8808 |
| 2 | Minibus / LCV | 1462 | 1539 | 1529 | 1506 | 1370 | 1056 | 377 | 553 |
| 3 | Truck / Bus | 3025 | 2869 | 2205 | 1109 | 1278 | 996 | 1178 | 1314 |
| 4 | Multi Axle | 2190 | 2365 | 2152 | 1453 | 1402 | 1390 | 1616 | 2207 |
| 5 | Oversized Vehicles | 3 | 2 | 84 | 60 | 50 | 28 | 5 | 7 |
| | Total | 12352 | 13838 | 13330 | 12556 | 12960 | 12515 | 10860 | 12889 |

Similar traffic data for toll plaza at km 105.000 is given as under

Table 2-4 : Traffic Data at Toll Plaza @ Km 105.000

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) – FY 2015-16 | Annual Average Daily Traffic (Nos.) – FY 2016-17 | Annual Average Daily Traffic (Nos.) – FY 2017-18 | Annual Average Daily Traffic (Nos.) – FY 2018-19 | Annual Average Daily Traffic (Nos.) – FY 2019-20 | Annual Average Daily Traffic (Nos.) – FY 2020-21 | Annual Average Daily Traffic (Nos.) – FY 2021-22 | Annual Average Daily Traffic (Nos.) – FY 2022-23 |
|--------|--------------------|--|--|--|--|--|--|--|--|
| 1 | CAR | 3072 | 2810 | 2915 | 3276 | 3446 | 3736 | 3612 | 3918 |
| 2 | Minibus/ LCV | 861 | 893 | 880 | 780 | 661 | 573 | 235 | 363 |
| 3 | Truck/Bus | 1407 | 819 | 906 | 691 | 778 | 767 | 913 | 914 |
| 4 | Multi Axle | 1637 | 1584 | 1746 | 1315 | 1248 | 1556 | 2031 | 2203 |
| 5 | Oversized Vehicles | 3 | 3 | 25 | 25 | 19 | 18 | 6 | 9 |
| | Total | 6979 | 6108 | 6472 | 6087 | 6151 | 6650 | 6798 | 7407 |

Pandemic of COVID-19 (Corona Virus) has impacted the entire world. Taking precaution, Government of India announced a complete lockdown in last week of March 2020 and traffic on highways was stopped which was eased out progressively later. Traffic on project corridor is recovering at good rate but still traffic numbers had effect of Pandemic. Thereafter India was hit by Covid-19 second and third wave in April 21 to July 21 and December 21 to March 22. Recovering traffic pattern was somewhat again disturbed due to second and third wave of Covid-19. Traffic numbers for the period from April 2020 to March 2021 are not representative of traffic pattern at project corridor due to pandemic lockdown impact. However, for integrity of data same shown above. NHAI also has, in principle, approved providing extension of concession period to make up for the loss of revenue due to lockdown. Traffic has been affected due to second wave of COVID-19 in period from April 21 to July 21 and from December 21 to March 22 due to third wave of Covid-19. Traffic from April 2021 to March 2022 was also affected but now by and large traffic has normalized on project stretch hence no additional recovery is considered.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued. There was mining ban in area which had impacted traffic temporarily. It is reported that environment clearance is obtained by

select lease holders for mining and final Supreme Court order was received in mid November 2021. Opening of mining activity would have positive impact on traffic flow on project road corridor.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in **Table 2-5**.

Table 2-5 : PCU Factors Adopted for Study

| Vehicle Type | PCUs |
|-------------------------------------|------|
| Car | 1.0 |
| Minibus | 1.5 |
| Standard Bus | 3.0 |
| LCV/LGV | 1.5 |
| 2 Axle Truck | 3.0 |
| 3 – 6 Axle Truck | 4.5 |
| MAV | 4.5 |
| Auto Rickshaw | 1.0 |
| Van/Tempo | 1.0 |
| Agriculture Tractor with Trailer | 4.5 |
| Agriculture Tractor without Trailer | 1.5 |

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under.

Table 2-6 : Traffic in PCU at both sections

| Toll Plaza Location | Period | PCU | PCU Index |
|---------------------|------------|-------|-----------|
| 30.500 | FY 2015-16 | 26809 | 2.17 |
| | FY 2016-17 | 28629 | 2.07 |
| | FY 2017-18 | 26323 | 1.98 |
| | FY 2018-19 | 20823 | 1.66 |

| Toll Plaza Location | Period | PCU | PCU Index |
|----------------------------|---------------|------------|------------------|
| | FY 2019-20 | 21283 | 1.64 |
| | FY 2020-21 | 19998 | 1.60 |
| | FY 2021-22 | 19077 | 1.76 |
| | FY 2022-23 | 23541 | 1.83 |
| 105.000 | FY 2015-16 | 15963 | 2.29 |
| | FY 2016-17 | 13747 | 2.25 |
| | FY 2017-18 | 14917 | 2.30 |
| | FY 2018-19 | 12549 | 2.06 |
| | FY 2019-20 | 12472 | 2.03 |
| | FY 2020-21 | 13979 | 2.10 |
| | FY 2021-22 | 15871 | 2.33 |
| | FY 2022-23 | 17158 | 2.32 |

It can be observed from above that project traffic has a PCU index ranging 1.5 to 2.4 which indicates a good mix of commercial and passenger traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent yearly traffic numbers for year 2021-22 have been considered as the base numbers.

It is observed that car traffic forms 69% of total traffic at toll plaza location 30.5 while multi axle vehicles are 17% of total traffic. 10% of traffic is Truck /Bus while LCV traffic forms the balance 4%. Overall, about 31% of traffic is commercial in nature.

At toll plaza location 105.0 car traffic forms 53% of total traffic at toll plaza while multi axle and LCV are 30% and 5%. Truck/ Bus volume is 12% of the total traffic. Overall, about 47% of traffic is commercial in nature which is higher as compared to toll plaza location 30.5.

Another important bifurcation of traffic is components of traffic with respect to various type of toll ticketing like

1. Single Journey
2. Return Journey
3. Overweight Vehicles (Concessionaire provided special tariff for this category)
4. Monthly Pass (Local and General)

The following table provides numbers of vehicles falling in each of above category on base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20 2020-21, 2021-22 and April 2022 to March 2023.

Table 2-7 : Journey Type Bifurcation of Traffic at KM 30.500

| Sr. No | Type | Traffic Volume (Nos.) for FY 2015-16 | Traffic Volume (Nos.) for FY 2016-17 | Traffic Volume (Nos.) for FY 2017-18 | Traffic Volume (Nos.) for FY 2018-19 | Traffic Volume (Nos.) for FY 2019-20 | Traffic Volume (Nos.) for FY 2020-21 | Traffic Volume (Nos.) for FY 2021-22 | Traffic Volume (Nos.) for FY 2022-23 |
|--------|---------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1 | Single Journey | 4240 | 4703 | 4852 | 4395 | 5113 | 6409 | 4900 | 5273 |
| 2 | Return Journey | 6166 | 6458 | 6174 | 5372 | 5188 | 3676 | 5858 | 7502 |
| 3 | Overweight vehicles | 537 | 369 | 131 | 314 | 2 | 0 | 0 | 0 |
| 4 | Monthly Pass | 1409 | 2308 | 2173 | 2475 | 2657 | 2430 | 102 | 114 |

A significant part of the traffic at KM 30.500 is return journey (58%) followed by single journey (41%) and monthly passes which share 1% of the total traffic volume. Overweight vehicle shares have reduced to almost nil.

Similarly, traffic numbers for type of journey at KM 105.000 are given in following table.

Table 2-8 : Journey Type Bifurcation of Traffic at KM 105.000

| Sr. No | Type | Traffic Volume (Nos.) for FY 2015-16 | Traffic Volume (Nos.) for FY 2016-17 | Traffic Volume (Nos.) for FY 2017-18 | Traffic Volume (Nos.) for FY 2018-19 | Traffic Volume (Nos.) for FY 2019-20 | Traffic Volume (Nos.) for FY 2020-21 | Traffic Volume (Nos.) for FY 2021-22 | Traffic Volume (Nos.) for FY 2022-23 |
|--------|---------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1 | Single Journey | 3075 | 3314 | 3422 | 2999 | 3379 | 4475 | 3950 | 4082 |
| 2 | Return Journey | 2200 | 1888 | 2248 | 2036 | 1978 | 1634 | 2816 | 3300 |
| 3 | Overweight vehicles | 315 | 215 | 109 | 252 | 6 | 0 | 0 | 0 |
| 4 | Monthly Pass | 1389 | 691 | 693 | 800 | 788 | 541 | 32 | 25 |

Here single journey (55%) forms highest portion of traffic followed by return journey (45%) and monthly pass journey (0%). It can be observed as 105.000 is predominantly a rural part, monthly passes and return journey components have reduced as compared to location 30.500. Component of overweight vehicle remain same though.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. The following are some of such important factors.

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data

CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Jaipur – Deoli section of NH-12 has been done taking above factors into consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Rajasthan is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given categories of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log } (P) = k \times \text{Log } (EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2004 | 18565 | 397290 | 4.27 | 5.60 | | |
| 2005 | 19445 | 417701 | 4.29 | 5.62 | 5% | |
| 2006 | 21342 | 467675 | 4.33 | 5.67 | 10% | |
| 2007 | 21922 | 524723 | 4.34 | 5.72 | 3% | |
| 2008 | 23356 | 585161 | 4.37 | 5.77 | 7% | |
| 2009 | 24304 | 659616 | 4.39 | 5.82 | 4% | |
| 2010 | 27502 | 748295 | 4.44 | 5.87 | 13% | |
| 2011 | 29612 | 845909 | 4.47 | 5.93 | 8% | |
| 2012 | 30839 | 947598 | 4.49 | 5.98 | 4% | |
| 2013 | 31386 | 1053406 | 4.50 | 6.02 | 2% | |
| 2014 | 33186 | 1171267 | 4.52 | 6.07 | 6% | 6.0% |

Regression analysis of same is given in figure below

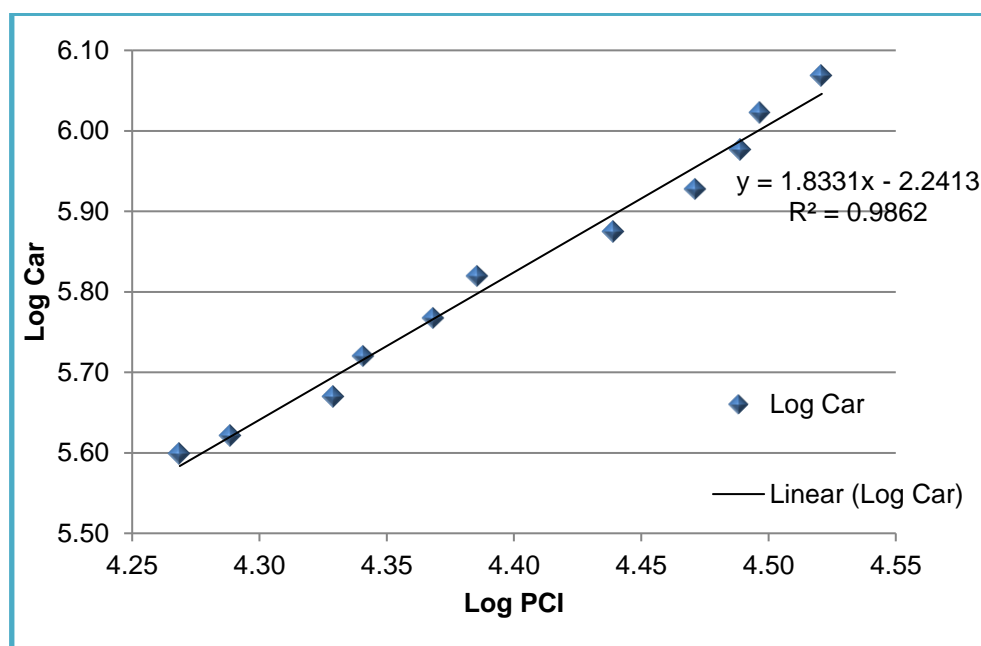
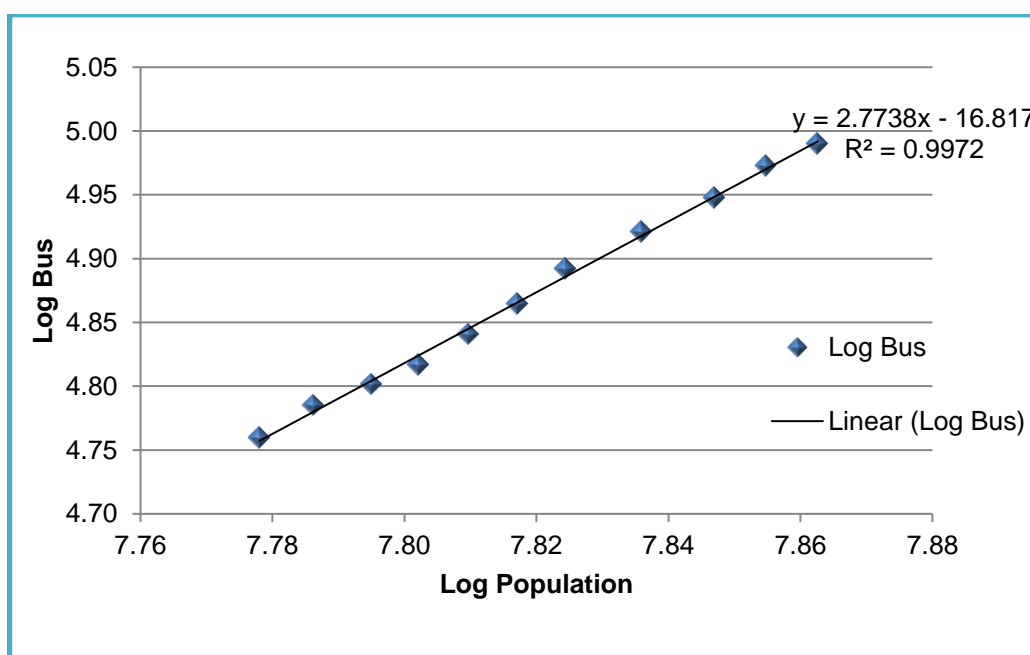
**Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation**

Table 3-2 : Population Vs Bus

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2004 | 59984000 | 57542 | 7.78 | 4.76 | | |
| 2005 | 61136000 | 60979 | 7.79 | 4.79 | 2% | |
| 2006 | 62377000 | 63320 | 7.80 | 4.80 | 2% | |
| 2007 | 63407000 | 65605 | 7.80 | 4.82 | 2% | |
| 2008 | 64533000 | 69298 | 7.81 | 4.84 | 2% | |
| 2009 | 65650000 | 73257 | 7.82 | 4.86 | 2% | |
| 2010 | 66750000 | 77980 | 7.82 | 4.89 | 2% | |
| 2011 | 68548437 | 83345 | 7.84 | 4.92 | 3% | |
| 2012 | 70314000 | 88616 | 7.85 | 4.95 | 3% | |
| 2013 | 71584000 | 93892 | 7.85 | 4.97 | 2% | |
| 2014 | 72877000 | 97650 | 7.86 | 4.99 | 2% | 1.97% |

Regression analysis of same is given in figure below

**Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation**

Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|-----------|--------|----------|-----------|-------------|-------------------------|
| 2004 | 112636000 | 186431 | 8.05 | 5.27 | | |
| 2005 | 120202000 | 206381 | 8.08 | 5.31 | 7% | |
| 2006 | 134350000 | 232007 | 8.13 | 5.37 | 12% | |
| 2007 | 140471000 | 252109 | 8.15 | 5.40 | 5% | |
| 2008 | 152284000 | 266048 | 8.18 | 5.42 | 8% | |
| 2009 | 161159000 | 289925 | 8.21 | 5.46 | 6% | |
| 2010 | 185366000 | 323273 | 8.27 | 5.51 | 15% | |
| 2011 | 202749000 | 362028 | 8.31 | 5.56 | 9% | |
| 2012 | 214391000 | 401983 | 8.33 | 5.60 | 6% | |
| 2013 | 224632000 | 434379 | 8.35 | 5.64 | 5% | |
| 2014 | 237530000 | 472365 | 8.38 | 5.67 | 6% | 7.43% |

Following figure depict regression analysis and extrapolation.

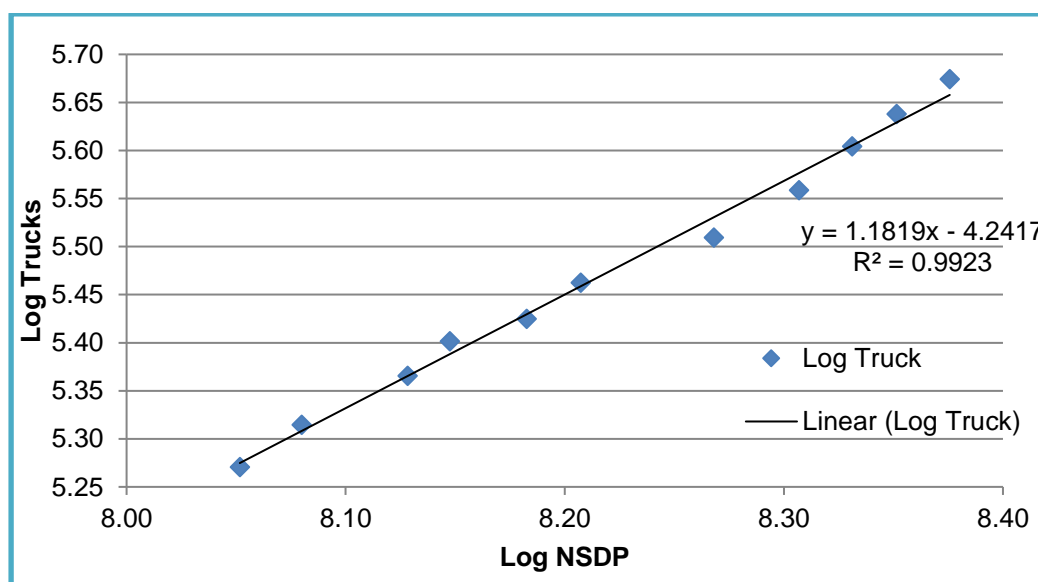


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-----------|------------------|----------------------|-------------------------|----------------|----------------------------|----------------|----------------------|
| Rajasthan | Car/Jeep | PCI | $y = 1.8331x - 2.2413$ | $R^2 = 0.9862$ | 1.8331 | 6.03% | 11.05% |
| | Bus | Population | $y = 2.7738x - 16.8173$ | $R^2 = 0.9972$ | 2.7738 | 1.97% | 5.46% |
| | Truck | NSDP | $y = 1.1819x - 4.2417$ | $R^2 = 0.9923$ | 1.1819 | 7.43% | 8.78% |

Economic model for predicting growth is good tool, however other local, regional, national factors should also be considered before finalizing growth factors. Considering factors such as proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Jaipur to Deoli has recently been commissioned and tolling only commenced in 2013-14. Only 3-4 years traffic data is available with project concessionaire. Following factors also have added to inconsistency in traffic volume on project during previous years.

- Demonetization in November 2016
- Ban on mining in Rajasthan
- Covid-19 Impact from Feb-20 onwards by successive waves

It is assumed that as project is now completed after adding the balance length, the impact of demonetization is diminishing, and mining ban has also been lifted in area. This had impacted the traffic growth adversely.

Traffic on project stretch was affected due to COVID-19 lockdown announced by Central government in March 2020. Traffic is affected by subsequent second and third waves as well in year 2021-22. Traffic for period from April 2021 to March 2022 was also impacted due to COVID-19 lockdown hence same is not considered for historical growth.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2011-12, the economy recovered in 2013-14, and a high growth rate of GDP was recorded in up to 2018-19. Pandemic of COVID-19 impacted all economies of world including India. Following figure show trend of GDP growth in India.

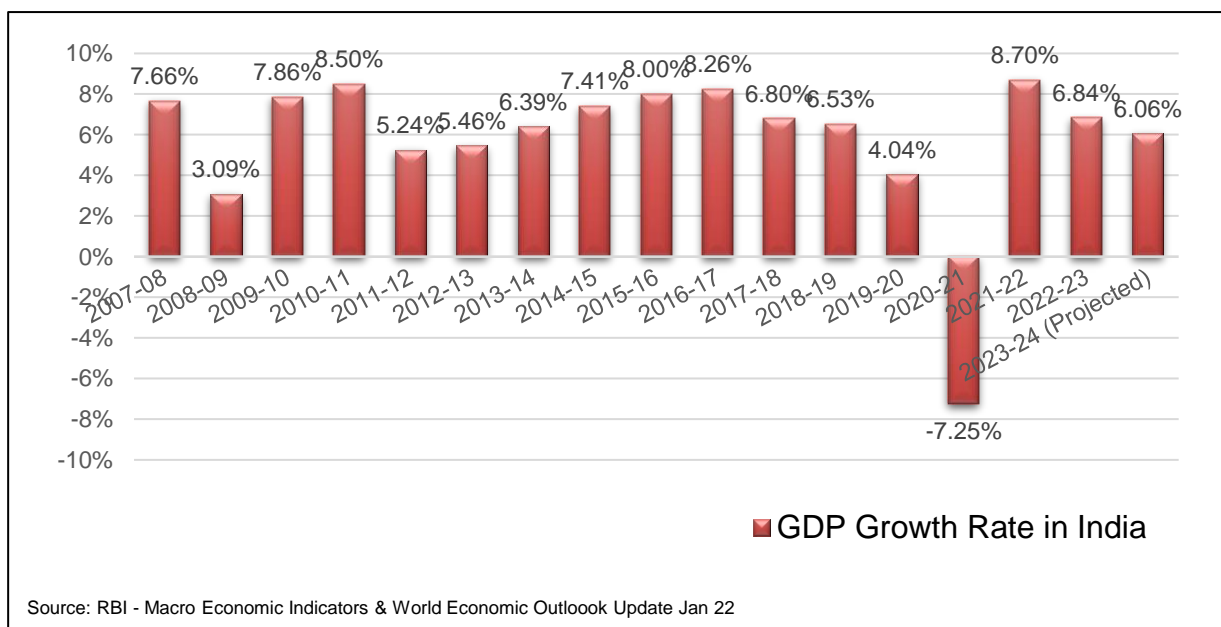


Figure 3-4 : Growth of GDP in India

FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of

6.8% in FY 2018-19. Government took major policy decision including tax infrastructure reforming, banking sector improvement and ease of doing business.

Major economies of world collapsed due to pandemic COVID-19 including India. Indian economy is also registered negative growth in financial year 2020-21. After that Indian economy recovered handsomely and registered a growth of about 9% in Year 2021-22. This was partly due to low base of year 2020-21 as well.

Honorable Prime Minister has announced a major relief package of Rs. 20 lakh crores which is about 10% of GDP. This is aimed at turning this major crisis of COVID-19 into opportunity by providing major impetus to industrial production to the limit of becoming a self-reliant economy. With major thrust of this package being on **Make -In- India** it is expected that industry in India would grow at rapid pace and recover handsomely in post COVID-19 scenario.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Curb on mining activity in area due to ban on quarrying had affected traffic on this project.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic**, **Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Table 3-5 : Recommended Growth Rates Optimistic

| Up to Year/ Vehicle Type | 2021- 2023 | 2023- 2026 | 2026- 2031 | 2031- 2036 | 2036- 2041 | 2041- 2046 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| CAR | 9.51% | 8.69% | 7.54% | 6.46% | 5.45% | 4.50% |
| Minibus /LCV | 6.25% | 5.67% | 5.23% | 4.52% | 3.59% | 2.70% |
| Truck / Bus | 6.81% | 6.81% | 5.97% | 5.19% | 4.47% | 3.81% |
| Multi Axle | 6.81% | 5.76% | 5.06% | 4.41% | 3.81% | 3.26% |
| Oversized Vehicles | 6.81% | 5.76% | 5.06% | 4.41% | 3.81% | 3.26% |

Table 3-6 : Recommended Growth Rates Pessimistic

| Year/ Vehicle Type | 2021- 2023 | 2023- 2026 | 2026- 2031 | 2031- 2036 | 2036- 2041 | 2041- 2046 |
|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| CAR | 8.51% | 7.69% | 6.54% | 5.46% | 4.45% | 3.50% |
| Minibus /LCV | 5.25% | 4.67% | 4.23% | 3.52% | 2.59% | 1.70% |
| Truck / Bus | 5.81% | 5.81% | 4.97% | 4.19% | 3.47% | 2.81% |
| Multi Axle | 5.81% | 4.76% | 4.06% | 3.41% | 2.81% | 2.26% |
| Oversized Vehicles | 5.81% | 4.76% | 4.06% | 3.41% | 2.81% | 2.26% |

Table 3-7 : Recommended Growth Rates Most Likely

| Year/ Vehicle Type | 2021- 2023 | 2023- 2026 | 2026- 2031 | 2031- 2036 | 2036- 2041 | 2041- 2046 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| CAR | 9.01% | 8.19% | 7.04% | 5.96% | 4.95% | 4.00% |
| Minibus /LCV | 5.75% | 5.17% | 4.73% | 4.02% | 3.09% | 2.20% |
| Truck / Bus | 6.31% | 6.31% | 5.47% | 4.69% | 3.97% | 3.31% |
| Multi Axle | 6.31% | 5.26% | 4.56% | 3.91% | 3.31% | 2.76% |
| Oversized Vehicles | 6.31% | 5.26% | 4.56% | 3.91% | 3.31% | 2.76% |

There was ban on mining and quarrying in Rajasthan. Rajasthan government has started giving permission to mining in piecemeal basis. It is reported that environment clearance is obtained by select lease holders for mining and they are waiting for final Supreme Court order to start mining. Opening of mining activity would bring positive impact on traffic flow on project road corridor.

3.7 COVID-19 Impact

Corona virus crisis affected the traffic since March 2020 onwards. Traffic in year 2020-21 was negatively affected by lockdown. Impact of Covid-19 is analyzed in next section of this chapter. All social and economic activities had been completely disrupted due worldwide pandemic of Corona Virus. This had affected traffic on project stretch as well. Traffic was severely affected from March 2020 due to lockdown. Government considered partial lifting of lockdown and allowing selective economic activities on zone-to-zone basis in May 2020. Government has decided to open economic activities in phases and by now almost all the activities are open with some restrictions.

Concessionaire shared traffic data for year 2020-21 and 2021-22. At all toll plaza commercial traffic has almost reached back to previous level. Passenger traffic, which picked up quite late, has also recovered handsomely in later months and has reached back to original level. But traffic was further affected due to second wave of COVID-19 in April 21 to July 21 and third wave in December 2021 to March 2022.

Government has announced a mega economic stimulate and package of Rs. 20 Lakh Crore to bring the economy back on track and recover the losses. But now by and large traffic is normalized on project stretch hence no additional recovery growth is taken in projections now.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 30.500 KM
(Optimistic Growth Scenario)**

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|--------------|------------|------------|--------------------|-----------|-----------|
| 2023-24 | 9647 | 588 | 1404 | 2357 | 7 | 14003 | 25379 |
| 2024-25 | 10564 | 624 | 1499 | 2517 | 7 | 15211 | 27355 |
| 2025-26 | 11361 | 657 | 1588 | 2644 | 7 | 16257 | 29040 |
| 2026-27 | 12217 | 691 | 1683 | 2778 | 7 | 17376 | 30835 |
| 2027-28 | 13137 | 727 | 1784 | 2918 | 7 | 18573 | 32742 |
| 2028-29 | 14127 | 765 | 1890 | 3066 | 7 | 19855 | 34773 |
| 2029-30 | 15193 | 805 | 2003 | 3221 | 7 | 21229 | 36936 |
| 2030-31 | 16174 | 841 | 2107 | 3363 | 7 | 22492 | 38922 |
| 2031-32 | 17218 | 879 | 2216 | 3511 | 7 | 23831 | 41016 |
| 2032-33 | 18330 | 918 | 2331 | 3665 | 7 | 25251 | 43224 |
| 2033-34 | 19513 | 959 | 2451 | 3826 | 7 | 26756 | 45553 |
| 2034-35 | 20773 | 1001 | 2578 | 3994 | 7 | 28353 | 48013 |
| 2035-36 | 21904 | 1037 | 2693 | 4146 | 7 | 29787 | 50227 |
| 2036-37 | 23097 | 1074 | 2813 | 4304 | 7 | 31295 | 52547 |
| 2037-38 | 24355 | 1112 | 2939 | 4468 | 7 | 32881 | 54978 |
| 2038-39 | 25682 | 1152 | 3070 | 4638 | 7 | 34549 | 57523 |
| 2039-40 | 27080 | 1193 | 3208 | 4814 | 7 | 36302 | 60188 |
| 2040-41 | 28299 | 1225 | 3330 | 4970 | 7 | 37831 | 62523 |

Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM
(Optimistic Growth Scenario)

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|--------------|------------|------------|--------------------|-----------|-----------|
| 2023-24 | 4291 | 385 | 975 | 2353 | 9 | 8013 | 18423 |
| 2024-25 | 4699 | 409 | 1041 | 2514 | 9 | 8672 | 19789 |
| 2025-26 | 5053 | 430 | 1102 | 2642 | 9 | 9236 | 20934 |
| 2026-27 | 5434 | 452 | 1168 | 2776 | 9 | 9839 | 22149 |
| 2027-28 | 5843 | 476 | 1237 | 2916 | 9 | 10481 | 23431 |
| 2028-29 | 6283 | 501 | 1311 | 3063 | 9 | 11167 | 24792 |
| 2029-30 | 6757 | 526 | 1389 | 3218 | 9 | 11899 | 26235 |
| 2030-31 | 7193 | 550 | 1461 | 3360 | 9 | 12573 | 27562 |
| 2031-32 | 7658 | 575 | 1537 | 3508 | 9 | 13287 | 28958 |
| 2032-33 | 8153 | 600 | 1618 | 3663 | 9 | 14043 | 30431 |
| 2033-34 | 8679 | 627 | 1701 | 3824 | 9 | 14840 | 31971 |
| 2034-35 | 9239 | 655 | 1789 | 3993 | 9 | 15685 | 33598 |
| 2035-36 | 9742 | 679 | 1870 | 4145 | 9 | 16445 | 35064 |
| 2036-37 | 10272 | 703 | 1953 | 4303 | 9 | 17240 | 36590 |
| 2037-38 | 10831 | 728 | 2041 | 4466 | 9 | 18075 | 38184 |
| 2038-39 | 11420 | 753 | 2132 | 4636 | 9 | 18950 | 39848 |
| 2039-40 | 12042 | 780 | 2227 | 4812 | 9 | 19870 | 41588 |
| 2040-41 | 12584 | 801 | 2312 | 4969 | 9 | 20675 | 43123 |

Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 30.500 KM
(Pessimistic Growth Scenario)

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|--------------|------------|------------|--------------------|-----------|-----------|
| 2023-24 | 9558 | 583 | 1391 | 2335 | 7 | 13874 | 25145 |
| 2024-25 | 10371 | 614 | 1472 | 2471 | 7 | 14935 | 26859 |
| 2025-26 | 11048 | 640 | 1544 | 2572 | 7 | 15811 | 28246 |
| 2026-27 | 11771 | 666 | 1620 | 2676 | 7 | 16740 | 29704 |
| 2027-28 | 12540 | 694 | 1700 | 2785 | 7 | 17726 | 31245 |
| 2028-29 | 13360 | 723 | 1784 | 2898 | 7 | 18772 | 32869 |
| 2029-30 | 14234 | 754 | 1873 | 3016 | 7 | 19884 | 34588 |
| 2030-31 | 15011 | 780 | 1951 | 3119 | 7 | 20868 | 36101 |
| 2031-32 | 15831 | 806 | 2033 | 3226 | 7 | 21903 | 37688 |
| 2032-33 | 16694 | 834 | 2118 | 3336 | 7 | 22989 | 39343 |
| 2033-34 | 17605 | 863 | 2207 | 3450 | 7 | 24132 | 41077 |
| 2034-35 | 18566 | 894 | 2299 | 3568 | 7 | 25334 | 42892 |
| 2035-36 | 19391 | 916 | 2379 | 3669 | 7 | 26362 | 44444 |
| 2036-37 | 20252 | 940 | 2462 | 3772 | 7 | 27433 | 46054 |
| 2037-38 | 21152 | 964 | 2548 | 3879 | 7 | 28550 | 47729 |
| 2038-39 | 22092 | 988 | 2637 | 3988 | 7 | 29712 | 49463 |
| 2039-40 | 23074 | 1013 | 2728 | 4100 | 7 | 30922 | 51259 |
| 2040-41 | 23882 | 1030 | 2804 | 4192 | 7 | 31915 | 52735 |

Table 4-4 : Total Tollable Traffic@ Toll Plaza 2- Chainage 105.000 KM
(Pessimistic Growth Scenario)

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|--------------|------------|------------|--------------------|-----------|-----------|
| 2023-24 | 4252 | 382 | 966 | 2331 | 9 | 7940 | 18253 |
| 2024-25 | 4614 | 401 | 1023 | 2467 | 9 | 8514 | 19427 |
| 2025-26 | 4916 | 418 | 1073 | 2567 | 9 | 8983 | 20354 |
| 2026-27 | 5237 | 436 | 1126 | 2671 | 9 | 9479 | 21329 |
| 2027-28 | 5579 | 454 | 1183 | 2780 | 9 | 10005 | 22360 |
| 2028-29 | 5943 | 473 | 1242 | 2893 | 9 | 10560 | 23438 |
| 2029-30 | 6332 | 492 | 1303 | 3011 | 9 | 11147 | 24569 |
| 2030-31 | 6678 | 510 | 1358 | 3114 | 9 | 11669 | 25571 |
| 2031-32 | 7042 | 528 | 1415 | 3220 | 9 | 12214 | 26610 |
| 2032-33 | 7426 | 547 | 1474 | 3330 | 9 | 12786 | 27694 |
| 2033-34 | 7831 | 566 | 1535 | 3444 | 9 | 13385 | 28824 |
| 2034-35 | 8258 | 585 | 1599 | 3562 | 9 | 14013 | 30002 |
| 2035-36 | 8625 | 600 | 1654 | 3662 | 9 | 14550 | 31007 |
| 2036-37 | 9008 | 616 | 1711 | 3765 | 9 | 15109 | 32048 |
| 2037-38 | 9409 | 632 | 1770 | 3871 | 9 | 15691 | 33127 |
| 2038-39 | 9827 | 648 | 1831 | 3980 | 9 | 16295 | 34243 |
| 2039-40 | 10263 | 664 | 1895 | 4092 | 9 | 16923 | 35399 |
| 2040-41 | 10623 | 676 | 1947 | 4185 | 9 | 17440 | 36351 |

Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 30.500 KM
(Most Likely Growth Scenario)

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|----------------|------------|---------------------|-------------------|-------------------|---------------------------|------------------|------------------|
| 2023-24 | 9602 | 585 | 1398 | 2347 | 7 | 13939 | 25267 |
| 2024-25 | 10467 | 618 | 1485 | 2495 | 7 | 15072 | 27108 |
| 2025-26 | 11203 | 647 | 1567 | 2609 | 7 | 16033 | 28647 |
| 2026-27 | 11991 | 678 | 1653 | 2728 | 7 | 17057 | 30275 |
| 2027-28 | 12834 | 710 | 1743 | 2852 | 7 | 18146 | 31994 |
| 2028-29 | 13737 | 743 | 1838 | 2982 | 7 | 19307 | 33816 |
| 2029-30 | 14704 | 778 | 1939 | 3118 | 7 | 20546 | 35751 |
| 2030-31 | 15581 | 809 | 2029 | 3240 | 7 | 21666 | 37493 |
| 2031-32 | 16509 | 842 | 2124 | 3367 | 7 | 22849 | 39327 |
| 2032-33 | 17493 | 875 | 2223 | 3499 | 7 | 24097 | 41252 |
| 2033-34 | 18536 | 910 | 2327 | 3635 | 7 | 25415 | 43271 |
| 2034-35 | 19640 | 946 | 2436 | 3777 | 7 | 26806 | 45395 |
| 2035-36 | 20612 | 975 | 2533 | 3901 | 7 | 28028 | 47260 |
| 2036-37 | 21631 | 1006 | 2634 | 4029 | 7 | 29307 | 49204 |
| 2037-38 | 22700 | 1037 | 2738 | 4163 | 7 | 30645 | 51235 |
| 2038-39 | 23822 | 1069 | 2847 | 4300 | 7 | 32045 | 53348 |
| 2039-40 | 25000 | 1102 | 2960 | 4442 | 7 | 33511 | 55554 |
| 2040-41 | 26001 | 1126 | 3058 | 4564 | 7 | 34756 | 57434 |

Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM
(Most Likely Growth Scenario)

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|--------------|------------|------------|--------------------|-----------|-----------|
| 2023-24 | 4272 | 384 | 971 | 2342 | 9 | 7978 | 18341 |
| 2024-25 | 4657 | 406 | 1032 | 2489 | 9 | 8593 | 19603 |
| 2025-26 | 4985 | 425 | 1089 | 2603 | 9 | 9111 | 20644 |
| 2026-27 | 5336 | 445 | 1148 | 2722 | 9 | 9660 | 21737 |
| 2027-28 | 5712 | 466 | 1212 | 2846 | 9 | 10245 | 22895 |
| 2028-29 | 6113 | 488 | 1278 | 2976 | 9 | 10864 | 24112 |
| 2029-30 | 6543 | 510 | 1348 | 3112 | 9 | 11522 | 25397 |
| 2030-31 | 6932 | 531 | 1412 | 3234 | 9 | 12118 | 26558 |
| 2031-32 | 7345 | 552 | 1478 | 3360 | 9 | 12744 | 27768 |
| 2032-33 | 7783 | 574 | 1547 | 3491 | 9 | 13404 | 29035 |
| 2033-34 | 8247 | 596 | 1620 | 3627 | 9 | 14099 | 30363 |
| 2034-35 | 8739 | 620 | 1696 | 3769 | 9 | 14833 | 31758 |
| 2035-36 | 9171 | 639 | 1763 | 3894 | 9 | 15476 | 32982 |
| 2036-37 | 9624 | 658 | 1833 | 4022 | 9 | 16146 | 34250 |
| 2037-38 | 10100 | 679 | 1906 | 4156 | 9 | 16850 | 35579 |
| 2038-39 | 10600 | 700 | 1982 | 4293 | 9 | 17584 | 36955 |
| 2039-40 | 11124 | 722 | 2060 | 4435 | 9 | 18350 | 38385 |
| 2040-41 | 11569 | 738 | 2128 | 4557 | 9 | 19001 | 39607 |

4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Jaipur - Deoli project, the Target Date and Target Traffic are defined as under:

Target Date - 1st October 2018

Target Traffic - 30344 in PCU

It was observed that as per traffic projections, traffic volume fell short of target traffic and concession period is expected to extend by about 5 years.

