

(A subsidiary of
IRB INFRASTRUCTURE DEVELOPERS LTD)

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CIN : U45200MH2002PTC135512

May 6, 2024

To,
National Stock Exchange of India Limited
Exchange Plaza
Plot no. C/1, G Block
Bandra-Kurla Complex, Bandra (East)
Mumbai 400051

Dear Sir,

Ref.: NSE Symbol: IRBIT / Series: IV

Subject: Valuation Report & Toll Revenue Projection Report for the financial year ended March 31, 2024

We are enclosing herewith the Valuation Report dated May 3, 2024, issued by M/s. KPMG Valuation Services LLP [IBBI Reg. No. IBBI/RV-E/06/2020/115], as on March 31, 2024, for IRB Infrastructure Trust (the “Trust”).

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:

| Particulars | (Rs. in Million) |
|--|-------------------------|
| A. Assets | 567,707.56 |
| B. Liabilities (at book value) | 267,667.46 |
| C. Net Assets [A-B] | 300,040.10 |
| D. Outstanding Units (in million) | 1,113.69 |
| E. NAV at Fair Value (Rupees/per Unit) [C/D] | 269.41 |

You are requested to note the same.

For MMK Toll Road Private Limited
(in its capacity as Investment Manager to IRB Infrastructure Trust)

Kaustubh Shevade
Company Secretary & Compliance Officer

Encl.: As above.



Security Cover

Valuation Report

—

May 2024





IRB Infrastructure Trust

Valuation of IRB Infrastructure Trust and its SPVs

Valuation Report

—

May 2024





Strictly private and confidential

03 May 2024

IRB Infrastructure Trust
1101, Hiranandani Knowledge Park,
Technology Street, Hill Side Avenue,
Powai, Mumbai – 400 076

Dear Sir,

Valuation Report (“Valuation Report”)

This is in accordance with the terms of reference set out in our Letter of Engagement dated 16 October 2023 (“LoE”), wherein KPMG Valuation Services LLP (Registered valuer entity under Companies (Registered Valuers and Valuation) Rules, 2017 having IBBI Registration No. IBBI/RV-E/06/2020/115) (hereinafter referred to as the “KPMG ” or “Us” or “We”) has been appointed by IRB Infrastructure Trust (“the Client”, or “IRBI Trust/Trust”, or “the Company” or “You”) in relation to carrying out Enterprise Valuation of 15 Special Purpose Vehicles (“SPVs” or “IRBI Trust Assets”) of IRBI Trust and Equity Valuation of IRBI Trust (jointly referred as “Targets”) as on the agreed date of the valuation in accordance with Regulation 21 of the Securities Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 (“SEBI InvIT Regulations”) where valuation is required to be conducted by a registered valuer (as defined under section 247 of the Companies Act, 2013) and such valuation report (“Report”) is required to be in compliance with the SEBI InvIT Regulations (“Engagement”).

The date for the valuation is 31 March 2024 (“Valuation Date”).

We hereby enclose our Valuation Report dated 03 May 2024. This is our deliverable and sets out KPMG’s conclusions on the valuation of the Targets and has been prepared in accordance with the LoE as of Valuation Date. The report is based on the information provided to KPMG by the management of the Targets (“Management”). As detailed in the enclosed Valuation Report, the NAV at fair value per unit of IRBI Trust is **INR 269.41 per unit** as on 31 March 2024.

The Valuation Report is confidential to the Client and will be used by the Client only for the purpose, as indicated in this Report, for which we have been appointed. The results of our valuation analysis and our Report cannot be used or relied by the Client for any other purpose or by any other party for any other purpose whatsoever.

The Valuation Report is issued by us on the express understanding that it shall not be copied, disclosed or circulated or referred to in correspondence or in discussion with any third party or used for any other purpose without KPMG’s prior written consent. We are aware that the Report may have to be shared with certain regulatory authorities in India and stock exchanges in India and therefore Report may enter the public domain and hereby provide our consent to such sharing. It is clarified that reference to this Valuation Report in any document and/ or filing with aforementioned regulatory authorities/ stock exchanges in India, shall not be deemed to be an acceptance by the Valuer of any responsibility or liability to any person/ party other than the Client.

We will not, pursuant to the Letter of Engagement, perform any management functions for You, nor make any decisions. You are responsible for making management decisions, including accepting responsibility for the results.

The Valuation Report does not constitute an offer or invitation to any section of the public to subscribe for or purchase any securities in, or the other business or assets or liabilities of the Targets or Client. This letter forms an integral part of the Valuation Report and should be read in conjunction with the Valuation Report enclosed herein.

For KPMG Valuation Services LLP
Yours faithfully

Amit Jain
IBBI Registered Valuer
RV No- IBBI/RV/06/2018/10501



Glossary

| | | | | | |
|----------------|--|-------------------|---|-----------------------|---|
| % | Percentage | IKTPL | IRB Kota Tollway Private Limited | NHIDCL | National Highway and Infrastructure Development Corporation Limited |
| A | Actual | ILTPL | IRB Lalitpur Tollway Private Limited | NWC | Net Working Capital |
| Adj. | Adjusted | IMF | International Monetary Fund | O&M | Operation and Maintenance |
| AETL | AE Tollway Limited | IMHTL | IRB Hapur Moradabad Tollway Limited | PAT | Profit After Tax |
| B | Budgeted | INR | Indian Rupee | PBT | Profit Before Tax |
| bn | Billion | InvIT | Investment Trust | PDTPL | Palsit Dankuni Private Tollway Limited |
| CAGR | Compounded Annual Growth Rate | IRBI Trust | IRB Infrastructure Trust | PIB | Press Information Bureau |
| Capex | Capital Expenditure | IRBIDL | IRB Infrastructure Developers Limited | PV | Present Value |
| CGTL | CG Tollway Limited | IWTL | IRB Westcoast Tollway Limited | R(f) | Risk free rate of Return |
| CoCo | Comparable Companies | k | Thousands | R(m) | Market rate of Return |
| COD | Commercial operation date | Kd | Cost of Debt | Rf | Risk-free Rate |
| CoTrans | Comparable Transactions | Ke | Cost of Equity | SEBI | Securities and Exchange Board of India |
| Cr | Crore | KGTL | Kishangarh Gulabpura Tollway Limited | Sponsor | IRB Infrastructure Developers Limited |
| CWIP | Capital Work In Progress | Km | Kilometer | SPV | Special Purpose Vehicle |
| DBFOT | Design, Build, Finance, Operate and Transfer | KPMG | KPMG Valuation Services LLP | STPL | Samakhiali Tollway Private Limited |
| DCF | Discounted Cash Flow | KTL | Kaithal Tollway Limited | SYTL | Solapur Yedeshi Tollway Limited |
| EBIT | Earnings Before Interest and Tax | LoE | Letter of Engagement | t | Trillion |
| EBITDA | Earnings Before Interest, Tax, Depreciation and Amortization | Management | Management of IRBI Trust and its 12 SPVs | UTL | Udaipur Tollway Limited |
| EV | Enterprise Value | MAT | Minimum Alternate Tax | Valuation Date | 31 March 2024 |
| FCFF | Free Cash Flows to Firm | mn | Million | WACC | Weighted Average Cost Of Capital |
| FV | Fair Value | MoRTH | The Ministry of Road Transport and Highways | WPI | Wholesale Price Index |
| FY | Financial Year | n.a. | Not applicable | YATL | Yedeshi Aurangabad Tollway Limited |
| IBEF | India Brand Equity Foundation | n.m. | No Meaningful Figure | y-o-y | Year on year |
| IGEPL | IRB Golconda Expressway Private Limited | NA | Not applicable | YTD | Year to date |
| IGTPL | IRB Gwalior Tollway Private Limited | NAV | Net Asset Value | | |
| | | NHAI | National Highways Authority of India | | |

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1.

Executive Summary

Overview

Terms of the Engagement

- We have been appointed by IRBI Trust to undertake Enterprise Valuation of 15 Special Purpose Vehicles of IRBI Trust and Equity Valuation of IRBI Trust in accordance with Regulation 21 of the SEBI InvIT Regulations where valuation is required to be conducted by a registered valuer and such valuation report is required to be in compliance with the SEBI InvIT Regulations.
- As per the LoE, the valuation is to be carried out as on 31 March 2024. This report has been prepared by KPMG pursuant to terms of LoE.
- As at 31 March 2024 IRBI Trust assets comprised of the following 15 SPVs.
 - IRB Westcoast Tollway Limited (“IWTL”)
 - Solapur Yedeshi Tollway Limited (“SYTL”)
 - Yedeshi Aurangabad Tollway Limited (“YATL”)
 - Kaithal Tollway Limited (“KTL”)
 - AE Tollway Limited (“AETL”)
 - Udaipur Tollway Limited (“UTL”)
 - Chittorgarh Gulabpura Tollway Limited (“CGTL”)
 - Kishangarh Gulabpura Tollway Limited (“KGTL”)
 - IRB Hapur Moradabad Tollway Limited (“IHMTL”)
 - Palsit Dankuni Tollway Private Limited (“PDTPL”)
 - IRB Golconda Expressway Private Limited (“IGEPL”)
 - Samakhiali Tollway Private Limited (“STPL”)
 - IRB Kota Tollway Private Limited (“IKTPL”)
 - IRB Lalitpur Tollway Private Limited (“ILTPL”)
 - IRB Gwalior Tollway Private Limited (“IGTPL”)

Valuation Approach and Methodology

| Approach | Method |
|-----------------|-----------------------------------|
| Income Approach | Discounted Cash Flow Method (DCF) |

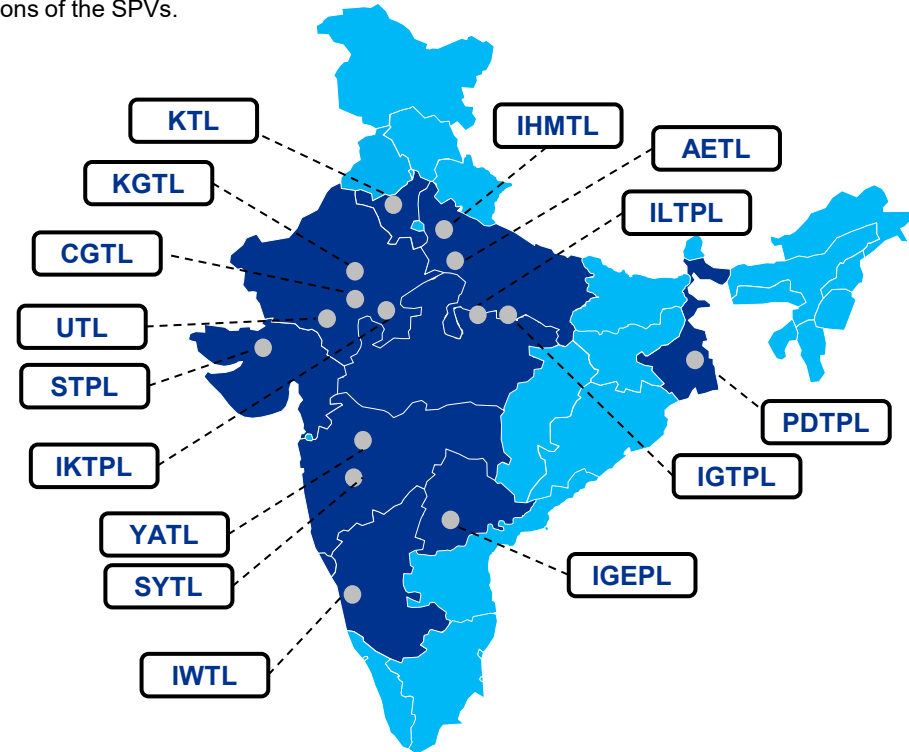
Source(s): Management information, KPMG analysis



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SPV Overview

IRBI Trust has acquired 11 DBFOT assets and 4 TOT asset from the sponsors in the states of Maharashtra, Gujarat, Rajasthan, Goa, Karnataka, Haryana, Madhya Pradesh, Uttar Pradesh, Telangana and West Bengal, which are being managed in pursuant to concessions granted by the National Highways Authority of India (“NHAI”) / Hyderabad Metropolitan Development Authority. IRBI Trust holds 100% equity interest in the SPVs. The map below represents the locations of the SPVs.



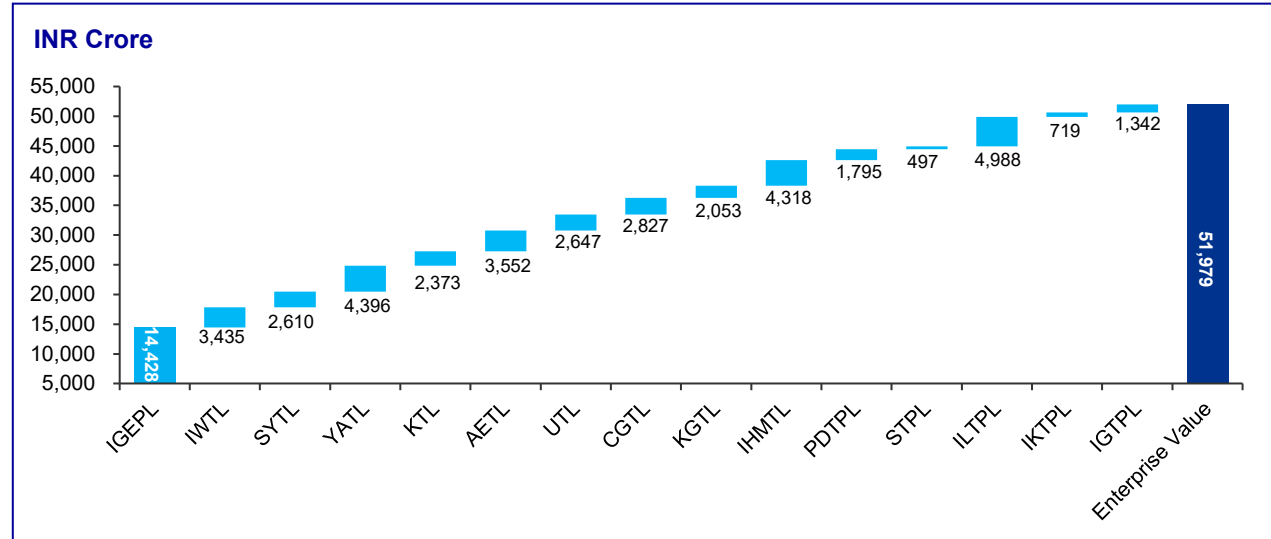
Valuation Conclusion

Valuation Conclusion (INR Crs)

| Valuation Conclusion 31 March 2024 | | INR Crore |
|---|--|---------------|
| IRB Golconda Expressway Private Limited | | 14,428 |
| IRB Westcoast Tollway Limited | | 3,435 |
| Solapur Yedeshi Tollway Limited | | 2,610 |
| Yedeshi Aurangabad Tollway Limited | | 4,396 |
| Kaithal Tollway Limited | | 2,373 |
| AE Tollway Limited | | 3,552 |
| Udaipur Tollway Limited | | 2,647 |
| CG Tollway Limited | | 2,827 |
| Kishangarh Gulabpura Tollway Limited | | 2,053 |
| IRB Hapur Moradabad Tollway Limited | | 4,318 |
| Palsit Dankuni Tollway Private Limited | | 1,795 |
| Samakhiali Tollway Private Limited | | 497 |
| Lalitpur Tollway Private Limited | | 4,988 |
| IRB Kota Tollway Private Limited | | 719 |
| IRB Gwalior Tollway Private Limited | | 1,342 |
| Enterprise Value of the SPVs | | 51,979 |
| Cash and cash Equivalents | | 161 |
| Surplus | | 178 |
| Debt | | (21,690) |
| PV of standalone expense pertaining to InvIT | | (227) |
| Capex creditors | | (397) |
| Equity Value of IRBI Trust | | 30,004 |
| NAV at fair value per unit as on 31 March 2024 | | |
| Equity Value of IRBI Trust (INR Cr) | | 30,004 |
| Units outstanding (No.) | | 1,113,693,265 |
| NAV at fair value per unit (INR) | | 269.41 |

Source(s): Management information, KPMG analysis

Enterprise Value of SPVs



The Enterprise Value of the SPVs is INR 51,979 crores and the 100% Equity Value of the IRBI Trust is INR 30,004 crores as on 31 March 2024.

The NAV at fair value per unit of IRBI Trust as on 31 March 2024 is INR 269.41 per unit.

Note: SPVs are individually referred as “Target”, “Business”, “Company”, “SPV” or the “Asset” Collectively referred as SPVs or Assets

2.

IRBI Trust Overview

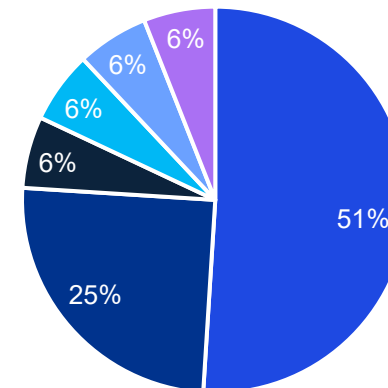
IRBI Trust Overview

IRBI Trust - Overview

- IRB Infrastructure Developers Limited (“IRBIDL” or “sponsor”) is one of the largest infrastructure development and construction companies in India in the roads and highways sector. It was incorporated on 27 July 1998 and is based in Mumbai, India.
- IRBI Trust has been settled by the sponsor as an irrevocable trust under the provisions of the Trusts Act in New Delhi, India pursuant to the Indenture of Trust dated August 27, 2019, as amended. The Indenture of Trust is registered under the Registration Act. IRBI Trust is registered with the SEBI as an infrastructure investment trust under the InvIT regulations.
- The object and purpose of IRBI Trust is to carry on the activity of an infrastructure investment trust under the InvIT regulations. Investment by the IRBI Trust shall only be in holding companies, SPVs, infrastructure projects, securities in India or other permitted investments in accordance with the InvIT regulations, the investment strategy and IRBI Trust documents.
- As at 31 March 2024 IRBI Trust assets comprised of 15 SPVs. IRBI Trust has acquired 11 DBFOT road assets and 4 TOT road asset from the sponsor. All SPVs of IRBI Trust are revenue generating. Refer subsequent slides for more details.
- IRBI trust is held by IRBIDL as sponsor with 51% stake and remaining 49% stake is held by GIC through its affiliates.
- IRBI Trust has in March 2024 by way of right issue issued 92.0 Mn units to the eligible unitholders of the IRBI Trust at an issue price of INR 244.86 per unit aggregating to INR 2,252.70 Cr. The purpose of the issue was to acquire and fund total project cost of IGEPL.
- The IRBI Trust is required to make distributions to the unitholders in accordance with the InvIT regulations and the distribution policy.

Source(s): Management information, IRBI Trust website, Provisional Consolidated Trust Financials FY2024

Shareholding Pattern of IRBI Trust as on 31 March 2024

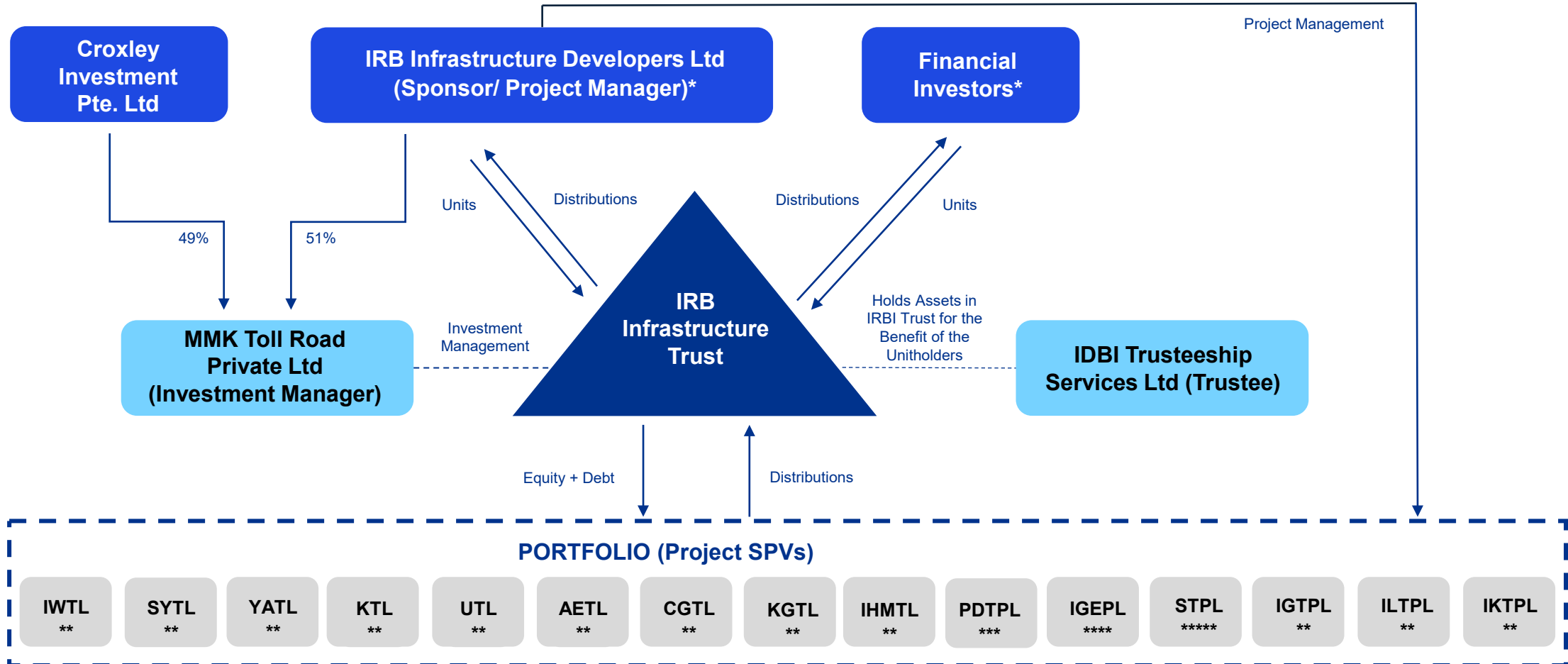


- IRB Infrastructure Developers Ltd
- Anahera Investments Pte Ltd
- Bricklayers Investment Pte Ltd
- Chiswick Investments Pte Ltd
- Stretford End Investments Pte Ltd
- Dangenham Investments Pte Ltd

Key related parties of the IRBI Trust

| Role | Entity Name |
|--------------------|---------------------------------------|
| Sponsor | IRB Infrastructure Developers Limited |
| Investment manager | MMK Toll Road Private Limited |
| Trustee | IDBI Trusteeship Services Limited |

Structure of the IRBI Trust



* Unitholders in the IRBI Trust
 ** 100% of each project SPV held by the IRBI Trust, together with nominee shareholders.
 *** 99.96% of PDTPL held by the IRBI Trust, with the Sponsor and Sponsor's nominee shareholders holding the remaining 0.04%.
 **** 99.99% of IGEPL held by the IRBI Trust, with the Sponsor and Sponsor's nominee shareholders holding the remaining 0.01%.
 ***** 99.96% of STPL held by the IRBI Trust, with the Sponsor and Sponsor's nominee shareholders holding the remaining 0.04%.
 Source(s): IRBI Trust Corporate Presentation, Management



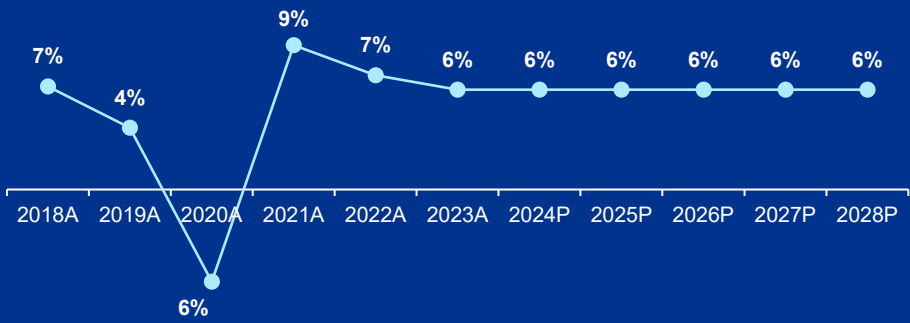
3.

Industry Overview

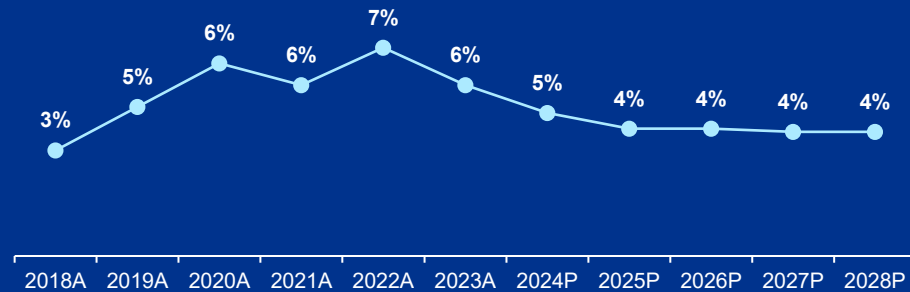
Indian Economy Outlook

Strong economic growth in the first quarter of 2023 helped India overcome the UK to become the fifth-largest economy after it recovered from the COVID-19 pandemic shock. Also, according to IMF economic outlook, India continues to be the fastest-growing economy in the world.

Real GDP growth rate (%)



Annual percentage changes of average consumer prices (%)



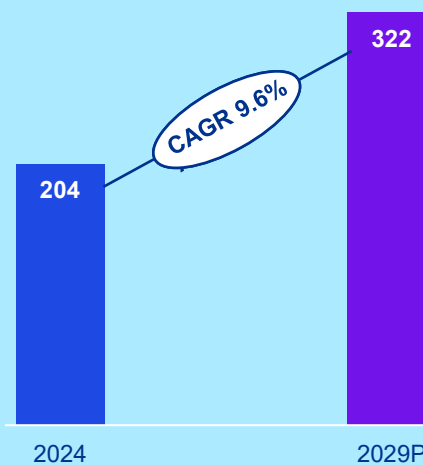
Source(s): International Monetary Fund ("IMF"), India Brand Equity Foundation ("IBEF"), Modor intelligence, EMIS

Infra Sector

Infrastructure is a key enabler in helping India become a USD 26 trillion economy by 2047. The government has announced a strong pipeline of infra projects across sectors.

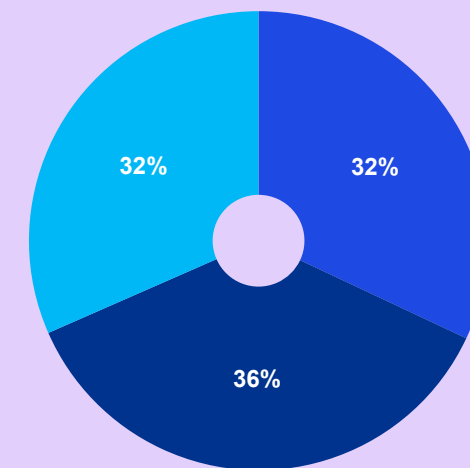
Capital investment outlay for infrastructure is being increased by 33 per cent, which would be 3.3 per cent of GDP and almost three times the outlay in 2019-20.

India Infrastructure market (USD billion)



Construction Industry

Market segmentation of India's Construction industry (2022)



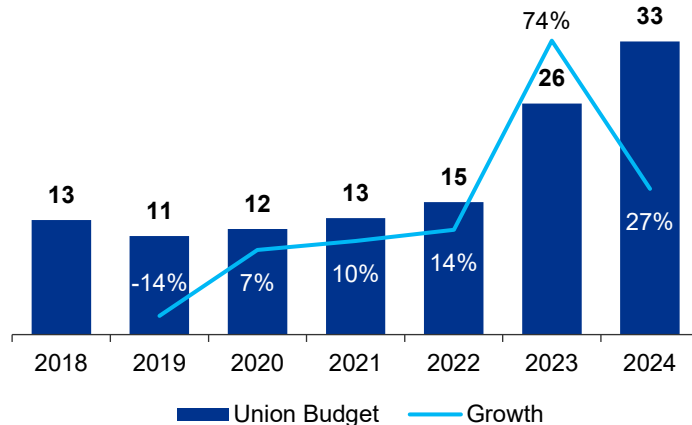
- Infrastructure construction
- Residential construction
- Commercial and special economic zones

Road Transport and Highways

Road Transport and Highways sector

- The Ministry of Road Transport and Highways (“MoRTH”) formulates and administers policies for road transport, national highways and transport research. It is also involved with the construction and maintenance of the National Highways (“NHs”) through the National Highways Authority of India (“NHAI”), and the National Highway and Infrastructure Development Corporation Limited (“NHIDCL”). NHAI is an agency of MoRTH which is also responsible for the toll collection on several highways.
- The Union Budget 2023-24 underscored the central government’s focus on infrastructure development in India with a big increase in infrastructure spending.

Outlay for Roads under the Union Budget (USD billion)



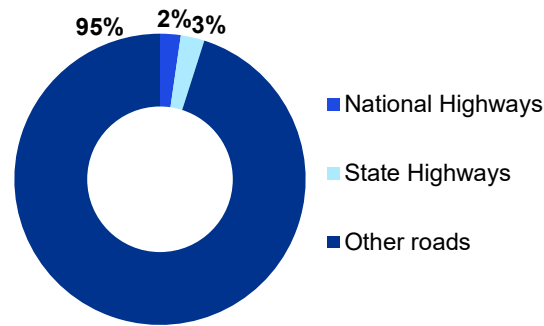
*2023 data is as of 30 December 2022

Source(s): MoRTH, IBEF, Invest India

2nd

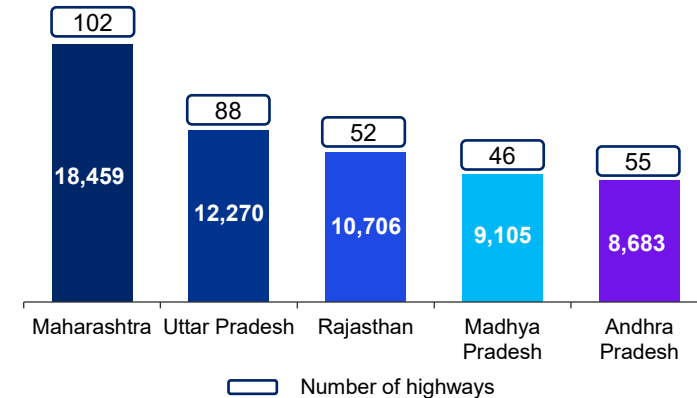
India has the second largest road network in the world of about 67 lakh km. This comprises National Highways, Expressways, State Highways, District Roads, Other District Roads and Village Roads.

Road & Highway – classification breakup



As per the data from Ministry of Road Transport and Highways, National Highways (NHs) make up for about 2.2 per cent (1,46,145 km) of the total road network of India (66,71,083 km).

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



National Highways carry over 40 per cent of the total traffic across the length and breadth of the country. Maharashtra has the largest network of National Highways with 18,459 km (12.7%). As per MoRTH, there are 962 highways in India. (State-wise split is as per Dec 2022)

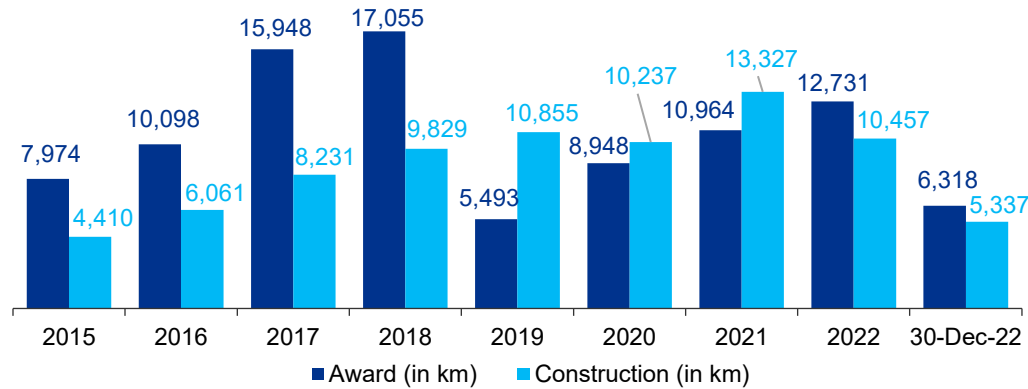
36.2%

The market for roads and highways in India is projected to grow at a CAGR of 36.2 per cent during 2016-2025, on account of growing government initiatives to improve transportation infrastructure in the country.

Key drivers of the sector

Pace of length of highways awarded and constructed (in kms)

The awarding of projects has picked up pace after the sanction of ambitious Bharatmala programme. The Government of India has allocated INR 1.9 lakh crore under the National Infrastructure Pipeline for 2025. The government also aims to construct 23 new national highways by 2025.



CAGR - Length of highways constructed



Estimated toll collection (in INR lakh crore)



Road construction target (in km)



Estimated road constructed per day

Source(s): MoRTH, Press Information Bureau ("PIB"), RTO Care, Money control

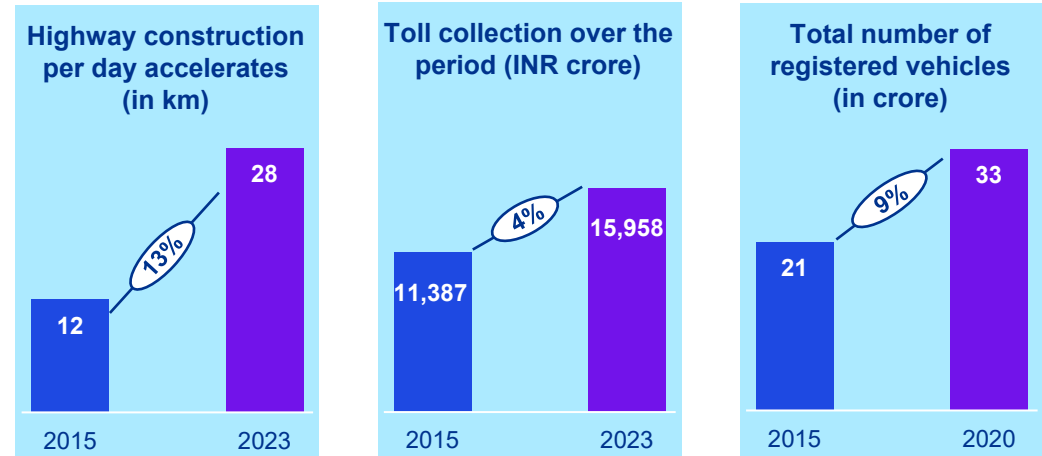
Toll operations efficiency increased due to adoption and growth of FASTag

7.9 Cr

As of 30th November 2023, banks have issued over 7.9 crore FASTags with an average daily ETC transactions of 86.6 lakhs.

147 Cr

The average daily collection via FASTag on NH fee plaza is INR 147.3 crore thereby increasing efficiency in toll operations.



2023 data is as of 05 January 2024
○ - CAGR

Government has implemented multiple initiatives in the last 9 years to augment the capacity of the National Highway infrastructure in the country. The pace of National Highways construction has increased consistently between 2014-15 and 2022-23 due to the systematic push through corridor-based National Highway development approach.

Financing in road infrastructure

Financing infrastructure

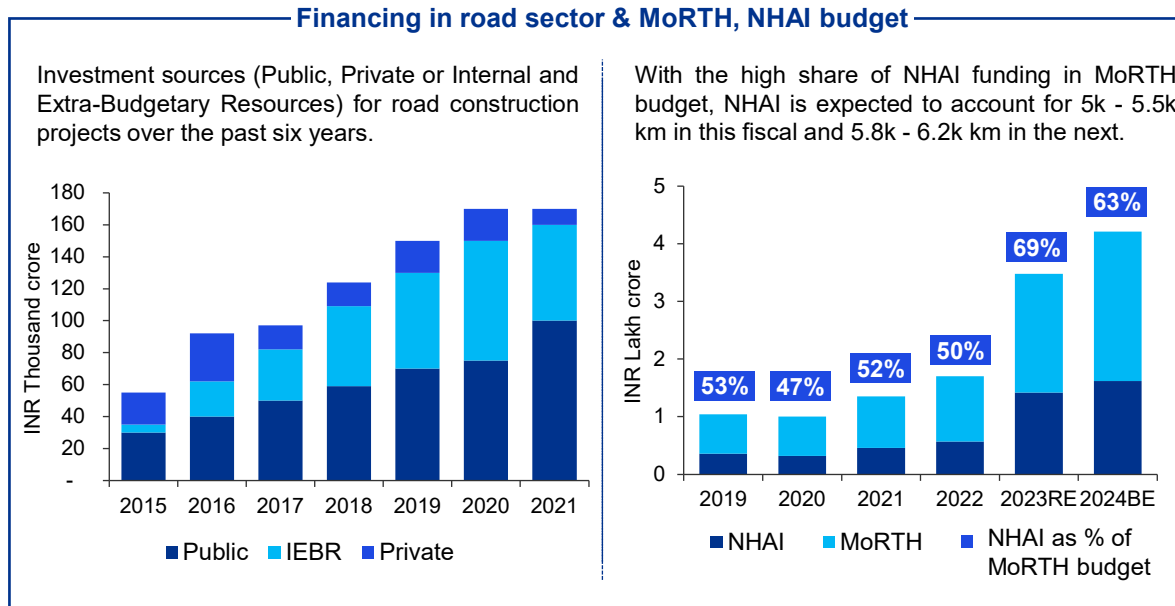
Investment in road infrastructure is long-term and returns are seen several years after construction. Roads and highways are financed through Government and private sources. Funding from Government sources includes budgetary allocations.

Private financing

Under private financing, the private developer builds a road, and in return has the right to collect toll for a specified period of time. The developer is responsible for the maintenance of roads during this period.

Public financing

Funding from government sources includes budgetary allocations, which are financed from taxes, cesses, or dedicated road funds. Publicly funded projects are usually given to contractors under various contract models such as the Engineering Procurement Construction (EPC).



Types of projects awarded by NHA

a. Engineering Procurement & Construction

Under the EPC model, Government pays private players to lay roads. The private player has no role in the road's ownership, toll collection or maintenance.

b. Build Operate Transfer ("BOT")

Private players build, operate and maintain the road for a specified period before transferring the asset back to the Government. The private player arranges all the finances for the project, while collecting toll revenue/annuity fee from the Government.

c. Hybrid Annuity Model ("HAM")

HAM is a hybrid model, a mix of the EPC and BOT (build, operate, transfer) models. HAM combines EPC (40 per cent) and BOT-Annuity (60 per cent). On behalf of the government, NHA releases 40 per cent of the total project cost. The balance 60 per cent is arranged by the developer.



Source(s): PRS Legislative research, IBEF, CRISIL, MoRTH, Invest India
RE – Revised estimate, BE – Budgeted estimate

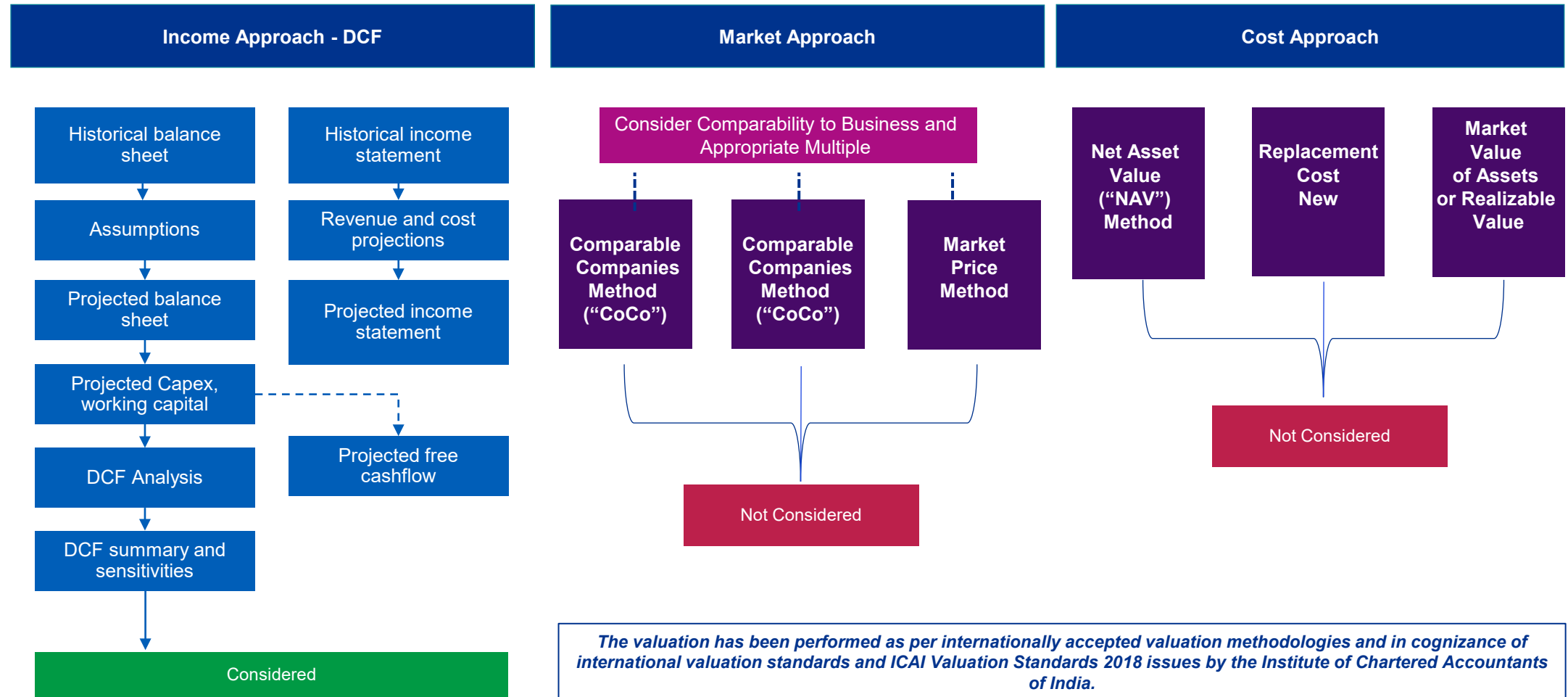
4.

Valuation Methodology and Approach



Valuation Methodology and Approach

Methodology and Approach



Valuation Methodologies - Income Approach



Discounted Cash Flows (“DCF”)

- Under a DCF approach, forecast cash flows are discounted back to the present date, generating a net present value for the cash flow stream of the business. A terminal value at the end of the explicit forecast period is then determined and that value is also discounted back to the valuation date to give an overall value for the business.
- A discounted cash flow methodology typically requires the forecast period to be of such a length to enable the business to achieve a stabilized level of earnings, or to be reflective of an entire operation cycle for more cyclical industries.
- The rate at which the future cash flows are discounted (“the discount rate”) should reflect not only the time value of money, but also the risk associated with the business’ future operations. The discount rate most generally employed is weighted average cost of capital (“WACC”), reflecting an optimal as opposed to actual financing structure.
- In calculating the terminal value, regard must be had to the business’ potential for further growth beyond the explicit forecast period. The “constant growth model”, which applies an expected constant level of growth to the cash flow forecast in the last year of the forecast period and assumes such growth is achieved in perpetuity, is a common method. These results would be cross-checked, however, for reasonability to implied exit multiples.
- Due to the finite life of the concession period of the SPVs, we have not computed a terminal value for the valuation of the SPVs.
- The rate at which future cash flows are discounted should reflect not only the time value of the cash flows but also the risk associated with the business’ future operations. This means that in order for a DCF to produce a sensible valuation figure, the importance of the quality of the underlying cash flow forecasts is fundamental.
- The DCF approach has been applied in the valuation of the SPVs.

Valuation Methodologies - Market Approach



Comparable Companies ("CoCo")

- Under comparable companies method, the value of shares / business of a company is determined based on market multiples of publicly traded comparable companies. Although no two companies are entirely alike, the companies selected as comparable companies should be engaged in the same or a similar line of business as the subject company.
- The appropriate multiple is generally based on the performance of listed companies with similar business models and size.
- The CoCo methodology has been not been applied in the valuation of IRBI Trust and SPVs.
- The list of companies in the road segment have mix of assets which are at different stages of operation / development / revenue mix/ leasing period. Therefore, comparable companies' method is not considered.



Comparable Transactions ("CoTrans")

- Under comparable transactions method, the value of shares / business of a company is determined based on market multiples of publicly disclosed transactions in the similar space as that of the subject company. Due to different purposes of investments, transaction rationale and synergy benefits, different control premiums and minority discounts are embedded in the transaction values.
- Multiples are generally based on data from recent transactions in a comparable sector, but with appropriate adjustment after consideration has been given to the specific characteristics of the business being valued.
- The list of transactions in the road segment have mix of assets which are at different stages of operation / development / revenue mix/ leasing period. Therefore, Therefore, comparable transactions method has not been considered for the valuation of IRBI Trust and SPVs.



Market Price Method

- Under this approach, the value of the business is arrived at considering the market price of the company based on the daily moving averages of the last six-month volume traded weighted average of closing price on the stock exchange where the company's shares are most frequently traded.
- The market price methodology has not been considered in the valuation of IRBI Trust and SPVs as it is not publicly listed or traded on any stock exchange.

Valuation Methodologies – Cost Approach



Net Asset Value (“NAV”) Method

- Under the net asset value approach, total value is based on the sum of net asset value as recorded on the balance sheet.
- A net asset methodology is most applicable for businesses where the value lies in the underlying assets and not the ongoing operations of the business.
- The net assets methodology has not been considered for the valuation of IRBI Trust and SPVs as the Targets are operational and the financials are made on a going concern basis.



Replacement Cost New

- The replacement cost of a business is the cost of acquiring similar assets employed in the business and/or reaching a similar level of development. A purchaser, faced with a build versus buy scenario, may be prepared to pay significantly over and above this cost to obtain advantages including time saved in developing a similar business, and risk of failure.
- The replacement cost method quantifies the cost and risk to reach the present stage of development.
- This approach is often used for start-up/non-mature technology or biotech businesses.
- Hence, the replacement cost method has not been considered.



Market Value of Assets or Realizable Value

- Under the market value methodology, total value is based on the sum of market value of asset value less market value of liabilities plus, the value of intangible assets not recorded on the balance sheet.
- This methodology is most applicable for businesses where the value lies in the underlying assets and not the ongoing operations of the business.
- Hence, the market value method has not been considered.



WACC Analysis

Discount Rate and Terminal Value

Discount rate

In order to determine the discount rate, we have used the WACC methodology as set out below:

$$\text{WACC} = K_e * (E/(D + E)) + K_d * (1-T) * (D/(D + E))$$

Where:

| | | |
|-------|---|-------------------------|
| K_e | = | cost of equity |
| E | = | market value of equity |
| K_d | = | cost of debt |
| D | = | market value of debt |
| T | = | corporate taxation rate |

Terminal Value

- Due to the finite life of the concession period of the SPVs, we have not computed a terminal value for the valuation of the SPVs.

The cost of equity is derived using the Capital Asset Pricing Model (“CAPM”) as follows:

Where:

| | | |
|-----------------|---|---|
| K_e | = | $R_f + \beta * (R_m - R_f) + \alpha$ |
| R_f | = | the current return on risk-free assets |
| R_m market | = | the expected average return of the market |
| $(R_m - R_f)$ | = | the average risk premium above the risk - free rate that a “market” portfolio of assets is earning |
| β | = | the beta factor, being the measure of the systematic risk of a particular asset relative to the risk of a portfolio of all risky assets |
| α | = | company specific risk factor (alpha) |

Summary - WACC

| WACC calculation | | | | | | | | | | | | | | | |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Name of SPV | IWTL | SYTL | YATL | KTL | AETL | UTL | CGTL | KGTL | IHMTL | PDTPL | IGEPL | STPL | ILTPL | IGTPL | IKTPL |
| Risk free rate of return | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% | 7.1% |
| India risk premium | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% | 7.0% |
| Beta | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Alpha | - | - | - | - | - | - | - | - | - | 1% | - | 1% | - | - | - |
| Cost of Equity | 13.8% | 13.8% | 13.8% | 13.8% | 13.8% | 13.8% | 13.8% | 13.8% | 13.8% | 14.8% | 13.8% | 14.8% | 13.8% | 13.8% | 13.8% |
| Cost of Debt | 8.60% | 8.60% | 8.60% | 8.60% | 8.60% | 8.75% | 8.75% | 8.60% | 8.60% | 9.00% | 8.75% | 9.00% | 8.75% | 8.75% | 8.75% |
| Tax Rate | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% | 25.2% |
| After Tax Cost of Debt | 6.4% | 6.4% | 6.4% | 6.4% | 6.4% | 6.5% | 6.5% | 6.4% | 6.4% | 6.7% | 6.5% | 6.7% | 6.5% | 6.5% | 6.5% |
| Debt to Capital % | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% |
| Equity to Capital % | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% |
| Weighted Average Cost of Capital | 9.40% | 9.40% | 9.40% | 9.40% | 9.40% | 9.46% | 9.46% | 9.40% | 9.40% | 9.98% | 9.46% | 9.98% | 9.46% | 9.46% | 9.46% |

Refer annexure 2a, 2b and 2c for detailed WACC workings.

Refer subsequent slides for valuation of each SPV based on the discount rates.

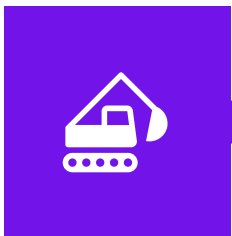
5.

Valuation of Individual SPVs



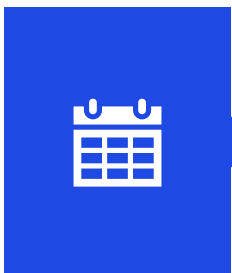
IRB Westcoast Tollway Limited

Overview



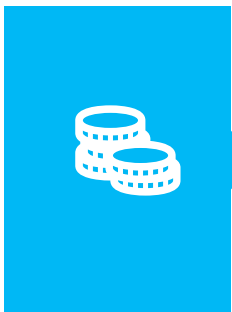
Project details

IWTL was engaged for four laning the existing two lane highway on DBFOT basis. The project stretch is 187.28 kms long involving the Goa/Karnataka border to Kundapur Section of NH-17 from 93.7 kms to 283.3 kms in Karnataka with 3 toll plazas.



Concession period

IWTL is required to construct, operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 28 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 5.6 years.



Premium

There is no premium clause in the concession agreement.

Source(s): Management information

Highlights

| Particulars | Details |
|--|----------------------------------|
| Project location | Goa/Karnataka border to Kundapur |
| Concessionaire | IWTL |
| State | Karnataka |
| Tollable length (kms) | 187.28 |
| No. of toll plazas | 3 |
| Concession agreement date | 25-Mar-13 |
| Appointed date | 3-Mar-14 |
| Four laning completion certificate date | 19-Mar-23 |
| Scheduled end date | 2-Mar-42 |
| New scheduled end date | 6-Feb-48 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHA and IWTL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 44% |
| 1.5% increase for every 1% decrease | 67% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 5.6 |
| Revised concession period | 33.6 |
| Scheduled end date | 02-Mar-42 |
| New scheduled end date | 06-Feb-48 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 124 days on account of covid-19. (included above)
- The Management has confirmed to us to consider revised concession period till 6 February 2048. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 6 February 2048.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHA shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 2% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that IWTL has 80IA benefit from FY2024 to FY2033, the same has been considered while calculating forecast tax outflows along with any carried forward business loss and unabsorbed depreciation. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Discounted Cash Flows (1/3)

| Discounted Cash Flow | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | 168 | 188 | 210 | 236 | 262 | 294 | 326 | 365 | 403 |
| EBITDA [A] | 99 | 160 | 180 | 206 | 121 | 222 | 293 | 331 | 367 |
| EBITDA margin | 59% | 85% | 86% | 87% | 46% | 75% | 90% | 91% | 91% |
| Depreciation | (27) | (30) | (33) | (37) | (41) | (43) | (45) | (50) | (55) |
| EBIT | 72 | 131 | 146 | 168 | 79 | 178 | 248 | 281 | 312 |
| EBIT margin | 43% | 69% | 70% | 71% | 30% | 61% | 76% | 77% | 77% |
| Less: Tax on EBIT [B] | (13) | (23) | (26) | (29) | (14) | (31) | (43) | (49) | (54) |
| Change in working capital [C] | 41 | - | - | - | - | - | - | - | - |
| Less : Capex [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm E = [A+B+C+D] | 127 | 138 | 154 | 176 | 107 | 190 | 250 | 282 | 312 |
| Discounting period | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 |
| Present value of cash flows [E*F] | 122 | 120 | 123 | 129 | 71 | 116 | 139 | 144 | 146 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows (2/3)

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 449 | 502 | 559 | 620 | 689 | 767 | 855 | 950 | 1,056 | 1,176 |
| EBITDA | [A] | 402 | 298 | 519 | 580 | 649 | 578 | 760 | 906 | 1,010 | 1,127 |
| EBITDA margin | | 89% | 59% | 93% | 94% | 94% | 75% | 89% | 95% | 96% | 96% |
| Depreciation | | (62) | (69) | (76) | (85) | (94) | (105) | (117) | (130) | (145) | (161) |
| EBIT | | 340 | 230 | 442 | 496 | 555 | 473 | 642 | 776 | 865 | 966 |
| EBIT margin | | 76% | 46% | 79% | 80% | 81% | 62% | 75% | 82% | 82% | 82% |
| Less: Tax on EBIT | [B] | (59) | (40) | (77) | (87) | (97) | (112) | (158) | (195) | (221) | (250) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 342 | 258 | 441 | 494 | 552 | 466 | 602 | 711 | 789 | 877 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 |
| Discount factor | [F] | 0.426 | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.190 |
| Present value of cash flows | [E*F] | 146 | 101 | 157 | 161 | 164 | 127 | 150 | 162 | 164 | 167 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows (3/3)

| Discounted Cash Flow | | | | | | |
|------------------------------------|----------------------|------------|--------------|--------------|--------------|--------------|
| | | FY2044 | FY2045 | FY2046 | FY2047 | FY2048 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 10.2 months |
| Revenue | | 1,314 | 1,462 | 1,626 | 1,806 | 1,712 |
| EBITDA | [A] | 1,263 | 1,408 | 1,570 | 1,747 | 1,659 |
| EBITDA margin | | 96% | 96% | 97% | 97% | 97% |
| Depreciation | | (180) | (200) | (223) | (247) | (234) |
| EBIT | | 1,083 | 1,208 | 1,347 | 1,499 | 1,425 |
| EBIT margin | | 82% | 83% | 83% | 83% | 83% |
| Less: Tax on EBIT | [B] | (314) | (354) | (395) | (440) | (418) |
| Change in working capital | [C] | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 949 | 1,054 | 1,175 | 1,307 | 1,242 |
| Discounting period | | 19.500 | 20.500 | 21.500 | 22.500 | 23.350 |
| Discount factor | [F] | 0.174 | 0.159 | 0.145 | 0.133 | 0.123 |
| Present value of cash flows | [E*F] | 165 | 167 | 170 | 173 | 153 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 3,435 |
| Present value of release of working capital | 0 |
| Enterprise Valuation | 3,435 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of INR 2 Cr released at the end of the concession period.

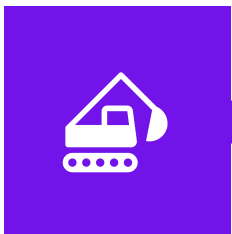
Basis the above and using a WACC of 9.40%, the Enterprise Value of IWTL, as on 31 March 2024 is INR 3,435 crore.

Please refer annexure 2a for WACC breakup.



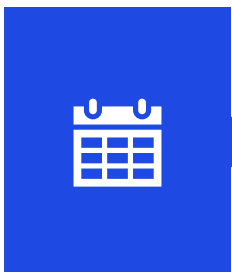
Solapur Yedeshi Tollway Limited

Overview



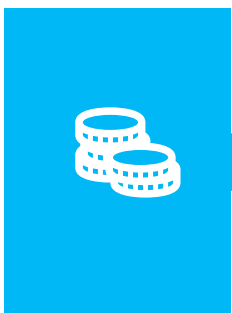
Project details

SYTL was engaged for four laning the existing two lane highway on DBFOT basis the project stretch is 98.7 kms long involving the Solapur to Yedeshi section of NH-211 from 0.00 kms to 100 kms in Maharashtra with 2 toll plazas.



Concession period

SYTL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 29 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement is zero. Refer key assumptions on the next slide.



Premium

There is no premium clause in the concession agreement.

Source(s): Management information

Highlights

| Particulars | Details |
|--|-----------------|
| Project location | Solapur Yedeshi |
| Concessionaire | SYTL |
| State | Maharashtra |
| Tollable length (kms) | 98.7 |
| No. of toll plazas | 2 |
| Concession agreement date | 3-Mar-14 |
| Appointed date | 21-Jan-15 |
| Four laning completion certificate date | 15-Oct-19 |
| Scheduled end date | 21-Jan-44 |
| New scheduled end date | 20-Apr-44 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHAI and SYTL, *“In the event actual average traffic shall have exceeded the target traffic, then for every 1% excess as compared to the target traffic, the concession period shall, subject to payment of concession fee in accordance with this agreement, be reduced by 0.75% thereof; provided such reduction in concession period shall not in any case exceed 10% of the concession period”*.
- Based on the concession agreement and traffic study report of SYTL we note that the actual traffic for SYTL has exceeded the projected traffic. Pursuant to clause 29 of the concession agreement, concession period will need to be reduced by 2.4 year to account for excess traffic. However, Management has represented that concession period of SYTL will not be reduced as reduction in the concession period necessitated due to excess traffic will be offset by the extension in the concession period due to augmentation of capacity to serve excess traffic. We have not been provided with approval from authority for extension of concession period and have relied on the Management representation for the same.
- Management represented that the concession period will only be increased by 115 days on account of covid-19.
- The Management has confirmed to us to consider revised concession period till 20 April 2044. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 20 April 2044.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHAI shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 4% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that SYTL has 80IA benefit from FY2025 to FY2034, the same has been considered while calculating forecast tax outflows along with any carried forward business loss and unabsorbed depreciation. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Source(s): Management information

Discounted Cash Flows (1/2)

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 152 | 175 | 193 | 215 | 237 | 266 | 295 | 331 | 367 | 409 |
| EBITDA | [A] | 115 | 136 | 152 | 194 | 215 | 242 | 270 | 305 | 279 | 316 |
| EBITDA margin | | 76% | 78% | 79% | 90% | 90% | 91% | 92% | 92% | 76% | 77% |
| Depreciation | | (18) | (21) | (24) | (27) | (29) | (33) | (37) | (41) | (46) | (51) |
| EBIT | | 97 | 115 | 129 | 167 | 185 | 209 | 234 | 264 | 233 | 265 |
| EBIT margin | | 64% | 66% | 67% | 78% | 78% | 79% | 79% | 80% | 63% | 65% |
| Less: Tax on EBIT | [B] | (17) | (20) | (22) | (29) | (32) | (37) | (41) | (46) | (41) | (46) |
| Change in working capital | [C] | 18 | 19 | 15 | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 117 | 135 | 144 | 164 | 182 | 205 | 230 | 259 | 238 | 270 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 | 9.500 |
| Discount factor | [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 | 0.426 |
| Present value of cash flows | [E*F] | 112 | 118 | 115 | 120 | 122 | 125 | 128 | 132 | 111 | 115 |

Source(s): Management information KPMG analysis

Discounted Cash Flows (2/2)

| Discounted Cash Flow | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 | FY2044 | FY2045 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 0.7 months |
| Revenue | 459 | 511 | 566 | 633 | 702 | 788 | 869 | 967 | 1,076 | 1,202 | 73 |
| EBITDA [A] | 361 | 479 | 531 | 595 | 661 | 745 | 822 | 874 | 979 | 1,098 | 59 |
| EBITDA margin | 79% | 94% | 94% | 94% | 94% | 94% | 95% | 90% | 91% | 91% | 81% |
| Depreciation | (57) | (63) | (70) | (78) | (87) | (98) | (108) | (120) | (133) | (149) | (9) |
| EBIT | 304 | 416 | 461 | 517 | 574 | 647 | 715 | 755 | 845 | 949 | 50 |
| EBIT margin | 66% | 81% | 81% | 82% | 82% | 82% | 82% | 78% | 79% | 79% | 68% |
| Less: Tax on EBIT [B] | (53) | (73) | (81) | (90) | (153) | (174) | (194) | (207) | (233) | (265) | (15) |
| Change in working capital [C] | - | - | - | - | - | - | - | - | - | - | - |
| Less : Capex [D] | - | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm E = [A+B+C+D] | 308 | 406 | 451 | 505 | 508 | 571 | 629 | 668 | 746 | 833 | 44 |
| Discounting period | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 | 19.500 | 19.556 |
| Discount factor [F] | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.190 | 0.174 | 0.173 |
| Present value of cash flows [E*F] | 120 | 145 | 147 | 150 | 138 | 142 | 143 | 139 | 142 | 145 | 8 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 2,615 |
| Present value of release of working capital | (5) |
| Enterprise Valuation | 2,610 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of negative INR 32 Cr released at the end of the concession period.

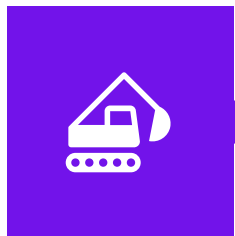
Basis the above and using a WACC of 9.40%, the Enterprise Value of SYTL, as on 31 March 2024 is INR 2,610 crore.

Please refer annexure 2a for WACC breakup.



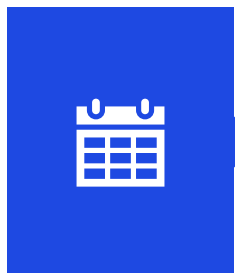
Yedeshi Aurangabad Tollway Limited

Overview



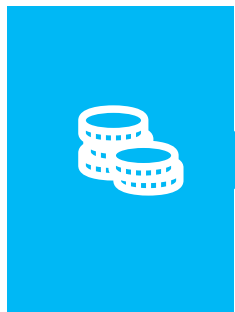
Project details

YATL was engaged for four laning the existing two lane highway on DBFOT basis. The project stretch is 189.1 kms long involving the Yedeshi Aurangabad section of NH-211 from 100.0 kms to 290.2 kms in Maharashtra with 3 toll plazas.



Concession period

YATL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 26 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 1.2 years.



Premium

There is no premium clause in the concession agreement.

Source(s): Management information

Highlights

| Particulars | Details |
|--|--------------------|
| Project location | Yedeshi Aurangabad |
| Concessionaire | YATL |
| State | Maharashtra |
| Tollable length (kms) | 189.1 |
| No. of toll plazas | 3 |
| Concession agreement date | 30-May-14 |
| Appointed date | 1-Jul-15 |
| Four laning completion certificate date | 24-Sep-20 |
| Scheduled end date | 1- July-41 |
| New scheduled end date | 20-Jan-43 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHAI and YATL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 3% |
| 1.5% increase for every 1% decrease | 5% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 1.2 |
| Revised concession period | 27.2 |
| Scheduled end date | 01-July-41 |
| New scheduled end date | 20-Jan-43 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 151 days on account of covid-19 and Kannad ghat crisis. (included above)
- The Management has confirmed to us to consider revised concession period till 20 January 2043. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 20 January 2043.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHAI shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 4% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that YATL has 80IA benefit from FY2026 to FY2035, the same has been considered while calculating forecast tax outflows along with any carried forward business loss and unabsorbed depreciation. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Discounted Cash Flows [1/2]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 306 | 346 | 378 | 416 | 452 | 497 | 546 | 599 | 653 |
| EBITDA | [A] | 251 | 288 | 317 | 386 | 420 | 464 | 511 | 562 | 505 |
| EBITDA margin | | 82% | 83% | 84% | 93% | 93% | 93% | 94% | 94% | 77% |
| Depreciation | | (68) | (72) | (71) | (72) | (78) | (86) | (95) | (104) | (113) |
| EBIT | | 183 | 217 | 246 | 315 | 342 | 378 | 416 | 458 | 392 |
| EBIT margin | | 60% | 63% | 65% | 76% | 76% | 76% | 76% | 77% | 60% |
| Less: Tax on EBIT | [B] | (32) | (38) | (43) | (55) | (60) | (66) | (73) | (80) | (68) |
| Change in working capital | [C] | 29 | 31 | 27 | 19 | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 248 | 281 | 302 | 350 | 360 | 398 | 438 | 482 | 437 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 |
| Present value of cash flows | [E*F] | 237 | 246 | 241 | 256 | 241 | 243 | 244 | 246 | 204 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/2]

| Discounted Cash Flow | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|--------------|------------|
| | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 9.7 months |
| Revenue | 716 | 784 | 858 | 936 | 1,025 | 1,121 | 1,231 | 1,344 | 1,471 | 1,303 |
| EBITDA [A] | 561 | 621 | 814 | 889 | 976 | 1,070 | 1,117 | 1,224 | 1,345 | 1,241 |
| EBITDA margin | 78% | 79% | 95% | 95% | 95% | 95% | 91% | 91% | 91% | 95% |
| Depreciation | (124) | (136) | (149) | (162) | (178) | (195) | (214) | (233) | (255) | (226) |
| EBIT | 436 | 485 | 665 | 727 | 798 | 876 | 903 | 991 | 1,090 | 1,015 |
| EBIT margin | 61% | 62% | 77% | 78% | 78% | 78% | 73% | 74% | 74% | 78% |
| Less: Tax on EBIT [B] | (76) | (85) | (116) | (127) | (140) | (153) | (200) | (266) | (328) | (312) |
| Change in working capital [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm E = [A+B+C+D] | 484 | 536 | 698 | 762 | 837 | 917 | 917 | 958 | 1,018 | 929 |
| Discounting period | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.306 |
| Discount factor [F] | 0.426 | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.193 |
| Present value of cash flows [E*F] | 206 | 209 | 249 | 248 | 249 | 249 | 228 | 218 | 211 | 180 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 4,404 |
| Present value of release of working capital | (8) |
| Enterprise Valuation | 4,396 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of negative INR 44 Cr released at the end of the concession period.

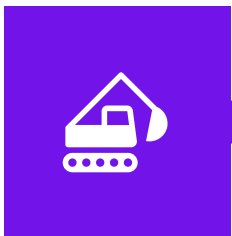
Basis the above and using a WACC of 9.40%, the Enterprise Value of YATL, as on 31 March 2024 is INR 4,396 crore.

Please refer annexure 2a for WACC breakup.



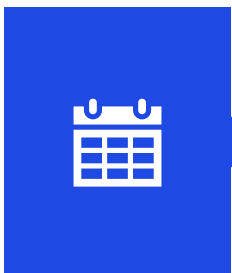
Kaithal Tollway Limited

Overview



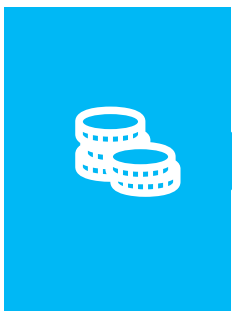
Project details

KTL was engaged to expand the existing two-lane road to a four-lane road in the Kaithal to Rajasthan border section of NH-152/65 from 33.25 Km to 241.58 Km i.e. total design length of 166.3 Km in the state of Haryana under National Highway Development Program Phase IV on a DBFOT basis.



Concession period

KTL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 27 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 5.4 years.



Premium

There is no premium clause in the concession agreement.

Source(s): Management information

Highlights

| Particulars | Details |
|--|----------------------------|
| Project location | Kaithal – Rajasthan border |
| Concessionaire | KTL |
| State | Haryana |
| Tollable length (kms) | 166.3 |
| No. of toll plazas | 3 |
| Concession agreement date | 23-Jun-14 |
| Appointed date | 15-Jul-15 |
| Four laning completion certificate date | 29-Mar-19 |
| Scheduled end date | 14-Jul-42 |
| New scheduled end date | 6-Feb-49 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHA and KTL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 31% |
| 1.5% increase for every 1% decrease | 47% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 5.4 |
| Revised concession period | 32.4 |
| Scheduled end date | 14-July-42 |
| New scheduled end date | 06-Feb-49 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 446 days on account of covid-19 and farmer protests (included above).
- The Management has confirmed to us to consider revised concession period till 06 February 2049. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 06 February 2049.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHA shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 4% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that KTL has 80IA benefit from FY2025 to FY2034, the same has been considered while calculating forecast tax outflows along with any carried forward business loss and unabsorbed depreciation. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Discounted Cash Flows [1/3]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|------------|-----------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 158 | 173 | 188 | 205 | 223 | 243 | 264 | 287 | 311 |
| EBITDA | [A] | 92 | 103 | 165 | 181 | 197 | 215 | 235 | 129 | 146 |
| EBITDA margin | | 58% | 60% | 88% | 88% | 88% | 89% | 89% | 45% | 47% |
| Depreciation | | (24) | (27) | (29) | (32) | (34) | (37) | (41) | (44) | (48) |
| EBIT | | 67 | 76 | 136 | 149 | 163 | 178 | 195 | 85 | 98 |
| EBIT margin | | 43% | 44% | 72% | 73% | 73% | 73% | 74% | 30% | 32% |
| Less: Tax on EBIT | [B] | (12) | (13) | (24) | (26) | (28) | (31) | (34) | (15) | (17) |
| Change in working capital | [C] | 45 | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 125 | 90 | 141 | 155 | 168 | 184 | 201 | 114 | 129 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 |
| Present value of cash flows | [E*F] | 120 | 78 | 113 | 113 | 112 | 112 | 112 | 58 | 60 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/3]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 338 | 369 | 401 | 435 | 473 | 514 | 560 | 606 | 658 | 714 |
| EBITDA | [A] | 165 | 334 | 365 | 397 | 433 | 472 | 422 | 461 | 506 | 663 |
| EBITDA margin | | 49% | 91% | 91% | 91% | 92% | 92% | 75% | 76% | 77% | 93% |
| Depreciation | | (52) | (57) | (62) | (67) | (73) | (79) | (84) | (90) | (98) | (107) |
| EBIT | | 113 | 277 | 303 | 330 | 360 | 393 | 338 | 371 | 407 | 556 |
| EBIT margin | | 33% | 75% | 76% | 76% | 76% | 76% | 60% | 61% | 62% | 78% |
| Less: Tax on EBIT | [B] | (20) | (48) | (53) | (58) | (63) | (69) | (85) | (95) | (106) | (161) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 145 | 286 | 312 | 339 | 370 | 403 | 336 | 366 | 399 | 503 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 |
| Discount factor | [F] | 0.426 | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.190 |
| Present value of cash flows | [E*F] | 62 | 111 | 111 | 110 | 110 | 110 | 84 | 83 | 83 | 95 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [3/3]

| Discounted Cash Flow | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|-------------|
| | | FY2044 | FY2045 | FY2046 | FY2047 | FY2048 | FY2049 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 10.2 months |
| Revenue | | 777 | 843 | 914 | 992 | 1,035 | 961 |
| EBITDA | [A] | 724 | 787 | 855 | 930 | 969 | 902 |
| EBITDA margin | | 93% | 93% | 94% | 94% | 94% | 94% |
| Depreciation | | (116) | (126) | (136) | (148) | (155) | (143) |
| EBIT | | 608 | 661 | 718 | 782 | 815 | 759 |
| EBIT margin | | 78% | 78% | 79% | 79% | 79% | 79% |
| Less: Tax on EBIT | [B] | (182) | (198) | (215) | (234) | (244) | (227) |
| Change in working capital | [C] | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 542 | 589 | 640 | 696 | 725 | 675 |
| Discounting period | | 19.500 | 20.500 | 21.500 | 22.500 | 23.500 | 24.350 |
| Discount factor | [F] | 0.174 | 0.159 | 0.145 | 0.133 | 0.121 | 0.112 |
| Present value of cash flows | [E*F] | 94 | 93 | 93 | 92 | 88 | 76 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 2,374 |
| Present value of release of working capital | (1) |
| Enterprise Valuation | 2,373 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of negative INR 13 Cr released at the end of the concession period.

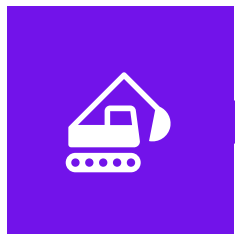
Basis the above and using a WACC of 9.40%, the Enterprise Value of KTL, as on 31 March 2024 is INR 2,373 crore.

Please refer annexure 2a for WACC breakup.



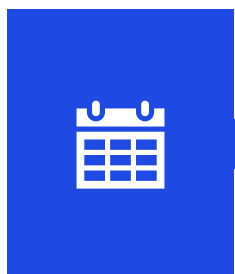
AE Tollway Limited

Overview



Project details

AETL was engaged to expand the Agra to Etawah bypass section of NH-2 from 199.66 Km to 323.52 Km in the state of Uttar Pradesh from four to six lanes under National Highway Development Program Phase V on a DBFOT basis.



Concession period

AETL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 24 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 4.8 years.



Premium

AETL was engaged on payment of premium of INR 81 Crs to NHAI in the remaining period of the year of appointed date and for each subsequent year the premium shall increase by an additional 5% as compared to the previous year.

Source(s): Management information

Highlights

| Particulars | Details |
|---|---------------|
| Project location | Agra Etawah |
| Concessionaire | AETL |
| State | Uttar Pradesh |
| Tollable length (kms) | 124.52 |
| No. of toll plazas | 2 |
| Concession agreement date | 01-Sep-15 |
| Appointed date | 01-Aug-16 |
| Six laning completion certificate date | 24-Nov-20 |
| Scheduled end date | 31-Jul-40 |
| New scheduled end date | 19-Oct-45 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHAI and AETL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 34% |
| 1.5% increase for every 1% decrease | 51% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 4.8 |
| Revised concession period | 28.8 |
| Scheduled end date | 31-Jul-40 |
| New scheduled end date | 19-Oct-45 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 163 days on account of covid-19 and demonetization (included above).
- The Management has confirmed to us to consider revised concession period till 19 October 2045. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 19 October 2045.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHAI shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHAI is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 4% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

h. Tax

- Management represented that AETL has 80IA benefit from FY2027 to FY2036, the same has been considered while calculating forecast tax outflows along with any carried forward business loss and unabsorbed depreciation. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Discounted Cash Flows [1/3]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|------------|-----------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 155 | 182 | 212 | 244 | 282 | 324 | 372 | 428 | 489 |
| EBITDA | [A] | 77 | 100 | 168 | 198 | 234 | 273 | 196 | 243 | 296 |
| EBITDA margin | | 50% | 55% | 79% | 81% | 83% | 85% | 53% | 57% | 60% |
| Depreciation | | (38) | (42) | (47) | (52) | (58) | (65) | (73) | (81) | (91) |
| EBIT | | 40 | 58 | 121 | 146 | 176 | 209 | 124 | 161 | 205 |
| EBIT margin | | 25% | 32% | 57% | 60% | 62% | 64% | 33% | 38% | 42% |
| Less: Tax on EBIT | [B] | (7) | (10) | (21) | (26) | (31) | (36) | (22) | (28) | (36) |
| Change in working capital | [C] | 39 | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 109 | 89 | 147 | 173 | 203 | 237 | 175 | 215 | 260 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 |
| Present value of cash flows | [E*F] | 104 | 78 | 117 | 126 | 136 | 145 | 98 | 109 | 121 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/3]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| INR crores | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 558 | 637 | 718 | 805 | 903 | 1,013 | 1,141 | 1,259 | 1,398 | 1,551 |
| EBITDA | [A] | 497 | 573 | 651 | 734 | 756 | 858 | 978 | 1,173 | 1,308 | 1,456 |
| EBITDA margin | | 89% | 90% | 91% | 91% | 84% | 85% | 86% | 93% | 94% | 94% |
| Depreciation | | (101) | (113) | (126) | (137) | (128) | (131) | (146) | (160) | (176) | (193) |
| EBIT | | 396 | 460 | 525 | 597 | 627 | 727 | 832 | 1,014 | 1,133 | 1,263 |
| EBIT margin | | 71% | 72% | 73% | 74% | 69% | 72% | 73% | 81% | 81% | 81% |
| Less: Tax on EBIT | [B] | (69) | (80) | (92) | (104) | (110) | (127) | (173) | (283) | (329) | (367) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 428 | 493 | 559 | 630 | 646 | 731 | 805 | 890 | 979 | 1,090 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 |
| Discount factor | [F] | 0.426 | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.190 |
| Present value of cash flows | [E*F] | 182 | 192 | 199 | 205 | 192 | 199 | 200 | 202 | 203 | 207 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [3/3]

| Discounted Cash Flow | | | | |
|------------------------------------|----------------------|--------------|--------------|------------|
| | | FY2044 | FY2045 | FY2046 |
| INR crores | | 12 months | 12 months | 6.6 months |
| Revenue | | 1,725 | 1,904 | 1,157 |
| EBITDA | [A] | 1,626 | 1,800 | 1,097 |
| EBITDA margin | | 94% | 95% | 95% |
| Depreciation | | (213) | (233) | (141) |
| EBIT | | 1,413 | 1,567 | 956 |
| EBIT margin | | 82% | 82% | 83% |
| Less: Tax on EBIT | [B] | (409) | (453) | (276) |
| Change in working capital | [C] | - | - | - |
| Less : Capex | [D] | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 1,217 | 1,347 | 821 |
| Discounting period | | 19.500 | 20.500 | 21.053 |
| Discount factor | [F] | 0.174 | 0.159 | 0.151 |
| Present value of cash flows | [E*F] | 211 | 214 | 124 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 3,566 |
| Present value of release of working capital | (14) |
| Enterprise Valuation | 3,552 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of negative INR 99 Cr released at the end of the concession period.

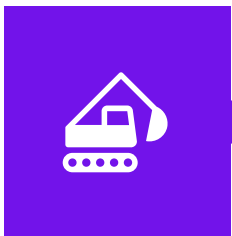
Basis the above and using a WACC of 9.40%, the Enterprise Value of AETL, as on 31 March 2024 is INR 3,552 crore.

Please refer annexure 2a for WACC breakup.



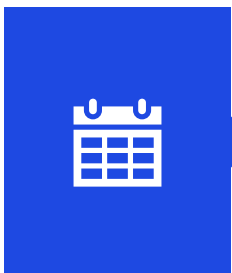
Udaipur Tollway Limited

Overview



Project details

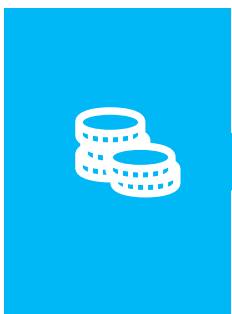
UTL was engaged to expand the Udaipur bypass (287.40 Km) to the Rajasthan/Gujarat border (401.20 Km) section of NH-8 in the states of Rajasthan & Gujarat (approx. length 113.80 Km) from four to six lanes under National Highway Development Program Phase V on a DBFOT basis.



Concession period

UTL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 21 years commencing from the appointed date.

Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 4.2 years.



Premium

UTL was engaged on payment of premium of INR 163.8 Crs to NHAI immediately after the 3rd anniversary year of COD and for each subsequent year till the 9th anniversary of COD, the premium shall increase by an additional 3% as compared to the previous year. From the 9th anniversary of COD until the end of the concession period, the premium shall increase by an additional 8% each year as compared to the previous year. UTL has filed Writ petition with Rajasthan High Court with prayer to commence payment of premium to NHAI, six months post actual completion of the project construction work. The High Court prima facie agreed with the contention and have provided interim relief from payment of premium. The matter is currently under arbitration.

Source(s): Management information



Highlights

| Particulars | Details |
|---|------------------------|
| Project location | Udaipur Gujarat border |
| Concessionaire | UTL |
| State | Rajasthan/ Gujarat |
| Tollable length (kms) | 113.8 |
| No. of toll plazas | 1 |
| Concession agreement date | 09-Dec-16 |
| Appointed date | 03-Sep-17 |
| Six laning completion certificate date | 01-Jun-21 |
| Scheduled end date | 02-Sep-38 |
| New scheduled end date | 13-Feb-43 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHAI and UTL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 15% |
| 1.5% increase for every 1% decrease | 23% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 4.2 |
| Revised concession period | 25.2 |
| Scheduled end date | 02-Sep-38 |
| New scheduled end date | 13-Feb-43 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 106 days on account of covid-19. (included above)
- The Management has confirmed to us to consider revised concession period till 13 February 2043. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 13 February 2043.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHAI shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHAI is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 3% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

h. Tax

- Management represented that UTL has 35AD benefit for income tax and the same has been considered while calculating forecast tax outflows along with any carried forward business loss and mat credit. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Source(s): Management information



Discounted Cash Flows [1/2]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 160 | 189 | 223 | 261 | 291 | 326 | 365 | 407 | 453 |
| EBITDA | [A] | 69 | 90 | 195 | 237 | 146 | 174 | 210 | 374 | 425 |
| EBITDA margin | | 43% | 48% | 88% | 91% | 50% | 53% | 58% | 92% | 94% |
| Depreciation | | (44) | (48) | (53) | (59) | (65) | (72) | (79) | (88) | (96) |
| EBIT | | 24 | 42 | 142 | 178 | 81 | 102 | 131 | 287 | 329 |
| EBIT margin | | 15% | 22% | 64% | 68% | 28% | 31% | 36% | 70% | 72% |
| Less: Tax on EBIT | [B] | (4) | (7) | (25) | (31) | (14) | (18) | (23) | (50) | (57) |
| Change in working capital | [C] | - | - | - | 39 | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 65 | 83 | 170 | 245 | 132 | 156 | 188 | 324 | 367 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.873 | 0.798 | 0.729 | 0.666 | 0.608 | 0.556 | 0.508 | 0.464 |
| Present value of cash flows | [E*F] | 62 | 72 | 136 | 178 | 88 | 95 | 104 | 165 | 170 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/2]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 10.4 months |
| Revenue | | 504 | 562 | 623 | 689 | 760 | 845 | 937 | 1,025 | 1,127 | 1,080 |
| EBITDA | [A] | 388 | 441 | 473 | 657 | 727 | 811 | 902 | 988 | 1,088 | 1,045 |
| EBITDA margin | | 77% | 78% | 76% | 95% | 96% | 96% | 96% | 96% | 97% | 97% |
| Depreciation | | (106) | (117) | (128) | (124) | (104) | (114) | (126) | (137) | (150) | (143) |
| EBIT | | 283 | 324 | 345 | 532 | 623 | 697 | 776 | 851 | 938 | 902 |
| EBIT margin | | 56% | 58% | 55% | 77% | 82% | 83% | 83% | 83% | 83% | 84% |
| Less: Tax on EBIT | [B] | (49) | (57) | (60) | (93) | (183) | (204) | (227) | (249) | (274) | (263) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 339 | 384 | 413 | 564 | 544 | 607 | 675 | 739 | 814 | 782 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.369 |
| Discount factor | [F] | 0.424 | 0.387 | 0.354 | 0.323 | 0.295 | 0.270 | 0.246 | 0.225 | 0.206 | 0.190 |
| Present value of cash flows | [E*F] | 144 | 149 | 146 | 182 | 161 | 164 | 166 | 166 | 167 | 149 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 2,663 |
| Present value of release of working capital | (16) |
| Enterprise Valuation | 2,647 |
| WACC | 9.46% |

Present value of release in working capital represent working capital of negative INR 88 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.46%, the Enterprise Value of UTL, as on 31 March 2024 is INR 2,647 crore.

Please refer annexure 2b for WACC breakup.



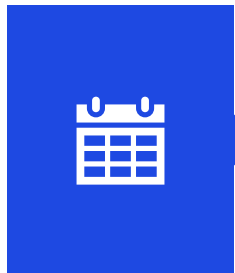
Chittorgarh Gulabpura Tollway Limited

Overview



Project details

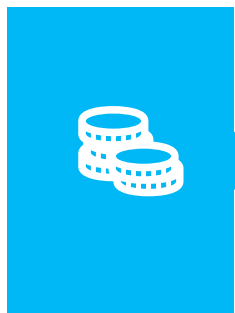
CGTL was engaged for six laning the existing four lane highway on DBFOT basis. The project stretch is 124.87 kms long involving the Kishangarh Udaipur Ahmedabad section from 90 kms (near Gulabpara) to 214.87 kms (end of Chittorgarh Bypass) of NH-79 in Rajasthan with 2 toll plazas.



Concession period

CGTL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 20 years commencing from the appointed date.

Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 4 years.



Premium

CGTL was engaged on payment of premium of INR 228.6 Crs to NHAI immediately after the 3rd anniversary year of COD and for each subsequent year till the 9th anniversary of COD, the premium shall increase by an additional 3% as compared to the previous year. From the 9th anniversary of COD until the end of the concession period, the premium shall increase by an additional 8% each year as compared to the previous year. CGTL has filed Writ petition with Rajasthan High Court with prayer to commence payment of premium to NHAI, six months post actual completion of the project construction work. The High Court prima facie agreed with the contention and have provided interim relief from payment of premium. The matter is currently under arbitration.

Source(s): Management information

Highlights

| Particulars | Details |
|---|-----------------------|
| Project location | Gulabpura Chittorgarh |
| Concessionaire | CGTL |
| State | Rajasthan |
| Tollable length (kms) | 124.87 |
| No. of toll plazas | 2 |
| Concession agreement date | 9-Dec-16 |
| Appointed date | 4-Nov-17 |
| Six laning completion certificate date | 14-Aug-21 |
| Scheduled end date | 3-Nov-37 |
| New scheduled end date | 3-Feb-42 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession Agreement between NHA and CGTL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 26% |
| 1.5% increase for every 1% decrease | 40% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 4 |
| Revised concession period | 24 |
| Scheduled end date | 03-Nov-37 |
| New scheduled end date | 03-Feb-42 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 117 days on account of covid-19. (included above)
- The Management has confirmed to us to consider revised concession period till 3 February 2042. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 3 February 2042.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHA shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHA is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 4% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

h. Tax

- Management represented that CGTL has 35AD benefit for income tax and the same has been considered while calculating forecast tax outflows along with any carried forward business loss and mat credit. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

Discounted Cash Flows [1/2]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 167 | 205 | 248 | 296 | 332 | 378 | 421 | 467 | 517 |
| EBITDA | [A] | 104 | 139 | 178 | 254 | 289 | 333 | 287 | 326 | 370 |
| EBITDA margin | | 62% | 68% | 72% | 86% | 87% | 88% | 68% | 70% | 71% |
| Depreciation | | (45) | (45) | (50) | (55) | (61) | (68) | (74) | (82) | (89) |
| EBIT | | 59 | 94 | 129 | 199 | 228 | 265 | 212 | 244 | 280 |
| EBIT margin | | 36% | 46% | 52% | 67% | 69% | 70% | 50% | 52% | 54% |
| Less: Tax on EBIT | [B] | (10) | (16) | (22) | (35) | (40) | (46) | (37) | (43) | (49) |
| Change in working capital | [C] | - | - | - | 50 | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 94 | 122 | 156 | 269 | 249 | 286 | 249 | 283 | 321 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.873 | 0.798 | 0.729 | 0.666 | 0.608 | 0.556 | 0.508 | 0.464 |
| Present value of cash flows | [E*F] | 89 | 107 | 124 | 196 | 166 | 174 | 139 | 144 | 149 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/2]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 10.1 months |
| Revenue | | 576 | 640 | 706 | 779 | 860 | 949 | 1,050 | 1,153 | 1,075 |
| EBITDA | [A] | 521 | 573 | 597 | 663 | 738 | 874 | 969 | 1,066 | 994 |
| EBITDA margin | | 90% | 90% | 85% | 85% | 86% | 92% | 92% | 92% | 93% |
| Depreciation | | (98) | (108) | (118) | (129) | (141) | (154) | (169) | (184) | (170) |
| EBIT | | 422 | 465 | 479 | 534 | 597 | 720 | 800 | 882 | 824 |
| EBIT margin | | 73% | 73% | 68% | 69% | 69% | 76% | 76% | 77% | 77% |
| Less: Tax on EBIT | [B] | (74) | (82) | (150) | (167) | (186) | (220) | (244) | (268) | (250) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 447 | 491 | 447 | 496 | 552 | 654 | 725 | 798 | 744 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.342 |
| Discount factor | [F] | 0.424 | 0.387 | 0.354 | 0.323 | 0.295 | 0.270 | 0.246 | 0.225 | 0.208 |
| Present value of cash flows | [E*F] | 189 | 190 | 158 | 160 | 163 | 176 | 179 | 179 | 155 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 2,838 |
| Present value of release of working capital | (10) |
| Enterprise Valuation | 2,827 |
| WACC | 9.46% |

Present value of release in working capital represent working capital of negative INR 52 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.46%, the Enterprise Value of CGTL, as on 31 March 2024 is INR 2,827 crore.

Please refer annexure 2b for WACC breakup.



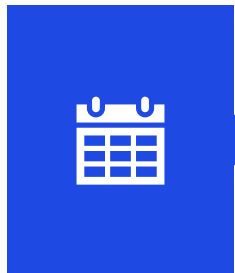
Kishangarh Gulabpura Tollway Limited

Overview



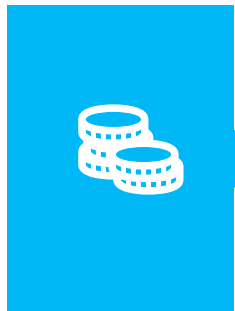
Project details

KGTL was engaged for six laning the existing four lane highway on DBFOT basis. The project stretch is 90 kms long involving the Kishangarh to Gulabpura section of NH-79A and NH-79 in Rajasthan with a single toll plaza.



Concession period

KGTL is required to construct, operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 20 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 4 years.



Premium

KGTL was engaged on payment of premium of INR 186.3 Crs to NHAI immediately after the 3rd anniversary year of COD and for each subsequent year till the 9th anniversary of COD, the premium shall increase by an additional 3% as compared to the previous year. From the 9th anniversary of COD until the end of the concession period, the premium shall increase by an additional 8% each year as compared to the previous year. KGTL has filed Writ petition with Rajasthan High Court with prayer to commence payment of premium to NHAI, six months post actual completion of the project construction work. The High Court prima facie agreed with the contention and have provided interim relief from payment of premium. The matter is currently under arbitration.

Source(s): Management information

Highlights

| Particulars | Details |
|---|----------------------|
| Project location | Kishangarh Gulabpura |
| Concessionaire | KGTL |
| State | Rajasthan |
| Tollable length (kms) | 90 |
| No. of toll plazas | 1 |
| Concession agreement date | 22-Feb-17 |
| Appointed date | 21-Feb-18 |
| Six laning completion certificate date | 20-Jul-22 |
| Scheduled end date | 20-Feb-38 |
| New scheduled end date | 20-Jun-42 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHAI and KGTL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 22% |
| 1.5% increase for every 1% decrease | 33% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 4 |
| Revised concession period | 24 |
| Scheduled end date | 20-Feb-38 |
| New scheduled end date | 20-Jun-42 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 136 days on account of covid-19 (included above).
- The Management has confirmed to us to consider revised concession period till 20 June 2042. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 20 June 2042.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHAI shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHAI is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 4% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

h. Tax

- Management represented that KGTL has 35AD benefit for income tax and the same has been considered while calculating forecast tax outflows along with any carried forward business loss and mat credit. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.



Discounted Cash Flows [1/2]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 110 | 136 | 166 | 199 | 235 | 266 | 297 | 334 | 372 |
| EBITDA | [A] | 85 | 110 | 38 | 170 | 205 | 234 | 264 | 299 | 230 |
| EBITDA margin | | 77% | 81% | 23% | 86% | 87% | 88% | 89% | 89% | 62% |
| Depreciation | | (33) | (37) | (37) | (39) | (43) | (47) | (52) | (57) | (63) |
| EBIT | | 52 | 73 | 0 | 132 | 162 | 187 | 212 | 241 | 168 |
| EBIT margin | | 47% | 54% | 0% | 66% | 69% | 70% | 71% | 72% | 45% |
| Less: Tax on EBIT | [B] | (9) | (13) | (0) | (23) | (28) | (33) | (37) | (42) | (29) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 76 | 97 | 38 | 147 | 177 | 201 | 227 | 256 | 201 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 |
| Present value of cash flows | [E*F] | 73 | 85 | 30 | 108 | 118 | 123 | 126 | 131 | 94 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/2]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 2.7 months |
| Revenue | | 415 | 463 | 517 | 571 | 631 | 701 | 779 | 863 | 943 | 230 |
| EBITDA | [A] | 274 | 311 | 473 | 523 | 580 | 645 | 720 | 800 | 876 | 205 |
| EBITDA margin | | 66% | 67% | 92% | 92% | 92% | 92% | 92% | 93% | 93% | 89% |
| Depreciation | | (69) | (76) | (84) | (91) | (100) | (110) | (121) | (133) | (144) | (35) |
| EBIT | | 205 | 235 | 390 | 432 | 480 | 536 | 599 | 668 | 732 | 170 |
| EBIT margin | | 49% | 51% | 75% | 76% | 76% | 76% | 77% | 77% | 78% | 74% |
| Less: Tax on EBIT | [B] | (36) | (41) | (68) | (132) | (146) | (162) | (181) | (201) | (220) | (52) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 238 | 270 | 405 | 392 | 434 | 483 | 539 | 599 | 656 | 154 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 17.722 |
| Discount factor | [F] | 0.426 | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.204 |
| Present value of cash flows | [E*F] | 101 | 105 | 144 | 127 | 129 | 131 | 134 | 136 | 136 | 31 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 2,063 |
| Present value of release of working capital | (11) |
| Enterprise Valuation | 2,053 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of negative INR 56 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.40%, the Enterprise Value of KGTL, as on 31 March 2024 is INR 2,053 crore.

Please refer annexure 2a for WACC breakup.



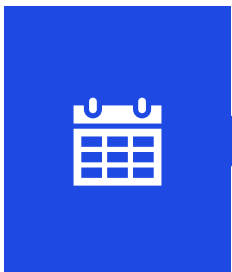
IRB Hapur Moradabad Tollway Limited

Overview



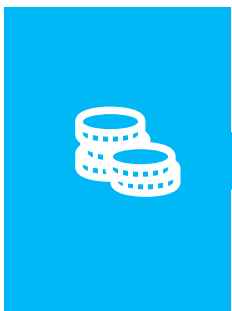
Project details

IHMTL was engaged for six laning the existing four lane highway on DBFOT basis. The project stretch is 99.87 kms long involving the Hapur bypass to Moradabad section from 50 kms to 148.277 kms (Design chainage 149.87 kms) of NH-24 in Uttar Pradesh with 2 toll plazas.



Concession period

IHMTL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 22 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 3 years.



Premium

IHMTL was engaged on payment of premium of INR 31.5 Crs to NHA immediately after the 3rd anniversary year of COD and for each subsequent year till the 9th anniversary of COD, the premium shall increase by an additional 3% as compared to the previous year. From the 9th anniversary of COD until the end of the concession period, the premium shall increase by an additional 8% each year as compared to the previous year.

Source(s): Management information

Highlights

| Particulars | Details |
|---|-----------------|
| Project location | Hapur Moradabad |
| Concessionaire | IHMTL |
| State | Uttar Pradesh |
| Tollable length (kms) | 99.87 |
| No. of toll plazas | 2 |
| Concession agreement date | 29-May-18 |
| Appointed date | 28-May-19 |
| Six laning completion certificate date | 7-Apr-23 |
| Scheduled end date | 31-May-41 |
| New scheduled end date | 1-Sept-44 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHA and IHMTL, *“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”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 9% |
| 1.5% increase for every 1% decrease | 14% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 3 |
| Revised concession period | 25 |
| Scheduled end date | 31-May-41 |
| New scheduled end date | 1-Sept-44 |

- Besides the extension mentioned in the agreement, Management represented that the concession period will be increased by further 105 days on account of covid-19. (included above)
- The Management has confirmed to us to consider revised concession period till 1 September 2044. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 1 September 2044.

b. Traffic Volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

Source(s): Management information

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHA shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHA is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2030. For the forecast period post FY2030 (i) routine maintenance has been increased by 2% to 5% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

h. Tax

- Management represented that IHMTL has 35AD benefit for income tax and the same has been considered while calculating forecast tax outflows along with any carried forward business loss and mat credit. The SPV will initially pay tax under MAT and gradually shift to the new regime of income tax once its MAT credit is exhausted.

i. Capex

- Management has forecasted capex of INR 19 Cr in FY2025.



Discounted Cash Flows [1/3]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 300 | 337 | 375 | 413 | 453 | 501 | 545 | 599 | 656 |
| EBITDA | [A] | 291 | 239 | 275 | 318 | 443 | 485 | 459 | 511 | 587 |
| EBITDA margin | | 97% | 71% | 73% | 77% | 98% | 97% | 84% | 85% | 90% |
| Depreciation | | (56) | (62) | (65) | (71) | (78) | (86) | (93) | (102) | (112) |
| EBIT | | 235 | 176 | 210 | 247 | 365 | 399 | 366 | 409 | 475 |
| EBIT margin | | 78% | 52% | 56% | 60% | 81% | 80% | 67% | 68% | 72% |
| Less: Tax on EBIT | [B] | (41) | (31) | (37) | (43) | (64) | (70) | (64) | (71) | (83) |
| Change in working capital | [C] | 4 | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | (19) | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 236 | 208 | 238 | 275 | 379 | 415 | 395 | 440 | 504 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 |
| Present value of cash flows | [E*F] | 225 | 182 | 190 | 200 | 253 | 253 | 220 | 224 | 235 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/3]

| Discounted Cash Flow | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| INR crores | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | 716 | 782 | 847 | 917 | 992 | 1,072 | 1,167 | 1,251 | 1,358 | 1,467 |
| EBITDA [A] | 701 | 769 | 620 | 672 | 739 | 1,050 | 1,148 | 1,229 | 1,332 | 1,438 |
| EBITDA margin | 98% | 98% | 73% | 73% | 74% | 98% | 98% | 98% | 98% | 98% |
| Depreciation | (122) | (133) | (144) | (156) | (169) | (182) | (198) | (213) | (231) | (249) |
| EBIT | 579 | 636 | 476 | 516 | 570 | 867 | 950 | 1,016 | 1,101 | 1,189 |
| EBIT margin | 81% | 81% | 56% | 56% | 57% | 81% | 81% | 81% | 81% | 81% |
| Less: Tax on EBIT [B] | (101) | (111) | (156) | (169) | (186) | (264) | (289) | (309) | (335) | (362) |
| Change in working capital [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm E = [A+B+C+D] | 600 | 658 | 464 | 503 | 553 | 785 | 859 | 919 | 997 | 1,076 |
| Discounting period | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 |
| Discount factor [F] | 0.426 | 0.389 | 0.356 | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.190 |
| Present value of cash flows [E*F] | 256 | 256 | 165 | 164 | 165 | 214 | 214 | 209 | 207 | 204 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [3/3]

| Discounted Cash Flow | | | |
|------------------------------------|----------------------|--------------|------------|
| | | FY2044 | FY2045 |
| INR crores | | 12 months | 5 months |
| Revenue | | 1,593 | 725 |
| EBITDA | [A] | 1,561 | 701 |
| EBITDA margin | | 98% | 97% |
| Depreciation | | (271) | (123) |
| EBIT | | 1,291 | 578 |
| EBIT margin | | 81% | 80% |
| Less: Tax on EBIT | [B] | (393) | (176) |
| Change in working capital | [C] | - | - |
| Less : Capex | [D] | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 1,168 | 524 |
| Discounting period | | 19.500 | 19.919 |
| Discount factor | [F] | 0.174 | 0.167 |
| Present value of cash flows | [E*F] | 203 | 88 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 4,327 |
| Present value of release of working capital | (8) |
| Enterprise Valuation | 4,318 |
| WACC | 9.40% |

Present value of release in working capital represent working capital of negative INR 53 Cr released at the end of the concession period.

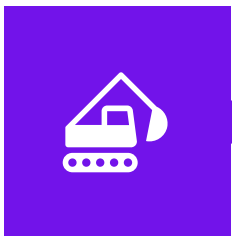
Basis the above and using a WACC of 9.40%, the Enterprise Value of IHMTL, as on 31 March 2024 is INR 4,318 crore.

Please refer annexure 2a for WACC breakup.



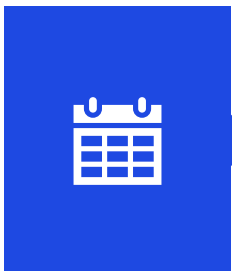
Palsit Dankuni Tollway Private Limited

Overview



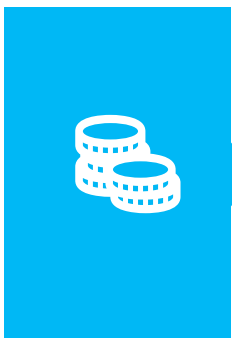
Project details

PDTPL was engaged for six laning the existing four lane highway on DBFOT basis. The project stretch is 74.72 kms long involving the Palsit to Dankuni (up to NH-6 Connector) section from 588.87 kms to 652.7 kms (total design length - 63.83 kms) of NH-19 in West Bengal with 1 toll plaza.



Concession period

PDTPL is required to construct; operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 17 years commencing from the appointed date. Probable shortening of concession period is estimated according to Article 29 of concession agreement for all cases which comes to about 2.2 years.



Premium

PDTPL has to pay premium after the 1st anniversary of project completion date for every year of the remaining concession period, calculated on total realizable fee. For the 2nd year after project completion date premium shall equal to 10.8% of the total realizable fee during that year. For all subsequent years, the premium shall be determined on the total realizable fee by increasing the percentage of premium by an additional 1% as compared to the immediately preceding year.

Source(s): Management information

Highlights

| Particulars | Details |
|------------------------------------|--------------------|
| Project | Dankuni to Palsit |
| Concessionaire | PDTPL |
| State | West Bengal |
| Tollable length (kms) | 63.83 |
| No. of toll plazas | 1 |
| Concession agreement date | 14-Jun-21 |
| Appointed date | 1-Apr-22 |
| Completion certificate date | Under construction |
| Scheduled end date | 1-Apr-39 |
| New scheduled end date | 5-Feb-37 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|--|---------|
| IRB Infrastructure Developers Ltd | 0.04% |
| IRB Infrastructure Trust | 99.96% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2.2 of the concession agreement between NHA1 and PDTPL, “In the event actual average traffic shall have exceeded the target traffic by more than 5%, then for every 1% increase as compared to the target traffic, the remaining concession period shall, be reduced by 1% thereof; provided that such reduction in concession period shall not exceed 20% of the concession period.”
- Thus, the concession period is decreased as per the above clause as follows:

| Particulars | Details |
|---|-----------------|
| Shortfall in traffic (pessimistic scenario) | -22% |
| 1% decrease for every 1% increase beyond 5% | -17% |
| Maximum decrease in concession period | 20% |
| Decrease in concession period (years) | 2.2 |
| Revised concession period | 14.8 |
| Scheduled end date | 1-April-39 |
| New scheduled end date | 5-Feb-37 |

- The Management has confirmed to us to consider revised concession period till 5 February 2037. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 5 February 2037.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHA1 shared by the Management.
- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto.

Source(s): Management information

- Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.
- Additional PDTPL has forecasted the toll rate to increase from 75% of the toll rates to 100% of the toll rates (close to 32% increase), once it receives its provisional completion certificate in FY2025.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHA1 is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2032. For the forecast period post FY2032 (i) routine maintenance has been increased by 5% to 5.5% till FY2035, thereafter reduced by 44% in FY2036 due to higher periodic maintenance and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue and capex being incurred in the forecast period.

h. Tax

- Management represented that the SPV has adopted the new tax regime. Thus, tax outflows for the forecast have been calculated based on the new regime of income tax. Carried forward business loss and unabsorbed depreciation if any has been considered while calculating tax outflows.

i. Capex

- Capex has been forecasted to be INR 521 Cr in FY2025 based on Management estimates. Management have provided statement of expenses/work in progress pertaining to capex as at 31 March 2024.



Discounted Cash Flows [1/2]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 250 | 316 | 328 | 360 | 388 | 424 | 459 | 497 | 536 |
| EBITDA | [A] | 207 | 271 | 280 | 310 | 303 | 331 | 366 | 435 | 470 |
| EBITDA margin | | 83% | 86% | 86% | 86% | 78% | 78% | 80% | 88% | 88% |
| Depreciation | | (80) | (105) | (116) | (129) | (142) | (157) | (172) | (189) | (206) |
| EBIT | | 127 | 166 | 164 | 181 | 161 | 173 | 194 | 246 | 264 |
| EBIT margin | | 51% | 53% | 50% | 50% | 41% | 41% | 42% | 50% | 49% |
| Less: Tax on EBIT | [B] | (7) | (23) | (25) | (33) | (31) | (38) | (47) | (64) | (73) |
| Change in working capital | [C] | (85) | - | - | 85 | - | - | - | - | - |
| Less : Capex | [D] | (521) | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | (406) | 248 | 255 | 362 | 272 | 292 | 319 | 371 | 397 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.954 | 0.867 | 0.788 | 0.717 | 0.652 | 0.593 | 0.539 | 0.490 | 0.446 |
| Present value of cash flows | [E*F] | (387) | 215 | 201 | 259 | 177 | 173 | 172 | 182 | 177 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/2]

| Discounted Cash Flow | | | | | |
|------------------------------------|----------------------|------------|------------|------------|-------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 |
| INR crores | | 12 months | 12 months | 12 months | 10.2 months |
| Revenue | | 580 | 629 | 675 | 618 |
| EBITDA | [A] | 510 | 554 | 550 | 520 |
| EBITDA margin | | 88% | 88% | 81% | 84% |
| Depreciation | | (226) | (248) | (270) | (250) |
| EBIT | | 284 | 306 | 280 | 270 |
| EBIT margin | | 49% | 49% | 42% | 44% |
| Less: Tax on EBIT | [B] | (83) | (94) | (93) | (93) |
| Change in working capital | [C] | - | - | - | - |
| Less : Capex | [D] | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 426 | 459 | 457 | 427 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.347 |
| Discount factor | [F] | 0.405 | 0.368 | 0.335 | 0.309 |
| Present value of cash flows | [E*F] | 173 | 169 | 153 | 132 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crore | |
| Present value of cash flows | 1,797 |
| Present value of release of working capital | (1) |
| Enterprise Valuation | 1,795 |
| WACC | 9.98% |

Present value of release in working capital represent negative working capital of INR 5 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.98%, the Enterprise Value of PDTPL, as on 31 March 2024 is **INR 1,795 crore.**

Please refer annexure 2c for WACC breakup.



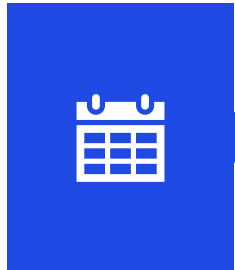
IRB Golconda Expressway Private Limited

Overview



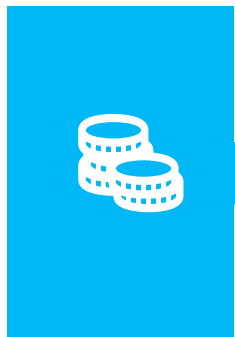
Project details

IGEPL is engaged to carry out the operation and maintenance of Nehru Outer Ring Road project in accordance with the concession agreement on TOT basis. The project stretch is 158 kms, 8 lane ring road encircling Hyderabad. with 22 toll plazas.



Concession period

IGEPL is required to operate and maintain and modify, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 30 years commencing from the appointed date. Article 24 of the concession agreement stipulates increase or decrease in the concession period on the basis of toll collection in April 2033 (Target point 1) and April 2043 (Target point2). As per the traffic report, no shortening or extension of concession period is estimated.



Upfront Concession fee

As per the concession agreement, IGEPL has paid INR 7,380 crores as upfront concession fee to Hyderabad Metropolitan Development Authority.

Source(s): Management information

Highlights

| Particulars | Details |
|------------------------------------|----------------------------------|
| Project | Nehru Outer Ring Road, Hyderabad |
| Concessionaire | IGEPL |
| State | Telangana |
| Tollable length (kms) | 158 |
| No. of toll plazas | 22 |
| Concession agreement date | 26-Mar-23 |
| Appointed date | 12-Aug-23 |
| Completion certificate date | NA |
| Scheduled end date | 11-Aug-53 |
| New scheduled end date | NA |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|--|---------|
| IRB Infrastructure Developers Ltd | 99.99% |
| Nominees of IRB Infrastructure Developers Ltd | 0.01% |

Key Assumptions

a. Modification in concession period

- Article 24 of the concession agreement of IGEPL provides for modification of the concession period.
- As per Article 24.5.1, “In the event actual fee 1 shall have fallen short of or exceeded the target fee 1 by more than 20%, then for every 1% shortfall or increase as compared to the target fee 1, the concession period, subject to fulfillment of terms of this agreement, shall be increased by 1.5% or decreased by 0.75% thereof. In the event of a shortfall or increase by 30% in target fee 1, the concession period shall be increased by 15% or decreased by 7.5% thereof.”
- As per Article 24.5.2, “In the event actual fee 2 shall have fallen short of or exceeded the target fee 2 by more than 30%, then for every 1% shortfall or increase as compared to the target fee 2, the concession period, subject to fulfillment of terms of this agreement, shall be increased by 1.5% or decreased by 0.75% thereof. In the event of a shortfall or increase by 40% in target fee 2, the concession period shall be increased by 15% or decreased by 7.5% thereof.”
- As per the traffic report, revenue variance is estimated to be lower than the caps mentioned above. Thus, there shall be no modification to the concession period in line with the above articles of the concession agreement.
- The Management has confirmed to us to consider concession period to end on 11 August 2053. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 11 August 2053.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

c. Toll rates

- The toll rates have been forecasted in accordance with the concession agreement with Hyderabad Metropolitan Development Authority and Hyderabad Growth Corridor Ltd and in accordance to Telangana Infrastructure Development Enabling Act, 2001 (Act No. 36 of 2001), Nehru Outer Ring Road, Hyderabad (Toll) Rules, 2012 issued vide G.O.Ms. No. 365 dated September 22, 2012 [published by Municipal Administration & Urban Development

- c. (12) Department], the Andhra Pradesh Reorganisation Act, 2014, Amendment to Nehru Outer Ring Road, Hyderabad (Toll) Rules 2012 issued vide GOMs. No 5 dated 12 January 2023 [published by Municipal Administration & urban Development (Plg.II) Department] and any further amendments issued till bid due date (the “Fee Rules”). The toll rates shall be revised annually on April 01, subject to and in accordance with provisions of the Fee rules.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2033. For the forecast period post FY2033 (i) routine maintenance has been increased by 2% to 3% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue and capex being incurred in the forecast period.

h. Tax

- Management represented that the SPV has adopted the new tax regime. Thus, tax outflows for the forecast have been calculated based on the new regime of income tax.

i. Capex

- Management have forecasted capex to be INR 3 Cr in FY2025.

Source(s): Management information



Discounted Cash Flows [1/3]

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 771 | 856 | 953 | 1,061 | 1,161 | 1,275 | 1,410 | 1,566 | 1,720 |
| EBITDA | [A] | 644 | 671 | 710 | 807 | 736 | 838 | 962 | 1,104 | 1,408 |
| EBITDA margin | | 84% | 78% | 75% | 76% | 63% | 66% | 68% | 71% | 82% |
| Depreciation | | (55) | (61) | (68) | (76) | (84) | (92) | (102) | (113) | (124) |
| EBIT | | 589 | 611 | 642 | 731 | 652 | 746 | 860 | 991 | 1,284 |
| EBIT margin | | 76% | 71% | 67% | 69% | 56% | 59% | 61% | 63% | 75% |
| Less: Tax on EBIT | [B] | (36) | (101) | (111) | (135) | (117) | (143) | (174) | (209) | (286) |
| Change in working capital | [C] | - | - | 243 | - | - | - | - | - | - |
| Less : Capex | [D] | (3) | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 605 | 571 | 843 | 672 | 619 | 696 | 788 | 895 | 1,122 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.873 | 0.798 | 0.729 | 0.666 | 0.608 | 0.556 | 0.508 | 0.464 |
| Present value of cash flows | [E*F] | 578 | 498 | 672 | 490 | 412 | 423 | 438 | 454 | 520 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/3]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| INR crores | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 1,886 | 2,058 | 2,261 | 2,480 | 2,696 | 2,941 | 3,213 | 3,498 | 3,810 | 4,163 |
| EBITDA | [A] | 1,563 | 1,337 | 1,524 | 1,732 | 1,935 | 2,552 | 2,809 | 2,845 | 3,142 | 3,479 |
| EBITDA margin | | 83% | 65% | 67% | 70% | 72% | 87% | 87% | 81% | 82% | 84% |
| Depreciation | | (136) | (148) | (163) | (179) | (194) | (212) | (232) | (252) | (275) | (300) |
| EBIT | | 1,427 | 1,188 | 1,361 | 1,553 | 1,741 | 2,340 | 2,577 | 2,592 | 2,867 | 3,178 |
| EBIT margin | | 76% | 58% | 60% | 63% | 65% | 80% | 80% | 74% | 75% | 76% |
| Less: Tax on EBIT | [B] | (325) | (268) | (315) | (368) | (419) | (574) | (638) | (648) | (723) | (807) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 1,238 | 1,068 | 1,209 | 1,364 | 1,516 | 1,978 | 2,170 | 2,197 | 2,419 | 2,671 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 |
| Discount factor | [F] | 0.424 | 0.387 | 0.354 | 0.323 | 0.295 | 0.270 | 0.246 | 0.225 | 0.206 | 0.188 |
| Present value of cash flows | [E*F] | 524 | 413 | 427 | 441 | 447 | 533 | 534 | 494 | 497 | 502 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [3/3]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | FY2044 | FY2045 | FY2046 | FY2047 | FY2048 | FY2049 | FY2050 | FY2051 | FY2052 | FY2053 | FY2054 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12.0 months | 12.0 months | 12.0 months | 12.0 months | 12.0 months | 4.4 months |
| Revenue | 4,526 | 4,893 | 5,321 | 5,778 | 6,309 | 6,792 | 7,362 | 7,968 | 8,662 | 9,352 | 3,689 |
| EBITDA | [A] | 3,824 | 4,412 | 4,823 | 4,730 | 5,239 | 5,706 | 6,257 | 7,372 | 8,042 | 3,296 |
| EBITDA margin | 84% | 90% | 91% | 82% | 83% | 84% | 85% | 93% | 93% | 89% | 89% |
| Depreciation | (326) | (353) | (384) | (417) | (455) | (490) | (531) | (575) | (625) | (674) | (266) |
| EBIT | 3,498 | 4,059 | 4,439 | 4,314 | 4,784 | 5,217 | 5,726 | 6,798 | 7,417 | 7,632 | 3,030 |
| EBIT margin | 77% | 83% | 83% | 75% | 76% | 77% | 78% | 85% | 86% | 82% | 82% |
| Less: Tax on EBIT | [B] | (894) | (1,042) | (1,146) | (1,122) | (1,250) | (1,368) | (1,506) | (1,787) | (1,956) | (805) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 2,930 | 3,370 | 3,677 | 3,608 | 3,989 | 4,338 | 4,750 | 5,585 | 6,086 | 2,491 |
| Discounting period | | 19.500 | 20.500 | 21.500 | 22.500 | 23.500 | 24.500 | 25.500 | 26.500 | 27.500 | 28.864 |
| Discount factor | [F] | 0.172 | 0.157 | 0.143 | 0.131 | 0.119 | 0.109 | 0.100 | 0.091 | 0.083 | 0.074 |
| Present value of cash flows | [E*F] | 503 | 528 | 526 | 472 | 477 | 473 | 474 | 509 | 506 | 183 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|---------------|
| INR Crores | |
| Present value of cash flows | 14,428 |
| Present value of release of working capital | 1 |
| Enterprise Valuation | 14,428 |
| WACC | 9.46% |

Present value of release in working capital represent working capital of INR 7 Cr released at the end of the concession period.

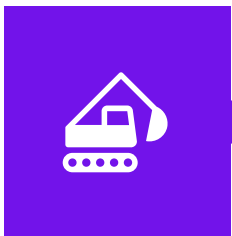
Basis the above and using a WACC of 9.46%, the Enterprise Value of IGEPL, as on 31 March 2024 is INR 14,428 crore.

Please refer annexure 2b for WACC breakup.



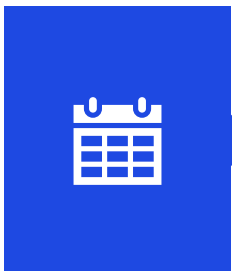
Samakhiyali Tollway Private Limited

Overview



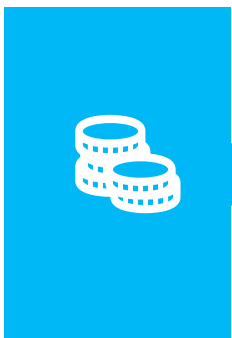
Project details

STPL is engaged in six laning the existing four lane highway on DBFOT basis. The project stretch is 90.90 kms long involving the Samakhiyali to Santalpur section of NH-27 in Gujarat.



Concession period

STPL is required to construct, obtain and maintain the project highway in accordance with the concession agreement for a period of 20 years commencing from the appointed date. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 0.3 years.



Premium

STPL has agreed to pay to NHAI immediately after the 1st anniversary of project completion date, a premium in the form of additional concession fee for every year of the remaining concession period, to be calculated on total realizable fee. The premium to be paid for the 2nd year after project completion date shall equal to 42.84% of the total realizable fee. For all subsequent years, premium shall be determined by increasing percentage of premium by additional 1% as compared to immediately preceding year.

Source(s): Management information

Highlights

| Particulars | Details |
|---|--------------------------|
| Project location | Samakhiyali to Santalpur |
| Concessionaire | STPL |
| State | Gujarat |
| Tollable length (kms) | 90.90 |
| No. of toll plazas | 1 |
| Concession agreement date | 12-May-23 |
| Appointed date | 28-Dec-23 |
| Six laning completion certificate date | Under construction |
| Scheduled end date | 27-Dec-43 |
| New scheduled end date | 18-Apr-44 |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|--|---------|
| IRB Infrastructure Developers Ltd | 0.04% |
| IRB Infrastructure Trust | 99.96% |

Key Assumptions

a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHAI and STPL, *“In the event actual average traffic shall have fallen short of the target traffic by more than 5%, then for every 1% shortfall as compared to the target traffic, the remaining concession period shall, subject to payment of concession and additional concession fee in accordance with this agreement, be increased by 1% thereof; provided such increase in concession period shall not in any case exceed 20% of the concession period”.*
- Thus, the concession period is increased as per the above clause as follows:

| Particulars | Details |
|---|------------------|
| Shortfall in traffic (pessimistic scenario) | 7% |
| 1% increase for every 1% decrease beyond 5% | 2% |
| Maximum increase in concession period | 20% |
| Increase in concession period (years) | 0.3 |
| Revised concession period | 20.3 |
| Scheduled end date | 27-Dec-43 |
| New scheduled end date | 18-Apr-44 |

- The Management has confirmed to us to consider revised concession period till 18th April 2044. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 18 April 2044.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by an independent consultant in March 2024.

c. Toll rates

- The current toll rates provided by the Management have been corroborated from toll notifications issued by NHAI shared by the Management.

- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Premium payable

- The premium payable to NHAI is considered and corroborated from the concession agreement as given by the Management.

f. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2033. For the forecast period post FY2033 (i) routine maintenance has been increased by 2% to 3% and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

g. Depreciation & Amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

h. Tax

- Management represented that the SPV has adopted the new tax regime. Thus, tax outflows for the forecast have been calculated based on the new regime of income tax. Carried forward business loss and unabsorbed depreciation if any has been considered while calculating tax outflows.

i. Capex

- Capex has been forecasted to be INR 1,680 Cr between FY2025 (INR 1,255 Cr) and FY2026 (INR 425 Cr) based on Management estimates. Management have provided statement of expenses/work in progress pertaining to capex as at 31 March 2024.

Source(s): Management information



Discounted Cash Flows [1/3]

| Discounted Cash Flow | | | | | | | | | |
|------------------------------------|----------------------|----------------|--------------|------------|------------|------------|------------|------------|------------|
| | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | 164 | 204 | 271 | 197 | 211 | 231 | 254 | 280 | 305 |
| EBITDA | [A] | 160 | 193 | 247 | 172 | 185 | 205 | 228 | 241 |
| EBITDA margin | 98% | 94% | 91% | 87% | 88% | 89% | 90% | 77% | 79% |
| Depreciation | (16) | (27) | (39) | (44) | (49) | (55) | (61) | (69) | (77) |
| EBIT | 144 | 166 | 208 | 128 | 136 | 151 | 166 | 147 | 164 |
| EBIT margin | 88% | 81% | 77% | 65% | 65% | 65% | 65% | 53% | 54% |
| Less: Tax on EBIT | [B] | (27) | (24) | (35) | (16) | (20) | (25) | (30) | (34) |
| Change in working capital | [C] | - | (100) | - | 100 | - | - | - | - |
| Less : Capex | [D] | (1,255) | (425) | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | (1,122) | (357) | 211 | 256 | 166 | 181 | 198 | 207 |
| Discounting period | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.954 | 0.867 | 0.788 | 0.717 | 0.652 | 0.593 | 0.490 | 0.446 |
| Present value of cash flows | [E*F] | (1,070) | (309) | 167 | 184 | 108 | 107 | 93 | 92 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [2/3]

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| INR crores | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 |
| | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 332 | 361 | 394 | 427 | 464 | 502 | 543 | 586 | 634 | 683 |
| EBITDA | [A] | 266 | 332 | 365 | 397 | 433 | 471 | 467 | 509 | 555 | 649 |
| EBITDA margin | | 80% | 92% | 92% | 93% | 93% | 94% | 86% | 87% | 88% | 95% |
| Depreciation | | (85) | (94) | (105) | (116) | (129) | (142) | (157) | (174) | (192) | (212) |
| EBIT | | 181 | 238 | 260 | 281 | 304 | 328 | 310 | 335 | 363 | 437 |
| EBIT margin | | 54% | 66% | 66% | 66% | 66% | 65% | 57% | 57% | 57% | 64% |
| Less: Tax on EBIT | [B] | (40) | (57) | (65) | (73) | (82) | (91) | (91) | (101) | (113) | (136) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 226 | 275 | 300 | 324 | 351 | 379 | 377 | 408 | 442 | 512 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 |
| Discount factor | [F] | 0.405 | 0.368 | 0.335 | 0.305 | 0.277 | 0.252 | 0.229 | 0.208 | 0.189 | 0.172 |
| Present value of cash flows | [E*F] | 91 | 101 | 100 | 99 | 97 | 95 | 86 | 85 | 84 | 88 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows [3/3]

| Discounted Cash Flow | | | |
|------------------------------------|----------------------|---------------------|--------------------|
| INR crores | | FY2044 12 months | FY2045 1 months |
| Revenue | | 740 | 38 |
| EBITDA | [A] | 705 | 37 |
| EBITDA margin | | 95% | 95% |
| Depreciation | | (235) | (13) |
| EBIT | | 470 | 24 |
| EBIT margin | | 63% | 62% |
| Less: Tax on EBIT | [B] | (150) | (8) |
| Change in working capital | [C] | - | - |
| Less : Capex | [D] | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 555 | 29 |
| Discounting period | | 19.500 | 19.550 |
| Discount factor | [F] | 0.157 | 0.156 |
| Present value of cash flows | [E*F] | 87 | 4 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crores | |
| Present value of cash flows | 497 |
| Present value of release of working capital | (0) |
| Enterprise Valuation | 497 |
| WACC | 9.98% |

Present value of release in working capital represents negative working capital of INR 0.1 Cr released at the end of the concession period.

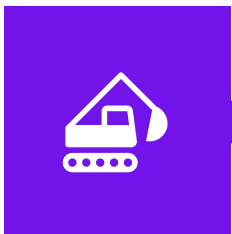
Basis the above and using a WACC of 9.98%, the Enterprise Value of STPL, as on 31 March 2024 is INR 497 crore.

Please refer annexure 2c for WACC breakup.



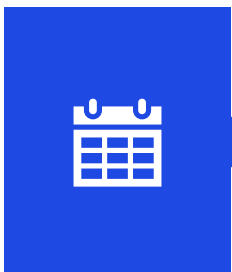
IRB Gwalior Tollway Private Limited

Overview



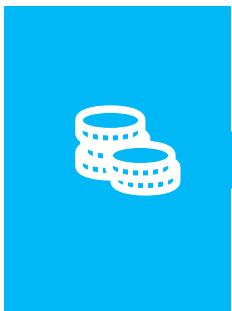
Project details

IGTPL is engaged to carry out the operation and maintenance of the Gwalior – Jhansi section on the NH75 in accordance with the concession agreement on a TOT basis. The project stretch is 82.5 kms, 4 lane road stretching between Gwalior and Jhansi.



Concession period

IGTPL is required to operate, manage and maintain, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 20 years commencing from the appointed date. The concession agreement also stipulates that the concession period shall not be reduced by more than 5 years or increased by more than 10 years whatsoever. As per the traffic report, no shortening or extension of concession period is estimated.



Upfront Concession Fee

As per the concession agreement, IGTPPL is required to pay INR 1,161 crores as upfront concession fee to NHA1 which has been paid in March 2024.

Source(s): Management information

| Highlights | |
|------------------------------------|----------------------------------|
| Particulars | Details |
| Project location | Gwalior-Jhansi stretch on NH75 |
| Concessionaire | IGTPL |
| State | Madhya Pradesh and Uttar Pradesh |
| Tollable length (kms) | 82.5 |
| Concession agreement date | 12-Jan-24 |
| Appointed date | 1-Apr-24 |
| Completion certificate date | NA |
| Concession Period | 20 years from Appointed Date |

| Shareholding as at 31 March 2024 | |
|----------------------------------|---------|
| Particulars | Stake % |
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- Article 24 of the concession agreement of IGTPPL provides for modification of the concession period.
- As per Article 24.5.1, “in the event Actual Fee 1 shall have fallen short of or exceeded the Target Fee 1 by more than 20% (twenty percent), then for every 1% (one percent) shortfall or increase as compared to the Target Fee 1, the Concession Period, subject to fulfilment of terms of this Agreement, shall be increased by 1.5% (one and a half percent) or decreased by 0.75% (point seven five percent) thereof; provided that such increase or decrease in concession period shall not in any case exceed not more than limits specified in Clause 3.1.”
- As per Article 24.5.2, “in the event Actual Fee 2 shall have fallen short of or exceeded the Target Fee 2 by more than 30% (thirty percent), then for every 1% (one percent) shortfall or increase as compared to the Target Fee 2, the concession period, subject to fulfilment of terms of this Agreement, shall be increased by 1.5% (one and a half percent) or decreased by 0.75% (point seven five percent) thereof; provided that such increase or decrease in Concession Period shall not in any case exceed not more than limits specified in Clause 3.1.”
- As per the traffic report, revenue variance is estimated to be lower than the caps mentioned above. Thus, there shall be no modification to the concession period in line with the above articles of the concession agreement.
- The Management have paid the upfront fee and confirmed to us to consider concession appointment date as 01 April 2024. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 31 March 2044.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by independent consultant in March 2024.

c. Toll rates

- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the

increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2034. For the forecast period post FY2034 (i) routine maintenance has been increased by an average of 3.6 per cent each year (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that the SPV has adopted the new tax regime. Thus, tax outflows for the forecast have been calculated based on the new regime of income tax. Carried forward business loss and unabsorbed depreciation if any has been considered while calculating tax outflows.

h. Capex

- Capex is forecasted to be INR 69 Cr in FY2025. Management represented that the capex pertains to EPC cost and preliminary and pre-operative cost. Management has provided project cost and completion certificate as at 27 March 2024.

Source(s): Management information

Discounted Cash Flows (1/2)

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|-----------|-----------|-----------|------------|-----------|-----------|-----------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 112 | 126 | 139 | 154 | 167 | 182 | 199 | 218 | 238 |
| EBITDA | [A] | 97 | 110 | 110 | 101 | 109 | 110 | 110 | 180 | 198 |
| EBITDA margin | | 86% | 87% | 79% | 66% | 65% | 61% | 55% | 82% | 83% |
| Depreciation | | (24) | (26) | (29) | (32) | (36) | (39) | (42) | (47) | (51) |
| EBIT | | 73 | 83 | 81 | 69 | 74 | 72 | 68 | 133 | 147 |
| EBIT margin | | 65% | 66% | 58% | 45% | 44% | 39% | 34% | 61% | 62% |
| Less: Tax on EBIT | [B] | (9) | (12) | (12) | (10) | (12) | (12) | (12) | (30) | (34) |
| Change in working capital | [C] | - | - | - | 41 | - | - | - | - | - |
| Less : Capex | [D] | (69) | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 18 | 98 | 98 | 132 | 97 | 98 | 98 | 150 | 163 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.873 | 0.798 | 0.729 | 0.666 | 0.608 | 0.556 | 0.508 | 0.464 |
| Present value of cash flows | [E*F] | 18 | 85 | 78 | 97 | 65 | 60 | 55 | 76 | 76 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows (2/2)

| Discounted Cash Flow | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 | FY2044 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | 259 | 280 | 304 | 327 | 354 | 384 | 414 | 448 | 482 | 522 | 564 |
| EBITDA [A] | 209 | 218 | 240 | 247 | 257 | 335 | 365 | 374 | 394 | 422 | 448 |
| EBITDA margin | 81% | 78% | 79% | 75% | 73% | 87% | 88% | 83% | 82% | 81% | 79% |
| Depreciation | (55) | (60) | (65) | (70) | (75) | (82) | (88) | (95) | (103) | (111) | (120) |
| EBIT | 154 | 159 | 175 | 177 | 182 | 254 | 276 | 278 | 292 | 311 | 328 |
| EBIT margin | 59% | 57% | 58% | 54% | 51% | 66% | 67% | 62% | 61% | 60% | 58% |
| Less: Tax on EBIT [B] | (37) | (39) | (45) | (46) | (49) | (69) | (76) | (78) | (84) | (91) | (97) |
| Change in working capital [C] | - | - | - | - | - | - | - | - | - | - | - |
| Less : Capex [D] | - | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm E = [A+B+C+D] | 172 | 179 | 195 | 200 | 208 | 267 | 289 | 295 | 311 | 332 | 351 |
| Discounting period | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 | 19.500 |
| Discount factor [F] | 0.424 | 0.387 | 0.354 | 0.323 | 0.295 | 0.270 | 0.246 | 0.225 | 0.206 | 0.188 | 0.172 |
| Present value of cash flows [E*F] | 73 | 69 | 69 | 65 | 61 | 72 | 71 | 66 | 64 | 62 | 60 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crores | |
| Present value of cash flows | 1,342 |
| Present value of release of working capital | (0) |
| Enterprise Valuation | 1,342 |
| WACC | 9.46% |

Present value of release in working capital represent negative working capital of INR 1 Cr released at the end of the concession period.

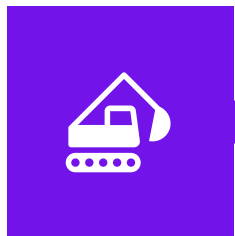
Basis the above and using a WACC of 9.46%, the Enterprise Value of IGTPPL on 31 March 2024 is INR 1,342 crore.

Refer Annexure 2b for detailed WACC analysis



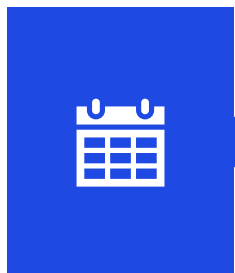
IRB Lalitpur Tollway Private Limited

Overview



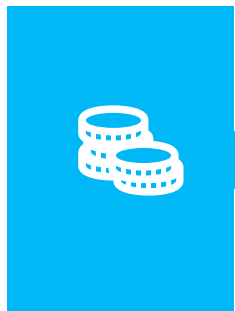
Project details

ILTPL is engaged to carry out the operation and maintenance of the Lalitpur – Sagar – Lakhnadon stretch on NH26 in accordance with the concession agreement on a TOT basis. The project stretch is 316 kms, 4 lane road stretching through Uttar Pradesh and Madhya Pradesh.



Concession period

ILTPL is required to operate, manage and maintain, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 20 years commencing from the appointed date. The concession agreement also stipulates that the concession period shall not be reduced by more than 5 years or increased by more than 10 years whatsoever. As per the traffic report, no shortening or extension of concession period is estimated.



Upfront Concession Fee

As per the concession agreement, ILTPL is required to pay INR 4,428 crores as upfront concession fee to NHAI which the Management has paid in March 2024.

Source(s): Management information

Highlights

| Particulars | Details |
|------------------------------------|--|
| Project location | Lalitpur-Sagar-Lakhnadon stretch on NH26 |
| Concessionaire | ILTPL |
| State | Uttar Pradesh and Madhya Pradesh |
| Tollable length (kms) | 316.1 |
| Concession agreement date | 24-Nov-23 |
| Appointed date | 1-Apr-24 |
| Completion certificate date | NA |
| Concession Period | 20 years from Appointed Date |

Shareholding as at 31 March 2024

| Particulars | Stake % |
|---------------------------------|---------|
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- Article 24 of the concession agreement of ILTPL provides for modification of the concession period.
- As per Article 24.5.1, “in the event Actual Fee 1 shall have fallen short of or exceeded the Target Fee 1 by more than 20% (twenty percent), then for every 1% (one percent) shortfall or increase as compared to the Target Fee 1, the Concession Period, subject to fulfilment of terms of this Agreement, shall be increased by 1.5% (one and a half percent) or decreased by 0.75% (point seven five percent) thereof; provided that such increase or decrease in concession period shall not in any case exceed not more than limits specified in Clause 3.1.”
- As per Article 24.5.2, “in the event Actual Fee 2 shall have fallen short of or exceeded the Target Fee 2 by more than 30% (thirty percent), then for every 1% (one percent) shortfall or increase as compared to the Target Fee 2, the concession period, subject to fulfilment of terms of this Agreement, shall be increased by 1.5% (one and a half percent) or decreased by 0.75% (point seven five percent) thereof; provided that such increase or decrease in Concession Period shall not in any case exceed not more than limits specified in Clause 3.1.”
- As per the traffic report, revenue variance is estimated to be lower than the caps mentioned above. Thus, there shall be no modification to the concession period in line with the above articles of the concession agreement.
- The Management have paid the upfront fee and confirmed to us to consider concession appointment date as 01 April 2024. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 31 March 2044.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by independent consultant in March 2024.

c. Toll rates

- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the

increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2034. For the forecast period post FY2034 (i) routine maintenance has been increased by 2.4 per cent to 3.4 per cent and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that the SPV has adopted the new tax regime. Thus, tax outflows for the forecast have been calculated based on the new regime of income tax. Carried forward business loss and unabsorbed depreciation if any has been considered while calculating tax outflows.

h. Capex

- Capex is forecasted to be INR 529 Cr in FY2025. Management represented that the capex pertains to EPC cost and preliminary and pre-operative cost. Management has provided project cost and completion certificate as at 26 March 2024.

Source(s): Management information



Discounted Cash Flows (1/2)

| Discounted Cash Flow | | | | | | | | | | |
|------------------------------------|----------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 406 | 458 | 501 | 550 | 593 | 648 | 709 | 778 | 849 |
| EBITDA | [A] | 342 | 391 | 431 | 477 | 451 | 501 | 556 | 619 | 685 |
| EBITDA margin | | 84% | 85% | 86% | 87% | 76% | 77% | 78% | 80% | 81% |
| Depreciation | | (97) | (108) | (118) | (129) | (142) | (155) | (169) | (186) | (203) |
| EBIT | | 245 | 283 | 313 | 347 | 309 | 346 | 386 | 433 | 482 |
| EBIT margin | | 60% | 62% | 63% | 63% | 52% | 53% | 54% | 56% | 57% |
| Less: Tax on EBIT | [B] | (27) | (35) | (46) | (57) | (51) | (63) | (77) | (93) | (109) |
| Change in working capital | [C] | - | - | - | 156 | - | - | - | - | - |
| Less : Capex | [D] | (529) | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | (213) | 355 | 386 | 576 | 400 | 438 | 479 | 526 | 575 |
| Discounting period | | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | 0.956 | 0.873 | 0.798 | 0.729 | 0.666 | 0.608 | 0.556 | 0.508 | 0.464 |
| Present value of cash flows | [E*F] | (204) | 310 | 308 | 420 | 267 | 266 | 266 | 267 | 267 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows (2/2)

| Discounted Cash Flow | | | | | | | | | | | |
|------------------------------------|----------------------|------------|------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 | FY2044 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | 929 | 1,005 | 1,091 | 1,178 | 1,275 | 1,380 | 1,492 | 1,604 | 1,730 | 1,868 | 2,020 |
| EBITDA | [A] | 839 | 912 | 878 | 959 | 1,049 | 1,148 | 1,252 | 1,494 | 1,617 | 1,716 |
| EBITDA margin | 90% | 91% | 80% | 81% | 82% | 83% | 84% | 93% | 93% | 84% | 85% |
| Depreciation | (222) | (240) | (261) | (281) | (305) | (330) | (356) | (383) | (413) | (446) | (483) |
| EBIT | 617 | 672 | 617 | 677 | 745 | 818 | 895 | 1,111 | 1,203 | 1,121 | 1,233 |
| EBIT margin | 66% | 67% | 57% | 57% | 58% | 59% | 60% | 69% | 70% | 60% | 61% |
| Less: Tax on EBIT | [B] | (148) | (167) | (158) | (178) | (201) | (226) | (252) | (313) | (344) | (369) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 691 | 746 | 720 | 780 | 848 | 922 | 1,000 | 1,181 | 1,273 | 1,347 |
| Discounting period | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 | 19.500 |
| Discount factor | [F] | 0.424 | 0.387 | 0.354 | 0.323 | 0.295 | 0.270 | 0.246 | 0.225 | 0.206 | 0.188 |
| Present value of cash flows | [E*F] | 293 | 289 | 255 | 252 | 250 | 248 | 246 | 266 | 262 | 232 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crores | |
| Present value of cash flows | 4,989 |
| Present value of release of working capital | (1) |
| Enterprise Valuation | 4,988 |
| WACC | 9.46% |

Present value of release in working capital represent negative working capital of INR 9 Cr released at the end of the concession period.