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days

Traffic was severely impacted on project highway during initial lockdown period. NHAI has declared a policy of providing extension of concession to make up for revenue loss during lockdown. It is expected that extension would be provided to project concession period on this account as well.

Accordingly, traffic and revenue projections have been worked out up to year 2040-41.

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. Monthly Pass: For frequent users monthly pass is issued for 50 trips per month. The discount factor works out to 33.33% for 50 journeys. Similarly, there is a pass for 100 trips per month as well, with a discount factor of 33.33% for 100 journeys.
2. Daily Pass (for Return Trip): A 75% discount will be offered on the return trip.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2021-22. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site

(www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

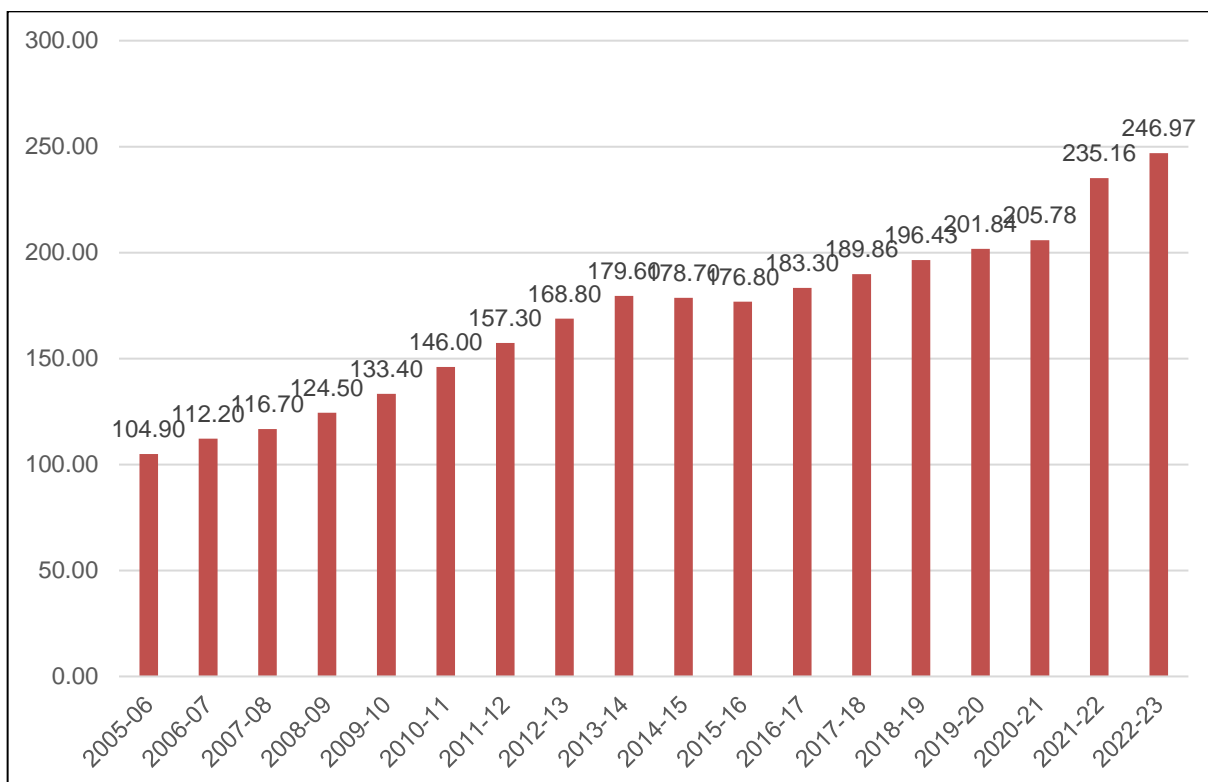


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2023 is 5.23%. For Future year initially it is takes 5% and suitably stepped down for future year.

It has been observed that project corridor witness's high percentage of overweight vehicles. In response to same, Concessionaire has further declared special rates for overweight vehicles which are applicable on project corridor.

These overweight categories and rate on base year (2015-16) are given as under

Table 5-1 : Overweight Traffic Rate

| Category | Rate (Rs) |
|-----------------------------------|-----------|
| LCV (Single Journey of Ten Times) | 1300 |
| LCV (Single Journey of Two Times) | 260 |

| Category | Rate (Rs) |
|--|-----------|
| Truck/ Bus (Single Journey of Ten Times) | 2700 |
| Truck/ Bus (Single Journey of Two Times) | 540 |
| Multi Axle Vehicle (Single Journey of Ten Times) | 4150 |
| Multi Axle Vehicle (Single Journey of Two Times) | 830 |

Normal escalation in the basis of WPI would be applicable to these rates as well.

In addition to above concessive has also declared special rates for overweight return journey as under

Table 5-2 : Special Overweight Return Pass

| Category | Rate (Rs.) |
|--------------|------------|
| Minibus /LCV | 170 |
| Truck/Bus | 210 |
| Multi Axle | 205 |

These rates would be escalated at normal inflation rate.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-3 : Base Toll Rates 2007 - 08

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|--------------------------------|
| Car, Jeep, Van or Light Motor Vehicle | 0.65 |
| Light Commercial Vehicle, Light Goods Vehicle or Minibus | 1.05 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|--------------------------------|
| Bus or Truck (2 Axle) | 2.2 |
| Three Axle commercial vehicles | 2.4 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles) | 3.45 |
| Oversized Vehicle (seven or more axles) | 4.2 |

There are number of bypasses and structures in each package. Equivalent length for structures is added to tollable length at each toll plaza. Bypasses having cost more than Rs. 10 Cr. are to be charged 1.5 times the normal fee. This has been incorporated in rates. Following table provides details of tollable lengths at each toll plaza

Table 5-4 : Tollable Length Jaipur – Deoli section of NH -12

| Toll Plaza Chainage | Length (km) | Bypass Cost (Cr) | Equivalent Structure length (km) | Tollable highway + structure length (km) |
|---------------------|-------------|-------------------------|----------------------------------|--|
| 30.500 | 59.164 | 64.5 (Chaksu Bypass) | - | 59.194 |
| 105.000 | 66.500 | - | - | 66.50 |

Additional rate for bypass having cost more than 10 Cr has been added as per schedule -R in toll rates for toll plaza at 30.50 km

Other than this there is no structure or bypass which qualifies for additional toll rate at any toll plaza.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below. Since applicable length of highway length is equal for both plazas, applicable toll rates are also same

Thus, worked out rates for various categories of vehicle and discounts are given as under;

Table 5-5 : Toll Rates for Single Journey @ Km 30.500

| Year | CAR | LCV | Truck / Bus | Multi Axle | Oversized Vehicles |
|----------------|------------|------------|--------------------|-------------------|---------------------------|
| 2023-24 | 120 | 185 | 385 | 595 | 745 |
| 2024-25 | 125 | 195 | 405 | 625 | 785 |
| 2025-26 | 130 | 205 | 425 | 660 | 825 |
| 2026-27 | 135 | 215 | 450 | 695 | 865 |
| 2027-28 | 145 | 225 | 470 | 730 | 910 |
| 2028-29 | 150 | 240 | 495 | 765 | 955 |
| 2029-30 | 160 | 250 | 515 | 800 | 1000 |
| 2030-31 | 165 | 260 | 540 | 840 | 1050 |
| 2031-32 | 175 | 275 | 570 | 880 | 1100 |
| 2032-33 | 180 | 290 | 595 | 925 | 1150 |
| 2033-34 | 190 | 300 | 625 | 970 | 1210 |
| 2034-35 | 200 | 315 | 655 | 1015 | 1270 |
| 2035-36 | 210 | 330 | 690 | 1065 | 1330 |
| 2036-37 | 220 | 350 | 720 | 1115 | 1395 |
| 2037-38 | 230 | 365 | 760 | 1175 | 1465 |
| 2038-39 | 245 | 385 | 795 | 1230 | 1535 |
| 2039-40 | 255 | 405 | 835 | 1290 | 1610 |
| 2040-41 | 265 | 425 | 875 | 1355 | 1695 |

Table 5-6 : Toll Rates for Return Journey @ Km 30.500

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles |
|----------------|------------|------------|--------------------|----------------------|---------------------------|
| 2023-24 | 175 | 280 | 580 | 895 | 1120 |
| 2024-25 | 185 | 295 | 610 | 940 | 1175 |
| 2025-26 | 195 | 310 | 640 | 990 | 1235 |
| 2026-27 | 205 | 325 | 670 | 1040 | 1300 |
| 2027-28 | 215 | 340 | 705 | 1095 | 1365 |
| 2028-29 | 225 | 360 | 740 | 1145 | 1430 |
| 2029-30 | 235 | 375 | 775 | 1200 | 1500 |
| 2030-31 | 250 | 395 | 815 | 1260 | 1570 |
| 2031-32 | 260 | 410 | 855 | 1320 | 1650 |
| 2032-33 | 275 | 430 | 895 | 1385 | 1730 |
| 2033-34 | 285 | 455 | 940 | 1450 | 1815 |
| 2034-35 | 300 | 475 | 985 | 1525 | 1900 |
| 2035-36 | 315 | 500 | 1030 | 1600 | 1995 |
| 2036-37 | 330 | 525 | 1085 | 1675 | 2095 |
| 2037-38 | 345 | 550 | 1135 | 1760 | 2195 |
| 2038-39 | 365 | 575 | 1195 | 1845 | 2305 |
| 2039-40 | 380 | 605 | 1250 | 1935 | 2420 |
| 2040-41 | 400 | 635 | 1315 | 2035 | 2540 |

Table 5-7 : Toll Rates for Overweight Ticket @ Km 30.500

| Year | LCV (Single Journey of Ten Times) | LCV (Single Journey of Two Times) | Truck/ Bus (Single Journey of Ten Times) | Truck/ Bus (Single Journey of Two Times) | Multi Axle Vehicle (Single Journey of Ten Times) | Multi Axle Vehicle (Single Journey of Two Times) |
|----------------|--|--|---|---|---|---|
| 2023-24 | 1850 | 370 | 3850 | 770 | 5950 | 1190 |
| 2024-25 | 1950 | 390 | 4050 | 810 | 6250 | 1250 |
| 2025-26 | 2050 | 410 | 4250 | 850 | 6600 | 1320 |
| 2026-27 | 2150 | 430 | 4500 | 900 | 6950 | 1390 |
| 2027-28 | 2250 | 450 | 4700 | 940 | 7300 | 1460 |
| 2028-29 | 2400 | 480 | 4950 | 990 | 7650 | 1530 |
| 2029-30 | 2500 | 500 | 5150 | 1030 | 8000 | 1600 |
| 2030-31 | 2600 | 520 | 5400 | 1080 | 8400 | 1680 |
| 2031-32 | 2750 | 550 | 5700 | 1140 | 8800 | 1760 |
| 2032-33 | 2900 | 580 | 5950 | 1190 | 9250 | 1850 |
| 2033-34 | 3000 | 600 | 6250 | 1250 | 9700 | 1940 |
| 2034-35 | 3150 | 630 | 6550 | 1310 | 10150 | 2030 |
| 2035-36 | 3300 | 660 | 6900 | 1380 | 10650 | 2130 |
| 2036-37 | 3500 | 700 | 7200 | 1440 | 11150 | 2230 |
| 2037-38 | 3650 | 730 | 7600 | 1520 | 11750 | 2350 |
| 2038-39 | 3850 | 770 | 7950 | 1590 | 12300 | 2460 |
| 2039-40 | 4050 | 810 | 8350 | 1670 | 12900 | 2580 |
| 2040-41 | 4250 | 850 | 8750 | 1750 | 13550 | 2710 |

Table 5-8 : Toll Rates for Overweight Return Ticket (RPPU) @Km 30.500

| Year | Minibus /LCV | Truck/ Bus | Multi Axle |
|----------------|---------------------|-------------------|-------------------|
| 2023-24 | 300 | 415 | 455 |
| 2024-25 | 315 | 435 | 480 |
| 2025-26 | 330 | 455 | 505 |
| 2026-27 | 345 | 480 | 530 |
| 2027-28 | 360 | 505 | 555 |
| 2028-29 | 375 | 530 | 580 |
| 2029-30 | 390 | 555 | 605 |
| 2030-31 | 410 | 580 | 630 |
| 2031-32 | 430 | 605 | 660 |
| 2032-33 | 450 | 630 | 690 |
| 2033-34 | 470 | 660 | 720 |
| 2034-35 | 490 | 690 | 750 |
| 2035-36 | 510 | 720 | 785 |
| 2036-37 | 535 | 750 | 820 |
| 2037-38 | 560 | 785 | 855 |
| 2038-39 | 585 | 820 | 895 |
| 2039-40 | 610 | 855 | 935 |
| 2040-41 | 635 | 895 | 975 |

Table 5-9 : Toll Rates for Monthly Pass Local @ Km 30.500

| Year | CAR (Non-Commercial Vehicles) | CAR SPL (10 to 20 Km) | LCV / Minibus SPL | LCV / Minibus (10 to 20 Km) |
|----------------|--------------------------------------|------------------------------|--------------------------|------------------------------------|
| 2023-24 | 330 | 1800 | 3035 | 3980 |
| 2024-25 | 345 | 1890 | 3185 | 4180 |
| 2025-26 | 365 | 1985 | 3345 | 4390 |
| 2026-27 | 385 | 2085 | 3510 | 4610 |
| 2027-28 | 405 | 2190 | 3685 | 4840 |
| 2028-29 | 420 | 2290 | 3850 | 5060 |
| 2029-30 | 440 | 2395 | 4025 | 5290 |
| 2030-31 | 465 | 2505 | 4205 | 5530 |
| 2031-32 | 485 | 2620 | 4395 | 5780 |
| 2032-33 | 510 | 2740 | 4595 | 6040 |
| 2033-34 | 535 | 2865 | 4800 | 6310 |
| 2034-35 | 560 | 2995 | 5015 | 6595 |
| 2035-36 | 590 | 3130 | 5240 | 6890 |
| 2036-37 | 620 | 3270 | 5475 | 7200 |
| 2037-38 | 650 | 3415 | 5720 | 7525 |
| 2038-39 | 680 | 3570 | 5975 | 7865 |
| 2039-40 | 715 | 3730 | 6245 | 8220 |
| 2040-41 | 750 | 3900 | 6525 | 8590 |

Table 5-10 : Toll Rates for Monthly Pass @ Km 30.500

| Year | Car | Minibus /LCV | Truck/ Bus | Multi Axle | Oversized Vehicle | Truck/Bus - 100 Trips |
|----------------|------------|---------------------|-------------------|-------------------|--------------------------|------------------------------|
| 2023-24 | 3925 | 6215 | 12860 | 19905 | 24855 | 25725 |
| 2024-25 | 4125 | 6530 | 13515 | 20915 | 26115 | 27025 |
| 2025-26 | 4335 | 6860 | 14200 | 21980 | 27440 | 28400 |
| 2026-27 | 4555 | 7210 | 14925 | 23105 | 28845 | 29850 |
| 2027-28 | 4790 | 7580 | 15690 | 24290 | 30320 | 31385 |
| 2028-29 | 5020 | 7945 | 16450 | 25460 | 31785 | 32895 |
| 2029-30 | 5260 | 8330 | 17240 | 26690 | 33320 | 34485 |
| 2030-31 | 5515 | 8735 | 18075 | 27980 | 34930 | 36155 |
| 2031-32 | 5785 | 9155 | 18955 | 29340 | 36625 | 37910 |
| 2032-33 | 6065 | 9600 | 19875 | 30765 | 38410 | 39755 |
| 2033-34 | 6360 | 10070 | 20845 | 32265 | 40285 | 41690 |
| 2034-35 | 6675 | 10565 | 21865 | 33845 | 42255 | 43730 |
| 2035-36 | 7000 | 11080 | 22940 | 35505 | 44325 | 45875 |
| 2036-37 | 7345 | 11625 | 24065 | 37250 | 46505 | 48130 |
| 2037-38 | 7705 | 12200 | 25250 | 39085 | 48800 | 50505 |
| 2038-39 | 8085 | 12805 | 26500 | 41020 | 51210 | 53000 |
| 2039-40 | 8490 | 13435 | 27815 | 43050 | 53750 | 55630 |
| 2040-41 | 8910 | 14105 | 29195 | 45190 | 56420 | 58395 |

Table 5-11 : Toll Rates for Single Journey @ Km 105.000

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles |
|----------------|------------|---------------------|-------------------|-------------------|---------------------------|
| 2023-24 | 100 | 160 | 340 | 535 | 650 |
| 2024-25 | 105 | 170 | 355 | 560 | 680 |
| 2025-26 | 110 | 180 | 375 | 590 | 715 |
| 2026-27 | 115 | 190 | 395 | 620 | 755 |
| 2027-28 | 120 | 200 | 415 | 650 | 790 |
| 2028-29 | 130 | 205 | 435 | 680 | 830 |
| 2029-30 | 135 | 215 | 455 | 715 | 870 |
| 2030-31 | 140 | 230 | 480 | 750 | 910 |
| 2031-32 | 150 | 240 | 500 | 785 | 955 |
| 2032-33 | 155 | 250 | 525 | 825 | 1005 |
| 2033-34 | 165 | 265 | 550 | 865 | 1050 |
| 2034-35 | 170 | 275 | 580 | 905 | 1105 |
| 2035-36 | 180 | 290 | 605 | 950 | 1155 |
| 2036-37 | 190 | 305 | 635 | 995 | 1215 |
| 2037-38 | 195 | 320 | 665 | 1045 | 1275 |
| 2038-39 | 205 | 335 | 700 | 1100 | 1335 |
| 2039-40 | 215 | 350 | 735 | 1155 | 1405 |
| 2040-41 | 230 | 370 | 770 | 1210 | 1475 |

Table 5-12 : Toll Rates for Return Journey @ Km 105.000

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles |
|----------------|------------|---------------------|-------------------|-------------------|---------------------------|
| 2023-24 | 150 | 245 | 510 | 800 | 975 |
| 2024-25 | 160 | 255 | 535 | 840 | 1025 |
| 2025-26 | 165 | 270 | 565 | 885 | 1075 |
| 2026-27 | 175 | 280 | 590 | 930 | 1130 |
| 2027-28 | 185 | 295 | 620 | 975 | 1185 |
| 2028-29 | 195 | 310 | 650 | 1020 | 1245 |
| 2029-30 | 200 | 325 | 685 | 1070 | 1305 |
| 2030-31 | 210 | 340 | 715 | 1125 | 1370 |
| 2031-32 | 220 | 360 | 750 | 1180 | 1435 |
| 2032-33 | 235 | 375 | 790 | 1235 | 1505 |
| 2033-34 | 245 | 395 | 825 | 1295 | 1575 |
| 2034-35 | 255 | 415 | 865 | 1360 | 1655 |
| 2035-36 | 270 | 435 | 910 | 1425 | 1735 |
| 2036-37 | 280 | 455 | 955 | 1495 | 1820 |
| 2037-38 | 295 | 480 | 1000 | 1570 | 1910 |
| 2038-39 | 310 | 500 | 1050 | 1645 | 2005 |
| 2039-40 | 325 | 525 | 1100 | 1730 | 2105 |
| 2040-41 | 340 | 550 | 1155 | 1815 | 2210 |

Table 5-13 : Toll Rates for Overweight Tickets @ Km 105.000

| Year | LCV (Single Journey of Ten Times) | LCV (Single Journey of Two Times) | Truck/ Bus (Single Journey of Ten Times) | Truck/ Bus (Single Journey of Two Times) | Multi Axle Vehicle (Single Journey of Ten Times) | Multi Axle Vehicle (Single Journey of Two Times) |
|----------------|--|--|---|---|---|---|
| 2023-24 | 1600 | 320 | 3400 | 680 | 5350 | 1070 |
| 2024-25 | 1700 | 340 | 3550 | 710 | 5600 | 1120 |
| 2025-26 | 1800 | 360 | 3750 | 750 | 5900 | 1180 |
| 2026-27 | 1900 | 380 | 3950 | 790 | 6200 | 1240 |
| 2027-28 | 2000 | 400 | 4150 | 830 | 6500 | 1300 |
| 2028-29 | 2050 | 410 | 4350 | 870 | 6800 | 1360 |
| 2029-30 | 2150 | 430 | 4550 | 910 | 7150 | 1430 |
| 2030-31 | 2300 | 460 | 4800 | 960 | 7500 | 1500 |
| 2031-32 | 2400 | 480 | 5000 | 1000 | 7850 | 1570 |
| 2032-33 | 2500 | 500 | 5250 | 1050 | 8250 | 1650 |
| 2033-34 | 2650 | 530 | 5500 | 1100 | 8650 | 1730 |
| 2034-35 | 2750 | 550 | 5800 | 1160 | 9050 | 1810 |
| 2035-36 | 2900 | 580 | 6050 | 1210 | 9500 | 1900 |
| 2036-37 | 3050 | 610 | 6350 | 1270 | 9950 | 1990 |
| 2037-38 | 3200 | 640 | 6650 | 1330 | 10450 | 2090 |
| 2038-39 | 3350 | 670 | 7000 | 1400 | 11000 | 2200 |
| 2039-40 | 3500 | 700 | 7350 | 1470 | 11550 | 2310 |
| 2040-41 | 3700 | 740 | 7700 | 1540 | 12100 | 2420 |

Table 5-14 : Toll Rates for Overweight Return Pass (RPPU) @ Km 105.00

| Year | Minibus /LCV | Truck/ Bus | Multi Axle |
|----------------|---------------------|-------------------|-------------------|
| 2023-24 | 265 | 375 | 390 |
| 2024-25 | 280 | 395 | 410 |
| 2025-26 | 295 | 415 | 430 |
| 2026-27 | 310 | 435 | 450 |
| 2027-28 | 325 | 455 | 475 |
| 2028-29 | 340 | 475 | 495 |
| 2029-30 | 355 | 495 | 515 |
| 2030-31 | 370 | 515 | 540 |
| 2031-32 | 385 | 540 | 565 |
| 2032-33 | 400 | 565 | 590 |
| 2033-34 | 420 | 590 | 615 |
| 2034-35 | 440 | 615 | 645 |
| 2035-36 | 460 | 645 | 675 |
| 2036-37 | 480 | 675 | 705 |
| 2037-38 | 500 | 705 | 735 |
| 2038-39 | 525 | 735 | 770 |
| 2039-40 | 550 | 770 | 805 |
| 2040-41 | 575 | 805 | 840 |

Table 5-15 : Toll Rates for Local Monthly Pass @ Km 105.000

| Year | CAR (Non-Commercial Vehicles) | CAR SPL (10 to 20 Km) | LCV / Minibus SPL | LCV / Minibus (10 to 20 Km) |
|----------------|--------------------------------------|------------------------------|--------------------------|------------------------------------|
| 2023-24 | 330 | 1790 | 2940 | 7920 |
| 2024-25 | 345 | 1880 | 3085 | 8315 |
| 2025-26 | 365 | 1975 | 3240 | 8730 |
| 2026-27 | 385 | 2075 | 3400 | 9165 |
| 2027-28 | 405 | 2180 | 3570 | 9625 |
| 2028-29 | 420 | 2280 | 3730 | 10060 |
| 2029-30 | 440 | 2385 | 3900 | 10515 |
| 2030-31 | 465 | 2490 | 4075 | 10990 |
| 2031-32 | 485 | 2600 | 4260 | 11485 |
| 2032-33 | 510 | 2715 | 4450 | 12000 |
| 2033-34 | 535 | 2835 | 4650 | 12540 |
| 2034-35 | 560 | 2965 | 4860 | 13105 |
| 2035-36 | 590 | 3100 | 5080 | 13695 |
| 2036-37 | 620 | 3240 | 5310 | 14310 |
| 2037-38 | 650 | 3385 | 5550 | 14955 |
| 2038-39 | 680 | 3535 | 5800 | 15630 |
| 2039-40 | 715 | 3695 | 6060 | 16335 |
| 2040-41 | 750 | 3860 | 6335 | 17070 |

Table 5-16 : Toll Rates for Monthly Pass @ Km 105.000

| Year | Car | Minibus /LCV | Truck/ Bus | Multi Axle | Oversized Vehicle | Truck/Bus - 100 Trips |
|---------|------|--------------|------------|------------|-------------------|-----------------------|
| 2023-24 | 3345 | 5405 | 11330 | 17765 | 21625 | 22655 |
| 2024-25 | 3515 | 5680 | 11900 | 18665 | 22720 | 23805 |
| 2025-26 | 3695 | 5970 | 12510 | 19615 | 23880 | 25015 |
| 2026-27 | 3885 | 6275 | 13145 | 20615 | 25100 | 26295 |
| 2027-28 | 4085 | 6595 | 13820 | 21675 | 26385 | 27640 |
| 2028-29 | 4280 | 6915 | 14485 | 22720 | 27655 | 28975 |
| 2029-30 | 4485 | 7250 | 15185 | 23815 | 28990 | 30375 |
| 2030-31 | 4705 | 7600 | 15920 | 24970 | 30395 | 31845 |
| 2031-32 | 4930 | 7970 | 16695 | 26180 | 31870 | 33390 |
| 2032-33 | 5170 | 8355 | 17505 | 27455 | 33420 | 35015 |
| 2033-34 | 5425 | 8765 | 18360 | 28795 | 35050 | 36720 |
| 2034-35 | 5690 | 9190 | 19260 | 30200 | 36765 | 38515 |
| 2035-36 | 5970 | 9640 | 20205 | 31680 | 38570 | 40405 |
| 2036-37 | 6265 | 10115 | 21195 | 33240 | 40465 | 42390 |
| 2037-38 | 6570 | 10615 | 22240 | 34880 | 42460 | 44485 |
| 2038-39 | 6895 | 11140 | 23340 | 36605 | 44560 | 46680 |
| 2039-40 | 7240 | 11690 | 24500 | 38415 | 46770 | 48995 |
| 2040-41 | 7600 | 12275 | 25715 | 40325 | 49095 | 51430 |

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza starting from the year 2023-24 are shown in tables below.

Table 5-17 : Toll Revenue Optimistic Scenario**(Rs. Crores)**

| Year | Toll at Plaza 30.500 | Toll at Plaza 105.000 | Total |
|----------------|---------------------------------|----------------------------------|---------------|
| 2023-24 | 103.13 | 70.84 | 173.96 |
| 2024-25 | 116.40 | 79.55 | 195.96 |
| 2025-26 | 129.74 | 88.37 | 218.11 |
| 2026-27 | 144.37 | 98.22 | 242.60 |
| 2027-28 | 161.92 | 109.20 | 271.12 |
| 2028-29 | 179.18 | 121.08 | 300.26 |
| 2029-30 | 199.47 | 133.93 | 333.40 |
| 2030-31 | 220.38 | 147.41 | 367.79 |
| 2031-32 | 244.13 | 162.98 | 407.11 |
| 2032-33 | 268.36 | 179.12 | 447.49 |
| 2033-34 | 295.99 | 197.34 | 493.33 |
| 2034-35 | 327.43 | 216.64 | 544.07 |
| 2035-36 | 360.18 | 238.03 | 598.21 |
| 2036-37 | 393.57 | 259.52 | 653.08 |
| 2037-38 | 431.64 | 283.32 | 714.96 |
| 2038-39 | 475.48 | 310.46 | 785.94 |
| 2039-40 | 521.26 | 340.89 | 862.16 |
| 2040-41 | 566.25 | 370.36 | 936.61 |

Table 5-18 : Toll Revenue Pessimistic Scenario**(Rs. Crores)**

| Year | Toll at Plaza 30.500 | Toll at Plaza 105.000 | Total |
|----------------|---------------------------------|----------------------------------|---------------|
| 2023-24 | 102.14 | 70.18 | 172.32 |
| 2024-25 | 114.21 | 78.08 | 192.29 |
| 2025-26 | 126.08 | 85.93 | 212.01 |
| 2026-27 | 138.91 | 94.59 | 233.50 |
| 2027-28 | 154.32 | 104.18 | 258.50 |
| 2028-29 | 169.23 | 114.37 | 283.61 |
| 2029-30 | 186.67 | 125.33 | 312.01 |
| 2030-31 | 204.29 | 136.63 | 340.92 |
| 2031-32 | 224.16 | 149.60 | 373.76 |
| 2032-33 | 244.09 | 162.90 | 406.99 |
| 2033-34 | 266.73 | 177.76 | 444.49 |
| 2034-35 | 292.28 | 193.33 | 485.61 |
| 2035-36 | 318.42 | 210.39 | 528.81 |
| 2036-37 | 344.62 | 227.19 | 571.81 |
| 2037-38 | 374.31 | 245.71 | 620.02 |
| 2038-39 | 408.45 | 266.64 | 675.10 |
| 2039-40 | 443.41 | 290.01 | 733.42 |
| 2040-41 | 476.98 | 312.08 | 789.06 |

Table 5-19 : Toll Revenue Most Likely Scenario**(Rs. Crores)**

| Year | Toll at Plaza 30.500 | Toll at Plaza 105.000 | Total |
|----------------|---------------------------------|----------------------------------|---------------|
| 2023-24 | 102.63 | 70.52 | 173.15 |
| 2024-25 | 115.26 | 78.81 | 194.08 |
| 2025-26 | 127.90 | 87.15 | 215.05 |
| 2026-27 | 141.66 | 96.39 | 238.05 |
| 2027-28 | 158.09 | 106.64 | 264.73 |
| 2028-29 | 174.17 | 117.64 | 291.81 |
| 2029-30 | 192.99 | 129.51 | 322.51 |
| 2030-31 | 212.22 | 141.86 | 354.08 |
| 2031-32 | 233.95 | 156.08 | 390.03 |
| 2032-33 | 255.97 | 170.75 | 426.72 |
| 2033-34 | 281.02 | 187.22 | 468.25 |
| 2034-35 | 309.40 | 204.56 | 513.95 |
| 2035-36 | 338.71 | 223.68 | 562.39 |
| 2036-37 | 368.37 | 242.70 | 611.07 |
| 2037-38 | 402.04 | 263.76 | 665.79 |
| 2038-39 | 440.78 | 287.66 | 728.44 |
| 2039-40 | 480.88 | 314.32 | 795.20 |
| 2040-41 | 519.86 | 339.82 | 859.68 |

CHAPTER 6

OPERATION AND MAINTENANCE

6.1 Operation & Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on guess basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Jaipur to Deoli on NH-12 in state of Rajasthan.

- i) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- j) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost is spread over three years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2023-2024 is given in table below.

Table 6-1 : O&M Cost

| Year | Annual maintenance (Rs. Cr) | Thermoplastic painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr.) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | | Total Expenditure (Rs. Crores) | Remarks |
|---------|-----------------------------|---------------------------------|--------------------------------|----------------------------|--------------------------------|-----------------|----------|--------------------------------|---|
| | | | | | | Annual | Periodic | | |
| 2023-24 | 12.45 | | | | 0.07 | 0.04 | | 16.82 | Regular O & M |
| 2024-25 | 12.70 | | | 0.80 | 0.07 | 0.04 | | 19.14 | Regular O & M |
| 2025-26 | 12.95 | | | 0.80 | 0.07 | 0.04 | | 20.47 | Regular O & M |
| 2026-27 | 13.21 | 1.72 | 23.37 | 27.28 | 0.07 | 0.04 | | 101.89 | Renewal of Wearing course + Pavement repair |
| 2027-28 | 13.47 | 1.47 | 20.03 | 32.10 | 0.07 | 0.04 | | 109.42 | Renewal of Wearing course + Pavement repair |
| 2028-29 | 13.74 | 1.72 | 23.37 | 43.33 | 0.07 | 0.04 | | 140.70 | Renewal of Wearing course + Pavement repair |
| 2029-30 | 14.43 | | | 12.84 | 0.07 | 0.04 | | 49.16 | Regular O & M |
| 2030-31 | 15.15 | | | 4.81 | 0.07 | 0.04 | | 37.85 | Regular O & M |
| 2031-32 | 15.91 | | | 4.81 | 0.07 | 0.04 | | 41.24 | Regular O & M |
| 2032-33 | 16.23 | 0.49 | | 10.43 | 0.07 | 0.04 | | 56.66 | Renewal of Wearing course + Pavement repair |
| 2033-34 | 16.55 | 1.47 | 20.03 | 40.12 | 0.07 | 0.04 | | 170.87 | Renewal of Wearing course + Pavement repair |
| 2034-35 | 16.88 | 1.72 | 23.37 | 12.84 | 0.07 | 0.04 | | 125.86 | Renewal of Wearing course |

| Year | Annual maintenance (Rs. Cr) | Thermoplastic painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | | Total Expenditure (Rs. Crores) | Remarks |
|---------|--------------------------------|------------------------------------|----------------------------------|----------------------------|-----------------------------------|-----------------|--|-----------------------------------|---------------|
| 2035-36 | 16.88 | | | 3.21 | 0.07 | 0.04 | | 48.61 | Regular O & M |
| 2036-37 | 16.88 | | | 3.21 | 0.07 | 0.04 | | 51.04 | Regular O & M |
| 2037-38 | 16.88 | | | 3.21 | 0.07 | 0.04 | | 53.59 | Regular O & M |
| 2038-39 | 16.88 | | | 3.21 | 0.07 | 0.04 | | 56.27 | Regular O & M |
| 2039-40 | 16.88 | 1.72 | | 1.60 | 0.07 | 0.04 | | 59.41 | Regular O & M |
| 2040-41 | 5.06 | | | 0.32 | 0.07 | 0.04 | | 16.86 | Regular O & M |

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Jaipur to Deoli section of NH-12 in state of Rajasthan from km 18.700 to km 165.000 is currently a four-lane road. The road is in sound condition and serves to reasonably good levels of traffic volume. The project corridor falls in the influence zone of fast upcoming metro city Jaipur. There are many upcoming projects in the area which have the potential to boost economic growth of area and add value to development of region. All these developments have potential to give positive impact to traffic flow on project. As estimated in this study report project traffic revenue is expected to grow at rate of 6-8% per annum.

Following can be considered as major outcome of study

- a) There is good amount of tollable traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% post COVID-19 annually in near future due to various development in area and overall growth of the economy.
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality .

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.

CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 Project Illustrations

Current condition OF Project has been depicted in the following photographs.



Figure 8-1 : Chaksu Junction



Figure 8-2 : General Condition



Figure 8-3 : General Condition



Figure 8-4 : Toll at Barkheda



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OMALAUUR TO NAMAKKAL (KM 180.00 TO KM 248.625)
SECTION OF NH-7 IN THE STATE OF TAMIL NADU.

APRIL 2023



**TOLL REVENUE AND O&M COST
PROJECTION REPORT
(FINAL)**



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**TOLL REVENUE AND O&M COST
PROJECTION REPORT
(FINAL)**

APRIL 2023



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highways Authority of India |
| BOT | - Build Operate Transfer | NHDP | - National Highways Development Project |
| CAGR | - Compound Annual Growth Rate | NSDP | - Net State Domestic Product |
| CTV | - Classified traffic volume | O&M | - Operation & Maintenance |
| DBFOT | - Design, Build, Finance, Operate & Transfer | PCDP | - Per Capita Domestic Product |
| EME | - Earth Moving Equipment | PCI | - Per Capita Income |
| GDP | - Gross Domestic Product | PCU | - Passenger Car Unit |
| GSDP | - Gross State Domestic Product | PSC | - Pre-stressed Concrete |
| HCM | - Heavy Construction Machinery | RCC | - Reinforced cement concrete |
| HCV | - Heavy Commercial Vehicle | RHS | - Right Hand Side |
| HTMS | - Highway Traffic Management System | SH | - State Highway |
| IRC | - Indian Road Congress | TP | - Toll Plaza |
| IRR | - Internal Rate of Return | WPI | - Wholesale Price Index |
| LCV | - Light Commercial Vehicle | SIR | - Special Investment Region |
| LHS | - Left Hand Side | c. | - Circa |
| LGV | - Light Goods Vehicle | ROB | - Railway Over Bridge |
| MAV | - Multi Axle Vehicle | MDR | - Major District Road |
| MORTH | - Ministry of Road Transport and Highways | ODR | - Other District Road |
| NH | - National Highway | CA | - Concession Agreement |
| PCC | - Plain Cement Concrete | RMT | - Running Meter |
| CR | - Coarse Rubble | | |

CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Omalur - Namakkal section of NH-7 from Km 180.000 to km 248.625 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. Project has concession period of 20 years. Project achieved COD on 6th August-2009. The Project has been commissioned and is currently in the operation / maintenance phase. Project under consideration is a combination of construction and maintenance packages as given under

Maintenance package – From Km 180.000 to Km 207.500

Construction & Maintenance Package – From Km 207.500 to Km 248.625

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as “*Toll Revenue and O&M Cost Projection Report*” mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. Report was further updated with yearly traffic data of 2019-20 in May 2020. With traffic data from April 2020 to March 2021 report was updated, report was further updated with yearly traffic data from April 2021 to March 2022 and now concessionaire has provided traffic data from April 2022 to March 2023, report is updated taking this latest traffic data into consideration.

There are no further updates to the O & M cost projections included in our previous report.

CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at toll plaza location on Omalur - Namakkal section of NH-7 for base year 2015-16, 2016-17, 2017-18 2018-19, 2019-20, 2020-21, 2021-22 and traffic data from April 2022 to March 2023.
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

Project can be divided into following homogenous sections from traffic point of view.

These sections can be

- Omalur to Salem
- Salem to Rasipuram
- Rasipuram to Namakkal

Table 2-1 below lists provides details of locations from where traffic details have been collected.

Table 2-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Multiple Journey | Monthly Pass | Local Traffic |
|--------|-----------------------|-------------------------|------------------------|--------------------|--------------------|--------------------|
| 1 | Km 191.800 Toll Plaza | AADT for Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 |
| | | AADT for year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for Year 2018-19 | For Year 2018-19 | For Year 2018-19 | For Year 2018-19 | For Year 2018-19 |
| | | AADT for Year 2019-20 | For Year 2019-20 | For Year 2019-20 | For Year 2019-20 | For Year 2019-20 |
| | | AADT for Year 2020-21 | For Year 2020-21 | For Year 2020-21 | For Year 2020-21 | For Year 2020-21 |
| | | AADT for Year 2021-22 | For Year 2021-22 | For Year 2021-22 | For Year 2021-22 | For Year 2021-22 |
| | | AADT for Year 2022-23 | For Year 2022-23 | For Year 2022-23 | For Year 2022-23 | For Year 2022-23 |

The locations of each of the traffic survey are illustrated in Figure 2-1.