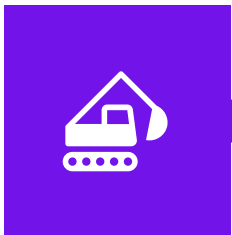
Basis the above and using a WACC of 9.46%, the Enterprise Value of ILTPL on 31 March 2024 is INR 4,988 crore.

Refer Annexure 2b for details WACC calculation



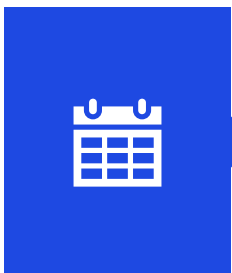
IRB Kota Tollway Private Limited

Overview



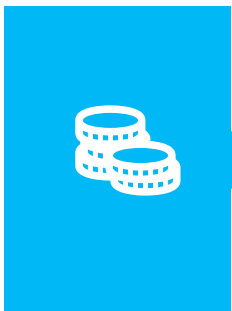
Project details

IKTPL is engaged to carry out the operation and maintenance of the Kota bypass and cable stay bridge on NH76 in accordance with the concession agreement on a TOT basis. The project stretch is 27.8 kms, 4 lane road near Kota, Rajasthan.



Concession period

IKTPL is required to operate, manage and maintain, repair or otherwise make improvements to the project highway in accordance with the concession agreement for a period of 20 years commencing from the appointed date. The concession agreement also stipulates that the concession period shall not be reduced by more than 5 years or increased by more than 10 years whatsoever. As per the traffic report, no shortening or extension of concession period is estimated.



Upfront Concession Fee

As per the concession agreement, IKTPL is required to pay INR 522 crores as upfront concession fee to NHAI which the Management has paid in March 2024.

Source(s): Management information

| Highlights | |
|------------------------------------|-----------------------------------|
| Particulars | Details |
| Project location | Kota Bypass and Cable Stay Bridge |
| Concessionaire | IKTPL |
| State | Rajasthan |
| Tollable length (kms) | 27.8 |
| Concession agreement date | 12-Jan-24 |
| Appointed date | 1-Apr-24 |
| Completion certificate date | NA |
| Concession Period | 20 years from Appointed Date |

| Shareholding as at 31 March 2024 | |
|----------------------------------|---------|
| Particulars | Stake % |
| IRB Infrastructure Trust | 100% |

Key Assumptions

a. Modification in concession period

- Article 24 of the concession agreement of IKTPL provides for modification of the concession period.
- As per Article 24.5.1, “in the event Actual Fee 1 shall have fallen short of or exceeded the Target Fee 1 by more than 20% (twenty percent), then for every 1% (one percent) shortfall or increase as compared to the Target Fee 1, the Concession Period, subject to fulfilment of terms of this Agreement, shall be increased by 1.5% (one and a half percent) or decreased by 0.75% (point seven five percent) thereof; provided that such increase or decrease in concession period shall not in any case exceed not more than limits specified in Clause 3.1.”
- As per Article 24.5.2, “in the event Actual Fee 2 shall have fallen short of or exceeded the Target Fee 2 by more than 30% (thirty percent), then for every 1% (one percent) shortfall or increase as compared to the Target Fee 2, the concession period, subject to fulfilment of terms of this Agreement, shall be increased by 1.5% (one and a half percent) or decreased by 0.75% (point seven five percent) thereof; provided that such increase or decrease in Concession Period shall not in any case exceed not more than limits specified in Clause 3.1.”
- As per the traffic report, revenue variance is estimated to be lower than the caps mentioned above. Thus, there shall be no modification to the concession period in line with the above articles of the concession agreement.
- The Management have paid the upfront fee and confirmed to us to consider concession appointment date as 01 April 2024. Thus, the explicit period for the current valuation analysis exercise has been considered from 1 April 2024 to 31 March 2044.

b. Traffic volume

- Traffic volume for the forecast period has been considered based on the traffic report prepared by independent consultant in March 2024.

c. Toll rates

- Annual revision of toll rate for the forecast period shall be in accordance with National Highway Fee (Determination of Rates and Collection) Rules, 2008 and amendment thereto. Additionally, the applicable base rate shall be revised annually on April 1 to reflect the increase in wholesale price index (“WPI”) but such revision shall be restricted to 40% of the

increase in WPI on overall basis during the concession period. As given in the traffic report, WPI has been projected to grow by 5% initially and stepped down for the future years.

d. Revenue

- Toll revenue has been considered basis the pessimistic scenario from the traffic report prepared by an independent consultant.

e. Periodic maintenance & routine maintenance costs

- Periodic and routine maintenance is based on the agreement with IRB Infrastructure Developers Limited till FY2034. For the forecast period post FY2034 (i) routine maintenance has been increased by 2.5 per cent to 3.5 per cent and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management.

f. Depreciation & amortization

- Forecasted depreciation on assets has been provided by the Management. Management has forecasted depreciation to increase in line with the increase in revenue.

g. Tax

- Management represented that the SPV has adopted the new tax regime. Thus, tax outflows for the forecast have been calculated based on the new regime of income tax.

h. Capex

- Capex is forecasted to be INR 59 Cr in FY2025. Management represented that the capex pertains to EPC cost and preliminary and pre-operative cost. Management has provided project cost and completion certificate as at 27 March 2024.

Source(s): Management information



Discounted Cash Flows (1/2)

| Discounted Cash Flow | | | | | | | | | |
|--|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | 62 | 70 | 77 | 85 | 93 | 101 | 111 | 122 | 134 |
| EBITDA [A] | 40 | 49 | 55 | 62 | 61 | 69 | 85 | 96 | 106 |
| EBITDA margin | 65% | 70% | 72% | 73% | 66% | 68% | 77% | 78% | 80% |
| Depreciation | (11) | (12) | (13) | (15) | (16) | (18) | (20) | (21) | (24) |
| EBIT | 29 | 37 | 42 | 47 | 45 | 51 | 66 | 74 | 83 |
| EBIT margin | 47% | 53% | 54% | 56% | 48% | 50% | 59% | 61% | 62% |
| Less: Tax on EBIT | (3) | (5) | (7) | (8) | (8) | (10) | (14) | (17) | (19) |
| Change in working capital | [B] | [C] | [C] | [C] | [C] | [C] | [C] | [C] | [C] |
| Less : Capex | [D] | [D] | [D] | [D] | [D] | [D] | [D] | [D] | [D] |
| Free cash flows to the firm E = [A+B+C+D] | (22) | 44 | 49 | 76 | 53 | 59 | 71 | 79 | 87 |
| Discounting period | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 |
| Discount factor | [F] | [F] | [F] | [F] | [F] | [F] | [F] | [F] | [F] |
| Present value of cash flows [E*F] | (21) | 38 | 39 | 55 | 35 | 36 | 40 | 40 | 40 |

Source(s): Management information, KPMG analysis

Discounted Cash Flows (2/2)

| Discounted Cash Flow | | | | | | | | | | | | |
|------------------------------------|----------------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | FY2034 | FY2035 | FY2036 | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 | FY2044 |
| INR crores | | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Revenue | | 146 | 158 | 172 | 186 | 203 | 219 | 239 | 258 | 280 | 304 | 330 |
| EBITDA | [A] | 99 | 110 | 142 | 155 | 171 | 175 | 193 | 224 | 244 | 267 | 269 |
| EBITDA margin | | 68% | 70% | 82% | 83% | 84% | 80% | 81% | 87% | 87% | 88% | 82% |
| Depreciation | | (26) | (28) | (30) | (33) | (36) | (39) | (42) | (46) | (49) | (53) | (58) |
| EBIT | | 73 | 82 | 112 | 122 | 135 | 136 | 151 | 178 | 195 | 213 | 211 |
| EBIT margin | | 50% | 52% | 65% | 66% | 67% | 62% | 63% | 69% | 70% | 70% | 64% |
| Less: Tax on EBIT | [B] | (17) | (20) | (28) | (32) | (36) | (37) | (41) | (49) | (54) | (60) | (60) |
| Change in working capital | [C] | - | - | - | - | - | - | - | - | - | - | - |
| Less : Capex | [D] | - | - | - | - | - | - | - | - | - | - | - |
| Free cash flows to the firm | E = [A+B+C+D] | 81 | 90 | 114 | 123 | 135 | 138 | 152 | 175 | 190 | 207 | 208 |
| Discounting period | | 9.500 | 10.500 | 11.500 | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 | 19.500 |
| Discount factor | [F] | 0.424 | 0.387 | 0.354 | 0.323 | 0.295 | 0.270 | 0.246 | 0.225 | 0.206 | 0.188 | 0.172 |
| Present value of cash flows | [E*F] | 34 | 35 | 40 | 40 | 40 | 37 | 37 | 39 | 39 | 39 | 36 |

Source(s): Management information, KPMG analysis

| Valuation conclusion | |
|---|--------------|
| INR Crores | |
| Present value of cash flows | 719 |
| Present value of release of working capital | (0) |
| Enterprise Valuation | 719 |
| WACC | |
| | 9.46% |

Present value of release in working capital represent negative working capital of INR 1 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.46%, the Enterprise Value of IKTPL on 31 March 2024 is INR 719 crore.

Refer Annexure 2b for detailed WACC analysis

6.

Valuation Conclusion

Valuation Conclusion (1/2)

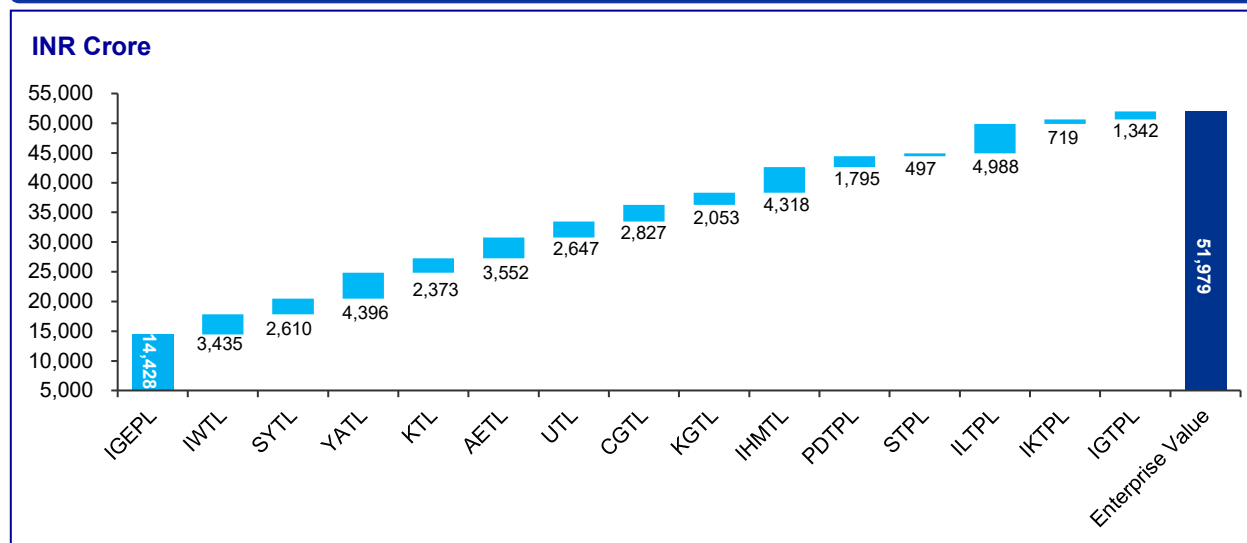
Valuation Conclusion (INR Crs)

| Valuation Conclusion 31 March 2024 | | INR Crore |
|--|--|---------------|
| IRB Golconda Expressway Private Limited | | 14,428 |
| IRB Westcoast Tollway Limited | | 3,435 |
| Solapur Yedeshi Tollway Limited | | 2,610 |
| Yedeshi Aurangabad Tollway Limited | | 4,396 |
| Kaithal Tollway Limited | | 2,373 |
| AE Tollway Limited | | 3,552 |
| Udaipur Tollway Limited | | 2,647 |
| CG Tollway Limited | | 2,827 |
| Kishangarh Gulabpura Tollway Limited | | 2,053 |
| IRB Hapur Moradabad Tollway Limited | | 4,318 |
| Palsit Dankuni Tollway Private Limited | | 1,795 |
| Samakhiali Tollway Private Limited | | 497 |
| Lalitpur Tollway Private Limited | | 4,988 |
| IRB Kota Tollway Private Limited | | 719 |
| IRB Gwalior Tollway Private Limited | | 1,342 |
| Enterprise Value of the SPVs | | 51,979 |
| Cash and cash Equivalents | | 161 |
| Surplus | | 178 |
| Debt | | (21,690) |
| PV of standalone expense pertaining to InvIT | | (227) |
| Capex creditors | | (397) |
| Equity Value of IRBI Trust | | 30,004 |

| NAV at fair value per unit as on 31 March 2024 | |
|--|---------------|
| Equity Value of IRBI Trust (INR Cr) | 30,004 |
| Units outstanding (No.) | 1,113,693,265 |
| NAV at fair value per unit (INR) | 269.41 |

Source(s): Management information, KPMG analysis

Enterprise Value of SPVs



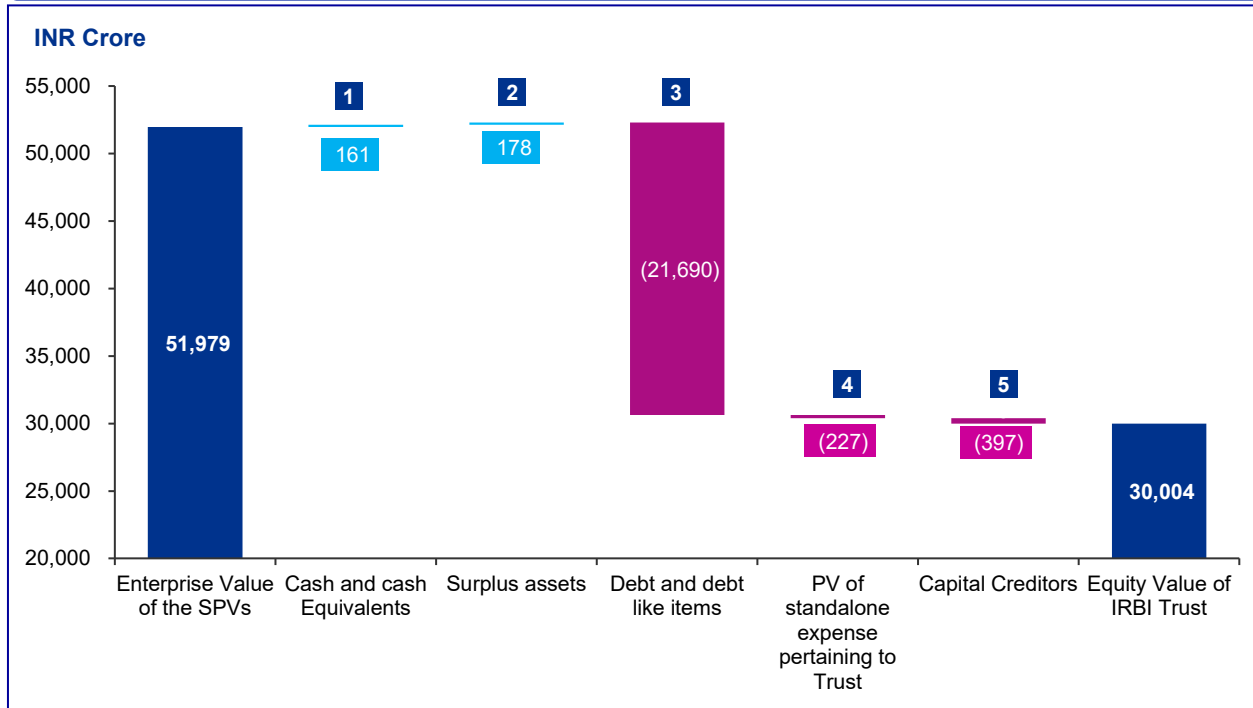
The chart above presents the Enterprise Value of the SPVs. Refer subsequent slide for details about the post Enterprise Value adjustments.

The Enterprise Value of the SPVs is INR 51,979 crores and the 100% Equity Value of the IRBI Trust is INR 30,004 crores as on 31 March 2024.

The NAV at fair value per unit of IRBI Trust as on 31 March 2024 is INR 269.41 per unit.

Valuation Conclusion (2/2)

Calculation of Equity Value of IRBI Trust from Enterprise Value of the SPVs



- 1 Cash and cash equivalents comprise balance and deposits with banks as at 31 March 2024.
- 2 Surplus assets primarily comprise investment in mutual funds of INR 152 Cr and advance tax net of provisions of INR 17 Cr as at 31 March 2024.
- 3 Debt and debt like items primarily represents loan from banks and financial institutions of INR 19,121 Cr and non-convertible debentures of INR 2,804 Cr as at 31 March 2024. The debt and debt like items has been reduced by INR 237 Cr, which represents the present value of the release of DSRA of INR 262 Cr as at 31 March 2024, maintained by the Management in standalone books of the Trust. The release schedule of the DSRA along with applicable interest earned on the DSRA balance has been provided by the Management.
- 4 Present value of standalone expenses of the IRBI Trust represent the present value of the investment manager fee in the books of the IRBI Trust. The expenses have been forecasted to increase by 10% each year till 11 August 2053 (FY2054).
- 5 Capital creditors of INR 397 Cr have been considered debt like in nature and adjusted from the Enterprise Value to arrive at the Equity Value of IRBI Trust. Management represented that they do not consider these liabilities as part of the working capital and thus they have not been considered as part of the forecast working capital

The Enterprise Value of the SPVs is INR 51,979 crores and the 100% Equity Value of the IRBI Trust is INR 30,004 crores as on 31 March 2024.

The NAV at fair value per unit of IRBI Trust as on 31 March 2024 is INR 269.41 per unit.

Source(s): Management information, KPMG analysis



7.

Annexures

Annexure 1: Sources of Information (1/2)

This Report is prepared based on the below sources of information as provided to us by the Management:

The following information provided to KPMG by Management was used in preparation of the Valuation Report:

- Audited financial statements for FY2020, FY2021, FY2022 and FY2023 of all the SPVs except IGEPL, STPL, ILTPL, IGTPL and IKTPL.
- Consolidated audited financial statements for FY2020, FY2021, FY2022 and FY2023 of IRBI Trust.
- Provisional financial statements for the period ended 31 March 2024 for all the SPVs and IRBI Trust (standalone and consolidated).
- Financial projections of SPV's from 1 April 2024 till the end of the concession period of the respective SPV's
- Other data for all the SPVs which is as follows –
 - Concession Agreements
 - Completion Certificates
 - Traffic Reports prepared by GMD consultants
 - Toll Rate Notifications
 - Extract of O&M agreement with IRBIDL
- Since PDTPL and STPL are still under construction, the Management has provided statement of expenses/work in progress pertaining to capex as at 31 March 2024.
- Management has provide project cost completion certificate for ILTPL, IGTPL and IKTPL as at 26 March 2024/27 March 2024.
- List of approvals, permits, licenses and litigations for the SPVs as at 31 March 2024.
- Management has provided Traffic consultant reports prepared by GMD Consultants (appointed independently by Client) dated March 2024 for all the SPVs. Management has confirmed that the traffic studies shared are the most recent studies available. Forecast revenue has been considered from the aforesaid traffic study reports for each of the SPVs. We have compared the revenue considered in the forecast model with the revenue forecasted in the traffic study reports and noted that the Management has considered the pessimistic revenue scenario in their forecast. This is in line with the actual revenue recorded by the SPVs for last financial year compared to traffic study carried out historically.
- Management has informed that O&M for the SPVs projects would be done by IRBIDL based on fixed price contract. O&M payments are fixed for the contract period of 10 years (till FY2032 for PDTPL, FY2033 for IGEPL and STPL, FY2034 for ILTPL, IGTPL and IKTPL and till FY2030 for other SPVs) after which terms of the contract may get renegotiated upon renewal. Management has shared extract of the contract and we have validated forecasted periodic and routine maintenance expense for contract period from the same. For the forecast period post the contract period (i) routine maintenance has been increased by 2% to 5% annually for inflation and (ii) periodic maintenance has been considered based on the technical feasibility study conducted by the Management. While the inflation considered is in line with long term inflation forecast for India, we have gone ahead with Management assumption on periodic maintenance. Given the technical nature of this study, review of the same is not part of our scope of work.

Annexure 1: Sources of Information (2/2)

- We understand that CGTL, UTL and KGTL have filed Writ petition with Hon'ble Rajasthan High Court with prayer to commence payment of premium to NHAI, six months post actual completion of the project construction work. The Hon'ble High Court prima facie agreed with the contention of the SPVs and have provided interim relief from payment of premium. The matter is currently under arbitration. Forecast provided is based on assumption that said relief will be granted to respective SPV's.
- The investment management fees is computed assuming 10% markup on the cost incurred by investment manager. The said expenses are projected to increase by 10 per cent annually which is in line with agreement between Trust and Investment manager.
- Based on the concession agreement and traffic study report of SYTL we note that the actual traffic for SYTL as on target traffic date is expected to exceed the target traffic. Pursuant to clause 29 of the concession agreement, concession period will need to be reduced by 2.4 year to account for excess traffic. However, Management has confirmed that concession period of SYTL will not be reduced as reduction in the concession period necessitated due to excess traffic will be offset by the extension in the concession period due to augmentation of capacity to serve excess traffic pursuant to clause 29.2.3 of the concession agreement. Management has confirmed that considering uncertainty of capex and corresponding extension of concession period they have neither factored in capex required for capacity augmentation nor any extension in concession period as per clause 29.2.3 or reduction in concession period due to excess traffic in their forecast. We have gone ahead with the same assumption.
- Management represented that due to covid 19 the concession period end dates across all SPVs (besides PDTPL, IGEPL, STPL, ILTPL, IKTPL and IGTPPL) increased by 90-139 days pursuant to notification no F.184/2020-PPD dated 13th May 2020 and Notification no. Covid-19/Roadmap/JS(H)/2020 dated 26th August 2021. Concession period of Kaithal Tollways Limited in addition to covid 19 increase, increased by further 356 days due to farmer agitations on its route. Apart from this, concession period is increased for AETL due to demonetization and for SYTL and YATL due to Kannad Ghat crisis. Based on this representation from Management, we have considered extended concession period in our analysis.
- We noted that other financial liabilities of INR 4,077 Cr and sub-debt of INR 1,692 Cr is outstanding in the consolidated financials of IRBI Trust is payable to IRBIDL as at 31 March 2024. These liabilities have not been considered as debt like in nature for the purpose of valuation analysis. We have been given to understand that SPV's have ongoing claims and litigations with NHAI for respective projects. IRBI Trust and its SPV's have entered into a debt novation agreement with IRBIDL pursuant to which any amount received by SPVs or Trust towards these NHAI claims will be paid to IRBIDL. Management has also confirmed that these claims and liabilities have no financial impact on the SPVs or the IRBI Trust and the claim amounts from NHAI are significantly higher than the liabilities recognized by the IRBI Trust. Based on the above, we have not considered any impact of these liabilities in our valuation analysis.
- Given the nature of the liability, capital creditors of INR 397 Cr outstanding in the books of the SPVs have been considered debt like in nature and adjusted from the Enterprise Value to arrive at the Equity Value of IRBI Trust.
- Besides the above, there may be other information provided by the Management which may not have been perused by us in any detail, if not considered relevant for our defined scope.
- In addition to the above, we have also obtained such other information and explanations from the Management, either verbally or in written form, as were considered relevant for the purpose of the valuation. We had discussions with the key members of the Management, including Mr. Tushar Kawedia and Ms. Shilpa Todankar;
- The following external sources were used in the preparation of the report:
 - External databases such as Capital IQ, Mergermarket, etc.
 - Relevant information made available to us by Management at our request.
 - Publicly available information and secondary information.

Annexure 2a: WACC – IWTL, SYTL, YATL, KTL, AETL, KGTL and IHMTL (1/2)

| | |
|-------------------------------------|--|
| <p>Risk free rate (Rf) 7.1%</p> | <ul style="list-style-type: none"> The nominal risk-free rate is based on our understanding of the analysis of 10 year benchmark government of India securities yield as well analysis of the consensus forecast yield. |
| <p>Equity risk premium 7%</p> | <ul style="list-style-type: none"> Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India. |
| <p>Relevered beta 0.96</p> | <ul style="list-style-type: none"> Beta is a measure of the risk of the shares of a company. β is the co-variance between the return on sample stock and the return on the market. In order to determine the appropriate beta factor for the Company, consideration must be given either to the market beta of the Company or betas of comparable quoted companies. We have considered companies involved in the road operating industry and infrastructure investment trusts. Betas are low in this industry due to the stable nature of the road operating industry and low level of cash flow volatility due to the relatively steady usage of roads. Refer annexure 3. |
| <p>Cost of equity 13.8%</p> | <ul style="list-style-type: none"> Based on above parameters cost of equity is 13.8%. |

Source: KPMG analysis

Annexure 2a: WACC – IWTL, SYTL, YATL, KTL, AETL, KGTL and IHMTL (2/2)

| | |
|---------------------------------------|--|
| <p>Cost of debt 8.6%</p> | <ul style="list-style-type: none"> As per the Management, the average cost of debt for the SPVs is 8.6%. |
| <p>Tax rate 25.17%</p> | <ul style="list-style-type: none"> We understand that eventually all the SPVs will transition to the new tax regime once its MAT credit is exhausted, hence we have considered tax rate of 25.17% for the WACC analysis which is the long term tax rate applicable to all SPVs. |
| <p>Post-tax cost of debt 6.4%</p> | <ul style="list-style-type: none"> The average post tax cost of debt is 6.4% for all SPVs |
| <p>Debt Equity Ratio 150%</p> | <ul style="list-style-type: none"> We have considered a debt to equity ratio of 150% i.e. debt to capital of 60% and equity to capital of 40%. The median debt to equity ratio for comparable companies is 65.8%. Based on discussion with the Management we understand that all the assets of the IRBI Trust are operational and thus the SPVs and IRBI Trust can infuse higher leverage in their capital structure in the long term. Based on our analysis and discussion with the Management we have considered the debt to equity ratio to be 150%. |
| <p>WACC 9.40%</p> | <ul style="list-style-type: none"> Based on the optimal capital structure, the weighted average cost of capital is 9.40%. |

Source: KPMG analysis

Annexure 2b: WACC – UTL, CGTL, IGEPL, ILTPL, IGTPL and IKTPL (1/2)

| | |
|-------------------------------------|--|
| <p>Risk free rate (Rf) 7.1%</p> | <ul style="list-style-type: none"> The nominal risk-free rate is based on our understanding of the analysis of 10 year benchmark government of India securities yield as well analysis of the consensus forecast yield. |
| <p>Equity risk premium 7%</p> | <ul style="list-style-type: none"> Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India. |
| <p>Relevered beta 0.96</p> | <ul style="list-style-type: none"> Beta is a measure of the risk of the shares of a company. β is the co-variance between the return on sample stock and the return on the market. In order to determine the appropriate beta factor for the Company, consideration must be given either to the market beta of the Company or betas of comparable quoted companies. We have considered companies involved in the road operating industry and infrastructure investment trusts. Betas are low in this industry due to the stable nature of the road operating industry and low level of cash flow volatility due to the relatively steady usage of roads. Refer annexure 3. |
| <p>Cost of equity 13.8%</p> | <ul style="list-style-type: none"> Based on above parameters cost of equity is 13.8%. |

Source: KPMG analysis

Annexure 2b: WACC – UTL, CGTL, IGEPL, ILTPL, IGTPPL and IKTPPL (2/2)

| | |
|---------------------------------------|--|
| <p>Cost of debt 8.8%</p> | <ul style="list-style-type: none"> As per the Management, the average cost of debt for the SPVs is 8.75%. |
| <p>Tax rate 25.17%</p> | <ul style="list-style-type: none"> We understand that eventually all the SPVs will transition to the new tax regime once its MAT credit is exhausted, hence we have considered tax rate of 25.17% for the WACC analysis which is the long term tax rate applicable to all SPVs. |
| <p>Post-tax cost of debt 6.5%</p> | <ul style="list-style-type: none"> The average post tax cost of debt is 6.5% for all SPVs |
| <p>Debt Equity Ratio 150%</p> | <ul style="list-style-type: none"> We have considered a debt to equity ratio of 150% i.e. debt to capital of 60% and equity to capital of 40%. The median debt to equity ratio for comparable companies is 65.8%. Based on discussion with the Management we understand that all the assets of the IRBI Trust are operational and thus the SPVs and IRBI Trust can infuse higher leverage in their capital structure in the long term. Based on our analysis and discussion with the Management we have considered the debt to equity ratio to be 150%. |
| <p>WACC 9.46%</p> | <ul style="list-style-type: none"> Based on the optimal capital structure, the weighted average cost of capital is 9.46%. |

Source: KPMG analysis

Annexure 2c: WACC – PDTPL and STPL (1/2)

| | |
|-------------------------------------|--|
| <p>Risk free rate (Rf) 7.1%</p> | <ul style="list-style-type: none"> The nominal risk-free rate is based on our understanding of the analysis of 10 year benchmark government of India securities yield as well analysis of the consensus forecast yield. |
| <p>Equity risk premium 7%</p> | <ul style="list-style-type: none"> Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India. |
| <p>Relevered beta 0.96</p> | <ul style="list-style-type: none"> Beta is a measure of the risk of the shares of a company. β is the co-variance between the return on sample stock and the return on the market. In order to determine the appropriate beta factor for the Company, consideration must be given either to the market beta of the Company or betas of comparable quoted companies. We have considered companies involved in the road operating industry and infrastructure investment trusts. Betas are low in this industry due to the stable nature of the road operating industry and low level of cash flow volatility due to the relatively steady usage of roads. Refer annexure 3. |
| <p>Alpha 1%</p> | <ul style="list-style-type: none"> Alpha is business specific risk premium. The quantification of alpha is based on but not limited to the following factors: Inherent execution risk in the Management business plan, size of operations and uncertainty related to expected growth in revenue. Alpha has been considered at 1% only for PDTPL and STPL SPVs because as at Valuation Date, construction for all other SPVs is complete and although tolling has commenced in PDTPL and STPL, its construction is expected to be completed in FY2025 and FY2026 respectively. |
| <p>Cost of equity 14.8%</p> | <ul style="list-style-type: none"> Based on above parameters cost of equity is 14.8%. |

Source: KPMG analysis

Annexure 2c: WACC – PDTPL and STPL (2/2)

| | |
|---------------------------------------|--|
| <p>Cost of debt 9%</p> | <ul style="list-style-type: none"> As per the Management, the average cost of debt for PDTPL and STPL is 9%. |
| <p>Tax rate 25.17%</p> | <ul style="list-style-type: none"> We have considered tax rate of 25.17% for the WACC analysis which is the tax rate applicable to PDTPL and STPL. |
| <p>Post-tax cost of debt 6.7%</p> | <ul style="list-style-type: none"> The post tax cost of debt is 6.7% for PDTPL and STPL. |
| <p>Debt Equity Ratio 150%</p> | <ul style="list-style-type: none"> We have considered a debt to equity ratio of 150% i.e. debt to capital of 60% and equity to capital of 40%. The median debt to equity ratio for comparable companies is 65.8%. Based on discussion with the Management we understand that all the assets of the IRBI Trust are operational and thus the SPVs and IRBI Trust can infuse higher leverage in their capital structure in the long term. Based on our analysis and discussion with the Management we have considered the debt to equity ratio to be 150%. |
| <p>WACC 9.98%</p> | <ul style="list-style-type: none"> Based on the optimal capital structure, the weighted average cost of capital is 9.98%. |

Source: KPMG analysis

Annexure 3: Beta Computation

| Beta computation 31 March 2024 | | | | | | | | | | |
|---|-----------------------|------------|---------------|----------------------|------|----------|----------------|----------------------|-------------------|-----------------|
| | Market Capitalization | Total Debt | Debt / Equity | Debt / Total Capital | Beta | Tax Rate | Unlevered Beta | Target's Debt Equity | Target's Tax Rate | Re Levered Beta |
| IRB Infrastructure Developers Limited | 347,483 | 180,971 | 52.1% | 34.2% | 1.37 | 25.17% | 0.99 | 150.0% | 25.17% | 2.10 |
| PNC Infratech Limited | 107,423 | 70,823 | 65.8% | 39.7% | 1.05 | 25.17% | 0.70 | 150.0% | 25.17% | 1.49 |
| Dilip Buildcon Limited | 63,112 | 67,688 | 107.2% | 51.7% | 1.43 | 25.17% | 0.79 | 150.0% | 25.17% | 1.68 |
| Bharat Road Network Limited | 6,213 | 13,693 | 220.4% | 68.8% | 1.10 | 25.17% | 0.42 | 150.0% | 25.17% | 0.88 |
| National Highways Infra Trust | 163,352 | 29,984 | 18.4% | 15.5% | 0.37 | 25.17% | 0.33 | 150.0% | 25.17% | 0.70 |
| India Infrastructure Trust | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Bharat Highways InvIT | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| India Grid Trust | 100,349 | 187,096 | 186.3% | 65.1% | 0.45 | 25.17% | 0.19 | 150.0% | 25.17% | 0.40 |
| Powergrid Infrastructure Investment Trust | 87,890 | 5,721 | 6.5% | 6.1% | 0.48 | 25.17% | 0.45 | 150.0% | 25.17% | 0.96 |
| IRB InvIT Fund | 39,317 | 30,562 | 77.7% | 43.7% | 0.47 | 25.17% | 0.30 | 150.0% | 25.17% | 0.64 |
| G R Infraprojects Limited | 119,653 | 63,238 | 52.7% | 34.5% | 1.07 | 25.17% | 0.77 | 150.0% | 25.17% | 1.63 |
| Median | | | | | | | | | | 0.96 |

Note:

- (a) Market capitalization of comparable companies has been considered based on 3-month volume weighted average share prices till 31 March 2024.
- (b) Beta has been computed based on 1-year daily average adjusted beta.
- (c) Although, India Infrastructure Trust and Bharat Highways InvIT are a part of our comparable companies set, they have been excluded while calculating the beta due to low trading.

Source(s): KPMG analysis based on data sourced from S&P Capital IQ database.

Annexure 4: Investment Management Expenses

| Present value of stand alone expenses pertaining to InvIT | | | | | | | | | | | | |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Trust expenses | 7.5 | 8.2 | 9.0 | 9.9 | 10.9 | 12.0 | 13.2 | 14.5 | 16.0 | 17.6 | 19.3 | 21.3 |
| Discounting period | 0.500 | 1.500 | 2.500 | 3.500 | 4.500 | 5.500 | 6.500 | 7.500 | 8.500 | 9.500 | 10.500 | 11.500 |
| Discount factor | 0.956 | 0.874 | 0.799 | 0.730 | 0.668 | 0.610 | 0.558 | 0.510 | 0.466 | 0.426 | 0.389 | 0.356 |
| Present value of cash flows | 7.1 | 7.2 | 7.2 | 7.2 | 7.3 | 7.3 | 7.4 | 7.4 | 7.5 | 7.5 | 7.5 | 7.6 |

| Present value of stand alone expenses pertaining to InvIT | | | | | | | | | | | | | |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | FY2037 | FY2038 | FY 2039 | FY2040 | FY2041 | FY2042 | FY2043 | FY2044 | FY2045 | FY2046 | FY2047 | FY2048 | FY2049 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months | 12 months |
| Trust expenses | 23.4 | 25.7 | 28.3 | 31.1 | 34.3 | 37.7 | 41.5 | 45.6 | 50.2 | 55.2 | 60.7 | 66.8 | 73.4 |
| Discounting period | 12.500 | 13.500 | 14.500 | 15.500 | 16.500 | 17.500 | 18.500 | 19.500 | 20.500 | 21.500 | 22.500 | 23.500 | 24.500 |
| Discount factor | 0.325 | 0.298 | 0.272 | 0.249 | 0.227 | 0.208 | 0.190 | 0.174 | 0.159 | 0.145 | 0.133 | 0.121 | 0.111 |
| Present value of cash flows | 7.6 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.9 | 7.9 | 8.0 | 8.0 | 8.0 | 8.1 | 8.1 |

| Present value of stand alone expenses pertaining to InvIT | | | | | |
|---|------------|------------|------------|------------|------------|
| | FY2050 | FY2051 | FY2052 | FY2053 | FY2054 |
| INR crores | 12 months | 12 months | 12 months | 12 months | 4.4 months |
| Trust expenses | 80.8 | 88.9 | 97.8 | 107.5 | 43.0 |
| Discounting period | 25.500 | 26.500 | 27.500 | 28.500 | 28.864 |
| Discount factor | 0.101 | 0.093 | 0.085 | 0.077 | 0.075 |
| Present value of cash flows | 8.2 | 8.2 | 8.3 | 8.3 | 3.2 |

| Valuation conclusion | |
|------------------------------------|--------------|
| INR Crore | |
| Present value of cash flows | 227 |
| WACC | 9.40% |

Source(s): Management Information

The investment management fees have been forecasted to increase by 10% each year. Management represented that the fees is computed as cost incurred by investment manager +10% markup. We have relied on Management representation for the same.

Annexure 5: Other disclosures as required under SEBI InvIT Regulations

The following disclosures are as at 31 March 2024 for the SPVs

1. **Valuation of the project in the previous 3 years:** Refer annexure 5a for the aforementioned information.
2. **List of one-time sanctions/approvals which are obtained or pending/ List of up to date/overdue periodic clearances:** Refer annexure 5b for the aforementioned information.
3. **Estimates of already carried as well as proposed major repairs and improvements along with estimated time of completion:** Refer annexure 5c for the aforementioned information.
4. **Purchase price of the project by the InvIT:** Refer annexure 5d for the aforementioned information.
5. **On-going and closed material litigations including tax disputes in relation to the assets, if any:** Management represented that there are no on-going and closed material litigations in PDTPL, IHMTL, STPL, IKTPL, IGTPPL and ILTPL. Refer annexure 5e for the aforementioned information for other SPV's.
6. **Statement of assets:** Refer annexure 5f for the aforementioned information.
7. **Revenue pendencies including local authority taxes associated with InvIT asset and compounding charges, if any:** Management represented that there are no revenue pendencies including local authority taxes and compounding charges with respect to the 15 SPVs.
8. **Vulnerability to natural or induced hazards that may not have been covered in town planning/ building control:** Management represented that there are no such natural or induced hazards which have been not considered in town planning/building control with respect to the 15 SPVs.
9. **Latest pictures of the SPVs:** Refer annexure 5g for the aforementioned information
10. **Date of site inspection:** During the month of February/March 2024.
11. **In term of the SEBI InvIT Regulations, we hereby confirm that:**
 - We are competent to undertake the valuation.
 - We are independent and have prepared this Report on fair and unbiased basis.
 - The Valuation has been performed as per internationally accepted valuation methodologies and in cognizance of international valuation standards and ICAI Valuation Standards 2018 issued by the Institute of Chartered Accountants of India.
 - KPMG is not affiliated to the Client in any manner whatsoever. Further KPMG does not have a prospective interest in the Targets which is the subject of this Valuation and KPMG's fee is not contingent on an action or event resulting from the analysis, opinions or conclusions in the Valuation.

Caveat to disclosures

KPMG has not independently verified the documents related to disclosures mentioned in the annexures and have relied on Management representation for the same.

Source(s): Management information, KPMG analysis

Annexure 5a: Valuation of the projects in the previous 3 years

| Valuation summary | | | |
|---|-------|--------|-----------------|
| INR Crore | | | |
| Name of the SPV | Mar23 | Sep23 | Dec23/ Jan24 |
| IRB Westcoast Tollway Limited | 3,640 | 3,741 | 3,392 |
| Solapur Yedeshi Tollway Limited | 2,373 | 2,403 | 2,625 |
| Yedeshi Aurangabad Tollway Limited | 4,177 | 4,216 | 4,411 |
| Kaithal Tollway Kimited | 2,471 | 2,506 | 2,366 |
| AE Tollway Limited | 3,183 | 3,259 | 3,509 |
| Udaipur Tollway Limited | 2,607 | 2,673 | 2,663 |
| CG Tollway Limited | 2,744 | 2,803 | 2,854 |
| Kishangarh Gulabpura Tollway Limited | 2,136 | 2,206 | 2,068 |
| IRB Hapur Moradabad Tollway Limited | 4,112 | 4,176 | 4,303 |
| Palsit Dankuni Private Tollway Limited | 1,095 | 1,576 | 1,662 |
| IRB Golconda Expressway Private Limited | NA | 12,682 | 14,025 |
| Samakhiyali Tollway Private Limited | NA | NA | 365 |
| IRB Lalitpur Tollway Private Limited** | NA | NA | 222 |
| IRB Kota Tollway Private Limited** | NA | NA | 149 |
| IRB Gwalior Tollway Private Limited** | NA | NA | 90 |

Source(s): Company website and Management Information

** Valuation carried out as of 31 January 2024.

Annexure 5b: One-time sanctions and approvals and overdue periodic clearances

| Sr. No. | Description | Remarks |
|--------------------------------------|---|----------------------|
| IRB Westcoast Tollway Limited | | |
| A | Permission of State government for extraction of boulders from quarry. | Received |
| B | Permission of Village Panchayat & Pollution control board for installation of crushers | Received |
| C | License for use of explosives. | Received |
| D | Permission of state government for drawing water from Rivers & reservoir | Not Applicable |
| E | License from Inspector of factories or competent authorities for setting up Batching Plant. | Received |
| F | Clearance from Pollution control board for Setting up Batching Plant | Received |
| G | Permission of Village Panchayat & Pollution control board for Asphalt Plant | Received |
| H | Permission of Village Panchayat & State government for Borrow earth | Received |
| I | Permission of State Government for Cutting of trees | Received |
| J | Any other permits or clearance required under applicable Laws | Labour License taken |

| Sr. No. | Description | Remarks |
|---|---|-----------------------|
| Palsit Dankuni Private Tollway Limited | | |
| A | Permission of the State Government for extraction of boulder from quarry. | Applied |
| B | Permission of Village Panchayat and Pollution Control Board for installation of crusher; | Applied |
| C | License for use of explosives | Applied |
| D | Permission of state government for drawing water from river/reservoir | Not Applicable |
| E | License from the inspector of factories or other competent authority for setting up Batching plant. | Received |
| F | Clearance of Pollution Control Board for setting up Batching Plant; | Received |
| G | Clearance of Village Panchayats and Pollution Control Board for Asphalt Plant | Received |
| H | Permission of Village Panchayat and State Government for borrow areas | Received |
| I | Permission of State Government for cutting of trees | Received |
| J | Any other permits or clearances required under Applicable Laws | Labour License taken. |

Source(s): Management information

Annexure 5b: One-time sanctions and approvals and overdue periodic clearances

| Sr. No. | Description | Remarks |
|--|---|-----------------------|
| Samakhiyali Tollway Private Limited | | |
| A | Permission of the State Government for extraction of boulder from quarry. | Received |
| B | Permission of Village Panchayat and Pollution Control Board for installation of crusher; | Received |
| C | License for use of explosives | Received |
| D | Permission of state government for drawing water from river/reservoir | Not Applicable |
| E | License from the inspector of factories or other competent authority for setting up Batching plant. | Not Received |
| F | Clearance of Pollution Control Board for setting up Batching Plant; | Application Done |
| G | Clearance of Village Panchayats and Pollution Control Board for Asphalt Plant | Application Done |
| H | Permission of Village Panchayat and State Government for borrow areas | Received |
| I | Permission of State Government for cutting of trees | Received |
| J | Any other permits or clearances required under Applicable Laws | Labour License taken. |

| Sr. No. | Description | Remarks |
|--|---|--|
| IRB Gwalior Tollway Private Limited | | |
| A | Permission of the State Government for extraction of boulder from quarry. | Not Applicable |
| B | Permission of Village Panchayat and Pollution Control Board for installation of crusher; | Not Applicable |
| C | License for use of explosives | Not Required |
| D | Permission of state government for drawing water from river/reservoir | |
| E | License from the inspector of factories or other competent authority for setting up Batching plant. | The SPV is in process of identifying land for plant set-up and borrow areas. |
| F | Clearance of Pollution Control Board for setting up Batching Plant; | Once identified, Applicable permits and Clearances shall be obtained. |
| G | Clearance of Village Panchayats and Pollution Control Board for Asphalt Plant | |
| H | Permission of Village Panchayat and State Government for borrow areas | |
| I | Permission of State Government for cutting of trees | Not Required |
| J | Any other permits or clearances required under Applicable Laws | Not Applicable |

Source(s): Management information

Annexure 5b: One-time sanctions and approvals and overdue periodic clearances

| Sr. No. | Description | Remarks |
|---|---|--|
| IRB Lalitpur Tollway Private Limited | | |
| A | Permission of the State Government for extraction of boulder from quarry. | Not Applicable |
| B | Permission of Village Panchayat and Pollution Control Board for installation of crusher; | Not Applicable |
| C | License for use of explosives | Not Required |
| D | Permission of state government for drawing water from river/reservoir | The SPV is in process of identifying land for plant set-up and borrow areas. Once identified, Applicable permits and Clearances shall be obtained. |
| E | License from the inspector of factories or other competent authority for setting up Batching plant. | |
| F | Clearance of Pollution Control Board for setting up Batching Plant; | |
| G | Clearance of Village Panchayats and Pollution Control Board for Asphalt Plant | |
| H | Permission of Village Panchayat and State Government for borrow areas | |
| I | Permission of State Government for cutting of trees | Not Required |
| J | Any other permits or clearances required under Applicable Laws | Not Applicable |

| Sr. No. | Description | Remarks |
|---|---|--|
| IRB Kota Tollway Private Limited | | |
| A | Permission of the State Government for extraction of boulder from quarry. | Not Applicable |
| B | Permission of Village Panchayat and Pollution Control Board for installation of crusher; | Not Applicable |
| C | License for use of explosives | Not Required |
| D | Permission of state government for drawing water from river/reservoir | The SPV is in process of identifying land for plant set-up and borrow areas. Once identified, Applicable permits and Clearances shall be obtained. |
| E | License from the inspector of factories or other competent authority for setting up Batching plant. | |
| F | Clearance of Pollution Control Board for setting up Batching Plant; | |
| G | Clearance of Village Panchayats and Pollution Control Board for Asphalt Plant | |
| H | Permission of Village Panchayat and State Government for borrow areas | |
| I | Permission of State Government for cutting of trees | Not Required |
| J | Any other permits or clearances required under Applicable Laws | Not Applicable |

The information has been represented by the Management. The above disclosure is not required in case of SYTL, YATL, AETL, UTL, KTL, CGTL, KGTL, IHMTL and IGEPL since the projects have received COD.

Source(s): Management information

Annexure 5c: Estimates of already carried as well as proposed major repairs and improvements (1/4)

Estimates of already carried out as well as proposed major repairs and improvements

| INR Crore | | | | | | |
|---|---------|---------|---------|---------|---------|---------|
| Name of the SPV | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 |
| IRB Westcoast Tollway Limited | 42 | - | 1 | - | 111 | 41 |
| Solapur Yedeshi Tollway Limited | 18 | 19 | 20 | - | - | - |
| Yedeshi Aurangabad Tollway Limited | 29 | 31 | 32 | - | - | - |
| Kaithal Tollway Kimited | 45 | 48 | - | - | - | - |
| AE Tollway Limited | 39 | 41 | - | - | - | - |
| Udaipur Tollway Limited | 69 | 76 | 4 | - | 120 | 125 |
| CG Tollway Limited | 27 | 28 | 30 | - | - | - |
| Kishangarh Gulabpura Tollway Limited | - | - | 100 | - | - | - |
| IRB Hapur Moradabad Tollway Limited | - | 89 | 90 | 85 | - | 5 |
| Palsit Dankuni Private Tollway Limited | - | - | - | - | 55 | 61 |
| IRB Golconda Expressway Private Limited | - | - | - | - | 161 | 161 |
| Samakhiyali Tollway Private Limited | - | - | 0 | - | - | - |
| IRB Lalitpur Tollway Private Limited | - | - | - | - | 66 | 69 |
| IRB Kota Tollway Private Limited | 2 | - | - | - | 8 | 8 |
| IRB Gwalior Tollway Private Limited | 0 | - | 11 | 22 | 23 | 36 |

Source(s): Management information



Annexure 5c: Estimates of already carried as well as proposed major repairs and improvements (2/4)

Estimates of already carried out as well as proposed major repairs and improvements

| INR Crore | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|---------|---------|
| Name of the SPV | FY 2031 | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 |
| IRB Westcoast Tollway Limited | - | - | 2 | 12 | 166 | 2 | - | - |
| Solapur Yedeshi Tollway Limited | - | - | 61 | 64 | 67 | - | - | - |
| Yedeshi Aurangabad Tollway Limited | - | - | 110 | 115 | 121 | - | - | - |
| Kaithal Tollway Kimited | - | 128 | 134 | 140 | - | - | - | - |
| AE Tollway Limited | 123 | 130 | 135 | - | - | - | - | 73 |
| Udaipur Tollway Limited | 127 | 5 | - | 86 | 91 | 119 | - | - |
| CG Tollway Limited | 86 | 91 | 95 | - | 9 | 46 | 48 | 51 |
| Kishangarh Gulabpura Tollway Limited | - | - | 104 | 102 | 110 | - | - | - |
| IRB Hapur Moradabad Tollway Limited | 74 | 77 | 57 | 2 | - | 212 | 229 | 238 |
| Palsit Dankuni Private Tollway Limited | 57 | - | - | - | - | 80 | 61 | - |
| IRB Golconda Expressway Private Limited | 161 | 161 | - | - | 386 | 387 | 386 | 386 |
| Samakhiyali Tollway Private Limited | - | 36 | 37 | 38 | - | - | - | - |
| IRB Lalitpur Tollway Private Limited | 72 | 75 | 78 | - | - | 117 | 121 | 124 |
| IRB Kota Tollway Private Limited | - | - | - | 19 | 19 | - | - | - |
| IRB Gwalior Tollway Private Limited | 52 | - | - | 11 | 21 | 22 | 35 | 50 |

Source(s): Management information

Annexure 5c: Estimates of already carried as well as proposed major repairs and improvements (3/4)

| Estimates of already carried out as well as proposed major repairs and improvements | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|---------|---------|
| INR Crore | | | | | | | | |
| Name of the SPV | FY 2039 | FY 2040 | FY 2041 | FY 2042 | FY 2043 | FY 2044 | FY 2045 | FY 2046 |
| IRB Westcoast Tollway Limited | 148 | 53 | - | - | - | - | - | - |
| Solapur Yedeshi Tollway Limited | - | - | - | 42 | 44 | 46 | - | - |
| Yedeshi Aurangabad Tollway Limited | - | 60 | 63 | 66 | - | - | - | - |
| Kaithal Tollway Kimited | - | 94 | 99 | 104 | - | - | - | - |
| AE Tollway Limited | 77 | 81 | - | - | - | - | - | - |
| Udaipur Tollway Limited | - | - | - | - | - | - | - | - |
| CG Tollway Limited | - | - | - | - | - | - | - | - |
| Kishangarh Gulabpura Tollway Limited | - | - | - | - | - | - | - | - |
| IRB Hapur Moradabad Tollway Limited | 7 | - | - | - | - | - | - | - |
| Palsit Dankuni Private Tollway Limited | - | - | - | - | - | - | - | - |
| IRB Golconda Expressway Private Limited | - | - | 235 | 235 | 235 | 236 | - | - |
| Samakhiyali Tollway Private Limited | - | 43 | 44 | 45 | - | - | - | - |
| IRB Lalitpur Tollway Private Limited | 128 | 132 | - | - | 185 | 185 | - | - |
| IRB Kota Tollway Private Limited | 11 | 12 | - | - | - | 23 | - | - |
| IRB Gwalior Tollway Private Limited | - | - | 26 | 38 | 49 | 61 | - | - |

Source(s): Management information



Annexure 5c: Estimates of already carried as well as proposed major repairs and improvements (4/4)

| Estimates of already carried out as well as proposed major repairs and improvements | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|---------|---------|
| INR Crore | | | | | | | | |
| Name of the SPV | FY 2047 | FY 2048 | FY 2049 | FY 2050 | FY 2051 | FY 2052 | FY 2053 | FY 2054 |
| IRB Westcoast Tollway Limited | - | - | - | - | - | - | - | - |
| Solapur Yedeshi Tollway Limited | - | - | - | - | - | - | - | - |
| Yedeshi Aurangabad Tollway Limited | - | - | - | - | - | - | - | - |
| Kaithal Tollway Kimited | - | - | - | - | - | - | - | - |
| AE Tollway Limited | - | - | - | - | - | - | - | - |
| Udaipur Tollway Limited | - | - | - | - | - | - | - | - |
| CG Tollway Limited | - | - | - | - | - | - | - | - |
| Kishangarh Gulabpura Tollway Limited | - | - | - | - | - | - | - | - |
| IRB Hapur Moradabad Tollway Limited | - | - | - | - | - | - | - | - |
| Palsit Dankuni Private Tollway Limited | - | - | - | - | - | - | - | - |
| IRB Golconda Expressway Private Limited | 531 | 532 | 531 | 531 | - | - | 404 | 150 |
| Samakhiyali Tollway Private Limited | - | - | - | - | - | - | - | - |
| IRB Lalitpur Tollway Private Limited | - | - | - | - | - | - | - | - |
| IRB Kota Tollway Private Limited | - | - | - | - | - | - | - | - |
| IRB Gwalior Tollway Private Limited | - | - | - | - | - | - | - | - |

Source(s): Management information



Annexure 5d: Purchase price of the SPVs by the InvIT

| Purchase price of the SPVs | | | |
|--------------------------------------|---|---|----------------|
| Name of the SPV | No. of equity shares transferred to the Trust | No. of units of trust issued to the Sponsor | % Stake in SPV |
| IRB Westcoast Tollway Limited | 174,194,303 | 17,419,000 | 100.00% |
| Solapur Yedeshi Tollway Limited | 98,250,000 | 9,825,000 | 100.00% |
| Yedeshi Aurangabad Tollway Limited | 215,757,001 | 21,576,000 | 100.00% |
| Kaithal Tollway Kimited | 328,000,000 | 32,800,000 | 100.00% |
| AE Tollway Limited | 436,500,000 | 43,650,000 | 100.00% |
| Udaipur Tollway Limited | 116,800,000 | 11,680,000 | 100.00% |
| CG Tollway Limited | 203,500,000 | 20,350,000 | 100.00% |
| Kishangarh Gulabpura Tollway Limited | 155,500,000 | 15,550,000 | 100.00% |
| IRB Hapur Moradabad Tollway Limited | 189,500,000 | 18,950,000 | 100.00% |

The table above presents the number of equity shares transferred to the Trust and the number of units issued by the Trust to the Sponsor to acquire 100% of the equity stake in the aforementioned SPVs. The transfer is as per the share purchase agreement between the Trust and Sponsor dated 19 February 2020.

PDTPL

IRBI Trust acquired 99.96% stake in PDTPL by acquiring 121,200,000 equity shares in PDTPL through an equity infusion of INR 121.2 Cr in April 2022.

IGEPL

IRBI Trust issued and allotted 142,400,000 units to the eligible unitholders of the Trust for cash at an Issue price of INR 200.98 per unit, aggregating to approximately INR 2,861.95 Cr. The Sponsor of the Trust, has been allotted 72,800,000 units of the Trust while GIC Affiliates have been allotted 69,600,000 units. Proceeds from the issue were used for Acquisition of IGEPL through subscription to the equity shares of IGEPL pursuant to the IGEPL share subscription agreement for a consideration of INR 715.45 Cr.

STPL

IRBI Trust acquired 99.96% stake in STPL by acquiring 116,200,000 equity shares in STPL through an equity infusion of INR 116.2 Cr on 04 January 2024.

IGTPL, IKTPL and ILTPL

IRBI Trust acquired 100% stake in IGTP, IKTPL and ILTPL by acquiring 103,285,000; 39,347,500 and 50,000 equity shares in the 3 entities through an equity infusion of INR 103.2, INR 39.3 and INR 420.5 Cr in March 2024.

Source(s): Management information

Annexure 5e: Pending litigations - IWTL

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|---|---|--|--|--|
| 1 | Mr. Sachhidananda Shetty. | The Chief General Manager, Modern Road Makers Pvt. Ltd. | Judicial Magistrate First Class Court, Kundapura. | The plaintiff has filed this suit praying that the stay should be given for the stoppage suit. The matter is disposed by work of NH-66 to set right certain anomalies in the tree cutting tender closed. awarded to him by the NHAI in Kundapur forest division in respect of cutting of reserved categories of trees like teak, Bethonne, Matti, Sandalwood & season. | The plaintiff has withdrawn the matter. This matter is now closed. | Land acquisition and related cost, cutting the necessary trees for road widening work, and related cost, etc are the sole responsibilities of NHAI. Further the concessionaire is not a party in the tender awarded to the plaintiff for cutting of the trees. Hence, there are no financial implications in this matter. |
| 2 | Laxman Neelakanth Desai, Goangeri, Majali, Karwar | IRB West Coast Tollway Pvt Ltd, | Civil Judge & JMFC II Court, Karwar | The plaintiff has filed the suit to restrain the defendants from undertaking the blasting of the rocks/hill in unscientific manner as it has caused loss to the plaintiff. | There are no Adverse orders against the company. The matter is pending | The company and plaintiff had mediated the dispute partly and the company has paid a sum of Rs. 175000/- to the plaintiff in the interest of the project. The matter is pending for final determination. As the company has complied with all the necessary provisions and undertaken the work with all safety precautions, the company feels that there are no financial implications in this matter. |
| 3 | Venkatramana S | Chief General Manager (IRB), Kumta | JMFC at Bhatkal (O.S. No. 103/2018) | The plaintiff has filed this suit challenging the land acquisition and has prayed that the respondents should be restrained from doing the work against the provisions of the land acquisition act. | The matter is disposed by the court. | The responsibility of the entire process of land acquisition and payment of compensation is of NHAI. Hence, that there are no financial implications in this matter. |
| 4 | Mr. Vithobha Ganesh Naik | IRB West Coast Tollway Pvt Ltd, | Principal Judge, Karwar | The complainant is alleging that IRB WTL is encroaching upon the Petitioner's land to construct the highway | There are no Adverse orders against the company. The matter is pending | |

Source(s): Management information

Annexure 5e: Pending litigations - SYTL

| Sl. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|--|---|--|----------------------------|---|
| 1 | Raosaheb Chadre | Modern Road Makers Pvt. Ltd. | Civil Judge, Senior Division, Osmanabad (Special suit number 73/2018) | The plaintiffs have prayed that due to mining work by the defendant, the levelling of the ground has been disturbed and there have been huge holes in the ground which should be filled by the defendants and that the plaintiffs should pay Rs. 82,41,800/- towards the extraction cost. | The matter is pending | The company had undertaken the work with the consent of the plaintiff after obtaining necessary permissions. The claim of the plaintiff is false. The company has denied all the allegations. Considering the merits of the matter, there are no financial implications in this matter. |
| 2 | Bhagwan Rambhau Jadhwar | Solapur Yedeshi Tollway Pvt. Ltd. and others | Civil Judge, Junior Division, Kallam (regular civil suit number 1139/2018) | The plaintiff has filed suit claiming that due to the negligence of the defendants, in construction of drainage adjoining the road, the water from the drainage had entered in field of the plaintiff and has caused loss to the tune of Rs. 2,00,000/-, which should be made good by the respondents. | The matter is pending | The company has taken all the necessary safety measures while construction of the road and denied any negligence on its part. Considering the merits of the matter, there are no financial implications in this matter. |
| 3 | Solapur Yedeshi Tollway Ltd. | NHAI | Arbitration | SYTL (Claimant) had submitted claims to NHAI for compensation as per Clause 35.2 and Clause 35.3 of the Concession Agreement on account of delays attributable to NHAI. The claim for cost stands at Rs. 571.36 Crore in terms of Clause 35.2 and extension of Concession Period for 539.20 days in terms of Clause 35.3 of the Concession Agreement. Since there was no response received from NHAI, SYTL crystallised the matter as contractual dispute on 09.03.2022 and requested for amicable settlement through Conciliation as per Clause 44.2 of the Concession Agreement. | The matter is pending | Rs. 790.54 Cr + interest & extension of extension of 647.43 days |

Source(s): Management information

Annexure 5e: Pending litigations - YATL (1/2)

| Sl. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|--|--|---|----------------------------|---|
| 1 | Shaikh Rafiq and others | IRB Infrastructure Developers Limited and others | Bombay High Court Aurangabad Bench Writ Petition 5410/2015 | This matter is pertaining to Yedeshi Aurangabad Project. The petitioner is aggrieved by the award wherein his land is acquired by NHAI, for construction of highway. Hence, the petitioners have prayed not to change the existing alignment of the proposed road widening of NH 211 passing through petitioners village and to restrain respondents from proceeding further with any change in the existing alignment | The matter is pending. | The responsibility of the entire process of land acquisition and payment of compensation is of NHAI. Hence, there are no financial implications on the company. |
| 2 | Panditrao Chausalkar and others | IRB Infrastructure Developers Limited And Others | Bombay High Court Aurangabad Bench Writ Petition 92/2017 | This matter is pertaining to Yedeshi Aurangabad Project. The petitioner is aggrieved by the award wherein his land is acquired by NHAI, for construction of highway. Hence, the petitioners have prayed that the land acquisition should be set aside, the respondents should be restrained from acquiring the land belonging to the petitioners, etc.. | The matter is pending. | The responsibility of the entire process of land acquisition and payment of compensation is of NHAI. Hence, there are no financial implications on the company. |

Source(s): Management information



Annexure 5e: Pending litigations - YATL (2/2)

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|--|--|--|---|---|
| 3 | Pruthviraj shahane | IRB Infrastructure Developers Limited and others | Civil Judge senior division, Beed. Civil suit number 10/2016 | This matter is pertaining to Yedeshi Aurangabad Project. The Plaintiff claims that the electricity poles & DP coming within road alignment / area have been replaced but erected & installed within his private land which has not been acquired. | The matter is pending. | The responsibility of the entire process of land acquisition and payment of compensation is of NHAI. Utility shifting is being done on the land provided by NHAI Hence, there are no financial implications on the company. |
| 4 | Yedeshi Aurangabad Tollway Ltd | NHAI | Arbitration | YATL (Claimant) had submitted claims to Arbitral Tribunal pronounced NHAI for compensation as per Clause 35.2 and Clause 35.3 of the Concession Agreement on account of delays attributable to NHAI. The claim for cost along with applicable interest stands at Rs. 1,501.84 Crore in terms of Clause 35.2 and extension of Concession Period for 831.08 days in terms of Clause 35.3 of the Concession Agreement. YATL had proposed to NHAI for amicable settlement through CCIE. Since no written settlement reached between the Parties, YATL invoked arbitration on 09.03.2022 in terms of Clause 44.3 of the Concession Agreement. | Arbitral Tribunal pronounced Award in favour of YATL granting comepnasation of Rs 1719.48 Cr (as on 27.01.2024) days. | Rs 1719.48 Cr (as on 27.01.2024) along with applicable interest till realisation of payment and extension to Concession Period by 689 days. |

Source(s): Management information

Annexure 5e: Pending litigations - KTL (1/2)

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|--|--|---|--|--|
| 1 | SirsaEagle CHS Ltd. and another | National Highways Authority of India and Others (Kaithal Tollway Pvt. Ltd. is Respondent Number 5) | Punjab and Haryana High Court, Writ Petition Number 27756/2017 | The Petitioner has challenged the levy and collection of toll on the project, and has prayed that the notification by which the toll is collected should be quashed now closed. and issue the directions for frame policy for the local transporters which may not act against the financial interest of the poor local villagers who travel in busses. | The petition is dismissed by the court for non-joinder of necessary party. The matter is now closed. | Financial implications cannot be ascertained as not mentioned in the petition. Similar writ petition challenging the toll collection on the project was filed in Punjab and Haryana High Court by Azad Singh (reported under closed litigations writ petition number 22648/2017), has been dismissed by the High Court. The concessionaire has been collecting the toll on the project as per the concession agreement and the toll notification. The provisional completion certificate has been issued to the concessionaire as per the terms of the concession agreement. Considering the merits of the case, there are no financial implications in this matter. |

Source(s): Management information



Annexure 5e: Pending litigations - KTL (2/2)

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|-------------|--|---|----------------------------|---|
| 2 | Kaithal Tollway Ltd | NHAI | Arbitration | <p>Claimant had submitted claims to NHAI for compensation as per Clause 35.2 and Clause 35.3 of the Concession Agreement on account of delays attributable to NHAI. The claim for cost stands at Rs. 190.68 Crore in terms of Clause 35.2 and extension of Concession Period for 136.77 days in terms of Clause 35.3 of the Concession Agreement. The Claimant crystallised dispute on 09.03.2022 (and subsequently invoked arbitration on 19.04.2022)</p> <p>Against the claim of Rs 100.1 Cr on account of Farmer's strike, Rs 58.48 Cr was released by NHAI on 10.10.2022 NHAI recommended extension of Concession Period of 365 days. The Balance claim amount of Rs 41.62 Crore was disputed. and arbitration was invoked</p> <p>This matter is clubbed with the above referred arbitration.</p> | The matter is pending | Rs. 288.07 Cr + 582.77 days of extension of Concesison Period |

Source(s): Management information



Annexure 5e: Pending litigations - AETL

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|----------------------------|--|---|----------------------------|---|
| 1 | AE Tollway Limited | NHAI | Arbitration | Arbitration is invoked. AETL filed Statement of Claim account of delay in completion of construction and other Force Majeure claims such as Covid 19 etc. along with claim for loss of revenue during the delayed period.. | The matter is pending | Rs. 1317.98 Cr + interest & Extension to Concession Period by 351.41 days |
| 2 | Hakim Singh Yadav and others | AE Tollway Private Limited | High Court of Allahabad | The petitioner filed a writ petition before the High Court of Allahabad against the Sponsor and others (the "Respondents") in relation to the drainage system for the road asset operated by AETL. AETL had crystallised dispute and requested NHAI to take up the matter of payment of premium with proportionate reduction of revenue losses (the figures under dispute are excess payment of Premium of Rs. 12.84 Cr and outstanding payment of Premium including interest of Rs.55.34 Cr as on June 07, 2021) on account of Covid and delay in completion of construction as a dispute and for amicable settlement through Conciliation. Since no written settlement reached between the Parties, the AETL on 14.03.2022 invoked arbitration as per Clause 44.3 of the Concession Agreement. The matter is pending. | the matter is pending. | |

Source(s): Management information



Annexure 5e: Pending litigations - UTL

| Sl. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|---------------------------------|---|---|--|--|
| 1 | Hiteshkumar Ramanlal Gandhi | Bhairulal Salvi (Bus Driver) | FIR number 0299 dated 18/11/2017, Kherwada Police Station | Bus driver Mr. Bhairulal Salvi has damaged the toll booths by pelting the stone & created violence in smooth tolling operations at Khandiobri Toll. | The matter is being investigated by the police. | The FIR is filed against the Bus driver, by the employee of the company. The FIR is filed by the employee of the company against the bus driver. There are no proceedings against the company. |
| 2 | (Shift Incharge Khandiobri Toll) | Dist - Bhilwada. | Tah – Kherwara, Dist – Udaipur State – Rajasthan | | | |
| 3 | Udaipur Tollway Ltd | NHAI | Arbitration | Claimants filed Statement of Claim including the claim on account of compensation of Force Majeure Cost and extension in Concession Period on account of COVID 19) , Claim for compensation under Clause 35.2 & 35.3 along with a prayer that Premium is applicable after 6 months of Actual completion | The matter is pending | Commencement of Premium after 6 months of actual completion Claim Rs. 906.08 Cr + interest & extension of 214.99 days |

Source(s): Management information



Annexure 5e: Pending litigations - CGTL

| Sl. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|---|--|---|--|---|
| 1 | Shri Azad Sharma & Other | NHAI and others (The Manager, IRB is respondent number 7) | Lok Adalat, Bhilwara | The plaintiff has filed case challenging the collection of toll without completion of six lane. Plaintiff /Petitioners have prayed that collection of toll shall be stopped until works of six lanes are completed and toll collected in the name of six laning shall be returned with interest. | The matter is disposed by the court. Hence, this matter is closed. | The company is collecting the toll as per the toll notification and concession agreement with NHAI. Since, the project consists from 4 laining to 6 laining, hence, during the construction period, the company collects only 75% of the prescribed toll amount as per the toll fee notification. These toll rates are fixed for construction period. The company has good case on merits. The company has not violated any of the concession agreement provisions and hence, there are no financial implications in the matter. |
| 2 | CGTollway Ltd | NHAI | Arbitration | Claimants filed Statement of Claim including the claim on account of compensation of Force Majeure Cost and extension in Concession Period on account of COVID 19) , Claim for compensation under Clause 35.2 & 35.3 along with a prayer that Premium is applicable after 6 months of Actual completion | The matter is pending | Commencement of Premium after 6 months of actual completion Claim: Rs. 502.12 + + interest & extension of 241.37 days |