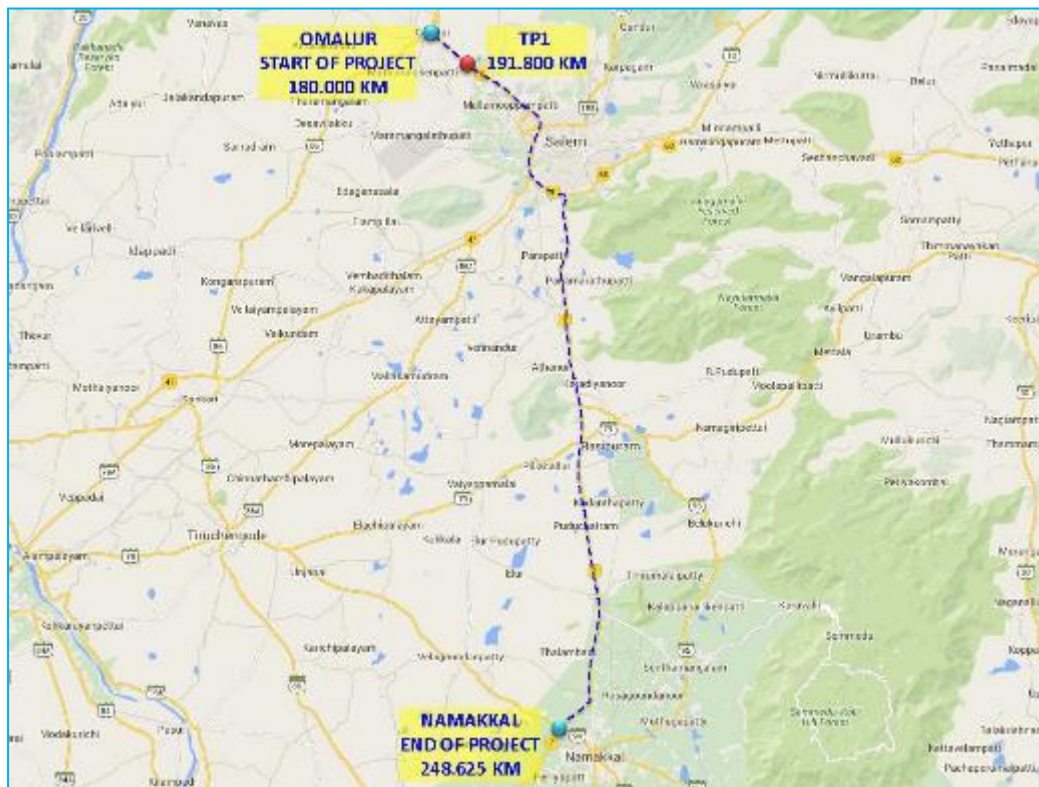


Figure 2-1: Toll Plaza Locations

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in Figure 2-1 and listed in Table 2-1.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in **Table 2-2**.

Table 2-2 : Vehicle Classification System

| Vehicle Type | |
|----------------|--|
| | Auto Rickshaw |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |
| Bus | Minibus |
| | Standard Bus |
| Truck | Light Goods Vehicle (LCV) |
| | 2 – Axle Truck |
| | 3 Axle Truck (HCV) |
| | Multi Axle Truck (4-6 Axle) |
| | Oversized Vehicles (7 or more axles) |
| Other Vehicles | Agriculture Tractor, Tractor & Trailer |

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / Van
- LCV
- Truck / Bus
- Multi Axle

2.3 Traffic Characteristic

Toll revenue of project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have substantial potential to affect toll collection. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, % of monthly pass traffic are some of such characteristics of traffic. These will be discussed in subsequent sections of report.

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and from April 2022 to March 2023 as under for toll plaza –

Table 2-3 : Traffic Data at Toll Plaza at Km 191.800

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) – FY 2015-16 | Annual Average Daily Traffic (Nos.) – FY 2016-17 | Annual Average Daily Traffic (Nos.) – FY 2017-18 | Annual Average Daily Traffic (Nos.) – FY 2018-19 | Annual Average Daily Traffic (Nos.) – FY 2019-20 | Annual Average Daily Traffic (Nos.) – FY 2020-21 | Annual Average Daily Traffic (Nos.) – FY 2021-22 | Annual Average Daily Traffic (Nos.) – FY 2022-23 |
|--------|-----------------|--|--|--|--|--|--|--|--|
| 1 | CAR | 10179 | 10765 | 12033 | 12645 | 13352 | 12618 | 14831 | 18389 |
| 2 | LCV | 3694 | 3966 | 4307 | 4672 | 4632 | 4290 | 2748 | 2856 |
| 3 | Truck/Bus | 3091 | 3148 | 3085 | 3199 | 3446 | 2666 | 3075 | 3796 |
| 4 | Multi Axle | 2482 | 2710 | 2552 | 2952 | 2873 | 3017 | 3350 | 3765 |
| | Total | 19447 | 20589 | 21977 | 23468 | 24304 | 22591 | 24004 | 28806 |

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

Pandemic of COVID-19 (Corona Virus) has impacted entire world. Taking precaution, government of India announced a complete lockdown in last of March 2020 and traffic on highways was stopped which was eased out progressively later. Traffic on project corridor was recovering at good rate but still traffic numbers had effect of Pandemic. There after India was hit by Covid-19 second and third wave in February 21 to July -21 and December 21 to March-22. Recovering traffic pattern was somewhat again disturbed due to second and third wave of Covid-19. Traffic numbers for the period from April-2021 to March 2022 are not representative of traffic pattern at project

corridor due to pandemic lockdown impact. However, for integrity of data has been shown above. NHAI also has, in principal, approved providing extension of concession period to make up for the loss of revenue due to lockdown. Traffic has been affected due to second wave of COVID-19 in period from April-21 to July 2021 and from December 21 to March-22 due to third wave of Covid-19. Current report is updated with traffic data made available by Concessionaire from April 2022 to March 2023.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in Table 3-4

Table 2-4 : PCU Factors Adopted for Study

| Vehicle Type | PCUs |
|-------------------------------------|------|
| Car | 1.0 |
| Minibus | 1.5 |
| Standard Bus | 3.0 |
| LCV/LGV | 1.5 |
| 2 Axle Truck | 3.0 |
| 3 – 6 Axle Truck | 4.5 |
| MAV | 4.5 |
| Auto Rickshaw | 1.0 |
| Van/Tempo | 1.0 |
| Agriculture Tractor with Trailer | 4.5 |
| Agriculture Tractor without Trailer | 1.5 |

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under

Table 2-5 : Traffic in PCU at Project Stretch

| Period | Toll Plaza Location | Traffic No | PCU | PCU Index |
|---------------|----------------------------|-------------------|------------|------------------|
| FY 2015-16 | 191.800 | 19447 | 36164 | 1.86 |
| FY 2016-17 | 191.800 | 20589 | 38355 | 1.86 |
| FY 2017-18 | 191.800 | 21977 | 39232 | 1.78 |
| FY 2018-19 | 191.800 | 23468 | 42534 | 1.81 |
| FY 2019-20 | 191.800 | 24304 | 43569 | 1.79 |
| FY 2020-21 | 191.800 | 22591 | 40626 | 1.80 |
| FY 2021-22 | 191.800 | 24004 | 43254 | 1.80 |
| FY 2022-23 | 191.800 | 28806 | 51004 | 1.77 |

It can be observed from above that project traffic has PCU index near 2 which is a fair indicator of good mix being split between commercial and urban traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers of for period from April 2021 to March 2022 have been considered as the base numbers.

It is observed that car traffic forms 64% of total traffic at toll plaza location Km 191.800 LCV and bus / truck share 10% and 13% respectively. Multi axle consists of 13% of total traffic. Overall about 36% of traffic is commercial in nature. Higher

percentage of urban traffic is due to the project corridor passing through the city of Salem which is a fast-upcoming urban C category town.

Another important bifurcation of traffic is components of traffic with respect to various type of toll ticketing like

1. Single Journey
2. Multi Journey
3. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category on base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and from April 2022 to March 2023.

Table 2-6 : Journey Type Bifurcation of Traffic at KM 191.800

| Sr. No | Type | Traffic Volume (Nos.) for FY 2015-16 | Traffic Volume (Nos.) for FY 2016-17 | Traffic Volume (Nos.) for FY 2017-18 | Traffic Volume (Nos.) For FY 2018-19 | Traffic Volume (Nos.) For FY 2019-20 | Traffic Volume (Nos.) For FY 2020-21 | Traffic Volume (Nos.) For FY 2021-22 | Traffic Volume (Nos.) For FY 2022-23 |
|--------|----------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1 | Single Journey | 13103 | 13942 | 15354 | 16311 | 16931 | 16626 | 16244 | 19856 |
| 2 | Return Journey | 4146 | 4264 | 4462 | 5210 | 5280 | 4492 | 7196 | 8280 |
| 3 | Monthly Pass | 2198 | 2383 | 2161 | 1947 | 2093 | 1473 | 564 | 670 |

The single journey component in total traffic numbers is as high as 69% while the return journey component is 29%. Monthly pass share is as low as 2%. As the project corridor serves as primary link for traffic between Madurai and Bangalore the component of single journey ticket is much higher. Moreover, toll structure of project is based on old toll policy and there are special rates for local single journey traffic. This makes the option of a monthly pass less attractive.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential

- Upcoming major infrastructural or industrial projects
- Special industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor.

CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Omalur - Namakkal section of NH-7 has been carried out taking above factors into consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicular traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income

- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP
- Time series data of vehicle (both passenger and goods) Registered in the state of Tamil Nadu is used as the base data for analysis of growth

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log}(P) = k \times \text{Log}(EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

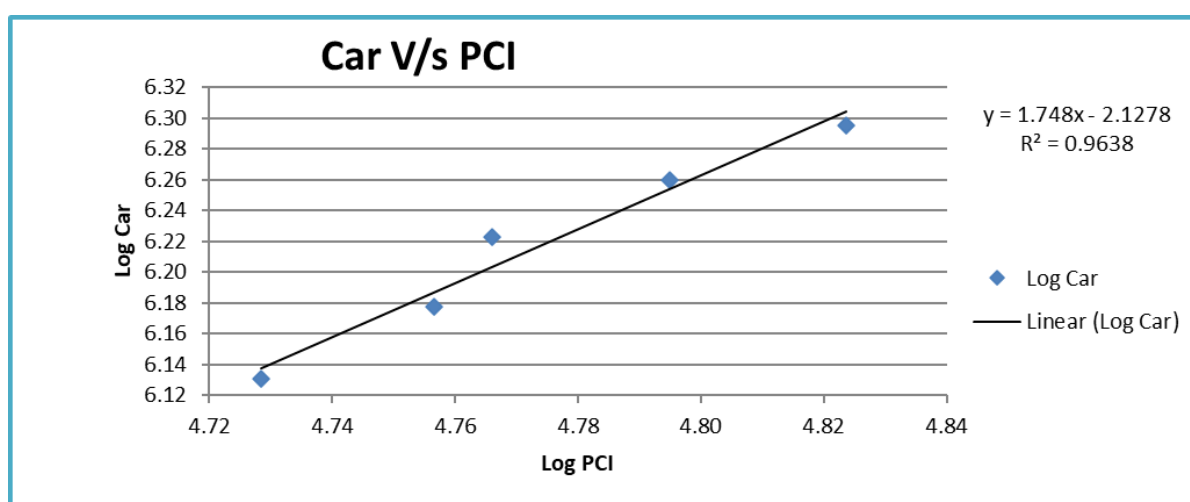
The elasticity for car and bus (passenger vehicles) is calculated based on Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2011 | 53507 | 1350722 | 4.73 | 6.13 | | |
| 2012 | 57093 | 1504735 | 4.76 | 6.18 | 7% | |
| 2013 | 58360 | 1668913 | 4.77 | 6.22 | 2% | |
| 2014 | 62361 | 1818284 | 4.79 | 6.26 | 7% | |
| 2015 | 66635 | 1972354 | 4.82 | 6.29 | 7% | 5.7% |

Regression analysis of same is given in figure below

**Figure 3-1: Regression and Elasticity PCI vs. Car–Extrapolation****Table 3-2 : Population Vs Bus**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2011 | 72147030 | 134887 | 7.86 | 5.13 | | |
| 2012 | 73447335 | 144251 | 7.87 | 5.16 | 2% | |
| 2013 | 74744601 | 156470 | 7.87 | 5.19 | 2% | |
| 2014 | 76038376 | 165176 | 7.88 | 5.22 | 2% | |
| 2015 | 77328222 | 171581 | 7.89 | 5.23 | 2% | 1.75% |

Regression analysis of same is given in figure below

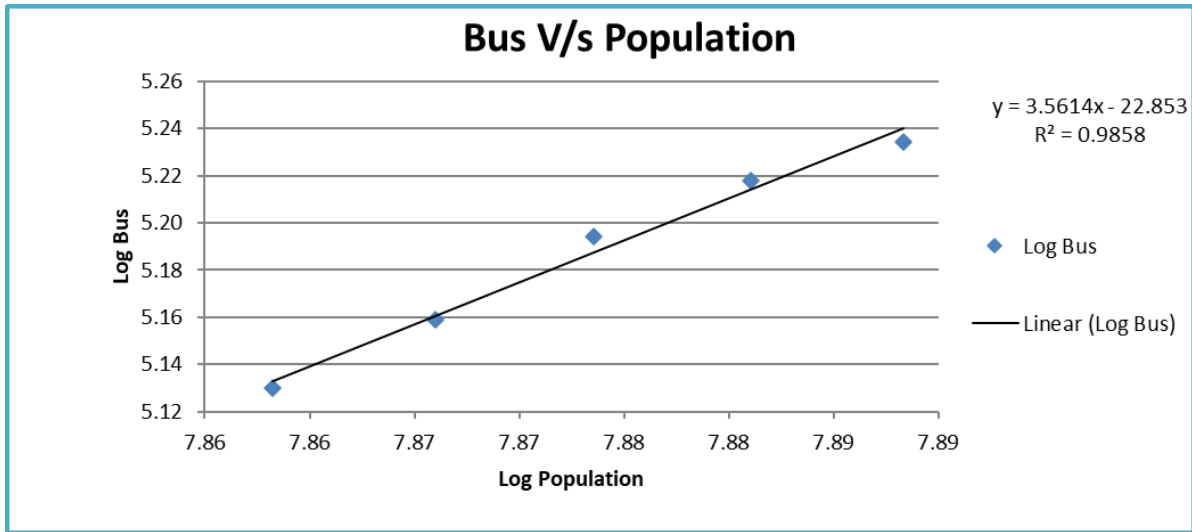


Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic has been worked out by regression analysis with NSDP.

Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (Year) |
|------|----------|--------|----------|-----------|-------------|-----------------------|
| 2011 | 35996050 | 744663 | 7.56 | 5.87 | | |
| 2012 | 38650813 | 821108 | 7.59 | 5.91 | 7% | |
| 2013 | 39747091 | 896985 | 7.60 | 5.95 | 3% | |
| 2014 | 42718219 | 924082 | 7.63 | 5.97 | 7% | |
| 2015 | 45898663 | 946232 | 7.66 | 5.98 | 7% | 6.28% |

Following figure depict regression analysis and extrapolation.

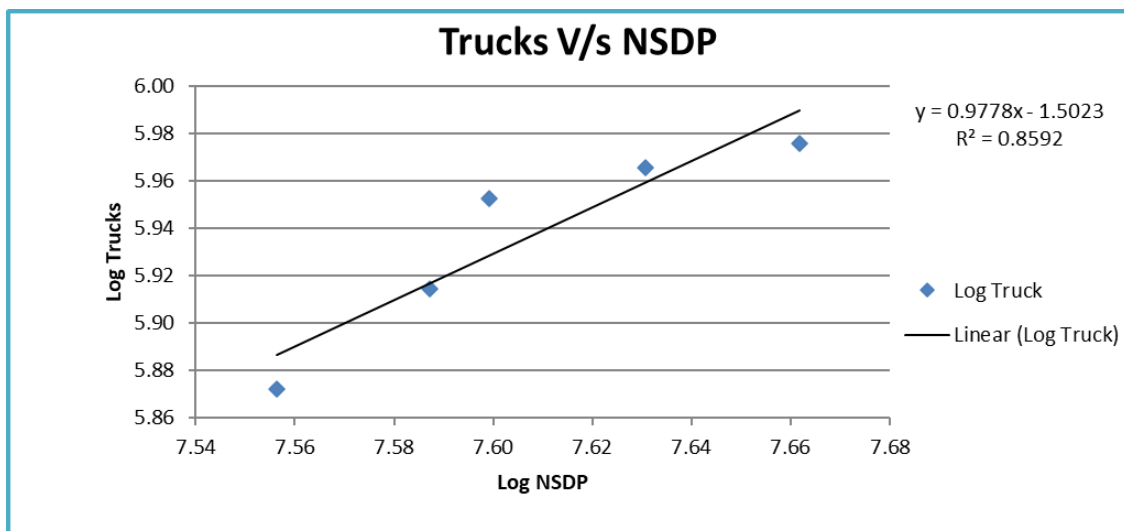


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|------------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Tamil Nadu | Car/Jeep | PCI | $y = 1.748x - 2.1278$ | $R^2 = 0.9638$ | 1.7480 | 5.66% | 9.89% | Good Regression |
| | Bus | Population | $y = 3.5614x - 22.8532$ | $R^2 = 0.9858$ | 3.5614 | 1.75% | 6.23% | Good Regression |
| | Truck | NSDP | $y = 0.9778x - 1.5023$ | $R^2 = 0.8592$ | 0.9778 | 6.28% | 6.14% | Good Regression |

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Omalur to Namakkal has been commissioned and it under tolled operation since 2009.

Table 3-5 : Historical Traffic at Project Stretch

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) FY 2015-16 | Annual Average Daily Traffic (Nos.) FY 2016-17 | Annual Average Daily Traffic (Nos.) FY 2017-18 | Annual Average Daily Traffic (Nos.) FY 2018-19 | Annual Average Daily Traffic (Nos.) FY 2019-20 | Annual Average Daily Traffic (Nos.) FY 2020-21 | Annual Average Daily Traffic (Nos.) FY 2021-22 | Annual Average Daily Traffic (Nos.) FY 2022-23 |
|--------|-----------------|--|--|--|--|--|--|--|--|
| 1 | CAR | 10179 | 10765 | 12033 | 12645 | 13352 | 12618 | 14831 | 18389 |
| 2 | LCV | 3694 | 3966 | 4307 | 4672 | 4632 | 4290 | 2748 | 2856 |
| 3 | Truck/Bus | 3091 | 3148 | 3085 | 3199 | 3446 | 2666 | 3075 | 3796 |
| 4 | Multi Axle | 2482 | 2710 | 2552 | 2952 | 2873 | 3017 | 3350 | 3765 |
| | Total | 19446 | 20589 | 21977 | 23468 | 24304 | 22591 | 24004 | 28806 |

Traffic for period from April 2020 to March 2021 is impacted due to COVID-19 lockdown. Though traffic on project corridor has shown impressive recovery growth in period from October 2020 to March 2021 but these numbers are affected by COVID-19 pandemic and cannot be taken as normal stabilized traffic numbers. There after project traffic was affected due to second and third wave of Covid-19 in period of February 2021 to July 2021 and from December 2021 to March 2022. Hence same is not considered for historical growth. It was expected that project stretch may register a good recovery growth in next year's in post COVID -19 scenario.

3.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2011-12, the economy recovered in 2013-14, and a high growth rate of GDP was recorded in up to 2018-19. Pandemic of COVID-19 impacted all economies of world including India. Following figure show trend of GDP growth in India.

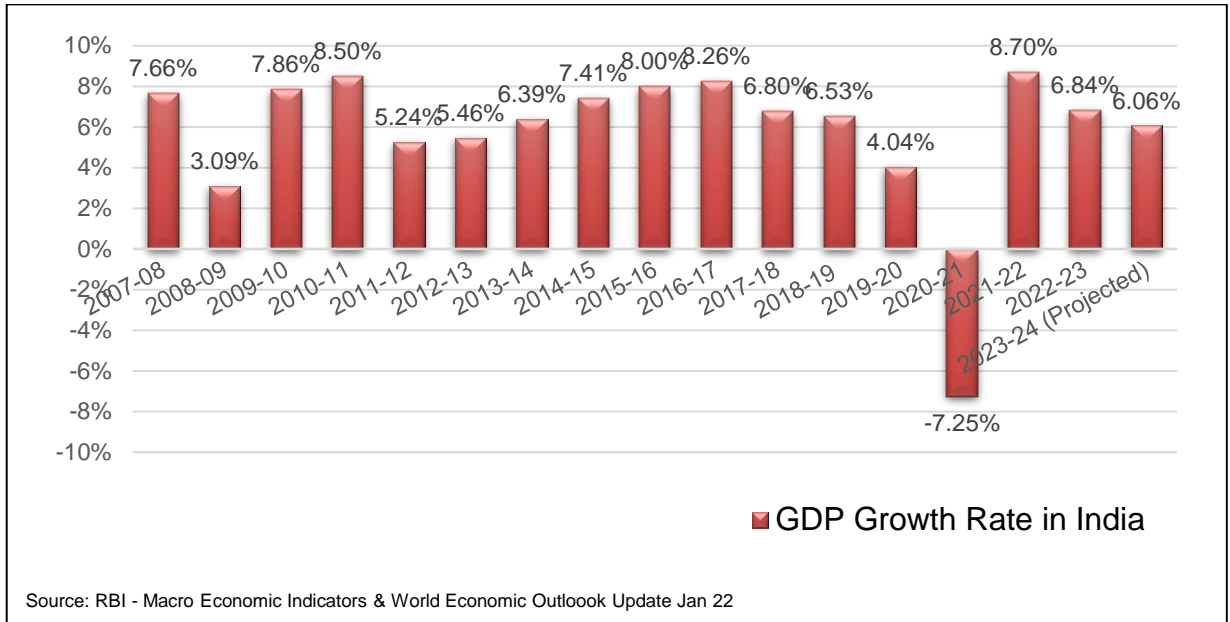


Figure 3-4 : Growth of GDP in India

FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Government took major policy decision including tax infrastructure reforming, banking sector improvement and ease of doing business.

Major economies of world collapsed due to pandemic COVID-19 including India. Indian economy is also registered negative growth in financial year 2020-21. After that Indian economy recovered handsomely and registered a growth of about 9% in Year 2021-22. This was partly due to low base of year 2020-21 as well.

Honorable Prime Minister has announced a major relief package of Rs. 20 lakh crores which is about 10% of GDP. This is aimed at turning this major crisis of COVID-19 into opportunity by providing major impetus to industrial production to the limit of becoming a self-reliant economy. With major thrust of this package being on **Make -In-India** it is expected that industry in India would grow at rapid pace and recover handsomely in post COVID-19 scenario.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is

not sustainable for long. It is established practice to stepped down future growth rates at suitable interval of years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence the corridor can have the expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic**, **Pessimistic** and **Most Likely** with a positive and negative variation 0.25% from Most Likely case.

Table 3-6 : Recommended Growth Rates Optimistic

| Year/ Vehicle Type | 2021- 2023 | 2023- 2026 | 2026- 2031 | 2031- 2036 | 2036- 2041 | 2041- 2046 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| CAR | 7.46% | 4.58% | 4.24% | 3.87% | 3.36% | 2.81% |
| Minibus /LCV | 5.93% | 3.09% | 2.88% | 2.72% | 2.65% | 2.53% |
| Truck / Bus | 7.48% | 3.86% | 3.52% | 3.19% | 2.86% | 2.53% |
| Multi Axle | 7.48% | 3.86% | 3.52% | 3.19% | 2.86% | 2.53% |

Table 3-7 : Recommended Growth Rates Pessimistic

| Year/ Vehicle Type | 2021-2023 | 2023- 2026 | 2026- 2031 | 2031- 2036 | 2036- 2041 | 2041- 2046 |
|--------------------------|-----------|---------------|---------------|---------------|---------------|---------------|
| CAR | 6.96% | 4.08% | 3.74% | 3.37% | 2.86% | 2.31% |
| Minibus /LCV | 5.43% | 2.59% | 2.38% | 2.22% | 2.15% | 2.03% |
| Truck / Bus | 6.98% | 3.36% | 3.02% | 2.69% | 2.36% | 2.03% |
| Multi Axle | 6.98% | 3.36% | 3.02% | 2.69% | 2.36% | 2.03% |

Table 3-8 : Recommended Growth Rates Most Likely

| Year/ Vehicle Type | 2021-2023 | 2023-2026 | 2026-2031 | 2031-2036 | 2036- 2041 | 2041- 2046 |
|-----------------------|-----------|-----------|-----------|-----------|---------------|---------------|
| CAR | 7.21% | 4.33% | 3.99% | 3.62% | 3.11% | 2.56% |
| Minibus /LCV | 5.68% | 2.84% | 2.63% | 2.47% | 2.40% | 2.28% |
| Truck / Bus | 7.23% | 3.61% | 3.27% | 2.94% | 2.61% | 2.28% |
| Multi Axle | 7.23% | 3.61% | 3.27% | 2.94% | 2.61% | 2.28% |

3.7 COVID-19 Impact

Current Corona virus crisis affected the traffic since March 2020 onwards. Traffic in year 2020-21 was negatively affected by lockdown. Impact of Covid-19 is analyzed in next section of this chapter. All social and economic activities had been completely disrupted due worldwide pandemic of Corona Virus. This had affected traffic on project stretch as well. Traffic was severely affected from March 2020 due to lockdown. Government considered partial lifting of lockdown and allowing selective economic activities on zone to zone basis in May 2020. Government has decided to open economic activities in phases and by now almost all the activities are open with some restrictions.

Concessionaire has shared traffic data for year 2020-21 and 2021-22. At all toll plaza commercial traffic has almost reached back to previous level. Passenger traffic, which picked up quite late, has also recovered handsomely in later months and has reached back to original level. But traffic was further affected due to second wave of COVID-19 in April-21 to July 21 and third wave in December 2021 to March -2022.

Government has announced a mega economic stimulate and package of Rs. 20 Lakh Crore to bring the economy back on track and recover the losses. It is observed that traffic has been normalized on project stretch now post COVID-19.

Taking recommended traffic growth and factors as discussed above into consideration traffic forecast for concession period is done and presented in next chapter.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM
(Optimistic Growth Scenario)

| Year | CAR | LCV | Truck/ Bus | Multi axle | Total No. | Total PCU (Including Non-Paid Traffic) |
|----------------|-------|------|---------------|---------------|--------------|---|
| 2023-24 | 19230 | 2944 | 3942 | 3910 | 30026 | 53067 |
| 2024-25 | 20110 | 3035 | 4094 | 4061 | 31300 | 55219 |
| 2025-26 | 20961 | 3123 | 4238 | 4204 | 32526 | 57278 |
| 2026-27 | 21848 | 3213 | 4388 | 4352 | 33801 | 59416 |

Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM*(Pessimistic Growth Scenario)*

| Year | CAR | LCV | Truck/ Bus | Multi axle | Total No. | Total PCU (Including Non- Paid Traffic) |
|----------------|-------|------|---------------|---------------|--------------|---|
| 2023-24 | 19139 | 2930 | 3923 | 3891 | 29883 | 52813 |
| 2024-25 | 19919 | 3006 | 4055 | 4022 | 31002 | 54692 |
| 2025-26 | 20663 | 3078 | 4178 | 4144 | 32063 | 56462 |
| 2026-27 | 21435 | 3152 | 4304 | 4269 | 33160 | 58286 |

Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM*(Most Likely Growth Scenario)*

| Year | CAR | LCV | Truck/ Bus | Multi axle | Total No. | Total PCU (Including Non- Paid Traffic) |
|----------------|-------|------|---------------|---------------|--------------|---|
| 2023-24 | 19184 | 2937 | 3933 | 3901 | 29955 | 52943 |
| 2024-25 | 20014 | 3020 | 4075 | 4042 | 31151 | 54958 |
| 2025-26 | 20812 | 3099 | 4207 | 4174 | 32292 | 56865 |
| 2026-27 | 21642 | 3181 | 4345 | 4310 | 33478 | 58844 |

4.2 Extension of Concession Period

15 days of extension in concession period has been approved by NHAI due to floods in Chennai in December, 2015. Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days. Traffic was severely impacted on project highway during the initial lockdown period. NHAI has declared a policy of providing extension of concession to make up for revenue loss during lockdown. It is expected that an extension would be provided to project concession period on this account as well.

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

Fee schedule of agreement of Omalur – Namakkal section of NH-7 is based on old toll policy. As per the Toll Notification (Schedule R) the following discounts have been considered:

1. Monthly Pass: For frequent user's monthly pass would be issued at fee 30 times the single journey fee. There are other local monthly passes for car /Jeep/ Van category I and II and school bus @ Rs.150, Rs.300 and Rs.1000 respectively.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5-time single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. There are several categories of local discounts.
 - a) Local Bus / truck and LCV (within 20 km) will be charged @ Rs. 25 and 15 respectively. Rate will be constant throughout concession period

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

$$\text{Base Fee} \times \frac{\text{WPI-B}}{\text{WPI-A}} \times \text{length of the said section.}$$

Where

- WPI-A = is the Wholesale Price Index of June, 1997 (131.4).
- WPI-B = is the Average Wholesale Price Index for the year ending March, 31st preceding the fee revision date.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules applicable for contract.

Table 5-1 : Base Toll Rates June 1997

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|---------------------------------|--------------------------------|
| Car, Jeep, Van or Jeep | 0.40 |
| Light Commercial Vehicle, (LCV) | 0.70 |
| Bus or Truck (2 Axle) | 1.40 |
| MAV (> 2 axle) | 2.25 |

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2021-22. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

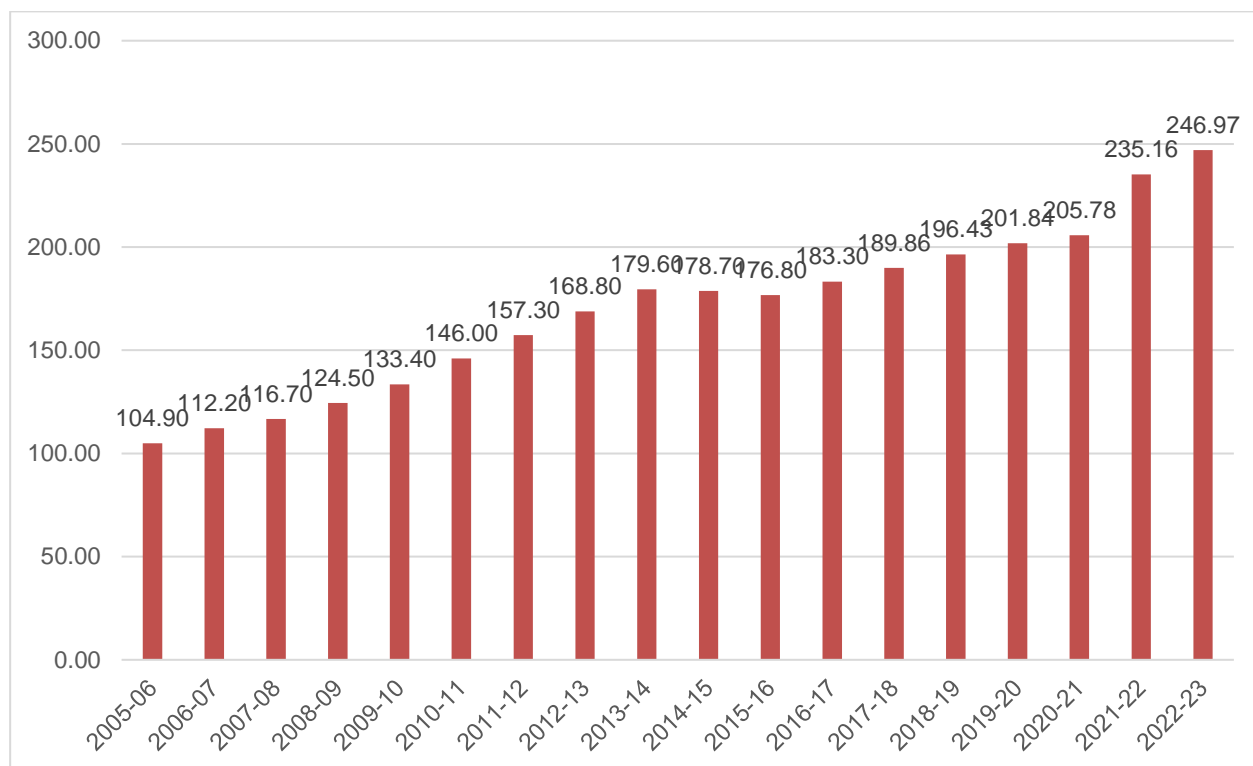


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2023 is 5.23%. For future years initially it takes 5% and suitably stepped down for future years.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below.

Thus, worked out rates for various categories of vehicle and discounts are given as under

Table 5-2 : Toll Rates for Single Journey @191.800

| Year | Car/Jeep/Van | LCV | Truck/Bus | Multi Axle (> 2 axle) | Car - LCO | LCV - LTO | Truck/Bus - LTO |
|---------|--------------|-----|-----------|-----------------------|-----------|-----------|-----------------|
| 2023-24 | 95 | 165 | 335 | 540 | 15 | 15 | 25 |
| 2024-25 | 100 | 175 | 350 | 565 | 15 | 15 | 25 |
| 2025-26 | 105 | 185 | 370 | 595 | 15 | 15 | 25 |
| 2026-27 | 110 | 195 | 385 | 625 | 15 | 15 | 25 |

Table 5-3 : Toll Rates for Multiple Journeys @ 191.800

| Year | Car | Minibus /LCV | Truck/ Bus | Multi Axle |
|---------|-----|--------------|------------|------------|
| 2023-24 | 145 | 250 | 500 | 805 |
| 2024-25 | 150 | 265 | 525 | 845 |
| 2025-26 | 160 | 275 | 555 | 890 |
| 2026-27 | 165 | 290 | 580 | 935 |

Table 5-4 : Toll Rates for Monthly Pass @191.800

| Year | Car/ Jeep/ Van | LCV | Truck/ Bus | Multi Axle (> 2 axle) | Car - LT1 | Car - LT2 | School Bus |
|---------|----------------|------|------------|-----------------------|-----------|-----------|------------|
| 2023-24 | 2870 | 5020 | 10040 | 16135 | 150 | 300 | 1000 |
| 2024-25 | 3010 | 5270 | 10540 | 16940 | 150 | 300 | 1000 |
| 2025-26 | 3160 | 5535 | 11070 | 17785 | 150 | 300 | 1000 |
| 2026-27 | 3320 | 5810 | 11620 | 18675 | 150 | 300 | 1000 |

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2026-27 (End of Concession Period) starting from the year 2022-23 are shown in tables below.

Table 5-5 : Toll Revenue Optimistic Scenario**(Rs. Crores)**

| Year | Toll Plaza 191.800 | Total |
|----------------|-------------------------------|---------------|
| 2023-24 | 164.17 | 164.17 |
| 2024-25 | 179.48 | 179.48 |
| 2025-26 | 196.00 | 196.00 |
| 2026-27 | 212.59 | 212.59 |

Table 5-6 : Toll Revenue Pessimistic Scenario**(Rs. Crores)**

| Year | Toll Plaza 191.800 | Total |
|----------------|-------------------------------|---------------|
| 2023-24 | 163.36 | 163.36 |
| 2024-25 | 177.75 | 177.75 |
| 2025-26 | 193.18 | 193.18 |
| 2026-27 | 208.55 | 208.55 |

Table 5-7 : Toll Revenue Most Likely Scenario**(Rs. Crores)**

| Year | Toll Plaza 191.800 | Total |
|----------------|-------------------------------|---------------|
| 2023-24 | 163.76 | 163.76 |
| 2024-25 | 178.57 | 178.57 |
| 2025-26 | 194.55 | 194.55 |
| 2026-27 | 210.50 | 210.50 |

CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on engineering judgment and experience basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Omallur to Salem on NH-44 in state of Tamil Nadu.

- b) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- c) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2023-24 is given in table below.

Table 6-1 : O&M COST

| Year | Annual maintenance (Rs. Cr) | Thermoplastic painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr.) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | Total Expenditure (Rs. Crores) | Remarks |
|---------|-----------------------------|---------------------------------|--------------------------------|----------------------------|--------------------------------|-----------------|--------------------------------|---|
| | | | | | | Annual | | |
| 2023-24 | 5.13 | 1.51 | 6.08 | 6.23 | 0.14 | 0.23 | 24.66 | Renewal of Wearing course + Pavement repair |
| 2024-25 | 5.13 | 1.51 | 6.08 | 5.71 | 0.14 | 0.23 | 25.20 | Renewal of Wearing course + Pavement repair |
| 2025-26 | 5.13 | | | | 0.14 | 0.23 | 7.75 | Regular O & M |
| 2026-27 | 5.13 | | | | 0.14 | 0.23 | 8.13 | Regular O & M |

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Omalur to Namakkal section of NH-7 in state of Tamil Nadu from km 180.000 to km 248.625 is presently a four-lane road. The road is in sound condition and serves healthy traffic volumes. The project corridor is a part of critical North – South connectivity via national highway NH-7. Bangalore has already emerged as IT capital of country and the project stretch falls in its catchment. There are many upcoming projects in area which are proposed to boost economic growth of area and add value to development of the region. All the developments considered in the Report have the potential to have a positive impact to traffic flow on project. Following can be considered as major outcome of study

- a) There is a healthy volume of tollable traffic running on project
- b) Project corridor has the potential to witness traffic growth @ 6-8% annually in post COVID-19 scenario due to various development in area and overall development of economy
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.

CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs



Figure 8-1 : General Project Condition



Figure 8-2 : Toll Plaza



Figure 8-3 General Project Condition



Figure 8-4 General Project Condition



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PATHANKOT TO AMRITSAR SECTION OF NH-15
(KM 6.082 TO 108.502)
IN THE STATE OF PUNJAB



APRIL 2023



**TOLL REVENUE AND O&M COST
PROJECTION REPORT
(FINAL)**



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highways Authority of India |
| BOT | - Build Operate Transfer | NHDP | - National Highways Development Project |
| CAGR | - Compound Annual Growth Rate | NSDP | - Net State Domestic Product |
| CTV | - Classified traffic volume | O&M | - Operation & Maintenance |
| DBFOT | - Design, Build, Finance, Operate & Transfer | PCDP | - Per Capita Domestic Product |
| EME | - Earth Moving Equipment | PCI | - Per Capita Income |
| GDP | - Gross Domestic Product | PCU | - Passenger Car Unit |
| GSDP | - Gross State Domestic Product | PSC | - Pre-stressed Concrete |
| HCM | - Heavy Construction Machinery | RCC | - Reinforced cement concrete |
| HCV | - Heavy Commercial Vehicle | RHS | - Right Hand Side |
| HTMS | - Highway Traffic Management System | SH | - State Highway |
| IRC | - Indian Road Congress | TP | - Toll Plaza |
| IRR | - Internal Rate of Return | WPI | - Wholesale Price Index |
| LCV | - Light Commercial Vehicle | NH | - National Highway |
| LHS | - Left Hand Side | | |
| LGV | - Light Goods Vehicle | | |
| MAV | - Multi Axle Vehicle | | |
| MORTH | - Ministry of Road Transport and Highways | | |

CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase III.