Source(s): Management information



Annexure 5e: Pending litigations - KGTL

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|-------------|--|---|----------------------------|---|
| 1 | Kishangarh Gulabpura Tollway Ltd | NHAI | Arbitration | Claimants filed Statement of Claim including the claim on account of compensation of Force Majeure Cost and extension in Concession Period on account of COVID 19) , Claim for compensation under Clause 35.2 & 35.3 along with a prayer that Premium is applicable after 6 months of Actual completion | The matter is pending | Commencement of Premium after 6 months of actual completion Claim :Rs. 868.96 + + interest & extension of 387.18 days |

Source(s): Management information



Annexure 5e: Pending litigations - IGEPL (1/2)

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|---|--|---|----------------------------|------------------------|
| 1 | Gadeela Raghuveer Reddy | 1.State of Telangana, 2. Hyderabad Metropolitan Development Authority (HMDA), 3. Hyderabad Growth Corridor Ltd (HGCL), 4. IRB Golconda Expressway Pvt Ltd (IRB GEPL) and 5. IRB Infrastructure Developers Ltd. (IRB) | High Court of State of Telangana | The Petitioner had filed a Writ Petition (PIL) against the Respondents. The Petitioner is seeking (i) to direct the State of Telangana (Municipal Administration and Urban Development) & HMDA to disclose the Initial Estimated Concession Value (IECV) for the Nehru Outer Ring Road (NORR) for the period of concession of the concession agreement and to direct the Comptroller and Auditor General of India (CAG) to check the veracity of the IECV arrived at by these Respondents; and (ii) in the event that the concession amount realized is undervalued, to declare the action of the HMDA in signing a concession agreement with the IRB GEPL for Tolling, Operations and Maintenance of the Nehru Outer Ring Road is illegal and to annul the Concession Agreement. | The matter is disposed | Nil |

Source(s): Management information



Annexure 5e: Pending litigations - IGEPL (2/2)

| SI. No. | Complainant/ Applicant/ Plaintiff | Respondents | Name & Address of the Court and case number | Brief Description of Case | Status as on 31 March 2024 | Financial implications |
|---------|---|---|--|---|----------------------------|------------------------|
| 2 | Kanugula Mahesh Kumar (Petitioner) | 1.State of Telangana, 2. Hyderabad Metropolitan Development Authority (HMDA), 3. Hyderabad Growth Corridor Ltd (HGCL), 4. IRB Golconda Expressway Pvt Ltd (IRB GEPL) and 5. IRB Infrastructure Developers Ltd. (IRB) | High Court of State of Telangana | <p>The Petitioner filed a public interest litigation before the High Court of Telangana against Respondents, praying, inter alia, to set aside the award of the Toll, Operate and Transfer (“TOT”) tender for the Nehru Outer Ring Road project to the IRB and IRB GEPL by entering into a concession agreement for a period of 30 years by not disclosing the initial estimated concession value for the project and seeking to illegally and unlawfully divert the funds from. The Petitioner has also sought quashing or setting aside of the concession agreement and all other agreements entered into by State of Telangana, HMDA and HGCL with IRB and IRB GEPL in relation to the Project.</p> <p>The Petitioner has also prayed, inter alia, to pass an order directing the IRB and IRB GEPL to not transfer the bid concession fee of ₹7,380 Crores to the HMDA or alternatively, not to transfer any funds from the bid concession fee of ₹7,380</p> | The matter is pending | Nil |

Source(s): Management information



Annexure 5f: Statement of assets as at 31 March 2024

| Statement of assets | | | | | |
|---|---------------------|-------------------|--------------------------|--------------------|----------------|
| INR Crore | | | | | |
| Name of the SPV | Net tangible assets | Intangible assets | Other non current assets | Non current assets | Current assets |
| IRB Westcoast Tollway Limited | - | 3,021 | 0 | 3,021 | 69 |
| Solapur Yedeshi Tollway Limited | - | 1,300 | - | 1,300 | 64 |
| Yedeshi Aurangabad Tollway Limited | - | 3,411 | 0 | 3,411 | 132 |
| Kaithal Tollway Kimited | 0 | 1,942 | - | 1,942 | 87 |
| AE Tollway Limited | 0 | 2,989 | 0 | 2,989 | 75 |
| Udaipur Tollway Limited | - | 2,557 | - | 2,557 | 76 |
| CG Tollway Limited | 0 | 2,063 | 2 | 2,065 | 86 |
| Kishangarh Gulabpura Tollway Limited | 0 | 1,618 | - | 1,619 | 36 |
| IRB Hapur Moradabad Tollway Limited | 0 | 3,116 | 1 | 3,117 | 55 |
| Palsit Dankuni Private Tollway Limited | - | 1,760 | - | 1,760 | 70 |
| IRB Golconda Expressway Private Limited | - | 7,958 | 0 | 7,959 | 362 |
| Samakhiyali Tollway Private Limited | - | 400 | 1 | 401 | 3 |
| IRB Lalitpur Tollway Private Limited | - | 4,462 | - | 4,462 | 242 |
| IRB Kota Tollway Private Limited | - | 526 | - | 526 | 31 |
| IRB Gwalior Tollway Private Limited | - | 1,172 | - | 1,172 | 51 |

Source(s): Management information



Annexure 5g: Site pictures - IWTL



भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
रास्ते का उपयोग करने वालों के लिए पथकर सूची

| वाहन का प्रकार | एक मासिक यात्रा हेतु (₹.) | 24 घण्टे में एक बार (₹.) | मासिक पास के दर (₹.) | जिले के अंदर वंजीकृत सामयिक वाहन की एक मासिक यात्रा हेतु (₹.) |
|------------------|---------------------------|--------------------------|----------------------|---|
| दो-चक्रिया वाहन | 110 | 165 | 3690 | 55 |
| तीन-चक्रिया वाहन | 175 | 260 | 5795 | 85 |
| चार-चक्रिया वाहन | 360 | 535 | 11930 | 180 |
| बस | 390 | 590 | 13055 | 195 |
| ट्रक | 550 | 825 | 18375 | 275 |
| ट्रैक्टर | 695 | 1045 | 23180 | 350 |



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - SYTL

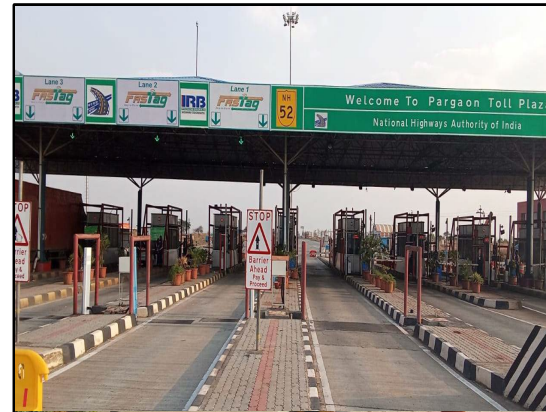
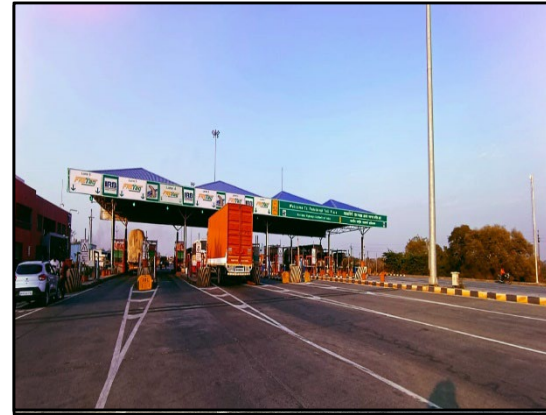


| भारतीय राष्ट्रीय राजमार्ग प्राधिकरण वाहन शुल्क (₹) | | | | जिला अंतर्गत नौदणी कृत वाणिज्य वाहनाच्या प्रत्येक फेऱ्यासाठी |
|---|--------------------------|---------------------------|-----------|---|
| वाहन प्रकार | एक तर्फी यात्रे करीता | २४ तासांमध्ये एका वेळा | मासिक पास | |
| | 75 | 110 | 2420 | 35 |
| | 115 | 175 | 3905 | 60 |
| | 245 | 370 | 8185 | 125 |
| | 270 | 400 | 8925 | 135 |
| | 385 | 575 | 12835 | 190 |
| | 470 | 705 | 15620 | 235 |



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - YATL



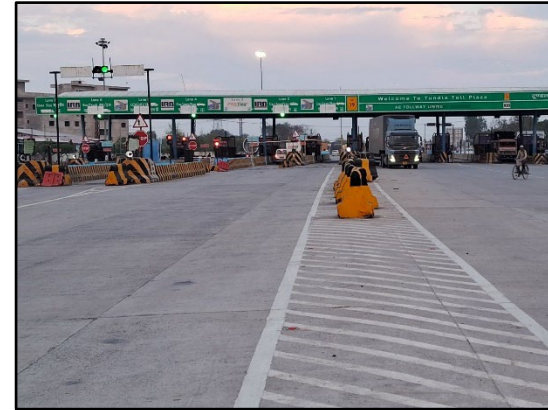
Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - KTL



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - AETL



| M/s AE Tollways Ltd. IRB | | M/s AE Tollways Ltd. IRB | |
|---|------------|---|------------|
| TUNDLA Toll at CH 224.950 of NH-19 (NH-2) | | TUNDLA Toll at CH 224.950 of NH-19 (NH-2) | |
| Toll Fee For Stretch From 199.620-252.250 Km of NH-2 User Fee Effective From -01-04-2023 | | Toll Fee For Stretch From 199.620-252.250 Km of NH-2 User Fee Effective From -01-04-2023 | |
| वाहनों के प्रकार | टोल फी (₹) | वाहनों के प्रकार | टोल फी (₹) |
| कार, जीप, वैन या ट्रक के अतिरिक्त वाहन | 210 | कार, जीप, वैन या ट्रक के अतिरिक्त वाहन | 105 |
| एकल यात्री वाहन (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 340 | एकल यात्री वाहन (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 170 |
| दो यात्री वाहन (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 710 | दो यात्री वाहन (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 355 |
| वाणिज्यिक वाहन (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 770 | वाणिज्यिक वाहन (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 385 |
| बस (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 1110 | बस (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 555 |
| ट्रक (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 1350 | ट्रक (ऑटो रिक्शा, टैक्सी, रिक्शा, रिक्शा, रिक्शा) | 675 |

Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - UTL



IRB National Highways Authority of India
USER FEE
 (Udaipur - Shamlaj) Section from km: 333-585 to 447-385 on NH-8

| Type of Vehicle | Single Journey Rate (Rs.)* | Return Journey Rate Valid for 24 Hrs. (Rs.)* | Monthly Pass 50 & more Single journey (Rs.)* |
|--|----------------------------|--|--|
| Car, Jeep, Van or LMV | 175 | 260 | 5750 |
| LCV, LGV or Mini Bus | 280 | 420 | 9290 |
| Bus / Truck (2 Axles) | 585 | 875 | 19470 |
| Commercial Vehicles (3 Axles) | 635 | 955 | 21240 |
| HCM, EME or Multi Axles Vehicles (4 to 6 Axle) | 915 | 1375 | 30530 |
| Oversized Vehicles (7 or More Axles) | 1115 | 1675 | 37170 |

* All Rates are Applicable only Payment through FASTAG

IRB National Highways Authority of India
EXEMPTED VEHICLES

B) USED FOR OFFICIAL PURPOSES BY:-

- The Ministry of Defence Including Those Which are Eligible For Exemption In Accordance With The Provision of The Indian Toll (Army and Air Force) Act 1901 and Rules Made There Under, As Extended to Navy also
- The Central and State Armed Forces in Uniform Including Para Milita Forces and Police
- An Executive Magistrate
- The Fire Fighting Department or Organization
- The National Highways Authority of India or any Other Government Organization Using Such Vehicle For Inspection, Survey Construction or Operation of National Highways and Maintenance There of

C) Used As Ambulance,
D) Used As Funeral Van
E) Mechanical vehicles Specially Designed and Constructed for use of a Person Suffering From Physical Disability

IRB National Highways Authority of India
EXEMPTED DIGITARIES

- TRANSPORTING AND ACCOMPANYING
- The President of India
- The Vice - President of India
- The Prime Minister of India
- The Governor of a State
- The Chief Justice of India
- The Speaker of India
- The Cabinet Minister of the House of People
- The Chief Minister of the Union
- The Minister of the Supreme Court
- The Minister of the State of the Union
- The Lieutenant Governor of a Union Territory
- The Chairman of a Staff Holding The Rank of Field General or Equivalent Rank
- The Speaker of The Legislative Council of a State
- The Chief Justice of High Court
- The Judge of a High Court
- The Member of Parliament
- The Army Commander or Vice - Chief of Army Staff And Equivalent in other Services
- The Chief Secretary to a State Government Within Concerned State
- The Secretary to The Government of India
- The Secretary, Council of States
- The Secretary, House of People
- The Foreign Dignitary on State Visit
- The Member of Legislative Assembly of a State and The Member of Legislative Council of a State Within Their Respective State If Her or She Produces His or Her Identity Card Issued by The Concerned Legislature of The State
- The Awardee of Param Vir Chakra, Ashok Chakra, Maha Vir Chakra, Kirti Chakra, Vir Chakra and Shaurya Chakra If Such Awardee Produces His or Her Photo Identity Card Duly Authenticated by The Appropriate or Competent Authority for Such Award

Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - CGTL



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - KGTL



Kishangarh Gulappura Tollway Limited

USER FEE
(Kishangarh Gulappura Section from km. 0.000 to 90.000 on NH - 79A & 79)

| Category of Vehicle / Applicable Fee | Fee for Single Journey (In Rupees)* | Fee for Multiple (max. no. of two one way) journey within a day (In Rupees)* | Fee for Monthly pass for 50 single journeys in a month (In Rupees)* | Fee for Commercial Vehicles registered within the District (In Rupees)* |
|--------------------------------------|-------------------------------------|--|---|---|
| Car / Jeep / Van / LMV | 140 | 210 | 4670 | 70 |
| LCV / LGV / Mini Bus | 225 | 340 | 7540 | 115 |
| Bus/ Truck (2 Axles) | 475 | 710 | 15800 | 235 |
| Commercial Vehicles (3 Axles) | 515 | 775 | 17235 | 260 |
| HCM / EME / MAV (4 to 6 Axles) | 745 | 1115 | 24775 | 370 |
| Oversized Vehicles (7 or more Axles) | 905 | 1355 | 30160 | 450 |

* All Rates are applicable only on Payment through FASTag

Kishangarh Gulappura Tollway Limited

CONCESSION

- The rate of monthly pass for person who owns a mechanical vehicle registered for non-commercial purposes and resides within a distance of twenty kilometers from the toll plaza is Rs. 1000/- (Rupees One thousand/-) only for the year 2023-24, which is subject to revision every year as per the provision of the National Highways Fee (Determination of Rates and Collection) Rules, 2008.
- For multiple journeys on the highway section, passes shall be issued at the following rates, namely:

| Amount Payable | Maximum number of one way journeys allowed | Period of validity |
|--|--|--|
| One and half times of the fee for one way journey | Two | Twenty Four hours from the time of payment |
| Two-third of amount of the fee payable for fifty or more single journeys | Fifty or more | One month from date of payment |
- Fee for commercial vehicle (including vehicles plying under national permit) registered in the district where the fee plaza falls shall be 50% of the prescribed rate for that category of vehicle provided no service road or alternative road is available for use of such commercial vehicles.
- All rates are applicable only on payment through FASTag



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - IHMTL



| TYPE OF VEHICLE | REG. STATE (Rs.) | REG. STATE (Rs.) | REG. STATE (Rs.) | REG. STATE (Rs.) |
|--|------------------|------------------|------------------|------------------|
| Two-wheeler (100 cc and below) | 105 | 160 | 3540 | 55 |
| Two-wheeler (100 cc and above) | 170 | 260 | 5720 | 85 |
| Light Motor Vehicle (1000 cc and below) | 360 | 540 | 11990 | 180 |
| Light Motor Vehicle (1000 cc and above) | 390 | 590 | 13080 | 195 |
| Heavy Commercial Vehicle (HCV) (1000 cc and above) | 565 | 845 | 18800 | 280 |
| Tractor (1000 cc and above) | 685 | 1030 | 22890 | 345 |

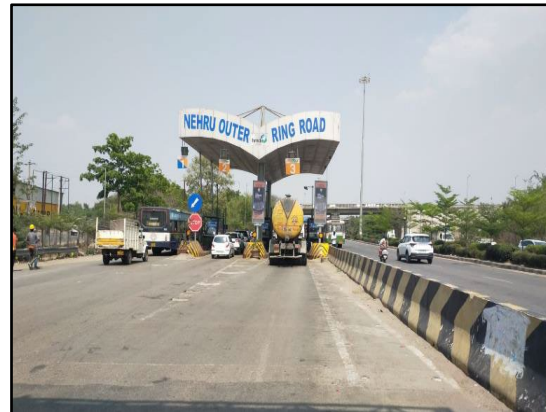
Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - PDTPL



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - IGEPL



| Sl. No. | Interchange Name | Distance in KM | Distance 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|---------|------------------|----------------|--------------|-----|-----|-----|-----|------|-----|-----|-----|------|
| 17 | Rajendra Nagar | 6.25 | 20 | 30 | 50 | 70 | 100 | 120 | | | | |
| 18 | TSPA | 11.65 | 30 | 40 | 70 | 100 | 140 | 170 | | | | |
| 18A | Narsingi | 15.90 | 40 | 60 | 100 | 130 | 190 | 230 | | | | |
| 19 | Nanakramguda | 22.06 | 60 | 80 | 140 | 180 | 260 | 320 | | | | |
| 1 | Kokapet | 19.91 | 40 | 70 | 130 | 160 | 230 | 280 | | | | |
| 1A | Neo Polis | 21.21 | 50 | 80 | 140 | 180 | 250 | 310 | | | | |
| 2 | Edulaganapally | 31.41 | 70 | 110 | 200 | 260 | 350 | 450 | | | | |
| 3 | Patencheru | 40.01 | 90 | 150 | 280 | 330 | 450 | 580 | | | | |
| 4 | Sultanpur | 48.51 | 110 | 180 | 310 | 400 | 550 | 710 | | | | |
| 4A | Mallampet | 54.91 | 120 | 200 | 350 | 450 | 650 | 790 | | | | |
| 5 | Baregudem | 60.21 | 140 | 220 | 390 | 500 | 720 | 880 | | | | |
| 6 | Medchal | 69.71 | 160 | 250 | 450 | 580 | 840 | 1020 | | | | |
| 7 | Shamirpet | 75.00 | 170 | 270 | 480 | 630 | 900 | 1090 | | | | |
| 8 | Kesasa | 83.10 | 190 | 300 | 530 | 700 | 980 | 1200 | | | | |
| 9 | Chhatrapati | 84.85 | 190 | 300 | 530 | 700 | 980 | 1200 | | | | |
| 10 | Taramatipet | 48.35 | 100 | 170 | 300 | 390 | 550 | 680 | | | | |
| 11 | Pedda Amberpet | 39.45 | 90 | 140 | 260 | 330 | 470 | 580 | | | | |
| 12 | Bongalur | 27.20 | 60 | 100 | 180 | 230 | 330 | 400 | | | | |
| 13 | Reviryal | 20.10 | 50 | 70 | 130 | 170 | 240 | 290 | | | | |
| 14 | Tukkuguda | 14.60 | 30 | 50 | 90 | 120 | 180 | 210 | | | | |
| 15 | Pedda Golconda | 6.35 | 10 | 20 | 40 | 50 | 80 | 90 | | | | |

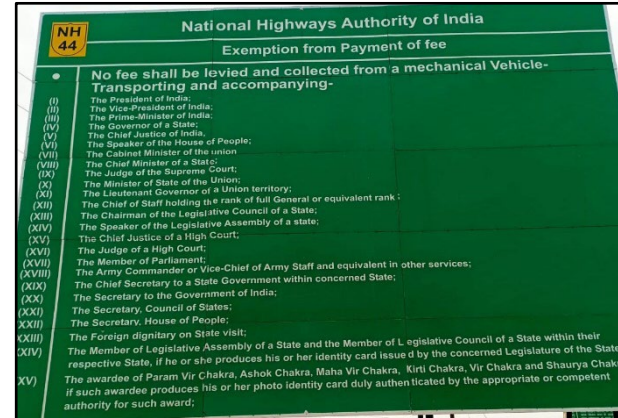
Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - STPL



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - IGTPL

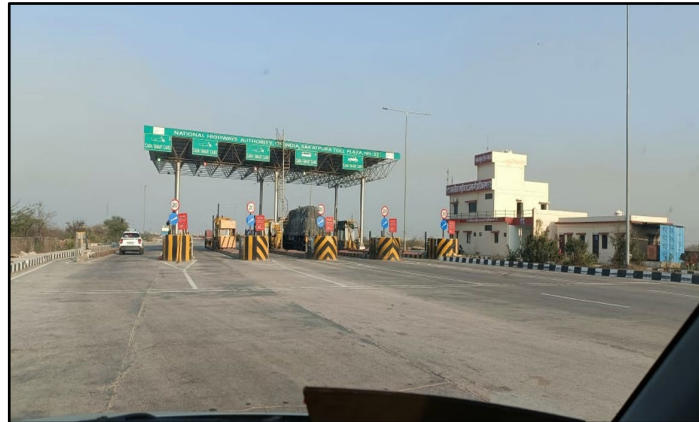


| वाहन का प्रकार | एक मागीय यात्रा के लिए शुल्क | वामसी यात्रा शुल्क निर्धारित समय में |
|--|------------------------------|--------------------------------------|
| कार/ऑप/वेन या हल्के वाहन (कुल वजन 7500 किलो तक) | 140 | 210 |
| हल्के वाणिज्यिक वाहन या मिनी बस (कुल वजन 7500 किलो से अधिक व 12000 किलो तक) | 225 | 340 |
| बस/ट्रक (बी एक्सएल) (कुल वजन 12000 किलो से अधिक व 16200 किलो तक) | 475 | 710 |
| वाणिज्यिक वाहन (सीए एक्सएल) (कुल वजन 16200 किलो से अधिक व 25000 किलो तक) | 515 | 775 |
| हवी कॉन्ट्रेक्टर मशीनरी/अर्थ मूविंग मशीनरी/बहुदुर्गिय वाहन (वार से छे एक्सएल) (कुल वजन 25000 किलो से अधिक व 54200 किलो तक) | 745 | 1115 |
| गामन्य से अधिक बड़े वाहन (वार से अधिक एक्सएल) (कुल वजन 54200 किलो से अधिक) | 905 | 1355 |



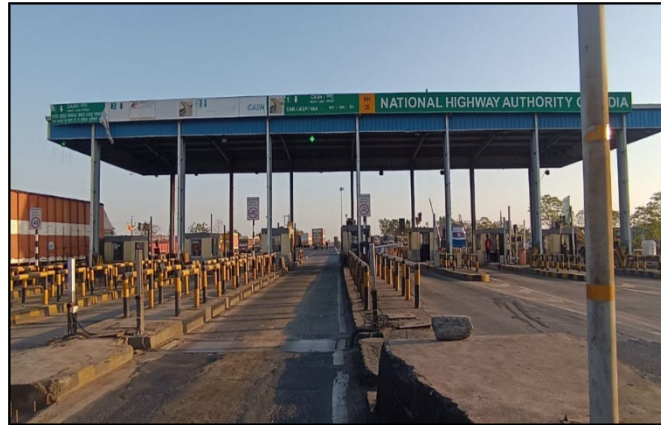
Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - IKTPL



Source(s): Site visits conducted in February/March 2024.

Annexure 5g: Site pictures - ILTPL



National Highways Authority of India
Toll Plaza-Chitora

Toll Free For Stretch- From Km 99.005 To Km 415.089 of NH-44

| Category of Vehicle | Single Journey | Return Journey Within 24 Hrs (Fastag Only) | Monthly Pass 50 Trip | Local Commercial Vehicle Registered Within District Plaza |
|--------------------------------------|----------------|--|----------------------|---|
| Car/ Jeep/Van of LMV | 150 | 225 | 5055 | 75 |
| LCV/LGV/or Mini Bus | 245 | 365 | 8150 | 120 |
| Bus/Truck (Tow Axle) | 510 | 777 | 17080 | 255 |
| 3Axle Commercial Vehicles | 560 | 840 | 18635 | 280 |
| HCM/EME/MAV (4-6 Axles) | 805 | 1205 | 26785 | 400 |
| Oversized Vehicles (7 Or More Axles) | 980 | 1465 | 32610 | 490 |

Note: The Rate for Monthly Pass (For FY 2023-24) will be Rs. 330/- per month for the Local Non-Commercial Vehicle Registered within a distance of 20 Km. from the Toll Plaza



Source(s): Site visits conducted in February/March 2024.

8.

Scope & Limitations

Scope & Limitations (1/3)

Terms of Engagement

- KPMG Valuation Services LLP (“KPMG” or “we”) has been appointed by IRB Infrastructure Trust (“IRBI Trust”, “Trust” or “Client” or “you”) in relation to carrying out Enterprise Valuation of 15 Special Purpose Vehicles (“SPVs” or “IRBI Trust Assets”) of IRBI Trust and Equity Valuation of IRBI Trust (jointly referred as “Targets”) as on the agreed date of the valuation in accordance with Regulation 21 of the Securities Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 where valuation is required to be conducted by a registered valuer (as defined under section 247 of the Companies Act, 2013) and such valuation report (“Report”) is required to be in compliance with the SEBI InvIT Regulations (“Engagement” or “Valuation”).
- The terms of the Engagement are set out in our letter of engagement dated 16 October 2023 (“LoE”). This letter of engagement is preceded by signed undertaking dated 11 July 2023 (“Undertaking letter”) provided by us. As agreed, Undertaking letter shall be read in conjunction and shall form part of the aforesaid letter of engagement.
- The date of Valuation is 31 March 2024 (“Valuation Date”).
- This Report sets out KPMG’s conclusions on the Valuation and has been prepared in accordance with LoE. Our Report is confidential to the Client and will be used by the Client only for purposes mentioned in the LoE. The Report will be issued by us on the express understanding that it shall not be copied, disclosed or circulated or referred to in correspondence or discussion with any third party. This Report is confidential to the Client and it is given on the express understanding that it is not communicated, in whole or in part, to any third party without KPMG’s prior written consent. Neither the Report nor its content may be used for any other purpose without prior written consent of KPMG. This Report has a limited scope as specified in it. KPMG will not accept any responsibilities to any other party to whom the Report may be shown or who may acquire a copy of the Report.
- We are not responsible to any other person/ party for any decision of such person/ party based on this Report. Any person/ party intending to provide finance/ invest in the shares/ businesses of the Targets/ their holding companies/ subsidiaries/ group companies, if any, shall do so after seeking their own professional advice and after carrying out their own due diligence procedures to ensure that they are making an informed decision. If any person/ party (other than the Client) chooses to place reliance upon any matters included in the report, they shall do so at their own risk and without recourse to the Valuer. It is hereby notified that usage, reproduction, distribution, circulation, copying or otherwise quoting of this Report or any part thereof, except for the purpose as set out earlier in this report, without our prior written consent, is not permitted, unless there is a statutory or a regulatory requirement to do so.
- We are aware that the Report may have to be shared with certain regulatory authorities in India and stock exchanges in India and therefore Report may enter the public domain and hereby provide our consent to such sharing subject to the following:
 - You shall indemnify and hold us harmless against any loss that may be incurred by us arising out of or relating to sharing of the Report with regulatory authorities in India or stock exchanges in India, or the Report entering the public domain as mentioned herein, as also against all costs, charges and expenses (including legal expenses) suffered or incurred by us on account of the aforesaid. In this clause “us” shall include all Firm Persons and “you” shall include Other Beneficiaries (as these terms have been defined in the LoE).
 - Such Report shall be disclosed in full and strictly in such forms as KPMG has provided to the Client without any deviation.
 - KPMG shall not be liable to any person or party for any reason and under any circumstances.
 - The readers of the Report shall not bring any claim against KPMG for matters arising out of or consequent upon disclosure of the Report.
 - The Report shall be issued with all the disclaimers as provided by KPMG at the time of issuance of the Report.

Scope & Limitations (2/3)

Disclosure of Interest/Conflict

- KPMG is not affiliated to the Client in any manner whatsoever. Further, KPMG does not have a prospective interest in the business which is the subject of this engagement.
- KPMG's fee is not contingent on an action or event resulting from the analyses, opinions or conclusions in this Report.

Basis of Value

- The report has been prepared on the basis of "Fair Value" as at Valuation Date. The generally accepted definition of "Fair Value" is the value as applied between a hypothetical willing vendor and a hypothetical willing prudent buyer in an open market and with access to all relevant information.

Premise of Value

- The report has adopted "Going Concern Value" as the premise of value in the given circumstances. The generally accepted definition of Going concern value is the value of a business enterprise that is expected to continue to operate in the future.
- The valuation has been performed as per internationally accepted valuation methodologies and in cognizance of international valuation standards and ICAI Valuation Standards 2018 issued by the Institute of Chartered Accountants of India.

Scope and Limitations

- This Report is based on the information provided by the Client and has been confirmed by the Client. KPMG have not independently verified or checked the accuracy or timeliness of the same. KPMG have indicated within this Report the sources of the information presented and have satisfied ourselves, so far as possible, that the information presented is consistent with other information which is made available to us in the course of our work in accordance with the terms of this engagement letter. KPMG have not, however, sought to establish the reliability of the sources by reference to other evidence, except as may be specifically agreed in writing between us.
- KPMG has read, analyzed and discussed the financial information and underlying management assumptions pertaining to the Targets as provided by the Management of the Client ("Management"). This information has been solely relied upon by KPMG for the Valuation.
- We have based our analysis on the audited financial statements of the Targets (other than IGEPL, STPL, ILTPL, IGTPL, IKTPL), for the years ended 31 March 2021 to 31 March 2023 and provisional financial statements of the Targets for the period from 01 April 2023 to 31 March 2024. Additionally, our analysis is based on the business plan of the SPVs for the period from 1 April 2024 to the end of the concession periods of respective SPVs as provided by the Management ("Management Business Plan") and key underlying assumptions. Any changes in the assumptions or methodology used to consolidate the financial statements may significantly impact our analysis and therefore the Valuation.
- KPMG has read and analyzed but have not commented on the appropriateness of or independently verified the Management Business Plan and underlying data and assumptions and accordingly provided no opinion on the same. If there were any omissions, inaccuracies or misrepresentations of the information provided by the Management, this may have a material effect on our findings and therefore the Valuation.
- The realization of the projections in the Management Business Plan will be dependent on the continuing validity of assumptions on which it is based. Our analysis therefore will not and cannot be directed to providing any assurance about the achievability of the future plans. Since the projections relate to the future, actual results are likely to be different from the projected results because events and circumstances do not occur as expected and the differences may be material.

Scope & Limitations (3/3)

- This Report makes reference to 'KPMG analysis'. This indicates only that we have (where specified) undertaken certain analytical activities on the underlying data to arrive at the information presented.
- Our work did not constitute an audit of the financial statements and accordingly, we do not express any opinion on the truth and fairness of the financial position as indicated in this Report. Our work did not constitute a validation of the financial statements of the Targets, and accordingly, we do not express any opinion on the same.
- We have carried out the Valuation based on Management Business Plan received. Our scope of work does not include any commercial / legal / technical due diligence or carrying out any environmental / technical feasibility analysis or comparison of Management Business Plan with approved budgets / annual operating plans of the Targets. We have relied on Management's representation on such considerations and any changes in the same may significantly impact our analysis and therefore the Valuation.
- Wherever applicable, we have relied upon the legal opinion document / affidavit copies provided by Management in relation to the current status of the projects. We have not carried out / sought any independent legal opinion, nor have we verified the accuracy of the legal opinion shared. Any discrepancy in the same may significantly impact our analysis and therefore the Valuation.
- Our opinion is based on prevailing market, economic, and other conditions at the Valuation Date. It should be appreciated that these conditions can change over relatively short periods of time, not only as a result of internal factors, but because of external factors, which could impact the value, either positively or negatively.
- For our analysis, we have relied on published and secondary sources of data, whether or not made available by the Client. We have not independently verified the accuracy or timeliness of the same.
- Neither KPMG nor any of its affiliates worldwide are responsible for updating this Report because of events or transactions occurring subsequent to the date of this Report. Any updates or second opinions in this Report cannot be sought by the Management from external agencies including global offices of KPMG without the prior written permission of KPMG.
- KPMG has not considered any finding made by other external agencies in carrying out the Valuation analysis other than the one mentioned herein.
- For the purpose of the Valuation, our scope does not include valuation or legal due diligence of current assets and liabilities and as represented by the Management, the same has been considered at their respective book value.
- For the purpose of this engagement and Report, we have made no investigation of, and assume no responsibility for the title to, or liabilities against the Targets. Our conclusion of value assumes that the title to the assets and liabilities of the Targets reflected in the financial statements as on Valuation Date is intact as at the date of this Report.
- Any discrepancies in any table/ annexure between the total and the sums of the amounts listed are due to rounding-off.
- The Report should be read in the light of these limitations, and we caution that had these matters been within the scope of our review, our conclusions may have changed, and that change could be material.
- The information presented in this Report does not reflect the outcome of any due diligence procedures. The reader is cautioned that the outcome of due diligence process could change the information herein and our Valuation, and that change could be material.
- This Report forms an integral whole and cannot be split in parts. The outcome of the Valuation can only lead to proper conclusions if the Report as a whole is taken into account.

Management representation

- This Report is prepared on the basis of the sources of information listed in Annexure 1. KPMG has relied upon written representation by the Management that the information contained in the Report is materially accurate and complete, fair in its manner of portrayal and therefore forms a reliable basis for the Valuation.



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The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

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AGRA TO ETAWAH (KM 199.660 TO KM 323.525) SECTION OF NH-2 IN THE STATE OF UTTAR PRADESH.



MARCH 2024

TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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, **Agra to Etawah** section of NH-2 from km 199.660 to km 323.525 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s AE Tollway. Ltd.* (Concessionaire) has been awarded the Project for a concession period of 24 years starting from 1st August 2016. The Project has been commissioned and is currently in the operation / maintenance phase. Six Laning of project has also been completed in Nov 2020.

Length of project road is 123.865 Kms. The project road is section of NH-2, which starts from Delhi and ends at Kolkata and is a part of the Golden Quadrilateral Project. The project road section passes through the districts of Agra, Firozabad and Etawah.

Project road alignment passes through the towns/ built-up areas of Tundla, Firozabad, Shikohabad, Sirsaganj, & Jaswantnagar. The following figure shows alignment of project road section from Agra to Etawah.

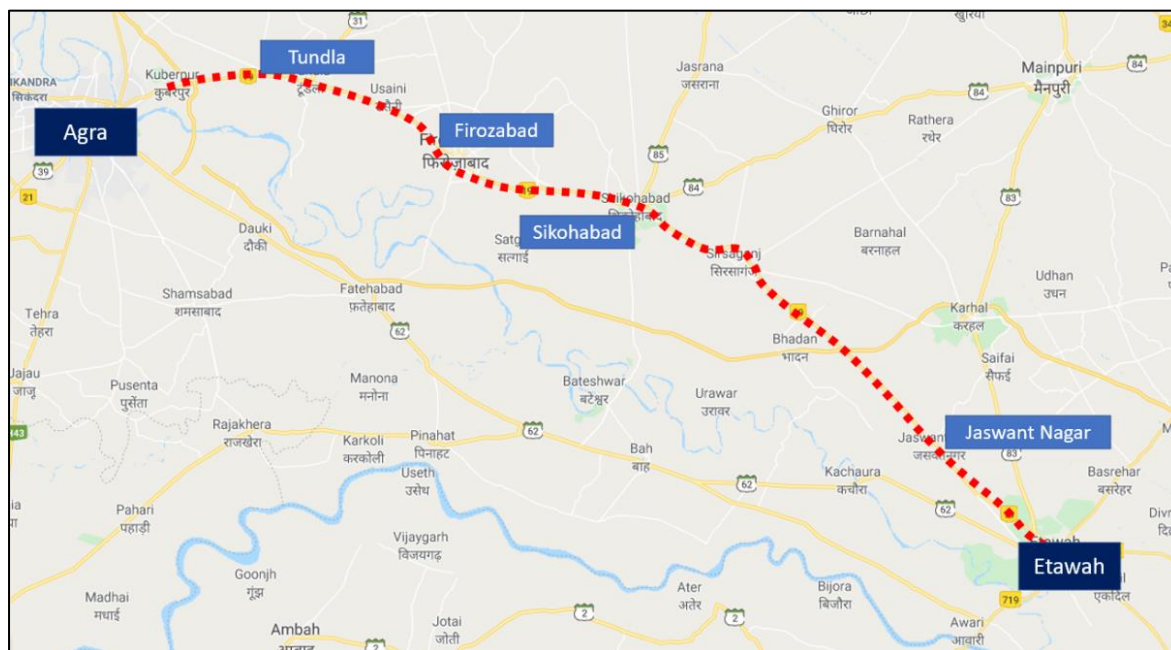


Figure 1-1: Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

National Highway 2 (NH 2) which is now renumbered as NH-19 is oldest highway in India and connects state of Delhi, Haryana, Uttar Pradesh, Bihar, Jharkhand and West Bengal. It constitutes a major portion of the historical grand truck road.

It connects the national capital Delhi to Kolkata, as well as important cities Mathura, Agra, Kanpur, Allahabad, Varanasi, Dhanbad, Asansol, Durgapur and Bardhaman. The highway is part of the Golden Quadrilateral project undertaken by National Highways Authority of India (NHAI).

The project road is a link between Agra and Kanpur in the state of Uttar Pradesh. The main project influence area of the project road consists of the three districts through which the project road passes. In addition, the project influence area includes the districts of Kanpur, Mathura and Aligarh also.

2.2 Project Stretch Description

Section of NH-2 from Agra to Etawah is part of the major transportation link in the area connecting industrial cities of Agra- Kanpur and Lucknow. Important cities of Firozabad, Shikohabad, and Jaswant Nagar fall on project alignment. Firozabad has a famous glass work industry. Like other parts of India rapid ribbon development is happening around these cities on project highway. This also contributes to sustainable traffic growth.

There are two operative toll plazas at project stretch. The first is at Tundla at Km 224.950 and second at Gurau at Km 285.200. The following figure shows project alignment and toll plaza locations.

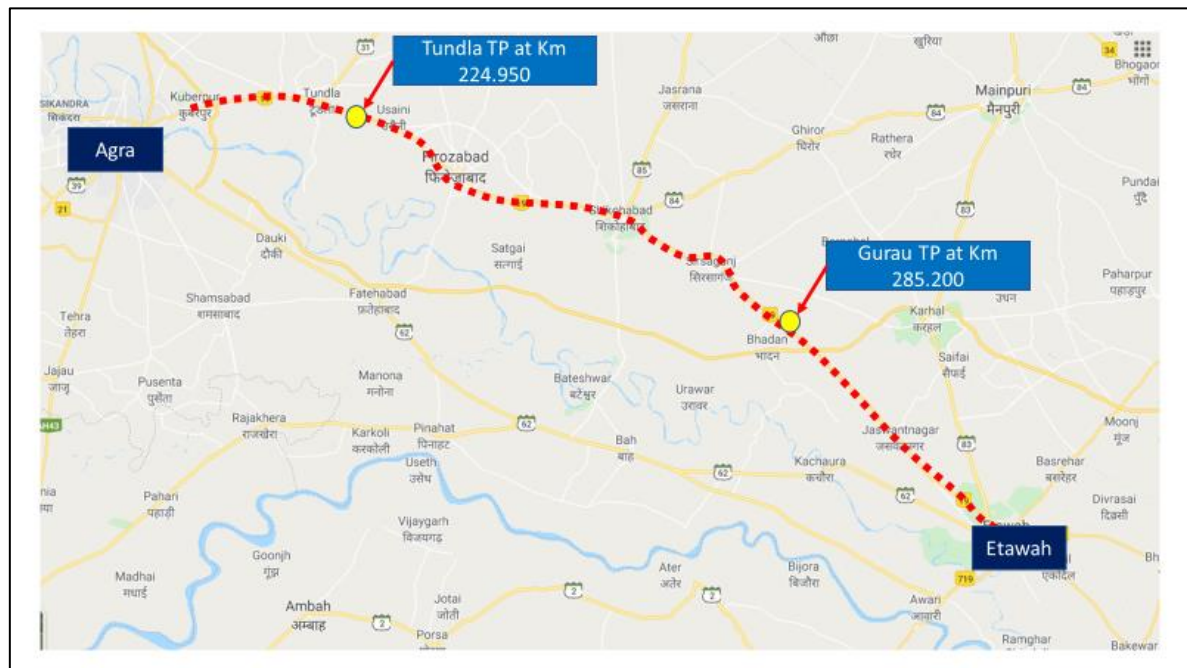


Figure 2-1: Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Six laning of project stretch is complete. The following photographs illustrate the project section along the corridor.



Figure 2-2: Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Agra- Etawah section of NH-2 for years 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,22-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|---------------------------------|--|---|---|---|---|
| 1 | Km 224.950 Toll Plaza at Tundla | AADT for Year 2017-18, 2018-19, 2019-20,2020-21 ,2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--------------------------------|---|--|--|--|--|
| | | | 2023 | 2023 | 2023 | 2023 |
| 2 | Km 285.200 Toll Plaza at Gurau | AADT for Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |

Toll plaza no. 1 & 2 are located in Uttar Pradesh.

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : 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) |

| Vehicle Type | |
|----------------|--|
| | 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Bus
- Truck
- 3-Axle
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Gurau Toll Plaza at Km 285.200

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-----------------|--|--|--|--|--|
| 1 | Car | 2071 | 3535 | 5268 | 3371 | 3525 |
| 2 | LCV | 1097 | 1286 | 919 | 748 | 742 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|------------------|--|--|--|--|--|
| 3 | Bus | 494 | 492 | 635 | 530 | 559 |
| 4 | Truck | 891 | 1100 | 1351 | 1410 | 1532 |
| 5 | 3-Axle | 901 | 909 | 882 | 839 | 826 |
| 6 | Multi Axle | 1426 | 1760 | 2138 | 2386 | 2685 |
| 7 | Oversize Vehicle | 11 | 8 | 4 | 10 | 10 |
| | Total | 6892 | 9090 | 11197 | 9292 | 9880 |

Table 3-4 : Traffic Data at Tundla Toll Plaza at Km 224.950

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|------------------|--|--|--|--|--|
| 1 | Car | 8324 | 5849 | 7347 | 8954 | 9575 |
| 2 | LCV | 1917 | 1514 | 1012 | 1082 | 1067 |
| 3 | Bus | 1148 | 777 | 856 | 1181 | 1328 |
| 4 | Truck | 1309 | 1272 | 1506 | 1775 | 1957 |
| 5 | 3-Axle | 955 | 948 | 924 | 887 | 879 |
| 6 | Multi Axle | 1255 | 1725 | 2179 | 2372 | 2764 |
| 7 | Oversize Vehicle | 10 | 11 | 8 | 10 | 10 |
| | Total | 14918 | 12096 | 13832 | 16260 | 17580 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-5.

Table 3-5 : 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 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|--------------------------|------------|-------|-----------|
| 2019-2020 | Gurau Km 285.200 | 6892 | 17043 | 2.47 |
| | Tundla Km 224.950 | 14918 | 27128 | 1.82 |

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|--------------------------|------------|-------|-----------|
| 2020-2021 | Gurau Km 285.200 | 9090 | 20922 | 2.30 |
| | Tundla Km 224.950 | 12096 | 24923 | 2.06 |
| 2021-2022 | Gurau Km 285.200 | 11197 | 24889 | 2.22 |
| | Tundla Km 224.950 | 13832 | 28565 | 2.07 |
| 2022-2023 | Gurau Km 285.200 | 9292 | 23606 | 2.54 |
| | Tundla Km 224.950 | 16260 | 32820 | 2.02 |
| 2023-2024 | Gurau Km 285.200 | 9880 | 25521 | 2.58 |
| | Tundla Km 224.950 | 17580 | 36151 | 2.06 |

It can be observed from above that project traffic has PCU index close to 2.5 at Guarau which is an indicator of high proportion of commercial traffic in traffic mix. At Tundla the index is more toward passenger traffic due to urban impact. The following figure illustrates variation of PCU index at two toll plaza locations.

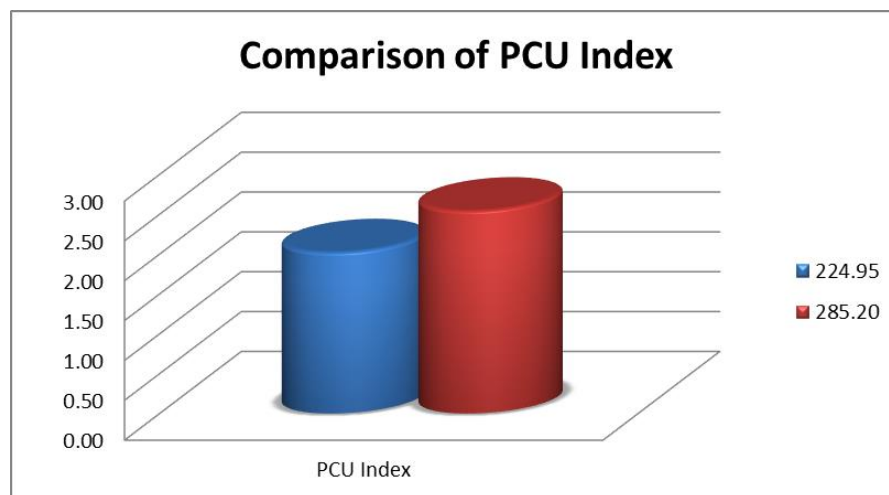


Figure 3-1: Comparison of PCU Index

3.4.2 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.

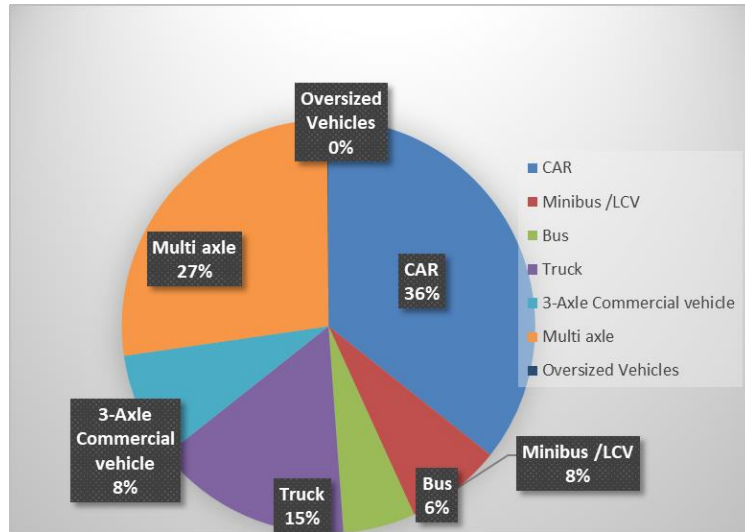


Figure 3-2 :Model Split of Tollable Vehicle-Km 285.200

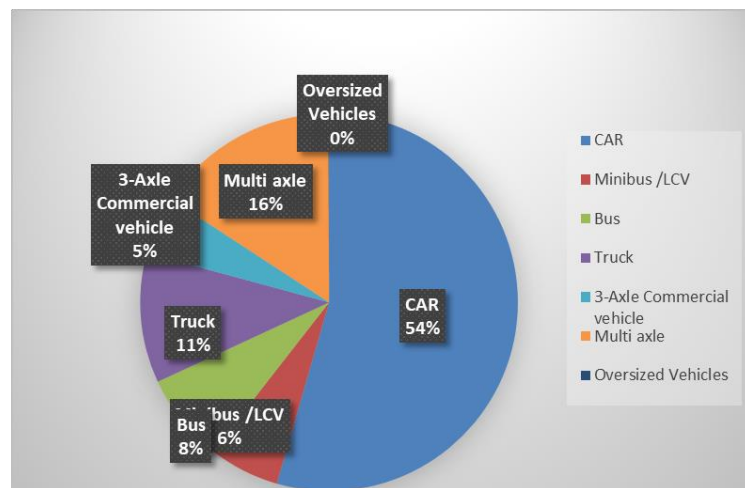


Figure 3-3 :Model Split of Tollable Vehicle-Km 224.950

It is observed that car traffic forms about 36% of total traffic at Gurau toll plaza location while multi axle commercial vehicles and trucks are about 64% of total traffic.

While at Tundla toll plaza car share rises to 54% and commercial vehicles multi axle and trucks share about 46%. This is due to the presence of strong urban impact of Tundla.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-7 : Journey Type Bifurcation of Traffic at Gurau Toll Plaza KM 285.200

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 6839 |
| 2 | Return Journey | 3006 |
| 3 | Local Commercial Single Journey | 19 |
| 4 | Monthly Pass Local | 9 |
| 5 | Monthly Pass | 7 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 69%. Return journey component is 31%.

The following tables give the details of journey distribution at Tundla toll plaza at Km 224.950.

Table 3-8 : Journey Type Bifurcation of Traffic at Tundla Toll Plaza KM 224.950

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 8627 |
| 2 | Return Journey | 8671 |
| 3 | Local Commercial Single Journey | 94 |
| 4 | Monthly Pass Local | 169 |
| 5 | Monthly Pass | 20 |

At Tundla toll plaza single journey share drops to 49% while return share is 49% respectively. Monthly pass is 0% and Local 2%.

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch has toll application history from last few years, and it can be assumed that project traffic is settled. However, from an analysis point of view there can be one alternate route using Agra Lucknow Expressway at local level.

At the regional level, this route connects Delhi to Kanpur and then goes towards Prayagraj and West Bengal. Most obvious alternate route is through Lucknow – Agra Expressway again.

The following maps show these routes in relation to project stretches at both local and regional level.

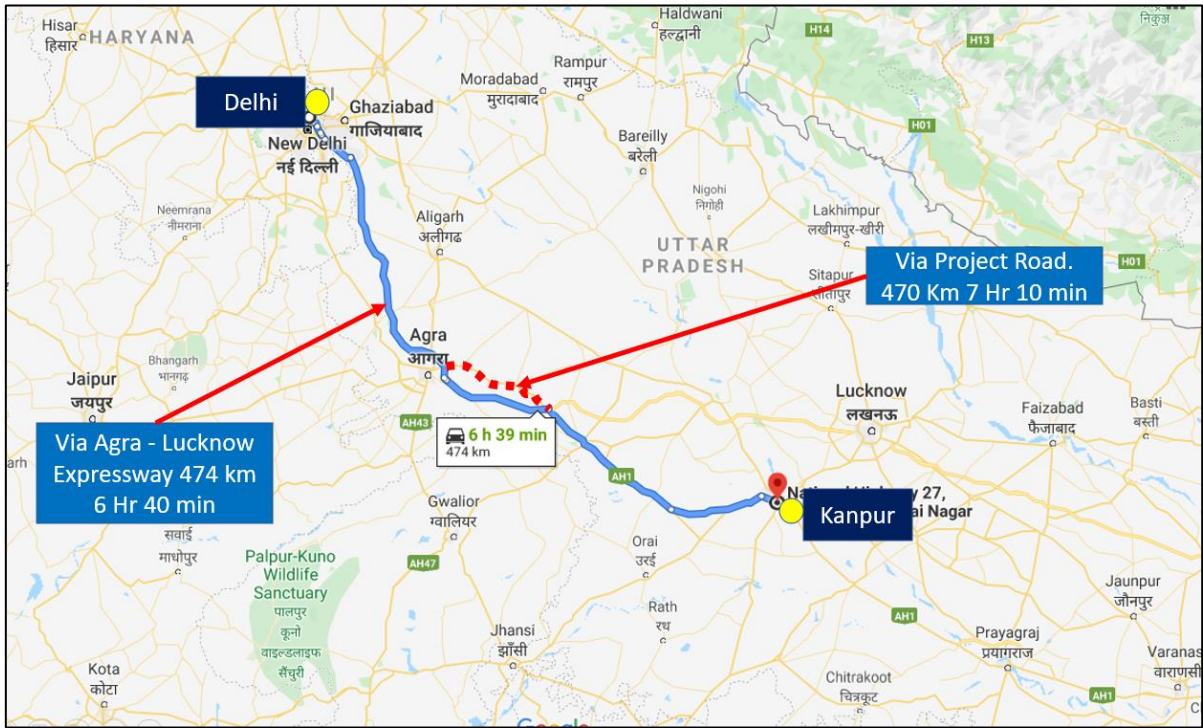


Figure 4-1: Alternate route at regional level.



Figure 4-2: Alternate route at local level.

It can be observed that the project highway forms one of the main spines of the corridor between Agra and Etawah. Agra – Lucknow Expressway is a faster connectivity for obvious regions. It’s been in operation for the last few years and most of the traffic which had potential of diversion had done so. Traffic on project road is now settled and it can be assumed as dedicated traffic on project road for logistic obligations. With six laning now complete, project stretch has become slightly more attractive due to the improved level of service.

At regional level also the difference between two alignment is only of Agra- Lucknow Expressway. Hence there too, regional level traffic is expected to have settled.

The following table provides summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Competing Roads Details

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|--|-----------------|-------------|-------------------|------------------|--|
| Regional Level | | | | | | |
| 1 | Delhi to Kanpur Via Agra- Lucknow Expressway | Alternate Route | 474 | 70 | 6 Hr 40 Min | Alternate route running for years after toll on project road. Traffic Settled. No further diversion expected |
| | Delhi to Kanpur Via Project Road (NH-19) | Project Road | 470 | 65 | 7 Hr 10 Min | |
| Local Level | | | | | | |
| 2 | Agra to Etawah Via Agra- Lucknow Expressway | Alternate Route | 123 | 65 | 1 Hr. 52 Min | Alternate route running for years after toll on project road. Traffic Settled. No further diversion expected |
| | Agra to tawah Via Project Road (NH-19) | Project Road | 129 | 50 | 2 Hr. 30 Min | |

Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road. Further, it may be noted that during its construction phase, the project road had many bottlenecks like Firozabad bypass etc. Due to this part of traffic preferred Agra Lucknow expressway over project road despite higher toll tariff at Agra – Lucknow Expressway. Now as these bottlenecks are removed it is expected that some part of traffic would return to Project Corridor due to improved level of service and low toll fee as compared to Agra – Lucknow Expressway.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Surat- Dahisar section of NH-8 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable to projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP
-

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

The project corridor spreads across the state of Uttar. Toll plazas at Tunda and Gurau are in the state of Uttar Pradesh. Project corridor has certain impact of traffic from Delhi, and Haryana also. For elasticity calculations, working data from these states has been analyzed.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Uttar Pradesh State.

Table 5-1 : Per Capita Income Vs Car Uttar Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2012 | 32002 | 1108100 | 4.51 | 6.04 | | |
| 2013 | 32908 | 1205374 | 4.52 | 6.08 | 3% | |
| 2014 | 34044 | 1423020 | 4.53 | 6.15 | 3% | |
| 2015 | 34583 | 1572217 | 4.54 | 6.20 | 2% | |
| 2016 | 36973 | 1746117 | 4.57 | 6.24 | 7% | |
| 2017 | 40641 | 2027972 | 4.61 | 6.31 | 10% | 4.94% |

Regression analysis of same is given in figure below.

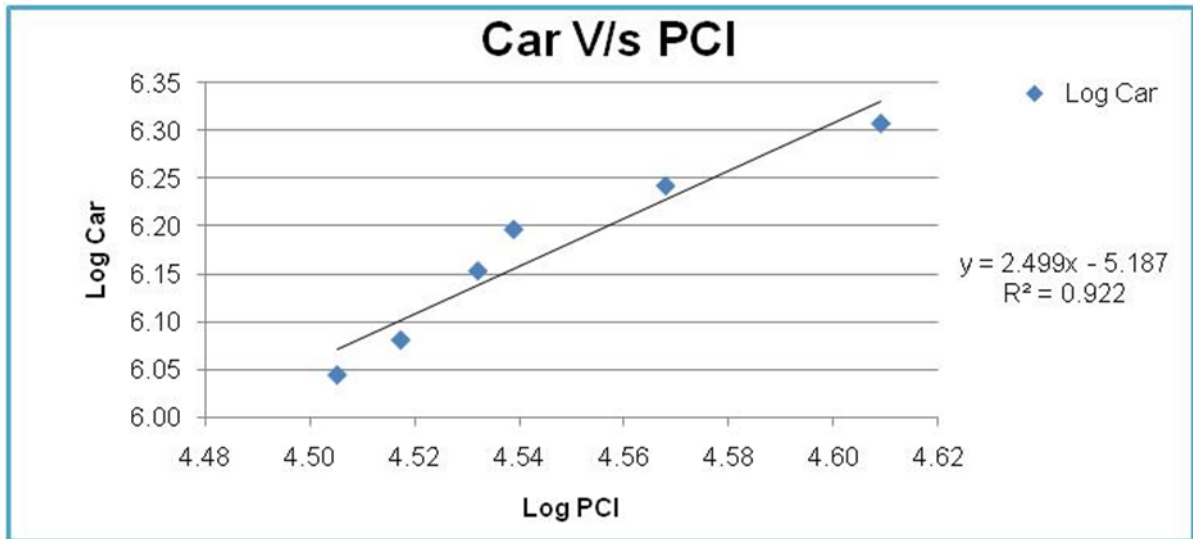


Figure 5-1: Regression and Elasticity PCI vs. Car–Extrapolation Uttar Pradesh

Table 5-2 : Population Vs Bus Uttar Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 199812341 | 57901 | 8.30 | 4.76 | | |
| 2013 | 203382046 | 64147 | 8.31 | 4.81 | 2% | |
| 2014 | 206942855 | 74389 | 8.32 | 4.87 | 2% | |
| 2015 | 210493544 | 80460 | 8.32 | 4.91 | 2% | |
| 2016 | 214032922 | 89127 | 8.33 | 4.95 | 2% | |
| 2017 | 217559836 | 112020 | 8.34 | 5.05 | 2% | 1.72% |

Regression analysis of same is given in figure below.

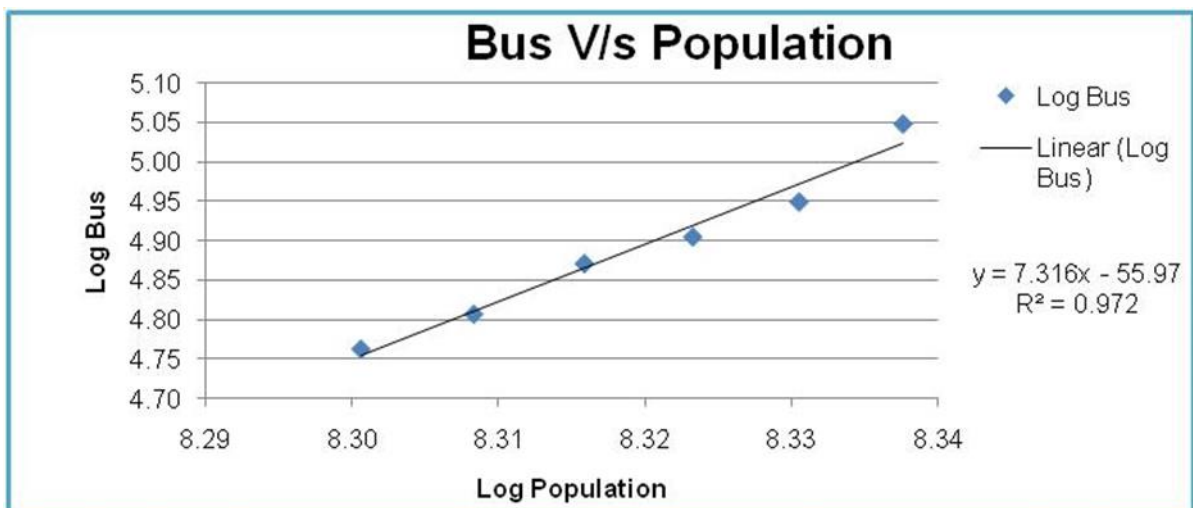


Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : LCV Traffic Vs NSDP Uttar Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 645132 | 176164 | 5.81 | 5.25 | | |
| 2013 | 673552 | 213657 | 5.83 | 5.33 | 4% | |
| 2014 | 707469 | 265025 | 5.85 | 5.42 | 5% | |
| 2015 | 729686 | 294022 | 5.86 | 5.47 | 3% | |
| 2016 | 792049 | 316815 | 5.90 | 5.50 | 9% | 5.28% |

The following figure depicts regression analysis and extrapolation.

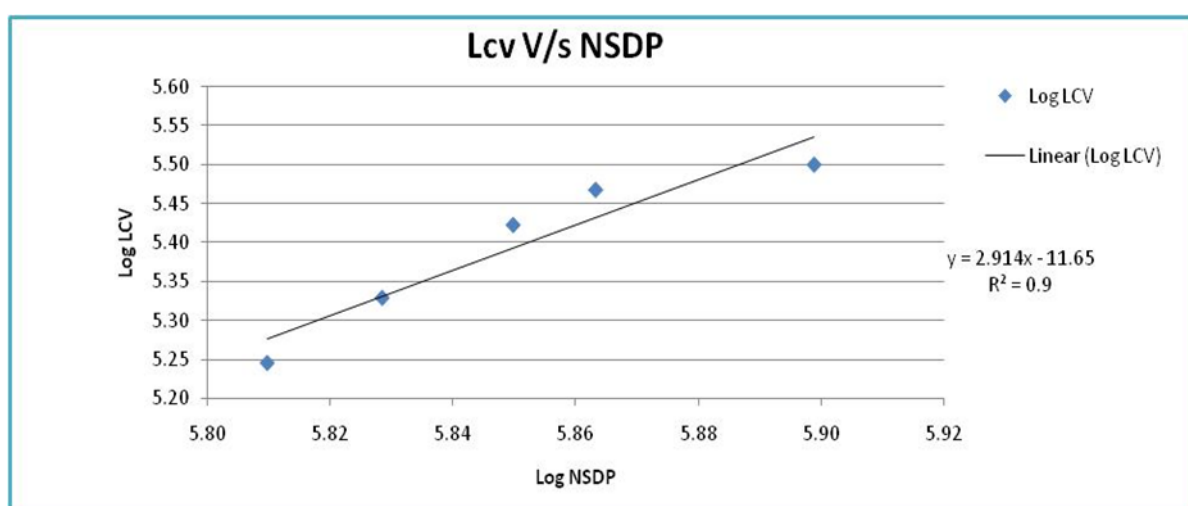


Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Uttar Pradesh.

Table 5-4 : Truck Traffic Vs NSDP Uttar Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 645132 | 162813 | 5.81 | 5.21 | | |
| 2013 | 673552 | 186404 | 5.83 | 5.27 | 4% | |
| 2014 | 707469 | 202761 | 5.85 | 5.31 | 5% | |
| 2015 | 729686 | 217609 | 5.86 | 5.34 | 3% | |
| 2016 | 792049 | 245688 | 5.90 | 5.39 | 9% | |
| 2017 | 883962 | 265167 | 5.95 | 5.42 | 12% | 6.55% |

The following figure depicts regression analysis and extrapolation.

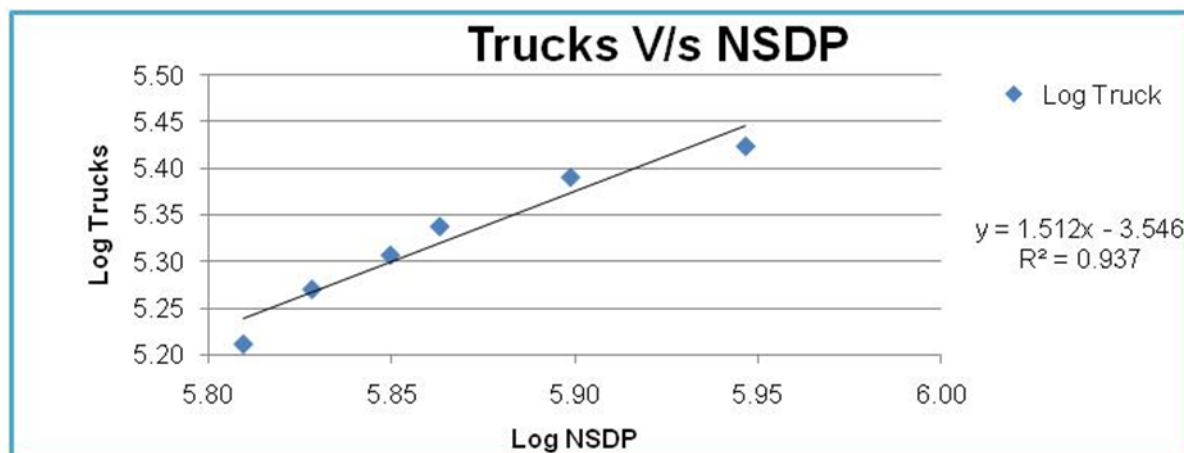


Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Uttar Pradesh.

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. R² statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R² more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-5 : Summary Regression Analysis Uttar Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|--------------------------|----------------------|-----------------|
| Uttar Pradesh | Car/Jeep | PCI | $y = 2.499x + -5.1874$ | R ² = 0.922 | 2.4990 | 4.94% | 12.34% | Good Regression |
| | Bus | Population | $y = 7.3167x - 55.9791$ | R ² = 0.9726 | 7.3167 | 1.72% | 12.56% | Good Regression |
| | LCV | NSDP | $y = 2.9149x - 11.6585$ | R ² = 0.9 | 2.9149 | 5.28% | 15.40% | Good Regression |
| | Truck | NSDP | $y = 1.5121x - 3.5463$ | R ² = 0.9373 | 1.5121 | 6.55% | 9.90% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Delhi State.

Table 5-6 : Per Capita Income Vs Car Delhi

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 185361 | 2172069 | 5.27 | 6.34 | | |
| 2013 | 193175 | 2416974 | 5.29 | 6.38 | 4% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2014 | 202216 | 2568380 | 5.31 | 6.41 | 5% | |
| 2015 | 215726 | 2730071 | 5.33 | 6.44 | 7% | |
| 2016 | 235737 | 2986579 | 5.37 | 6.48 | 9% | |
| 2017 | 247255 | 3061817 | 5.39 | 6.49 | 5% | 5.95% |

Regression analysis of same is given in figure below.

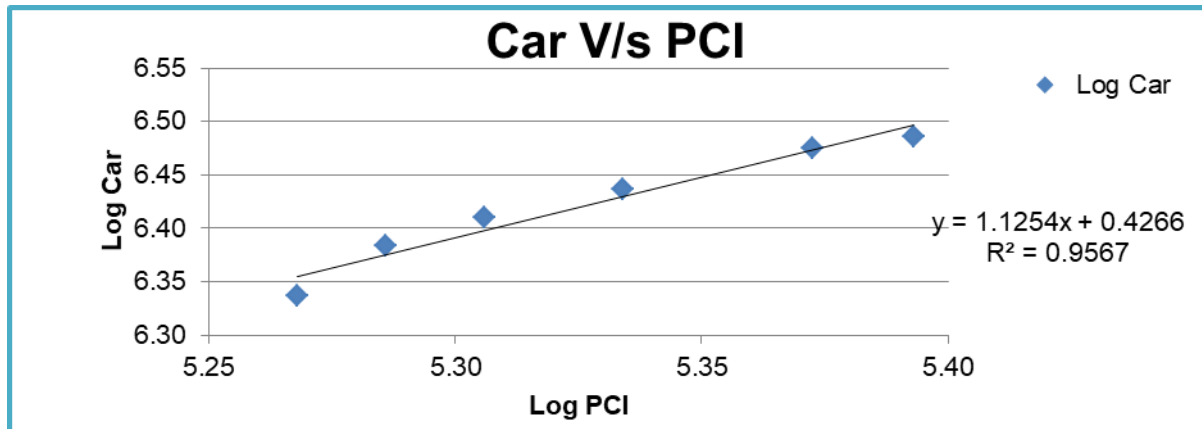


Figure 5-5: Regression and Elasticity PCI vs. Car–Extrapolation Delhi

Table 5-7 : Population Vs Bus Delhi

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 16787941 | 109790 | 7.22 | 5.04 | | |
| 2013 | 17071599 | 19917 | 7.23 | 4.30 | 2% | |
| 2014 | 17354281 | 19595 | 7.24 | 4.29 | 2% | |
| 2015 | 17635897 | 19700 | 7.25 | 4.29 | 2% | |
| 2016 | 17916359 | 43723 | 7.25 | 4.64 | 2% | |
| 2017 | 18195583 | 41686 | 7.26 | 4.62 | 2% | 1.62% |

Regression analysis of same is given in figure below.

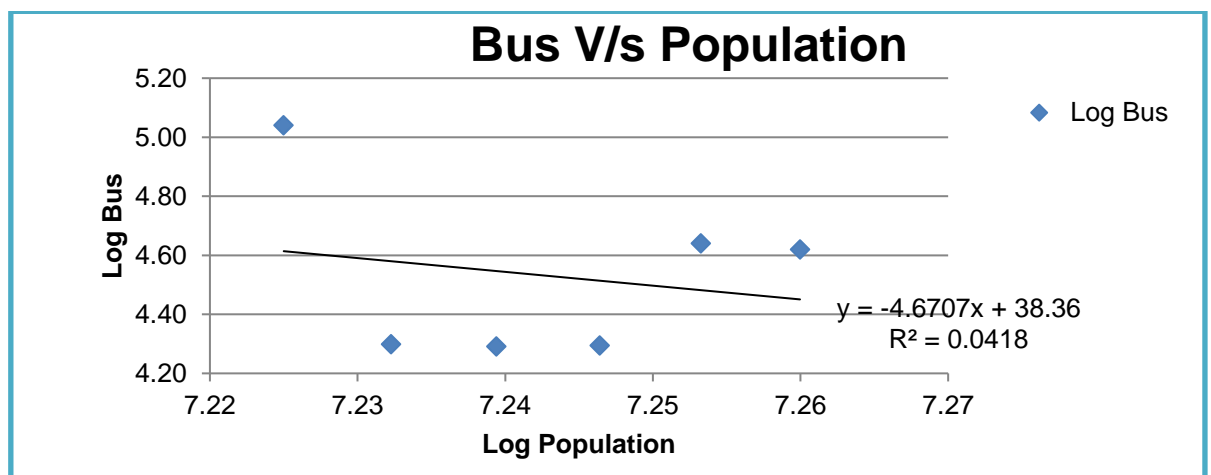


Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Delhi

The elasticity of goods traffic has been worked out by regression analysis with NSDP.
The following table represents the data and details.

Table 5-8 : LCV Traffic Vs NSDP Delhi

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 314650 | 124547 | 5.50 | 5.10 | | |
| 2013 | 334193 | 126539 | 5.52 | 5.10 | 6% | |
| 2014 | 356528 | 136110 | 5.55 | 5.13 | 7% | |
| 2015 | 387639 | 145903 | 5.59 | 5.16 | 9% | |
| 2016 | 431730 | 183486 | 5.64 | 5.26 | 11% | |
| 2017 | 461476 | 221068 | 5.66 | 5.34 | 7% | 7.98% |

The following figure depicts regression analysis and extrapolation.

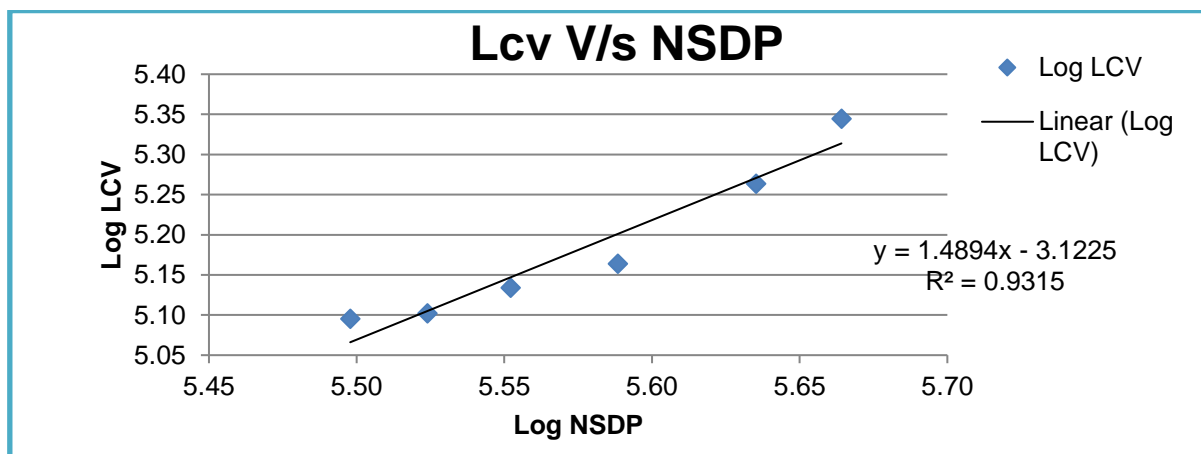


Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Delhi.

Table 5-9 : Truck Traffic Vs NSDP Delhi

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 314650 | 4792 | 5.50 | 3.68 | | |
| 2013 | 334193 | 5176 | 5.52 | 3.71 | 6% | |
| 2014 | 356528 | 6093 | 5.55 | 3.78 | 7% | |
| 2015 | 387639 | 7503 | 5.59 | 3.88 | 9% | |
| 2016 | 431730 | 8703 | 5.64 | 3.94 | 11% | |
| 2017 | 461476 | 10440 | 5.66 | 4.02 | 7% | 7.98% |

The following figure depicts regression analysis and extrapolation.

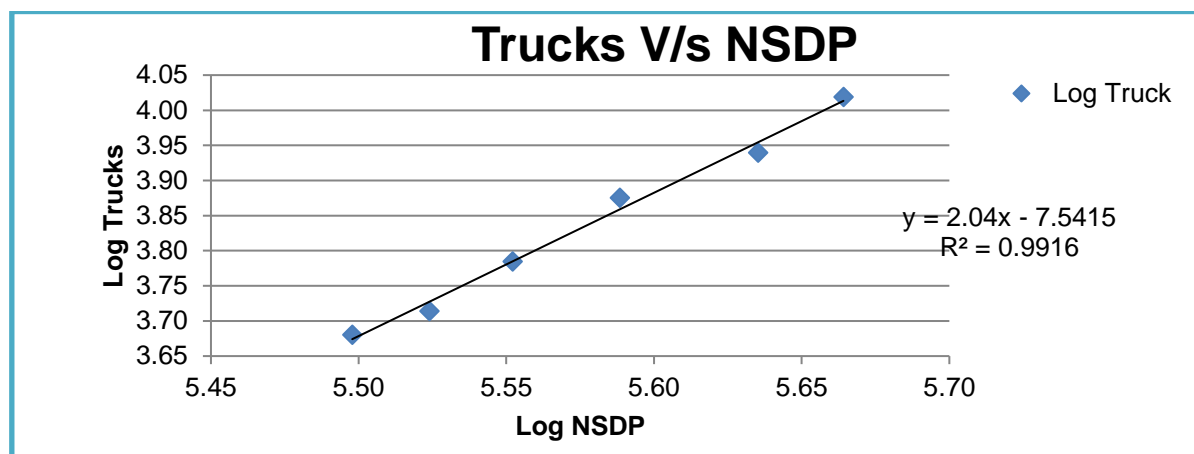


Figure 5-8: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Delhi.

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. R² statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R² more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-10 : Summary Regression Analysis Delhi

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|------------------------|-------------------------|----------------------------|--------------------------|----------------------|-----------------|
| Delhi | Car/Jeep | PCI | $y = 1.1254x + 0.4266$ | R ² = 0.9567 | 1.1254 | 5.95% | 6.69% | Good Regression |
| | Bus | Population | $y = -4.6707x - 38.36$ | R ² = 0.0418 | -4.6707 | 1.62% | -7.58% | Poor Regression |
| | LCV | NSDP | $y = 1.4894x - 3.1225$ | R ² = 0.9315 | 1.4894 | 7.98% | 11.88% | Good Regression |
| | Truck | NSDP | $y = 2.04x - 7.5415$ | R ² = 0.9916 | 2.0400 | 7.98% | 16.27% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Haryana State.

Table 5-11 : Per Capita Income Vs Car Haryana

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 106085 | 989519 | 5.03 | 6.00 | | |
| 2013 | 111780 | 1134616 | 5.05 | 6.05 | 5% | |
| 2014 | 119791 | 1278272 | 5.08 | 6.11 | 7% | |
| 2015 | 125032 | 1420621 | 5.10 | 6.15 | 4% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2016 | 137818 | 1711692 | 5.14 | 6.23 | 10% | |
| 2017 | 150241 | 1851788 | 5.18 | 6.27 | 9% | 7.23% |

Regression analysis of same is given in figure below.

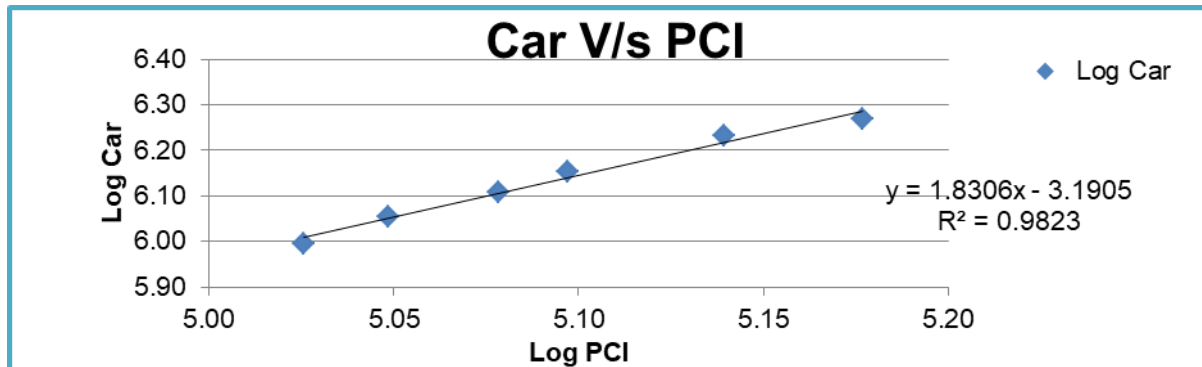


Figure 5-9: Regression and Elasticity PCI vs. Car-Extrapolation Haryana

Table 5-12 : Population Vs Bus Haryana

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 25351462 | 39153 | 7.40 | 4.59 | | |
| 2013 | 25751257 | 43456 | 7.41 | 4.64 | 2% | |
| 2014 | 26149236 | 46558 | 7.42 | 4.67 | 2% | |
| 2015 | 26545282 | 52640 | 7.42 | 4.72 | 2% | |
| 2016 | 26939286 | 55781 | 7.43 | 4.75 | 1% | |
| 2017 | 27331141 | 60129 | 7.44 | 4.78 | 1% | 1.52% |

Regression analysis of same is given in figure below.

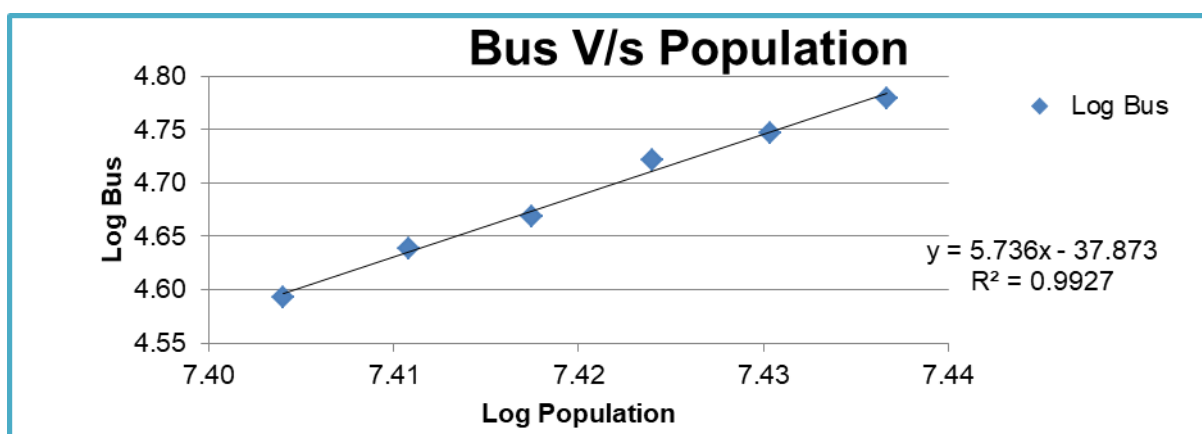


Figure 5-10: Regression and Elasticity Population vs. Bus - Extrapolation Haryana

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-13 : LCV Traffic Vs NSDP Haryana

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 271152 | 124897 | 5.43 | 5.10 | | |
| 2013 | 289756 | 137511 | 5.46 | 5.14 | 7% | |
| 2014 | 314931 | 152069 | 5.50 | 5.18 | 9% | |
| 2015 | 333359 | 167901 | 5.52 | 5.23 | 6% | |
| 2016 | 372659 | 182776 | 5.57 | 5.26 | 12% | |

The following figure depicts regression analysis and extrapolation.

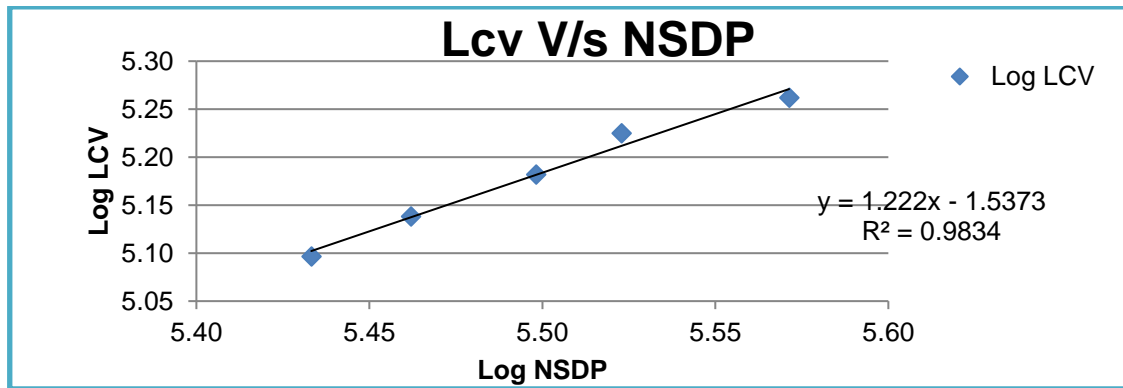


Figure 5-11: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Haryana.

Table 5-14 : Truck Traffic Vs NSDP Haryana

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 271152 | 292735 | 5.43 | 5.47 | | |
| 2013 | 289756 | 307509 | 5.46 | 5.49 | 7% | |
| 2014 | 314931 | 327882 | 5.50 | 5.52 | 9% | |
| 2015 | 333359 | 348732 | 5.52 | 5.54 | 6% | |
| 2016 | 372659 | 367730 | 5.57 | 5.57 | 12% | |
| 2017 | 412006 | 390321 | 5.61 | 5.59 | 11% | 8.75% |

The following figure depicts regression analysis and extrapolation.

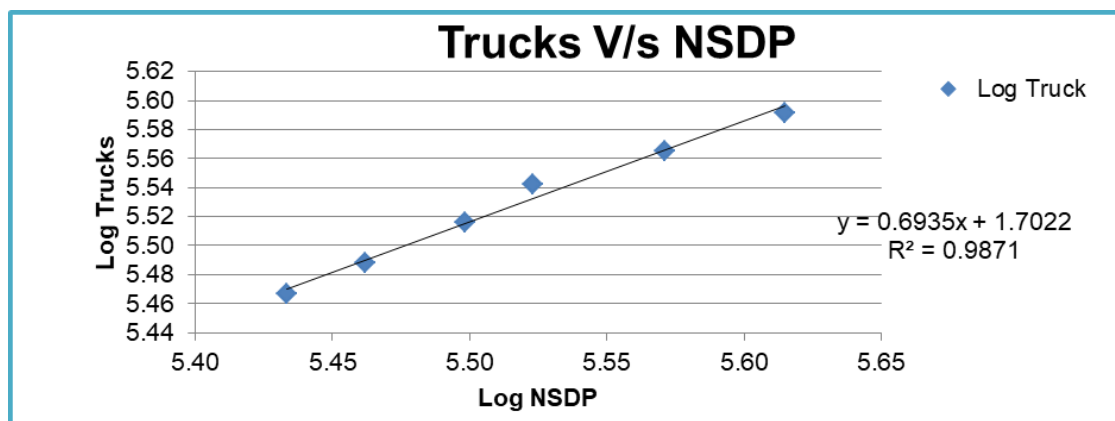


Figure 5-12: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Haryana.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-15 : Summary Regression Analysis Haryana

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------|------------------|----------------------|-------------------------|-------------------------|----------------------------|--------------------------|----------------------|-----------------|
| Haryana | Car/Jeep | PCI | $y = 1.8306x + -3.1905$ | R ² = 0.9823 | 1.8306 | 7.23% | 13.24% | Good Regression |
| | Bus | Population | $y = 5.736x - 37.8732$ | R ² = 0.9927 | 5.7360 | 1.52% | 8.69% | Good Regression |
| | LCV | NSDP | $y = 1.222x - 1.5373$ | R ² = 0.9834 | 1.2220 | 8.30% | 10.14% | Good Regression |
| | Truck | NSDP | $y = 0.6935x - 1.7022$ | R ² = 0.9871 | 0.6935 | 8.75% | 6.07% | Good Regression |

The economic model for predicting growth is a good tool, however other local, regional, and 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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Agra to Etawah has recently been commissioned and is under tolling operation since 2016-17. As traffic data is available with the project concessionaire of three years, we do not have sufficient data points to be able to establish a reliable past trend of traffic growth. Moreover, the part two years traffic is affected by COVID-19 impact. A minimum of about 5 -6 years' traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

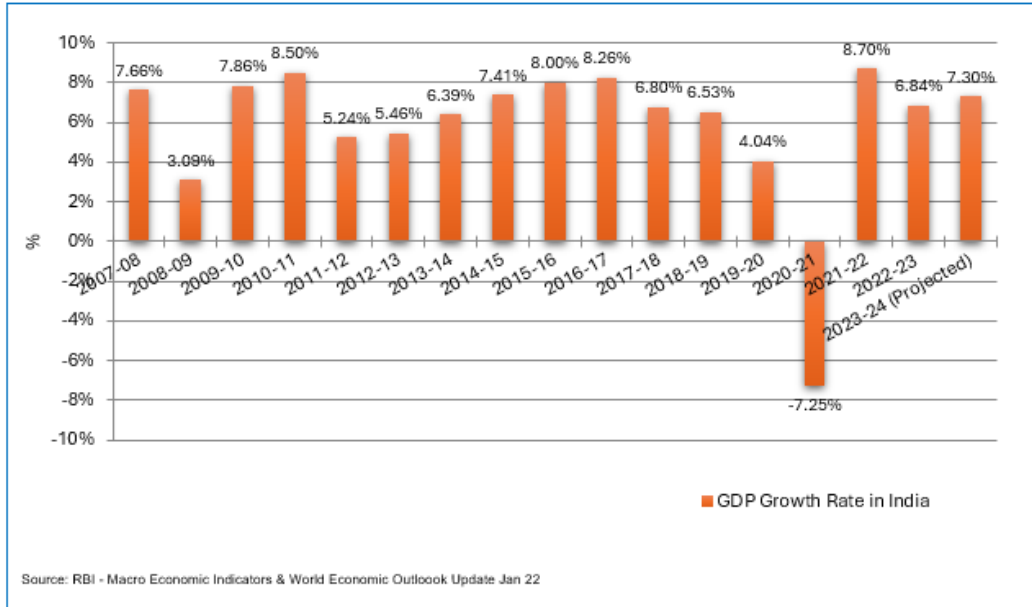


Figure 5-13 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

Though the growth of Delhi has been consistently below the national average economic growth, it is the largest state in terms of population and consumption driven demand for goods and services will remain significantly high. The rate of growth of NSDP also seems to be catching up with the national average over the years. Other regions in the influenced area states, namely Delhi, Haryana and Uttarakhand are all growing significantly faster than the national average. Considering the scenario, it may be assumed that the traffic

growth on the project highway would remain high and there are minimal risks in terms of growth.

Table 5-16 : GDP of India, UP and other important states

| Year | India (GDP) | Bihar | Haryana | Madhya Pradesh | Maharashtra | Odisha | Punjab | Rajasthan | Uttar Pradesh | Uttarakhand | West Bengal | Delhi |
|------------------|-------------|-------|---------|----------------|-------------|--------|--------|-----------|---------------|-------------|-------------|-------|
| 1980-81 | 12336 | 514 | 357 | 623 | 1464 | 529 | 504 | 560 | 1631 | 138 | 830 | 269 |
| 1981-82 | 13030 | 543 | 371 | 639 | 1498 | 528 | 551 | 607 | 1670 | 141 | 808 | 291 |
| 1982-83 | 13411 | 548 | 394 | 668 | 1556 | 497 | 568 | 620 | 1800 | 152 | 840 | 328 |
| 1983-84 | 14464 | 601 | 402 | 702 | 1654 | 597 | 578 | 761 | 1871 | 158 | 939 | 320 |
| 1984-85 | 15037 | 658 | 418 | 668 | 1675 | 569 | 623 | 706 | 1900 | 161 | 964 | 333 |
| 1985-86 | 15663 | 672 | 493 | 726 | 1807 | 635 | 670 | 704 | 1975 | 167 | 1005 | 386 |
| 1986-87 | 16339 | 725 | 493 | 694 | 1832 | 643 | 694 | 771 | 2060 | 174 | 1045 | 411 |
| 1987-88 | 16917 | 685 | 484 | 789 | 1955 | 623 | 730 | 718 | 2154 | 182 | 1101 | 447 |
| 1988-89 | 18635 | 772 | 602 | 847 | 2159 | 754 | 769 | 1014 | 2434 | 206 | 1148 | 486 |
| 1989-90 | 19778 | 759 | 610 | 865 | 2515 | 805 | 834 | 993 | 2502 | 212 | 1188 | 531 |
| 1990-91 | 20824 | 831 | 674 | 987 | 2629 | 668 | 849 | 1149 | 2651 | 224 | 1251 | 553 |
| 1991-92 | 21122 | 784 | 688 | 916 | 2620 | 753 | 888 | 1061 | 2662 | 225 | 1349 | 638 |
| 1992-93 | 22254 | 737 | 688 | 983 | 3017 | 740 | 930 | 1220 | 2690 | 228 | 1389 | 660 |
| 1993-94 | 23519 | 755 | 719 | 1088 | 3349 | 788 | 970 | 1121 | 2757 | 233 | 1490 | 705 |
| 1994-95 | 25023 | 842 | 771 | 1107 | 3414 | 826 | 995 | 1325 | 2901 | 254 | 1594 | 790 |
| 1995-96 | 26846 | 712 | 787 | 1174 | 3791 | 864 | 1032 | 1374 | 2995 | 251 | 1713 | 804 |
| 1996-97 | 28987 | 893 | 879 | 1252 | 3941 | 804 | 1107 | 1535 | 3327 | 267 | 1832 | 915 |
| 1997-98 | 30234 | 850 | 887 | 1318 | 4158 | 920 | 1137 | 1721 | 3292 | 270 | 1985 | 1063 |
| 1998-99 | 32255 | 904 | 934 | 1405 | 4324 | 948 | 1203 | 1797 | 3316 | 274 | 2112 | 1116 |
| 1999-00 | 34837 | 950 | 1002 | 1552 | 4735 | 1008 | 1267 | 1801 | 3440 | 274 | 2264 | 1170 |
| 2000-01 | 36282 | 1106 | 1081 | 1426 | 4589 | 982 | 1309 | 1743 | 3511 | 308 | 2343 | 1215 |
| 2001-02 | 38236 | 1043 | 1165 | 1528 | 4751 | 1042 | 1326 | 1941 | 3575 | 323 | 2512 | 1262 |
| 2002-03 | 39719 | 1175 | 1236 | 1449 | 5079 | 1034 | 1348 | 1708 | 3690 | 353 | 2600 | 1359 |
| 2003-04 | 42883 | 1099 | 1358 | 1611 | 5471 | 1185 | 1433 | 2251 | 3885 | 381 | 2753 | 1433 |
| 2004-05 | 45906 | 1238 | 1475 | 1664 | 5948 | 1340 | 1504 | 2196 | 4079 | 431 | 2936 | 1588 |
| 2005-06 | 50257 | 1207 | 1608 | 1748 | 6810 | 1399 | 1577 | 2344 | 4317 | 492 | 3121 | 1752 |
| 2006-07 | 55066 | 1416 | 1791 | 1907 | 7748 | 1574 | 1748 | 2620 | 4660 | 551 | 3366 | 1969 |
| 2007-08 | 60199 | 1489 | 1931 | 1997 | 8650 | 1708 | 1899 | 2739 | 4959 | 648 | 3627 | 2191 |
| 2008-09 | 64248 | 1716 | 2080 | 2250 | 8786 | 1837 | 2004 | 2969 | 5336 | 716 | 3774 | 2464 |
| 2009-10 | 69769 | 1798 | 2340 | 2463 | 9634 | 1852 | 2132 | 3142 | 5668 | 839 | 4067 | 2667 |
| 2010-11 | 75987 | 2073 | 2498 | 2592 | 10732 | 1968 | 2270 | 3614 | 6120 | 927 | 4313 | 2888 |
| 2011-12 | 81069 | 2285 | 2712 | 2824 | 11222 | 2042 | 2392 | 3953 | 6451 | 1020 | 4471 | 3147 |
| 2012-13 | 85463 | 2369 | 2894 | 3069 | 11842 | 2163 | 2518 | 4098 | 6736 | 1095 | 4838 | 3342 |
| 2013-14 | 90636 | 2469 | 3142 | 3226 | 12671 | 2331 | 2675 | 4343 | 7075 | 1178 | 5247 | 3565 |
| 2014-15 | 97121 | 2557 | 3314 | 3394 | 13322 | 2359 | 2777 | 4656 | 7297 | 1257 | 5633 | 3882 |
| 2015-16 | 105033 | 2749 | 3612 | 3597 | 14417 | 2557 | 2926 | 4981 | 7894 | 1355 | - | 4291 |
| 2016-17 | 112476 | 3033 | 3927 | 4129 | 15744 | 2828 | 3095 | 5352 | 8457 | 1448 | - | 4658 |
| 2017-18 | 119762 | - | - | 4432 | - | 3029 | - | 5736 | 9011 | 1547 | - | 5035 |
| Growth 1981-2018 | 6.34 | 5.05 | 6.88 | 5.44 | 6.82 | 4.83 | 5.17 | 6.49 | 4.73 | 6.75 | 5.79 | 8.24 |
| Growth 1994-2018 | 7.02 | 6.23 | 7.66 | 6.03 | 6.96 | 5.77 | 5.17 | 7.04 | 5.06 | 8.20 | 6.54 | 8.53 |
| Growth 2000-2018 | 7.10 | 7.07 | 8.37 | 6.00 | 7.32 | 6.30 | 5.40 | 6.65 | 5.50 | 10.10 | 6.27 | 8.45 |

5.7 Industrial Units along Project Corridor

There are a number of big and small industrial units along the project corridor. The following figure shows some of these along corridors.

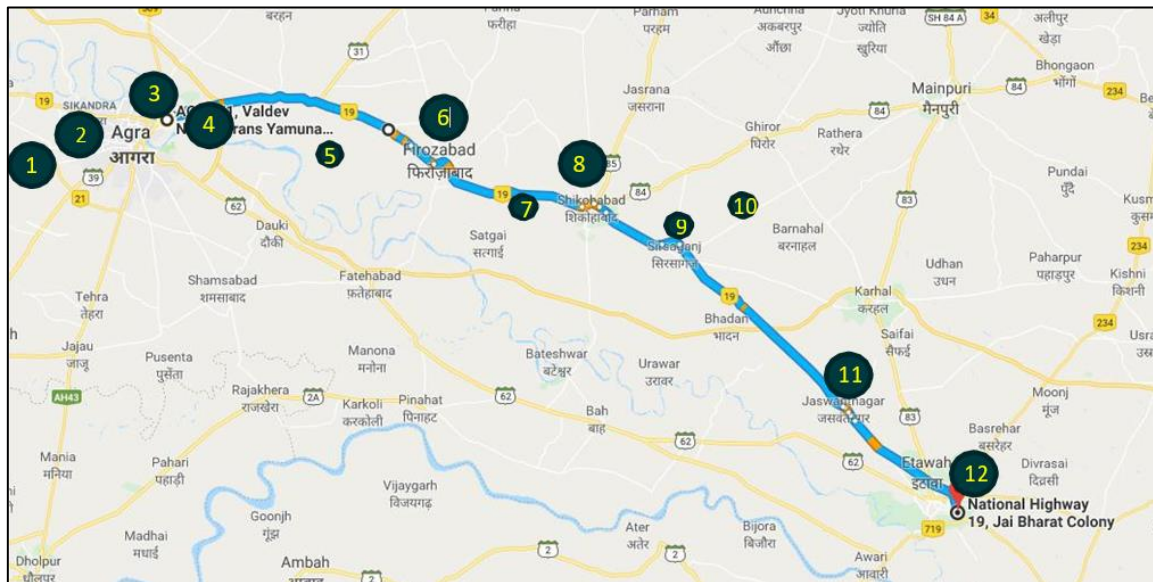


Figure 5-14 : Industrial Units along project corridor.

The following is the list of industrial units along the project corridor.

1. Leather Park, **Agra**
2. Export Promotional Industrial Park (EPIP)
3. Foundry Nagar (BK Casting, Agricultural Industries, Paint Industries, Plastic Industries, Metal Industries), **Agra**
4. Industrial Estate, **Agra**
5. Agarbatti Industry
6. Glass Industries, **Firozabad**
7. Pipe Industries, Glass Bulb Industries
8. Agro Industries, Glass Industries, Cold Storage
9. Food Processing Industries
10. PVC Pipe Industries
11. Rural Industrial Estate, **Jaswant Nagar**
12. **Etawah**(Caplock Industries Private Limited, Rice Mills)

Such industries along project corridor and urban development around major cities of Firozabad, Tundla, Shikohabad, Jaswantnagar and Wtawah provide impetus to project traffic on corridor.

5.8 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 below. The rate of growth is moderate in light of overall regional trends. 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, the rate of growth diminishes. Same growth rate is not sustainable for long. Hence growth rates have been suitably stepped down in future years.

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

5.8.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-17 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.96% | 8.75% | 8.71% | 7.42% | 6.23% | 5.15% |
| Bus | 4.86% | 4.70% | 4.68% | 3.29% | 2.58% | 1.95% |
| LCV | 5.91% | 5.71% | 5.65% | 4.63% | 3.71% | 3.16% |
| 2- Axle | 6.25% | 6.07% | 6.01% | 5.06% | 4.20% | 3.42% |
| 3 - Axle | 6.59% | 6.39% | 6.33% | 5.32% | 4.41% | 3.59% |
| 4 to 6 Axle | 6.93% | 6.72% | 6.64% | 5.58% | 4.62% | 3.76% |
| 7 and Above Axle | 6.93% | 6.72% | 6.64% | 5.58% | 4.62% | 3.76% |

Table 5-18 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.46% | 8.25% | 8.21% | 6.92% | 5.73% | 4.65% |
| Bus | 4.36% | 4.20% | 4.18% | 2.79% | 2.08% | 1.45% |
| LCV | 5.41% | 5.21% | 5.15% | 4.13% | 3.21% | 2.66% |
| 2- Axle | 5.75% | 5.57% | 5.51% | 4.56% | 3.70% | 2.92% |
| 3 - Axle | 6.09% | 5.89% | 5.83% | 4.82% | 3.91% | 3.09% |
| 4 to 6 Axle | 6.43% | 6.22% | 6.14% | 5.08% | 4.12% | 3.26% |
| 7 and Above Axle | 6.43% | 6.22% | 6.14% | 5.08% | 4.12% | 3.26% |

Table 5-19 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.71% | 8.50% | 8.46% | 7.17% | 5.98% | 4.90% |
| Bus | 4.61% | 4.45% | 4.43% | 3.04% | 2.33% | 1.70% |
| LCV | 5.66% | 5.46% | 5.40% | 4.38% | 3.46% | 2.91% |
| 2- Axle | 6.00% | 5.82% | 5.76% | 4.81% | 3.95% | 3.17% |
| 3 - Axle | 6.34% | 6.14% | 6.08% | 5.07% | 4.16% | 3.34% |
| 4 to 6 Axle | 6.68% | 6.47% | 6.39% | 5.33% | 4.37% | 3.51% |
| 7 and Above Axle | 6.68% | 6.47% | 6.39% | 5.33% | 4.37% | 3.51% |

With completion of project corridor and removal of bottlenecks as discussed in previous chapter, certain part of traffic would return to project road which had started using Agra - Lucknow Expressway as preferred route. This also has been considered while estimating future traffic and revenue on project road.

Traffic and revenue have been worked out on the basis of the above growths and some are presented in subsequent chapters of report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 224.95 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 9575 | 1067 | 1328 | 1957 | 879 | 2764 | 10 | 17580 | 36151 |
| 2024-25 | 10434 | 1131 | 1394 | 2079 | 937 | 2955 | 11 | 18941 | 38708 |
| 2025-26 | 11347 | 1196 | 1459 | 2205 | 997 | 3153 | 11 | 20368 | 41362 |
| 2026-27 | 12340 | 1264 | 1528 | 2339 | 1060 | 3365 | 11 | 21907 | 44209 |
| 2027-28 | 13419 | 1336 | 1599 | 2481 | 1127 | 3591 | 11 | 23564 | 47253 |
| 2028-29 | 14593 | 1412 | 1674 | 2631 | 1199 | 3832 | 11 | 25352 | 50517 |
| 2029-30 | 15870 | 1492 | 1752 | 2791 | 1276 | 4090 | 11 | 27282 | 54020 |
| 2030-31 | 17252 | 1576 | 1834 | 2959 | 1356 | 4361 | 11 | 29349 | 57737 |
| 2031-32 | 18755 | 1665 | 1920 | 3137 | 1441 | 4651 | 11 | 31580 | 61726 |
| 2032-33 | 20387 | 1759 | 2009 | 3326 | 1532 | 4960 | 11 | 33984 | 65996 |
| 2033-34 | 22162 | 1858 | 2102 | 3526 | 1628 | 5290 | 11 | 36577 | 70572 |
| 2034-35 | 24092 | 1962 | 2200 | 3738 | 1730 | 5642 | 11 | 39375 | 75478 |
| 2035-36 | 25879 | 2052 | 2272 | 3927 | 1821 | 5957 | 11 | 41919 | 79873 |
| 2036-37 | 27799 | 2147 | 2347 | 4125 | 1917 | 6289 | 11 | 44635 | 84537 |
| 2037-38 | 29863 | 2246 | 2424 | 4334 | 2019 | 6641 | 11 | 47538 | 89497 |
| 2038-39 | 32080 | 2350 | 2504 | 4554 | 2126 | 7012 | 11 | 50637 | 94761 |
| 2039-40 | 34460 | 2458 | 2586 | 4784 | 2239 | 7404 | 11 | 53942 | 100342 |
| 2040-41 | 36608 | 2549 | 2652 | 4985 | 2337 | 7746 | 11 | 56888 | 105260 |
| 2041-42 | 38891 | 2644 | 2721 | 5194 | 2439 | 8104 | 11 | 60004 | 110437 |
| 2042-43 | 41316 | 2742 | 2791 | 5412 | 2546 | 8479 | 11 | 63297 | 115881 |
| 2043-44 | 43892 | 2843 | 2863 | 5639 | 2658 | 8871 | 11 | 66777 | 121606 |
| 2044-45 | 46629 | 2948 | 2937 | 5876 | 2775 | 9281 | 11 | 70457 | 127629 |
| 2045-46 | 49031 | 3041 | 2994 | 6077 | 2875 | 9629 | 11 | 73658 | 132811 |

Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 285.20 KM**(Optimistic Growth Scenario)**

| Year | Car | Minibuses /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|----------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3525 | 742 | 559 | 1532 | 826 | 2685 | 10 | 9880 | 25521 |
| 2024-25 | 3842 | 786 | 586 | 1627 | 881 | 2871 | 11 | 10604 | 27272 |
| 2025-26 | 4179 | 830 | 613 | 1726 | 938 | 3064 | 11 | 11361 | 29093 |
| 2026-27 | 4544 | 877 | 641 | 1831 | 998 | 3270 | 11 | 12172 | 31034 |
| 2027-28 | 4941 | 926 | 671 | 1942 | 1061 | 3489 | 11 | 13041 | 33102 |
| 2028-29 | 5373 | 978 | 702 | 2060 | 1129 | 3723 | 11 | 13976 | 35316 |
| 2029-30 | 5842 | 1034 | 735 | 2185 | 1201 | 3973 | 11 | 14981 | 37684 |
| 2030-31 | 6350 | 1092 | 769 | 2316 | 1277 | 4237 | 11 | 16052 | 40190 |
| 2031-32 | 6902 | 1153 | 805 | 2455 | 1358 | 4518 | 11 | 17202 | 42866 |
| 2032-33 | 7503 | 1218 | 842 | 2603 | 1444 | 4818 | 11 | 18439 | 45728 |
| 2033-34 | 8157 | 1287 | 881 | 2759 | 1535 | 5138 | 11 | 19768 | 48783 |
| 2034-35 | 8867 | 1360 | 922 | 2924 | 1632 | 5479 | 11 | 21195 | 52046 |
| 2035-36 | 9525 | 1422 | 952 | 3072 | 1719 | 5785 | 11 | 22486 | 54969 |
| 2036-37 | 10231 | 1487 | 983 | 3228 | 1810 | 6108 | 11 | 23858 | 58060 |
| 2037-38 | 10990 | 1556 | 1015 | 3391 | 1907 | 6449 | 11 | 25319 | 61333 |
| 2038-39 | 11805 | 1628 | 1048 | 3562 | 2008 | 6809 | 11 | 26871 | 64791 |
| 2039-40 | 12680 | 1703 | 1082 | 3743 | 2115 | 7189 | 11 | 28523 | 68455 |
| 2040-41 | 13470 | 1766 | 1110 | 3900 | 2208 | 7521 | 11 | 29986 | 71667 |
| 2041-42 | 14309 | 1831 | 1138 | 4064 | 2305 | 7869 | 11 | 31527 | 75037 |
| 2042-43 | 15200 | 1899 | 1168 | 4234 | 2406 | 8232 | 11 | 33150 | 78566 |
| 2043-44 | 16147 | 1969 | 1198 | 4411 | 2512 | 8613 | 11 | 34861 | 82272 |
| 2044-45 | 17153 | 2042 | 1229 | 4596 | 2623 | 9011 | 11 | 36665 | 86159 |
| 2045-46 | 18036 | 2107 | 1253 | 4753 | 2717 | 9350 | 11 | 38227 | 89490 |

Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 224.95 KM**(Pessimistic Growth Scenario)**

| Year | Car | Minibuses /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|----------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 9575 | 1067 | 1328 | 1957 | 879 | 2764 | 10 | 17580 | 36151 |
| 2024-25 | 10386 | 1125 | 1386 | 2069 | 933 | 2941 | 11 | 18851 | 38522 |
| 2025-26 | 11243 | 1184 | 1444 | 2185 | 988 | 3124 | 11 | 20179 | 40978 |
| 2026-27 | 12170 | 1246 | 1504 | 2307 | 1046 | 3319 | 11 | 21603 | 43595 |
| 2027-28 | 13174 | 1311 | 1567 | 2436 | 1107 | 3526 | 11 | 23132 | 46387 |
| 2028-29 | 14261 | 1379 | 1632 | 2572 | 1171 | 3745 | 11 | 24771 | 49357 |
| 2029-30 | 15437 | 1450 | 1701 | 2716 | 1239 | 3978 | 11 | 26532 | 52531 |
| 2030-31 | 16704 | 1524 | 1772 | 2866 | 1311 | 4223 | 11 | 28411 | 55890 |
| 2031-32 | 18076 | 1602 | 1846 | 3024 | 1386 | 4482 | 11 | 30427 | 59466 |
| 2032-33 | 19561 | 1684 | 1923 | 3190 | 1466 | 4757 | 11 | 32592 | 63280 |
| 2033-34 | 21167 | 1770 | 2003 | 3366 | 1551 | 5049 | 11 | 34917 | 67352 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2034-35 | 22904 | 1861 | 2086 | 3551 | 1641 | 5359 | 11 | 37413 | 71695 |
| 2035-36 | 24490 | 1938 | 2144 | 3713 | 1720 | 5632 | 11 | 39648 | 75522 |
| 2036-37 | 26185 | 2018 | 2204 | 3882 | 1803 | 5918 | 11 | 42021 | 79560 |
| 2037-38 | 27996 | 2101 | 2265 | 4059 | 1889 | 6219 | 11 | 44540 | 83822 |
| 2038-39 | 29933 | 2187 | 2328 | 4244 | 1980 | 6535 | 11 | 47218 | 88327 |
| 2039-40 | 32005 | 2277 | 2393 | 4437 | 2075 | 6867 | 11 | 50065 | 93087 |
| 2040-41 | 33840 | 2350 | 2442 | 4601 | 2156 | 7149 | 11 | 52549 | 97182 |
| 2041-42 | 35780 | 2425 | 2492 | 4771 | 2240 | 7444 | 11 | 55163 | 101474 |
| 2042-43 | 37832 | 2502 | 2544 | 4948 | 2327 | 7751 | 11 | 57915 | 105971 |
| 2043-44 | 40002 | 2582 | 2597 | 5131 | 2418 | 8070 | 11 | 60811 | 110678 |
| 2044-45 | 42296 | 2665 | 2651 | 5320 | 2513 | 8402 | 11 | 63858 | 115604 |
| 2045-46 | 44262 | 2736 | 2689 | 5476 | 2591 | 8676 | 11 | 66441 | 119726 |

**Table 6-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 285.20KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3525 | 742 | 559 | 1532 | 826 | 2685 | 10 | 9880 | 25521 |
| 2024-25 | 3823 | 782 | 582 | 1620 | 877 | 2858 | 11 | 10553 | 27144 |
| 2025-26 | 4138 | 822 | 606 | 1710 | 928 | 3036 | 11 | 11251 | 28815 |
| 2026-27 | 4479 | 865 | 631 | 1806 | 982 | 3225 | 11 | 11999 | 30596 |
| 2027-28 | 4848 | 909 | 658 | 1906 | 1040 | 3426 | 11 | 12798 | 32490 |
| 2028-29 | 5247 | 956 | 686 | 2012 | 1101 | 3639 | 11 | 13652 | 34503 |
| 2029-30 | 5680 | 1005 | 714 | 2124 | 1165 | 3865 | 11 | 14564 | 36639 |
| 2030-31 | 6145 | 1057 | 744 | 2241 | 1233 | 4102 | 11 | 15533 | 38893 |
| 2031-32 | 6648 | 1111 | 775 | 2365 | 1305 | 4354 | 11 | 16569 | 41292 |
| 2032-33 | 7193 | 1168 | 807 | 2495 | 1381 | 4621 | 11 | 17676 | 43838 |
| 2033-34 | 7782 | 1228 | 841 | 2632 | 1461 | 4905 | 11 | 18860 | 46548 |
| 2034-35 | 8421 | 1291 | 876 | 2777 | 1545 | 5206 | 11 | 20127 | 49428 |
| 2035-36 | 9003 | 1344 | 900 | 2903 | 1619 | 5471 | 11 | 21251 | 51954 |
| 2036-37 | 9627 | 1400 | 925 | 3035 | 1697 | 5749 | 11 | 22444 | 54618 |
| 2037-38 | 10294 | 1457 | 950 | 3173 | 1779 | 6041 | 11 | 23705 | 57420 |
| 2038-39 | 11006 | 1517 | 977 | 3318 | 1864 | 6348 | 11 | 25041 | 60374 |
| 2039-40 | 11768 | 1579 | 1004 | 3469 | 1954 | 6670 | 11 | 26455 | 63482 |
| 2040-41 | 12443 | 1630 | 1025 | 3598 | 2031 | 6945 | 11 | 27683 | 66152 |
| 2041-42 | 13157 | 1682 | 1046 | 3731 | 2110 | 7231 | 11 | 28968 | 68930 |
| 2042-43 | 13911 | 1735 | 1068 | 3869 | 2192 | 7529 | 11 | 30315 | 71831 |
| 2043-44 | 14709 | 1791 | 1090 | 4012 | 2277 | 7840 | 11 | 31730 | 74862 |
| 2044-45 | 15553 | 1848 | 1112 | 4161 | 2366 | 8164 | 11 | 33215 | 78030 |
| 2045-46 | 16277 | 1897 | 1128 | 4283 | 2439 | 8430 | 11 | 34465 | 80657 |

Traffic projections for Most Likely scenario is given as under

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 1-Tundla- Chainage 224.95 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 9575 | 1067 | 1328 | 1957 | 879 | 2764 | 10 | 17580 | 36151 |
| 2024-25 | 10411 | 1128 | 1390 | 2073 | 935 | 2948 | 11 | 18896 | 38613 |
| 2025-26 | 11296 | 1190 | 1451 | 2194 | 992 | 3139 | 11 | 20273 | 41167 |
| 2026-27 | 12257 | 1255 | 1515 | 2322 | 1053 | 3342 | 11 | 21755 | 43898 |
| 2027-28 | 13299 | 1323 | 1582 | 2458 | 1117 | 3559 | 11 | 23349 | 46820 |
| 2028-29 | 14430 | 1395 | 1652 | 2602 | 1185 | 3789 | 11 | 25064 | 49940 |
| 2029-30 | 15657 | 1471 | 1725 | 2754 | 1257 | 4034 | 11 | 26909 | 53274 |
| 2030-31 | 16982 | 1550 | 1801 | 2913 | 1332 | 4292 | 11 | 28881 | 56809 |
| 2031-32 | 18418 | 1633 | 1881 | 3081 | 1412 | 4566 | 11 | 31002 | 60586 |
| 2032-33 | 19975 | 1721 | 1964 | 3258 | 1497 | 4858 | 11 | 33284 | 64624 |
| 2033-34 | 21664 | 1813 | 2051 | 3446 | 1587 | 5168 | 11 | 35740 | 68941 |
| 2034-35 | 23496 | 1911 | 2142 | 3645 | 1683 | 5498 | 11 | 38386 | 73563 |
| 2035-36 | 25180 | 1994 | 2207 | 3821 | 1768 | 5791 | 11 | 40772 | 77668 |
| 2036-37 | 26985 | 2081 | 2273 | 4005 | 1857 | 6100 | 11 | 43312 | 82011 |
| 2037-38 | 28920 | 2172 | 2342 | 4197 | 1951 | 6425 | 11 | 46018 | 86610 |
| 2038-39 | 30993 | 2267 | 2413 | 4398 | 2049 | 6768 | 11 | 48899 | 91479 |
| 2039-40 | 33216 | 2366 | 2486 | 4610 | 2152 | 7129 | 11 | 51970 | 96639 |
| 2040-41 | 35205 | 2448 | 2544 | 4792 | 2241 | 7441 | 11 | 54682 | 101142 |
| 2041-42 | 37312 | 2533 | 2603 | 4981 | 2333 | 7766 | 11 | 57539 | 105859 |
| 2042-43 | 39545 | 2621 | 2663 | 5177 | 2430 | 8106 | 11 | 60553 | 110813 |
| 2043-44 | 41911 | 2712 | 2725 | 5381 | 2531 | 8460 | 11 | 63731 | 116010 |
| 2044-45 | 44420 | 2806 | 2789 | 5593 | 2636 | 8830 | 11 | 67085 | 121468 |
| 2045-46 | 46597 | 2888 | 2837 | 5770 | 2724 | 9139 | 11 | 69966 | 126097 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Gurau - Chainage 285.20 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3525 | 742 | 559 | 1532 | 826 | 2685 | 10 | 9880 | 25521 |
| 2024-25 | 3833 | 784 | 584 | 1623 | 879 | 2865 | 11 | 10579 | 27209 |
| 2025-26 | 4159 | 827 | 609 | 1717 | 932 | 3050 | 11 | 11305 | 28948 |
| 2026-27 | 4512 | 872 | 636 | 1817 | 989 | 3247 | 11 | 12084 | 30807 |
| 2027-28 | 4895 | 919 | 664 | 1923 | 1050 | 3457 | 11 | 12919 | 32791 |
| 2028-29 | 5310 | 968 | 694 | 2035 | 1114 | 3681 | 11 | 13813 | 34905 |
| 2029-30 | 5761 | 1020 | 725 | 2153 | 1182 | 3919 | 11 | 14771 | 37156 |
| 2030-31 | 6248 | 1075 | 757 | 2277 | 1254 | 4170 | 11 | 15792 | 39539 |
| 2031-32 | 6775 | 1132 | 791 | 2408 | 1330 | 4436 | 11 | 16883 | 42072 |
| 2032-33 | 7348 | 1193 | 826 | 2546 | 1411 | 4720 | 11 | 18055 | 44776 |
| 2033-34 | 7970 | 1257 | 863 | 2692 | 1497 | 5021 | 11 | 19311 | 47656 |
| 2034-35 | 8644 | 1325 | 901 | 2847 | 1588 | 5342 | 11 | 20658 | 50728 |
| 2035-36 | 9264 | 1382 | 928 | 2984 | 1668 | 5627 | 11 | 21864 | 53448 |
| 2036-37 | 9928 | 1442 | 956 | 3128 | 1752 | 5927 | 11 | 23144 | 56320 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2037-38 | 10640 | 1504 | 985 | 3278 | 1841 | 6244 | 11 | 24503 | 59356 |
| 2038-39 | 11402 | 1570 | 1015 | 3436 | 1934 | 6577 | 11 | 25945 | 62558 |
| 2039-40 | 12219 | 1639 | 1046 | 3601 | 2032 | 6928 | 11 | 27476 | 65940 |
| 2040-41 | 12951 | 1696 | 1070 | 3743 | 2116 | 7231 | 11 | 28818 | 68871 |
| 2041-42 | 13725 | 1754 | 1095 | 3891 | 2204 | 7548 | 11 | 30228 | 71942 |
| 2042-43 | 14546 | 1815 | 1120 | 4044 | 2295 | 7878 | 11 | 31709 | 75146 |
| 2043-44 | 15416 | 1877 | 1146 | 4203 | 2390 | 8223 | 11 | 33266 | 78502 |
| 2044-45 | 16339 | 1942 | 1173 | 4369 | 2489 | 8583 | 11 | 34906 | 82018 |
| 2045-46 | 17139 | 1998 | 1192 | 4507 | 2572 | 8884 | 11 | 36303 | 84977 |

6.2 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 Agra-Etawah project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2025

Target Traffic - 52995 PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. The probable extension of the concession period is estimated according to article 29 of the concession agreement which comes to about 5 years. Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2025 | 52995 | 35107 | -34% | 51% | 20% | 24 | 4.8 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2025 | 52995 | 35280 | -33% | 50% | 20% | 24 | 4.8 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2025 | 52995 | 34941 | -34% | 51% | 20% | 24 | 4.8 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Surat-Dahisar section of NH-8 is based on the old toll policy. As per the Toll Notification (Schedule -G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued at fee 50 time the single journey fee at 2/3rd Rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: Local Car Jeep Van -Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza). Additionally, local commercial vehicles are charged at 50% rate of single journey.

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) 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 years 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.

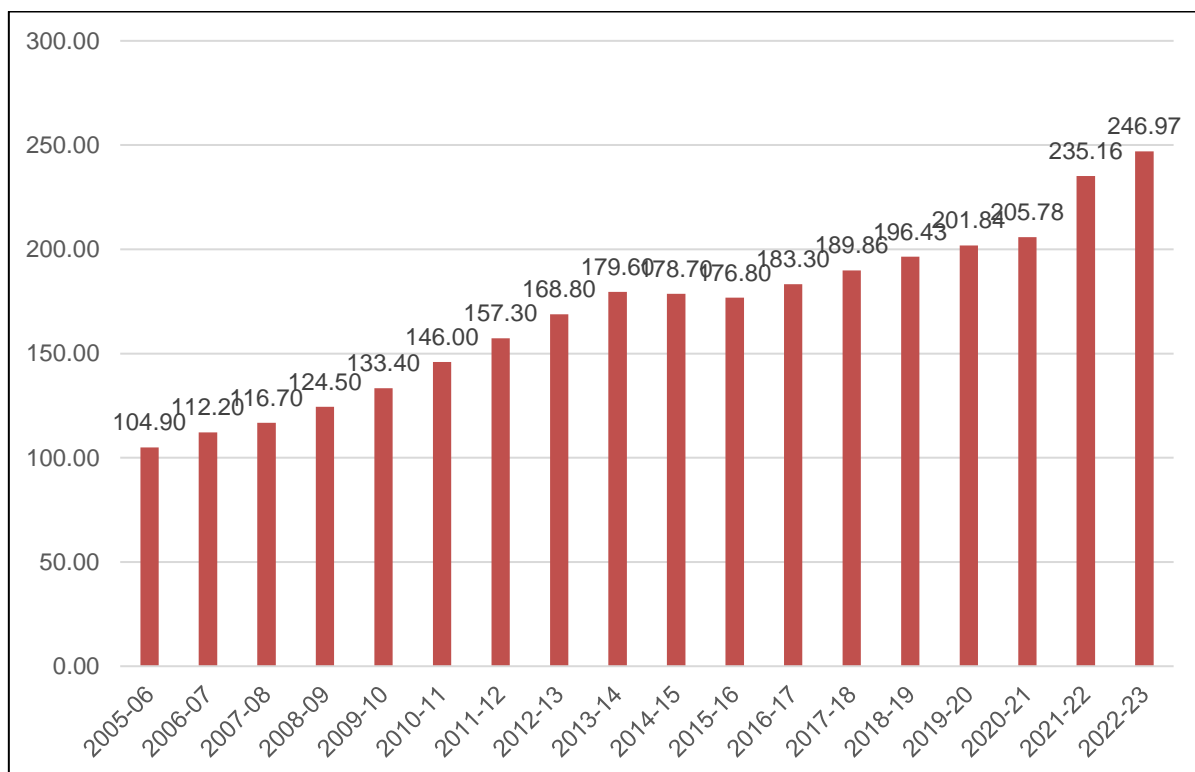


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

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

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

Table 7-2 : Toll Rates for Single Journey@ Km 224.95

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2023-24 | 105 | 170 | 355 | 355 | 385 | 555 | 675 |
| 2024-25 | 105 | 175 | 365 | 365 | 395 | 570 | 695 |
| 2025-26 | 115 | 180 | 380 | 380 | 415 | 600 | 730 |
| 2026-27 | 120 | 190 | 400 | 400 | 435 | 630 | 765 |
| 2027-28 | 125 | 200 | 420 | 420 | 460 | 660 | 805 |
| 2028-29 | 130 | 210 | 440 | 440 | 485 | 695 | 845 |
| 2029-30 | 135 | 220 | 465 | 465 | 505 | 730 | 890 |
| 2030-31 | 145 | 235 | 490 | 490 | 535 | 765 | 935 |
| 2031-32 | 150 | 245 | 515 | 515 | 560 | 805 | 980 |
| 2032-33 | 160 | 260 | 540 | 540 | 590 | 850 | 1035 |
| 2033-34 | 170 | 270 | 570 | 570 | 620 | 890 | 1085 |
| 2034-35 | 175 | 285 | 600 | 600 | 655 | 940 | 1145 |
| 2035-36 | 185 | 300 | 630 | 630 | 690 | 990 | 1205 |
| 2036-37 | 195 | 315 | 665 | 665 | 725 | 1040 | 1265 |
| 2037-38 | 205 | 335 | 700 | 700 | 760 | 1095 | 1335 |
| 2038-39 | 215 | 350 | 735 | 735 | 805 | 1155 | 1405 |
| 2039-40 | 230 | 370 | 775 | 775 | 845 | 1215 | 1480 |
| 2040-41 | 240 | 390 | 815 | 815 | 890 | 1280 | 1560 |
| 2041-42 | 255 | 410 | 860 | 860 | 940 | 1350 | 1645 |
| 2042-43 | 270 | 435 | 905 | 905 | 990 | 1425 | 1730 |
| 2043-44 | 285 | 455 | 955 | 955 | 1045 | 1500 | 1825 |
| 2044-45 | 300 | 480 | 1010 | 1010 | 1100 | 1580 | 1925 |
| 2045-46 | 315 | 510 | 1065 | 1065 | 1160 | 1670 | 2030 |

Table 7-3 : Toll Rates for Single Journey @ Km 285.20

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|---------|------------|--------------------|
| 2023-24 | 110 | 180 | 380 | 380 | 415 | 600 | 730 |
| 2024-25 | 115 | 185 | 390 | 390 | 425 | 615 | 750 |
| 2025-26 | 120 | 195 | 410 | 410 | 450 | 645 | 785 |
| 2026-27 | 125 | 205 | 430 | 430 | 470 | 680 | 825 |
| 2027-28 | 130 | 215 | 455 | 455 | 495 | 710 | 865 |
| 2028-29 | 140 | 230 | 475 | 475 | 520 | 750 | 910 |
| 2029-30 | 145 | 240 | 500 | 500 | 545 | 785 | 960 |
| 2030-31 | 155 | 250 | 525 | 525 | 575 | 825 | 1005 |
| 2031-32 | 160 | 265 | 555 | 555 | 605 | 870 | 1060 |
| 2032-33 | 170 | 280 | 585 | 585 | 635 | 915 | 1115 |
| 2033-34 | 180 | 295 | 615 | 615 | 670 | 965 | 1170 |
| 2034-35 | 190 | 310 | 645 | 645 | 705 | 1015 | 1235 |
| 2035-36 | 200 | 325 | 680 | 680 | 740 | 1065 | 1300 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2036-37 | 210 | 340 | 715 | 715 | 780 | 1125 | 1365 |
| 2037-38 | 220 | 360 | 755 | 755 | 820 | 1180 | 1440 |
| 2038-39 | 230 | 380 | 795 | 795 | 865 | 1245 | 1515 |
| 2039-40 | 245 | 400 | 835 | 835 | 910 | 1310 | 1595 |
| 2040-41 | 255 | 420 | 880 | 880 | 960 | 1380 | 1680 |
| 2041-42 | 270 | 445 | 930 | 930 | 1015 | 1455 | 1775 |
| 2042-43 | 285 | 465 | 980 | 980 | 1070 | 1535 | 1870 |
| 2043-44 | 300 | 495 | 1030 | 1030 | 1125 | 1620 | 1970 |
| 2044-45 | 315 | 520 | 1090 | 1090 | 1185 | 1705 | 2080 |
| 2045-46 | 335 | 550 | 1150 | 1150 | 1250 | 1800 | 2190 |

Table 7-4 : Toll Rates for Return Journey @ Km 224.95

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2023-24 | 155 | 255 | 530 | 530 | 580 | 835 | 1015 |
| 2024-25 | 160 | 260 | 545 | 545 | 595 | 855 | 1040 |
| 2025-26 | 170 | 275 | 570 | 570 | 625 | 895 | 1090 |
| 2026-27 | 180 | 285 | 600 | 600 | 655 | 940 | 1145 |
| 2027-28 | 185 | 300 | 630 | 630 | 690 | 990 | 1205 |
| 2028-29 | 195 | 315 | 665 | 665 | 725 | 1040 | 1265 |
| 2029-30 | 205 | 335 | 700 | 700 | 760 | 1095 | 1330 |
| 2030-31 | 215 | 350 | 735 | 735 | 800 | 1150 | 1400 |
| 2031-32 | 230 | 370 | 770 | 770 | 840 | 1210 | 1470 |
| 2032-33 | 240 | 385 | 810 | 810 | 885 | 1270 | 1550 |
| 2033-34 | 250 | 405 | 855 | 855 | 930 | 1340 | 1630 |
| 2034-35 | 265 | 430 | 900 | 900 | 980 | 1410 | 1715 |
| 2035-36 | 280 | 450 | 945 | 945 | 1030 | 1485 | 1805 |
| 2036-37 | 295 | 475 | 995 | 995 | 1085 | 1560 | 1900 |
| 2037-38 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2000 |
| 2038-39 | 325 | 525 | 1105 | 1105 | 1205 | 1730 | 2105 |
| 2039-40 | 345 | 555 | 1165 | 1165 | 1270 | 1825 | 2220 |
| 2040-41 | 360 | 585 | 1225 | 1225 | 1335 | 1920 | 2340 |
| 2041-42 | 380 | 615 | 1290 | 1290 | 1410 | 2025 | 2465 |
| 2042-43 | 400 | 650 | 1360 | 1360 | 1485 | 2135 | 2600 |
| 2043-44 | 425 | 685 | 1435 | 1435 | 1565 | 2250 | 2740 |
| 2044-45 | 445 | 720 | 1515 | 1515 | 1650 | 2375 | 2890 |
| 2045-46 | 470 | 760 | 1595 | 1595 | 1740 | 2505 | 3045 |

Table 7-5 : Toll Rates for Return Journey @ Km 285.20

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2023-24 | 165 | 275 | 575 | 575 | 625 | 900 | 1095 |
| 2024-25 | 170 | 280 | 585 | 585 | 640 | 920 | 1120 |
| 2025-26 | 180 | 295 | 615 | 615 | 675 | 970 | 1180 |
| 2026-27 | 190 | 310 | 650 | 650 | 705 | 1015 | 1235 |
| 2027-28 | 195 | 325 | 680 | 680 | 745 | 1070 | 1300 |
| 2028-29 | 210 | 340 | 715 | 715 | 780 | 1120 | 1365 |
| 2029-30 | 220 | 360 | 750 | 750 | 820 | 1180 | 1435 |
| 2030-31 | 230 | 380 | 790 | 790 | 865 | 1240 | 1510 |
| 2031-32 | 240 | 395 | 830 | 830 | 910 | 1305 | 1590 |
| 2032-33 | 255 | 420 | 875 | 875 | 955 | 1370 | 1670 |
| 2033-34 | 265 | 440 | 920 | 920 | 1005 | 1445 | 1760 |
| 2034-35 | 280 | 460 | 970 | 970 | 1055 | 1520 | 1850 |
| 2035-36 | 295 | 485 | 1020 | 1020 | 1115 | 1600 | 1945 |
| 2036-37 | 310 | 510 | 1075 | 1075 | 1170 | 1685 | 2050 |
| 2037-38 | 330 | 540 | 1130 | 1130 | 1235 | 1775 | 2160 |
| 2038-39 | 345 | 570 | 1190 | 1190 | 1300 | 1865 | 2275 |
| 2039-40 | 365 | 600 | 1255 | 1255 | 1370 | 1965 | 2395 |
| 2040-41 | 385 | 630 | 1320 | 1320 | 1440 | 2075 | 2525 |
| 2041-42 | 405 | 665 | 1395 | 1395 | 1520 | 2185 | 2660 |
| 2042-43 | 425 | 700 | 1470 | 1470 | 1600 | 2305 | 2805 |
| 2043-44 | 450 | 740 | 1550 | 1550 | 1690 | 2430 | 2955 |
| 2044-45 | 475 | 780 | 1630 | 1630 | 1780 | 2560 | 3115 |
| 2045-46 | 500 | 820 | 1720 | 1720 | 1880 | 2700 | 3285 |

Table 7-6 : Toll Rates for Monthly pass Local @ 224.95

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2043-44 | 890 | 890 |
| 2044-45 | 940 | 940 |
| 2045-46 | 990 | 990 |

Table 7-7 : Toll Rates for Monthly pass Local @ 285.20

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |
| 2043-44 | 890 | 890 |
| 2044-45 | 940 | 940 |
| 2045-46 | 990 | 990 |

Table 7-8 : Toll Rates for Monthly Pass @ Km 224.95

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|---------|------------|--------------------|
| 2023-24 | 3490 | 5635 | 11810 | 11810 | 12880 | 18520 | 22545 |
| 2024-25 | 3575 | 5775 | 12100 | 12100 | 13200 | 18975 | 23100 |
| 2025-26 | 3755 | 6065 | 12710 | 12710 | 13865 | 19930 | 24265 |
| 2026-27 | 3945 | 6375 | 13350 | 13350 | 14565 | 20940 | 25490 |
| 2027-28 | 4145 | 6695 | 14030 | 14030 | 15305 | 22000 | 26785 |
| 2028-29 | 4355 | 7040 | 14745 | 14745 | 16085 | 23125 | 28150 |
| 2029-30 | 4580 | 7400 | 15500 | 15500 | 16910 | 24305 | 29590 |
| 2030-31 | 4815 | 7780 | 16295 | 16295 | 17780 | 25555 | 31115 |
| 2031-32 | 5065 | 8180 | 17140 | 17140 | 18695 | 26875 | 32720 |
| 2032-33 | 5325 | 8605 | 18030 | 18030 | 19665 | 28270 | 34420 |
| 2033-34 | 5605 | 9055 | 18970 | 18970 | 20690 | 29745 | 36210 |
| 2034-35 | 5895 | 9525 | 19960 | 19960 | 21775 | 31300 | 38105 |
| 2035-36 | 6205 | 10025 | 21010 | 21010 | 22920 | 32945 | 40110 |
| 2036-37 | 6535 | 10555 | 22120 | 22120 | 24130 | 34685 | 42225 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|---------|------------|--------------------|
| 2037-38 | 6880 | 11115 | 23290 | 23290 | 25410 | 36525 | 44465 |
| 2038-39 | 7250 | 11710 | 24530 | 24530 | 26760 | 38470 | 46830 |
| 2039-40 | 7635 | 12335 | 25840 | 25840 | 28190 | 40525 | 49335 |
| 2040-41 | 8045 | 12995 | 27230 | 27230 | 29705 | 42700 | 51985 |
| 2041-42 | 8480 | 13695 | 28695 | 28695 | 31305 | 45000 | 54785 |
| 2042-43 | 8935 | 14435 | 30250 | 30250 | 33000 | 47435 | 57745 |
| 2043-44 | 9420 | 15220 | 31890 | 31890 | 34790 | 50010 | 60885 |
| 2044-45 | 9935 | 16050 | 33630 | 33630 | 36685 | 52735 | 64200 |
| 2045-46 | 10480 | 16930 | 35470 | 35470 | 38690 | 55620 | 67710 |

Table 7-9 : Toll Rates for Monthly Pass @ Km 285.20

| Year | Car | Minibus /LCV | Bus | Truck | 3 axles | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|---------|------------|--------------------|
| 2023-24 | 3685 | 6080 | 12740 | 12740 | 13895 | 19975 | 24320 |
| 2024-25 | 3780 | 6230 | 13055 | 13055 | 14240 | 20470 | 24920 |
| 2025-26 | 3970 | 6545 | 13710 | 13710 | 14955 | 21500 | 26175 |
| 2026-27 | 4175 | 6875 | 14405 | 14405 | 15715 | 22590 | 27500 |
| 2027-28 | 4390 | 7225 | 15135 | 15135 | 16510 | 23735 | 28895 |
| 2028-29 | 4615 | 7590 | 15905 | 15905 | 17355 | 24945 | 30365 |
| 2029-30 | 4850 | 7980 | 16720 | 16720 | 18240 | 26220 | 31920 |
| 2030-31 | 5100 | 8390 | 17580 | 17580 | 19180 | 27570 | 33565 |
| 2031-32 | 5365 | 8825 | 18490 | 18490 | 20170 | 28995 | 35295 |
| 2032-33 | 5645 | 9280 | 19450 | 19450 | 21215 | 30500 | 37130 |
| 2033-34 | 5945 | 9765 | 20460 | 20460 | 22320 | 32085 | 39060 |
| 2034-35 | 6255 | 10275 | 21530 | 21530 | 23490 | 33765 | 41105 |
| 2035-36 | 6585 | 10815 | 22665 | 22665 | 24725 | 35540 | 43265 |
| 2036-37 | 6935 | 11390 | 23860 | 23860 | 26030 | 37415 | 45550 |
| 2037-38 | 7305 | 11990 | 25125 | 25125 | 27410 | 39400 | 47965 |
| 2038-39 | 7695 | 12630 | 26460 | 26460 | 28870 | 41500 | 50520 |
| 2039-40 | 8110 | 13305 | 27875 | 27875 | 30410 | 43715 | 53220 |
| 2040-41 | 8550 | 14020 | 29375 | 29375 | 32045 | 46065 | 56075 |
| 2041-42 | 9010 | 14775 | 30955 | 30955 | 33770 | 48545 | 59100 |
| 2042-43 | 9500 | 15575 | 32630 | 32630 | 35595 | 51170 | 62295 |
| 2043-44 | 10020 | 16420 | 34400 | 34400 | 37530 | 53950 | 65675 |
| 2044-45 | 10565 | 17315 | 36275 | 36275 | 39575 | 56890 | 69255 |
| 2045-46 | 11145 | 18260 | 38260 | 38260 | 41740 | 60000 | 73045 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2045-46 years starting from the year 2023-24 are shown in tables below.