The project under consideration, **Pathankot- Amritsar** section of NH 15 from km 6.082 to km 108.502 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. M/s IPATRL (Concessionaire) has been awarded the Project for concession period of 20 years starting from December 31, 2010. The Project has been commissioned and is currently in the operation / maintenance phase

The Pathankot - Amritsar NH 15 Project comprises the section of NH 15 from km 6.082 to km 108.502. IPATRL was entrusted to expand a 102.42 Km section of NH 15 between Pathankot and Amritsar in Punjab from two lanes to four lanes on a DBFOT basis. The project received a completion certificate on November 27, 2014, and IPATRL commenced tolling for a project length of 102.42 Km on that date. Subsequently, the project has received a final completion certificate on August 17, 2017.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as “**Toll Revenue and O&M Cost Projection Report**” mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic traffic data and other project details on the basis of which the above analysis has been carried out.

“Toll Revenue and O&M Cost Projection Report” was submitted in August 2017. In this report traffic data of year 2016-17 was used as base traffic. The report was updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2019 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Report was further updated with yearly traffic data of 2019-20 in May 2020. Toll collection is affected on project stretch due to ongoing Farmer’s agitation in state. Toll collection is suspended at both toll plaza from early October 2020. Traffic data from April 2020 to October 2020 was available, this report was updated taking this latest traffic data into consideration. Now concessionaire has shared full year 2022-23 traffic data. Hence the data from April-2022 to March-2023 can be considered as base traffic for future projections. Projections have been updated on the basis of this new data.

CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Survey

In the course of our work, we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

Toll operation on project was suspended due to farmer's agitation. Toll operation is resumed from December 2021 and only nine-month data is available for that period which is also affected due to Covid-19 Third wave. Concessionaire has now made available yearly traffic data from April-2022- to March-2023 hence report is updated on the basis of such data from April-2022 to March-2023.

The following traffic data has been collected for project.

- Classified traffic volume counts at the two toll plaza locations on Pathankot Amritsar section of NH-15 for base year 2016-17, 2017-18, 2018-19, 2019-20, traffic data from April 2020 to October 2020 and traffic data from April 2022 to March 2023. Toll operation was suspended temporarily due to farmer's agitation thereafter and has been resumed from December 2021. Moreover, during the year 2022-23, toll operation was suspended from 16th December, 2022 to 15th January, 2023.
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any

- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

The project can be divided into two homogenous sections from traffic point of view.

These sections can be

1. Pathankot to Gurdaspur
2. Gurdaspur to Amritsar

Traffic of both sections is represented by toll plaza in each section. Table below lists provides details of locations from where traffic details have been collected.

Table 2-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Return Pass Traffic | Monthly Pass Traffic | Local Traffic |
|--------|---------------------|-------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 1 | Km 16.00 Toll Plaza | AADT for Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 |
| | | AADT for Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 |
| | | AADT for Year 2020-2021 (up to Oct- | For Year 2020-2021 (up to Oct- | For Year 2020-2021 (up to Oct- | For Year 2020-2021 (up to Oct- | For Year 2020-2021 (up to Oct- |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Return Pass Traffic | Monthly Pass Traffic | Local Traffic |
|--------|---------------------|--|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | | to Oct-20) | 20) | 20) | 20) | 20) |
| | | AADT for Year 2022-2023 | For Year 2022-2023 | For Year 2022-2023 | For Year 2022-2023 | For Year 2022-2023 |
| 2 | Km 88.50 Toll Plaza | AADT for Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 |
| | | AADT for Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 |
| | | AADT for Year 2020-2021 (up to Oct-20) * | For Year 2020-2021 (up to Oct-20) | For Year 2020-2021 (up to Oct-20) | For Year 2020-2021 (up to Oct-20) | For Year 2020-2021 (up to Oct-20) |
| | | AADT for Year 2022-2023 | For Year 2022-2023 | For Year 2022-2023 | For Year 2022-2023 | For Year 2022-2023 |

*Toll operation was suspended since October 20 on project stretch due to farmer's agitation and resumed in December, 2021. Moreover, during the year 2022-23, toll operation was temporarily suspended from 16th December, 2022 to 15th January, 2023.

The locations of each of the traffic survey are illustrated in Figure below.



Figure 2-1: Toll Plaza Locations

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in figure and table given above.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the toll able

vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in below.

Table 2-2 : Vehicle Classification System

| Vehicle Type | |
|----------------|--|
| Auto Rickshaw | |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |
| Bus | Minibus |
| | Standard Bus |
| Truck | Light Goods Vehicle (LCV) |
| | 2 – Axle Truck |
| | 3 Axle Truck (HCV) |
| | Multi Axle Truck (4-6 Axle) |
| | Oversized Vehicles (7 or more axles) |
| Other Vehicles | Agriculture Tractor, Tractor & Trailer |

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of toll able vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Truck / Bus
- Multi Axle
- Oversize Vehicle

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2016-17, 2017-18, 2018-19, 2019-20, April 2020 to October-2020 and April 2022 to March 2023 as under for toll plazas after resumption of traffic on project stretch.

Table 2-3 : Traffic Data at Toll Plaza @ Km 16.00

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2016-17 | Annual Average Daily Traffic (Nos.) 2017-18 | Annual Average Daily Traffic (Nos.) 2018-19 | Annual Average Daily Traffic (Nos.) 2019-20 | Annual Average Daily Traffic (Nos.) 2020-21 (up to Oct-20) * | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|--------------------|---|---|---|---|--|---|
| 1 | Car | 8094 | 8916 | 9220 | 9402 | 5404 | 5888 |
| 2 | Minibus / LCV | 999 | 992 | 881 | 804 | 660 | 383 |
| 3 | Truck / Bus | 1470 | 1343 | 1109 | 1063 | 738 | 1087 |
| 4 | Multi Axle | 2940 | 2979 | 2450 | 2113 | 2013 | 2134 |
| 5 | Oversized Vehicles | 604 | 22 | 17 | 32 | 16 | 10 |
| | Total | 14107 | 14252 | 13677 | 13414 | 8831 | 9502 |

*Toll operation was suspended since October 20 on project stretch due to farmer's agitation and started from December 2021.

Similar traffic data for toll plaza at km 88.50 is given as under

Table 2-4 : Traffic Data at Toll Plaza @ Km 88.50

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2016-17 | Annual Average Daily Traffic (Nos.) 2017-18 | Annual Average Daily Traffic (Nos.) 2018-19 | Annual Average Daily Traffic (Nos.) 2019-20 | Annual Average Daily Traffic (Nos.) 2020-21(up to Oct-20) | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|--------------------|---|---|---|---|---|---|
| 1 | CAR | 10428 | 11238 | 11271 | 11633 | 6284 | 8064 |
| 2 | Minibus/ LCV | 578 | 598 | 574 | 587 | 496 | 248 |
| 3 | Truck/Bus | 840 | 849 | 841 | 845 | 395 | 892 |
| 4 | Multi Axle | 688 | 939 | 1177 | 1239 | 1181 | 1498 |
| 5 | Oversized Vehicles | 479 | 26 | 8 | 15 | 62 | 8 |
| | Total | 13013 | 13649 | 13870 | 14319 | 8418 | 10710 |

Concessionaire has made available traffic data for year 2022-23. Hence the report is updated for data from April-2022 to March-2023 (in this period, 15 Dec 22 to 15 Jan 2023 toll was temporarily closed due to farmers' protest).

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

Pandemic of COVID-19 (Corona Virus) has impacted entire world this year. Taking precaution, Government of India announced a complete lockdown in last week of March 2020 and traffic on highways was stopped which was eased out progressively later. Traffic has been normalized on almost all stretches in India post COVID-19. Hence it is expected that traffic on project stretch will also follow normal growth pattern now.

Pathankot -Amritsar stretch is gateway of Jammu and Kashmir to rest of India. Traffic from Jammu & Kashmir was quite affected to due to post article 370 situations in Valley. As expected, that traffic picked as normalcy returns to valley and trade starts improving. Collection of tolls at both toll plazas of project corridor

was suspended due ongoing agitation of Farmers in the state. Toll operation has been resumed on toll plazas from December 2021.

As now traffic data of year 2022-23 is made available Report has been updated with traffic numbers of April 2022 – March 2023 period.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of futuristic traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in table given below.

Table 2-5 : PCU Factors Adopted for Study

| Vehicle Type | PCUs |
|-------------------------------------|------|
| Car | 1.0 |
| Minibus | 1.5 |
| Standard Bus | 3.0 |
| LCV/LGV | 1.5 |
| 2 Axle Truck | 3.0 |
| 3 – 6 Axle Truck | 4.5 |
| MAV | 4.5 |
| Auto Rickshaw | 1.0 |
| Van/Tempo | 1.0 |
| Agriculture Tractor with Trailer | 4.5 |
| Agriculture Tractor without Trailer | 1.5 |

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under

Table 2-6 : Traffic in PCU at both sections

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|------------------------------|--------------------------|------------|-------|-----------|
| FY2016-17 | 16.00 | 14107 | 29951 | 2.12 |
| | 88.50 | 13013 | 19067 | 1.47 |
| FY2017-18 | 16.00 | 14249 | 27926 | 1.96 |
| | 88.50 | 13642 | 18999 | 1.39 |
| FY 2018-19 | 16.00 | 13677 | 24969 | 1.83 |
| | 88.50 | 13870 | 19986 | 1.44 |
| FY 2019-20 | 16.00 | 13414 | 23449 | 1.75 |
| | 88.50 | 14319 | 20691 | 1.45 |
| FY 2020-21 (up to Oct-20) | 16.00 | 17739 | 8831 | 2.01 |
| | 88.50 | 13808 | 8418 | 1.64 |
| FY 2022-23 | 16.00 | 9502 | 19371 | 2.04 |
| | 88.50 | 10710 | 17888 | 1.67 |

There was ban on mining in Punjab in year 2017-18 due to which growth of large size vehicles (multi-axle) slowed down. The same is reflecting in reduction of PCU Index. It can be observed from above that project traffic has a PCU index ranging between 1.4 to 2.0 which indicates a good mix of passenger and commercial traffic on the project corridor.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

It is observed that car traffic forms 62% of total traffic at toll plaza location Km 16.00 while multi axle vehicles are 22% of total traffic. 12% of traffic is Truck /Bus while LCV traffic forms the balance 4%. Overall, about 38% of traffic is commercial in nature.

At toll plaza location Km 88.50 car traffic forms 75% of total traffic at toll plaza while multi axle and truck / bus are 14% and 9%. LCV volume is 2% of the total traffic. Overall about 25% of traffic is commercial in nature which is lower as compared to toll plaza location Km 16.00.

Another important bifurcation of traffic is components of traffic with respect to various type of toll ticketing like

1. Single Journey
2. Return Journey
3. Overweight Vehicles (Concessionaire provided special tariff for this category)
4. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category in various years.

Table 2-7 : Journey Type Bifurcation of Traffic at KM 16.00

| Sr. No | Type | Traffic Volume (Nos.) 2016-17 | Traffic Volume (Nos.) 2017-18 | Traffic Volume (Nos.) 2018-19 | Traffic Volume (Nos.) 2019-20 | Traffic Volume (Nos.) 2020-21 (up to Oct-21) | Traffic Volume (Nos.) 2022-23 |
|--------|----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--|-------------------------------|
| 1 | Single Journey | 4255 | 4785 | 4574 | 4407 | 3786 | 4674 |
| 2 | Return Journey | 5364 | 4648 | 4322 | 4236 | 1924 | 4676 |
| 3 | Monthly Pass | 4488 | 4820 | 4781 | 4771 | 3121 | 152 |

A significant part of the traffic at KM 16.00 is monthly and return journey which is 2% and 49% respectively. Single journey component is 49%. This indicated presence of dedicated urban traffic on corridor.

Similarly, traffic numbers for type of journey at KM 88.50 is return and monthly journey 1% and 52% respectively. Single journey component is 47%.

Table 2-8 : Journey Type Bifurcation of Traffic at KM 88.50

| Sr. No | Type | Traffic Volume (Nos.) 2016-17 | Traffic Volume (Nos.) 2017-18 | Traffic Volume (Nos.) 2018-19 | Traffic Volume (Nos.) 2019-20 | Traffic Volume (Nos.) 2020-21 (up to Oct-20) | Traffic Volume (Nos.) 2022-23 |
|--------|----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--|-------------------------------|
| 1 | Single Journey | 2656 | 2858 | 3177 | 3616 | 3406 | 5021 |
| 2 | Return Journey | 5352 | 5434 | 5620 | 5736 | 2332 | 5542 |
| 3 | Monthly Pass | 5005 | 5360 | 5073 | 4967 | 2680 | 149 |

Here return journey form highest portion of traffic followed by monthly pass and single journey. As discussed previously traffic data for period from April to September 2020 is impacted due to lockdown and toll collection was suspended on project road due to Farmer's agitation in state till December 21. Hence traffic data for period April-2022 to March 2023 is used for journey type bifurcation.

Secondary Data Collection.

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors.

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data

CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Pathankot- Amritsar section of NH-15 has been done taking above factors in to consideration. Established best practices and standard guidelines such as “**IRC: 108-2015-Guidelines for Traffic Forecast on Highways**” have been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Forecast on Highways**. Since the entire project alignment falls in Punjab State and has very little contribution from other states in terms of traffic, hence all developmental parameter pertaining traffic growth are considered for Punjab State only.

In this method, past trends of any vehicular data are paired with an economic

indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under:

- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Punjab is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given categories of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log } (P) = k \times \text{Log } (EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1: Per Capita Income Vs Car

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|---------|-------|--------|---------|---------|------------|----------------|
| 2004-05 | 33103 | 337345 | 4.52 | 5.53 | | |
| 2005-06 | 34096 | 376954 | 4.53 | 5.58 | 3% | |
| 2006-07 | 37087 | 414612 | 4.57 | 5.62 | 9% | |
| 2007-08 | 39567 | 456521 | 4.60 | 5.66 | 7% | |
| 2008-09 | 41003 | 496658 | 4.61 | 5.70 | 4% | |
| 2009-10 | 42831 | 538862 | 4.63 | 5.73 | 4% | |
| 2010-11 | 44783 | 609469 | 4.65 | 5.78 | 5% | |
| 2011-12 | 46422 | 680076 | 4.67 | 5.83 | 4% | |
| 2012-13 | 48496 | 774611 | 4.69 | 5.89 | 4% | |
| 2013-14 | 49411 | 869565 | 4.69 | 5.94 | 2% | |
| 2014-15 | 51517 | 960734 | 4.71 | 5.98 | 4% | 4.5% |

Regression analysis of same is given in figure below

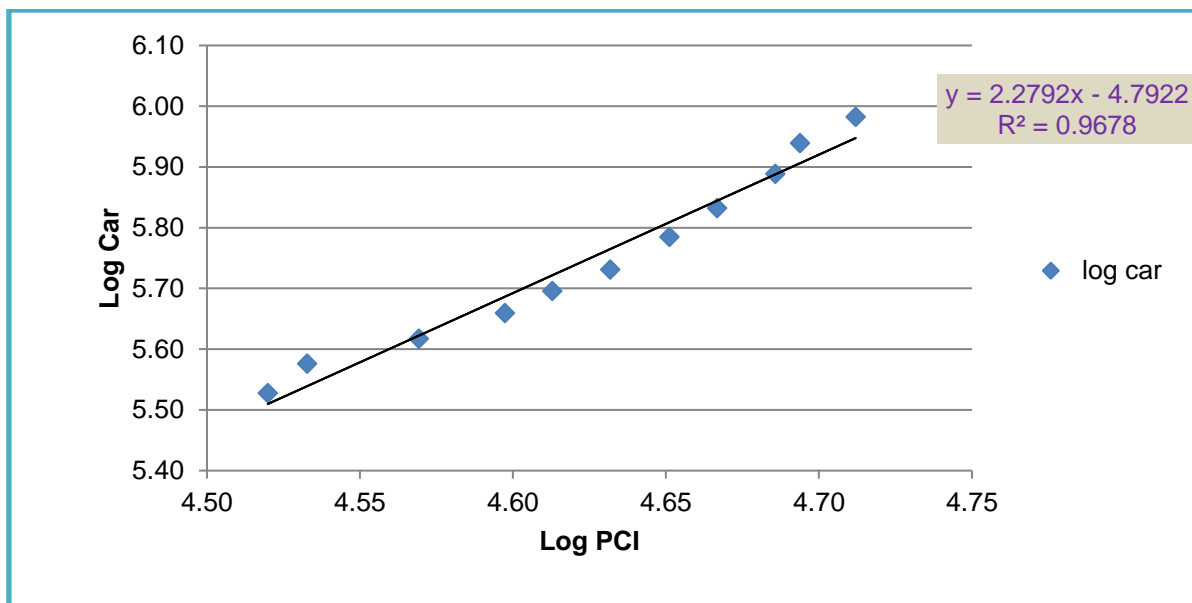


Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation

Table 3-2 : Population Vs Bus

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|---------|------------|-------|---------|---------|------------|----------------|
| 2004-05 | 26012183 | 19855 | 7.42 | 4.30 | | |
| 2005-06 | 26492788 | 21136 | 7.42 | 4.33 | 2% | |
| 2006-07 | 26982983 | 22373 | 7.43 | 4.35 | 2% | |
| 2007-08 | 27482038 | 24457 | 7.44 | 4.39 | 2% | |
| 2008-09 | 27989725 | 25682 | 7.45 | 4.41 | 2% | |
| 2009-10 | 28506747 | 27146 | 7.45 | 4.43 | 2% | |
| 2010-11 | 29034180 | 28653 | 7.46 | 4.46 | 2% | |
| 2011-12 | 29571111 | 30160 | 7.47 | 4.48 | 2% | |
| 2012-13 | 29795907 | 33475 | 7.47 | 4.52 | 1% | |
| 2013-14 | 35222450 | 35864 | 7.55 | 4.55 | 18% | |
| 2014-15 | 35579780 | 40545 | 7.55 | 4.61 | 1% | 3.29% |

Regression analysis of same is given in figure below

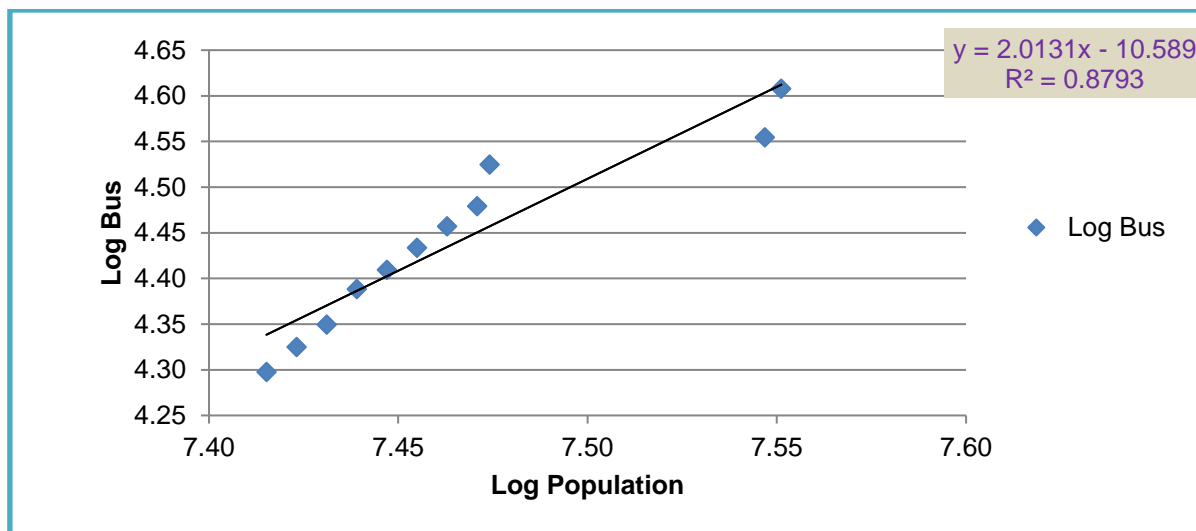


Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic has been worked out by regression analysis with NSDP.

Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|---------|----------|--------|----------|-----------|-------------|-------------------------|
| 2004-05 | 8610813 | 119183 | 6.94 | 5.08 | | |
| 2005-06 | 9032981 | 128201 | 6.96 | 5.11 | 5% | |
| 2006-07 | 10007179 | 140380 | 7.00 | 5.15 | 11% | |
| 2007-08 | 10873818 | 150720 | 7.04 | 5.18 | 9% | |
| 2008-09 | 11476627 | 160113 | 7.06 | 5.20 | 6% | |
| 2009-10 | 12209725 | 170519 | 7.09 | 5.23 | 6% | |
| 2010-11 | 13002377 | 186725 | 7.11 | 5.27 | 6% | |
| 2011-12 | 13727501 | 202930 | 7.14 | 5.31 | 6% | |
| 2012-13 | 14449823 | 216238 | 7.16 | 5.33 | 5% | |
| 2013-14 | 17403765 | 233211 | 7.24 | 5.37 | 20% | |
| 2014-15 | 18329810 | 251035 | 7.26 | 5.40 | 5% | 7.96% |

Following figure depict regression analysis and extrapolation.

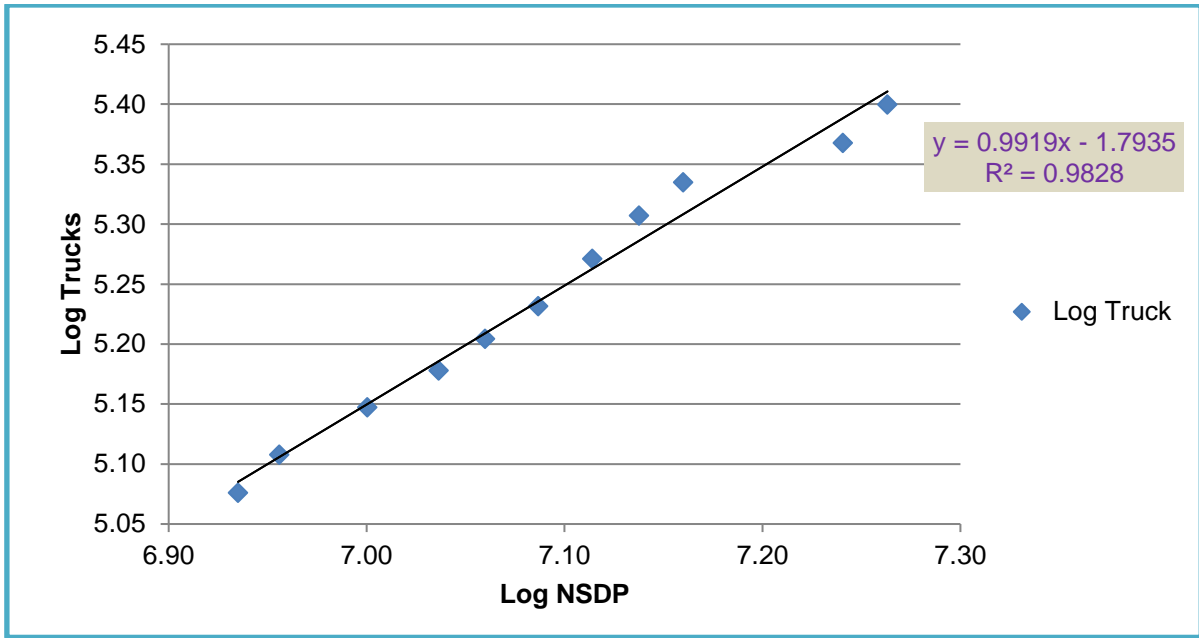


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below.

Table 3-4 : Summary Regression Analysis

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|--------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Punjab | Car/Jeep | PCI | $y = 2.2792x - 4.7922$ | $R^2 = 0.9678$ | 2.2792 | 4.54% | 10.34% | Good Regression |
| | Bus | Population | $y = 2.0131x - 10.5894$ | $R^2 = 0.8793$ | 2.0131 | 3.29% | 6.63% | Good Regression |
| | Truck | NSDP | $y = 0.9919x - 1.7935$ | $R^2 = 0.9828$ | 0.9919 | 7.96% | 7.90% | Good Regression |

Economical model for predicting growth is good tool, however other local, regional, national factors should also be considered before finalizing growth factors. Considering factors such as Existing developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Pathankot to Amritsar has recently been commissioned and tolling commenced in 2014. Only few years traffic data is available which is not sufficient to establish any credible trend. Moreover, due to ban on mining in area commercial traffic is temporarily affected. Lockdown for Corona Virus pandemic (COVID-19) disrupted project traffic in March 2020. Traffic for period from April 2020 to September 2020 is impacted due to COVID-19 lockdown and from October-20 onwards toll collection was suspended on project which is recently resumed in December 2021. Hence same cannot be considered for historical growth

Hence traffic growth on project corridor has been taken from economic model.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2011-12, the economy recovered in 2013-14, and a high growth rate of GDP was recorded in up to 2018-19. Pandemic of COVID-19 impacted all economies of world including India. Following figure show trend of GDP growth in India.

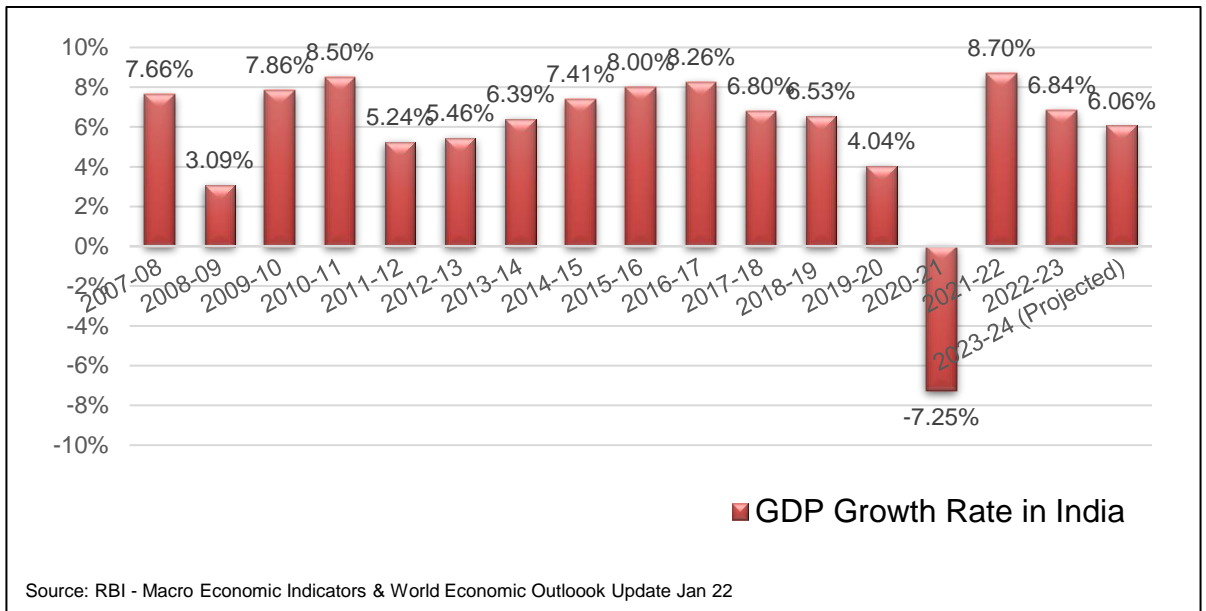


Figure 3-4 : Growth of GDP in India

FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Government took major policy decision including tax infrastructure reforming, banking sector improvement and ease of doing business.

Major economies of world collapsed due to pandemic COVID-19 including India. Indian economy is also registered negative growth in financial year 2020-21. After that Indian economy recovered handsomely and registered a growth of about 9% in Year 2021-22. This was partly due to low base of year 2020-21 as well.

Honorable Prime Minister has announced a major relief package of Rs. 20 lakh crores which is about 10% of GDP. This is aimed at turning this major crisis of COVID-19 into opportunity by providing major impetus to industrial production to the limit of becoming a self-reliant economy. With major thrust of this package being on **Make -In- India** it is expected that industry in India would grow at rapid pace and recover handsomely in post COVID-19 scenario. World Economic Outlook update also has predicted a growth rate of about 7.5 % in next year 2022-23.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Growth rates are recommended for three scenarios for sensitivity analysis namely Optimistic, Pessimistic and Most Likely with a positive and negative variation 0.5% and -1.0% from Most Likely case respectively. While working out future growth projections both historical and economical model growths are considered.

Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as the trend of technological advances in the logistics industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is an established practice to step down future growth rates at interval of 5 years.

Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as the trend of technological advances in the logistics industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is an established practice to step down future growth rates at interval of 5 years

Table 3-5 : Recommended Growth Rates Optimistic

| Year/ Vehicle Type | 2020-22 | 2022-27 | 2027-32 | 2032-37 | 2037-42 |
|---------------------------------|---------|---------|---------|---------|---------|
| Car/Jeep/Van | 8.84% | 7.84% | 6.84% | 5.84% | 5.34% |
| LCV | 7.40% | 6.40% | 5.40% | 4.40% | 4.15% |
| Truck/Bus | 6.13% | 5.13% | 4.13% | 3.13% | 2.88% |
| Multi Axle (> 2 axle) | 8.40% | 7.40% | 6.40% | 5.40% | 5.15% |

Table 3-6 : Recommended Growth Rates Pessimistic

| Year/ Vehicle Type | 2020-22 | 2022-27 | 2027-32 | 2032-37 | 2037-42 |
|---------------------------------|---------|---------|---------|---------|---------|
| Car/Jeep/Van | 7.34% | 6.34% | 5.34% | 4.34% | 3.84% |
| LCV | 5.90% | 4.90% | 3.90% | 2.90% | 2.65% |
| Truck/Bus | 4.63% | 3.63% | 2.63% | 1.63% | 1.38% |
| Multi Axle (> 2 axle) | 6.90% | 5.90% | 4.90% | 3.90% | 3.65% |

Table 3-7 : Recommended Growth Rates Most Likely

| Year/ Vehicle Type | 2020-22 | 2022-27 | 2027-32 | 2032-37 | 2037-42 |
|---------------------------------|---------|---------|---------|---------|---------|
| Car/Jeep/Van | 8.34% | 7.34% | 6.34% | 5.34% | 4.84% |
| LCV | 6.90% | 5.90% | 4.90% | 3.90% | 3.65% |
| Truck/Bus | 5.63% | 4.63% | 3.63% | 2.63% | 2.38% |
| Multi Axle (> 2 axle) | 7.90% | 6.90% | 5.90% | 4.90% | 4.65% |

With return of normalcy in J & K valley it is expected that transportation of famous Kashmiri apple has also started picking up and same is expected have positive impact in future traffic. This is expected to contribute and enhanced traffic growth on project corridor.

Concessionaire has made available traffic data from April-2022 to March 2023. Current report has been updated using the same traffic data.

3.7 COVID-19 Impact

Current Corona virus crisis affected the traffic since March 2020 onwards. Traffic in year 2020-21 was negatively affected by lockdown. All social and economic activities had been completely disrupted due worldwide pandemic of Corona Virus. This had affected traffic on project stretch as well. Traffic was severely affected from March-2020 due to lockdown. Government considered partial lifting of lockdown and allowing selective economic activities on zone to zone basis in May 2020. Government has decided to open economic activities in phases and by now almost all the activities are open with some restrictions.

Further, toll operation was suspended since October 2020 on project stretch due to farmer's agitation hence which is resumed just three months back in December 2021. Now Concessionaire has made available traffic data from April-2022 to March 2023. During this period, toll operation was temporarily suspended from 16th December, 2022 to 15th January, 2023. Current report has been updated using the same traffic data.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM
(Optimistic Growth Scenario)**

| Year | CAR | Minibus/LCV | Truck/Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|-------------|-----------|------------|--------------------|-----------|-----------|
| 2023-24 | 6350 | 407 | 1143 | 2292 | 10 | 10202 | 20749 |
| 2024-25 | 6848 | 433 | 1201 | 2461 | 10 | 10953 | 22220 |
| 2025-26 | 7384 | 461 | 1262 | 2644 | 10 | 11761 | 23805 |
| 2026-27 | 7963 | 490 | 1327 | 2839 | 10 | 12629 | 25500 |
| 2027-28 | 8507 | 516 | 1382 | 3020 | 10 | 13435 | 27062 |
| 2028-29 | 9088 | 544 | 1439 | 3213 | 10 | 14294 | 28725 |
| 2029-30 | 9710 | 573 | 1497 | 3418 | 10 | 15208 | 30487 |
| 2030-31 | 10375 | 604 | 1558 | 3637 | 10 | 16184 | 32367 |
| 2031-32 | 11085 | 636 | 1623 | 3870 | 10 | 17224 | 34368 |
| 2032-33 | 11733 | 664 | 1674 | 4079 | 10 | 18160 | 36152 |
| 2033-34 | 12418 | 693 | 1728 | 4299 | 10 | 19148 | 38032 |
| 2034-35 | 13143 | 724 | 1782 | 4532 | 10 | 20191 | 40014 |
| 2035-36 | 13910 | 755 | 1837 | 4776 | 10 | 21288 | 42091 |
| 2036-37 | 14722 | 788 | 1895 | 5034 | 10 | 22449 | 44287 |
| 2037-38 | 15508 | 821 | 1950 | 5292 | 10 | 23581 | 46449 |

Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.50 KM
(Optimistic Growth Scenario)

| Year | CAR | Minibus | Truck/Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|---------|-----------|------------|--------------------|-----------|-----------|
| 2023-24 | 8697 | 264 | 937 | 1608 | 8 | 11514 | 19176 |
| 2024-25 | 9378 | 280 | 986 | 1727 | 16 | 12387 | 20600 |
| 2025-26 | 10113 | 298 | 1036 | 1855 | 17 | 13319 | 22092 |
| 2026-27 | 10905 | 317 | 1088 | 1992 | 18 | 14320 | 23690 |
| 2027-28 | 11651 | 334 | 1133 | 2120 | 19 | 15257 | 25177 |
| 2028-29 | 12448 | 352 | 1179 | 2256 | 20 | 16255 | 26755 |
| 2029-30 | 13299 | 371 | 1228 | 2400 | 21 | 17319 | 28434 |
| 2030-31 | 14208 | 390 | 1278 | 2553 | 22 | 18451 | 30215 |
| 2031-32 | 15179 | 411 | 1330 | 2716 | 23 | 19659 | 32111 |
| 2032-33 | 16065 | 429 | 1372 | 2863 | 24 | 20753 | 33816 |
| 2033-34 | 17002 | 448 | 1415 | 3017 | 25 | 21907 | 35608 |
| 2034-35 | 17994 | 467 | 1460 | 3180 | 26 | 23127 | 37502 |
| 2035-36 | 19044 | 488 | 1505 | 3351 | 27 | 24415 | 39492 |
| 2036-37 | 20155 | 509 | 1551 | 3531 | 28 | 25774 | 41587 |
| 2037-38 | 21232 | 530 | 1596 | 3713 | 29 | 27100 | 43654 |

Similarly, traffic projections for Pessimistic scenario are given as under.

Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM
(Pessimistic Growth Scenario)

| Year | CAR | Minibus/LCV | Truck/Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|-------------|-----------|------------|--------------------|-----------|-----------|
| 2023-24 | 6263 | 402 | 1127 | 2261 | 10 | 10063 | 20467 |
| 2024-25 | 6661 | 421 | 1168 | 2395 | 10 | 10655 | 21619 |
| 2025-26 | 7083 | 442 | 1210 | 2536 | 10 | 11281 | 22833 |
| 2026-27 | 7532 | 463 | 1253 | 2685 | 10 | 11943 | 24113 |
| 2027-28 | 7935 | 481 | 1286 | 2816 | 10 | 12528 | 25232 |
| 2028-29 | 8359 | 500 | 1319 | 2954 | 10 | 13142 | 26404 |
| 2029-30 | 8806 | 519 | 1354 | 3099 | 10 | 13788 | 27637 |
| 2030-31 | 9276 | 540 | 1389 | 3251 | 10 | 14466 | 28928 |
| 2031-32 | 9772 | 561 | 1424 | 3410 | 10 | 15177 | 30276 |
| 2032-33 | 10196 | 577 | 1446 | 3544 | 10 | 15773 | 31393 |
| 2033-34 | 10639 | 594 | 1469 | 3682 | 10 | 16394 | 32551 |
| 2034-35 | 11101 | 612 | 1492 | 3826 | 10 | 17041 | 33757 |
| 2035-36 | 11583 | 630 | 1515 | 3975 | 10 | 17713 | 35006 |
| 2036-37 | 12085 | 648 | 1538 | 4130 | 10 | 18411 | 36301 |
| 2037-38 | 12549 | 666 | 1559 | 4281 | 10 | 19065 | 37535 |

Table 4-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.50 KM
(Pessimistic Growth Scenario)

| Year | CAR | Minibus | Truck/Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|---------|-----------|------------|--------------------|-----------|-----------|
| 2023-24 | 8577 | 260 | 924 | 1586 | 8 | 11355 | 18912 |
| 2024-25 | 9121 | 272 | 956 | 1680 | 16 | 12045 | 20029 |
| 2025-26 | 9700 | 285 | 989 | 1779 | 17 | 12770 | 21177 |
| 2026-27 | 10316 | 299 | 1025 | 1883 | 18 | 13541 | 22394 |
| 2027-28 | 10867 | 310 | 1052 | 1975 | 19 | 14223 | 23461 |
| 2028-29 | 11447 | 322 | 1079 | 2072 | 20 | 14940 | 24581 |
| 2029-30 | 12059 | 334 | 1107 | 2173 | 21 | 15694 | 25754 |
| 2030-31 | 12703 | 346 | 1136 | 2280 | 22 | 16487 | 26989 |
| 2031-32 | 13382 | 360 | 1165 | 2391 | 23 | 17321 | 28280 |
| 2032-33 | 13963 | 370 | 1184 | 2484 | 24 | 18025 | 29356 |
| 2033-34 | 14570 | 381 | 1203 | 2581 | 25 | 18760 | 30478 |
| 2034-35 | 15202 | 392 | 1222 | 2682 | 26 | 19524 | 31642 |
| 2035-36 | 15863 | 403 | 1241 | 2786 | 27 | 20320 | 32849 |
| 2036-37 | 16551 | 415 | 1260 | 2894 | 28 | 21148 | 34103 |
| 2037-38 | 17187 | 426 | 1277 | 2999 | 29 | 21918 | 35283 |

Similarly, traffic projections for Most Likely are given as under.

Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM
(Most Likely Growth Scenario)

| Year | CAR | Minibus/LCV | Truck/Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|-------------|-----------|------------|--------------------|-----------|-----------|
| 2023-24 | 6321 | 406 | 1139 | 2282 | 10 | 10158 | 20661 |
| 2024-25 | 6785 | 430 | 1193 | 2440 | 10 | 10858 | 22034 |
| 2025-26 | 7283 | 456 | 1248 | 2609 | 10 | 11606 | 23497 |
| 2026-27 | 7817 | 483 | 1306 | 2789 | 10 | 12405 | 25055 |
| 2027-28 | 8313 | 507 | 1353 | 2954 | 10 | 13137 | 26471 |
| 2028-29 | 8840 | 531 | 1404 | 3128 | 10 | 13913 | 27970 |
| 2029-30 | 9400 | 557 | 1455 | 3312 | 10 | 14734 | 29550 |
| 2030-31 | 9996 | 584 | 1509 | 3507 | 10 | 15606 | 31226 |
| 2031-32 | 10629 | 613 | 1564 | 3714 | 10 | 16530 | 32999 |
| 2032-33 | 11196 | 637 | 1605 | 3896 | 10 | 17344 | 34544 |
| 2033-34 | 11793 | 661 | 1647 | 4087 | 10 | 18198 | 36162 |
| 2034-35 | 12422 | 687 | 1690 | 4287 | 10 | 19096 | 37859 |
| 2035-36 | 13085 | 714 | 1733 | 4497 | 10 | 20039 | 39637 |
| 2036-37 | 13783 | 742 | 1778 | 4717 | 10 | 21030 | 41502 |
| 2037-38 | 14450 | 769 | 1820 | 4936 | 10 | 21985 | 43321 |

**Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.500 KM
(Most Likely Growth Scenario)**

| Year | CAR | Minibus | Truck/Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|---------|-----------|------------|--------------------|-----------|-----------|
| 2023-24 | 8656 | 262 | 933 | 1602 | 8 | 11461 | 19093 |
| 2024-25 | 9291 | 277 | 976 | 1712 | 16 | 12272 | 20411 |
| 2025-26 | 9972 | 293 | 1021 | 1831 | 17 | 13134 | 21791 |
| 2026-27 | 10703 | 310 | 1067 | 1957 | 18 | 14055 | 23257 |
| 2027-28 | 11382 | 324 | 1106 | 2073 | 19 | 14904 | 24600 |
| 2028-29 | 12104 | 340 | 1147 | 2195 | 20 | 15806 | 26023 |
| 2029-30 | 12872 | 356 | 1188 | 2324 | 21 | 16761 | 27523 |
| 2030-31 | 13689 | 373 | 1231 | 2461 | 22 | 17776 | 29115 |
| 2031-32 | 14556 | 391 | 1276 | 2606 | 23 | 18852 | 30801 |
| 2032-33 | 15333 | 406 | 1309 | 2734 | 24 | 19806 | 32280 |
| 2033-34 | 16151 | 422 | 1343 | 2868 | 25 | 20809 | 33832 |
| 2034-35 | 17013 | 438 | 1377 | 3009 | 26 | 21863 | 35459 |
| 2035-36 | 17920 | 455 | 1414 | 3156 | 27 | 22972 | 37168 |
| 2036-37 | 18875 | 472 | 1451 | 3311 | 28 | 24137 | 38962 |
| 2037-38 | 19789 | 489 | 1485 | 3465 | 29 | 25257 | 40701 |

4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Pathankot-Amritsar project, the Target Date and Target Traffic are defined as under.

Target Date - 1st January 2019

Target Traffic - 34498 in PCU.

It was observed that as per traffic projections, traffic volume falls short of target traffic in all scenarios. This warrants for extension of concession period. Extension of concession period is worked out as per provisions of concession agreement. Following table provides details of modification in concession agreement.

| Scenario | Average Traffic in PCUs of Month Dec-2019 Jan-2019 | Expected reduction/shortening in Concession Period |
|----------|--|--|
| Actual | 23110 | 4 years |

Further, due to the suspension in toll in the year FY17 for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days.

Traffic was severely impacted on project highway during initial lockdown period. NHAI has declared a policy of providing extension of concession to make up for revenue loss during lockdown. It is expected extension would be provided to project concession period on this account as well.

Concessionaire had initiated arbitration proceedings against National Highways Authority of India (“NHAI”) before the Hon’ble Arbitration Tribunal for extension of the Concession Period by 518 days and compensation for delay in completion of construction of the project on account of the reasons not attributable to Concessionaire.

A petition filed by NHAI challenging the Arbitral Award has been dismissed by the Honorable Delhi High Court & the Arbitral Award has been upheld. As a result, the extension of the Concession period by 518 days would accrue to concession period. Thus a total of about 6 years would be added to the original concession period. Projection of revenue and traffic has been done accordingly.

Due to farmers’ protest in the state of Punjab and Haryana, toll operations were suspended from October, 2020 to December, 2021. As per provisions of Concession agreement, the Concessionaire is eligible for extension of concession period by 436 days.

Due to farmers’ protest in the state of Punjab, toll operations were temporarily suspended from December 16, 2022 to January 15, 2023. As per provisions of Concession agreement, the Concessionaire is eligible for extension of concession period by 31 days.

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. Monthly Pass: For frequent user's monthly pass is issued for 50 trips per month. Applicable discounted rate is 2/3 times the normal rate. Concessionaire has also issued additional monthly pass for 60 trips at 2/3 times the normal rate.
2. Daily Pass (for Return Trip): A 75% discount will be offered on the return trip.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2021-22. A moderate growth in Wholesale Price Index (WPI) has

been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

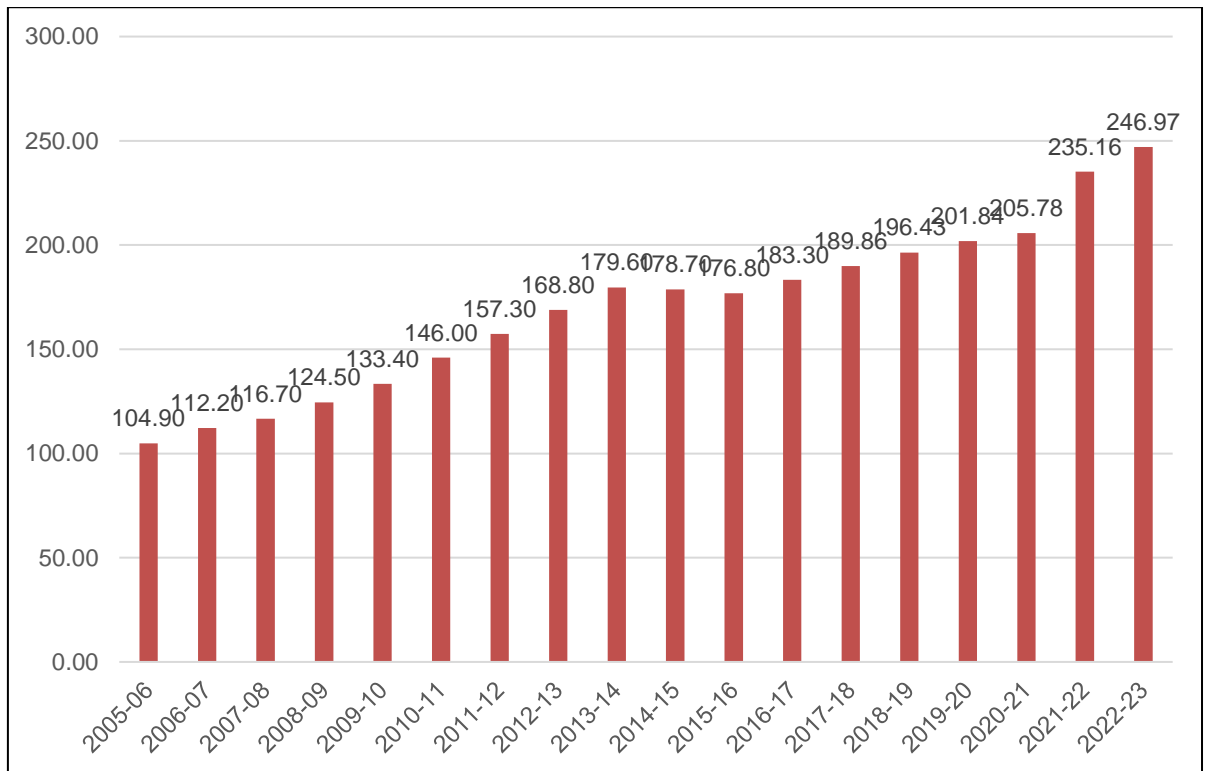


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2021 is 5.24%. A WPI growth of 5% has been considered for future rate estimates.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-1 : Base Toll Rates 2007 - 08

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|--------------------------------|
| Car, Jeep, Van or Light Motor Vehicle | 0.65 |
| Light Commercial Vehicle, Light Goods Vehicle or Minibus | 1.05 |
| Bus or Truck (2 Axle) | 2.2 |
| Three Axle commercial vehicles | 2.4 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles) | 3.45 |
| Oversized Vehicle (seven or more axles) | 4.2 |

There are number of bypasses and structures in each package. Equivalent length for structures is added to tollable length at each toll plaza. Bypasses having cost more than Rs. 50 Cr. are to be charged as per fee notification which provide incremental rate over basic rate for Rs. 15 Cr cost of bypass. Following table provides details of Bypasses having cost more than Rs. 50 Cr.

Additional rates for bypass having cost more than Rs. 50 Cr has been added as per schedule -R in toll rates for both toll plazas. Lengths of bypasses are deducted to arrive at effective length of road for each toll plaza for normal toll rates. Effective length excluding length of bypasses thus works out to Km 31.310 and Km 36.97 for Toll Plaza at Km 16.00 and Km 88.50 respectively.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below. Since applicable length of highway length is equal for both plazas, applicable toll rates are also same

Thus, worked out rates for various categories of vehicle and discounts are given as under.

Table 5-2 : Toll Rates for Single Journey @Km 16.00

| Year | CAR | Minibus | LCV | Truck | Bus | Multi axle | Oversized Vehicles |
|----------------|------------|----------------|------------|--------------|------------|-------------------|---------------------------|
| 2023-24 | 130 | 200 | 200 | 410 | 410 | 620 | 805 |
| 2024-25 | 135 | 210 | 210 | 430 | 430 | 650 | 845 |
| 2025-26 | 145 | 220 | 220 | 450 | 450 | 685 | 890 |
| 2026-27 | 150 | 235 | 235 | 475 | 475 | 720 | 935 |
| 2027-28 | 160 | 245 | 245 | 500 | 500 | 755 | 980 |
| 2028-29 | 170 | 260 | 260 | 525 | 525 | 795 | 1030 |
| 2029-30 | 175 | 270 | 270 | 550 | 550 | 835 | 1085 |
| 2030-31 | 185 | 285 | 285 | 580 | 580 | 880 | 1140 |
| 2031-32 | 195 | 300 | 300 | 610 | 610 | 925 | 1200 |
| 2032-33 | 205 | 315 | 315 | 645 | 645 | 975 | 1265 |
| 2033-34 | 215 | 330 | 330 | 675 | 675 | 1025 | 1330 |
| 2034-35 | 225 | 350 | 350 | 710 | 710 | 1080 | 1400 |
| 2035-36 | 240 | 370 | 370 | 750 | 750 | 1140 | 1475 |
| 2036-37 | 250 | 390 | 390 | 790 | 790 | 1200 | 1555 |
| 2037-38 | 265 | 410 | 410 | 830 | 830 | 1260 | 1635 |

Table 5-3 : Toll Rates for Return Journey@ Km 16.000

| Year | CAR | Minibus | LCV | Truck | Bus | Multi axle | Oversized Vehicles |
|----------------|-----|---------|-----|-------|------|------------|--------------------|
| 2023-24 | 195 | 300 | 300 | 615 | 615 | 930 | 1205 |
| 2024-25 | 205 | 315 | 315 | 645 | 645 | 980 | 1265 |
| 2025-26 | 215 | 335 | 335 | 675 | 675 | 1030 | 1330 |
| 2026-27 | 225 | 350 | 350 | 710 | 710 | 1080 | 1400 |
| 2027-28 | 240 | 370 | 370 | 750 | 750 | 1135 | 1470 |
| 2028-29 | 250 | 385 | 385 | 785 | 785 | 1195 | 1545 |
| 2029-30 | 265 | 405 | 405 | 830 | 830 | 1255 | 1625 |
| 2030-31 | 280 | 430 | 430 | 870 | 870 | 1320 | 1710 |
| 2031-32 | 290 | 450 | 450 | 915 | 915 | 1390 | 1800 |
| 2032-33 | 310 | 475 | 475 | 965 | 965 | 1460 | 1895 |
| 2033-34 | 325 | 500 | 500 | 1015 | 1015 | 1540 | 1995 |
| 2034-35 | 340 | 525 | 525 | 1070 | 1070 | 1620 | 2100 |
| 2035-36 | 360 | 555 | 555 | 1125 | 1125 | 1705 | 2210 |
| 2036-37 | 380 | 580 | 580 | 1185 | 1185 | 1795 | 2330 |
| 2037-38 | 400 | 615 | 615 | 1250 | 1250 | 1895 | 2455 |

Table 5-4 : Toll Rates for Local Monthly Ticket @ Km 16.000

| Year | CAR |
|----------------|-----|
| 2023-24 | 330 |
| 2024-25 | 345 |
| 2025-26 | 365 |
| 2026-27 | 385 |
| 2027-28 | 405 |
| 2028-29 | 425 |
| 2029-30 | 445 |
| 2030-31 | 470 |
| 2031-32 | 495 |
| 2032-33 | 520 |
| 2033-34 | 545 |
| 2034-35 | 575 |
| 2035-36 | 605 |
| 2036-37 | 635 |
| 2037-38 | 670 |

Table 5-5 : Toll Rates for Monthly Pass Local (50 Trips) @Km 16.000

| Year | Car/Jeep/Van | LCV | Truck | Bus | 3 - Axle | Multi Axle |
|---------|--------------|-------|-------|-------|----------|------------|
| 2023-24 | 4355 | 6700 | 13630 | 13630 | 20685 | 26805 |
| 2024-25 | 4575 | 7040 | 14325 | 14325 | 21730 | 28165 |
| 2025-26 | 4805 | 7400 | 15050 | 15050 | 22835 | 29595 |
| 2026-27 | 5050 | 7775 | 15820 | 15820 | 24005 | 31110 |
| 2027-28 | 5310 | 8175 | 16630 | 16630 | 25235 | 32705 |
| 2028-29 | 5585 | 8595 | 17490 | 17490 | 26530 | 34385 |
| 2029-30 | 5870 | 9040 | 18390 | 18390 | 27905 | 36165 |
| 2030-31 | 6175 | 9510 | 19345 | 19345 | 29350 | 38040 |
| 2031-32 | 6500 | 10005 | 20355 | 20355 | 30880 | 40025 |
| 2032-33 | 6840 | 10530 | 21420 | 21420 | 32495 | 42115 |
| 2033-34 | 7200 | 11085 | 22545 | 22545 | 34205 | 44330 |
| 2034-35 | 7580 | 11665 | 23735 | 23735 | 36010 | 46670 |
| 2035-36 | 7980 | 12285 | 24995 | 24995 | 37920 | 49145 |
| 2036-37 | 8405 | 12940 | 26320 | 26320 | 39935 | 51760 |
| 2037-38 | 8855 | 13630 | 27730 | 27730 | 42070 | 54525 |

Table 5-6 : Toll Rates for Single Journey @ Km 88.500

| Year | CAR | Minibus | LCV | Truck | Bus | Multi axle | Oversized Vehicles |
|---------|-----|---------|-----|-------|-----|------------|--------------------|
| 2023-24 | 110 | 175 | 175 | 355 | 355 | 545 | 700 |
| 2024-25 | 120 | 185 | 185 | 375 | 375 | 575 | 735 |
| 2025-26 | 125 | 195 | 195 | 395 | 395 | 605 | 770 |
| 2026-27 | 130 | 205 | 205 | 415 | 415 | 635 | 810 |
| 2027-28 | 135 | 215 | 215 | 435 | 435 | 665 | 850 |
| 2028-29 | 145 | 225 | 225 | 460 | 460 | 700 | 895 |
| 2029-30 | 150 | 235 | 235 | 480 | 480 | 735 | 940 |
| 2030-31 | 160 | 250 | 250 | 505 | 505 | 775 | 990 |
| 2031-32 | 170 | 260 | 260 | 535 | 535 | 815 | 1040 |
| 2032-33 | 175 | 275 | 275 | 560 | 560 | 855 | 1095 |
| 2033-34 | 185 | 290 | 290 | 590 | 590 | 905 | 1155 |
| 2034-35 | 195 | 305 | 305 | 620 | 620 | 950 | 1215 |
| 2035-36 | 205 | 320 | 320 | 655 | 655 | 1000 | 1280 |
| 2036-37 | 215 | 335 | 335 | 690 | 690 | 1055 | 1350 |
| 2037-38 | 230 | 355 | 355 | 725 | 725 | 1110 | 1420 |

Table 5-7 : Toll Rates for Return Journey @ Km 88.500

| Year | CAR | Minibus | LCV | Truck | Bus | Multi axle | Oversized Vehicles |
|---------|-----|---------|-----|-------|------|------------|--------------------|
| 2023-24 | 170 | 260 | 260 | 535 | 535 | 820 | 1045 |
| 2024-25 | 175 | 275 | 275 | 565 | 565 | 860 | 1100 |
| 2025-26 | 185 | 290 | 290 | 590 | 590 | 905 | 1155 |
| 2026-27 | 195 | 305 | 305 | 620 | 620 | 950 | 1215 |
| 2027-28 | 205 | 320 | 320 | 655 | 655 | 1000 | 1275 |
| 2028-29 | 215 | 335 | 335 | 685 | 685 | 1050 | 1345 |
| 2029-30 | 225 | 355 | 355 | 725 | 725 | 1105 | 1415 |
| 2030-31 | 240 | 370 | 370 | 760 | 760 | 1160 | 1485 |
| 2031-32 | 250 | 390 | 390 | 800 | 800 | 1220 | 1565 |
| 2032-33 | 265 | 410 | 410 | 840 | 840 | 1285 | 1645 |
| 2033-34 | 280 | 435 | 435 | 885 | 885 | 1355 | 1730 |
| 2034-35 | 295 | 455 | 455 | 935 | 935 | 1425 | 1825 |
| 2035-36 | 310 | 480 | 480 | 980 | 980 | 1500 | 1920 |
| 2036-37 | 325 | 505 | 505 | 1035 | 1035 | 1580 | 2020 |
| 2037-38 | 345 | 530 | 530 | 1090 | 1090 | 1665 | 2130 |

Table 5-8 : Toll Rates for Local Monthly Ticket @ Km 88.500

| Year | CAR |
|---------|-----|
| 2023-24 | 330 |
| 2024-25 | 345 |
| 2025-26 | 365 |
| 2026-27 | 385 |
| 2027-28 | 405 |
| 2028-29 | 425 |
| 2029-30 | 445 |
| 2030-31 | 470 |
| 2031-32 | 495 |
| 2032-33 | 520 |
| 2033-34 | 545 |
| 2034-35 | 575 |
| 2035-36 | 605 |
| 2036-37 | 635 |
| 2037-38 | 670 |

Table 5-9 : Toll Rates for Monthly Pass Local (50 Trips) @ Km 88.50

| Year | Car/Jeep/Van | LCV | Truck | Bus | 3 - Axle | Multi Axle |
|---------|--------------|-------|-------|-------|----------|------------|
| 2023-24 | 3745 | 5815 | 11905 | 11905 | 18190 | 23270 |
| 2024-25 | 3930 | 6110 | 12510 | 12510 | 19115 | 24450 |
| 2025-26 | 4130 | 6425 | 13145 | 13145 | 20085 | 25690 |
| 2026-27 | 4345 | 6750 | 13815 | 13815 | 21110 | 27005 |
| 2027-28 | 4565 | 7095 | 14525 | 14525 | 22195 | 28390 |
| 2028-29 | 4800 | 7460 | 15275 | 15275 | 23335 | 29850 |
| 2029-30 | 5050 | 7850 | 16060 | 16060 | 24545 | 31390 |
| 2030-31 | 5310 | 8255 | 16895 | 16895 | 25815 | 33020 |
| 2031-32 | 5590 | 8685 | 17775 | 17775 | 27160 | 34740 |
| 2032-33 | 5880 | 9140 | 18705 | 18705 | 28585 | 36560 |
| 2033-34 | 6190 | 9620 | 19690 | 19690 | 30085 | 38480 |
| 2034-35 | 6515 | 10130 | 20730 | 20730 | 31675 | 40510 |
| 2035-36 | 6860 | 10665 | 21825 | 21825 | 33350 | 42660 |
| 2036-37 | 7225 | 11230 | 22990 | 22990 | 35125 | 44930 |
| 2037-38 | 7615 | 11830 | 24215 | 24215 | 37005 | 47330 |

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section. Toll operation was suspended at both toll plazas from October 2020 to December, 2021 due to ongoing Farmer's agitation in the state. Current report is updated with traffic data made available by Concessionaire from April 2022 to March 2023.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2037-38 starting from the year 2023-24 are shown in tables below.

Table 5-10 : Toll Revenue Pessimistic Scenario (Crores)

| Year | Toll at Plaza 16.00 | Toll at Plaza 88.50 | Total |
|----------------|--------------------------------|--------------------------------|---------------|
| 2023-24 | 93.51 | 73.38 | 166.90 |
| 2024-25 | 103.27 | 81.81 | 185.08 |
| 2025-26 | 114.98 | 90.85 | 205.84 |
| 2026-27 | 127.41 | 100.63 | 228.04 |
| 2027-28 | 140.96 | 110.76 | 251.71 |
| 2028-29 | 154.73 | 122.18 | 276.91 |
| 2029-30 | 169.69 | 133.95 | 303.65 |
| 2030-31 | 187.25 | 148.50 | 335.76 |
| 2031-32 | 206.40 | 164.11 | 370.52 |
| 2032-33 | 225.14 | 177.85 | 402.99 |
| 2033-34 | 245.25 | 195.16 | 440.41 |
| 2034-35 | 267.24 | 213.08 | 480.32 |
| 2035-36 | 293.78 | 233.33 | 527.11 |
| 2036-37 | 319.47 | 254.09 | 573.56 |
| 2037-38 | 347.86 | 278.14 | 626.00 |

Table 5-11 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | Toll at Plaza 16.00 | Toll at Plaza 88.50 | Total |
|----------------|--------------------------------|--------------------------------|---------------|
| 2023-24 | 94.80 | 74.40 | 169.20 |
| 2024-25 | 106.16 | 84.15 | 190.31 |
| 2025-26 | 119.89 | 94.81 | 214.70 |
| 2026-27 | 134.78 | 106.55 | 241.33 |
| 2027-28 | 151.27 | 119.00 | 270.27 |
| 2028-29 | 168.43 | 133.13 | 301.56 |
| 2029-30 | 187.38 | 148.08 | 335.45 |
| 2030-31 | 209.73 | 166.50 | 376.23 |
| 2031-32 | 234.54 | 186.66 | 421.20 |
| 2032-33 | 259.62 | 205.27 | 464.89 |
| 2033-34 | 286.96 | 228.39 | 515.35 |
| 2034-35 | 317.31 | 252.98 | 570.29 |
| 2035-36 | 353.83 | 281.03 | 634.86 |
| 2036-37 | 390.34 | 310.48 | 700.82 |
| 2037-38 | 431.04 | 344.94 | 775.99 |

Table 5-12 : Toll Revenue Most Likely Scenario
(Rs. Crores)

| Year | Toll at Plaza 16.00 | Toll at Plaza 88.50 | Total |
|----------------|--------------------------------|--------------------------------|---------------|
| 2023-24 | 94.39 | 74.08 | 168.47 |
| 2024-25 | 105.25 | 83.36 | 188.61 |
| 2025-26 | 118.33 | 93.50 | 211.83 |
| 2026-27 | 132.37 | 104.59 | 236.95 |
| 2027-28 | 147.90 | 116.23 | 264.13 |
| 2028-29 | 163.93 | 129.43 | 293.35 |
| 2029-30 | 181.53 | 143.24 | 324.77 |
| 2030-31 | 202.23 | 160.32 | 362.54 |
| 2031-32 | 225.04 | 178.91 | 403.96 |
| 2032-33 | 247.88 | 195.83 | 443.72 |
| 2033-34 | 272.69 | 216.92 | 489.61 |
| 2034-35 | 300.04 | 239.13 | 539.18 |
| 2035-36 | 333.11 | 264.39 | 597.50 |
| 2036-37 | 365.75 | 290.73 | 656.48 |
| 2037-38 | 402.03 | 321.42 | 723.45 |

CHAPTER 6

OPERATION & MAINTENANCE COST

6.1 General

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on guess basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Pathankot to Amritsar on NH-15 in state of Punjab.

- i) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- j) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost is spread over more than one years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2023-24 is given in table below.

Table 6-1 : Year wise Details of Operation & Maintenance Cost

| Year | Annual maintenance (Rs. Cr) | Thermoplastic painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr.) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | Total Expenditure (Rs. Crores) | Remarks |
|---------|-----------------------------|---------------------------------|--------------------------------|----------------------------|--------------------------------|-----------------|--------------------------------|-----------------|
| | | | | | | Annual | | |
| 2023-24 | 19.12 | | | | 0.06 | 0.94 | 25.68 | Regular O & M |
| 2024-25 | 19.12 | 1.18 | 16.64 | 7.21 | 0.06 | 0.94 | 60.50 | Periodic Repair |
| 2025-26 | 19.12 | 1.18 | 16.64 | 5.04 | 0.06 | 0.94 | 60.48 | Periodic Repair |
| 2026-27 | 19.12 | | | 5.76 | 0.06 | 0.94 | 38.24 | Periodic Repair |
| 2027-28 | 19.12 | | | | 0.06 | 0.94 | 31.21 | Regular O & M |
| 2028-29 | 19.12 | | | 10.09 | 0.06 | 0.94 | 49.20 | Periodic Repair |
| 2029-30 | 19.12 | 2.03 | 28.52 | | 0.06 | 0.94 | 86.65 | Periodic Repair |
| 2030-31 | 16.25 | | | | 0.06 | 0.94 | 30.39 | Regular O & M |
| 2031-32 | 16.25 | | | | 0.06 | 0.94 | 31.30 | Regular O & M |
| 2032-33 | 16.25 | | | | 0.06 | 0.94 | 32.24 | Regular O & M |
| 2033-34 | 16.25 | | | | 0.06 | 0.94 | 33.21 | Regular O & M |
| 2034-35 | 16.25 | | | | 0.06 | 0.94 | 34.20 | Regular O & M |

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Pathankot to Amritsar section of NH-15 in state of Punjab from km 6.082 to km 108.502 is currently a four-lane road. The road is in sound condition and serves to reasonably good levels of traffic volume. The project corridor falls in the influence zone of fast upcoming metro city Amritsar. There are many upcoming projects in the area which have the potential to boost economic growth of area and add value to development of region. All these developments have potential to give positive impact to traffic flow on project. As estimated in this study report project traffic is expected to grow at rate of 6-8% per annum in post COVID-19 scenario.

Following can be considered as major outcome of study

- a) There is good amount of toll able traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall growth of the economy once tolling is resumed on project stretch.
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality
- d) Project infrastructure is in good condition and its maintenance cost is also reasonable

Based on above it can be considered a stable healthy project from traffic and revenue point of view.

CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs



Figure 8-1 : General Condition



Figure 8-2 : General Condition



Figure 8-3 : General Condition



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TALEGAON TO AMRAVATI SECTION OF NH-6 (KM 100.000 To KM 166.725) IN THE STATE OF MAHARASHTRA



TOLL REVENUE AND O&M COST PROJECTION REPORT (FINAL)



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APRIL 2023



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(KM 100.000 TO KM 166.725)
IN THE STATE OF MAHARASHTRA**

**TOLL REVENUE AND O&M COST
PROJECTION REPORT
(FINAL)**

APRIL 2023



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highways Authority of India |
| BOT | - Build Operate Transfer | NHDP | - National Highways Development Project |
| CAGR | - Compound Annual Growth Rate | NSDP | - Net State Domestic Product |
| CTV | - Classified traffic volume | O&M | - Operation & Maintenance |
| DBFOT | - Design, Build, Finance, Operate & Transfer | PCDP | - Per Capita Domestic Product |
| EME | - Earth Moving Equipment | PCI | - Per Capita Income |
| GDP | - Gross Domestic Product | PCU | - Passenger Car Unit |
| GSDP | - Gross State Domestic Product | PSC | - Pre-stressed Concrete |
| HCM | - Heavy Construction Machinery | RCC | - Reinforced cement concrete |
| HCV | - Heavy Commercial Vehicle | RHS | - Right Hand Side |
| HTMS | - Highway Traffic Management System | SH | - State Highway |
| IRC | - Indian Road Congress | TP | - Toll Plaza |
| IRR | - Internal Rate of Return | WPI | - Wholesale Price Index |
| LCV | - Light Commercial Vehicle | SIR | - Special Investment Region |
| LHS | - Left Hand Side | c. | - Circa |
| LGV | - Light Goods Vehicle | ROB | - Railway Over Bridge |
| MAV | - Multi Axle Vehicle | MDR | - Major District Road |
| MORTH | - Ministry of Road Transport and Highways | ODR | - Other District Road |
| NH | - National Highway | CA | - Concession Agreement |
| PCC | - Plain Cement Concrete | RMT | - Running Meter |
| CR | - Coarse Rubble | | |

CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Talegaon - Amravati section of NH-6 from Km 100.000 to km 166.725 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IRB Talegaon - Amravati Tollway Ltd.* (Concessionaire) has been awarded the Project for concession period of 22 years starting from 3rd September 2010 to 2nd September 2032. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as “*Toll Revenue and O&M Cost Projection Report*” mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgment on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Report was further updated with yearly traffic data of 2019-20 in May 2020. With traffic data from April 2020 to March 2021 report was updated report was further updated with yearly traffic data from April 2021 to March 2022 and now concessionaire has provided traffic data from April 2022 to March 2023 this report is updated taking this latest traffic data into consideration.

CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work, we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at toll plaza locations on Amravati - Talegaon section of NH-6 for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and traffic data from April 2022 to March 2023.
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

Table 2-1 below lists provides details of locations from where traffic details have been collected.

Table 2-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Return Journey Traffic | Monthly Pass Traffic | Local Traffic |
|---------------|-----------------------|-------------------------|-------------------------------|-------------------------------|-----------------------------|----------------------|
| 1 | Km 142.800 Toll Plaza | AADT for Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 |
| | | AADT for year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for Year 2018-2019 | For Year 2018-2019 | For Year 2018-2019 | For Year 2018-19 | For Year 2018-19 |
| | | AADT for Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 | For Year 2019-2020 |
| | | AADT for year 2020-2021 | For Year 2020-2021 | For Year 2020-2021 | For Year 2020-2021 | For Year 2020-2021 |
| | | AADT for year 2021-2022 | For year 2021-2022 | For year 2021-2022 | For year 2021-2022 | For year 2021-2022 |
| | | AADT for year 2022-2023 | For year 2022-2023 | For year 2022-2023 | For year 2022-2023 | For year 2022-2023 |

The locations of each of the traffic survey are illustrated in following Figure.

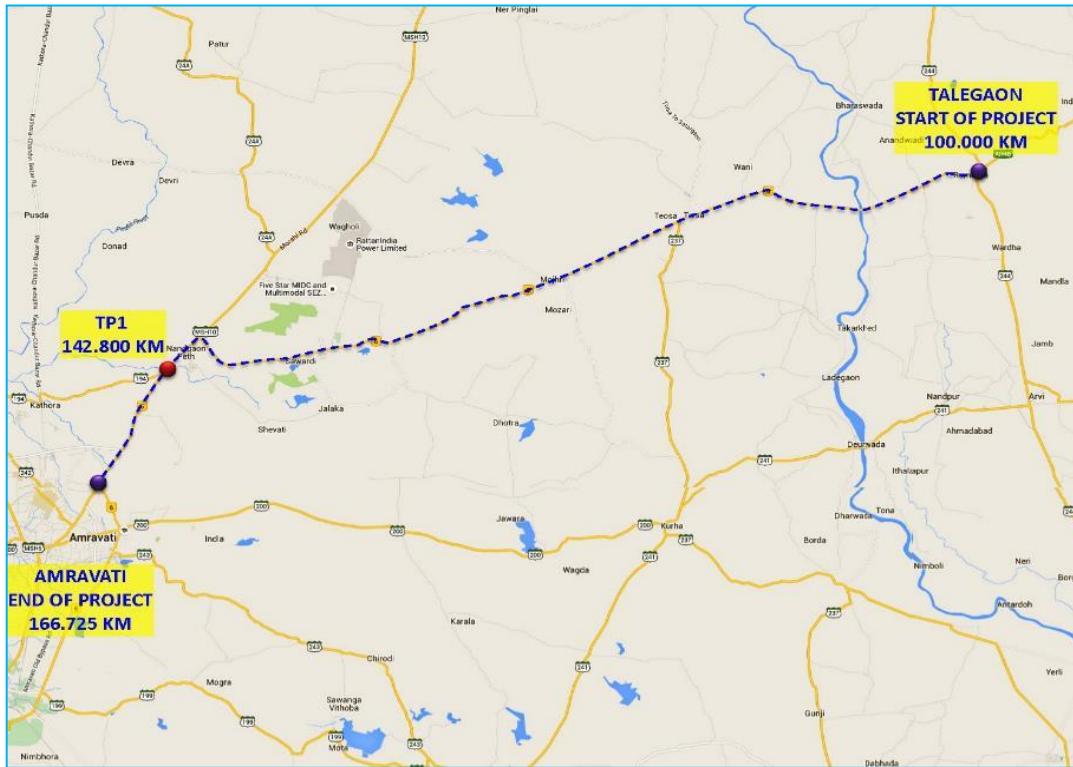


Figure 2-1: Toll Plaza Location

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHA. These locations are indicated in **Figure 2-1** and listed in **Table 2-1**.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in **Table 2-2**.

Table 2-2 : Vehicle Classification System

| Vehicle Type | |
|---------------|--|
| | Auto Rickshaw |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |
| Bus | Minibus |

| Vehicle Type | |
|----------------|--|
| | Standard Bus |
| Truck | Light Goods Vehicle (LCV) |
| | 2 – Axle Truck |
| | 3 Axle Truck (HCV) |
| | Multi Axle Truck (4-6 Axle) |
| | Oversized Vehicles (7 or more axles) |
| Other Vehicles | Agriculture Tractor, Tractor & Trailer |

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Truck / Bus
- Multi Axle
- Oversize Vehicle

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on total traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report.

2.3.1 Traffic Data

The Concessionaire has provided Traffic data for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21,2021-22 and from April 2022 to March 2023 as under for toll plaza –

Table 2-3 : Traffic Data at Toll Plaza at Km 142.800

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) – FY 2015-16 | Annual Average Daily Traffic (Nos.) – FY 2016-17 | Annual Average Daily Traffic (Nos.) – FY 2017-18 | Annual Average Daily Traffic (Nos.) - FY 2018-19 | Annual Average Daily Traffic (Nos.) – FY 2019-20 | Annual Average Daily Traffic (Nos.) – FY 2020-21 | Annual Average Daily Traffic (Nos.) – FY 2021-22 | Annual Average Daily Traffic (Nos.) – FY 2022-23 |
|--------|--------------------|--|--|--|--|--|--|--|--|
| 1 | Car | 5105 | 5825 | 6275 | 6738 | 7407 | 7090 | 5937 | 6173 |
| 2 | Minibus/ LCV | 1253 | 1374 | 1439 | 1511 | 1408 | 1217 | 620 | 547 |
| 3 | Truck/Bus | 1238 | 1290 | 1362 | 1421 | 1623 | 1374 | 1340 | 1661 |
| 4 | Multi Axle | 1742 | 1962 | 2233 | 2285 | 2173 | 2297 | 2327 | 2239 |
| 5 | Oversized Vehicles | 2 | 1 | 4 | 2 | 4 | 4 | 7 | 9 |
| | Total | 9340 | 10452 | 11313 | 11957 | 12616 | 11981 | 10231 | 10629 |

Pandemic of COVID-19 (Corona Virus) has impacted entire world. Taking precaution, Government of India announced a complete lockdown in last week of March 2020 and traffic on highways was stopped which was eased out progressively later. There after India was hit by Covid-19 second and third wave in April 21 to July 21 and December 21 to March 22. Recovering traffic pattern was somewhat again disturbed due to second and third wave of Covid-19. Traffic numbers for the period from April 2020 to March 2021 are not representative of traffic pattern at project corridor due to pandemic lockdown impact. However, for integrity of data same has been shown above. NHAI also has, in principle, approved providing extension of concession period to make up for the loss of revenue due to lockdown. Traffic has been affected due to second wave of COVID-19 in period from April 21 to July 2021 and from December 21 to March 22 due to third wave of Covid-19. Hence traffic from April 2021 to March 2022 is also affected by Covid impact. Report is updated with traffic data made available by Concessionaire from April 2022 to March 2023.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in **Table 2-4**.

Table 2-4 : PCU Factors Adopted for Study

| Vehicle Type | PCUs |
|-------------------------------------|------|
| Car | 1.0 |
| Minibus | 1.5 |
| Standard Bus | 3.0 |
| LCV/LGV | 1.5 |
| 2 Axle Truck | 3.0 |
| 3 – 6 Axle Truck | 4.5 |
| MAV | 4.5 |
| Auto Rickshaw | 1.0 |
| Van/Tempo | 1.0 |
| Agriculture Tractor with Trailer | 4.5 |
| Agriculture Tractor without Trailer | 1.5 |

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under

Table 2-5 : Traffic in PCU at Project Stretch

| Period | Toll Plaza Location | Traffic No | PCU | PCU Index |
|------------|----------------------------|------------|-------|-----------|
| FY 2015-16 | 142.800 (Nandgaon Peth) | 9340 | 18547 | 1.99 |
| FY 2016-17 | 142.800 (Nandgaon Peth) | 10452 | 20590 | 1.97 |

| Period | Toll Plaza Location | Traffic No | PCU | PCU Index |
|------------|----------------------------|------------|-------|-----------|
| FY 2017-18 | 142.800 (Nandgaon Peth) | 11312 | 22582 | 2.00 |
| FY 2018-19 | 142.800 (Nandgaon Peth) | 11957 | 23558 | 1.97 |
| FY 2019-20 | 142.800 (Nandgaon Peth) | 12616 | 24187 | 1.92 |
| FY 2020-21 | 142.800 (Nandgaon Peth) | 11981 | 23389 | 1.95 |
| FY 2021-22 | 142.800 (Nandgaon Peth) | 10231 | 21390 | 2.09 |
| FY 2022-23 | 142.800 (Nandgaon Peth) | 10629 | 22092 | 2.08 |

It can be observed from above that project traffic has PCU index close to 2.0 which indicates balance mix of commercial, goods traffic and passenger traffic. It can be appreciated that character of traffic is consistent on stretch.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A Larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers for the period April 2022 to March 2023 have been considered as the base numbers.