Table 7-10 : Toll Revenue Optimistic Scenario**(Rs. Crores)**

| Year | TP-1 | TP2 | Total |
|----------------|-------------|------------|----------------|
| 2023-24 | 113.24 | 139.03 | 252.28 |
| 2024-25 | 123.79 | 152.08 | 275.87 |
| 2025-26 | 138.76 | 171.17 | 309.92 |
| 2026-27 | 155.52 | 192.19 | 347.71 |
| 2027-28 | 174.13 | 215.35 | 389.48 |
| 2028-29 | 195.46 | 241.16 | 436.62 |
| 2029-30 | 218.42 | 270.56 | 488.97 |
| 2030-31 | 244.95 | 304.26 | 549.21 |
| 2031-32 | 275.57 | 342.71 | 618.28 |
| 2032-33 | 308.66 | 384.53 | 693.19 |
| 2033-34 | 346.70 | 431.52 | 778.21 |
| 2034-35 | 388.89 | 485.39 | 874.28 |
| 2035-36 | 432.66 | 542.06 | 974.72 |
| 2036-37 | 480.08 | 601.63 | 1081.71 |
| 2037-38 | 533.18 | 669.78 | 1202.96 |
| 2038-39 | 592.79 | 745.32 | 1338.12 |
| 2039-40 | 661.32 | 835.20 | 1496.52 |
| 2040-41 | 726.38 | 916.84 | 1643.22 |
| 2041-42 | 802.40 | 1014.59 | 1816.99 |
| 2042-43 | 885.13 | 1122.05 | 2007.17 |
| 2043-44 | 979.52 | 1244.91 | 2224.43 |
| 2044-45 | 1077.13 | 1370.93 | 2448.06 |
| 2045-46 | 1180.88 | 1503.96 | 2684.83 |

Table 7-11 : Toll Revenue Pessimistic Scenario**(Rs. Crores)**

| Year | TP-1 | TP2 | Total |
|----------------|-------------|------------|----------------|
| 2023-24 | 113.24 | 139.03 | 252.28 |
| 2024-25 | 123.21 | 151.35 | 274.56 |
| 2025-26 | 137.44 | 169.54 | 306.98 |
| 2026-27 | 153.34 | 189.45 | 342.79 |
| 2027-28 | 170.94 | 211.29 | 382.23 |
| 2028-29 | 190.99 | 235.48 | 426.47 |
| 2029-30 | 212.43 | 262.96 | 475.39 |
| 2030-31 | 237.14 | 294.39 | 531.52 |
| 2031-32 | 265.51 | 330.05 | 595.56 |
| 2032-33 | 296.03 | 368.50 | 664.53 |
| 2033-34 | 330.90 | 411.65 | 742.56 |
| 2034-35 | 369.42 | 460.92 | 830.34 |
| 2035-36 | 409.12 | 512.33 | 921.45 |
| 2036-37 | 451.76 | 565.89 | 1017.65 |
| 2037-38 | 499.40 | 627.05 | 1126.44 |
| 2038-39 | 552.65 | 694.49 | 1247.13 |
| 2039-40 | 613.59 | 774.47 | 1388.06 |

| Year | TP-1 | TP2 | Total |
|---------|---------|---------|----------------|
| 2040-41 | 670.86 | 846.02 | 1516.88 |
| 2041-42 | 737.41 | 931.75 | 1669.17 |
| 2042-43 | 809.52 | 1025.54 | 1835.06 |
| 2043-44 | 891.54 | 1132.50 | 2024.05 |
| 2044-45 | 975.70 | 1241.09 | 2216.79 |
| 2045-46 | 1064.54 | 1355.05 | 2419.59 |

**Table 7-12 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

| Year | TP-1 | TP2 | Total |
|---------|---------|---------|----------------|
| 2023-24 | 113.24 | 139.03 | 252.28 |
| 2024-25 | 123.50 | 151.71 | 275.21 |
| 2025-26 | 138.10 | 170.34 | 308.44 |
| 2026-27 | 154.44 | 190.78 | 345.22 |
| 2027-28 | 172.57 | 213.28 | 385.85 |
| 2028-29 | 193.31 | 238.31 | 431.62 |
| 2029-30 | 215.47 | 266.69 | 482.16 |
| 2030-31 | 241.15 | 299.24 | 540.39 |
| 2031-32 | 270.61 | 336.20 | 606.81 |
| 2032-33 | 302.43 | 376.30 | 678.73 |
| 2033-34 | 338.80 | 421.29 | 760.09 |
| 2034-35 | 379.16 | 472.80 | 851.97 |
| 2035-36 | 420.85 | 526.79 | 947.64 |
| 2036-37 | 465.79 | 583.32 | 1049.11 |
| 2037-38 | 516.08 | 647.85 | 1163.92 |
| 2038-39 | 572.50 | 719.22 | 1291.72 |
| 2039-40 | 637.16 | 804.02 | 1441.18 |
| 2040-41 | 698.19 | 880.52 | 1578.71 |
| 2041-42 | 769.27 | 972.10 | 1741.37 |
| 2042-43 | 846.50 | 1072.50 | 1919.00 |
| 2043-44 | 934.52 | 1187.22 | 2121.74 |
| 2044-45 | 1025.31 | 1304.25 | 2329.55 |
| 2045-46 | 1121.33 | 1427.42 | 2548.75 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Agra to Etawah section of NH-2 in state of Delhi from km 199.660 to km 323.525 is currently six lane road. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the most busy and prominent national highway NH-2 which connects political and cultural capitals of India. This is one of the most important trunk roads which spreads across many states. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As discussed, the dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

- a) There is a good amount of tollable traffic running on the project.
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy.
- c) The Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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GULABPURA TO CHITTORGARH SECTION OF NH 79
(KM 90.000 TO KM 214.870)
IN THE STATE OF RAJASTHAN



**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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, Six Laning of Gulabpura to Chittorgarh section of NH-79 from km 90.000 to km 214.870 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. M/s CG Tollway Ltd. (Concessionaire) has been awarded the Project for a concession period of 20 years starting from 4th November 2017. The Project has been commissioned and is currently in the operation / maintenance phase for four laning. Six laning of project has also been completed in August 2021.

Length of project road is 124.870 Kms. The project road is section of NH-79, which connects Ajmer to Ghat Bilod. Project section of NH-79 passes through district of Bhiwara and Chittorgarh. Project road connects to Udaipur via NH-76.

Project road alignment passes through the towns/ built-up areas Fakirabad, Bhilwara, Gulabpura, & Chittorgarh. Following figure shows alignment of project road section from Gulabpura to Chittorgarh

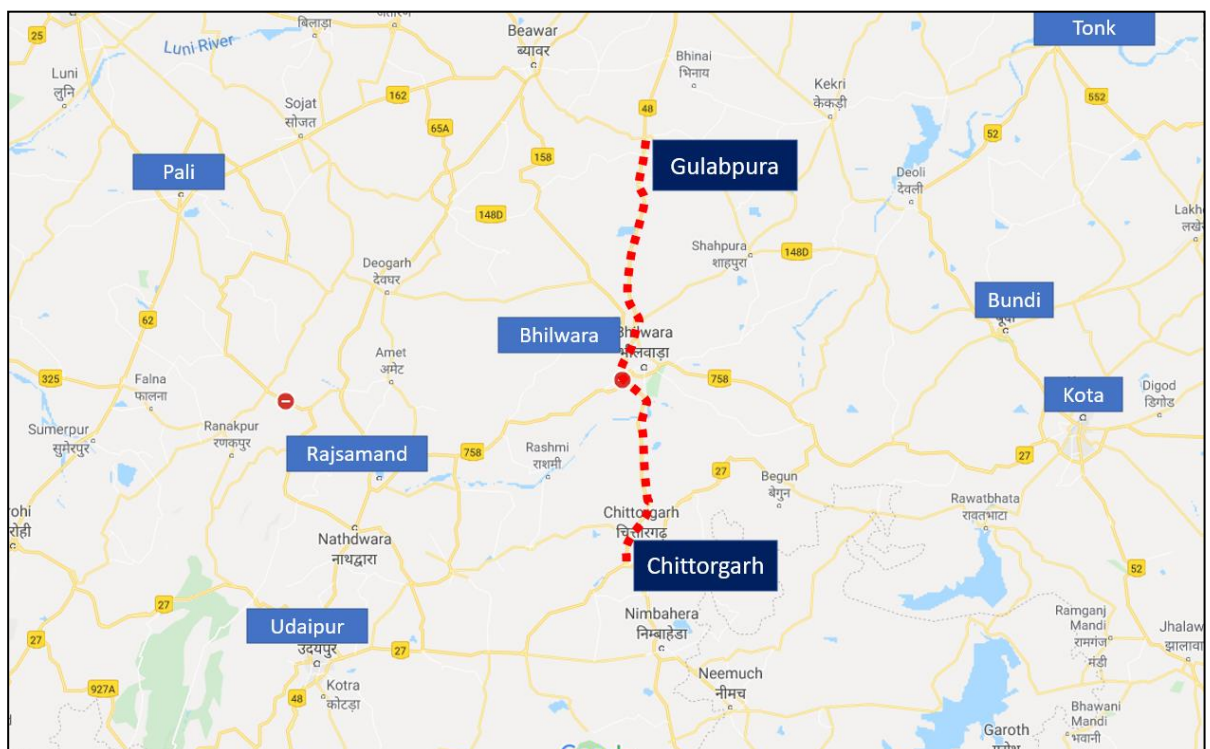


Figure 1-1: Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “Traffic Study & Toll Revenue Projection Report” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

National Highway 79 (NH 79) is an important link for traffic connecting Delhi, Jaipur to Udaipur, Chittorgarh and down south.

It is one of the major north-south road connectivity for the traffic from northern states of Haryana, Punjab and Delhi to Industrial and tourist areas of Rajasthan like Jaipur, Chittorgarh, Udaipur and then to Dahod, Ratlam and other parts of Madhya Pradesh.

2.2 Project Stretch Description

Section of NH-79 from Gulabpura to Chittorgarh is part of major transportation link in the area connecting industrial / tourist cities of Jaipur, Bhilwara, Chittorgarh and Udaipur. Important cities of Firozabad, Shikohabad, and Jaswant Nagar fall on project alignment. Major mining industries of marble, Zink, felspar, quarts of Udaipur and textile industry of Bhiwara provide are major contributor of commercial traffic on project corridor. Additionally, Udaipur, Chittorgarh and Bhilwara major tourist centers of India. This adds substantial value for passenger traffic on the project corridor section.

Like other parts of India rapid ribbon development is happening around these cities on project highway. This also contributes to sustainable traffic growth.

There are two operative toll plazas at project stretch. First is at Lambia Kalan at Km 121.020 and second at Zoro ka Khera at Km 184.020. The following figure show project alignment and toll plaza locations.

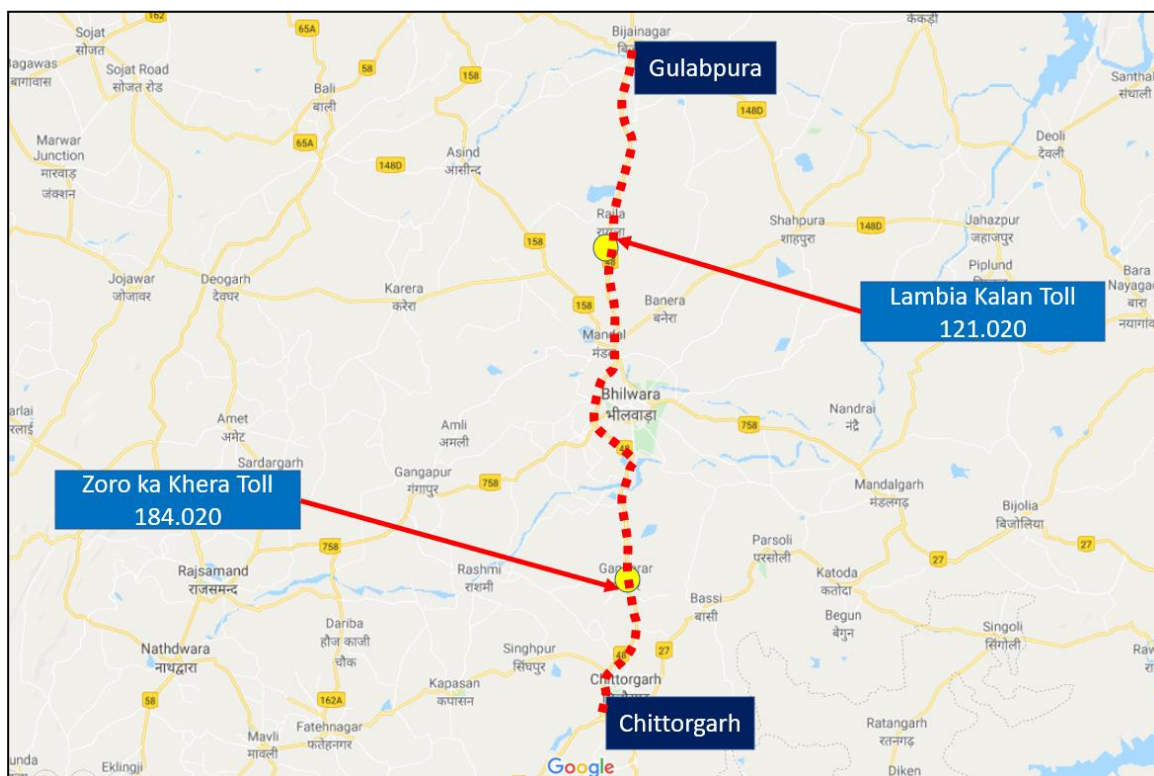


Figure 2-1: Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Six laning of project stretch is in progress and soon will be completed. The following photographs illustrate the project section along the corridor.



Figure 2-2: Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Gulabpura- Chittorgarh section of NH-79 for years 2018-19, 2019-20, 2020-21, 2021-22, 2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--|--|--|---|---|--|
| 1 | Km 121.020 Toll Plaza at Lambia Kalan | AADT for Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--|--|---|---|---|---|
| | | November 2023 | to November 2023 | 2023 to November 2023 | 2023 to November 2023 | to November 2023 |
| 2 | Km 184.020 Toll Plaza at Jojro ka Khera | AADT for Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-20, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : Vehicle Classification System

| Vehicle Type | |
|---------------|--|
| Auto Rickshaw | |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |
| Bus | Minibus |
| | Standard Bus |

| Vehicle Type | |
|----------------|--|
| 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Bus
- Truck
- 3-Axle
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 20223, it may not represent the whole year traffic. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Lambial Kalan Toll Plaza at Km 121.020

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|---------------------------|--|--|--|--|--|
| 1 | Car | 3563 | 3366 | 4812 | 6301 | 6851 |
| 2 | Minibus /LCV | 1266 | 933 | 585 | 768 | 754 |
| 3 | Bus | 428 | 270 | 376 | 446 | 455 |
| 4 | Truck | 1587 | 1321 | 1788 | 2455 | 2520 |
| 5 | 3-Axle Commercial vehicle | 2139 | 1591 | 1771 | 2006 | 1869 |
| 6 | Multi axle | 4606 | 4011 | 4587 | 5086 | 5130 |
| 7 | Oversized Vehicle | 23 | 19 | 30 | 11 | 12 |
| Total | | 13612 | 11511 | 13949 | 17072 | 17590 |

Table 3-4 : Traffic Data at Jojro ka Khera Toll Plaza at Km 184.0200

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|---------------------------|--|--|--|--|--|
| 1 | Car | 3042 | 3077 | 4440 | 5603 | 6077 |
| 2 | Minibus /LCV | 1081 | 824 | 549 | 716 | 777 |
| 3 | Bus | 423 | 265 | 347 | 408 | 435 |
| 4 | Truck | 1285 | 1164 | 1634 | 2306 | 2613 |
| 5 | 3-Axle Commercial vehicle | 1568 | 1344 | 1666 | 1950 | 2042 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|-------------------|--|--|--|--|--|
| 6 | Multi axle | 4360 | 4201 | 4934 | 5536 | 5971 |
| 7 | Oversized Vehicle | 21 | 21 | 21 | 14 | 12 |
| Total | | 11781 | 10896 | 13592 | 16532 | 17926 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-5.

Table 3-5 : 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 |

| Vehicle Type | PCUs |
|-------------------------------------|------|
| 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 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|------------------------------|------------|-------|-----------|
| 2019-2020 | Lambia Kalan Km 121.020 | 13612 | 38754 | 2.85 |
| | Jojro ka Khera Km 184.020 | 11781 | 34208 | 2.90 |
| 2020-2021 | Lambia Kalan Km 121.020 | 11511 | 32446 | 2.82 |
| | Jojro ka Khera Km 184.020 | 10896 | 31630 | 2.90 |
| 2021-2022 | Lambia Kalan Km 121.020 | 13949 | 38721 | 2.74 |
| | Jojro ka Khera Km 184.020 | 13592 | 38503 | 2.83 |
| 2022-23 | Lambia Kalan Km 121.020 | 17072 | 45107 | 2.64 |
| | Jojro ka Khera Km 184.020 | 16532 | 45642 | 2.76 |
| 2023-24 | Lambia Kalan Km 121.020 | 17590 | 45650 | 2.60 |
| | Jojro ka Khera Km 184.020 | 17926 | 49431 | 2.76 |

It can be observed from above that project traffic has PCU index close to 3 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at four toll plaza locations.

It can be observed that PCU index is consistent at both toll plaza locations.

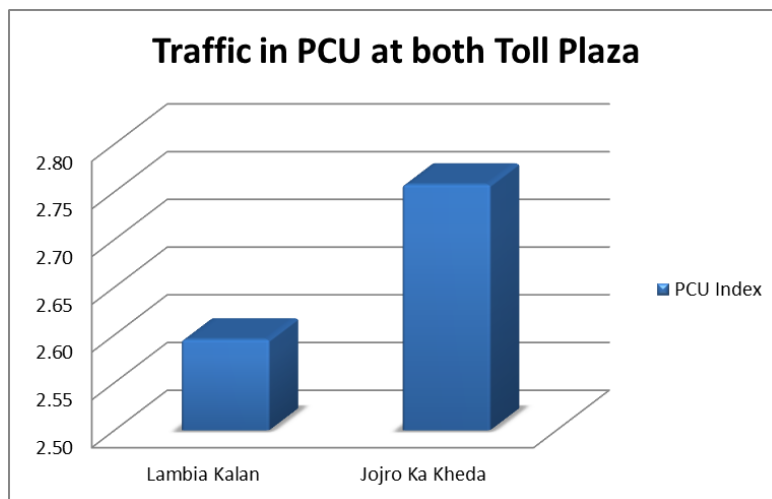


Figure 3-1: Comparison of PCU Index

3.4.2 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.

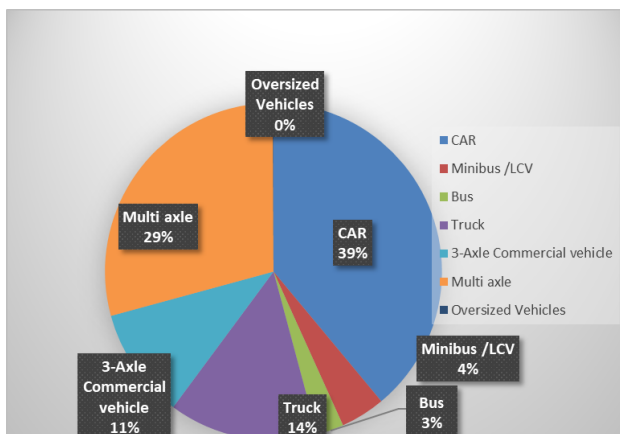


Figure 3-2 :Model Split of Tollable Vehicle-Km 121.020

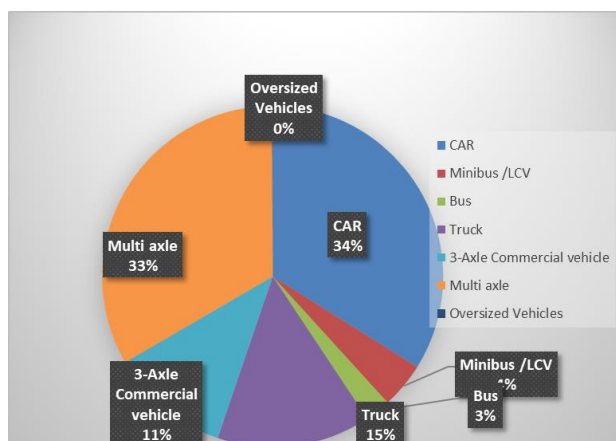


Figure 3-3 :Model Split of Tollable Vehicle- Km 184.020

It is observed that car traffic forms about 39% & 34% of total traffic at toll plaza locations while multi axle commercial vehicles are about 40% & 44% of total traffic. Truck / Bus and LCV share about 21% and 22% of traffic volume respectively.

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

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

The following table provides numbers of vehicles falling in each of above category for year 2023-24

Table 3-7 : Journey Type Bifurcation of Traffic at Lambia Kalan TP KM 121.020

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 12623 |
| 2 | Return Journey | 4635 |
| 3 | Local Commercial Single Journey | 292 |
| 4 | Monthly Pass Local | 37 |
| 5 | Monthly Pass | 12 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 72%. Return journey component is 26%. The number of monthly pass Local is 0% and Local commercial Single Journey 2% at Lambia Kalan toll plaza.

The following tables give the details of journey distribution at Jojro ka Khera toll plaza at Km 184.020.

Table 3-8 : Journey Type Bifurcation of Traffic at Jojro ka KheraTPKm 184.020

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|----------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 12716 |

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 2 | Return Journey | 4899 |
| 3 | Local Commercial Single Journey | 274 |
| 4 | Monthly Pass Local | 28 |
| 5 | Monthly Pass | 12 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch has toll application history from last few years, and it can be assumed that project traffic is settled. However, from an analysis point of view there can be two alternate routes at local level. One uses Ajmer Road to go from Kishangarh to Chittorgarh and the other on east side via Shapur.

At regional level, there can be two alternates for Udaipur traffic after Kishangarh. One via project road (Kishangarh – Bhiwara- Chittorgarh- Udaipur)

The following maps show these routes in relation to project stretches at both local and regional level.

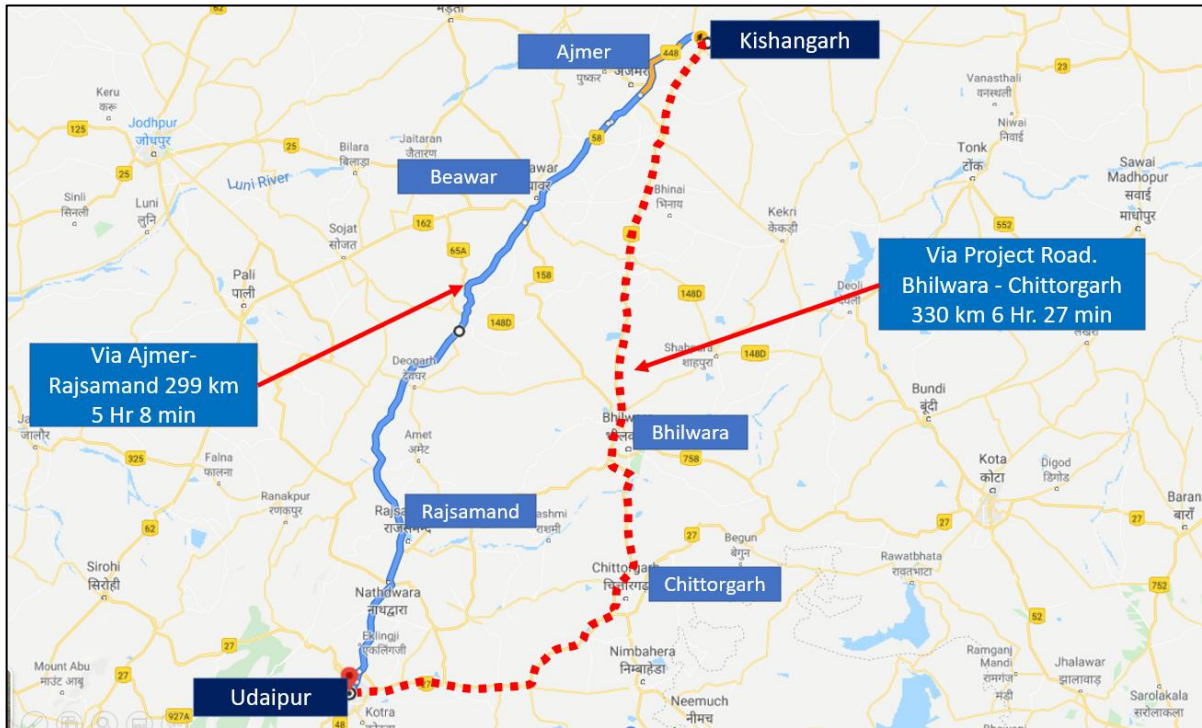


Figure 4-1: Alternate route at regional level.

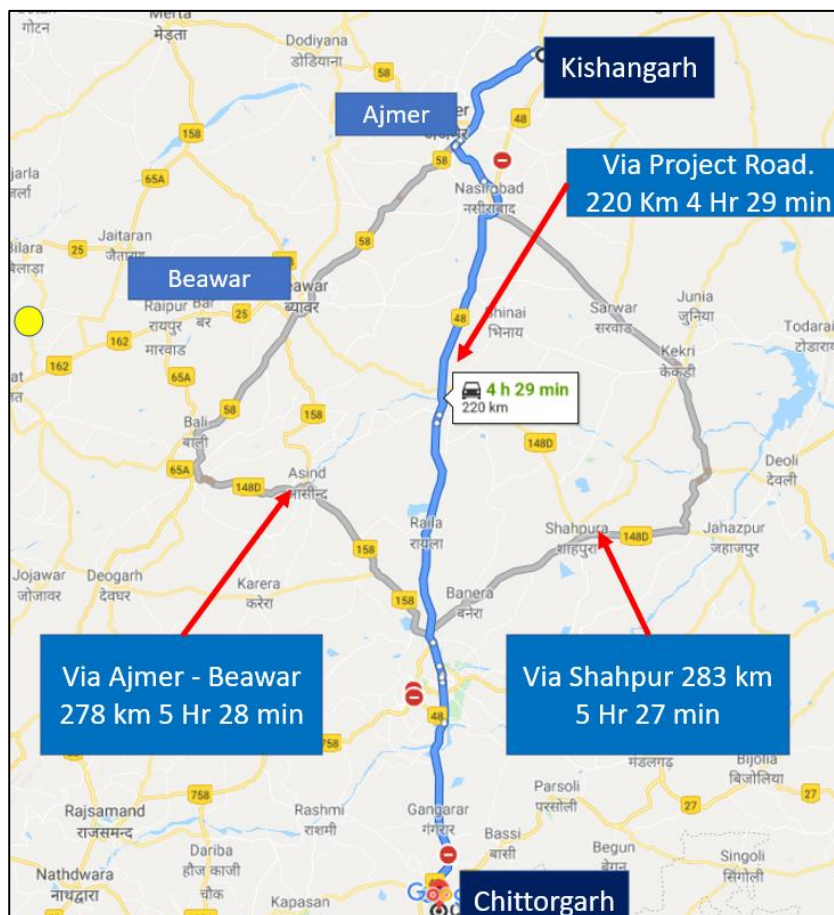


Figure 4-2: Alternate route at local level.

It can be observed that the project highway forms one of the main spines of the corridor between Kishangarh / Jaipur and Chittorgarh. Traffic on project road is now settled and it can be assumed as dedicated traffic on project road for logistic obligations.

At regional level for Udaipur traffic alternate route is faster and traffic is already using this alternate.

With six laning now nearing completion, the project stretch would become slightly more attractive due to the improved level of service. In such a case further diversion of traffic from the project road is not envisaged.

The following table provides summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Competing Roads Details

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|---|-----------------|-------------|-------------------|------------------|--|
| Regional Level | | | | | | |
| 1 | Kishangarh – Ajmer-Udaipur | Alternate Route | 299 | 58 | 5 Hr 8 Min | Alternate route has clear advantage for this pair of destination. Traffic Settled. No further diversion expected |
| | Kishangarh- Chittorgarh-Udaipur | Project Road | 330 | 51 | 6 Hr 127 Min | |
| Local Level | | | | | | |
| 2 | Kishangarh – Ajmer-Chittorgarh (West) | Alternate Route | 278 | 50 | 5 Hr. 28 Min | Project Road has advantage. Alternate route running for years after toll on project road. Traffic Settled. No further diversion expected |
| | Kishangarh – Shahpur-Chittorgarh (East) | Alternate Route | 283 | 51 | 5 Hr. 28 Min | |
| | Kishangarh – Bhilwara-Chittorgarh | Project Road | 220 | 50 | 4 Hr. 29 Min | |

Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road. Further, it may be noted that since the project highway has already been commissioned and has a tolling history, the current traffic traversing the project corridor already factors in traffic diversion (if any) that may have taken place.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Gulabpur- Chittorgarh section of NH-79 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

The project corridor spreads across the state of Rajasthan. Toll plazas at Lambia Kalan and Jojro ka Khera are in the state of Rajasthan. For elasticity calculations, working data from Rajasthan has been analyzed. Additionally, data of Gujarat is also analyzed as project corridor has close transportation link with Gujarat also.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-1 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2012 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2013 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2014 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2015 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2016 | 68565 | 899307 | 4.84 | 5.95 | 6% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2017 | 71394 | 988391 | 4.85 | 5.99 | 4% | 4.55% |

Regression analysis of same is given in figure below.

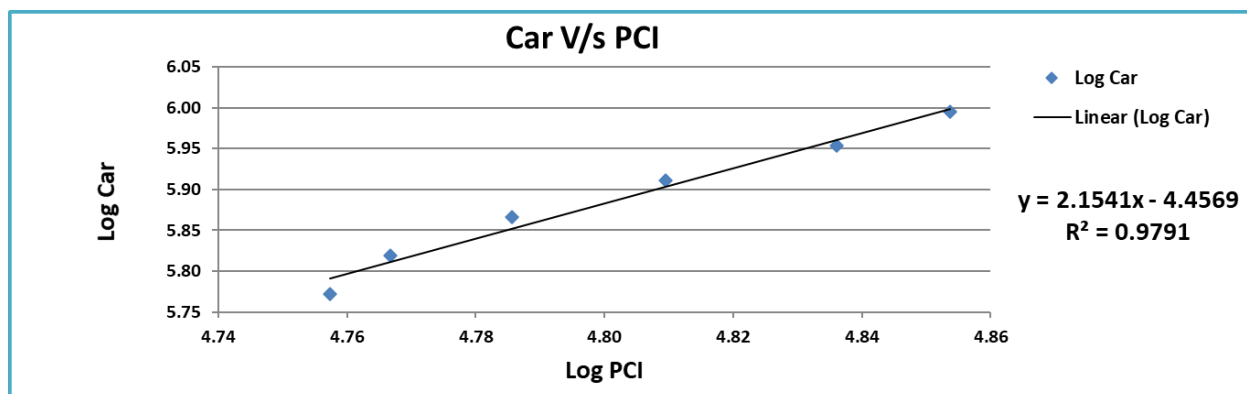


Figure 5-1: Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan

Table 5-2 : Population Vs Bus Rajasthan

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 68548437 | 83345 | 7.84 | 4.92 | | |
| 2013 | 69783885 | 88616 | 7.84 | 4.95 | 2% | |
| 2014 | 71016445 | 93892 | 7.85 | 4.97 | 2% | |
| 2015 | 72245688 | 97650 | 7.86 | 4.99 | 2% | |
| 2016 | 73471198 | 102818 | 7.87 | 5.01 | 2% | |
| 2017 | 74692571 | 108680 | 7.87 | 5.04 | 2% | 1.73% |

Regression analysis of same is given in figure below.

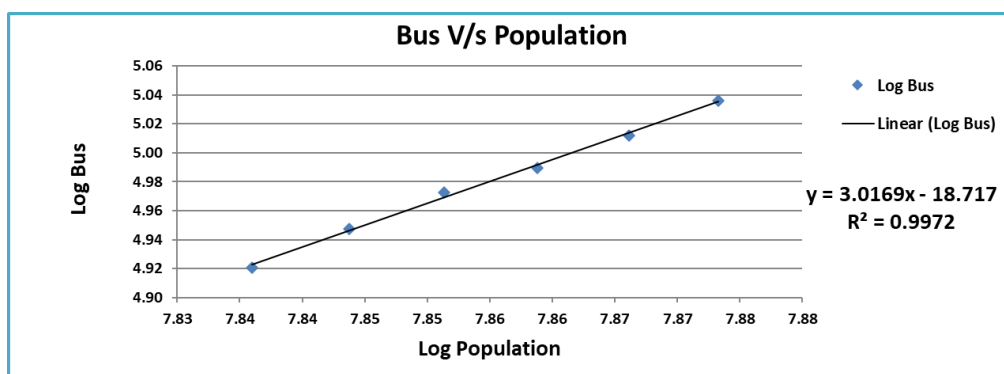


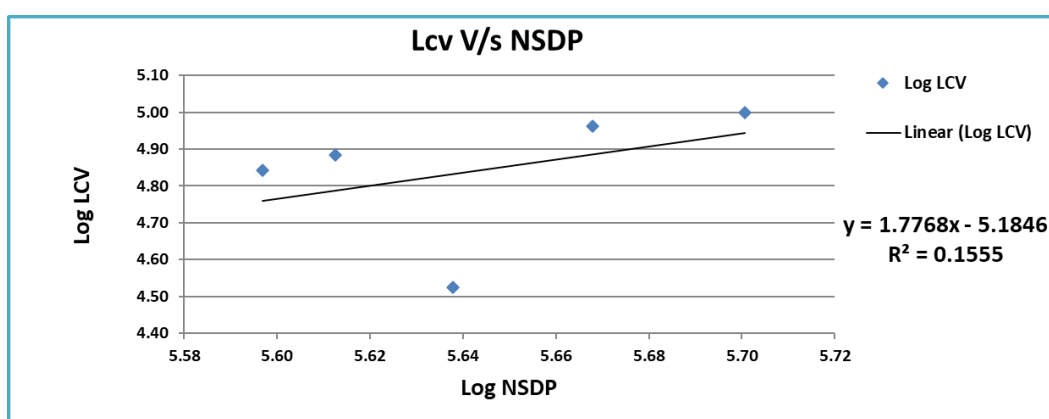
Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : LCV Traffic Vs NSDP Rajasthan

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth |
|------|--------|-------|----------|---------|-------------|----------------|
| 2012 | 395331 | 69509 | 5.60 | 4.84 | | |
| 2013 | 409802 | 76396 | 5.61 | 4.88 | 4% | |
| 2014 | 434292 | 33379 | 5.64 | 4.52 | 6% | |
| 2015 | 465408 | 91787 | 5.67 | 4.96 | 7% | |
| 2016 | 501922 | 99763 | 5.70 | 5.00 | 8% | 6.16% |

The following figure depicts regression analysis and extrapolation.

**Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.**

The following figure depicts regression analysis and extrapolation.

Table 5-4 : Truck Traffic Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|--------|--------|----------|-----------|-------------|----------------|
| 2012 | 395331 | 362028 | 5.60 | 5.56 | | |
| 2013 | 409802 | 401983 | 5.61 | 5.60 | 4% | |
| 2014 | 434292 | 434379 | 5.64 | 5.64 | 6% | |
| 2015 | 465408 | 472365 | 5.67 | 5.67 | 7% | |
| 2016 | 501922 | 517604 | 5.70 | 5.71 | 8% | |
| 2017 | 530172 | 561158 | 5.72 | 5.75 | 6% | 6.06% |

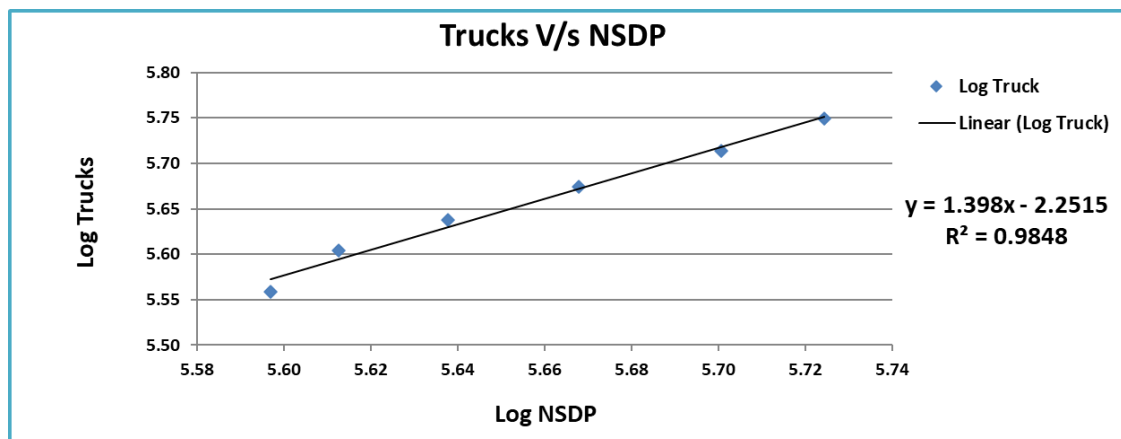


Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Rajasthan.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for the good fit regression as reflected by R2 values are presented in the Table below.

Table 5-5 : Summary Regression Analysis Rajasthan

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Rajasthan | Car/Jeep | PCI | $y = 2.1541x - 4.4569$ | $R^2 = 0.9791$ | 2.1541 | 4.55% | 9.79% | Good Regression |
| | Bus | Population | $y = 3.0169x - 18.7174$ | $R^2 = 0.9972$ | 3.0169 | 1.73% | 5.22% | Good Regression |
| | LCV | NSDP | $y = 1.7768x - 5.1846$ | $R^2 = 0.1555$ | 1.7768 | 6.16% | 10.95% | Poor Regression |
| | Truck | NSDP | $y = 1.398x - 2.2515$ | $R^2 = 0.9848$ | 1.3980 | 6.06% | 8.46% | Good Regression |

Table 5-6 : Per Capita Income Vs Car Gujarat

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 87481 | 1411898 | 4.94 | 6.15 | | |
| 2013 | 96683 | 1602129 | 4.99 | 6.20 | 11% | |
| 2014 | 102589 | 1771298 | 5.01 | 6.25 | 6% | |
| 2015 | 111370 | 2008748 | 5.05 | 6.30 | 9% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2016 | 120683 | 2260084 | 5.08 | 6.35 | 8% | |
| 2017 | 129738 | 2527537 | 5.11 | 6.40 | 8% | 8.21% |

Regression analysis of same is given in figure below.

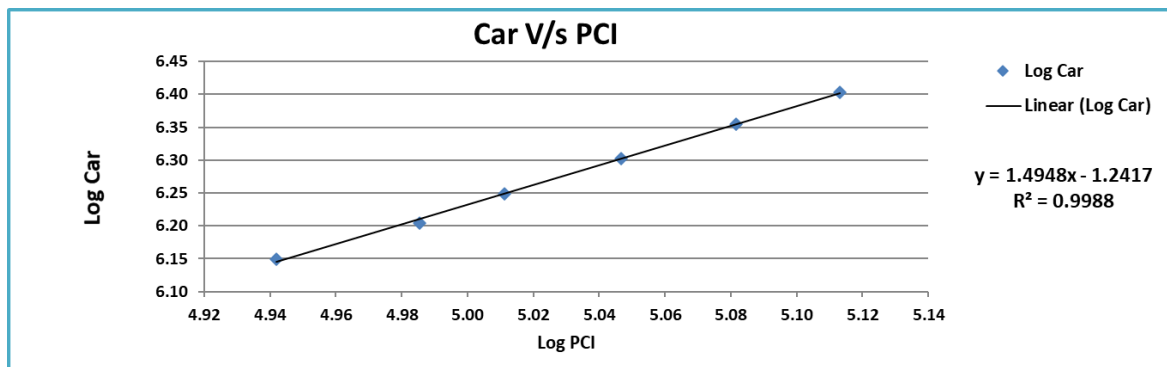


Figure 5-5: Regression and Elasticity PCI vs. Car – Extrapolation Gujarat

Table 5-7 : Population Vs Bus Gujarat

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 60439692 | 67546 | 7.78 | 4.83 | | |
| 2013 | 61563037 | 70615 | 7.79 | 4.85 | 2% | |
| 2014 | 62684375 | 72998 | 7.80 | 4.86 | 2% | |
| 2015 | 63803304 | 76435 | 7.80 | 4.88 | 2% | |
| 2016 | 64919427 | 82734 | 7.81 | 4.92 | 2% | |
| 2017 | 66032362 | 74855 | 7.82 | 4.87 | 2% | 1.79% |

Regression analysis of same is given in figure below.

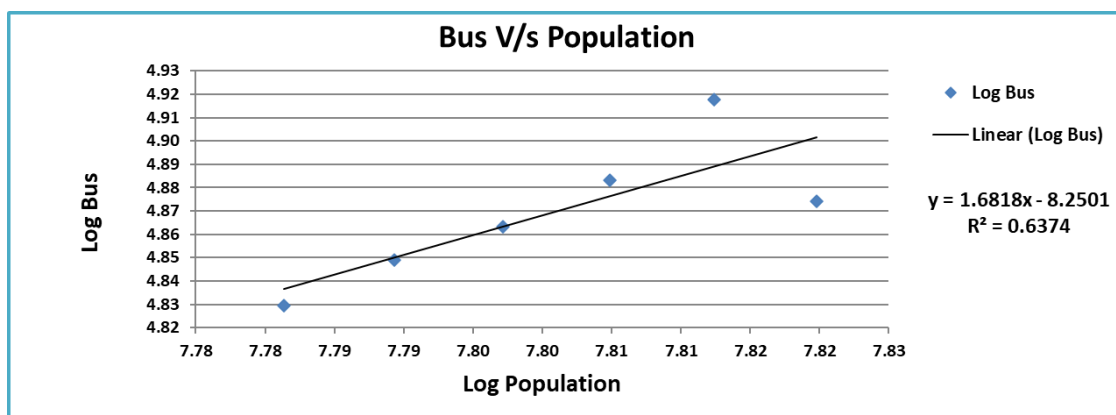


Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Gujarat

The elasticity of goods traffic has been worked out by regression analysis with NSDP.
The following table represents the data and details.

Table 5-8 : LCV Traffic Vs NSDP Gujarat

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth |
|------|--------|--------|----------|---------|-------------|----------------|
| 2012 | 532809 | 448958 | 5.73 | 5.65 | | |
| 2013 | 596659 | 499277 | 5.78 | 5.70 | 12% | |
| 2014 | 641489 | 542918 | 5.81 | 5.73 | 8% | |
| 2015 | 705629 | 589984 | 5.85 | 5.77 | 10% | |
| 2016 | 774775 | 633599 | 5.89 | 5.80 | 10% | 9.82% |

The following figure depicts regression analysis and extrapolation.

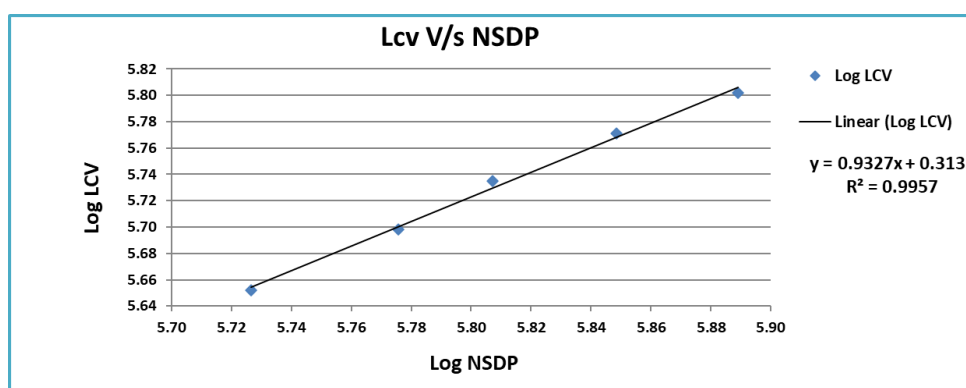


Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat.

The following figure depicts regression analysis and extrapolation.

Table 5-9 : Truck Traffic Vs NSDP Gujarat

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|--------|--------|----------|-----------|-------------|----------------|
| 2012 | 532809 | 301533 | 5.73 | 5.48 | | |
| 2013 | 596659 | 319207 | 5.78 | 5.50 | 12% | |
| 2014 | 641489 | 332185 | 5.81 | 5.52 | 8% | |
| 2015 | 705629 | 352225 | 5.85 | 5.55 | 10% | |
| 2016 | 774775 | 375265 | 5.89 | 5.57 | 10% | |
| 2017 | 843930 | 396061 | 5.93 | 5.60 | 9% | 9.64% |

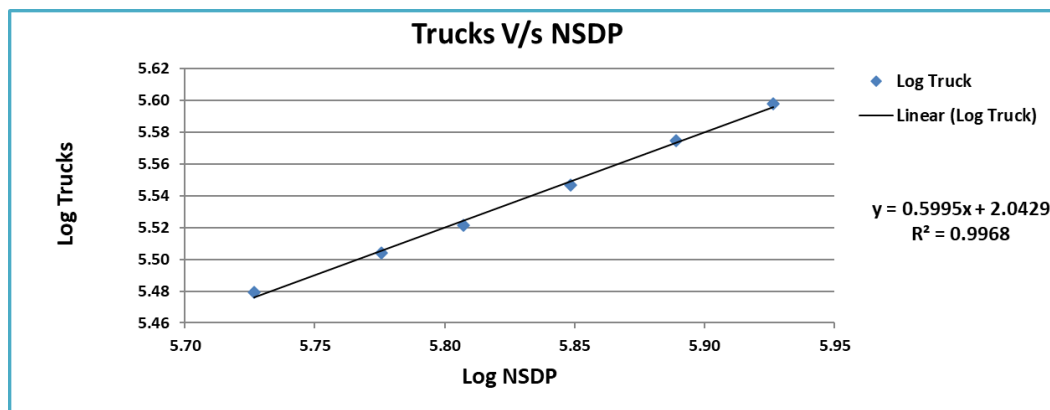


Figure 5-8: Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Gujarat.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-10 : Summary Regression Analysis Gujarat

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------|------------------|----------------------|------------------------|-------------------------|----------------------------|--------------------------|----------------------|-----------------|
| Gujarat | Car/Jeep | PCI | $y = 1.4948x - 1.2417$ | R ² = 0.9988 | 1.4948 | 8.21% | 12.27% | Good Regression |
| | Bus | Population | $y = 1.6818x - 8.2501$ | R ² = 0.6374 | 1.6818 | 1.79% | 3.00% | Fair Regression |
| | LCV | NSDP | $y = 0.9327x - 0.3133$ | R ² = 0.9957 | 0.9327 | 9.82% | 9.16% | Good Regression |
| | Truck | NSDP | $y = 0.5995x - 2.0429$ | R ² = 0.9968 | 0.5995 | 9.64% | 5.78% | Good Regression |

The economic model for predicting growth is a good tool, however other local, regional, and 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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Gulabpura to Chittorgarh is under tolling operation with current concessionaire and has two year of tolling history from 2018-19. As traffic data available with the project concessionaire is of year two years and that too affected by COVI-19, we do not have sufficient data points to be able to

establish a reliable past trend of traffic growth. A minimum of about 5 -6 years' consistent traffic data is required for establishing a reliable past trend.

5.5 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.

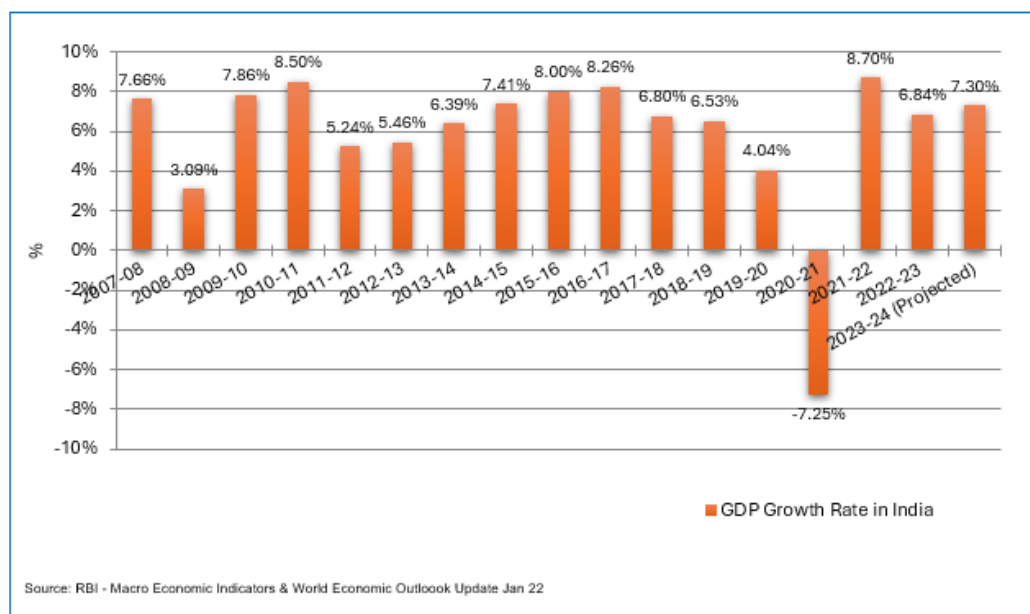


Figure 5-9 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

This Asset primarily serves traffic travelling between Delhi, Rajasthan, Gujarat and Maharashtra. It is observed that the vehicle distribution to be dominated by heavy vehicles. We further noticed several textile industries and marble/granite industries bordering the Asset. Udaipur serves as a big tourism hub as well as a consumption centre which also results in traffic feeding into the demand being generated.

In addition, Chittorgarh has 4 major cement plants located in Chanderiya and Nimbahera villages. There is a regular movement of Cement bulkers to and from these locations along asset. Chanderiya Lead-Zinc Smelter, is the one of the largest zinc-lead smelting complexes in the world, is also located in Chittorgarh. Bhilwara is home to the textile industry and the only centre in the country producing insulation bricks. Mining is another major sector for large scale mining of sandstone, soapstone feldspar, quartz, mica China clay and granite. Also, Iron Ore, Led, and Zinc are mined and processed in Bhilwara.

Rajasthan is rich in natural resources and benefits from its strategic geographic location in India. The state is pre-eminent in quarrying, mining in India and has been a leader in crude oil extraction over the past few years. Moreover, Rajasthan is also major tourism attractor in India. Considering the scenario, it may be assumed that the traffic growth on the project highway would remain high and there are minimal risks in terms of growth.

5.6.1 Industrial Units along Project Corridor

Bhilwara district occupies an important place in the mineral map of Rajasthan. The main minerals are lead Zinc, Soap Stone, China Clay, Feldspar, Quartz, Mica, Asbestos and Garnet.

Besides being a major tourist attraction in India Chittorgarh has a very rich profile in industrial mineral extraction. Limestone (Cement Grade), Red Occur, Silica sand, China Clay and Quartz are major minerals which are in abundance. There are a large number of cement plants in the area. Chanderiya Lead-Zinc Smelter is one of the largest zinc-lead smelting complexes in the world.

5.7 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 below. The rate of growth is moderate in light of overall regional trends. 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, the rate of growth diminishes. The same growth rate is not sustainable for long. Traffic growth is suitably stepped down fro future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-11 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.61% | 8.31% | 7.01% | 6.58% | 6.33% | 6.09% |
| Bus | 4.93% | 4.73% | 3.77% | 3.56% | 3.41% | 3.26% |
| LCV | 5.19% | 4.89% | 3.83% | 3.34% | 3.08% | 2.83% |
| 2- Axle | 5.68% | 5.38% | 4.55% | 4.05% | 3.78% | 3.53% |
| 3 – Axle | 6.02% | 5.71% | 4.55% | 4.05% | 3.78% | 3.53% |
| 4 to 6 Axle | 6.37% | 6.03% | 4.55% | 4.05% | 3.78% | 3.53% |
| 7 and Above Axle | 6.02% | 5.71% | 4.55% | 4.05% | 3.78% | 3.53% |

Table 5-12 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.11% | 7.81% | 6.51% | 6.08% | 5.83% | 5.59% |
| Bus | 4.43% | 4.23% | 3.27% | 3.06% | 2.91% | 2.76% |
| LCV | 4.69% | 4.39% | 3.33% | 2.84% | 2.58% | 2.33% |
| 2- Axle | 5.18% | 4.88% | 4.05% | 3.55% | 3.28% | 3.03% |
| 3 – Axle | 5.52% | 5.21% | 4.05% | 3.55% | 3.28% | 3.03% |
| 4 to 6 Axle | 5.87% | 5.53% | 4.05% | 3.55% | 3.28% | 3.03% |
| 7 and Above Axle | 5.52% | 5.21% | 4.05% | 3.55% | 3.28% | 3.03% |

Table 5-13 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.36% | 8.06% | 6.76% | 6.33% | 6.08% | 5.84% |
| Bus | 4.68% | 4.48% | 3.52% | 3.31% | 3.16% | 3.01% |
| LCV | 4.94% | 4.64% | 3.58% | 3.09% | 2.83% | 2.58% |
| 2- Axle | 5.43% | 5.13% | 4.30% | 3.80% | 3.53% | 3.28% |
| 3 - Axle | 5.77% | 5.46% | 4.30% | 3.80% | 3.53% | 3.28% |
| 4 to 6 Axle | 6.12% | 5.78% | 4.30% | 3.80% | 3.53% | 3.28% |
| 7 and Above Axle | 5.77% | 5.46% | 4.30% | 3.80% | 3.53% | 3.28% |

Traffic and revenue have been worked out on the basis of the above growths and some is presented in subsequent chapter of report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Lambia Kalan 121.020 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2023-24 | 6851 | 754 | 455 | 2520 | 1869 | 5130 | 12 | 17590 | 45650 |
| 2024-25 | 7390 | 804 | 459 | 2655 | 1978 | 5440 | 12 | 18738 | 48406 |
| 2025-26 | 8013 | 829 | 495 | 2804 | 2089 | 5777 | 12 | 20019 | 51471 |
| 2026-27 | 8627 | 882 | 499 | 2947 | 2205 | 6108 | 12 | 21280 | 54443 |
| 2027-28 | 9352 | 910 | 537 | 3113 | 2329 | 6484 | 12 | 22737 | 57886 |
| 2028-29 | 10072 | 967 | 542 | 3272 | 2458 | 6858 | 12 | 24181 | 61254 |
| 2029-30 | 10920 | 999 | 583 | 3456 | 2598 | 7280 | 12 | 25848 | 65144 |
| 2030-31 | 11624 | 1050 | 585 | 3604 | 2712 | 7594 | 12 | 27181 | 68129 |
| 2031-32 | 12457 | 1075 | 623 | 3777 | 2835 | 7949 | 12 | 28728 | 71599 |
| 2032-33 | 13264 | 1129 | 626 | 3937 | 2960 | 8292 | 12 | 30220 | 74895 |
| 2033-34 | 14213 | 1156 | 666 | 4126 | 3093 | 8679 | 12 | 31945 | 78712 |
| 2034-35 | 15138 | 1215 | 670 | 4302 | 3231 | 9056 | 12 | 33624 | 82376 |
| 2035-36 | 16155 | 1238 | 710 | 4488 | 3361 | 9433 | 12 | 35397 | 86192 |
| 2036-37 | 17146 | 1295 | 714 | 4656 | 3493 | 9797 | 12 | 37113 | 89818 |
| 2037-38 | 18299 | 1320 | 755 | 4857 | 3634 | 10203 | 12 | 39080 | 93985 |
| 2038-39 | 19426 | 1381 | 761 | 5040 | 3778 | 10598 | 12 | 40996 | 97980 |
| 2039-40 | 20728 | 1408 | 805 | 5258 | 3930 | 11036 | 12 | 43177 | 102535 |
| 2040-41 | 21958 | 1469 | 811 | 5442 | 4076 | 11437 | 12 | 45205 | 106669 |
| 2041-42 | 23377 | 1494 | 857 | 5663 | 4230 | 11880 | 12 | 47513 | 111382 |

Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Jojro ka Khera 184.020 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2023-24 | 6077 | 777 | 435 | 2613 | 2042 | 5971 | 12 | 17926 | 49431 |
| 2024-25 | 6600 | 816 | 457 | 2760 | 2165 | 6351 | 12 | 19161 | 52604 |
| 2025-26 | 7149 | 856 | 478 | 2908 | 2289 | 6734 | 12 | 20426 | 55815 |
| 2026-27 | 7742 | 898 | 500 | 3064 | 2420 | 7140 | 12 | 21776 | 59225 |
| 2027-28 | 8384 | 941 | 523 | 3228 | 2557 | 7570 | 12 | 23215 | 62839 |
| 2028-29 | 9080 | 987 | 548 | 3401 | 2702 | 8026 | 12 | 24756 | 66685 |
| 2029-30 | 9834 | 1034 | 575 | 3583 | 2855 | 8510 | 12 | 26403 | 70773 |
| 2030-31 | 10523 | 1074 | 597 | 3746 | 2985 | 8897 | 12 | 27834 | 74209 |
| 2031-32 | 11260 | 1115 | 619 | 3915 | 3120 | 9302 | 12 | 29343 | 77808 |
| 2032-33 | 12048 | 1157 | 642 | 4092 | 3262 | 9725 | 12 | 30938 | 81588 |
| 2033-34 | 12890 | 1200 | 665 | 4278 | 3410 | 10167 | 12 | 32622 | 85555 |
| 2034-35 | 13793 | 1246 | 690 | 4471 | 3565 | 10628 | 12 | 34405 | 89720 |
| 2035-36 | 14701 | 1287 | 714 | 4651 | 3709 | 11057 | 12 | 36131 | 93664 |
| 2036-37 | 15667 | 1329 | 739 | 4839 | 3858 | 11504 | 12 | 37948 | 97791 |
| 2037-38 | 16698 | 1372 | 766 | 5035 | 4014 | 11969 | 12 | 39866 | 102116 |
| 2038-39 | 17795 | 1418 | 793 | 5238 | 4176 | 12453 | 12 | 41885 | 106636 |
| 2039-40 | 18965 | 1465 | 821 | 5449 | 4345 | 12957 | 12 | 44014 | 111368 |
| 2040-41 | 20165 | 1510 | 849 | 5654 | 4509 | 13447 | 12 | 46146 | 116032 |
| 2041-42 | 21441 | 1556 | 877 | 5867 | 4680 | 13955 | 12 | 48388 | 120899 |

**Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Lambia Kalan 121.020 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2023-24 | 6851 | 754 | 455 | 2520 | 1869 | 5130 | 12 | 17590 | 45650 |
| 2024-25 | 7357 | 801 | 457 | 2643 | 1970 | 5415 | 12 | 18655 | 48190 |
| 2025-26 | 7942 | 822 | 491 | 2778 | 2071 | 5724 | 12 | 19840 | 51007 |
| 2026-27 | 8510 | 870 | 494 | 2906 | 2177 | 6022 | 12 | 20991 | 53699 |
| 2027-28 | 9186 | 893 | 529 | 3055 | 2289 | 6365 | 12 | 22329 | 56841 |
| 2028-29 | 9847 | 946 | 533 | 3197 | 2405 | 6698 | 12 | 23638 | 59866 |
| 2029-30 | 10629 | 972 | 570 | 3359 | 2529 | 7080 | 12 | 25151 | 63375 |
| 2030-31 | 11259 | 1018 | 569 | 3487 | 2628 | 7347 | 12 | 26320 | 65954 |
| 2031-32 | 12014 | 1036 | 605 | 3635 | 2735 | 7657 | 12 | 27694 | 69004 |
| 2032-33 | 12731 | 1085 | 604 | 3774 | 2843 | 7946 | 12 | 28995 | 71833 |
| 2033-34 | 13584 | 1104 | 642 | 3933 | 2958 | 8282 | 12 | 30515 | 75162 |
| 2034-35 | 14398 | 1157 | 641 | 4085 | 3074 | 8596 | 12 | 31963 | 78270 |
| 2035-36 | 15300 | 1172 | 680 | 4236 | 3183 | 8915 | 12 | 33498 | 81527 |
| 2036-37 | 16158 | 1222 | 678 | 4379 | 3292 | 9210 | 12 | 34951 | 84537 |
| 2037-38 | 17168 | 1238 | 718 | 4540 | 3409 | 9551 | 12 | 36636 | 88060 |
| 2038-39 | 18136 | 1291 | 716 | 4693 | 3525 | 9869 | 12 | 38242 | 91339 |
| 2039-40 | 19269 | 1307 | 758 | 4866 | 3651 | 10233 | 12 | 40096 | 95157 |
| 2040-41 | 20312 | 1360 | 755 | 5018 | 3765 | 10549 | 12 | 41771 | 98491 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2041-42 | 21531 | 1374 | 798 | 5189 | 3891 | 10909 | 12 | 43704 | 102371 |

**Table 6-4 : Total Tollable Traffic @Toll Plaza 2- Jojro ka Khera184.020 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2023-24 | 6077 | 777 | 435 | 2613 | 2042 | 5971 | 12 | 17926 | 49431 |
| 2024-25 | 6569 | 814 | 454 | 2748 | 2153 | 6322 | 12 | 19072 | 52358 |
| 2025-26 | 7082 | 848 | 472 | 2882 | 2264 | 6671 | 12 | 20231 | 55282 |
| 2026-27 | 7635 | 884 | 491 | 3023 | 2381 | 7040 | 12 | 21466 | 58380 |
| 2027-28 | 8231 | 923 | 510 | 3170 | 2504 | 7429 | 12 | 22779 | 61652 |
| 2028-29 | 8873 | 964 | 531 | 3324 | 2635 | 7840 | 12 | 24179 | 65123 |
| 2029-30 | 9566 | 1006 | 552 | 3486 | 2772 | 8273 | 12 | 25667 | 68788 |
| 2030-31 | 10189 | 1039 | 570 | 3627 | 2884 | 8608 | 12 | 26929 | 71781 |
| 2031-32 | 10853 | 1072 | 588 | 3773 | 3000 | 8956 | 12 | 28254 | 74900 |
| 2032-33 | 11559 | 1106 | 606 | 3926 | 3120 | 9318 | 12 | 29647 | 78159 |
| 2033-34 | 12310 | 1141 | 625 | 4084 | 3246 | 9695 | 12 | 31113 | 81568 |
| 2034-35 | 13110 | 1179 | 644 | 4249 | 3378 | 10087 | 12 | 32659 | 85137 |
| 2035-36 | 13905 | 1212 | 663 | 4400 | 3496 | 10443 | 12 | 34131 | 88448 |
| 2036-37 | 14749 | 1245 | 682 | 4556 | 3619 | 10814 | 12 | 35677 | 91905 |
| 2037-38 | 15645 | 1279 | 702 | 4717 | 3748 | 11197 | 12 | 37300 | 95505 |
| 2038-39 | 16594 | 1314 | 723 | 4884 | 3881 | 11593 | 12 | 39001 | 99252 |
| 2039-40 | 17603 | 1351 | 744 | 5057 | 4018 | 12004 | 12 | 40789 | 103159 |
| 2040-41 | 18629 | 1385 | 765 | 5223 | 4150 | 12398 | 12 | 42562 | 106966 |
| 2041-42 | 19716 | 1419 | 787 | 5394 | 4286 | 12805 | 12 | 44419 | 110922 |

Traffic projections for Most Likely scenario is given as under

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Lambia Kalan121.020 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2023-24 | 6851 | 754 | 455 | 2520 | 1869 | 5130 | 12 | 17590 | 45650 |
| 2024-25 | 7374 | 803 | 458 | 2650 | 1974 | 5426 | 12 | 18697 | 48296 |
| 2025-26 | 7979 | 827 | 493 | 2792 | 2080 | 5749 | 12 | 19932 | 51239 |
| 2026-27 | 8569 | 878 | 497 | 2927 | 2191 | 6063 | 12 | 21137 | 54069 |
| 2027-28 | 9271 | 904 | 534 | 3085 | 2308 | 6424 | 12 | 22538 | 57370 |
| 2028-29 | 9960 | 958 | 538 | 3234 | 2431 | 6776 | 12 | 23909 | 60552 |
| 2029-30 | 10776 | 988 | 578 | 3409 | 2561 | 7178 | 12 | 25502 | 64257 |
| 2030-31 | 11443 | 1036 | 578 | 3545 | 2669 | 7466 | 12 | 26749 | 67024 |
| 2031-32 | 12236 | 1059 | 616 | 3707 | 2782 | 7800 | 12 | 28212 | 70294 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2032-33 | 12999 | 1111 | 616 | 3855 | 2899 | 8114 | 12 | 29606 | 73343 |
| 2033-34 | 13898 | 1135 | 656 | 4031 | 3022 | 8477 | 12 | 31231 | 76928 |
| 2034-35 | 14767 | 1190 | 657 | 4192 | 3149 | 8820 | 12 | 32787 | 80290 |
| 2035-36 | 15724 | 1210 | 697 | 4363 | 3267 | 9169 | 12 | 34442 | 83835 |
| 2036-37 | 16647 | 1263 | 697 | 4516 | 3389 | 9496 | 12 | 36020 | 87134 |
| 2037-38 | 17726 | 1284 | 739 | 4699 | 3516 | 9870 | 12 | 37846 | 90983 |
| 2038-39 | 18772 | 1340 | 740 | 4863 | 3647 | 10223 | 12 | 39597 | 94590 |
| 2039-40 | 19987 | 1362 | 783 | 5062 | 3784 | 10626 | 12 | 41616 | 98788 |
| 2040-41 | 21123 | 1418 | 784 | 5226 | 3915 | 10979 | 12 | 43457 | 102485 |
| 2041-42 | 22438 | 1438 | 828 | 5426 | 4052 | 11384 | 12 | 45578 | 106795 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Jojro ka Khera 184.020 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2023-24 | 6077 | 777 | 435 | 2613 | 2042 | 5971 | 12 | 17926 | 49431 |
| 2024-25 | 6584 | 815 | 455 | 2755 | 2160 | 6337 | 12 | 19118 | 52487 |
| 2025-26 | 7115 | 854 | 474 | 2896 | 2277 | 6704 | 12 | 20332 | 55559 |
| 2026-27 | 7689 | 894 | 494 | 3044 | 2401 | 7091 | 12 | 21625 | 58811 |
| 2027-28 | 8307 | 935 | 515 | 3200 | 2532 | 7501 | 12 | 23002 | 62259 |
| 2028-29 | 8977 | 978 | 537 | 3364 | 2670 | 7934 | 12 | 24472 | 65914 |
| 2029-30 | 9700 | 1023 | 560 | 3535 | 2815 | 8393 | 12 | 26038 | 69787 |
| 2030-31 | 10355 | 1059 | 579 | 3687 | 2934 | 8753 | 12 | 27379 | 72986 |
| 2031-32 | 11054 | 1098 | 598 | 3845 | 3060 | 9129 | 12 | 28796 | 76345 |
| 2032-33 | 11800 | 1138 | 618 | 4010 | 3192 | 9521 | 12 | 30291 | 79866 |
| 2033-34 | 12596 | 1179 | 639 | 4181 | 3329 | 9930 | 12 | 31866 | 83551 |
| 2034-35 | 13446 | 1221 | 661 | 4360 | 3472 | 10357 | 12 | 33529 | 87417 |
| 2035-36 | 14296 | 1260 | 682 | 4525 | 3604 | 10750 | 12 | 35129 | 91048 |
| 2036-37 | 15199 | 1299 | 704 | 4696 | 3740 | 11157 | 12 | 36807 | 94828 |
| 2037-38 | 16161 | 1339 | 726 | 4874 | 3882 | 11580 | 12 | 38574 | 98780 |
| 2038-39 | 17184 | 1380 | 749 | 5059 | 4029 | 12019 | 12 | 40432 | 102905 |
| 2039-40 | 18272 | 1422 | 772 | 5250 | 4181 | 12475 | 12 | 42384 | 107206 |
| 2040-41 | 19384 | 1462 | 795 | 5435 | 4328 | 12915 | 12 | 44331 | 111423 |
| 2041-42 | 20562 | 1503 | 820 | 5626 | 4480 | 13371 | 12 | 46374 | 115818 |

6.2 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 Gulabpura-Chittorgarh project, the Target Date and Target Traffic are defined as under:

Target Date - 1st June 2026

Target Traffic - 76316 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 3-4 years Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 76316 | 56551 | -26% | 39% | 20% | 20 | 4 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 76316 | 56946 | -25% | 38% | 20% | 20 | 4 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 76316 | 56143 | -26% | 40% | 20% | 20 | 4 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Gulabpura-Chittorgarh section of NH-19 is based on the old toll policy. As per the Toll Notification (Schedule -G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips in month at 2/3d rate. Additionally, concessionaire has announced special monthly passes for local commercial cars at Rs. 670.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van I - Rs. 275 per
 - b) Local LCV - Rs. 1200 per trip
 - c) Local Commercial Vehicles at 50% rate for single journey

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

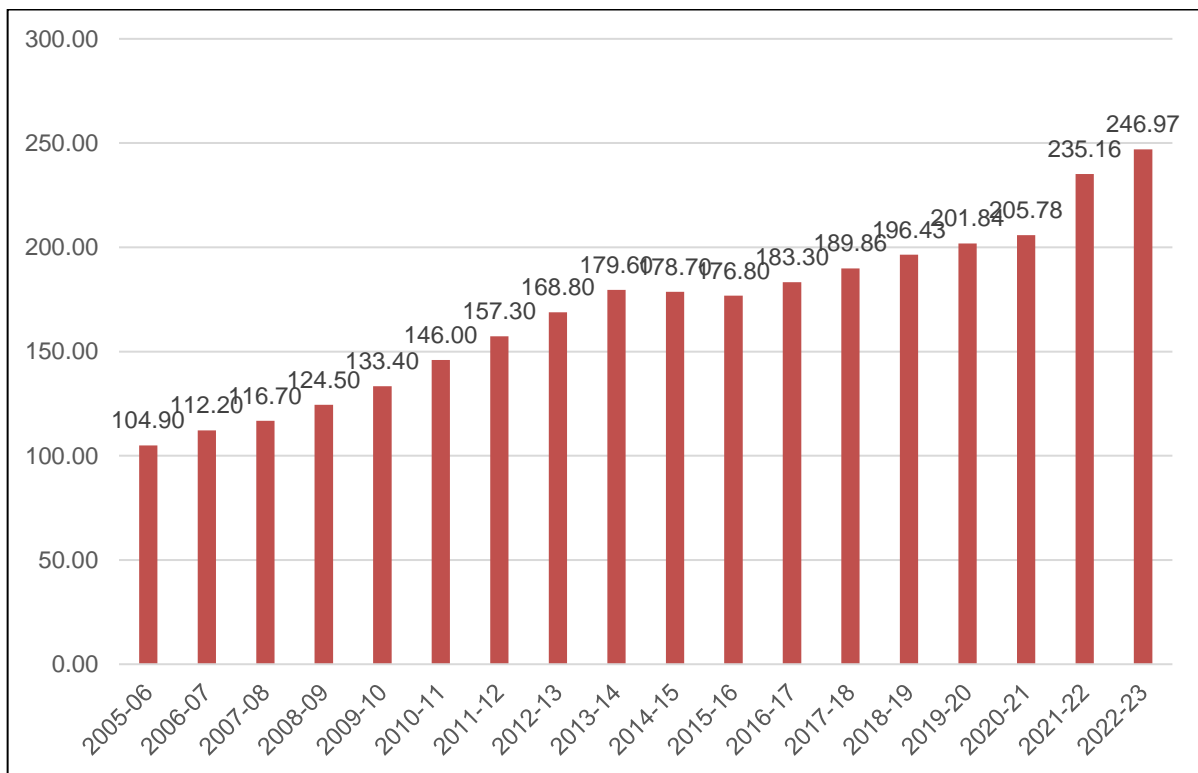


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

There is no bypass or structure to be factored in for rates calculations.