It is observed that car traffic forms 58% of total traffic at toll plaza location 142.800 where multi axle commercial vehicles comprise 21% of total traffic. Overall, about 42% of traffic is commercial in nature.

Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing like

1. Single Journey
2. Return Journey
3. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category. on base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and from April 2022 to March 2023 as under for toll plaza –

Table 2-6 : Journey Type Bifurcation of Traffic at KM 142.800

| Sr. No | Type | Traffic Volume (Nos.) for FY 2015-16 | Traffic Volume (Nos.) for FY 2016-17 | Traffic Volume (Nos.) for FY 2017-18 | Traffic Volume (Nos.) FY 2018-19 | Traffic Volume (Nos.) FY 2019-20 | Traffic Volume (Nos.) FY 2020-21 | Traffic Volume (Nos.) for FY 2021-22 | Traffic Volume (Nos.) for FY 2022-23 |
|--------|----------------|--------------------------------------|--------------------------------------|--------------------------------------|----------------------------------|----------------------------------|----------------------------------|--------------------------------------|--------------------------------------|
| 1 | Single Journey | 4160 | 4637 | 5160 | 5285 | 5513 | 6647 | 5828 | 5594 |
| 2 | Return Journey | 2860 | 2988 | 3294 | 3514 | 3341 | 1906 | 4274 | 4906 |
| 3 | Monthly Pass | 2320 | 2416 | 2859 | 3158 | 3761 | 3428 | 129 | 129 |

A significant part of the traffic at KM 142.800 is single journey 53% followed by return journey 46% and monthly passes which share 1% of the total traffic volume.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. The following are some of such important factors.

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth

- d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor. The same was presented in previous report and there is no significant update on this

CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the projections of other factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Bharuch - Surat section of NH-8 has been done taking above factors into consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income

- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Maharashtra is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given categories of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log}(P) = k \times \text{Log}(EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

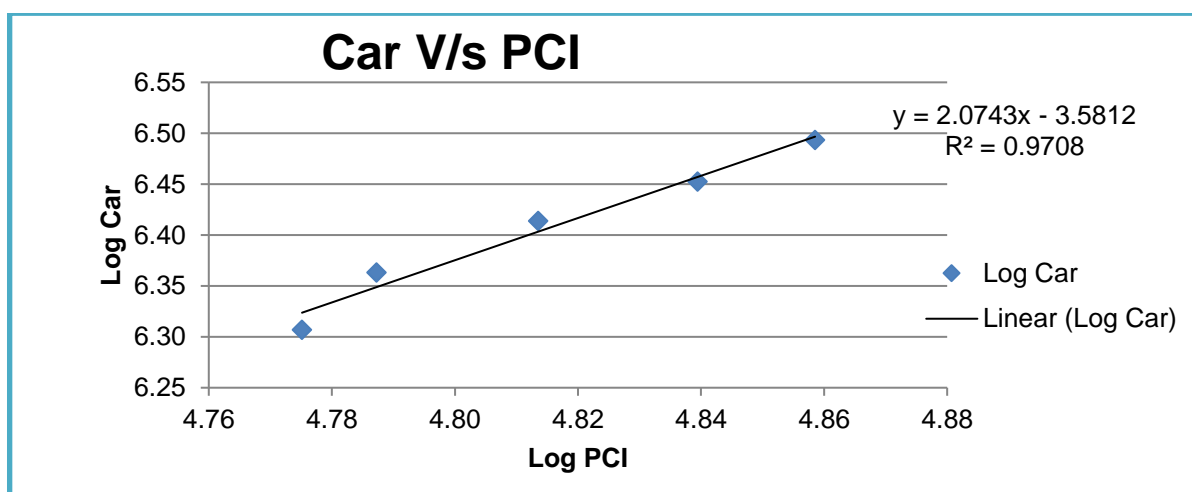
The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2011 | 59587 | 2027080 | 4.78 | 6.31 | | |
| 2012 | 61276 | 2307841 | 4.79 | 6.36 | 3% | |
| 2013 | 65095 | 2592565 | 4.81 | 6.41 | 6% | |
| 2014 | 69097 | 2834847 | 4.84 | 6.45 | 6% | |
| 2015 | 72200 | 3113773 | 4.86 | 6.49 | 4% | 4.9% |

Regression analysis of same is given in figure below.

**Figure 3-1: Regression and Elasticity PCI vs. Car–Extrapolation****Table 3-2 : Population Vs Bus**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2011 | 112374333 | 89861 | 8.05 | 4.95 | | |
| 2012 | 113807248 | 100097 | 8.06 | 5.00 | 1% | |
| 2013 | 115229410 | 110121 | 8.06 | 5.04 | 1% | |
| 2014 | 116640546 | 120886 | 8.07 | 5.08 | 1% | |
| 2015 | 118040394 | 120750 | 8.07 | 5.08 | 1% | 1.24% |

Regression analysis of same is given in figure below.

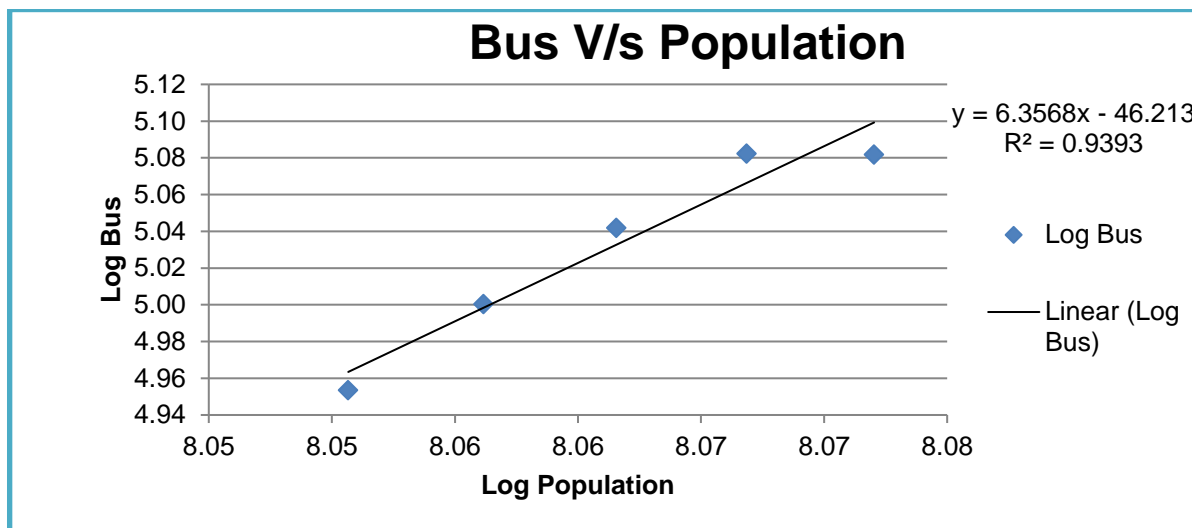


Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|----------|---------|----------|-----------|-------------|----------------|
| 2011 | 66762536 | 973788 | 7.82 | 5.99 | | |
| 2012 | 69590440 | 1067825 | 7.84 | 6.03 | 4% | |
| 2013 | 74913695 | 1142091 | 7.87 | 6.06 | 8% | |
| 2014 | 80559286 | 1273256 | 7.91 | 6.10 | 8% | |
| 2015 | 85245134 | 1360214 | 7.93 | 6.13 | 6% | 6.31% |

Following figure depict regression analysis and extrapolation.

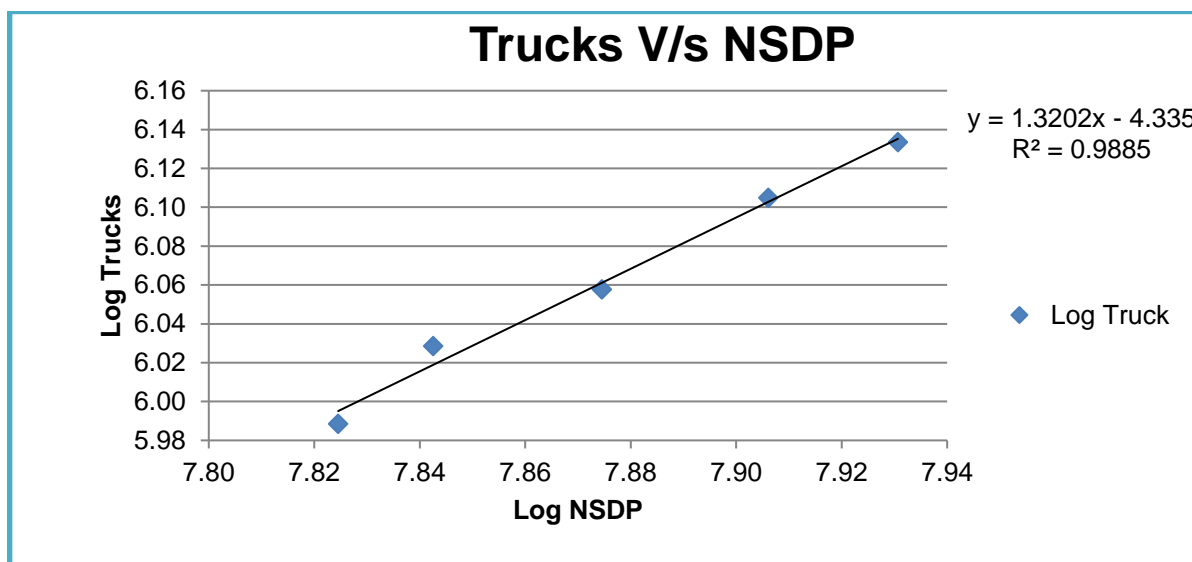


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below.

Table 3-4 : Summary Regression Analysis

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-------------|------------------|----------------------|-------------------------|----------------|----------------------------|----------------|----------------------|
| Maharashtra | Car/Jeep | PCI | $y = 2.0743x - 3.5812$ | $R^2 = 0.9708$ | 2.0743 | 4.93% | 11.08% |
| | Bus | Population | $y = 6.3568x - 46.2131$ | $R^2 = 0.9393$ | 6.3568 | 1.24% | 6.82% |
| | Truck | NSDP | $y = 1.3202x - 4.335$ | $R^2 = 0.9885$ | 1.3202 | 6.31% | 7.57% |

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Talegaon to Amravati has recently been commissioned and tolling commenced in 2013. Stable traffic data from year 2015-16 is only available for stretch which is not enough to establish any growth pattern for future. Following table present details of historic traffic on project road.

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) FY 2015-16 | Annual Average Daily Traffic (Nos.) FY 2016-17 | Annual Average Daily Traffic (Nos.) FY 2017-18 | Annual Average Daily Traffic (Nos.) FY 2018-19 | Annual Average Daily Traffic (Nos.) FY 2019-20 | Annual Average Daily Traffic (Nos.) FY 2020-21 | Annual Average Daily Traffic (Nos.) FY 2021-22 | Annual Average Daily Traffic (Nos.) FY 2022-23 |
|--------|-----------------|--|--|--|--|--|--|--|--|
| 1 | Car | 5105 | 5825 | 6275 | 6738 | 7407 | 7090 | 5937 | 6173 |
| 2 | LCV/Minibus | 1253 | 1374 | 1439 | 1511 | 1408 | 1217 | 620 | 547 |
| 3 | Bus/Truck | 1238 | 1290 | 1362 | 1421 | 1623 | 1374 | 1340 | 1661 |
| 4 | Mav | 1742 | 1962 | 2233 | 2285 | 2173 | 2297 | 2327 | 2239 |
| 5 | OSV | 2 | 1 | 4 | 2 | 4 | 4 | 7 | 9 |
| | Total | 9340 | 10452 | 11313 | 11957 | 12616 | 11981 | 10231 | 10629 |

Traffic for period from April 2020 to March 2021 and also traffic in period from April 21 to March-22 is impacted due to COVID-19 lockdown and successive first, second and third waves. Though traffic on project corridor has shown impressive recovery growth in period from October 2020 to March 2021 and thereafter but these numbers are affected by COVID-19 pandemic and cannot be taken as normal stabilized traffic numbers. Hence same is not considered for historical growth.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2011-12, the economy recovered in 2013-14, and a high growth rate of GDP was recorded in up to 2018-19. Pandemic of COVID-19 impacted all economies of world including India. Following figure show trend of GDP growth in India.

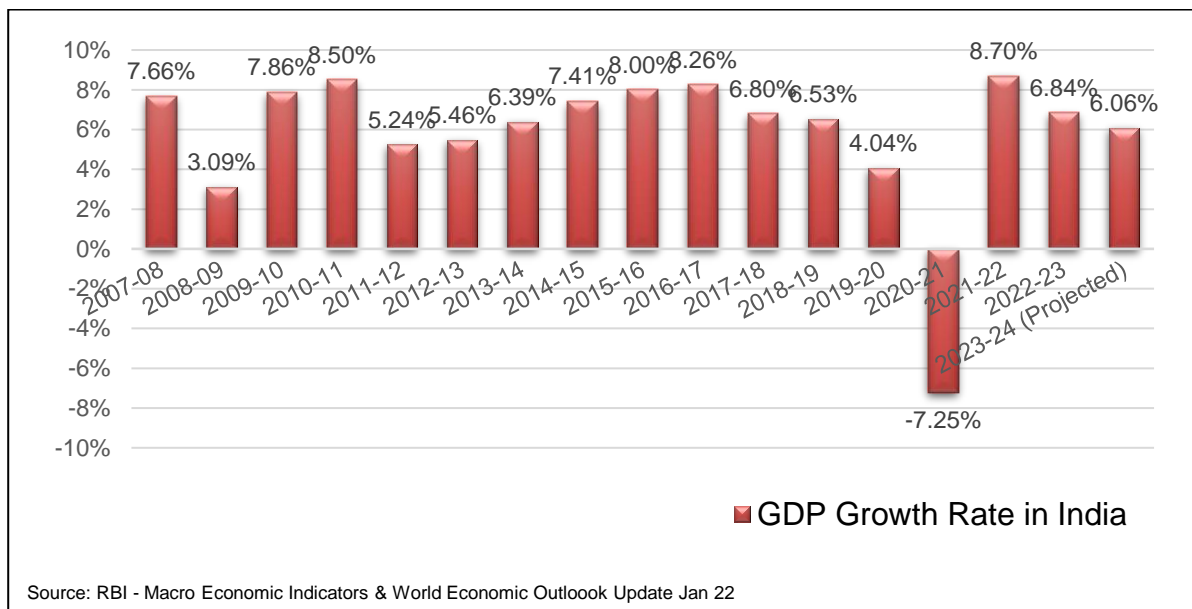


Figure 3-4 : Growth of GDP in India

FY 2017-18 recorded a growth of 6.7% which had a slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Government took major policy decision including tax infrastructure reforming, banking sector improvement and ease of doing business.

Major economies of world collapsed due to pandemic COVID-19 including India. Indian economy is also registered negative growth in financial year 2020-21. After that Indian economy recovered handsomely and registered a growth of about 9% in Year 2021-22. This was partly due to low base of year 2020-21 as well.

Honorable Prime Minister has announced a major relief package of Rs. 20 lakh crores which is about 10% of GDP. This is aimed at turning this major crisis of COVID-19 into opportunity by providing major impetus to industrial production to the limit of becoming a self-reliant economy. With major thrust of this package being on **Make - In- India** it is expected that industry in India would grow at rapid pace and recover handsomely in post COVID-19 scenario. World Economic Outlook update also has predicted a growth rate of about 7.5 % in next year 2022-23.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the

economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at suitable interval of years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence corridor can expect to have expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic, Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Table 3-5 : Recommended Growth Rates Optimistic

| Year/ Vehicle Type | 2021-2023 | 2023-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| CAR | 7.64% | 6.53% | 6.11% | 5.64% | 5.22% | 4.51% |
| Minibus /LCV | 6.00% | 5.43% | 5.06% | 4.75% | 4.46% | 4.22% |
| Truck / Bus | 6.42% | 6.42% | 5.84% | 5.53% | 4.96% | 4.40% |
| Multi Axle | 7.51% | 6.78% | 6.17% | 5.84% | 5.24% | 4.65% |
| Oversized Vehicles | 7.51% | 6.42% | 5.84% | 5.53% | 4.96% | 4.40% |

Table 3-6 : Recommended Growth Rates Pessimistic

| Year/ Vehicle Type | 2021-2023 | 2023-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| CAR | 7.14% | 6.03% | 5.61% | 5.14% | 4.72% | 4.01% |
| Minibus /LCV | 5.50% | 4.93% | 4.56% | 4.25% | 3.96% | 3.72% |
| Truck / Bus | 5.92% | 5.92% | 5.34% | 5.03% | 4.46% | 3.90% |
| Multi Axle | 7.01% | 6.28% | 5.67% | 5.34% | 4.74% | 4.15% |
| Oversized Vehicles | 7.01% | 5.92% | 5.34% | 5.03% | 4.46% | 3.90% |

Table 3-7 : Recommended Growth Rates Most Likely

| Year/ Vehicle Type | 2021-2023 | 2023-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| CAR | 7.39% | 6.28% | 5.86% | 5.39% | 4.97% | 4.26% |
| Minibus /LCV | 5.75% | 5.18% | 4.81% | 4.50% | 4.21% | 3.97% |
| Truck / Bus | 6.17% | 6.17% | 5.59% | 5.28% | 4.71% | 4.15% |
| Multi Axle | 7.26% | 6.53% | 5.92% | 5.59% | 4.99% | 4.40% |
| Oversized Vehicles | 7.26% | 6.17% | 5.59% | 5.28% | 4.71% | 4.15% |

3.7 COVID-19 Impact

Current Corona virus crisis affected the traffic since March 2020 onwards. Traffic in year 2020-21 was negatively affected by lockdown. Impact of Covid-19 is analyzed in next section of this chapter. All social and economic activities had been completely disrupted due worldwide pandemic of Corona Virus. This had affected traffic on project stretch as well. Traffic was severely affected from March 2020 due to lockdown. The government considered partial lifting of lockdown and allowing selective economic activities on zone to zone basis in May 2020. Government has decided to open economic activities in phases and by now almost all the activities are open with some restrictions.

Concessionaire shared traffic data for year 2020-21 and 2021-22. At all toll plaza commercial traffic has almost reached back to previous level. Passenger traffic, which picked up quite late, has also recovered handsomely in later months and has reached back to original level. But traffic was further affected due to second wave of COVID-19 in April 21 to July 21 and third wave in December 2021 to March 2022.

Government has announced a mega economic stimulate and package of Rs. 20 Lakh Crore to bring the economy back on track and recover the losses. It is observed that traffic has almost normalized on project stretch has additional recovery growth has not been considered in projections.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for the following three cases of growth.

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM
(Optimistic Growth Scenario)

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU (Including Non-Paid Traffic) |
|---------|-------|--------------|------------|------------|--------------------|-----------|--|
| 2023-24 | 6576 | 578 | 1768 | 2383 | 9 | 11314 | 23511 |
| 2024-25 | 7006 | 610 | 1882 | 2536 | 9 | 12043 | 25020 |
| 2025-26 | 7433 | 640 | 1992 | 2684 | 9 | 12758 | 26488 |
| 2026-27 | 7887 | 672 | 2108 | 2840 | 9 | 13516 | 28040 |
| 2027-28 | 8368 | 706 | 2230 | 3006 | 9 | 14319 | 29685 |
| 2028-29 | 8879 | 741 | 2360 | 3181 | 9 | 15170 | 31426 |
| 2029-30 | 9421 | 778 | 2498 | 3366 | 9 | 16072 | 33270 |
| 2030-31 | 9952 | 815 | 2636 | 3552 | 9 | 16964 | 35107 |
| 2031-32 | 10513 | 854 | 2781 | 3748 | 9 | 17905 | 37044 |
| 2032-33 | 11105 | 895 | 2934 | 3955 | 9 | 18898 | 39088 |
| 2033-34 | 11731 | 937 | 3096 | 4174 | 9 | 19947 | 41248 |
| 2034-35 | 12392 | 981 | 3267 | 4404 | 9 | 21053 | 43523 |

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU (Including Non-Paid Traffic) |
|---------|-------|--------------|------------|------------|--------------------|-----------|--|
| 2035-36 | 13038 | 1025 | 3429 | 4623 | 9 | 22124 | 45707 |
| 2036-37 | 13718 | 1071 | 3599 | 4852 | 9 | 23249 | 47996 |
| 2037-38 | 14434 | 1119 | 3778 | 5093 | 9 | 24433 | 50406 |

**Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM
(Pessimistic Growth Scenario)**

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU (Including Non-Paid Traffic) |
|---------|-------|--------------|------------|------------|--------------------|-----------|--|
| 2023-24 | 6545 | 575 | 1760 | 2371 | 9 | 11260 | 23398 |
| 2024-25 | 6939 | 603 | 1864 | 2511 | 9 | 11926 | 24776 |
| 2025-26 | 7328 | 630 | 1963 | 2645 | 9 | 12575 | 26105 |
| 2026-27 | 7739 | 658 | 2067 | 2786 | 9 | 13259 | 27505 |
| 2027-28 | 8173 | 688 | 2177 | 2934 | 9 | 13981 | 28980 |
| 2028-29 | 8631 | 720 | 2293 | 3090 | 9 | 14743 | 30536 |
| 2029-30 | 9115 | 752 | 2415 | 3254 | 9 | 15545 | 32172 |
| 2030-31 | 9583 | 784 | 2537 | 3417 | 9 | 16330 | 33787 |
| 2031-32 | 10074 | 817 | 2665 | 3588 | 9 | 17153 | 35481 |
| 2032-33 | 10591 | 851 | 2799 | 3768 | 9 | 18018 | 37261 |
| 2033-34 | 11134 | 887 | 2939 | 3958 | 9 | 18927 | 39133 |
| 2034-35 | 11706 | 924 | 3087 | 4157 | 9 | 19883 | 41100 |
| 2035-36 | 12258 | 961 | 3225 | 4342 | 9 | 20795 | 42954 |
| 2036-37 | 12836 | 998 | 3369 | 4535 | 9 | 21747 | 44888 |
| 2037-38 | 13442 | 1037 | 3519 | 4737 | 9 | 22744 | 46912 |

**Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM
(Most Likely Growth Scenario)**

| Year | CAR | Minibus /LCV | Truck/ Bus | Multi axle | Oversized Vehicles | Total No. | Total PCU (Including Non-Paid Traffic) |
|---------|-------|--------------|------------|------------|--------------------|-----------|--|
| 2023-24 | 6561 | 576 | 1764 | 2377 | 9 | 11287 | 23454 |
| 2024-25 | 6973 | 606 | 1872 | 2523 | 9 | 11983 | 24892 |
| 2025-26 | 7381 | 635 | 1976 | 2664 | 9 | 12665 | 26290 |
| 2026-27 | 7813 | 665 | 2086 | 2812 | 9 | 13385 | 27763 |
| 2027-28 | 8270 | 697 | 2202 | 2969 | 9 | 14147 | 29323 |
| 2028-29 | 8754 | 730 | 2324 | 3135 | 9 | 14952 | 30969 |
| 2029-30 | 9267 | 765 | 2454 | 3310 | 9 | 15805 | 32712 |
| 2030-31 | 9766 | 799 | 2583 | 3485 | 9 | 16642 | 34437 |
| 2031-32 | 10292 | 835 | 2719 | 3669 | 9 | 17524 | 36253 |
| 2032-33 | 10847 | 872 | 2862 | 3862 | 9 | 18452 | 38161 |
| 2033-34 | 11431 | 911 | 3013 | 4066 | 9 | 19430 | 40174 |
| 2034-35 | 12047 | 952 | 3172 | 4280 | 9 | 20460 | 42292 |
| 2035-36 | 12646 | 991 | 3321 | 4481 | 9 | 21448 | 44301 |
| 2036-37 | 13274 | 1032 | 3477 | 4692 | 9 | 22484 | 46408 |
| 2037-38 | 13934 | 1075 | 3640 | 4913 | 9 | 23571 | 48616 |

4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Talegaon - Amravati project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2020

Target Traffic - 41052 in PCU

It was observed that as per traffic projections, traffic volume falls short of target traffic in all scenarios. This warrants for an extension of the envisaged concession period. Based on the above traffic estimate probable extension of concession period is worked out as per article 29 of concession agreement which is summarized as under –

| Scenario | Projected Traffic in PCUs (average of traffic on target date, one year before target date and one year after target date) | Expected extension in Concession Period |
|-----------------|--|--|
| All | 24187 | 4.4 years |

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days. Traffic was severely impacted on project highway during initial lockdown period. NHAI has declared a policy of providing extension of concession to make up for revenue loss during lockdown. It is expected that an extension would be provided to project concession period on this account also.

Hence, traffic and toll revenue projections have been worked out for additional 5 years beyond original concession period.

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. Monthly Pass: For frequent users, monthly pass is issued for 50 trips per month. The discount factor works out to 33.33% for 50 journeys.
2. Daily Pass (for Return Trip): A 75% discount will be offered on the return trip.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)
5. Additionally, Concessionaire has introduced monthly rates for local commercial vehicles also.

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2021-22. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor

for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

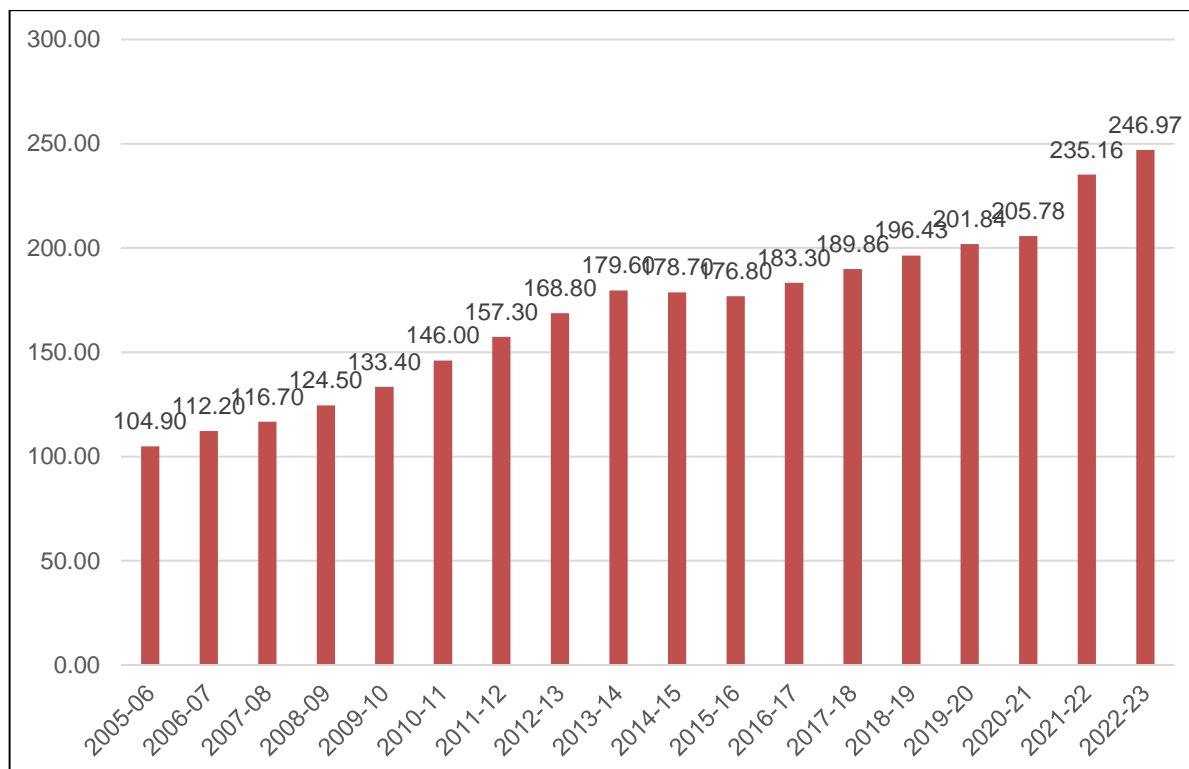


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2023 is 5.23%. For future years initially it is considered @ 5% and suitably stepped down for future years.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-1 : Base Toll Rates 2007 - 08

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|--------------------------------|
| Car, Jeep, Van or Light Motor Vehicle | 0.65 |
| Light Commercial Vehicle, Light Goods Vehicle or Minibus | 1.05 |
| Bus or Truck (2 Axle) | 2.2 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|--------------------------------|
| Three Axle commercial vehicles | 2.4 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles) | 3.45 |
| Oversized Vehicle (seven or more axles) | 4.2 |

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19.

Amravati bypass qualifies for adding to toll rate since its cost is more than 10 Cr. There is not structure in project which qualifies for addition in toll rates.

Table 5-2 : Additional Rate for Amravati Bypass

| Total Cost of Bypass | 95.09 Cr | Length | 17.43 km |
|----------------------|---------------------|------------------------------------|--------------|
| Type of Vehicle | Base Rate for 15 Cr | Addition for every 5 Cr over 15 Cr | Rate 2007-08 |
| Car/Jeep/Van | 5.00 | 1.00 | 22 |
| LCV | 7.50 | 1.50 | 33 |
| Bus | 15.00 | 3.00 | 66 |
| 2-axle | 15.00 | 3.00 | 66 |
| 3 - Axle | 22.00 | 4.50 | 98.5 |
| Multi Axle | 30.00 | 6.00 | 132 |

Above table provides for rates applicable for accounting for bypass in toll rates. This has been incorporated in toll rates at Toll Plaza at Km 142.800 at Nandgaon Peth.

Other than this there is no structure or bypass which qualifies for additional toll rate at any toll plaza.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below.

Thus, worked out rates for various categories of vehicle and discounts are given as under.

Table 5-3 : Toll Rates for Single Journey @ KM 142.800

| Year | CAR | LCV | Truck / Bus | Multi Axle | Oversized Vehicles |
|----------------|------------|------------|--------------------|-------------------|---------------------------|
| 2023-24 | 120 | 185 | 385 | 590 | 745 |
| 2024-25 | 125 | 195 | 405 | 620 | 785 |
| 2025-26 | 130 | 205 | 425 | 650 | 825 |
| 2026-27 | 140 | 215 | 445 | 685 | 865 |
| 2027-28 | 145 | 230 | 470 | 720 | 910 |
| 2028-29 | 150 | 240 | 490 | 755 | 955 |
| 2029-30 | 160 | 250 | 515 | 790 | 1000 |
| 2030-31 | 165 | 260 | 540 | 830 | 1050 |
| 2031-32 | 175 | 275 | 565 | 870 | 1100 |
| 2032-33 | 185 | 290 | 595 | 915 | 1155 |
| 2033-34 | 195 | 300 | 620 | 960 | 1210 |
| 2034-35 | 200 | 315 | 655 | 1005 | 1270 |
| 2035-36 | 210 | 335 | 685 | 1055 | 1330 |
| 2036-37 | 220 | 350 | 720 | 1105 | 1395 |
| 2037-38 | 235 | 365 | 755 | 1160 | 1465 |

Table 5-4 : Toll Rates for Return Journey @ KM 142.800

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles |
|----------------|------------|------------|------------------------|------------------------------|-------------------------------|
| 2023-24 | 180 | 280 | 575 | 885 | 1120 |
| 2024-25 | 185 | 295 | 605 | 930 | 1175 |
| 2025-26 | 195 | 310 | 635 | 980 | 1235 |
| 2026-27 | 205 | 325 | 670 | 1030 | 1300 |
| 2027-28 | 220 | 340 | 700 | 1080 | 1365 |
| 2028-29 | 230 | 360 | 735 | 1135 | 1430 |
| 2029-30 | 240 | 375 | 770 | 1190 | 1500 |
| 2030-31 | 250 | 395 | 810 | 1245 | 1575 |
| 2031-32 | 265 | 410 | 850 | 1305 | 1650 |
| 2032-33 | 275 | 430 | 890 | 1370 | 1730 |
| 2033-34 | 290 | 455 | 935 | 1435 | 1815 |
| 2034-35 | 305 | 475 | 980 | 1505 | 1900 |
| 2035-36 | 320 | 500 | 1025 | 1580 | 1995 |
| 2036-37 | 335 | 525 | 1075 | 1660 | 2095 |
| 2037-38 | 350 | 550 | 1130 | 1740 | 2195 |

Table 5-5 : Toll Rates for Monthly Pass @ KM 142.800

| Year | Car - LP | LCV - LC | Truck/Bus - LC | Car | Minibus /LCV | Truck/Bus | Multi Axle | Oversized Vehicle |
|----------------|----------------|-------------|-------------------|------|-----------------|-----------|---------------|----------------------|
| 2023-24 | 330 | 2075 | 3895 | 3965 | 6215 | 12795 | 19700 | 24865 |
| 2024-25 | 345 | 2180 | 4090 | 4165 | 6530 | 13445 | 20695 | 26125 |
| 2025-26 | 365 | 2290 | 4295 | 4375 | 6865 | 14125 | 21750 | 27455 |
| 2026-27 | 385 | 2405 | 4510 | 4600 | 7215 | 14850 | 22860 | 28860 |
| 2027-28 | 405 | 2525 | 4735 | 4835 | 7585 | 15610 | 24030 | 30335 |
| 2028-29 | 420 | 2640 | 4950 | 5070 | 7950 | 16360 | 25190 | 31800 |
| 2029-30 | 440 | 2760 | 5175 | 5315 | 8335 | 17150 | 26405 | 33335 |
| 2030-31 | 465 | 2885 | 5410 | 5570 | 8735 | 17985 | 27685 | 34950 |
| 2031-32 | 485 | 3015 | 5655 | 5840 | 9160 | 18855 | 29030 | 36645 |
| 2032-33 | 510 | 3150 | 5910 | 6125 | 9605 | 19775 | 30440 | 38430 |
| 2033-34 | 535 | 3290 | 6175 | 6425 | 10075 | 20740 | 31925 | 40305 |
| 2034-35 | 560 | 3440 | 6455 | 6740 | 10570 | 21750 | 33485 | 42275 |
| 2035-36 | 590 | 3595 | 6745 | 7070 | 11085 | 22820 | 35130 | 44345 |
| 2036-37 | 620 | 3755 | 7050 | 7415 | 11630 | 23940 | 36855 | 46530 |
| 2037-38 | 650 | 3925 | 7365 | 7780 | 12205 | 25120 | 38675 | 48820 |

* LP- Local Passenger, LC – Local Commercial

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2036-37 (End of Concession Period+ 5 Years) starting from the year 2020-21 are shown in tables below.

Table 5-6 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | Toll at Plaza 142.800 | Total |
|----------------|----------------------------------|---------------|
| 2023-24 | 99.38 | 99.38 |
| 2024-25 | 110.43 | 110.43 |
| 2025-26 | 122.61 | 122.61 |
| 2026-27 | 136.96 | 136.96 |
| 2027-28 | 152.95 | 152.95 |
| 2028-29 | 168.91 | 168.91 |
| 2029-30 | 187.61 | 187.61 |
| 2030-31 | 207.22 | 207.22 |
| 2031-32 | 230.42 | 230.42 |
| 2032-33 | 254.68 | 254.68 |
| 2033-34 | 282.01 | 282.01 |
| 2034-35 | 311.40 | 311.40 |
| 2035-36 | 344.00 | 344.00 |
| 2036-37 | 377.58 | 377.58 |
| 2037-38 | 416.70 | 416.70 |

Table 5-7 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | Toll at Plaza 142.800 | Total |
|----------------|----------------------------------|---------------|
| 2023-24 | 98.90 | 98.90 |
| 2024-25 | 109.41 | 109.41 |
| 2025-26 | 120.87 | 120.87 |
| 2026-27 | 134.39 | 134.39 |
| 2027-28 | 149.39 | 149.39 |
| 2028-29 | 164.20 | 164.20 |
| 2029-30 | 181.47 | 181.47 |
| 2030-31 | 199.46 | 199.46 |
| 2031-32 | 220.77 | 220.77 |
| 2032-33 | 242.82 | 242.82 |
| 2033-34 | 267.59 | 267.59 |
| 2034-35 | 294.08 | 294.08 |
| 2035-36 | 323.35 | 323.35 |
| 2036-37 | 353.15 | 353.15 |
| 2037-38 | 387.93 | 387.93 |

Table 5-8 : Toll Revenue Most Likely Scenario
(Rs. Crores)

| Year | Toll at Plaza 142.800 | Total |
|----------------|----------------------------------|---------------|
| 2023-24 | 99.12 | 99.12 |
| 2024-25 | 109.87 | 109.87 |
| 2025-26 | 121.71 | 121.71 |
| 2026-27 | 135.62 | 135.62 |
| 2027-28 | 151.16 | 151.16 |
| 2028-29 | 166.50 | 166.50 |
| 2029-30 | 184.49 | 184.49 |
| 2030-31 | 203.26 | 203.26 |
| 2031-32 | 225.56 | 225.56 |
| 2032-33 | 248.67 | 248.67 |
| 2033-34 | 274.70 | 274.70 |
| 2034-35 | 302.61 | 302.61 |
| 2035-36 | 333.51 | 333.51 |
| 2036-37 | 365.10 | 365.10 |
| 2037-38 | 401.95 | 401.95 |

CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

Operation and maintenance cost of project depends on number of factors like quality of construction, response of maintenance team to early damage, local climate (rain etc.).

Future cost of operation and maintenance is estimate on guess basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Talegaon to Amravati on NH-6 in state of Maharashtra.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year FY 2022-23 is given in table below.

Table 6-1 : O&M Cost

| Year | Annual maintenance (Rs. Cr) | Thermoplastic painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr.) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | | Total Expenditure (Rs. Crores) | Remarks |
|---------|-----------------------------|---------------------------------|--------------------------------|----------------------------|--------------------------------|-----------------|----------|--------------------------------|---|
| | | | | | | Annual | Periodic | | |
| 2023-24 | 12.45 | | | | 0.02 | 0.59 | | 16.66 | Regular O & M |
| 2024-25 | 12.45 | | | | 0.02 | 0.59 | | 17.49 | Regular O & M |
| 2025-26 | 12.45 | | | | 0.02 | 0.59 | | 18.37 | Regular O & M |
| 2026-27 | 12.45 | | | | 0.02 | 0.59 | | 19.29 | Regular O & M |
| 2027-28 | 12.45 | 1.47 | 16.36 | 4.58 | 0.02 | 0.59 | | 55.01 | Renewal of Wearing course + Pavement repair |
| 2028-29 | 12.45 | 1.47 | 16.36 | 7.64 | 0.02 | 0.59 | | 62.74 | Renewal of Wearing course + Pavement repair |
| 2029-30 | 12.45 | | | 2.29 | 0.02 | 0.59 | | 26.25 | Regular O & M |
| 2030-31 | 12.45 | | | 2.29 | 0.02 | 0.59 | | 27.56 | Regular O & M |
| 2031-32 | 12.45 | | | 2.29 | 0.02 | 0.59 | | 28.94 | Regular O & M |
| 2032-33 | 12.45 | | | 2.29 | 0.02 | 0.59 | | 30.38 | Regular O & M |

| Year | Annual maintenance (Rs. Cr) | Thermoplastic painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr.) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | | Total Expenditure (Rs. Crores) | Remarks |
|---------|-----------------------------|---------------------------------|--------------------------------|----------------------------|--------------------------------|-----------------|----------|--------------------------------|---|
| | | | | | | Annual | Periodic | | |
| 2033-34 | 12.45 | 1.47 | 16.36 | 9.16 | 0.02 | 0.59 | | 83.25 | Renewal of Wearing course + Pavement repair |
| 2034-35 | 12.45 | 1.47 | 16.36 | 12.22 | 0.02 | 0.59 | | 94.08 | Renewal of Wearing course + Pavement repair |
| 2035-36 | 12.45 | | | 2.29 | 0.02 | 0.59 | | 35.17 | Regular O & M |
| 2036-37 | 12.45 | | | 2.29 | 0.02 | 0.59 | | 36.93 | Regular O & M |

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Talegaon to Amravati section of NH-6 in state of Maharashtra from km 100.000 to km 166.725 is currently a four-lane road. The road is in sound condition and serves to stable traffic volumes. Project corridor is part of major east west connectivity National highway NH-6. There are many upcoming projects in area which will boost economic growth of area and add value to development of region. All these developments have potential to give positive impact to traffic flow on project. Following can considered as major outcome of study

- a) There is good amount of tollable traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually post COVID-19 impact in the near future, further moderated by 1-2% in the longer term due to various development in area and overall development of economy
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs.



Figure 8-1 : General Condition



Figure 8-2 : Toll Plaza



Figure 8-3 : General Condition



Figure 8-4 : General Condition



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TUMKUR TO CHITRADURGA (KM 75.000 TO KM 189.000) SECTION OF NH-4 IN THE STATE OF KARNATAKA



TOLL REVENUE AND O&M COST PROJECTION REPORT (FINAL)



APRIL 2023



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Adding Value

**TUMKUR TO CHITRADURGA
(KM 75.000 TO KM 189.000)
SECTION OF NH-4 IN THE STATE OF KARNATAKA**

**TOLL REVENUE AND O&M
COST PROJECTION REPORT
(FINAL)**

APRIL 2023



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highways Authority of India |
| BOT | - Build Operate Transfer | NHDP | - National Highways Development Project |
| CAGR | - Compound Annual Growth Rate | NSDP | - Net State Domestic Product |
| CTV | - Classified traffic volume | O&M | - Operation & Maintenance |
| DBFOT | - Design, Build, Finance, Operate & Transfer | PCDP | - Per Capita Domestic Product |
| EME | - Earth Moving Equipment | PCI | - Per Capita Income |
| GDP | - Gross Domestic Product | PCU | - Passenger Car Unit |
| GSDP | - Gross State Domestic Product | PSC | - Pre-stressed Concrete |
| HCM | - Heavy Construction Machinery | RCC | - Reinforced cement concrete |
| HCV | - Heavy Commercial Vehicle | RHS | - Right Hand Side |
| HTMS | - Highway Traffic Management System | SH | - State Highway |
| IRC | - Indian Road Congress | TP | - Toll Plaza |
| IRR | - Internal Rate of Return | WPI | - Wholesale Price Index |
| LCV | - Light Commercial Vehicle | SIR | - Special Investment Region |
| LHS | - Left Hand Side | c. | - Circa |
| LGV | - Light Goods Vehicle | ROB | - Railway Over Bridge |
| MAV | - Multi Axle Vehicle | MDR | - Major District Road |
| MORTH | - Ministry of Road Transport and Highways | ODR | - Other District Road |
| NH | - National Highway | CA | - Concession Agreement |
| PCC | - Plain Cement Concrete | RMT | - Running Meter |
| CR | - Coarse Rubble | | |

CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Tumkur - Chitradurga Section of NH-4 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. M/s *IRB Tumkur Chitradurga Tollway Ltd.* (Concessionaire) has been awarded the Project for concession period of 26 years starting from June 4th, 2011 to June 3rd, 2037. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as “*Toll Revenue and O&M Cost Projection Report*” mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgment on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. With traffic data from April 2020 to March 2021 report was updated report was further updated with yearly traffic data from April 2021 to March 2022 and now concessionaire has provided traffic data from April 2022 to March 2023 report is updated taking this latest traffic data into consideration.

CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work, we have collected the required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at the two toll plaza locations on Tumkur-Chitradurga section of NH-4 for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and traffic data from April 2022 to March 2023.
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project.
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

The project can be divided into two homogenous sections from traffic point of view.

These sections can be

1. Chitradurga to Sira
2. Sira to Tumkur

Traffic of both sections is represented by toll plaza in each section.

Table 2-1 below lists provides details of locations from where traffic details have been collected.

Table 2-1 : Traffic Survey Locations

| Sr. No. | Location | CTV | Single Journey Traffic | Return Journey Traffic | Monthly Pass Traffic | Local Traffic |
|---------|--|-------------------------|------------------------|------------------------|----------------------|--------------------|
| 1 | Km 172.770 Toll Plaza (Guilalu) | AADT for Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 |
| | | AADT for year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for year 2018-19 | For year 2018-19 | For year 2018-19 | For year 2018-19 | For year 2018-19 |
| | | AADT for year 2019-20 | For year 2019-20 | For year 2019-20 | For year 2019-20 | For year 2019-20 |
| | | AADT for year 2020-21 | For year 2020-21 | For year 2020-21 | For year 2020-21 | For year 2020-21 |
| | | AADT for Year 2021-22 | For Year 2021-22 | For Year 2021-22 | For Year 2021-22 | For Year 2021-22 |
| | | AADT for Year 2022-23 | For Year 2022-23 | For Year 2022-23 | For Year 2022-23 | For Year 2022-23 |
| 2 | Km 104.530 Toll Plaza (Karjeevanhalli) | AADT for Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 | For Year 2015-2016 |
| | | AADT for year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 | For Year 2016-2017 |
| | | AADT for year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 | For Year 2017-2018 |
| | | AADT for year 2018-19 | For year 2018-19 | For year 2018-19 | For year 2018-19 | For year 2018-19 |
| | | AADT for year 2019-20 | For year 2019-20 | For year 2019-20 | For year 2019-20 | For year 2019-20 |
| | | AADT for year 2020-21 | For year 2020-21 | For year 2020-21 | For year 2020-21 | For year 2020-21 |
| | | AADT for Year 2021-22 | For Year 2021-22 | For Year 2021-22 | For Year 2021-22 | For Year 2021-22 |

| | | | | | | |
|--|--|--------------------------|---------------------|---------------------|---------------------|---------------------|
| | | AADT for Year 2022-23 | For Year 2022-23 | For Year 2022-23 | For Year 2022-23 | For Year 2022-23 |
|--|--|--------------------------|---------------------|---------------------|---------------------|---------------------|

The locations of each of the traffic survey are illustrated in Figure 2-1.

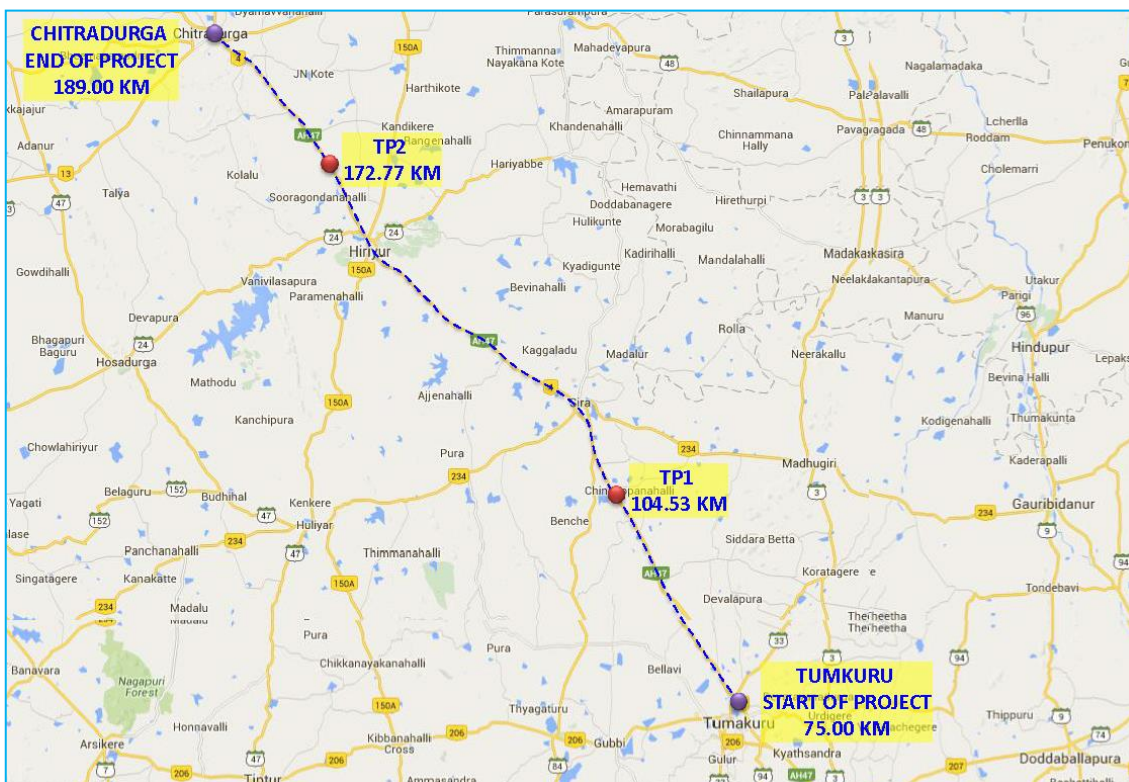


Figure 2-1: Traffic Survey Locations

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations were indicated in **Figure 2-1** and listed in **Table 2-1**.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in **Table 2-2**.

Table 2-2 : Vehicle Classification System

| Vehicle Type | |
|----------------|--|
| Auto Rickshaw | |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |
| Bus | Minibus |
| | Standard Bus |
| Truck | Light Goods Vehicle (LCV) |
| | 2 – Axle Truck |
| | 3 Axle Truck (HCV) |
| | Multi Axle Truck (4-6 Axle) |
| | Oversized Vehicles (7 or more axles) |
| Other Vehicles | Agriculture Tractor, Tractor & Trailer |

Source - IRC: 64 – 1990

However, since the project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the types of vehicles as per the Concession Agreement.

- Car / Jeep / Van
- LCV
- Truck / Bus
- HCM/ EME/ MAV

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report.

2.3.1 Traffic Data

The Concessionaire has provided Traffic data for base year 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22 and from April 2022 to March 2023 as under for toll plazas –

Table 2-3 : Traffic Data at Toll Plaza at Km 172.770

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) – FY 2015-16 | Annual Average Daily Traffic (Nos.) – FY 2016-17 | Annual Average Daily Traffic (Nos.) – FY 2017-18 | Annual Average Daily Traffic (Nos.) – FY 2018-19 | Annual Average Daily Traffic (Nos.) – FY 2019-20 | Annual Average Daily Traffic (Nos.) – FY 2020-21 | Annual Average Daily Traffic (Nos.) – FY 2021-22 | Annual Average Daily Traffic (Nos.) – FY 2022-23 |
|--------|--------------------|--|--|--|--|--|--|--|--|
| 1 | CAR | 4395 | 4803 | 5261 | 5244 | 5560 | 7633 | 11046 | 12943 |
| 2 | LCV | 2205 | 2237 | 2514 | 2918 | 2752 | 2652 | 2006 | 2079 |
| 3 | Truck/Bus | 2882 | 2976 | 3066 | 3157 | 3167 | 2631 | 3423 | 4395 |
| 4 | HCM /EME/ MAV | 5356 | 5365 | 5563 | 5748 | 5033 | 4968 | 5831 | 6359 |
| 5 | Oversized Vehicles | 47 | 80 | 46 | 31 | 37 | 14 | 15 | 25 |
| | Total | 14885 | 15460 | 16451 | 17099 | 16548 | 17898 | 22322 | 25801 |

Similar traffic data for toll plaza at Km 104.530 is given as under

Table 2-4 : Traffic Data at Toll Plaza at Km 104.530

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) – FY 2015-16 | Annual Average Daily Traffic (Nos.) – FY 2016-17 | Annual Average Daily Traffic (Nos.) – FY 2017-18 | Annual Average Daily Traffic (Nos.) – FY 2018-19 | Annual Average Daily Traffic (Nos.) – FY 2019-20 | Annual Average Daily Traffic (Nos.) – FY 2020-21 | Annual Average Daily Traffic (Nos.) – FY 2021-22 | Annual Average Daily Traffic (Nos.) – FY 2022-23 |
|--------|--------------------|--|--|--|--|--|--|--|--|
| 1 | CAR | 5340 | 6203 | 6577 | 6855 | 7664 | 10224 | 8597 | 10272 |
| 2 | LCV | 2494 | 2581 | 2999 | 3401 | 3237 | 3103 | 1803 | 1916 |
| 3 | Truck/Bus | 3562 | 3727 | 3743 | 3888 | 3896 | 3133 | 3005 | 3912 |
| 4 | HCM /EME/ MAV | 6116 | 6140 | 6464 | 6656 | 5833 | 5617 | 5305 | 5811 |
| 5 | Oversized Vehicles | 166 | 130 | 43 | 35 | 45 | 18 | 15 | 31 |
| | Total | 17678 | 18782 | 19826 | 20834 | 20675 | 22094 | 18725 | 21942 |

Pandemic of COVID-19 (Corona Virus) has impacted entire world. Taking precaution, Government of India announced a complete lockdown in last week of March 2020 and traffic on highways was stopped which was eased out progressively later. Traffic on project corridor is recovering at good rate but still traffic numbers had effect of Pandemic. There after India was hit by Covid-19 second and third wave

in April 21 to July 21 and December 21 to March 22. Recovering traffic pattern was somewhat again disturbed due to second and third wave of Covid-19. Traffic numbers for the period from April 2020 to March 2021 are not representative of traffic pattern at project corridor due to pandemic lockdown impact. However, for integrity of data same shown above. NHAI also has, in principal, approved providing extension of concession period to make up for the loss of revenue due to lockdown. Traffic has been affected due to second wave of COVID-19 in period from April 21 to July 2021 and from December 21 to March-22 due to third wave of Covid-19. Hence traffic from April 2021 to March 2022 is also affected by Covid impact. But as observed traffic has almost normalized on project stretch post COVID-19.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in **Table 2-5**.

Table 2-5 : PCU Factors Adopted for Study

| Vehicle Type | PCUs |
|------------------|------|
| Car | 1.0 |
| Minibus | 1.5 |
| Standard Bus | 3.0 |
| LCV/LGV | 1.5 |
| 2 Axle Truck | 3.0 |
| 3 – 6 Axle Truck | 4.5 |
| MAV | 4.5 |
| Auto Rickshaw | 1.0 |
| Van/Tempo | 1.0 |

| Vehicle Type | PCUs |
|-------------------------------------|------|
| Agriculture Tractor with Trailer | 4.5 |
| Agriculture Tractor without Trailer | 1.5 |

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under.

Table 2-6 : Traffic in PCU at both Toll Plazas

| Toll Plaza Location | Period | Traffic No | PCU | PCU Index |
|---------------------|------------|------------|-------|-----------|
| 172.770 | FY 2015-16 | 14885 | 40661 | 2.73 |
| | FY 2016-17 | 15460 | 41587 | 2.69 |
| | FY 2017-18 | 16451 | 43474 | 2.64 |
| | FY 2018-19 | 17099 | 45099 | 2.64 |
| | FY 2019-20 | 16548 | 42002 | 2.54 |
| | FY 2020-21 | 17898 | 41923 | 2.34 |
| | FY 2021-22 | 22322 | 50632 | 2.27 |
| | FY 2022-23 | 25801 | 57974 | 2.25 |
| 104.530 | FY 2015-16 | 17678 | 48037 | 2.72 |
| | FY 2016-17 | 18782 | 49471 | 2.63 |
| | FY 2017-18 | 19826 | 51585 | 2.60 |
| | FY 2018-19 | 20834 | 53728 | 2.58 |
| | FY 2019-20 | 20675 | 50659 | 2.45 |
| | FY 2020-21 | 22094 | 49634 | 2.25 |
| | FY 2021-22 | 18725 | 44256 | 2.36 |
| | FY 2022-23 | 21942 | 51171 | 2.33 |

It can be observed from above that project traffic has PCU index near 2.5 which indicates good mix of commercial and passenger traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A Larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers for period April 2022 to March 2023 have been considered as the base numbers.

It is observed that at Toll KM 172.770 Car traffic forms 50% of total traffic while as HCM / EME / MAV comprises 25% of total traffic. Overall about 50% of traffic is commercial in nature, and at Toll KM 104.530 Car traffic forms 47% of total traffic while as HCM / EME / MAV comprises 26% of total traffic. Overall about 53% of traffic is commercial in nature

Another important bifurcation of traffic is components of traffic with respect to various types of toll ticketing.

1. Single Journey
2. Return Journey
3. Local Single Journey (Concessionaire provided special tariff for this category)
4. Monthly Pass Journey

The following table provides numbers of vehicles falling in each of above category.

Table 2-7 : Journey Type Bifurcation of Traffic at KM 172.770

| Sr. No | Type | Traffic Volume (Nos.) for FY 2015-16 | Traffic Volume (Nos.) for FY 2016-17 | Traffic Volume (Nos.) for FY 2017-18 | Traffic Volume (Nos.) for FY 2018-19 | Traffic Volume (Nos.) for FY 2019-20 | Traffic Volume (Nos.) for FY 2020-21 | Traffic Volume (Nos.) for FY 2021-22 | Traffic Volume (Nos.) for FY 2022-23 |
|--------|----------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1 | Single Journey | 11733 | 12178 | 12808 | 13370 | 12845 | 14512 | 15558 | 18017 |
| 2 | Return Journey | 2642 | 2764 | 3146 | 3332 | 3356 | 3074 | 6724 | 7740 |
| 3 | Local Single Journey | 286 | 276 | 268 | 185 | 128 | 150 | 18 | 22 |
| 4 | Monthly Pass | 240 | 129 | 134 | 212 | 219 | 162 | 22 | 22 |

A significant part of the traffic at KM 172.770 is single journey (70%) followed by return journey (30%) with a very low component of local single journey and monthly pass traffic.

Similarly, traffic numbers for type of journey at KM 104.530 are given in following table.

Table 2-8 : Journey Type Bifurcation of Traffic at KM 104.530

| Sr. No | Type | Traffic Volume (Nos.) for FY 2015-16 | Traffic Volume (Nos.) for FY 2016-17 | Traffic Volume (Nos.) for FY 2017-18 | Traffic Volume (Nos.) for FY 2018-19 | Traffic Volume (Nos.) for FY 2019-20 | Traffic Volume (Nos.) for FY 2020-21 | Traffic Volume (Nos.) for FY 2021-22 | Traffic Volume (Nos.) for FY 2022-23 |
|--------|----------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1 | Single Journey | 13121 | 13721 | 14291 | 15053 | 14807 | 16990 | 13821 | 16220 |
| 2 | Return Journey | 3700 | 4032 | 4580 | 4820 | 4910 | 4456 | 4782 | 5632 |
| 3 | Local Single Journey | 378 | 419 | 392 | 387 | 385 | 316 | 65 | 73 |
| 4 | Monthly Pass | 494 | 501 | 481 | 574 | 573 | 332 | 57 | 15 |

A significant part of the traffic at KM 104.530 is single journey (74%) followed by return journey (26%) with a very low component of local single journey and monthly pass traffic.

Here too it was observed that single journey is the most dominant component of traffic consistent across entire length of the project highway.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data

- a) GDP
- b) NSDP
- c) Population Growth
- d) Per Capita Income growth
- e) Industrial Growth
- f) Special Industry Potential
- g) Regional and National development vision / plan
- h) Any other relevant data

CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor viz. Tumkur – Chitradurga section of NH-4 has been done after taking the above factors into consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income

- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Karnataka is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log}(P) = k \times \text{Log}(EI) + A$$

Where,

$$P = \text{Number of Vehicles (Mode wise)}$$

$$EI = \text{Economic Indicator}$$

$$A = \text{Regression constant}$$

$$k = \text{Elasticity coefficient (Regression coefficient)}$$

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) respectively and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2011 | 40699 | 1131201 | 4.61 | 6.05 | | |
| 2012 | 41492 | 1269430 | 4.62 | 6.10 | 2% | |
| 2013 | 43266 | 1420767 | 4.64 | 6.15 | 4% | |
| 2014 | 46012 | 1572521 | 4.66 | 6.20 | 6% | |
| 2015 | 48907 | 1741831 | 4.69 | 6.24 | 6% | 4.7% |

Regression analysis PCI Vs Car data is presented in the figure below

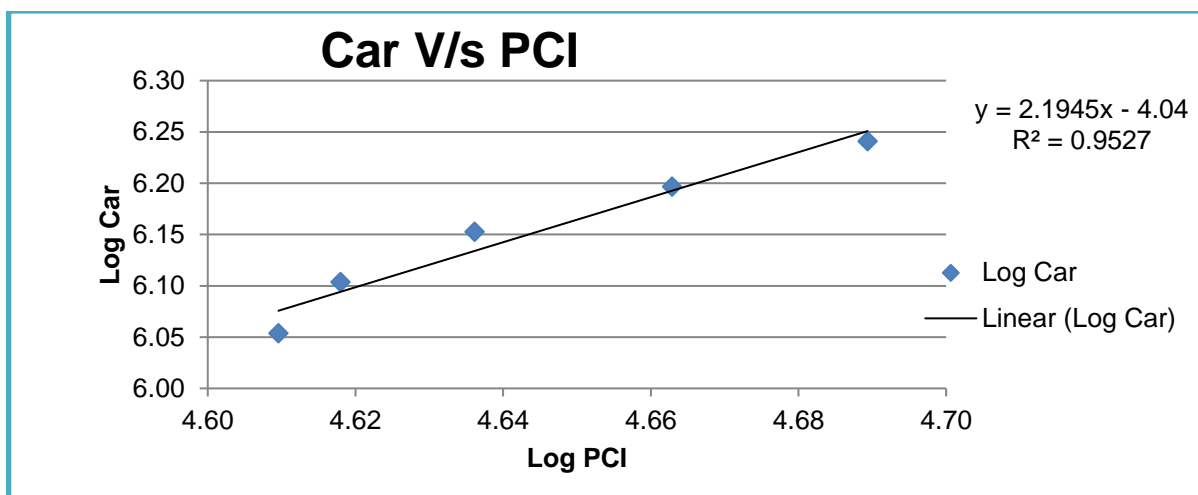


Figure 3-1: Regression and Elasticity PCI vs. Car–Extrapolation

Table 3-2 : Population Vs Bus

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2011 | 61095297 | 58012 | 7.79 | 4.76 | | |
| 2012 | 62058777 | 62501 | 7.79 | 4.80 | 2% | |
| 2013 | 63017877 | 69718 | 7.80 | 4.84 | 2% | |
| 2014 | 63972322 | 75529 | 7.81 | 4.88 | 2% | |
| 2015 | 64921845 | 80911 | 7.81 | 4.91 | 1% | 1.53% |

Regression analysis of population Vs. Bus Traffic is presented in figure below

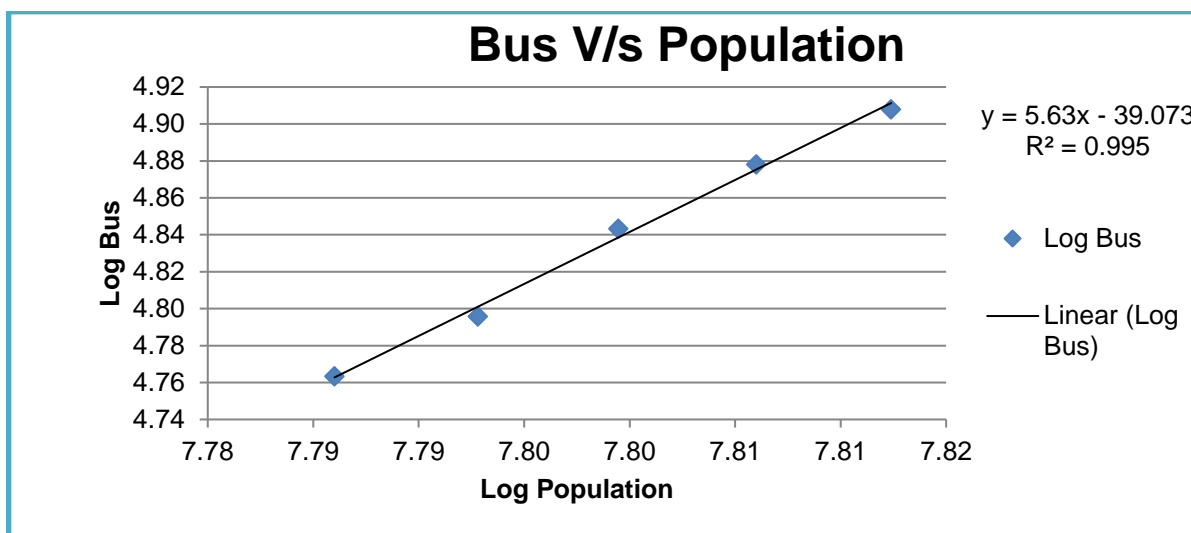


Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic demand has been worked out by regression analysis with NSDP. Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|----------|--------|----------|-----------|-------------|----------------|
| 2011 | 24081677 | 415491 | 7.38 | 5.62 | | |
| 2012 | 24804028 | 454582 | 7.39 | 5.66 | 3% | |
| 2013 | 26125013 | 506340 | 7.42 | 5.70 | 5% | |
| 2014 | 28056052 | 555255 | 7.45 | 5.74 | 7% | |
| 2015 | 30107076 | 606352 | 7.48 | 5.78 | 7% | 5.76% |

The following figure depicts regression analysis and extrapolation of NSDP vs. goods traffic

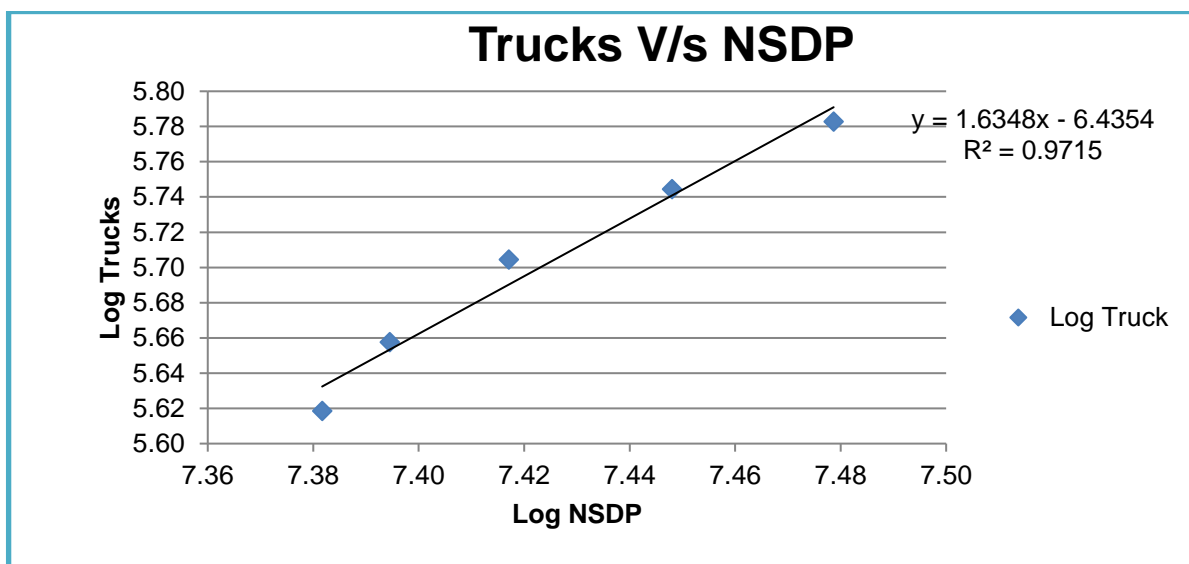


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient | Average Growth | Growth Elastic Model |
|-----------|------------------|----------------------|------------------------|----------------|------------------------|----------------|----------------------|
| Karnataka | Car/Jeep | PCI | $y = 2.1945x - 4.04$ | $R^2 = 0.9527$ | 2.1945 | 4.72% | 10.35% |
| | Bus | Population | $y = 5.63x - 39.0727$ | $R^2 = 0.995$ | 5.6300 | 1.53% | 8.62% |
| | Truck | NSDP | $y = 1.6348x - 6.4354$ | $R^2 = 0.9715$ | 1.6348 | 5.76% | 9.41% |

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections

3.4 Analysis of Historic Traffic Data

Traffic growth on a particular section of the highway depends on a number of factors. Some of these are local and some have regional or national context. Regional or national economy development has a marked impact on traffic growth. Still, historical traffic volume data at the project highway provides a meaningful insight into traffic development on corridor.

Recently there has been tremendous up-gradation in the logistics industry in terms of processes, technology and mode of transportation. Improvement in road networks has opened way for larger freight vehicles to be used for transportation of goods. This has added substantial value to logistical operations all across the country. It has been observed that volume of the typical 2 Axle truck has reduced and multi axle trucks or larger size have come in their place. This phenomenon is observed at project highway under study as well.

Following historical traffic data have been used for our analysis.

- a) Traffic Numbers provided in Contract document pertaining to year 2008
- b) Traffic Numbers provided in Report of Lea Associates pertaining to year 2010
- c) Traffic Numbers provided in by concessionaire pertaining to year 2016 to year upto March 2023

Traffic numbers pertaining to tollable category of contract have been compared.

The following tables provide historical traffic numbers at both toll plaza locations i.e. at Km 104.530 (Near Sira) and Km 172.770 (Near Chitradurga)

Table 3-5 : Historical Traffic Volume at Sira

| Location | Year | | | | | | | | |
|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 2007-08 | 2009-10 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| At Sira | | | | | | | | | |
| CAR | 2571 | 3061 | 6203 | 6577 | 6855 | 7664 | 10224 | 8597 | 10272 |
| LCV | 493 | 1462 | 2581 | 2999 | 3401 | 3237 | 3103 | 1803 | 1916 |
| Truck/Buses | 9211 | 4386 | 3727 | 3743 | 3888 | 3896 | 3133 | 3005 | 3912 |
| HCM/EME/MAV | 524 | 5498 | 6140 | 6464 | 6656 | 5833 | 5617 | 5305 | 5811 |
| Oversized Vehicles | 0 | 0 | 130 | 43 | 35 | 45 | 18 | 15 | 31 |
| Total | 12799 | 14407 | 18782 | 19826 | 20834 | 20675 | 22094 | 18725 | 21942 |

Table 3-6 : Historical Traffic Volume at Chitradurga

| Location | Year | | | | | | | | |
|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 2007-08 | 2009-10 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| At Chitradurga | | | | | | | | | |
| CAR | 1664 | 2356 | 4803 | 5261 | 5244 | 5560 | 7633 | 11046 | 12943 |
| LCV | 385 | 1475 | 2237 | 2514 | 2918 | 2752 | 2652 | 2006 | 2079 |
| Truck/Bus | 7907 | 9628 | 2976 | 3066 | 3157 | 3167 | 2631 | 3423 | 4395 |
| HCM /EME/MAV | 524 | 564 | 5365 | 5563 | 5748 | 5033 | 4968 | 5831 | 6359 |
| Oversized Vehicles | 0 | 0 | 80 | 46 | 31 | 37 | 14 | 15 | 25 |
| Total | 10480 | 14023 | 15460 | 16451 | 17099 | 16548 | 17898 | 22322 | 25801 |

Traffic on the project stretch was affected due to COVID-19 lockdown announced by central government in March-2020. Traffic was further affected by subsequent second and third waves as well in year 2021-22. Hence same is not considered for historical growth.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

Economy

After witnessing a slowdown during 2011-12, the economy recovered in 2013-14, and a high growth rate of GDP was recorded in up to 2018-19. Pandemic of COVID-19 impacted all economies of world including India. Following figure show trend of GDP growth in India.

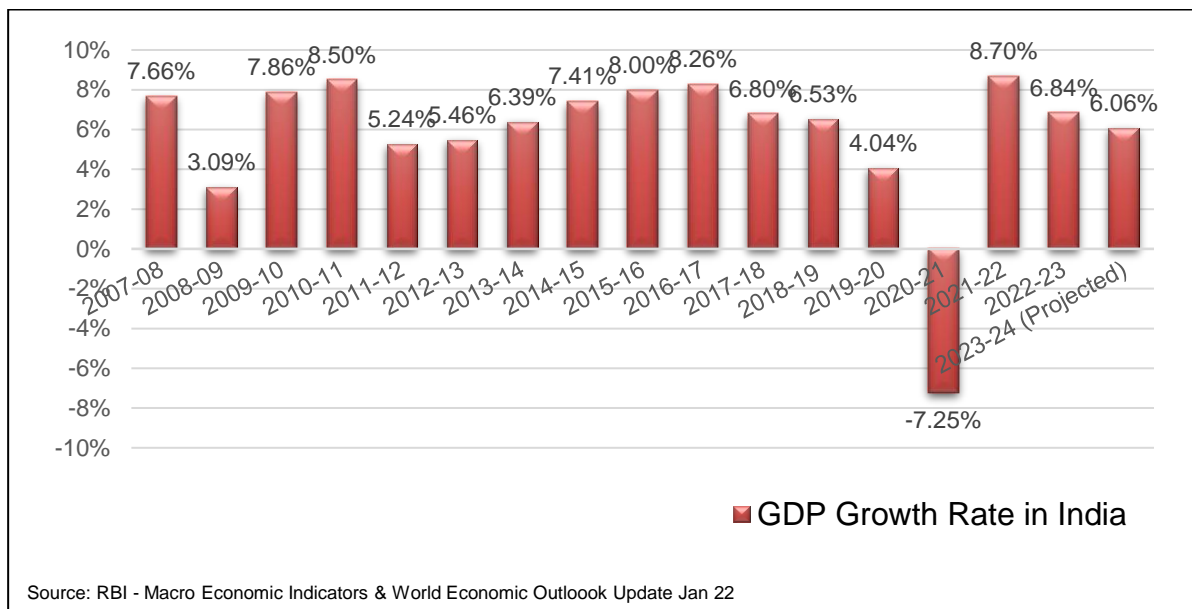


Figure 3-4 : Growth of GDP in India

FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Government took major policy decision including tax infrastructure reforming, banking sector improvement and ease of doing business.

Major economies of world collapsed due to pandemic COVID-19 including India. Indian economy is also registered negative growth in financial year 2020-21. After that Indian economy recovered handsomely and registered a growth of about 9% in Year 2021-22. This was partly due to low base of year 2020-21 as well.

Honorable Prime Minister has announced a major relief package of Rs. 20 lakh crores which is about 10% of GDP. This is aimed at turning this major crisis of COVID-19 into opportunity by providing major impetus to industrial production to the limit of becoming a self-reliant economy. With major thrust of this package being on **Make -In- India** it is expected that industry in India would grow at rapid pace and recover handsomely in post COVID-19 scenario.

3.6 Recommended Growth Rates of Traffic

Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at suitable interval of years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence corridor can expect to have expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic**, **Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under.

Table 3-7 : Recommended Growth Rates in an Optimistic Scenario

| Year/ Vehicle Type | 2021-23 | 2023-26 | 2026-31 | 2031-36 | 2036-41 | 2041-46 |
|--------------------|---------|---------|---------|---------|---------|---------|
| CAR | 7.09% | 6.06% | 5.66% | 5.21% | 4.61% | 3.94% |
| LCV | 7.00% | 6.45% | 6.05% | 5.59% | 5.16% | 4.80% |
| Truck / Bus | 5.68% | 5.68% | 5.26% | 4.85% | 4.44% | 4.04% |
| HCM /EME/ MAV | 7.14% | 6.51% | 6.03% | 5.55% | 5.09% | 4.63% |
| Oversized Vehicles | 7.14% | 7.14% | 6.61% | 6.08% | 5.57% | 5.06% |

Table 3-8 : Recommended Growth Rates in a Pessimistic Scenario

| Year/ Vehicle Type | 2021-23 | 2023-26 | 2026-31 | 2031-36 | 2036-41 | 2041-46 |
|--------------------|---------|---------|---------|---------|---------|---------|
| CAR | 6.59% | 5.56% | 5.16% | 4.71% | 4.11% | 3.44% |
| LCV | 6.50% | 5.95% | 5.55% | 5.09% | 4.66% | 4.30% |
| Truck / Bus | 5.18% | 5.18% | 4.76% | 4.35% | 3.94% | 3.54% |
| HCM /EME/ MAV | 6.64% | 6.01% | 5.53% | 5.05% | 4.59% | 4.13% |
| Oversized Vehicles | 6.64% | 6.64% | 6.11% | 5.58% | 5.07% | 4.56% |

Table 3-9 : Recommended Growth Rates in a Most Likely Scenario

| Year/ Vehicle Type | 2021-23 | 2023-26 | 2026-31 | 2031-36 | 2036-41 | 2041-46 |
|--------------------|---------|---------|---------|---------|---------|---------|
| CAR | 6.84% | 5.81% | 5.41% | 4.96% | 4.36% | 3.69% |
| LCV | 6.75% | 6.20% | 5.80% | 5.34% | 4.91% | 4.55% |
| Truck / Bus | 5.43% | 5.43% | 5.01% | 4.60% | 4.19% | 3.79% |
| HCM /EME/ MAV | 6.89% | 6.26% | 5.78% | 5.30% | 4.84% | 4.38% |
| Oversized Vehicles | 6.89% | 6.89% | 6.36% | 5.83% | 5.32% | 4.81% |

3.7 COVID-19 Impact

Current Corona virus crisis affected the traffic since March 2020 onwards. Traffic in year 2020-21 was negatively affected by lockdown. Impact of Covid-19 is analyzed in next section of this chapter. All social and economic activities had been completely disrupted due worldwide pandemic of Corona Virus. This had affected traffic on project stretch as well. Traffic was severely affected form March 2020 due to lockdown. Government considered partial lifting of lockdown and allowing selective economic activities on zone to zone basis in May 2020. Government has decided to open economic activities in phases and by now almost all the activities are open with some restrictions.