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

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

Table 7-2 : Toll Rates for Single Journey@ Km 121.020

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2023-24 | 95 | 155 | 325 | 325 | 355 | 510 | 620 |
| 2024-25 | 100 | 160 | 335 | 335 | 365 | 520 | 635 |
| 2025-26 | 105 | 165 | 350 | 350 | 380 | 550 | 670 |
| 2026-27 | 110 | 175 | 370 | 370 | 400 | 575 | 700 |
| 2027-28 | 115 | 185 | 385 | 385 | 420 | 605 | 735 |
| 2028-29 | 120 | 195 | 405 | 405 | 445 | 635 | 775 |
| 2029-30 | 125 | 205 | 425 | 425 | 465 | 670 | 815 |
| 2030-31 | 135 | 215 | 450 | 450 | 490 | 705 | 855 |
| 2031-32 | 140 | 225 | 470 | 470 | 515 | 740 | 900 |
| 2032-33 | 145 | 235 | 495 | 495 | 540 | 780 | 950 |
| 2033-34 | 155 | 250 | 520 | 520 | 570 | 820 | 995 |
| 2034-35 | 160 | 260 | 550 | 550 | 600 | 860 | 1050 |
| 2035-36 | 170 | 275 | 580 | 580 | 630 | 905 | 1105 |
| 2036-37 | 180 | 290 | 610 | 610 | 665 | 955 | 1165 |
| 2037-38 | 190 | 305 | 640 | 640 | 700 | 1005 | 1225 |
| 2038-39 | 200 | 320 | 675 | 675 | 735 | 1060 | 1290 |
| 2039-40 | 210 | 340 | 710 | 710 | 775 | 1115 | 1360 |
| 2040-41 | 220 | 360 | 750 | 750 | 820 | 1175 | 1430 |
| 2041-42 | 235 | 375 | 790 | 790 | 860 | 1240 | 1510 |

Table 7-3 : Toll Rates for Single Journey @ Km 184.020

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2023-24 | 100 | 160 | 335 | 335 | 370 | 530 | 645 |
| 2024-25 | 100 | 165 | 345 | 345 | 375 | 540 | 660 |
| 2025-26 | 105 | 175 | 365 | 365 | 395 | 570 | 695 |
| 2026-27 | 115 | 180 | 380 | 380 | 415 | 600 | 730 |
| 2027-28 | 120 | 190 | 400 | 400 | 435 | 630 | 765 |
| 2028-29 | 125 | 200 | 420 | 420 | 460 | 660 | 805 |
| 2029-30 | 130 | 210 | 445 | 445 | 485 | 695 | 845 |
| 2030-31 | 135 | 220 | 465 | 465 | 510 | 730 | 890 |
| 2031-32 | 145 | 235 | 490 | 490 | 535 | 765 | 935 |
| 2032-33 | 150 | 245 | 515 | 515 | 560 | 805 | 985 |
| 2033-34 | 160 | 260 | 540 | 540 | 590 | 850 | 1035 |
| 2034-35 | 170 | 270 | 570 | 570 | 620 | 895 | 1090 |
| 2035-36 | 175 | 285 | 600 | 600 | 655 | 940 | 1145 |
| 2036-37 | 185 | 300 | 630 | 630 | 690 | 990 | 1205 |
| 2037-38 | 195 | 315 | 665 | 665 | 725 | 1045 | 1270 |
| 2038-39 | 205 | 335 | 700 | 700 | 765 | 1100 | 1335 |
| 2039-40 | 220 | 350 | 740 | 740 | 805 | 1155 | 1410 |
| 2040-41 | 230 | 370 | 775 | 775 | 850 | 1220 | 1485 |
| 2041-42 | 240 | 390 | 820 | 820 | 895 | 1285 | 1565 |

Table 7-4 : Toll Rates for Return Journey @ Km 121.02

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 145 | 235 | 490 | 490 | 530 | 765 | 930 |
| 2024-25 | 150 | 240 | 500 | 500 | 545 | 785 | 955 |
| 2025-26 | 155 | 250 | 525 | 525 | 575 | 825 | 1000 |
| 2026-27 | 165 | 265 | 550 | 550 | 600 | 865 | 1055 |
| 2027-28 | 170 | 275 | 580 | 580 | 630 | 910 | 1105 |
| 2028-29 | 180 | 290 | 610 | 610 | 665 | 955 | 1165 |
| 2029-30 | 190 | 305 | 640 | 640 | 700 | 1005 | 1220 |
| 2030-31 | 200 | 320 | 675 | 675 | 735 | 1055 | 1285 |
| 2031-32 | 210 | 340 | 710 | 710 | 770 | 1110 | 1350 |
| 2032-33 | 220 | 355 | 745 | 745 | 810 | 1170 | 1420 |
| 2033-34 | 230 | 375 | 785 | 785 | 855 | 1230 | 1495 |
| 2034-35 | 245 | 395 | 825 | 825 | 900 | 1295 | 1575 |
| 2035-36 | 255 | 415 | 870 | 870 | 945 | 1360 | 1655 |
| 2036-37 | 270 | 435 | 915 | 915 | 995 | 1430 | 1745 |
| 2037-38 | 285 | 460 | 960 | 960 | 1050 | 1510 | 1835 |
| 2038-39 | 300 | 485 | 1015 | 1015 | 1105 | 1590 | 1935 |
| 2039-40 | 315 | 510 | 1065 | 1065 | 1165 | 1675 | 2035 |
| 2040-41 | 330 | 535 | 1125 | 1125 | 1225 | 1765 | 2145 |
| 2041-42 | 350 | 565 | 1185 | 1185 | 1295 | 1860 | 2260 |

Table 7-5 : Toll Rates for Return Journey @ Km 184.020

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 150 | 240 | 505 | 505 | 550 | 795 | 965 |
| 2024-25 | 155 | 245 | 520 | 520 | 565 | 815 | 990 |
| 2025-26 | 160 | 260 | 545 | 545 | 595 | 855 | 1040 |
| 2026-27 | 170 | 275 | 570 | 570 | 625 | 895 | 1090 |
| 2027-28 | 180 | 285 | 600 | 600 | 655 | 940 | 1145 |
| 2028-29 | 185 | 300 | 630 | 630 | 690 | 990 | 1205 |
| 2029-30 | 195 | 315 | 665 | 665 | 725 | 1040 | 1265 |
| 2030-31 | 205 | 335 | 700 | 700 | 760 | 1095 | 1330 |
| 2031-32 | 215 | 350 | 735 | 735 | 800 | 1150 | 1400 |
| 2032-33 | 230 | 370 | 770 | 770 | 840 | 1210 | 1475 |
| 2033-34 | 240 | 390 | 810 | 810 | 885 | 1275 | 1550 |
| 2034-35 | 255 | 410 | 855 | 855 | 935 | 1340 | 1630 |
| 2035-36 | 265 | 430 | 900 | 900 | 980 | 1410 | 1720 |
| 2036-37 | 280 | 450 | 945 | 945 | 1035 | 1485 | 1810 |
| 2037-38 | 295 | 475 | 995 | 995 | 1090 | 1565 | 1905 |
| 2038-39 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2005 |
| 2039-40 | 325 | 530 | 1105 | 1105 | 1205 | 1735 | 2115 |
| 2040-41 | 345 | 555 | 1165 | 1165 | 1270 | 1830 | 2225 |
| 2041-42 | 365 | 585 | 1230 | 1230 | 1340 | 1925 | 2345 |

Table 7-6 : Toll Rates for Monthly Pass Local @ Km 121.020

| Year | Car | Minibus /LCV |
|----------------|------------|---------------------|
| 2023-24 | 330 | 1470 |
| 2024-25 | 340 | 1485 |
| 2025-26 | 355 | 1560 |
| 2026-27 | 375 | 1640 |
| 2027-28 | 390 | 1720 |
| 2028-29 | 410 | 1805 |
| 2029-30 | 435 | 1895 |
| 2030-31 | 455 | 1990 |
| 2031-32 | 480 | 2090 |
| 2032-33 | 505 | 2195 |
| 2033-34 | 530 | 2305 |
| 2034-35 | 560 | 2420 |
| 2035-36 | 585 | 2540 |
| 2036-37 | 620 | 2665 |
| 2037-38 | 650 | 2800 |
| 2038-39 | 685 | 2940 |
| 2039-40 | 720 | 3085 |
| 2040-41 | 760 | 3240 |
| 2041-42 | 800 | 3400 |

Table 7-7 : Toll Rates for Monthly Pass Local @ Km 184.020

| Year | Car | Minibus /LCV |
|----------------|------------|---------------------|
| 2023-24 | 330 | 1165 |
| 2024-25 | 340 | 1175 |
| 2025-26 | 355 | 1235 |
| 2026-27 | 375 | 1295 |
| 2027-28 | 390 | 1360 |
| 2028-29 | 410 | 1430 |
| 2029-30 | 435 | 1500 |
| 2030-31 | 455 | 1575 |
| 2031-32 | 480 | 1655 |
| 2032-33 | 505 | 1740 |
| 2033-34 | 530 | 1825 |
| 2034-35 | 560 | 1915 |
| 2035-36 | 585 | 2010 |
| 2036-37 | 620 | 2110 |
| 2037-38 | 650 | 2215 |
| 2038-39 | 685 | 2325 |
| 2039-40 | 720 | 2440 |
| 2040-41 | 760 | 2560 |
| 2041-42 | 800 | 2690 |

Table 7-8 : Toll Rates for Monthly Pass @ Km 121.020

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 3200 | 5170 | 10835 | 10835 | 11820 | 16995 | 20690 |
| 2024-25 | 3280 | 5300 | 11105 | 11105 | 12115 | 17415 | 21200 |
| 2025-26 | 3445 | 5565 | 11665 | 11665 | 12725 | 18290 | 22265 |
| 2026-27 | 3620 | 5850 | 12255 | 12255 | 13365 | 19215 | 23395 |
| 2027-28 | 3805 | 6145 | 12875 | 12875 | 14045 | 20190 | 24580 |
| 2028-29 | 4000 | 6460 | 13530 | 13530 | 14760 | 21220 | 25835 |
| 2029-30 | 4205 | 6790 | 14225 | 14225 | 15520 | 22305 | 27155 |
| 2030-31 | 4420 | 7140 | 14955 | 14955 | 16315 | 23455 | 28555 |
| 2031-32 | 4645 | 7505 | 15730 | 15730 | 17160 | 24665 | 30025 |
| 2032-33 | 4890 | 7895 | 16545 | 16545 | 18050 | 25945 | 31585 |
| 2033-34 | 5145 | 8310 | 17405 | 17405 | 18990 | 27295 | 33230 |
| 2034-35 | 5410 | 8740 | 18320 | 18320 | 19985 | 28725 | 34970 |
| 2035-36 | 5695 | 9200 | 19280 | 19280 | 21035 | 30235 | 36810 |
| 2036-37 | 5995 | 9690 | 20300 | 20300 | 22145 | 31830 | 38750 |
| 2037-38 | 6315 | 10200 | 21375 | 21375 | 23315 | 33520 | 40805 |
| 2038-39 | 6650 | 10745 | 22510 | 22510 | 24560 | 35305 | 42980 |
| 2039-40 | 7005 | 11320 | 23715 | 23715 | 25870 | 37190 | 45275 |
| 2040-41 | 7385 | 11925 | 24990 | 24990 | 27260 | 39185 | 47705 |
| 2041-42 | 7780 | 12570 | 26335 | 26335 | 28730 | 41300 | 50275 |

Table 7-9 : Toll Rates for Monthly Pass @ Km 184.02

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 3320 | 5365 | 11240 | 11240 | 12260 | 17625 | 21455 |
| 2024-25 | 3400 | 5495 | 11515 | 11515 | 12560 | 18060 | 21985 |
| 2025-26 | 3575 | 5775 | 12095 | 12095 | 13195 | 18970 | 23090 |
| 2026-27 | 3755 | 6065 | 12705 | 12705 | 13860 | 19925 | 24260 |
| 2027-28 | 3945 | 6375 | 13350 | 13350 | 14565 | 20940 | 25490 |
| 2028-29 | 4145 | 6700 | 14035 | 14035 | 15310 | 22005 | 26790 |
| 2029-30 | 4360 | 7040 | 14750 | 14750 | 16095 | 23135 | 28160 |
| 2030-31 | 4585 | 7405 | 15510 | 15510 | 16920 | 24325 | 29610 |
| 2031-32 | 4820 | 7785 | 16310 | 16310 | 17795 | 25580 | 31140 |
| 2032-33 | 5070 | 8190 | 17155 | 17155 | 18715 | 26905 | 32755 |
| 2033-34 | 5335 | 8615 | 18050 | 18050 | 19690 | 28305 | 34460 |
| 2034-35 | 5610 | 9065 | 18995 | 18995 | 20725 | 29790 | 36265 |
| 2035-36 | 5905 | 9545 | 19995 | 19995 | 21810 | 31355 | 38170 |
| 2036-37 | 6220 | 10045 | 21050 | 21050 | 22965 | 33010 | 40185 |
| 2037-38 | 6550 | 10580 | 22165 | 22165 | 24180 | 34760 | 42315 |
| 2038-39 | 6900 | 11140 | 23345 | 23345 | 25470 | 36610 | 44570 |
| 2039-40 | 7265 | 11740 | 24595 | 24595 | 26830 | 38565 | 46950 |
| 2040-41 | 7655 | 12370 | 25915 | 25915 | 28270 | 40635 | 49470 |
| 2041-42 | 8070 | 13035 | 27310 | 27310 | 29795 | 42825 | 52135 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2041- 42 starting from the year 2023-24 are shown in tables below.

Table 7-10 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP2 | Total |
|---------|---------|---------|---------|
| 2023-24 | 179.77 | 202.66 | 382.43 |
| 2024-25 | 195.69 | 219.43 | 415.12 |
| 2025-26 | 218.10 | 245.10 | 463.20 |
| 2026-27 | 243.02 | 273.50 | 516.53 |
| 2027-28 | 271.24 | 305.53 | 576.77 |
| 2028-29 | 301.72 | 339.01 | 640.73 |
| 2029-30 | 336.62 | 378.65 | 715.27 |
| 2030-31 | 372.47 | 416.44 | 788.92 |
| 2031-32 | 410.70 | 460.07 | 870.77 |
| 2032-33 | 451.41 | 505.32 | 956.73 |
| 2033-34 | 498.52 | 558.27 | 1056.79 |
| 2034-35 | 549.15 | 616.50 | 1165.64 |
| 2035-36 | 605.07 | 677.27 | 1282.34 |
| 2036-37 | 664.60 | 742.18 | 1406.78 |
| 2037-38 | 730.43 | 816.54 | 1546.97 |
| 2038-39 | 803.66 | 897.14 | 1700.80 |
| 2039-40 | 885.52 | 988.77 | 1874.29 |
| 2040-41 | 969.76 | 1082.31 | 2052.07 |
| 2041-42 | 1066.32 | 1187.18 | 2253.49 |

Table 7-11 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP2 | Total |
|---------|--------|--------|---------|
| 2023-24 | 179.77 | 202.66 | 382.43 |
| 2024-25 | 194.78 | 218.42 | 413.21 |
| 2025-26 | 216.02 | 242.81 | 458.83 |
| 2026-27 | 239.55 | 269.60 | 509.15 |
| 2027-28 | 266.11 | 299.72 | 565.83 |
| 2028-29 | 294.67 | 331.05 | 625.72 |
| 2029-30 | 327.24 | 367.99 | 695.23 |
| 2030-31 | 360.24 | 402.80 | 763.05 |
| 2031-32 | 395.24 | 442.81 | 838.05 |
| 2032-33 | 432.31 | 484.01 | 916.32 |
| 2033-34 | 475.12 | 532.08 | 1007.20 |

| Year | TP-1 | TP2 | Total |
|----------------|--------|---------|----------------|
| 2034-35 | 520.93 | 584.71 | 1105.64 |
| 2035-36 | 571.17 | 639.21 | 1210.38 |
| 2036-37 | 624.33 | 697.13 | 1321.45 |
| 2037-38 | 682.92 | 763.21 | 1446.13 |
| 2038-39 | 747.88 | 834.49 | 1582.37 |
| 2039-40 | 820.07 | 915.45 | 1735.52 |
| 2040-41 | 893.78 | 997.22 | 1891.01 |
| 2041-42 | 978.01 | 1088.73 | 2066.74 |

**Table 7-12 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

| Year | TP-1 | TP2 | Total |
|----------------|---------|---------|----------------|
| 2023-24 | 179.77 | 202.66 | 382.43 |
| 2024-25 | 195.20 | 218.93 | 414.13 |
| 2025-26 | 217.04 | 243.98 | 461.01 |
| 2026-27 | 241.26 | 271.52 | 512.78 |
| 2027-28 | 268.66 | 302.62 | 571.28 |
| 2028-29 | 298.19 | 334.99 | 633.18 |
| 2029-30 | 331.89 | 373.25 | 705.14 |
| 2030-31 | 366.30 | 409.42 | 775.71 |
| 2031-32 | 402.88 | 451.18 | 854.06 |
| 2032-33 | 441.84 | 494.34 | 936.18 |
| 2033-34 | 486.76 | 544.88 | 1031.64 |
| 2034-35 | 534.91 | 600.25 | 1135.16 |
| 2035-36 | 588.04 | 657.83 | 1245.87 |
| 2036-37 | 644.35 | 719.23 | 1363.58 |
| 2037-38 | 706.50 | 789.35 | 1495.85 |
| 2038-39 | 775.59 | 865.06 | 1640.65 |
| 2039-40 | 852.48 | 951.20 | 1803.68 |
| 2040-41 | 931.39 | 1038.63 | 1970.02 |
| 2041-42 | 1021.63 | 1136.51 | 2158.13 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Gulabpura to Chittorgarh section of NH-79 in state of Rajasthan from km 90.000 to km 214.870 nearing completion of six laning. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the busy and prominent national highway NH-79 which connects Kishangarh to Udaipur via Bhiwala and Chittorgarh. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As discussed, the dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

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

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



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HAPUR TO MORADABAD SECTION OF NH-9 IN THE STATE OF UTTAR PRADESH (KM 50.000 TO KM148.277)



TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)

MARCH 2024



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**HAPUR TO MORADABAD SECTION OF NH-9
IN THE STATE OF UTTAR PRADESH
(KM 50.000 TO KM148.277)**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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, Six Laning of **Hapur Bypass to Moradabad section** of NH-9 from km 50.000 to km 148.277 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. M/s IRB Hapur Moradabad Tollway Ltd. (Concessionaire) has been awarded the Project for a concession period of 22 years starting from 28th May 2019. The Project is under capacity augmentation to six lanes. Tolling operation under current concession started in May 2019. COD-2 has been received in April 2023.

Project stretch from Hapur to Moradabad is part of new NH-9 which starts from Fazilka in Punjab and terminates in Uttarakhand at Pithoragarh. Previously this section was part of old NH-24 which is still popularly known as Delhi – Lucknow Road. New NH-9 takes off towards Pithoragarh from Rampur. A number of sections along the project road from Hapur to Moradabad have witnessed urban development along the highway. Places like Pilakhua, Babugarh, Brijghat, Gajrola and Joya are fast upcoming urban centers. Close proximity to Delhi and this being main connectivity of region to NCR is main region for this ribbon development along highway. The following figure shows the project road alignment.

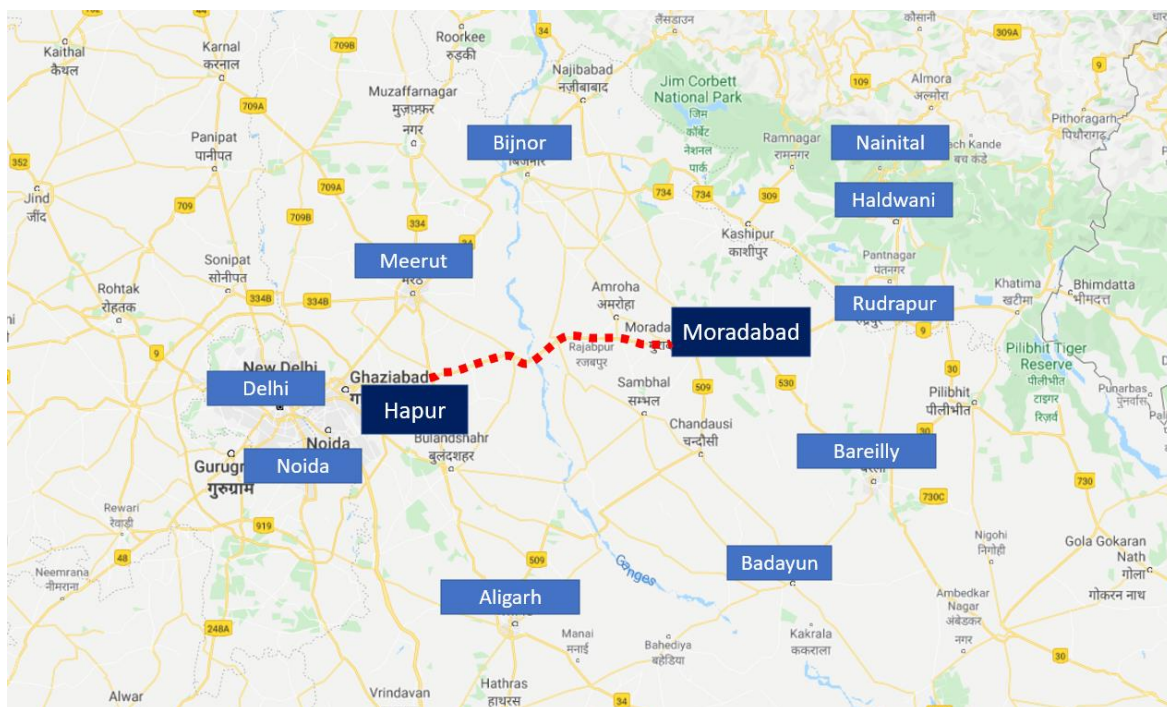


Figure 1-1: Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

The project road is the section of the former NH-24 which has now been re-designated as NH-9 connecting Fazilka in Punjab to Pithoragarh in Uttarakhand. On the way it connects several important cities in five states in North India (from west towards east): Malout, Sirsa, Hisar, Rohtak, Bahadurgarh, Delhi, Ghaziabad, Hapur, Moradabad, Rampur, Rudrapur, Sitarganj, Khatima, Pithoragarh. The total length of the highway is 811 Km. After renumbering of all national highways by National Highway Authority of India in 2010, the current NH 9 was formed by merging five differently numbered national highways in 2010, including Old NH 10 (Fazilka-Delhi section), Old NH 24 (Delhi-Rampur section), Old NH 87 (Rampur-Rudrapur section), Old NH 74 (Rudrapur-Sitarganj-Khatima section) and Old NH 125 (Tanakpur-Pithoragarh section)

2.2 Project Stretch Description

The Project section starts from Hapur Bypass (Km50.000) and ends in Moradabad (Km148.277). The total design length of project road section is about 100 Kms. The existing road is four lane divided carriageway, which is proposed to be six laned. The road passes through the districts of Hapur, Amroha and Moradabad; all in Uttar Pradesh.

Project road alignment passes through the small towns/built-up areas of Pakwara, Joya and Babugarh. Simbhaoli, one of the largest integrated sugar refinery complexes is right on the project road.

Hapur – Moradabad section of NH-9 was previously known as Delhi Road locally. This forms the main connectivity of areas like Moradabad, Rampur, Bareilly and important destinations in Uttarakhand like Rudrapur, Kashipur, Ranikhet, Pithoragarh etc to the national capital of Delhi.

There are two operative toll plazas at project stretch. The first is at Garh at Km 90.661 and second at Joya at Km 123.875. The following figure shows project alignment and toll plaza locations.

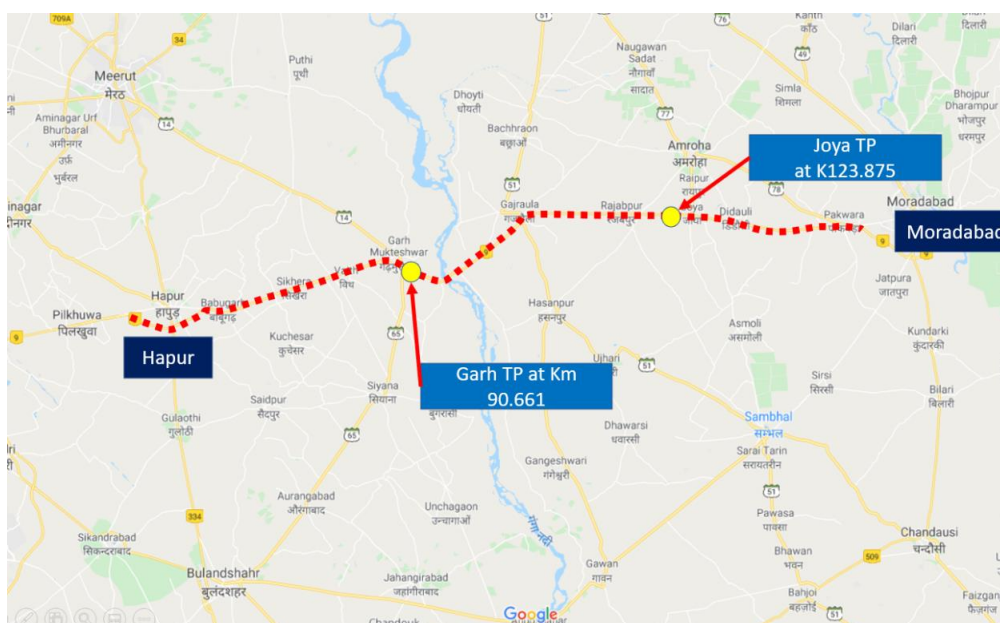


Figure 2-1: Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Six laning of project stretch is in progress and will be completed soon. The following photographs illustrate the project section along the corridor.



Figure 2-2: Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Hapur Bypass- Moradabad Section of NH-9 for years 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,22-23 and traffic data from April 2023 to November 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 the 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

ic details have been collected.

Table 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|------------------------------|--|---|---|--|---|
| 1 | Km 90.661 Toll Plaza at Garh | AADT for Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022 and 2022, | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022, |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--|---|--|--|--|--|
| | | month from April 2023 to November 2023 | month from April 2023 to November 2023 | month from April 2023 to November 2023 | 2022-2023 & Eight month from April 2023 to November 2023 | 2023 & Eight month from April 2023 to November 2023 |
| 2 | Km 123.875 Toll Plaza at Zoro ka Khera | AADT for Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022-2023 & Eight month from April 2023 to November 2023 |

3.5 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : Vehicle Classification System

| Vehicle Type |
|---------------|
| Auto Rickshaw |

| Vehicle Type | |
|----------------|--|
| 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Bus
- Truck
- 3-Axle
- Multi Axle

3.6 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 the report.

3.6.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Additionally, during the current year traffic was impacted due to extended period of Shraavan Kanwar Yatra in region. It is worthwhile to note that during Kanwar Yatra several routes are closed or diverted to facilitate this religious yatra. Hence, taking above factors into consideration, a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations.

The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Garh Toll Plaza at Km 90.661

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-------------------|--|--|--|--|--|
| 1 | Car | 14878 | 15865 | 21889 | 24088 | 27330 |
| 2 | Minibus/LCV | 3704 | 3119 | 1995 | 1730 | 1743 |
| 3 | Bus | 2033 | 1573 | 1862 | 2069 | 2303 |
| 4 | Truck | 1289 | 1354 | 1674 | 1972 | 2036 |
| 5 | 3-Axle | 1318 | 1105 | 1112 | 1070 | 1075 |
| 6 | Multi Axle | 1753 | 1635 | 1745 | 1962 | 2191 |
| 7 | Oversized Vehicle | 2 | 6 | 6 | 9 | 7 |
| | Total | 24977 | 24657 | 30283 | 32899 | 36686 |

Table 3-4 : Traffic Data at Zoya Toll Plaza at Km 123.875

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-----------------|--|--|--|--|--|
| 1 | Car | 10298 | 10526 | 13695 | 16037 | 18696 |
| 2 | Minibus/LCV | 2595 | 2259 | 1335 | 1181 | 1191 |
| 3 | Bus | 1062 | 1303 | 1485 | 1768 | 2008 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|------------------|--|--|--|--|--|
| 4 | Truck | 1532 | 1040 | 1184 | 1436 | 1628 |
| 5 | 3-Axle | 1128 | 1064 | 1081 | 1008 | 936 |
| 6 | Multi Axle | 1365 | 1370 | 1458 | 1765 | 2017 |
| 7 | Oversize Vehicle | 2 | 8 | 8 | 9 | 6 |
| | Total | 17982 | 17570 | 20246 | 23203 | 26481 |

3.7 Data Analysis

3.7.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-5**.

Table 3-5 : 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 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24

| Toll Plaza Location (Km) | Year | Traffic No | PCU | PCU Index |
|----------------------------|------------------|------------|-------|-----------|
| Garh Km 90.661 | 2019-2020 | 24977 | 42251 | 1.69 |
| | 2020-2021 | 24657 | 40024 | 1.62 |
| | 2021-2022 | 30283 | 46705 | 1.54 |
| | 2022-2023 | 32899 | 50882 | 1.55 |
| | 2023-2024 | 36686 | 56079 | 1.53 |
| Joya Km 123.875 | 2019-2020 | 17982 | 31508 | 1.75 |
| | 2020-2021 | 17570 | 30337 | 1.73 |
| | 2021-2022 | 20246 | 33545 | 1.66 |
| | 2022-2023 | 23203 | 38427 | 1.66 |
| | 2023-2024 | 26481 | 43300 | 1.64 |

It can be observed from above that project traffic has PCU index in range of 1.5 to 1.7 which is an indicator of high proportion of Passenger traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at four toll plaza locations.

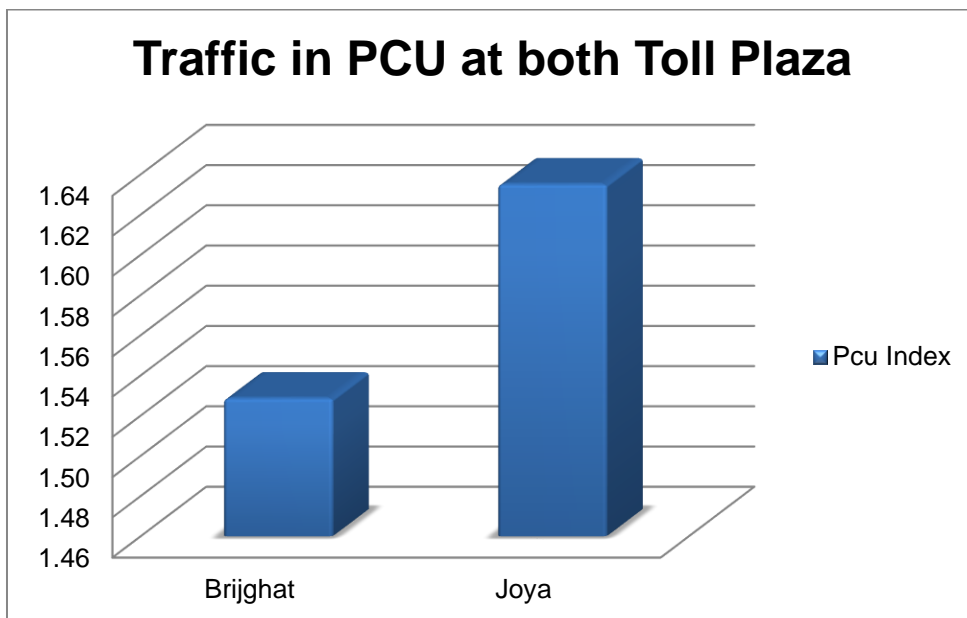


Figure 3-1: Comparison of PCU Index

It can be observed that PCU index is consistent at both toll plaza locations.

3.7.2 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.

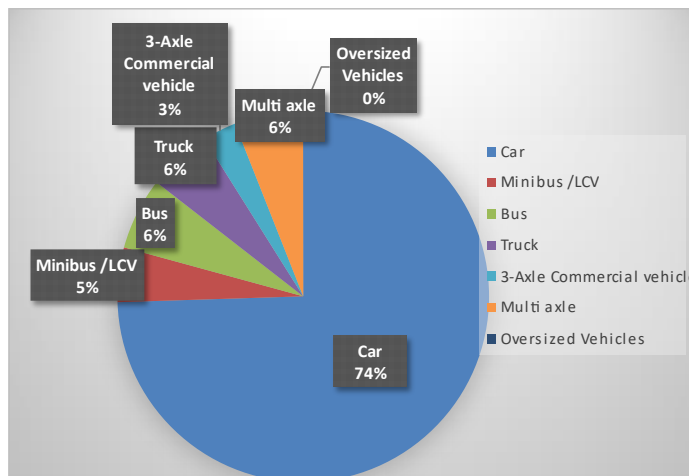


Figure 3-2: Model Split of Tollable Vehicle @TP-1

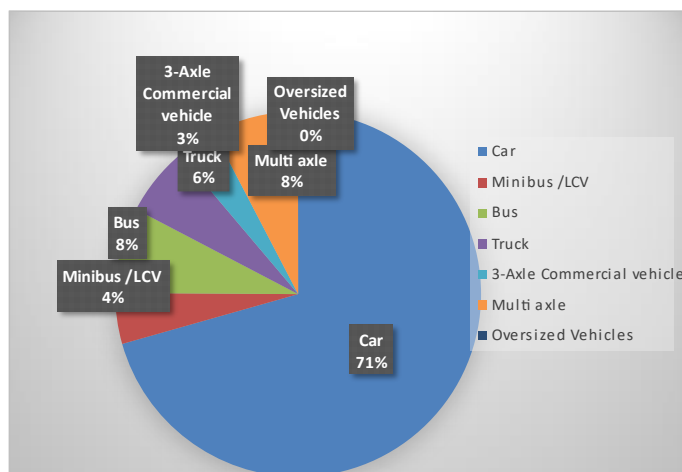


Figure 3-3: Model Split of Tollable Vehicle @TP-2

It is observed that car traffic forms about 74% - 71% of total traffic at toll plaza locations while multi axle commercial vehicles are about 9% -12% of total traffic. Truck / Bus and LCV share about 12%-14% and 5%-4% of traffic volume respectively.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-7 : Journey Type Bifurcation of Traffic at GarhTP-1 KM 90.661

| Sr. No | Type | Traffic Volume (Nos.)2023-24 |
|--------|---------------------------------|------------------------------|
| 1 | Single Journey | 16693 |
| 2 | Return Journey | 19950 |
| 3 | Local Commercial Single Journey | 7 |
| 4 | Monthly Pass Local | 29 |
| 5 | Monthly Pass | 7 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor. The single journey component in total traffic numbers is as high as 46%. Return journey component is 54%. The number of monthly pass local and Local Commercial Journey is 0% at Brijghat. The following tables give the details of journey distribution at Joya toll plaza at Km 123.875.

Table 3-8 : Journey Type Bifurcation of Traffic at Zoro ka Khera TP-2 KM 121.020

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------------|
| 1 | Single Journey | 14179 |
| 2 | Return Journey | 12275 |
| 3 | Local Commercial Single Journey | 11 |
| 4 | Monthly Pass Local | 7 |
| 5 | Monthly Pass | 9 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.8 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch has toll application history from last few years, and it can be assumed that project traffic is settled. However, from an analysis point of view there can be a few alternate routes at local level. Garh toll plaza is very near to the major river Ganga over which major bridge about 1 km in length is constructed. Due to this there is no local alternative route to toll plaza at Garh. There can be one alternative route which can bypass the toll plaza at Joya. From Atrasi one can take a left and bypass Toll Plaza at Joya and go back to NH-9 at Moradabad. This route quite long and passes through congested areas of Amroha. Further the road alignment of these district roads is very poor with little chance of improvement.

The following maps show these routes in relation to project stretch at local level.

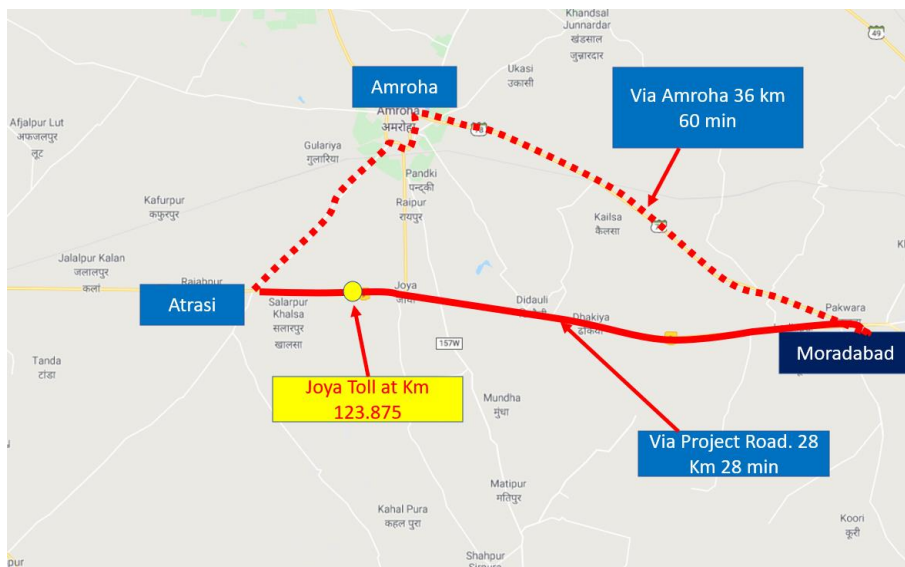


Figure 4-1: Alternate route at regional level

At regional level if we take Hisar and Rudrapur two origin destinations representing Delhi/ Haryana and Uttarakhand region, there can be one alternate via Bulandshahar – Sambhal Road. One can take Bulaandshahar road after getting down from Peripheral Expressway at after Ghaziabad. This road bypasses NH-9 between Ghaziabad and Moradabad. This route is also quite long as compared to NH-9 and also the road between Bulandshahar – Sambhal and Moradabad is poor and mostly of two-lane specifications. Hence in such case it has very little potential of any further traffic diversion from the project road.

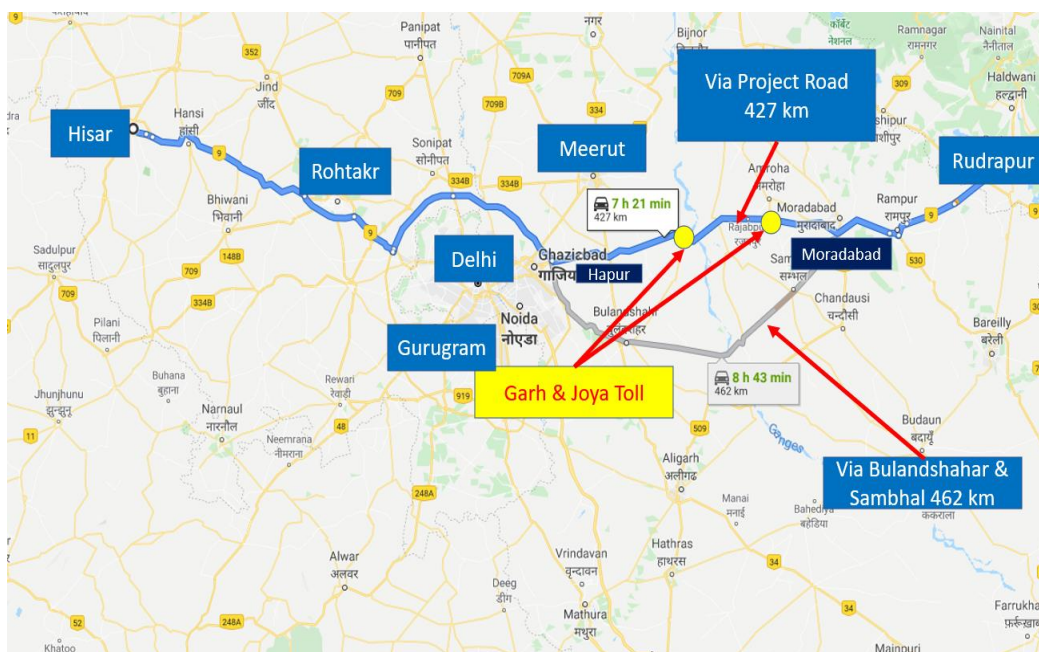


Figure 4-2: Alternate route at local level

It can be observed that the project highway forms one of the main spines of the corridor between Delhi / Ghaziabad/ Hapurand Moradabad / Rudrapur/ Haldwani. Traffic on project road is now settled and it can be assumed as dedicated traffic on project road for logistic obligations.

With six laning now nearing completion, the project stretch would become slightly more attractive due to the improved level of service. In such a case any diversion of traffic from the project road is not envisaged.

The following table provides summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Competing Roads Details

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|--|-----------------|-------------|-------------------|------------------|--|
| Regional Level | | | | | | |
| 1 | Hisar-Delhi- Bulandshahar- Sambhal- Moradabad - Rudrapur | Alternate Route | 462 | 53 | 8Hr 43 Min | Alternate route is longer and has poor geometrics and specifications. Traffic diversion not envisaged |
| | Hisar-Delhi- Hapur- Gajrola- Moradabad - Rudrapur | Project Road | 427 | 57 | 7 Hr 27 Min | |
| Local Level | | | | | | |
| 2 | Atrasi- Amroha- Pakbara- Moradabad (bypassing Joya Toll) | Alternate Route | 36 | 51 | 1 Hr. | Alternate route is unlikely to attract project traffic due to very poor geometrics and high congestion |
| | Atrasi- Joya- Palkbara- Moradabad | Project Road | 220 | 50 | 28 Min | |

Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road. Further, it may be noted that since the project highway has already been commissioned and has a tolling history, the current traffic traversing the project corridor already factors in traffic diversion (if any) that may have taken place.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Hapur–Moradabad section of NH-9 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

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

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

The project corridor spreads across the state of Rajasthan. Toll plazas at Garh and Joya are in the state of Uttar Pradesh. For elasticity calculations, working data from Uttar Pradesh, Delhi and Haryana has been analyzed since Delhi and Haryana have substantial impact on project traffic.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

Table 5-1 : Per Capita Income Vs Car Uttar Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2012 | 32002 | 1108100 | 4.51 | 6.04 | | |
| 2013 | 32908 | 1205374 | 4.52 | 6.08 | 3% | |
| 2014 | 34044 | 1423020 | 4.53 | 6.15 | 3% | |
| 2015 | 34583 | 1572217 | 4.54 | 6.20 | 2% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2016 | 36973 | 1746117 | 4.57 | 6.24 | 7% | |
| 2017 | 40641 | 2027972 | 4.61 | 6.31 | 10% | 4.94% |

Regression analysis of same is given in figure below.

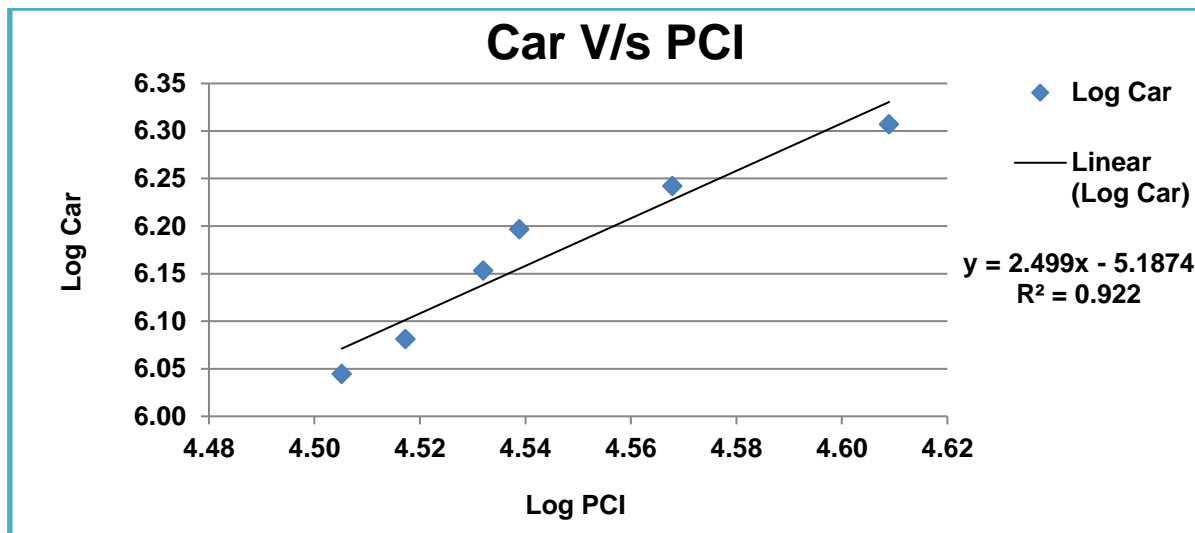


Figure 5-1: Regression and Elasticity PCI vs. Car–Extrapolation Uttar Pradesh

Table 5-2 : Population Vs Bus Uttar Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 199812341 | 57901 | 8.30 | 4.76 | | |
| 2013 | 203382046 | 64147 | 8.31 | 4.81 | 2% | |
| 2014 | 206942855 | 74389 | 8.32 | 4.87 | 2% | |
| 2015 | 210493544 | 80460 | 8.32 | 4.91 | 2% | |
| 2016 | 214032922 | 89127 | 8.33 | 4.95 | 2% | |
| 2017 | 217559836 | 112020 | 8.34 | 5.05 | 2% | 1.72% |

Regression analysis of same is given in figure below.

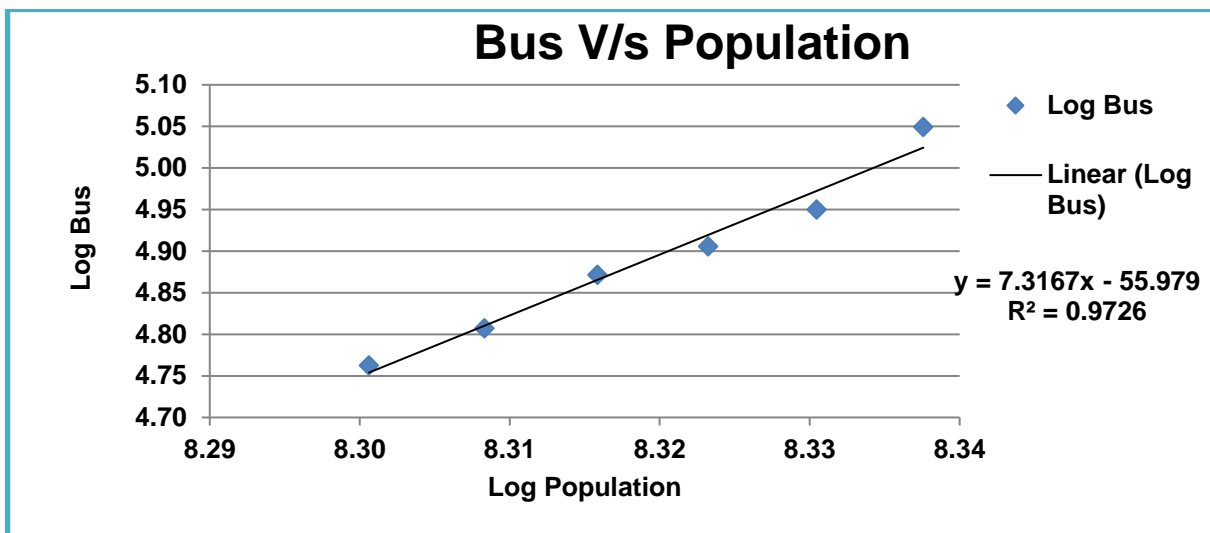


Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : LCV Traffic Vs NSDP Uttar Pradesh

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 645132 | 176164 | 5.81 | 5.25 | | |
| 2013 | 673552 | 213657 | 5.83 | 5.33 | 4% | |
| 2014 | 707469 | 265025 | 5.85 | 5.42 | 5% | |
| 2015 | 729686 | 294022 | 5.86 | 5.47 | 3% | |
| 2016 | 792049 | 316815 | 5.90 | 5.50 | 9% | 5.28% |

The following figure depicts regression analysis and extrapolation.

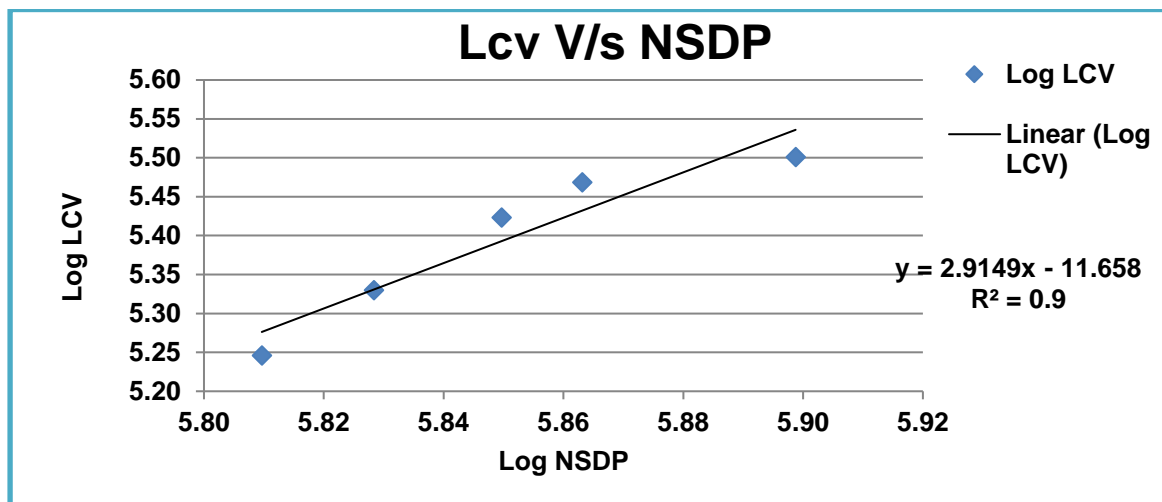


Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Uttar Pradesh

Table 5-4: Trucks Traffic Vs NSDP Uttar Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 645132 | 162813 | 5.81 | 5.21 | | |
| 2013 | 673552 | 186404 | 5.83 | 5.27 | 4% | |
| 2014 | 707469 | 202761 | 5.85 | 5.31 | 5% | |
| 2015 | 729686 | 217609 | 5.86 | 5.34 | 3% | |
| 2016 | 792049 | 245688 | 5.90 | 5.39 | 9% | |
| 2017 | 883962 | 265167 | 5.95 | 5.42 | 12% | 6.55% |

The following figure depicts regression analysis and extrapolation.

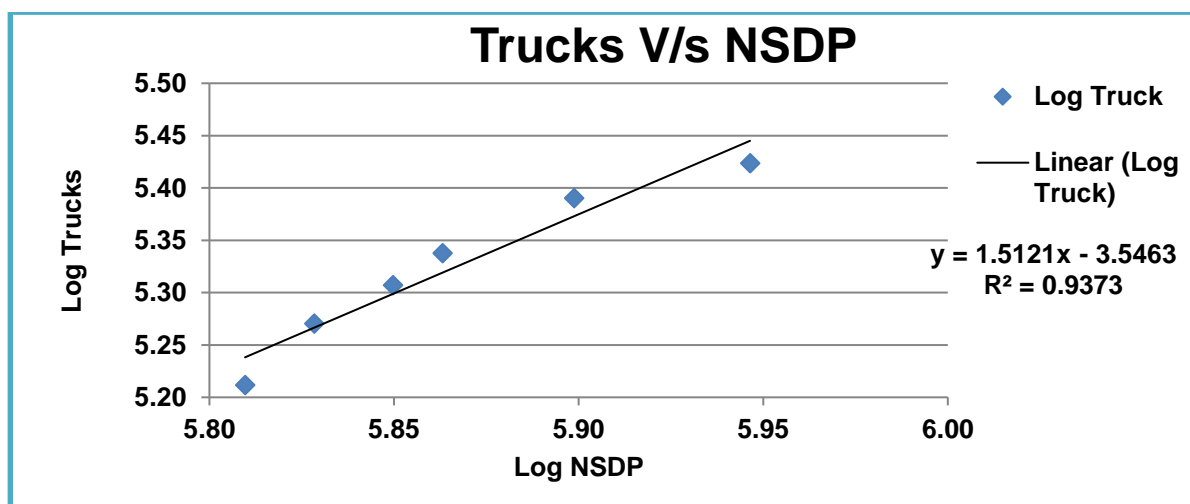


Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Uttar Pradesh

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. R² statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R² more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-4 : Summary Regression Analysis Uttar Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|---------------|------------------|----------------------|--------------------------|-------------------------|----------------------------|----------------|----------------------|
| Uttar Pradesh | Car/Jeep | PCI | $y = 2.499x + -5.1874$ | R ² = 0.922 | 2.4990 | 4.94% | 12.34% |
| | Bus | Population | $y = 7.3167x - -55.9791$ | R ² = 0.9726 | 7.3167 | 1.72% | 12.56% |
| | LCV | NSDP | $y = 2.9149x - -11.6585$ | R ² = 0.9 | 2.9149 | 5.28% | 15.40% |
| | Truck | NSDP | $y = 1.5121x - -3.5463$ | R ² = 0.9373 | 1.5121 | 6.55% | 9.90% |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Delhi State.

Table 5-5 : Per Capita Income Vs Car Delhi

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 185361 | 2172069 | 5.27 | 6.34 | | |
| 2013 | 193175 | 2416974 | 5.29 | 6.38 | 4% | |
| 2014 | 202216 | 2568380 | 5.31 | 6.41 | 5% | |
| 2015 | 215726 | 2730071 | 5.33 | 6.44 | 7% | |
| 2016 | 235737 | 2986579 | 5.37 | 6.48 | 9% | |
| 2017 | 247255 | 3061817 | 5.39 | 6.49 | 5% | 5.95% |

Regression analysis of same is given in figure below.

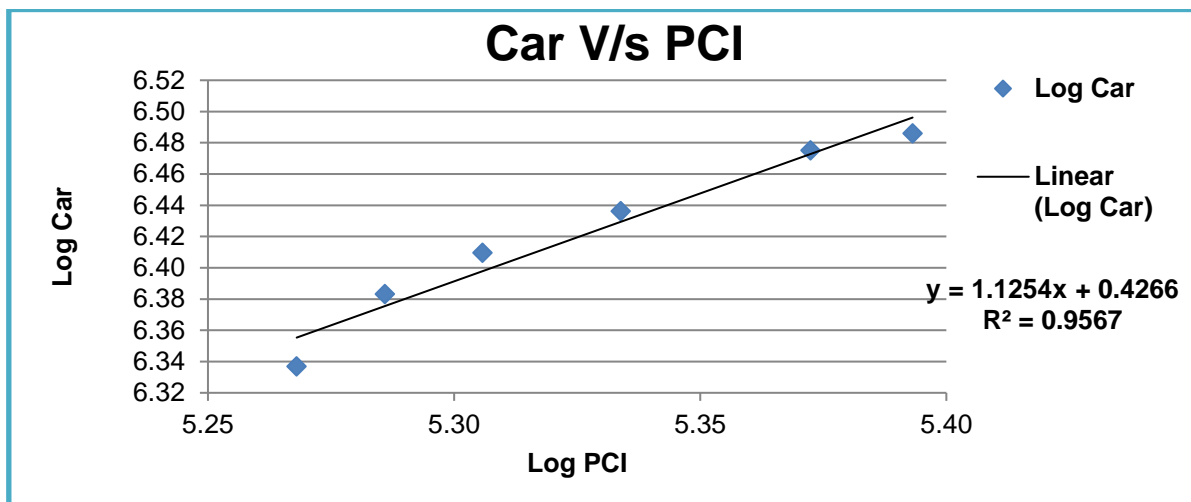


Figure 5-5: Regression and Elasticity PCI vs. Car–Extrapolation Delhi

Table 5-6 : Population Vs Bus Delhi

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 16787941 | 109790 | 7.22 | 5.04 | | |
| 2013 | 17071599 | 19917 | 7.23 | 4.30 | 2% | |
| 2014 | 17354281 | 19595 | 7.24 | 4.29 | 2% | |
| 2015 | 17635897 | 19700 | 7.25 | 4.29 | 2% | |
| 2016 | 17916359 | 43723 | 7.25 | 4.64 | 2% | |
| 2017 | 18195583 | 41686 | 7.26 | 4.62 | 2% | 1.62% |

Regression analysis of same is given in figure below.

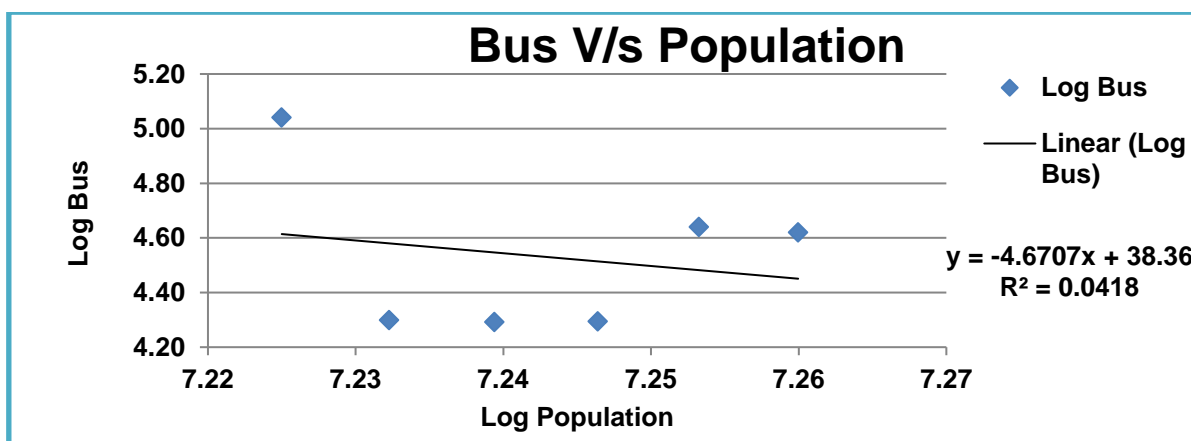


Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Delhi

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-7 : LCV Traffic Vs NSDP Delhi

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 314650 | 124547 | 5.50 | 5.10 | | |
| 2013 | 334193 | 126539 | 5.52 | 5.10 | 6% | |
| 2014 | 356528 | 136110 | 5.55 | 5.13 | 7% | |
| 2015 | 387639 | 145903 | 5.59 | 5.16 | 9% | |
| 2016 | 431730 | 183486 | 5.64 | 5.26 | 11% | |
| 2017 | 461476 | 221068 | 5.66 | 5.34 | 7% | 7.98% |

The following figure depicts regression analysis and extrapolation.

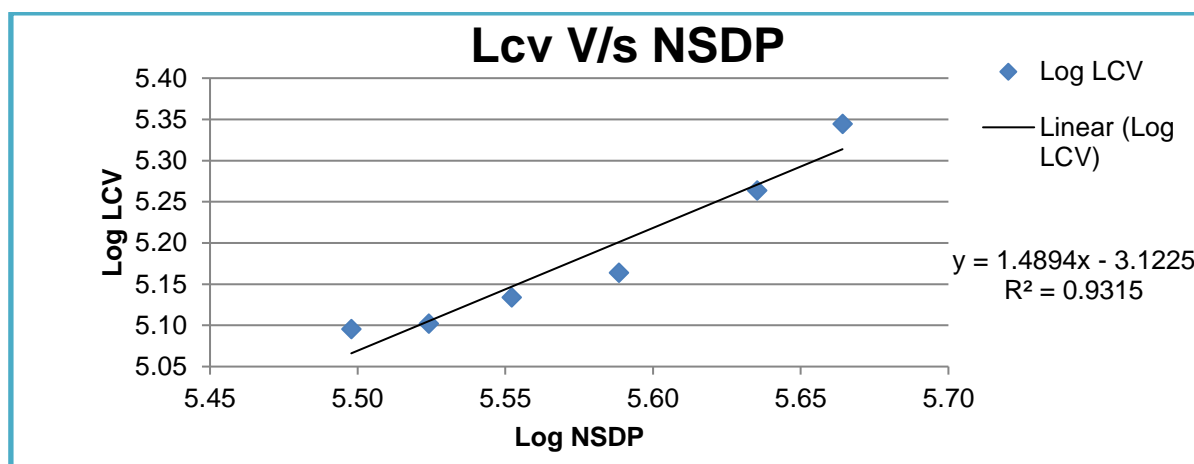
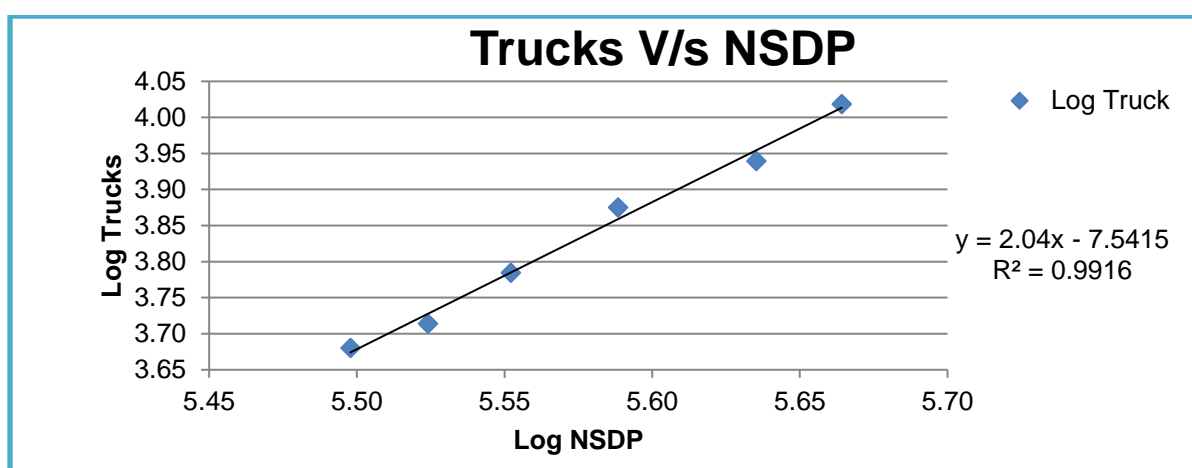


Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Delhi

Table 5-4: Trucks Traffic Vs NSDP Delhi

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 314650 | 4792 | 5.50 | 3.68 | | |
| 2013 | 334193 | 5176 | 5.52 | 3.71 | 6% | |
| 2014 | 356528 | 6093 | 5.55 | 3.78 | 7% | |
| 2015 | 387639 | 7503 | 5.59 | 3.88 | 9% | |
| 2016 | 431730 | 8703 | 5.64 | 3.94 | 11% | |
| 2017 | 461476 | 10440 | 5.66 | 4.02 | 7% | 7.98% |

The following figure depicts regression analysis and extrapolation.

**Figure 5-8: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Delhi**

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. R² statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R² more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-8 : Summary Regression Analysis Delhi

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-------|------------------|----------------------|------------------------|----------------|----------------------------|----------------|----------------------|
| Delhi | Car/Jeep | PCI | $y = 1.1254x + 0.4266$ | $R^2 = 0.9567$ | 1.1254 | 5.95% | 6.69% |
| | Bus | Population | $y = -4.6707x - 38.36$ | $R^2 = 0.0418$ | -4.6707 | 1.62% | -7.58% |
| | LCV | NSDP | $y = 1.4894x - 3.1225$ | $R^2 = 0.9315$ | 1.4894 | 7.98% | 11.88% |
| | Truck | NSDP | $y = 2.04x - 7.5415$ | $R^2 = 0.9916$ | 2.0400 | 7.98% | 16.27% |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Haryana State.

Table 5-9 : Per Capita Income Vs Car Haryana

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 106085 | 1134514 | 5.03 | 6.05 | | |
| 2013 | 111780 | 1293065 | 5.05 | 6.11 | 5% | |
| 2014 | 119791 | 1454182 | 5.08 | 6.16 | 7% | |
| 2015 | 125032 | 1609544 | 5.10 | 6.21 | 4% | |
| 2016 | 137818 | 1764448 | 5.14 | 6.25 | 10% | |
| 2017 | 150241 | 1879587 | 5.18 | 6.27 | 9% | 7.23% |

Regression analysis of same is given in figure below.

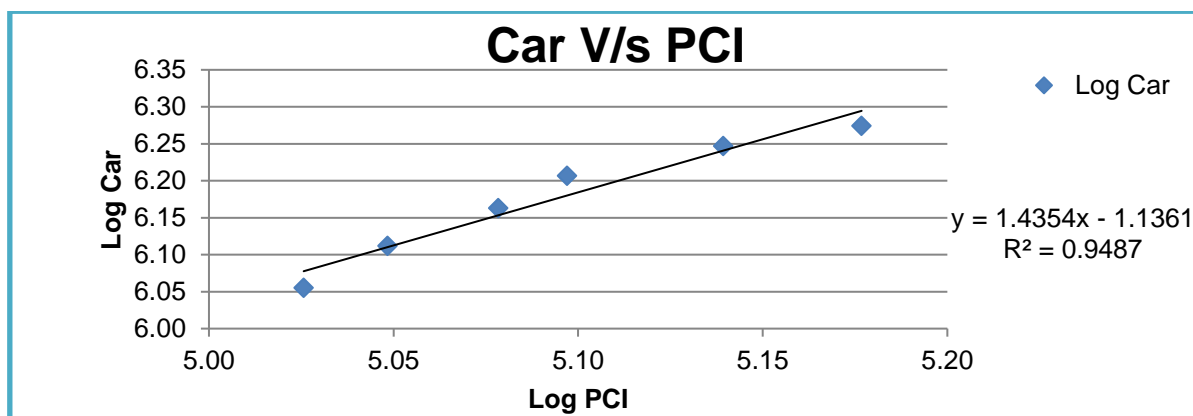
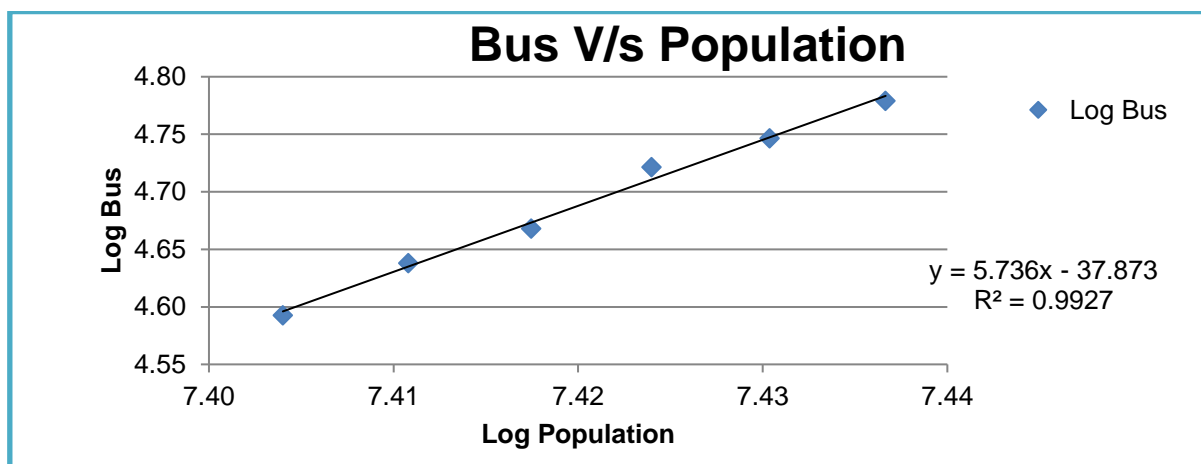
**Figure 5-9: Regression and Elasticity PCI vs. Car–Extrapolation Haryana**

Table 5-10 : Population Vs Bus Haryana

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 25351462 | 39153 | 7.40 | 4.59 | | |
| 2013 | 25751257 | 43456 | 7.41 | 4.64 | 2% | |
| 2014 | 26149236 | 46558 | 7.42 | 4.67 | 2% | |
| 2015 | 26545282 | 52640 | 7.42 | 4.72 | 2% | |
| 2016 | 26939286 | 55781 | 7.43 | 4.75 | 1% | |
| 2017 | 27331141 | 60129 | 7.44 | 4.78 | 1% | 1.52% |

Regression analysis of same is given in figure below.