Concessionaire shared traffic data for year 2020-21 and 2021-22. At all toll plaza commercial traffic has almost reached back to previous level. Passenger traffic, which picked up quite late, has also recovered handsomely in later months and has reached back to original level. But traffic was further affected due to second wave of COVID-19 in April 21 to July 21 and third wave in December 2021 to March 2022.

Government has announced a mega economic stimulate and package of Rs. 20 Lakh Crore to bring the economy back on track and recover the losses. Impact of these are seen in project traffic growth as well and it is observed that traffic has almost normalized on project stretch post COVID-19.

Taking recommended traffic growth as discussed above into consideration traffic forecast for concession period is done and presented in next chapter.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in the previous section of the Report are used to arrive at traffic projections for future years. Traffic projections at the respective toll plazas are presented in the tables below.

These projections have been done for following three growth scenarios:

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM
(Optimistic Growth Scenario)**

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles | Total No. | Total PCU |
|----------------|------------|------------|--------------------|----------------------|---------------------------|------------------|------------------|
| 2023-24 | 13728 | 2213 | 4645 | 6773 | 27 | 27386 | 61583 |
| 2024-25 | 14561 | 2355 | 4909 | 7214 | 29 | 29068 | 65414 |
| 2025-26 | 15385 | 2497 | 5167 | 7649 | 31 | 30729 | 69192 |
| 2026-27 | 16256 | 2648 | 5438 | 8110 | 33 | 32485 | 73186 |
| 2027-28 | 17176 | 2808 | 5723 | 8599 | 35 | 34341 | 77410 |
| 2028-29 | 18148 | 2978 | 6023 | 9118 | 37 | 36304 | 81882 |
| 2029-30 | 19175 | 3157 | 6339 | 9668 | 39 | 38378 | 86609 |
| 2030-31 | 20173 | 3334 | 6646 | 10205 | 41 | 40399 | 91219 |
| 2031-32 | 21223 | 3520 | 6968 | 10771 | 43 | 42525 | 96070 |
| 2032-33 | 22327 | 3717 | 7305 | 11369 | 45 | 44763 | 101181 |
| 2033-34 | 23489 | 3925 | 7659 | 12000 | 47 | 47120 | 106565 |
| 2034-35 | 24712 | 4144 | 8030 | 12666 | 49 | 49601 | 112236 |
| 2035-36 | 25852 | 4358 | 8386 | 13310 | 51 | 51957 | 117672 |
| 2036-37 | 27044 | 4583 | 8757 | 13987 | 53 | 54424 | 123370 |
| 2037-38 | 28291 | 4820 | 9145 | 14698 | 56 | 57010 | 129349 |
| 2038-39 | 29595 | 5069 | 9551 | 15445 | 59 | 59719 | 135620 |
| 2039-40 | 30961 | 5330 | 9976 | 16231 | 62 | 62560 | 142203 |
| 2040-41 | 32180 | 5586 | 10380 | 16982 | 65 | 65193 | 148411 |
| 2041-42 | 33446 | 5854 | 10799 | 17768 | 68 | 67935 | 154886 |
| 2042-43 | 34762 | 6135 | 11235 | 18590 | 71 | 70793 | 161644 |

**Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM
(Optimistic Growth Scenario)**

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles | Total No. | Total PCU |
|----------------|------------|------------|--------------------|----------------------|---------------------------|------------------|------------------|
| 2023-24 | 10894 | 2039 | 4135 | 6189 | 34 | 23291 | 54361 |
| 2024-25 | 11553 | 2170 | 4369 | 6591 | 36 | 24719 | 57737 |
| 2025-26 | 12206 | 2301 | 4599 | 6988 | 38 | 26132 | 61072 |
| 2026-27 | 12896 | 2439 | 4840 | 7409 | 40 | 27624 | 64595 |
| 2027-28 | 13626 | 2586 | 5094 | 7855 | 42 | 29203 | 68324 |
| 2028-29 | 14398 | 2742 | 5362 | 8329 | 44 | 30875 | 72276 |
| 2029-30 | 15212 | 2908 | 5644 | 8831 | 46 | 32641 | 76453 |
| 2030-31 | 16004 | 3070 | 5917 | 9321 | 48 | 34360 | 80521 |
| 2031-32 | 16836 | 3241 | 6204 | 9839 | 50 | 36170 | 84810 |
| 2032-33 | 17713 | 3422 | 6504 | 10385 | 52 | 38076 | 89325 |
| 2033-34 | 18635 | 3613 | 6819 | 10961 | 55 | 40083 | 94084 |
| 2034-35 | 19605 | 3815 | 7149 | 11570 | 58 | 42197 | 99101 |
| 2035-36 | 20509 | 4011 | 7466 | 12158 | 61 | 44205 | 103909 |
| 2036-37 | 21455 | 4217 | 7798 | 12776 | 64 | 46310 | 108955 |
| 2037-38 | 22444 | 4434 | 8144 | 13426 | 67 | 48515 | 114246 |
| 2038-39 | 23479 | 4663 | 8506 | 14109 | 70 | 50827 | 119797 |
| 2039-40 | 24561 | 4903 | 8884 | 14827 | 73 | 53248 | 125618 |
| 2040-41 | 25528 | 5138 | 9243 | 15513 | 76 | 55498 | 131115 |
| 2041-42 | 26533 | 5384 | 9616 | 16231 | 79 | 57843 | 136852 |
| 2042-43 | 27577 | 5642 | 10005 | 16982 | 82 | 60288 | 142843 |

Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM
(Pessimistic Growth Scenario)

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles | Total No. | Total PCU |
|----------------|------------|------------|--------------------|----------------------|---------------------------|------------------|------------------|
| 2023-24 | 13663 | 2202 | 4623 | 6741 | 27 | 27256 | 61291 |
| 2024-25 | 14423 | 2333 | 4862 | 7146 | 29 | 28793 | 64796 |
| 2025-26 | 15168 | 2462 | 5093 | 7541 | 30 | 30294 | 68210 |
| 2026-27 | 15950 | 2599 | 5335 | 7958 | 32 | 31874 | 71809 |
| 2027-28 | 16773 | 2743 | 5588 | 8398 | 34 | 33536 | 75596 |
| 2028-29 | 17639 | 2895 | 5854 | 8862 | 36 | 35286 | 79585 |
| 2029-30 | 18549 | 3055 | 6132 | 9352 | 38 | 37126 | 83783 |
| 2030-31 | 19422 | 3211 | 6398 | 9824 | 40 | 38895 | 87821 |
| 2031-32 | 20336 | 3374 | 6676 | 10321 | 42 | 40749 | 92059 |
| 2032-33 | 21293 | 3545 | 6966 | 10842 | 44 | 42690 | 96496 |
| 2033-34 | 22295 | 3726 | 7268 | 11390 | 46 | 44725 | 101150 |
| 2034-35 | 23344 | 3916 | 7583 | 11966 | 48 | 46857 | 106030 |
| 2035-36 | 24304 | 4098 | 7881 | 12515 | 50 | 48848 | 110637 |
| 2036-37 | 25304 | 4288 | 8191 | 13088 | 52 | 50923 | 115439 |
| 2037-38 | 26344 | 4488 | 8513 | 13688 | 54 | 53087 | 120454 |
| 2038-39 | 27427 | 4697 | 8848 | 14316 | 56 | 55344 | 125691 |
| 2039-40 | 28555 | 4916 | 9196 | 14973 | 58 | 57698 | 131157 |
| 2040-41 | 29536 | 5127 | 9522 | 15590 | 60 | 59835 | 136218 |
| 2041-42 | 30551 | 5347 | 9859 | 16233 | 62 | 62052 | 141476 |
| 2042-43 | 31600 | 5577 | 10208 | 16903 | 64 | 64352 | 146941 |

**Table 4-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM
(Pessimistic Growth Scenario)**

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles | Total No. | Total PCU |
|----------------|------------|------------|--------------------|----------------------|---------------------------|------------------|------------------|
| 2023-24 | 10843 | 2029 | 4115 | 6160 | 34 | 23181 | 54105 |
| 2024-25 | 11446 | 2150 | 4327 | 6531 | 36 | 24490 | 57204 |
| 2025-26 | 12036 | 2269 | 4533 | 6892 | 38 | 25768 | 60224 |
| 2026-27 | 12657 | 2395 | 4748 | 7273 | 40 | 27113 | 63402 |
| 2027-28 | 13310 | 2527 | 4973 | 7674 | 42 | 28526 | 66742 |
| 2028-29 | 13996 | 2667 | 5209 | 8098 | 44 | 30014 | 70263 |
| 2029-30 | 14718 | 2814 | 5456 | 8546 | 46 | 31580 | 73971 |
| 2030-31 | 15411 | 2957 | 5693 | 8978 | 48 | 33087 | 77543 |
| 2031-32 | 16136 | 3108 | 5940 | 9431 | 50 | 34665 | 81283 |
| 2032-33 | 16895 | 3266 | 6198 | 9907 | 52 | 36318 | 85204 |
| 2033-34 | 17690 | 3432 | 6467 | 10407 | 54 | 38050 | 89314 |
| 2034-35 | 18522 | 3607 | 6748 | 10933 | 56 | 39866 | 93627 |
| 2035-36 | 19284 | 3774 | 7014 | 11434 | 58 | 41564 | 97701 |
| 2036-37 | 20076 | 3950 | 7290 | 11959 | 60 | 43335 | 101957 |
| 2037-38 | 20901 | 4134 | 7577 | 12508 | 62 | 45182 | 106398 |
| 2038-39 | 21761 | 4326 | 7875 | 13081 | 65 | 47108 | 111032 |
| 2039-40 | 22656 | 4527 | 8185 | 13680 | 68 | 49116 | 115868 |
| 2040-41 | 23434 | 4722 | 8475 | 14244 | 71 | 50946 | 120360 |
| 2041-42 | 24238 | 4924 | 8775 | 14831 | 74 | 52842 | 125022 |
| 2042-43 | 25070 | 5135 | 9086 | 15442 | 77 | 54810 | 129866 |

Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM
(Most Likely Growth Scenario)

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles | Total No. | Total PCU |
|----------------|------------|------------|--------------------|----------------------|---------------------------|------------------|------------------|
| 2023-24 | 13695 | 2208 | 4634 | 6757 | 27 | 27321 | 61437 |
| 2024-25 | 14491 | 2345 | 4885 | 7179 | 29 | 28929 | 65100 |
| 2025-26 | 15275 | 2481 | 5129 | 7593 | 31 | 30509 | 68692 |
| 2026-27 | 16102 | 2625 | 5386 | 8032 | 33 | 32178 | 72490 |
| 2027-28 | 16973 | 2777 | 5656 | 8496 | 35 | 33937 | 76496 |
| 2028-29 | 17891 | 2937 | 5939 | 8987 | 37 | 35791 | 80722 |
| 2029-30 | 18859 | 3107 | 6236 | 9506 | 39 | 37747 | 85180 |
| 2030-31 | 19793 | 3273 | 6523 | 10010 | 41 | 39640 | 89501 |
| 2031-32 | 20774 | 3448 | 6823 | 10540 | 43 | 41628 | 94039 |
| 2032-33 | 21804 | 3632 | 7136 | 11099 | 45 | 43716 | 98808 |
| 2033-34 | 22884 | 3826 | 7464 | 11687 | 47 | 45908 | 103818 |
| 2034-35 | 24018 | 4030 | 7807 | 12307 | 49 | 48211 | 109086 |
| 2035-36 | 25065 | 4227 | 8133 | 12902 | 51 | 50378 | 114093 |
| 2036-37 | 26158 | 4434 | 8474 | 13526 | 53 | 52645 | 119337 |
| 2037-38 | 27299 | 4652 | 8829 | 14180 | 55 | 55015 | 124822 |
| 2038-39 | 28489 | 4881 | 9198 | 14866 | 58 | 57492 | 130563 |
| 2039-40 | 29732 | 5121 | 9583 | 15584 | 61 | 60081 | 136565 |
| 2040-41 | 30828 | 5354 | 9946 | 16266 | 64 | 62458 | 142182 |
| 2041-42 | 31965 | 5598 | 10323 | 16977 | 67 | 64930 | 148029 |
| 2042-43 | 33143 | 5853 | 10713 | 17720 | 70 | 67499 | 154117 |

Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM
(Most Likely Growth Scenario)

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles | Total No. | Total PCU |
|---------|-------|------|-------------|---------------|--------------------|-----------|-----------|
| 2023-24 | 10868 | 2034 | 4125 | 6175 | 34 | 23236 | 54235 |
| 2024-25 | 11499 | 2160 | 4348 | 6561 | 36 | 24604 | 57470 |
| 2025-26 | 12121 | 2285 | 4565 | 6940 | 38 | 25949 | 60645 |
| 2026-27 | 12776 | 2417 | 4793 | 7341 | 40 | 27367 | 63995 |
| 2027-28 | 13466 | 2557 | 5032 | 7765 | 42 | 28862 | 67529 |
| 2028-29 | 14195 | 2705 | 5284 | 8214 | 44 | 30442 | 71266 |
| 2029-30 | 14963 | 2861 | 5549 | 8689 | 46 | 32108 | 75209 |
| 2030-31 | 15704 | 3013 | 5804 | 9150 | 48 | 33719 | 79027 |
| 2031-32 | 16482 | 3174 | 6070 | 9635 | 50 | 35411 | 83036 |
| 2032-33 | 17298 | 3344 | 6349 | 10146 | 52 | 37189 | 87252 |
| 2033-34 | 18156 | 3522 | 6641 | 10684 | 54 | 39057 | 91683 |
| 2034-35 | 19055 | 3709 | 6946 | 11250 | 57 | 41017 | 96338 |
| 2035-36 | 19886 | 3891 | 7237 | 11794 | 59 | 42867 | 100772 |
| 2036-37 | 20753 | 4082 | 7540 | 12365 | 62 | 44802 | 105418 |
| 2037-38 | 21658 | 4282 | 7856 | 12963 | 65 | 46824 | 110275 |
| 2038-39 | 22603 | 4492 | 8185 | 13590 | 68 | 48938 | 115357 |
| 2039-40 | 23589 | 4712 | 8528 | 14247 | 71 | 51147 | 120672 |
| 2040-41 | 24459 | 4926 | 8852 | 14870 | 74 | 53181 | 125652 |
| 2041-42 | 25361 | 5150 | 9187 | 15521 | 77 | 55296 | 130838 |
| 2042-43 | 26296 | 5384 | 9535 | 16200 | 80 | 57495 | 136237 |

4.2 Modification of Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession

period shall be modified subject to calculation stipulated therein. For Tumkur-Chitradurga project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2020

Target Traffic - 54558 in PCU

It was observed that as per traffic projections, traffic volume falls short of Target Traffic in all scenarios. This warrants for extension of the concession period as per provisions of concession agreement which is summarized as under -

| Scenario | Projected Traffic in PCUs (average of traffic on target date, one year before target date and one year after target date) | Expected extension in Concession Period |
|-----------------|--|--|
| All | 46331 | 5.20 |

As per above, traffic and toll revenue have been considered assuming extension of 5.2 years in the concession period. The said extension is subject to approval from NHAI.

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days.

Traffic was severely impacted on project highway during initial lockdown period. NHAI has declared a policy of providing extension of concession to make up for revenue loss during lockdown. It is expected that extension would be provided to project concession period on this account also.

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. Monthly Pass: For frequent users monthly pass is issued for 50 trips per month. The discount factor works out to 33.33% for 50 journeys.
2. Daily Pass (for Return Trip): A 25% discount will be offered for a return pass.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)

The inflation and escalation of toll rate on the basis of WPI has been built up as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$

Concessionaire has further declared special discount rates which are applicable on project corridor.

These categories and rate on base year (2015-16) are given as under

Table 5-1 : Special Local Monthly Rate

| Category | Monthly Rate |
|--------------------|--------------|
| CAR (Local 2) | 370.00 |
| CAR (Local 3) | 615.00 |
| LCV (Local 1) | 615.00 |
| LCV (Local 2) | 1,850.00 |
| Truck/Bus(Local 1) | 3085.00 |
| Truck/Bus(Local 2) | 5185.00 |

Normal escalation in the basis of WPI would be applicable to these rates as well.

In addition to above Concessionaire has also declared special rates for single local journey as under

Table 5-2 : Special Local Single Journey Rate

| Category | Rate |
|---------------|-------|
| CAR | 30.00 |
| LCV | 40.00 |
| Truck/Bus | 70.00 |
| HCM /EME/ MAV | 95.00 |

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2021-22. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

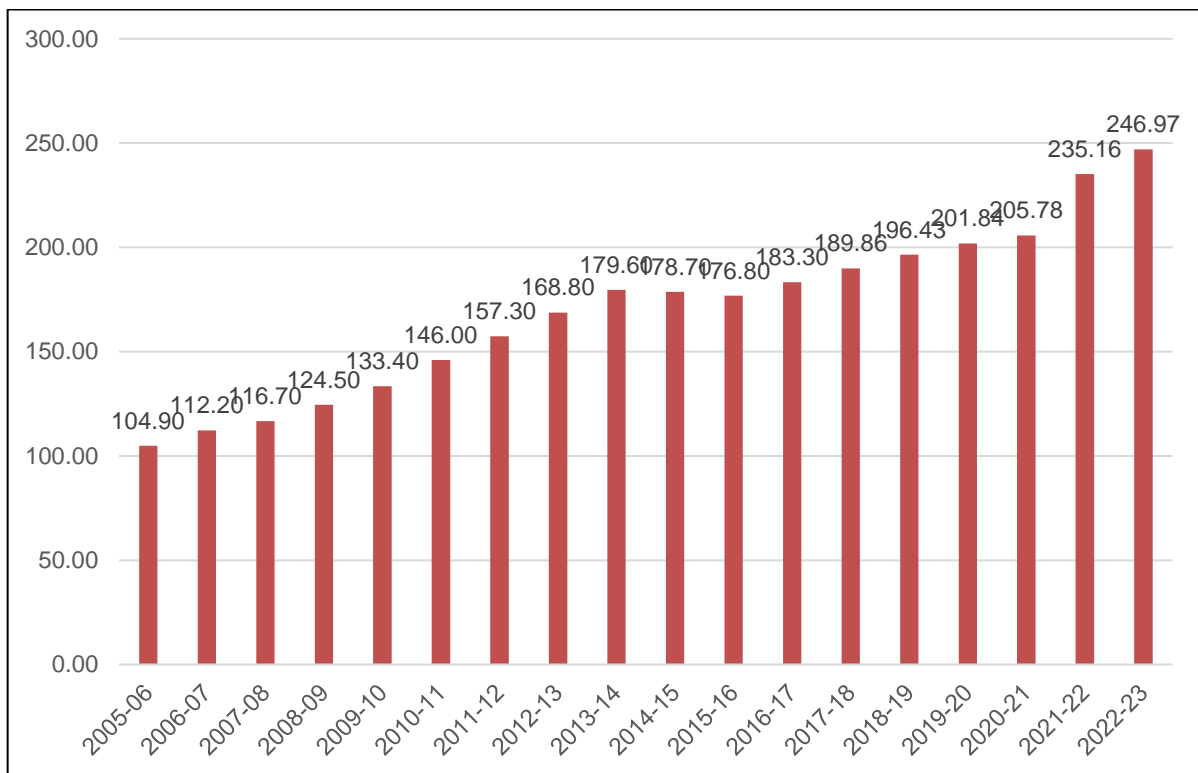


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2023 is 5.23%. For future years initially it takes 5% and suitably stepped down for future years.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-3 : Base Toll Rates 2007 - 08

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|-----------------------------------|
| Car, Jeep, Van or Light Motor Vehicle | 0.65 |
| Light Commercial Vehicle, Light Goods Vehicle or Minibus | 1.05 |
| Bus or Truck (2 Axle) | 2.2 |
| Three Axle commercial vehicles | 2.4 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--|-----------------------------------|
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles) | 3.45 |
| Oversized Vehicle (seven or more axles) | 4.2 |

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 108-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that as discussed above.

Table 5-4 : Tollable Length PKG-I

| Toll Plaza Chainage | Length (Km) | Tollable Highway+ Structure length (Km) |
|---------------------|-------------|---|
| 172.770 | 57.00 | 57.00 |
| 104.530 | 57.00 | 70.680 |

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below. Since applicable length of highway length is equal for both plazas, applicable toll rates are also same

Thus, worked out rates for various categories of vehicle and discounts are given as under

Table 5-5 : Toll Rates for Single Journey@ 172.770 & @104.530

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles |
|----------------|------------|------------|------------------------|------------------------------|-------------------------------|
| 2023-24 | 80 | 130 | 275 | 435 | 525 |
| 2024-25 | 85 | 140 | 290 | 455 | 555 |
| 2025-26 | 90 | 145 | 305 | 480 | 580 |
| 2026-27 | 95 | 155 | 320 | 500 | 610 |
| 2027-28 | 100 | 160 | 335 | 530 | 645 |
| 2028-29 | 105 | 170 | 355 | 555 | 675 |
| 2029-30 | 110 | 175 | 370 | 580 | 705 |
| 2030-31 | 115 | 185 | 390 | 610 | 740 |
| 2031-32 | 120 | 195 | 405 | 640 | 775 |
| 2032-33 | 125 | 205 | 425 | 670 | 815 |
| 2033-34 | 130 | 215 | 445 | 700 | 855 |
| 2034-35 | 140 | 225 | 470 | 735 | 895 |
| 2035-36 | 145 | 235 | 490 | 770 | 940 |
| 2036-37 | 155 | 245 | 515 | 810 | 985 |
| 2037-38 | 160 | 260 | 540 | 850 | 1035 |
| 2038-39 | 170 | 270 | 570 | 890 | 1085 |
| 2039-40 | 175 | 285 | 595 | 935 | 1140 |
| 2040-41 | 185 | 300 | 625 | 980 | 1195 |
| 2041-42 | 195 | 315 | 660 | 1030 | 1255 |
| 2042-43 | 205 | 330 | 690 | 1085 | 1320 |

Table 5-6 : Toll Rates for Return Journey @ 172.770 & @104.530

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV | Oversized Vehicles |
|----------------|------------|------------|--------------------|----------------------|---------------------------|
| 2023-24 | 120 | 200 | 415 | 650 | 790 |
| 2024-25 | 130 | 210 | 435 | 680 | 830 |
| 2025-26 | 135 | 220 | 455 | 715 | 870 |
| 2026-27 | 140 | 230 | 480 | 755 | 915 |
| 2027-28 | 150 | 240 | 505 | 790 | 965 |
| 2028-29 | 155 | 255 | 530 | 830 | 1010 |
| 2029-30 | 165 | 265 | 555 | 870 | 1060 |
| 2030-31 | 170 | 280 | 580 | 910 | 1110 |
| 2031-32 | 180 | 290 | 610 | 955 | 1165 |
| 2032-33 | 190 | 305 | 640 | 1005 | 1220 |
| 2033-34 | 200 | 320 | 670 | 1050 | 1280 |
| 2034-35 | 210 | 335 | 705 | 1105 | 1345 |
| 2035-36 | 220 | 350 | 740 | 1155 | 1410 |
| 2036-37 | 230 | 370 | 775 | 1215 | 1480 |
| 2037-38 | 240 | 390 | 815 | 1275 | 1550 |
| 2038-39 | 250 | 405 | 855 | 1335 | 1630 |
| 2039-40 | 265 | 425 | 895 | 1405 | 1710 |
| 2040-41 | 280 | 450 | 940 | 1475 | 1795 |
| 2041-42 | 290 | 470 | 985 | 1545 | 1885 |
| 2042-43 | 305 | 495 | 1035 | 1625 | 1975 |

Table 5-7 : Toll Rates for Local Single Journey@ 172.770 & @104.530

| Year | CAR | LCV | Truck / Bus | HCM /EME/ MAV |
|----------------|------------|------------|------------------------|------------------------------|
| 2023-24 | 70 | 80 | 140 | 285 |
| 2024-25 | 75 | 85 | 145 | 300 |
| 2025-26 | 80 | 90 | 150 | 315 |
| 2026-27 | 85 | 95 | 160 | 330 |
| 2027-28 | 90 | 100 | 170 | 345 |
| 2028-29 | 95 | 105 | 180 | 360 |
| 2029-30 | 100 | 110 | 190 | 375 |
| 2030-31 | 105 | 115 | 200 | 390 |
| 2031-32 | 110 | 120 | 210 | 410 |
| 2032-33 | 115 | 125 | 220 | 430 |
| 2033-34 | 120 | 130 | 230 | 450 |
| 2034-35 | 125 | 135 | 240 | 470 |
| 2035-36 | 130 | 140 | 250 | 490 |
| 2036-37 | 135 | 145 | 260 | 510 |
| 2037-38 | 140 | 150 | 270 | 535 |
| 2038-39 | 145 | 155 | 280 | 560 |
| 2039-40 | 150 | 160 | 295 | 585 |
| 2040-41 | 155 | 165 | 310 | 610 |
| 2041-42 | 160 | 170 | 325 | 635 |
| 2042-43 | 165 | 180 | 340 | 665 |

Table 5-8 : Toll Rates for Monthly Pass@ 172.770 & @104.530

| Year | CAR (Regular) | CAR (Local 1) | CAR (Local 2) | CAR (Local 3) | LCV (Regular) | LCV (Local 1) | LCV (Local 2) | Truck/Bus (Regular) | Truck/Bus (Local 1) | Truck/Bus (Local 2) | HCM /EME MAV | Oversized Vehicles | Truck / Bus (60 Trips) | Truck / Bus (80Trips) |
|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------------|---------------------|---------------------|--------------|--------------------|------------------------|-----------------------|
| 2023-24 | 2715 | 330 | 665 | 1065 | 4390 | 3975 | 3035 | 9195 | 5065 | 8320 | 14420 | 17555 | 10985 | 14715 |
| 2024-25 | 2855 | 345 | 700 | 1120 | 4610 | 4175 | 3185 | 9665 | 5320 | 8735 | 15155 | 18445 | 11545 | 15460 |
| 2025-26 | 3000 | 365 | 735 | 1175 | 4845 | 4385 | 3345 | 10155 | 5585 | 9175 | 15925 | 19385 | 12135 | 16245 |
| 2026-27 | 3155 | 385 | 770 | 1230 | 5095 | 4605 | 3515 | 10675 | 5865 | 9630 | 16735 | 20375 | 12760 | 17075 |
| 2027-28 | 3315 | 405 | 810 | 1295 | 5355 | 4835 | 3690 | 11220 | 6155 | 10115 | 17595 | 21420 | 13415 | 17950 |
| 2028-29 | 3475 | 420 | 845 | 1350 | 5615 | 5050 | 3855 | 11760 | 6435 | 10570 | 18445 | 22455 | 14065 | 18815 |
| 2029-30 | 3645 | 440 | 885 | 1415 | 5885 | 5280 | 4030 | 12330 | 6725 | 11045 | 19335 | 23535 | 14745 | 19725 |
| 2030-31 | 3820 | 465 | 925 | 1475 | 6170 | 5515 | 4210 | 12925 | 7025 | 11540 | 20270 | 24675 | 15460 | 20680 |
| 2031-32 | 4005 | 485 | 965 | 1545 | 6470 | 5765 | 4400 | 13555 | 7345 | 12060 | 21255 | 25875 | 16215 | 21685 |
| 2032-33 | 4200 | 510 | 1010 | 1610 | 6785 | 6025 | 4595 | 14215 | 7675 | 12605 | 22290 | 27135 | 17005 | 22740 |
| 2033-34 | 4405 | 535 | 1055 | 1685 | 7115 | 6295 | 4805 | 14905 | 8020 | 13170 | 23375 | 28455 | 17835 | 23850 |
| 2034-35 | 4620 | 560 | 1105 | 1760 | 7460 | 6580 | 5020 | 15635 | 8380 | 13765 | 24520 | 29850 | 18710 | 25015 |
| 2035-36 | 4845 | 590 | 1155 | 1840 | 7830 | 6875 | 5245 | 16400 | 8755 | 14380 | 25720 | 31310 | 19630 | 26245 |
| 2036-37 | 5085 | 620 | 1205 | 1925 | 8215 | 7185 | 5480 | 17210 | 9150 | 15030 | 26985 | 32850 | 20600 | 27535 |

| Year | CAR (Regular) | CAR (Local 1) | CAR (Local 2) | CAR (Local 3) | LCV (Regular) | LCV (Local 1) | LCV (Local 2) | Truck/Bus (Regular) | Truck/Bus (Local 1) | Truck/Bus (Local 2) | HCM/EME MAV | Oversized Vehicles | Truck / Bus (60 Trips) | Truck / Bus (80Trips) |
|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------------|------------------------|------------------------|----------------|-----------------------|---------------------------|--------------------------|
| 2037-38 | 5335 | 650 | 1260 | 2010 | 8620 | 7505 | 5730 | 18055 | 9560 | 15705 | 28315 | 34470 | 21620 | 28890 |
| 2038-39 | 5600 | 680 | 1315 | 2100 | 9045 | 7845 | 5985 | 18950 | 9990 | 16415 | 29715 | 36175 | 22690 | 30320 |
| 2039-40 | 5875 | 715 | 1375 | 2195 | 9490 | 8195 | 6255 | 19890 | 10440 | 17150 | 31190 | 37970 | 23815 | 31820 |
| 2040-41 | 6170 | 750 | 1435 | 2295 | 9965 | 8565 | 6535 | 20875 | 10910 | 17925 | 32740 | 39855 | 25000 | 33405 |
| 2041-42 | 6475 | 785 | 1500 | 2395 | 10460 | 8950 | 6830 | 21915 | 11405 | 18730 | 34370 | 41840 | 26250 | 35070 |
| 2042-43 | 6800 | 825 | 1570 | 2505 | 10985 | 9355 | 7140 | 23015 | 11915 | 19570 | 36090 | 43935 | 27565 | 36820 |

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Starting from the year 2023-24 are shown in the tables below.

Table 5-9 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | Toll at Plaza 177.2 | Toll at Plaza 104.53 | Total |
|---------|------------------------|-------------------------|---------|
| 2023-24 | 192.61 | 173.20 | 365.81 |
| 2024-25 | 214.84 | 193.16 | 408.00 |
| 2025-26 | 239.19 | 215.09 | 454.28 |
| 2026-27 | 265.06 | 238.26 | 503.32 |
| 2027-28 | 296.69 | 266.68 | 563.36 |
| 2028-29 | 328.56 | 295.40 | 623.95 |
| 2029-30 | 363.50 | 326.72 | 690.22 |
| 2030-31 | 401.84 | 361.36 | 763.20 |
| 2031-32 | 444.74 | 399.86 | 844.60 |
| 2032-33 | 489.47 | 440.08 | 929.56 |
| 2033-34 | 538.93 | 484.59 | 1023.52 |
| 2034-35 | 598.70 | 538.21 | 1136.91 |
| 2035-36 | 658.00 | 591.62 | 1249.62 |
| 2036-37 | 724.69 | 651.52 | 1376.21 |
| 2037-38 | 795.92 | 715.79 | 1511.71 |
| 2038-39 | 876.15 | 787.89 | 1664.05 |
| 2039-40 | 964.89 | 867.87 | 1832.76 |
| 2040-41 | 1055.40 | 949.14 | 2004.54 |

| Year | Toll at Plaza 177.2 | Toll at Plaza 104.53 | Total |
|----------------|--------------------------------|---------------------------------|----------------|
| 2041-42 | 1157.52 | 1041.38 | 2198.91 |
| 2042-43 | 1270.58 | 1143.13 | 2413.71 |

*Table 5-10 : Toll Revenue Pessimistic Scenario
(Rs. Crores)*

| Year | Toll at Plaza 177.2 | Toll at Plaza 104.53 | Total |
|----------------|--------------------------------|---------------------------------|----------------|
| 2023-24 | 191.67 | 172.40 | 364.07 |
| 2024-25 | 212.82 | 191.39 | 404.21 |
| 2025-26 | 235.78 | 212.10 | 447.87 |
| 2026-27 | 260.04 | 233.84 | 493.88 |
| 2027-28 | 289.67 | 260.50 | 550.16 |
| 2028-29 | 319.27 | 287.18 | 606.45 |
| 2029-30 | 351.55 | 316.08 | 667.64 |
| 2030-31 | 386.79 | 347.98 | 734.76 |
| 2031-32 | 426.06 | 383.25 | 809.30 |
| 2032-33 | 466.70 | 419.80 | 886.50 |
| 2033-34 | 511.42 | 460.06 | 971.48 |
| 2034-35 | 565.49 | 508.49 | 1073.98 |
| 2035-36 | 618.56 | 556.30 | 1174.86 |
| 2036-37 | 678.01 | 609.71 | 1287.72 |
| 2037-38 | 741.04 | 666.68 | 1407.72 |
| 2038-39 | 811.78 | 730.35 | 1542.14 |
| 2039-40 | 889.71 | 800.66 | 1690.37 |
| 2040-41 | 968.46 | 871.48 | 1839.95 |
| 2041-42 | 1057.07 | 951.63 | 2008.70 |

| Year | Toll at Plaza 177.2 | Toll at Plaza 104.53 | Total |
|----------------|--------------------------------|---------------------------------|----------------|
| 2042-43 | 1154.70 | 1039.63 | 2194.34 |

*Table 5-11 : Toll Revenue Most Likely Scenario
(Rs. Crores)*

| Year | Toll at Plaza 177.2 | Toll at Plaza 104.53 | Total |
|----------------|--------------------------------|---------------------------------|----------------|
| 2023-24 | 192.13 | 172.80 | 364.93 |
| 2024-25 | 213.81 | 192.25 | 406.06 |
| 2025-26 | 237.48 | 213.58 | 451.06 |
| 2026-27 | 262.54 | 236.06 | 498.59 |
| 2027-28 | 293.16 | 263.61 | 556.77 |
| 2028-29 | 323.89 | 291.31 | 615.20 |
| 2029-30 | 357.46 | 321.39 | 678.85 |
| 2030-31 | 394.21 | 354.65 | 748.86 |
| 2031-32 | 435.28 | 391.52 | 826.80 |
| 2032-33 | 477.95 | 429.88 | 907.83 |
| 2033-34 | 524.99 | 472.21 | 997.20 |
| 2034-35 | 581.85 | 523.21 | 1105.06 |
| 2035-36 | 637.92 | 573.75 | 1211.67 |
| 2036-37 | 700.91 | 630.38 | 1331.29 |
| 2037-38 | 767.94 | 690.93 | 1458.87 |
| 2038-39 | 843.30 | 758.72 | 1602.02 |
| 2039-40 | 926.51 | 833.79 | 1760.30 |
| 2040-41 | 1011.00 | 909.68 | 1920.67 |
| 2041-42 | 1106.18 | 995.71 | 2101.89 |
| 2042-43 | 1211.28 | 1090.41 | 2301.68 |

CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on engineering judgment and experience basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Tumkur to Chitradurga on NH-4 in state of Karnataka.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years. But since project is commissioned and running traffic for last many years, periodic maintenance shall be as per condition of pavement and other infrastructure. Inputs of concessionaire have been taken in this regard.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2022-23 is given in table below.

Table 6-1 : O&M COST

| Year | Annual Maintenance (Rs. Cr) | Thermoplastic Painting (Rs. Cr) | Renewal Coat with BC (Rs. Cr.) | Special Repair of pavement | Structure maintenance (Rs. Cr) | Electric System | | Total Expenditure (Rs. Crores) | Remarks |
|----------------|--------------------------------|------------------------------------|-----------------------------------|----------------------------|-----------------------------------|-----------------|----------|-----------------------------------|---|
| | | | | | | Annual | Periodic | | |
| 2023-24 | 8.56 | | | | 0.01 | 0.04 | | 10.97 | Regular O & M |
| 2024-25 | 8.56 | 0.98 | 13.74 | 19.91 | 0.01 | 0.04 | | 57.94 | Renewal of Wearing course + Pavement repair |
| 2025-26 | 8.56 | | | | 0.01 | 0.04 | | 12.10 | Regular O & M |
| 2026-27 | 8.56 | | | | 0.01 | 0.04 | | 12.70 | Regular O & M |
| 2027-28 | 8.56 | | | | 0.01 | 0.04 | | 13.34 | Regular O & M |
| 2028-29 | 8.56 | | | | 0.01 | 0.04 | | 14.01 | Regular O & M |
| 2029-30 | 8.56 | 0.98 | 13.74 | 19.91 | 0.01 | 0.04 | | 73.94 | Renewal of Wearing course + Pavement repair |
| 2030-31 | 8.56 | | | 1.81 | 0.01 | 0.04 | | 18.69 | Regular O & M |
| 2031-32 | 8.56 | | | 1.81 | 0.01 | 0.04 | | 19.63 | Regular O & M |
| 2032-33 | 8.56 | | | 1.81 | 0.01 | 0.04 | | 20.61 | Regular O & M |
| 2033-34 | 8.56 | | | 1.81 | 0.01 | 0.04 | | 21.64 | Regular O & M |
| 2034-35 | 8.56 | 1.72 | 13.74 | 28.96 | 0.01 | 0.04 | | 115.74 | Renewal of Wearing course + Pavement repair |
| 2035-36 | 8.56 | | | 1.81 | 0.01 | 0.04 | | 23.86 | Regular O & M |
| 2036-37 | 8.56 | | | 2.17 | 0.01 | 0.04 | | 25.92 | Regular O & M |

| Year | Annual Maintenance | Thermoplastic Painting | Renewal Coat with | Special Repair of | Structure maintenance | Electric System | | Total Expenditure | Remarks |
|---------|--------------------|------------------------|-------------------|-------------------|-----------------------|-----------------|--|-------------------|---------------|
| 2037-38 | 2.57 | | | | 0.01 | 0.04 | | 6.60 | Regular O & M |

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Tumkur to Chitradurga section of NH-4 in state of Karnataka from km 75.000 to km 189.000 is currently Six lane road. The road is in sound condition and serves to good traffic volume. As Indian economy is poised to grow at 7%+ post COVID-19, project corridor is expected to pick up same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. Following can considered as major outcome of study:

- a) There is good amount of tollable traffic running on project.
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future in post COVID-19 scenario due to various development in area and overall development of economy.
- c) Project corridor has committed traffic as long route traffic and does not have risk of traffic leakage due lack of competing road of comparable quality.

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.

CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs.



Figure 8-1 : General Condition of project road



Figure 8-2 : General Condition of project road



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