**Figure 5-10: Regression and Elasticity Population vs. Bus – Extrapolation Haryana**

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-11 : LCV Traffic Vs NSDP Haryana

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 271152 | 124897 | 5.43 | 5.10 | | |
| 2013 | 289756 | 137511 | 5.46 | 5.14 | 7% | |
| 2014 | 314931 | 152069 | 5.50 | 5.18 | 9% | |
| 2015 | 333359 | 167901 | 5.52 | 5.23 | 6% | |
| 2016 | 372659 | 182776 | 5.57 | 5.26 | 12% | 8.30% |

The following figure depicts regression analysis and extrapolation.

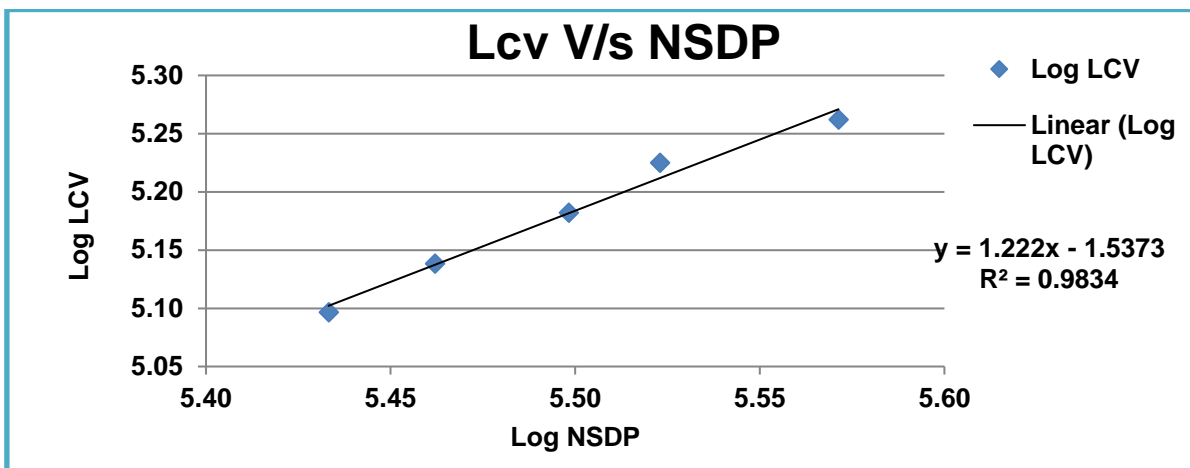


Figure 5-11: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Haryana

Table 5-4: Trucks Traffic Vs NSDP Haryana

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 271152 | 292735 | 5.43 | 5.47 | | |
| 2013 | 289756 | 307509 | 5.46 | 5.49 | 7% | |
| 2014 | 314931 | 327882 | 5.50 | 5.52 | 9% | |
| 2015 | 333359 | 348732 | 5.52 | 5.54 | 6% | |
| 2016 | 372659 | 367730 | 5.57 | 5.57 | 12% | |
| 2017 | 412006 | 390321 | 5.61 | 5.59 | 11% | 8.75% |

The following figure depicts regression analysis and extrapolation.

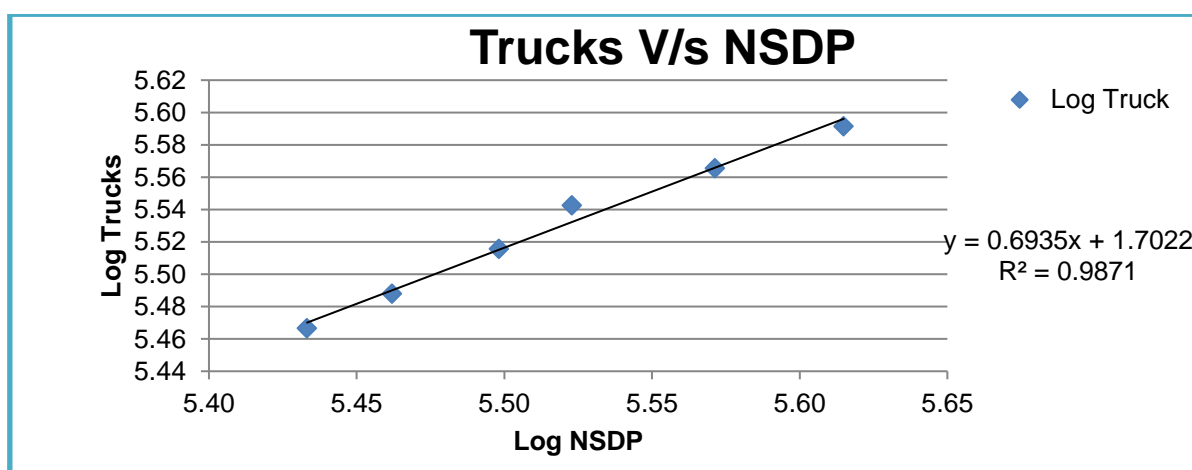


Figure 5-12: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Haryana

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for the good fit regression as reflected by R2 values are presented in the Table below.

Table 5-13: Summary Regression Analysis Haryana

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|---------|------------------|----------------------|------------------------|----------------|----------------------------|----------------|----------------------|
| Haryana | Car/Jeep | PCI | $y = 1.4354x - 1.1361$ | $R^2 = 0.9487$ | 1.4354 | 7.23% | 10.38% |
| | Bus | Population | $y = 5.736x - 37.8732$ | $R^2 = 0.9927$ | 5.7360 | 1.52% | 8.69% |
| | LCV | NSDP | $y = 1.222x - 1.5373$ | $R^2 = 0.9834$ | 1.2220 | 8.30% | 10.14% |
| | Truck | NSDP | $y = 0.6935x - 1.7022$ | $R^2 = 0.9871$ | 0.6935 | 8.75% | 6.07% |

The economic model for predicting growth is a good tool, however other local, regional, and 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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Hapur to Moradabad is under tolling operation with current concessionaire and has less than a year of tolling history from May 2019. Traffic data for the last two years is affected by COVID-19 impact. Hence sufficient data points are not available to be able to establish a reliable past trend of traffic growth. A minimum of about 5 -6 years' traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

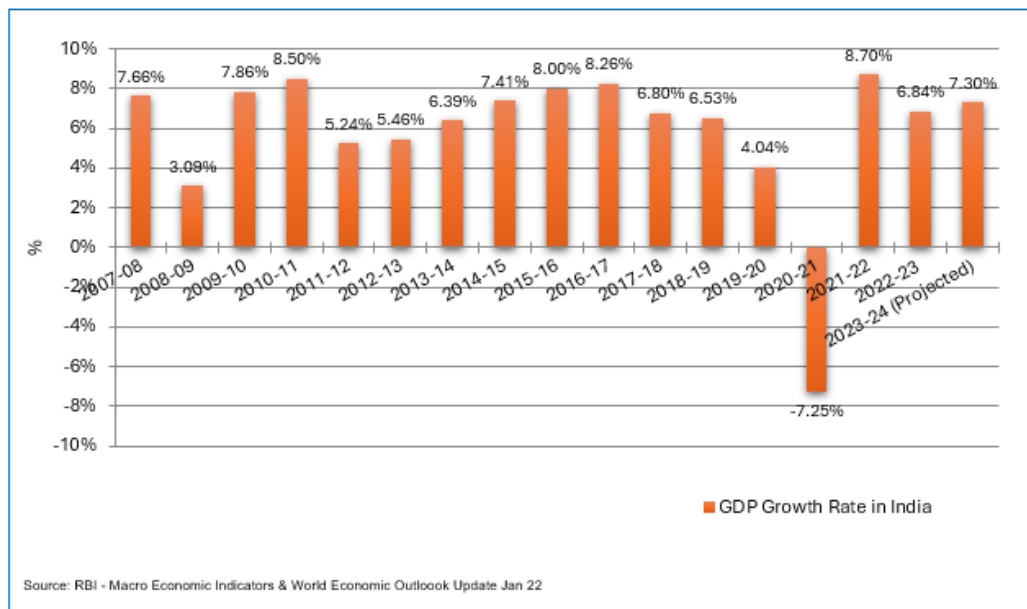


Figure 5-14: Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

Though growth of Uttar Pradesh has been consistently below the national average economic growth, it is the largest state in terms of population and consumption driven demand for goods and services will remain significantly high. The rate of growth of NSDP also seems to be catching up with the national average over the years. Other regions in the influenced area states, namely Delhi, Haryana and Uttarakhand are all growing significantly faster than the national average. Considering the scenario, it may be assumed that the traffic growth on the project highway would remain high and there are minimal risks in terms of growth.

The corridor passes through heavily cultivated Gangetic plains and also connects the fertile Doaba regions of the Uttarakhand plains. Simbaoli, one of the largest and most modern sugar refinery complexes falls right on the project corridor. Sugar refineries like this link agriculture, distillery, clean fuel technologies, green energy generation including cogeneration etc. which is a positive influence on this agriculturally right region. Other parts of the capital region of Delhi are also

experiencing rapid urbanization fueled by industrialization and growth. Thus, induced traffic from these developments around the project corridor and due to the improved facility will be a positive contributing factor to the traffic growth on the project corridor.

5.6.1 Industrial Units along Project Corridor

This project section of the NH-24 (newNH-9) crosses three districts of Uttar Pradesh (Hapur, Amroha and Moradabad). There are about 1000 significant industrial units in these districts out of which there are 40 large Scale and 11 Medium Scale industries. The major industrial base is dependent on agriculture and timber in the surrounding region. Being a sugarcane growing region, there are a number of sugar mills in the project catchment. Simbhawli Sugarmill is one of the largest integrated refineries producing gsugar, ethanol and other related products. The following map shows some of major industrial establishments along and in influence area of project stretch.

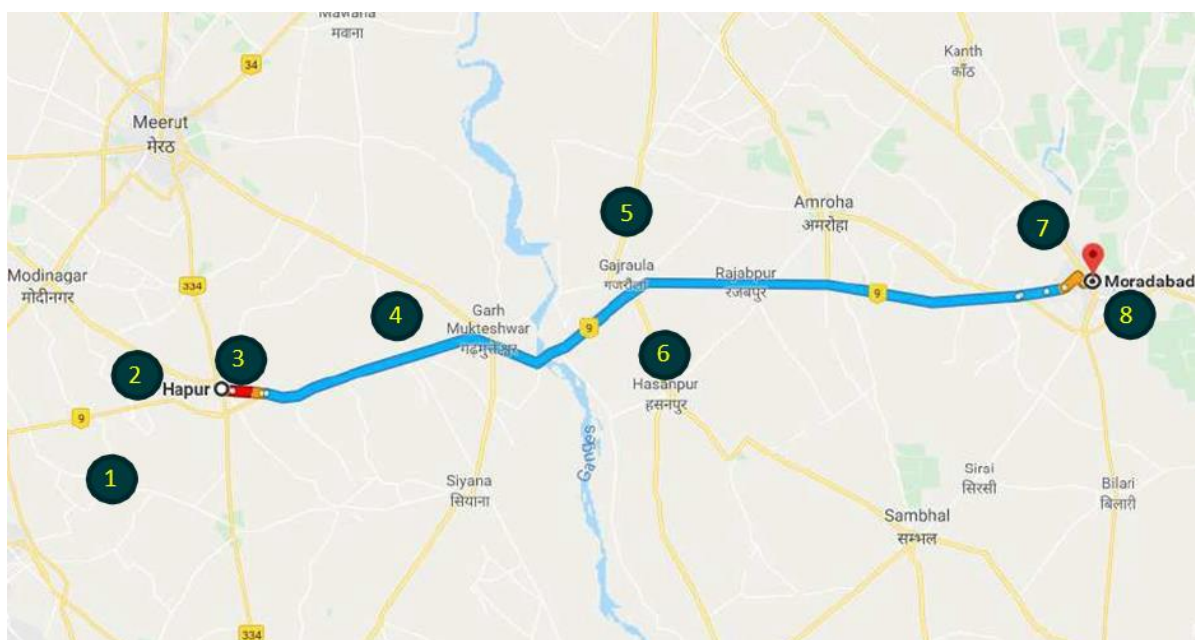


Figure 5-15: Industrial Units along project corridor

Industries shown in the above map are listed below.

1. **Dhaolana** (Chetak enterprises, Spooner Industries Pvt. Ltd., Astech build product India Pvt. Ltd.,
2. **Jindal Nagar, Hapur** (Marino Industries Jindal Nagar Hapur)– Large Scale Industry of Laminated Furnitures.
3. Medium Scale Industries in **Shakti Nagar, Hapur**
4. Sugar Mills (**Simbhawli** Sugar mills)
5. **Gajraula Industrial Area 1&2**(Paper & Sugar Mills, Food Products, Organic food Products)
6. Trivani Engineering & Industries Ltd., **Hasanpur** (Engineering Goods)
7. **Agwanpur** (Industries of Milk Powder, Ghee, Acrylic Fibre, Crystal Sugar, Craft Paper)
8. **Dalpatpur** (Moradabad Dugdh Utpadan Sahakari Sangh– Milk & Milk Products)

Rapid expansion of NCR and NOIDA has triggered growth along the project corridor as well. Large number of residential projects can be seen coming up along project road near Hapur, Gajraula and Moradabad. In fact, there is a new city “New Moradabad” has come up near Pakbara on Delhi Road.

5.7 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 below. The rate of growth is moderate in light of overall regional trends. 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, the rate of growth diminishes. The same growth rate is not sustainable for long It is established practice to stepdown future growth rates at suitable interval of years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-12 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 |
|------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 6.23% | 6.01% | 5.78% | 4.36% | 4.17% |
| LCV | 3.26% | 3.06% | 2.47% | 1.76% | 1.57% |
| Bus | 3.33% | 3.20% | 3.44% | 2.73% | 2.62% |
| 2- Axle | 3.81% | 3.61% | 3.17% | 1.76% | 1.57% |
| 3 - Axle | 3.81% | 3.61% | 3.17% | 1.76% | 1.57% |
| 4 to 6 Axle | 4.14% | 3.92% | 3.43% | 1.89% | 1.68% |
| 7 and Above Axle | 4.14% | 3.92% | 3.43% | 1.89% | 1.68% |

Table 5-13 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 |
|------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 5.73% | 5.51% | 5.28% | 3.86% | 3.67% |
| LCV | 2.76% | 2.56% | 1.97% | 1.26% | 1.07% |
| Bus | 2.83% | 2.70% | 2.94% | 2.23% | 2.12% |
| 2- Axle | 3.31% | 3.11% | 2.67% | 1.26% | 1.07% |
| 3 - Axle | 3.31% | 3.11% | 2.67% | 1.26% | 1.07% |
| 4 to 6 Axle | 3.64% | 3.42% | 2.93% | 1.39% | 1.18% |
| 7 and Above Axle | 3.64% | 3.42% | 2.93% | 1.39% | 1.18% |

Table 5-14 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 |
|-------------------------|------------------|------------------|------------------|------------------|------------------|
| Car/Jeep/Van | 5.98% | 5.76% | 5.53% | 4.11% | 3.92% |
| LCV | 3.01% | 2.81% | 2.22% | 1.51% | 1.32% |
| Bus | 3.08% | 2.95% | 3.19% | 2.48% | 2.37% |
| 2- Axle | 3.56% | 3.36% | 2.92% | 1.51% | 1.32% |
| 3 - Axle | 3.56% | 3.36% | 2.92% | 1.51% | 1.32% |
| 4 to 6 Axle | 3.89% | 3.67% | 3.18% | 1.64% | 1.43% |
| 7 and Above Axle | 3.89% | 3.67% | 3.18% | 1.64% | 1.43% |

Traffic and revenue have been worked out on the basis of the above growths and some are presented in subsequent chapters of report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Garh @90.661 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 27330 | 1743 | 2303 | 2036 | 1075 | 2191 | 7 | 36686 | 56079 |
| 2024-25 | 29032 | 1799 | 2380 | 2114 | 1117 | 2281 | 7 | 38730 | 58860 |
| 2025-26 | 30778 | 1854 | 2456 | 2190 | 1157 | 2370 | 7 | 40812 | 61665 |
| 2026-27 | 32629 | 1911 | 2534 | 2269 | 1199 | 2463 | 7 | 43012 | 64617 |
| 2027-28 | 34591 | 1970 | 2615 | 2351 | 1242 | 2559 | 7 | 45335 | 67717 |
| 2028-29 | 36671 | 2030 | 2699 | 2435 | 1286 | 2659 | 7 | 47787 | 70973 |
| 2029-30 | 38876 | 2092 | 2785 | 2523 | 1333 | 2763 | 7 | 50379 | 74402 |
| 2030-31 | 41122 | 2144 | 2881 | 2602 | 1375 | 2858 | 7 | 52989 | 77805 |
| 2031-32 | 43498 | 2197 | 2980 | 2684 | 1418 | 2957 | 7 | 55741 | 81378 |
| 2032-33 | 46012 | 2251 | 3083 | 2769 | 1463 | 3058 | 7 | 58643 | 85126 |
| 2033-34 | 48672 | 2306 | 3189 | 2857 | 1510 | 3163 | 7 | 61704 | 89064 |
| 2034-35 | 51485 | 2363 | 3299 | 2948 | 1558 | 3272 | 7 | 64932 | 93200 |
| 2035-36 | 53731 | 2404 | 3389 | 3000 | 1585 | 3333 | 7 | 67449 | 96289 |
| 2036-37 | 56075 | 2447 | 3481 | 3053 | 1613 | 3396 | 7 | 70072 | 99500 |
| 2037-38 | 58522 | 2490 | 3577 | 3106 | 1641 | 3460 | 7 | 72803 | 102831 |
| 2038-39 | 61076 | 2534 | 3675 | 3161 | 1670 | 3525 | 7 | 75648 | 106289 |
| 2039-40 | 63741 | 2579 | 3775 | 3216 | 1699 | 3592 | 7 | 78609 | 109875 |
| 2040-41 | 66401 | 2620 | 3874 | 3266 | 1726 | 3652 | 7 | 81546 | 113395 |
| 2041-42 | 69172 | 2661 | 3975 | 3317 | 1753 | 3713 | 7 | 84598 | 117039 |
| 2042-43 | 72059 | 2702 | 4079 | 3369 | 1780 | 3776 | 7 | 87772 | 120820 |
| 2043-44 | 75066 | 2745 | 4186 | 3422 | 1808 | 3840 | 7 | 91074 | 124743 |
| 2044-45 | 78198 | 2788 | 4296 | 3476 | 1836 | 3904 | 7 | 94505 | 128804 |

Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Joya @123.875 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 18696 | 1191 | 2008 | 1628 | 936 | 2017 | 6 | 26481 | 43300 |
| 2024-25 | 19861 | 1229 | 2074 | 1690 | 971 | 2101 | 5 | 27931 | 45387 |
| 2025-26 | 21055 | 1267 | 2140 | 1750 | 1006 | 2183 | 5 | 29406 | 47490 |
| 2026-27 | 22320 | 1305 | 2208 | 1813 | 1042 | 2268 | 5 | 30961 | 49695 |
| 2027-28 | 23661 | 1345 | 2279 | 1878 | 1079 | 2357 | 5 | 32604 | 52016 |
| 2028-29 | 25083 | 1385 | 2352 | 1946 | 1118 | 2449 | 5 | 34338 | 54452 |
| 2029-30 | 26591 | 1427 | 2427 | 2016 | 1158 | 2545 | 5 | 36169 | 57010 |
| 2030-31 | 28127 | 1462 | 2510 | 2080 | 1194 | 2633 | 5 | 38011 | 59543 |
| 2031-32 | 29751 | 1498 | 2596 | 2146 | 1231 | 2723 | 5 | 39950 | 62193 |
| 2032-33 | 31469 | 1535 | 2686 | 2214 | 1270 | 2816 | 5 | 41995 | 64976 |
| 2033-34 | 33287 | 1573 | 2778 | 2284 | 1310 | 2913 | 5 | 44150 | 67894 |
| 2034-35 | 35210 | 1611 | 2874 | 2357 | 1351 | 3013 | 5 | 46421 | 70954 |
| 2035-36 | 36746 | 1640 | 2952 | 2398 | 1374 | 3070 | 5 | 48185 | 73216 |
| 2036-37 | 38349 | 1669 | 3033 | 2441 | 1398 | 3128 | 5 | 50023 | 75567 |
| 2037-38 | 40021 | 1698 | 3116 | 2484 | 1423 | 3187 | 5 | 51934 | 78001 |
| 2038-39 | 41766 | 1727 | 3201 | 2528 | 1448 | 3247 | 5 | 53922 | 80522 |
| 2039-40 | 43588 | 1758 | 3288 | 2572 | 1474 | 3308 | 5 | 55993 | 83136 |
| 2040-41 | 45406 | 1785 | 3374 | 2613 | 1497 | 3364 | 5 | 58044 | 85696 |
| 2041-42 | 47300 | 1813 | 3462 | 2654 | 1520 | 3421 | 5 | 60175 | 88345 |
| 2042-43 | 49273 | 1842 | 3553 | 2695 | 1543 | 3478 | 5 | 62389 | 91083 |
| 2043-44 | 51328 | 1871 | 3646 | 2738 | 1567 | 3537 | 5 | 64692 | 93927 |
| 2044-45 | 53469 | 1900 | 3742 | 2781 | 1592 | 3597 | 5 | 67086 | 96873 |

Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Garh @ 90.661 KM
(Pessimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 27330 | 1743 | 2303 | 2036 | 1075 | 2191 | 7 | 36686 | 56079 |
| 2024-25 | 28894 | 1791 | 2368 | 2104 | 1111 | 2271 | 7 | 38546 | 58581 |
| 2025-26 | 30487 | 1837 | 2432 | 2169 | 1145 | 2348 | 7 | 40425 | 61078 |
| 2026-27 | 32168 | 1884 | 2497 | 2236 | 1181 | 2428 | 7 | 42401 | 63694 |
| 2027-28 | 33942 | 1932 | 2565 | 2305 | 1218 | 2511 | 7 | 44480 | 66435 |
| 2028-29 | 35814 | 1982 | 2634 | 2377 | 1256 | 2596 | 7 | 46666 | 69302 |
| 2029-30 | 37789 | 2032 | 2705 | 2451 | 1295 | 2685 | 7 | 48964 | 72304 |
| 2030-31 | 39783 | 2072 | 2784 | 2516 | 1329 | 2764 | 7 | 51255 | 75248 |
| 2031-32 | 41883 | 2113 | 2866 | 2583 | 1365 | 2845 | 7 | 53662 | 78329 |
| 2032-33 | 44094 | 2154 | 2950 | 2652 | 1402 | 2929 | 7 | 56188 | 81549 |
| 2033-34 | 46421 | 2197 | 3036 | 2723 | 1439 | 3014 | 7 | 58837 | 84905 |
| 2034-35 | 48872 | 2240 | 3126 | 2795 | 1477 | 3102 | 7 | 61619 | 88417 |
| 2035-36 | 50760 | 2268 | 3196 | 2830 | 1495 | 3145 | 7 | 63701 | 90909 |
| 2036-37 | 52721 | 2297 | 3267 | 2866 | 1513 | 3189 | 7 | 65860 | 93487 |
| 2037-38 | 54758 | 2326 | 3340 | 2902 | 1533 | 3233 | 7 | 68099 | 96152 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2038-39 | 56873 | 2355 | 3415 | 2938 | 1553 | 3278 | 7 | 70419 | 98906 |
| 2039-40 | 59070 | 2385 | 3491 | 2976 | 1573 | 3323 | 7 | 72825 | 101753 |
| 2040-41 | 61240 | 2410 | 3566 | 3008 | 1590 | 3362 | 7 | 75183 | 104508 |
| 2041-42 | 63489 | 2435 | 3642 | 3041 | 1607 | 3402 | 7 | 77623 | 107352 |
| 2042-43 | 65820 | 2461 | 3719 | 3074 | 1624 | 3442 | 7 | 80147 | 110283 |
| 2043-44 | 68236 | 2488 | 3798 | 3107 | 1641 | 3483 | 7 | 82760 | 113311 |
| 2044-45 | 70742 | 2515 | 3878 | 3140 | 1658 | 3524 | 7 | 85464 | 116432 |

**Table 6-4 : Total Tollable Traffic @ Toll Plaza 2- Joya @123.875 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 18696 | 1191 | 2008 | 1628 | 936 | 2017 | 6 | 26481 | 43300 |
| 2024-25 | 19768 | 1223 | 2064 | 1681 | 967 | 2091 | 5 | 27799 | 45171 |
| 2025-26 | 20857 | 1254 | 2120 | 1733 | 997 | 2163 | 5 | 29129 | 47044 |
| 2026-27 | 22006 | 1286 | 2177 | 1787 | 1027 | 2237 | 5 | 30525 | 48997 |
| 2027-28 | 23219 | 1319 | 2235 | 1842 | 1059 | 2313 | 5 | 31992 | 51037 |
| 2028-29 | 24499 | 1352 | 2296 | 1899 | 1092 | 2392 | 5 | 33535 | 53175 |
| 2029-30 | 25849 | 1387 | 2358 | 1958 | 1126 | 2473 | 5 | 35156 | 55407 |
| 2030-31 | 27213 | 1414 | 2428 | 2010 | 1156 | 2546 | 5 | 36772 | 57596 |
| 2031-32 | 28648 | 1442 | 2499 | 2064 | 1186 | 2621 | 5 | 38465 | 59875 |
| 2032-33 | 30160 | 1471 | 2572 | 2119 | 1218 | 2698 | 5 | 40243 | 62257 |
| 2033-34 | 31752 | 1500 | 2648 | 2176 | 1251 | 2777 | 5 | 42109 | 64746 |
| 2034-35 | 33428 | 1529 | 2726 | 2234 | 1285 | 2858 | 5 | 44065 | 67340 |
| 2035-36 | 34719 | 1549 | 2787 | 2262 | 1301 | 2898 | 5 | 45521 | 69156 |
| 2036-37 | 36060 | 1569 | 2849 | 2291 | 1317 | 2938 | 5 | 47029 | 71028 |
| 2037-38 | 37453 | 1589 | 2912 | 2320 | 1333 | 2979 | 5 | 48591 | 72960 |
| 2038-39 | 38899 | 1609 | 2977 | 2349 | 1349 | 3020 | 5 | 50208 | 74950 |
| 2039-40 | 40401 | 1629 | 3044 | 2379 | 1366 | 3061 | 5 | 51885 | 77009 |
| 2040-41 | 41884 | 1647 | 3109 | 2404 | 1381 | 3097 | 5 | 53527 | 78996 |
| 2041-42 | 43422 | 1665 | 3175 | 2430 | 1396 | 3133 | 5 | 55226 | 81044 |
| 2042-43 | 45016 | 1683 | 3242 | 2456 | 1411 | 3170 | 5 | 56983 | 83155 |
| 2043-44 | 46669 | 1701 | 3310 | 2483 | 1426 | 3207 | 5 | 58801 | 85332 |
| 2044-45 | 48383 | 1719 | 3380 | 2510 | 1441 | 3244 | 5 | 60682 | 87575 |

Traffic projections for Most Likely scenario is given as under

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Garh @ 90.661 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 27330 | 1743 | 2303 | 2036 | 1075 | 2191 | 7 | 36686 | 56079 |
| 2024-25 | 28963 | 1796 | 2374 | 2109 | 1114 | 2276 | 7 | 38639 | 58722 |
| 2025-26 | 30633 | 1846 | 2444 | 2180 | 1151 | 2360 | 7 | 40621 | 61379 |
| 2026-27 | 32399 | 1898 | 2516 | 2253 | 1189 | 2447 | 7 | 42709 | 64163 |
| 2027-28 | 34266 | 1951 | 2591 | 2329 | 1228 | 2536 | 7 | 44908 | 67080 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2028-29 | 36241 | 2006 | 2667 | 2407 | 1270 | 2629 | 7 | 47227 | 70144 |
| 2029-30 | 38329 | 2063 | 2745 | 2488 | 1313 | 2725 | 7 | 49670 | 73356 |
| 2030-31 | 40448 | 2109 | 2832 | 2560 | 1351 | 2812 | 7 | 52119 | 76526 |
| 2031-32 | 42684 | 2156 | 2923 | 2634 | 1390 | 2901 | 7 | 54695 | 79845 |
| 2032-33 | 45044 | 2204 | 3016 | 2711 | 1430 | 2993 | 7 | 57405 | 83321 |
| 2033-34 | 47535 | 2252 | 3113 | 2790 | 1472 | 3088 | 7 | 60257 | 86966 |
| 2034-35 | 50163 | 2302 | 3212 | 2871 | 1515 | 3187 | 7 | 63257 | 90783 |
| 2035-36 | 52226 | 2336 | 3291 | 2914 | 1538 | 3239 | 7 | 65551 | 93566 |
| 2036-37 | 54374 | 2371 | 3373 | 2958 | 1561 | 3292 | 7 | 67936 | 96452 |
| 2037-38 | 56610 | 2407 | 3457 | 3003 | 1584 | 3345 | 7 | 70413 | 99437 |
| 2038-39 | 58938 | 2443 | 3543 | 3048 | 1608 | 3400 | 7 | 72987 | 102531 |
| 2039-40 | 61361 | 2480 | 3632 | 3094 | 1632 | 3456 | 7 | 75662 | 105739 |
| 2040-41 | 63768 | 2512 | 3718 | 3135 | 1654 | 3505 | 7 | 78299 | 108861 |
| 2041-42 | 66270 | 2546 | 3807 | 3176 | 1676 | 3556 | 7 | 81038 | 112100 |
| 2042-43 | 68870 | 2580 | 3897 | 3218 | 1698 | 3607 | 7 | 83877 | 115442 |
| 2043-44 | 71572 | 2614 | 3989 | 3261 | 1720 | 3659 | 7 | 86822 | 118900 |
| 2044-45 | 74379 | 2648 | 4083 | 3304 | 1743 | 3711 | 7 | 89875 | 122472 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Joya @123.875 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 18696 | 1191 | 2008 | 1628 | 936 | 2017 | 6 | 26481 | 43300 |
| 2024-25 | 19815 | 1227 | 2069 | 1686 | 969 | 2096 | 5 | 27867 | 45282 |
| 2025-26 | 20956 | 1261 | 2130 | 1743 | 1002 | 2173 | 5 | 29270 | 47274 |
| 2026-27 | 22163 | 1296 | 2193 | 1802 | 1036 | 2253 | 5 | 30748 | 49361 |
| 2027-28 | 23439 | 1332 | 2257 | 1862 | 1071 | 2336 | 5 | 32302 | 51542 |
| 2028-29 | 24789 | 1369 | 2324 | 1924 | 1107 | 2421 | 5 | 33939 | 53825 |
| 2029-30 | 26216 | 1407 | 2392 | 1989 | 1144 | 2510 | 5 | 35663 | 56219 |
| 2030-31 | 27664 | 1438 | 2468 | 2047 | 1178 | 2590 | 5 | 37390 | 58578 |
| 2031-32 | 29193 | 1469 | 2546 | 2107 | 1212 | 2673 | 5 | 39205 | 61043 |
| 2032-33 | 30806 | 1502 | 2627 | 2169 | 1247 | 2758 | 5 | 41114 | 63622 |
| 2033-34 | 32509 | 1535 | 2711 | 2232 | 1283 | 2846 | 5 | 43121 | 66319 |
| 2034-35 | 34306 | 1569 | 2797 | 2297 | 1320 | 2937 | 5 | 45231 | 69141 |
| 2035-36 | 35716 | 1593 | 2867 | 2332 | 1340 | 2985 | 5 | 46838 | 71178 |
| 2036-37 | 37185 | 1617 | 2938 | 2367 | 1360 | 3034 | 5 | 48506 | 73281 |
| 2037-38 | 38714 | 1641 | 3011 | 2403 | 1381 | 3083 | 5 | 50238 | 75457 |
| 2038-39 | 40306 | 1666 | 3086 | 2439 | 1402 | 3134 | 5 | 52038 | 77712 |
| 2039-40 | 41963 | 1691 | 3163 | 2476 | 1423 | 3186 | 5 | 53907 | 80045 |
| 2040-41 | 43608 | 1713 | 3238 | 2509 | 1442 | 3231 | 5 | 55746 | 82307 |
| 2041-42 | 45318 | 1735 | 3315 | 2542 | 1461 | 3278 | 5 | 57654 | 84648 |
| 2042-43 | 47095 | 1758 | 3393 | 2575 | 1481 | 3325 | 5 | 59632 | 87064 |
| 2043-44 | 48942 | 1781 | 3474 | 2610 | 1501 | 3373 | 5 | 61686 | 89570 |
| 2044-45 | 50861 | 1805 | 3556 | 2645 | 1521 | 3421 | 5 | 63814 | 92152 |

6.2 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 Hapur-Moradabad project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2028

Target Traffic - 67413 in PCU

It was observed that as per traffic projections, average traffic volume is in excess of target traffic in all scenarios. The probable extension of the concession period is estimated according to article 29 of the concession agreement which comes to about 2 years. Traffic forecast and revenue projections have been kept up to concession period in report till actual finalization of modification.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2028 | 67413 | 62027 | -8% | 12% | 12% | 22 | 2.6 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2028 | 67413 | 62761 | -7% | 10% | 10% | 22 | 2.3 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2028 | 67413 | 61276 | -9% | 14% | 14% | 22 | 3.0 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Hapur-Moradabad section of NH-9 is based on the old toll policy. As per the Toll Notification (Schedule -G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips in month at 2/3d rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van I - Rs. 265 per month
 - b) Local Commercial Vehicles at 50% rate for single journey

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

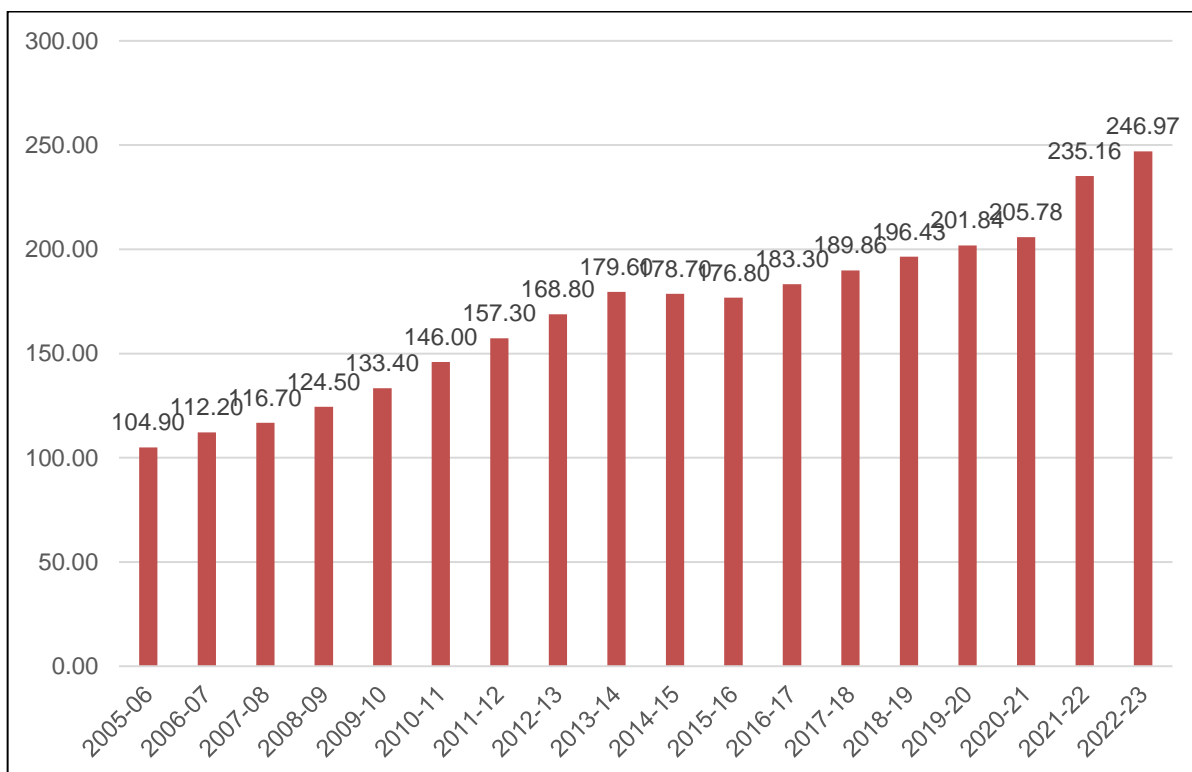


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|---------------------------------------|-----------------------------------|
| Car, Jeep, Van or Light Motor Vehicle | 0.65 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

There is no bypass or structure to be factored in for rates calculations.

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

Thus, worked out rates for various categories of vehicle and discounts are given below.

Table 7-2 : Toll Rates for Single Journey@ Km 90.661

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 105 | 170 | 360 | 360 | 390 | 565 | 685 |
| 2024-25 | 110 | 180 | 370 | 370 | 405 | 580 | 705 |
| 2025-26 | 120 | 190 | 395 | 395 | 430 | 615 | 750 |
| 2026-27 | 130 | 205 | 425 | 425 | 460 | 660 | 800 |
| 2027-28 | 135 | 215 | 445 | 445 | 485 | 695 | 845 |
| 2028-29 | 140 | 225 | 470 | 470 | 510 | 730 | 885 |
| 2029-30 | 150 | 240 | 490 | 490 | 535 | 765 | 930 |
| 2030-31 | 155 | 250 | 515 | 515 | 565 | 805 | 980 |
| 2031-32 | 165 | 265 | 545 | 545 | 595 | 850 | 1030 |
| 2032-33 | 175 | 275 | 575 | 575 | 625 | 895 | 1085 |
| 2033-34 | 180 | 290 | 605 | 605 | 655 | 940 | 1145 |
| 2034-35 | 190 | 305 | 635 | 635 | 690 | 990 | 1205 |
| 2035-36 | 200 | 325 | 670 | 670 | 730 | 1045 | 1265 |
| 2036-37 | 210 | 340 | 705 | 705 | 765 | 1100 | 1335 |
| 2037-38 | 225 | 360 | 740 | 740 | 805 | 1155 | 1405 |
| 2038-39 | 235 | 380 | 780 | 780 | 850 | 1220 | 1480 |
| 2039-40 | 250 | 400 | 825 | 825 | 895 | 1285 | 1560 |
| 2040-41 | 260 | 420 | 865 | 865 | 945 | 1355 | 1645 |
| 2041-42 | 275 | 440 | 915 | 915 | 995 | 1425 | 1735 |
| 2042-43 | 290 | 465 | 965 | 965 | 1050 | 1505 | 1830 |
| 2043-44 | 305 | 490 | 1015 | 1015 | 1110 | 1585 | 1930 |
| 2044-45 | 320 | 520 | 1070 | 1070 | 1170 | 1675 | 2035 |

Table 7 3: Toll Rates for Single Journey @ Km 123.875

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2023-24 | 70 | 110 | 230 | 230 | 250 | 360 | 440 |
| 2024-25 | 70 | 115 | 235 | 235 | 260 | 370 | 450 |
| 2025-26 | 75 | 120 | 250 | 250 | 270 | 390 | 475 |
| 2026-27 | 75 | 125 | 260 | 260 | 285 | 410 | 500 |
| 2027-28 | 80 | 130 | 275 | 275 | 300 | 430 | 525 |
| 2028-29 | 85 | 135 | 290 | 290 | 315 | 450 | 550 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2029-30 | 90 | 145 | 305 | 305 | 330 | 475 | 580 |
| 2030-31 | 95 | 150 | 320 | 320 | 345 | 500 | 610 |
| 2031-32 | 100 | 160 | 335 | 335 | 365 | 525 | 640 |
| 2032-33 | 105 | 170 | 350 | 350 | 385 | 550 | 670 |
| 2033-34 | 110 | 175 | 370 | 370 | 405 | 580 | 705 |
| 2034-35 | 115 | 185 | 390 | 390 | 425 | 610 | 745 |
| 2035-36 | 120 | 195 | 410 | 410 | 450 | 645 | 785 |
| 2036-37 | 130 | 205 | 430 | 430 | 470 | 675 | 825 |
| 2037-38 | 135 | 215 | 455 | 455 | 495 | 715 | 870 |
| 2038-39 | 140 | 230 | 480 | 480 | 525 | 750 | 915 |
| 2039-40 | 150 | 240 | 505 | 505 | 550 | 790 | 965 |
| 2040-41 | 155 | 255 | 530 | 530 | 580 | 835 | 1015 |
| 2041-42 | 165 | 265 | 560 | 560 | 610 | 880 | 1070 |
| 2042-43 | 175 | 280 | 590 | 590 | 645 | 925 | 1130 |
| 2043-44 | 185 | 295 | 625 | 625 | 680 | 975 | 1190 |
| 2044-45 | 195 | 315 | 655 | 655 | 715 | 1030 | 1255 |

Table 7-3 : Toll Rates for Return Journey @ Km 90.661

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 160 | 260 | 540 | 540 | 590 | 845 | 1030 |
| 2024-25 | 165 | 265 | 555 | 555 | 605 | 870 | 1060 |
| 2025-26 | 180 | 290 | 595 | 595 | 645 | 925 | 1125 |
| 2026-27 | 190 | 310 | 635 | 635 | 690 | 990 | 1205 |
| 2027-28 | 200 | 325 | 665 | 665 | 725 | 1040 | 1265 |
| 2028-29 | 210 | 340 | 700 | 700 | 765 | 1095 | 1330 |
| 2029-30 | 225 | 360 | 740 | 740 | 805 | 1150 | 1400 |
| 2030-31 | 235 | 375 | 775 | 775 | 845 | 1210 | 1470 |
| 2031-32 | 245 | 395 | 815 | 815 | 890 | 1275 | 1550 |
| 2032-33 | 260 | 415 | 860 | 860 | 935 | 1340 | 1630 |
| 2033-34 | 275 | 440 | 905 | 905 | 985 | 1410 | 1715 |
| 2034-35 | 285 | 460 | 950 | 950 | 1035 | 1485 | 1805 |
| 2035-36 | 300 | 485 | 1000 | 1000 | 1090 | 1565 | 1900 |
| 2036-37 | 320 | 510 | 1055 | 1055 | 1150 | 1645 | 2000 |
| 2037-38 | 335 | 540 | 1110 | 1110 | 1210 | 1735 | 2110 |
| 2038-39 | 355 | 565 | 1170 | 1170 | 1275 | 1830 | 2220 |
| 2039-40 | 370 | 595 | 1235 | 1235 | 1345 | 1925 | 2340 |
| 2040-41 | 390 | 630 | 1300 | 1300 | 1415 | 2030 | 2470 |
| 2041-42 | 415 | 665 | 1370 | 1370 | 1495 | 2140 | 2605 |
| 2042-43 | 435 | 700 | 1445 | 1445 | 1575 | 2255 | 2745 |
| 2043-44 | 460 | 735 | 1525 | 1525 | 1660 | 2380 | 2895 |
| 2044-45 | 485 | 775 | 1610 | 1610 | 1750 | 2510 | 3055 |

Table 7-4 : Toll Rates for Return Journey @ Km 123.875

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2023-24 | 100 | 165 | 345 | 345 | 375 | 540 | 660 |
| 2024-25 | 105 | 170 | 355 | 355 | 385 | 555 | 675 |
| 2025-26 | 110 | 180 | 370 | 370 | 405 | 585 | 710 |
| 2026-27 | 115 | 185 | 390 | 390 | 425 | 615 | 745 |
| 2027-28 | 120 | 195 | 410 | 410 | 450 | 645 | 785 |
| 2028-29 | 130 | 205 | 430 | 430 | 470 | 675 | 825 |
| 2029-30 | 135 | 215 | 455 | 455 | 495 | 710 | 865 |
| 2030-31 | 140 | 230 | 475 | 475 | 520 | 750 | 910 |
| 2031-32 | 150 | 240 | 500 | 500 | 550 | 785 | 960 |
| 2032-33 | 155 | 250 | 530 | 530 | 575 | 830 | 1010 |
| 2033-34 | 165 | 265 | 555 | 555 | 605 | 870 | 1060 |
| 2034-35 | 175 | 280 | 585 | 585 | 640 | 915 | 1115 |
| 2035-36 | 180 | 295 | 615 | 615 | 670 | 965 | 1175 |
| 2036-37 | 190 | 310 | 650 | 650 | 705 | 1015 | 1235 |
| 2037-38 | 200 | 325 | 680 | 680 | 745 | 1070 | 1305 |
| 2038-39 | 210 | 345 | 720 | 720 | 785 | 1125 | 1370 |
| 2039-40 | 225 | 360 | 755 | 755 | 825 | 1185 | 1445 |
| 2040-41 | 235 | 380 | 800 | 800 | 870 | 1250 | 1525 |
| 2041-42 | 250 | 400 | 840 | 840 | 915 | 1320 | 1605 |
| 2042-43 | 260 | 425 | 885 | 885 | 965 | 1390 | 1690 |
| 2043-44 | 275 | 445 | 935 | 935 | 1020 | 1465 | 1785 |
| 2044-45 | 290 | 470 | 985 | 985 | 1075 | 1545 | 1880 |

Table 7-5 : Toll Rates for Monthly Pass Local @ Km 90.661

| Year | Car |
|---------|-----|
| 2023-24 | 330 |
| 2024-25 | 330 |
| 2025-26 | 345 |
| 2026-27 | 360 |
| 2027-28 | 380 |
| 2028-29 | 400 |
| 2029-30 | 420 |
| 2030-31 | 445 |
| 2031-32 | 465 |
| 2032-33 | 490 |
| 2033-34 | 515 |
| 2034-35 | 545 |
| 2035-36 | 575 |
| 2036-37 | 605 |
| 2037-38 | 635 |
| 2038-39 | 670 |
| 2039-40 | 705 |
| 2040-41 | 745 |
| 2041-42 | 785 |

| Year | Car |
|---------|-----|
| 2042-43 | 830 |
| 2043-44 | 875 |
| 2044-45 | 920 |

Table 7-6 : Toll Rates for Monthly Pass Local @ Km 123.87

| Year | Car |
|---------|-----|
| 2023-24 | 330 |
| 2024-25 | 340 |
| 2025-26 | 355 |
| 2026-27 | 375 |
| 2027-28 | 390 |
| 2028-29 | 410 |
| 2029-30 | 435 |
| 2030-31 | 455 |
| 2031-32 | 480 |
| 2032-33 | 505 |
| 2033-34 | 530 |
| 2034-35 | 560 |
| 2035-36 | 585 |
| 2036-37 | 620 |
| 2037-38 | 650 |
| 2038-39 | 685 |
| 2039-40 | 720 |
| 2040-41 | 760 |
| 2041-42 | 800 |
| 2042-43 | 845 |
| 2043-44 | 890 |
| 2044-45 | 940 |

Table 7-7 : Toll Rates for Monthly Pass @ Km 90.661

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 3540 | 5720 | 11990 | 11990 | 13080 | 18800 | 22890 |
| 2024-25 | 3700 | 5935 | 12355 | 12355 | 13475 | 19335 | 23525 |
| 2025-26 | 3985 | 6395 | 13180 | 13180 | 14360 | 20555 | 24985 |
| 2026-27 | 4265 | 6840 | 14100 | 14100 | 15360 | 21990 | 26725 |
| 2027-28 | 4480 | 7190 | 14820 | 14820 | 16150 | 23120 | 28095 |
| 2028-29 | 4710 | 7555 | 15585 | 15585 | 16980 | 24310 | 29545 |
| 2029-30 | 4950 | 7945 | 16390 | 16390 | 17860 | 25570 | 31075 |
| 2030-31 | 5205 | 8355 | 17240 | 17240 | 18785 | 26895 | 32690 |
| 2031-32 | 5475 | 8785 | 18135 | 18135 | 19760 | 28300 | 34395 |
| 2032-33 | 5760 | 9245 | 19085 | 19085 | 20795 | 29780 | 36200 |
| 2033-34 | 6060 | 9725 | 20085 | 20085 | 21885 | 31345 | 38105 |
| 2034-35 | 6375 | 10235 | 21145 | 21145 | 23040 | 33000 | 40115 |
| 2035-36 | 6710 | 10775 | 22265 | 22265 | 24260 | 34750 | 42240 |
| 2036-37 | 7065 | 11345 | 23445 | 23445 | 25550 | 36600 | 44490 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|--------|------------|--------------------|
| 2037-38 | 7440 | 11950 | 24695 | 24695 | 26915 | 38555 | 46870 |
| 2038-39 | 7835 | 12585 | 26020 | 26020 | 28355 | 40625 | 49385 |
| 2039-40 | 8255 | 13260 | 27420 | 27420 | 29880 | 42810 | 52045 |
| 2040-41 | 8700 | 13970 | 28900 | 28900 | 31495 | 45125 | 54860 |
| 2041-42 | 9170 | 14725 | 30465 | 30465 | 33200 | 47570 | 57835 |
| 2042-43 | 9665 | 15525 | 32120 | 32120 | 35005 | 50160 | 60985 |
| 2043-44 | 10190 | 16370 | 33875 | 33875 | 36920 | 52900 | 64320 |
| 2044-45 | 10745 | 17260 | 35730 | 35730 | 38940 | 55800 | 67845 |

Table 7-8 : Toll Rates for Monthly Pass @ Km 123.875

| Year | Car | Minibus /LCV | Bus | Truck | 3 Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 2270 | 3670 | 7685 | 7685 | 8385 | 12055 | 14675 |
| 2024-25 | 2325 | 3760 | 7875 | 7875 | 8595 | 12355 | 15040 |
| 2025-26 | 2445 | 3950 | 8275 | 8275 | 9025 | 12975 | 15795 |
| 2026-27 | 2570 | 4150 | 8695 | 8695 | 9485 | 13630 | 16595 |
| 2027-28 | 2700 | 4360 | 9135 | 9135 | 9965 | 14325 | 17435 |
| 2028-29 | 2835 | 4580 | 9600 | 9600 | 10470 | 15055 | 18325 |
| 2029-30 | 2980 | 4815 | 10090 | 10090 | 11010 | 15825 | 19265 |
| 2030-31 | 3135 | 5065 | 10610 | 10610 | 11575 | 16640 | 20255 |
| 2031-32 | 3295 | 5325 | 11160 | 11160 | 12170 | 17500 | 21300 |
| 2032-33 | 3470 | 5600 | 11735 | 11735 | 12805 | 18405 | 22405 |
| 2033-34 | 3650 | 5895 | 12350 | 12350 | 13470 | 19365 | 23575 |
| 2034-35 | 3840 | 6200 | 12995 | 12995 | 14175 | 20380 | 24810 |
| 2035-36 | 4040 | 6530 | 13675 | 13675 | 14920 | 21450 | 26110 |
| 2036-37 | 4255 | 6870 | 14400 | 14400 | 15710 | 22580 | 27490 |
| 2037-38 | 4480 | 7235 | 15165 | 15165 | 16540 | 23780 | 28945 |
| 2038-39 | 4720 | 7620 | 15970 | 15970 | 17420 | 25045 | 30490 |
| 2039-40 | 4970 | 8030 | 16825 | 16825 | 18355 | 26385 | 32120 |
| 2040-41 | 5235 | 8460 | 17725 | 17725 | 19340 | 27800 | 33840 |
| 2041-42 | 5520 | 8915 | 18680 | 18680 | 20380 | 29295 | 35665 |
| 2042-43 | 5820 | 9400 | 19690 | 19690 | 21485 | 30880 | 37595 |
| 2043-44 | 6135 | 9910 | 20760 | 20760 | 22650 | 32560 | 39635 |
| 2044-45 | 6470 | 10450 | 21895 | 21895 | 23885 | 34330 | 41795 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2045-46 starting from the year 2023-24 are shown in tables below.

Table 7-9 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP2 | Total |
|---------|---------|--------|----------------|
| 2023-24 | 205.34 | 104.84 | 310.18 |
| 2024-25 | 222.06 | 112.29 | 334.35 |
| 2025-26 | 250.44 | 123.92 | 374.36 |
| 2026-27 | 280.82 | 134.33 | 415.16 |
| 2027-28 | 309.00 | 148.44 | 457.44 |
| 2028-29 | 338.20 | 163.80 | 502.00 |
| 2029-30 | 375.71 | 180.43 | 556.14 |
| 2030-31 | 410.09 | 197.45 | 607.54 |
| 2031-32 | 453.00 | 218.01 | 671.01 |
| 2032-33 | 498.96 | 237.82 | 736.79 |
| 2033-34 | 546.16 | 261.42 | 807.58 |
| 2034-35 | 598.77 | 287.18 | 885.95 |
| 2035-36 | 653.11 | 310.68 | 963.79 |
| 2036-37 | 709.60 | 338.63 | 1048.23 |
| 2037-38 | 773.44 | 366.46 | 1139.90 |
| 2038-39 | 841.17 | 396.36 | 1237.54 |
| 2039-40 | 917.89 | 434.79 | 1352.68 |
| 2040-41 | 990.69 | 467.48 | 1458.17 |
| 2041-42 | 1080.46 | 509.54 | 1590.00 |
| 2042-43 | 1173.41 | 552.52 | 1725.93 |
| 2043-44 | 1279.55 | 602.93 | 1882.48 |
| 2044-45 | 1386.60 | 652.95 | 2039.55 |

Table 7-10 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP2 | Total |
|---------|--------|--------|----------------|
| 2023-24 | 205.34 | 104.84 | 310.18 |
| 2024-25 | 221.00 | 111.75 | 332.75 |
| 2025-26 | 248.05 | 122.75 | 370.80 |
| 2026-27 | 276.74 | 132.42 | 409.16 |
| 2027-28 | 303.04 | 145.58 | 448.62 |
| 2028-29 | 330.10 | 159.89 | 489.99 |
| 2029-30 | 365.00 | 175.26 | 540.26 |
| 2030-31 | 396.50 | 190.88 | 587.38 |
| 2031-32 | 435.89 | 209.73 | 645.62 |
| 2032-33 | 477.79 | 227.70 | 705.49 |
| 2033-34 | 520.45 | 249.09 | 769.54 |
| 2034-35 | 567.76 | 272.37 | 840.12 |
| 2035-36 | 616.22 | 293.23 | 909.45 |
| 2036-37 | 666.24 | 318.02 | 984.27 |
| 2037-38 | 722.73 | 342.48 | 1065.21 |
| 2038-39 | 782.30 | 368.62 | 1150.92 |

| Year | TP-1 | TP2 | Total |
|----------------|---------|--------|----------------|
| 2039-40 | 849.62 | 402.35 | 1251.97 |
| 2040-41 | 912.61 | 430.52 | 1343.12 |
| 2041-42 | 990.46 | 467.00 | 1457.46 |
| 2042-43 | 1070.43 | 503.99 | 1574.42 |
| 2043-44 | 1161.60 | 547.31 | 1708.91 |
| 2044-45 | 1252.72 | 589.86 | 1842.58 |

**Table 7-11 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

| Year | TP-1 | TP2 | Total |
|----------------|---------|--------|----------------|
| 2023-24 | 205.34 | 104.84 | 310.18 |
| 2024-25 | 221.55 | 112.01 | 333.57 |
| 2025-26 | 249.24 | 123.33 | 372.57 |
| 2026-27 | 278.75 | 133.37 | 412.12 |
| 2027-28 | 305.99 | 147.00 | 452.99 |
| 2028-29 | 334.13 | 161.84 | 495.97 |
| 2029-30 | 370.34 | 177.86 | 548.21 |
| 2030-31 | 403.29 | 194.18 | 597.47 |
| 2031-32 | 444.43 | 213.86 | 658.29 |
| 2032-33 | 488.36 | 232.73 | 721.09 |
| 2033-34 | 533.28 | 255.21 | 788.49 |
| 2034-35 | 583.20 | 279.71 | 862.91 |
| 2035-36 | 634.56 | 301.84 | 936.40 |
| 2036-37 | 687.76 | 328.15 | 1015.90 |
| 2037-38 | 747.80 | 354.26 | 1102.06 |
| 2038-39 | 811.29 | 382.27 | 1193.57 |
| 2039-40 | 883.21 | 418.28 | 1301.48 |
| 2040-41 | 950.92 | 448.65 | 1399.57 |
| 2041-42 | 1034.55 | 487.80 | 1522.35 |
| 2042-43 | 1120.75 | 527.67 | 1648.42 |
| 2043-44 | 1219.12 | 574.42 | 1793.54 |
| 2044-45 | 1318.00 | 620.54 | 1938.53 |

CHAPTER 8

CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Hapur to Moradabad section of NH-9 in state of Uttar Pradesh from km 50.000 to km 148.277 is currently four lane and would be augmented to six lane in current concession. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the busy and prominent national highway NH-9 which is main link for traffic from Punjab, Haryana, Delhi to Moradabad, Rampur and eastern part of Uttarakhand. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

- a) There is a good amount of tollable traffic running on the project.
- b) Project corridor has potential to witness traffic growth @ 6-8% annually Post COVID-19 in near future due to various development in area and overall development of economy.
- c) The Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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GOA/KARNATAKA BORDER TO KUNDARPUR
(KM 93.300 TO KM 283.300)
SECTION OF NH-17 IN THE STATE OF
GOA & KARNATAKA



**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024

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**GOA/KARNATAKA BORDER TO KUNDARPUR
(KM 93.300 TO KM 283.300)
SECTION OF NH-17 IN THE STATE OF
GOA & KARNATAKA**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 various phases of NHDP. Under Phase IV NHAI has planned to convert existing 2-lane National Highways into 4-lane National Highway.

The project under consideration, Four Laning of Goa / Karnataka Border to Kundapur section of NH-17 from km 93.300 to km 283.300 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. M/s IRB Westcoast Tollway Ltd. (Concessionaire) has been awarded the Project for a concession period of 28 years starting from the appointed date of 3rd March 2014. The Project is under capacity augmentation to six lanes. Tolling operation under current concession has commenced in February 2020 after partial COD on 31st January 2020. Further to it additional length of 161.050 Km has been completed and put to commercial operation in February 2022. PCOD-3 has been received in March 2023 & the rest of length is expected to complete by Financial Year 2024.

Project road from Goa/ Karnataka Border (Near Karwar) to Kundapur is about 190 km section of Mumbai - Goa highway (NH-17) from Km 93.700 to Km 283.300. NH-17 is most important transportation corridor along west cost of India. It starts at Panvel, at the junction of National Highway 4 (NH 4), and ends at Kanyakumari. NH-17 mainly traverses through the west coast of India, sometimes touching the shores of the Arabian Sea. The NH 17 touches the Arabian Sea at Maravanthe in Karnataka, Thalassery, Alappuzha and Kollam in Kerala. It passes through the Indian states of Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu

The following figure shows the project road alignment.

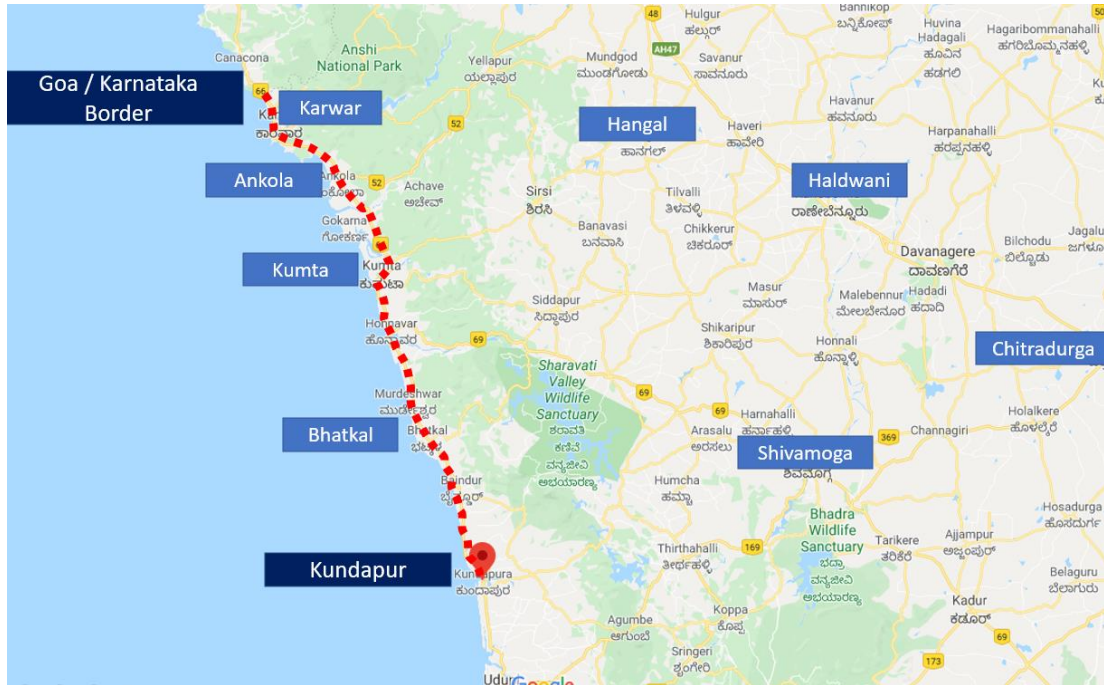


Figure 1-1 : Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “Traffic Study & Toll Revenue Projection Report” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

Project of Four Laning of Goa / Karnataka Border – Kundapur section of NH-17 from Km 93.700 to Km 283.300 is Phase-IV project of NHAI on PPP basis under DBFOT pattern. Ankola, Bhatkal, Kumta and Karwar are the main urban centers on project Corridor. For most of the length of the project road runs parallel to the western coast.

It can be observed that project road forms a main connectivity between Mumbai and southern parts on west coast like Goa, Kanoor, Kocchi, Thiruanantpuram and finally Kanyakumai. Thus, transportation requirements in terms of passenger and goods are largely dependent on this spinal road.

2.2 Project Stretch Description

Project road section of NH-17 (now NH-66) passes through the important places like Karwar, Bhatkal, Ankola. This is the main connectivity between Mumbai and- Goa and Kerala. The Project Road passes through the districts of Karnataka and Goa.

National Highway 66, commonly referred to as NH 66 (Erstwhile NH-17 and a part of NH-47), is a busy National Highway that runs roughly north–south along the western coast of India, parallel to the Western Ghats. It connects Panvel (a city south of Mumbai) to Kanyakumari, passing through the states of Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu

The following are the major centers of areas which have impact on project road in terms of traffic.

Goa: Is a state in India within the coastal region known as the Konkan, in Western India. It is bounded by Maharashtra to the north and Karnataka to the east and south, with the Arabian Sea forming its Western coast. It is India's smallest state by area and the fourth smallest by population. Goa has the highest GDP per capita among all Indian states,[3] that is two and a half times that of the country. It was ranked the 'best placed State' by the "Eleventh Finance Commission" for its infrastructure and ranked on top for the 'best quality of life' in India by the National Commission on Population based on the 12 Indicators.

Kumta: Is a town and a taluk in the Uttara Kannada district of Karnataka, India. Kumta is about 142 km south of Margao and 58 km north of Bhatkal. It is situated 72.7 km from Karwar, the district headquarters. It is one of the important stations along the Konkan Railway line running between Mumbai and Mangalore.

Bhatkal: Is a port town in the Uttara Kannada District of the South Indian state of Karnataka. The town of Bhatkal lies on National Highway 66, which runs between Mumbai and Kochi, and has one of the major railway stations along the Konkan Railway line, which runs between Mumbai and Mangaluru

As the project highway runs along the west coast for most parts of its alignment, there are only radial roads connecting to the project highway which work as feeder network to project road.

Four laning of project highway is higher priority of both central & concerned state governments. Currently highways have bottlenecks at many places which are being improved as a priority. Due to the poor condition of NH-17 and higher number of accidents some part of traffic uses Mumbai -Pune Expressway and then take Bangalore Highway (NH-48) to go to Goa and parts of Karnataka and Kerala. This traffic is expected to come back on the project highway.

There are three operative toll plazas at project stretch. at km 119.00, km 184.00 and km 243.00 respectively. The following figure shows project alignment and toll plaza locations.

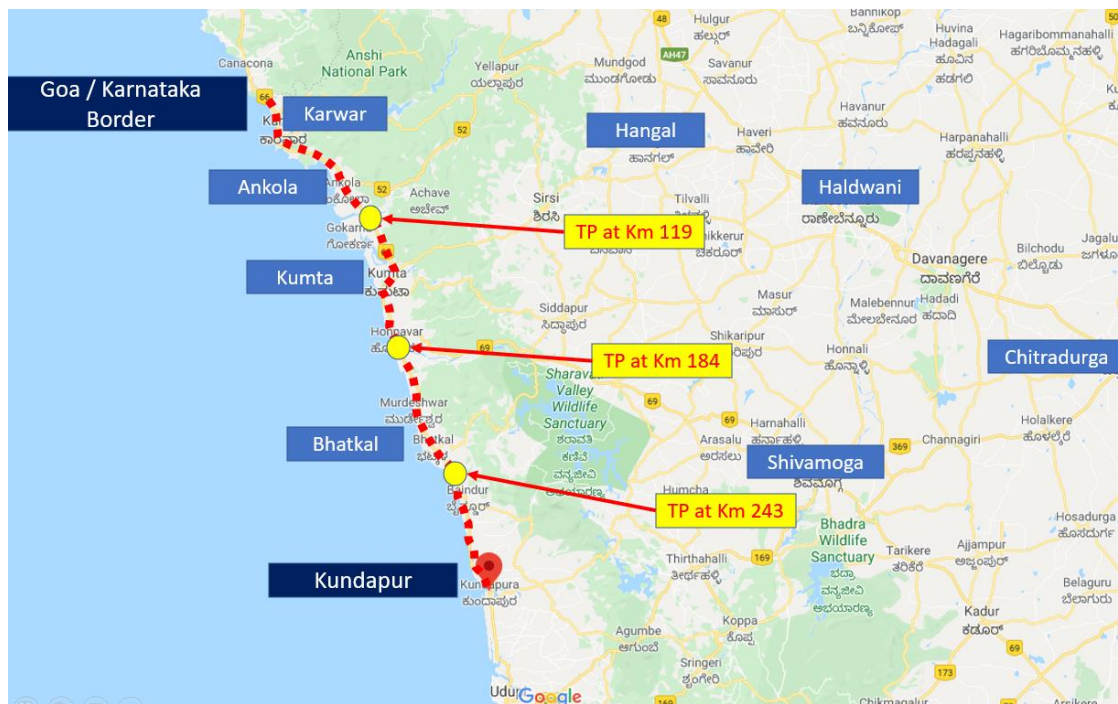


Figure 2-1 : Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Six laning of project stretch is complete. The following photographs illustrate the project section along the corridor.



Figure 2-2 : Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Goa Karnataka Border to Kundapur section of NH17 for years 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|-------------------|--|---|---|---|---|
| 1 | Km 119 Toll Plaza | AADT for Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 |
| 2 | Km 184 Toll Plaza | AADT for Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|-------------------|--|---|---|---|---|
| | | | 2023 | from April 2023 to November 2023 | 2023 | |
| 3 | Km 243 Toll Plaza | AADT for Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 | For Period from February 2020 to March 2020, 2020-21, 2021-2022, 2022-2023 & Eight month from April 2023 to November 2023 |

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 3-2 : 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Bus
- Truck
- 3 Axle commercial vehicle
- Multi Axle

3.3 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.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Traffic was temporarily impacted on account of state elections. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average

Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Belekeri Toll Plaza at Km 119.00

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- February 20 to March 20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|--------------------|--|--|--|--|--|
| 1 | Car | 1485 | 1639 | 1974 | 3061 | 3058 |
| 2 | Minibus/LCV | 380 | 360 | 150 | 130 | 129 |
| 3 | Bus | 308 | 101 | 159 | 234 | 256 |
| 4 | Truck | 177 | 256 | 240 | 259 | 253 |
| 5 | 3 Axle | 162 | 130 | 155 | 182 | 132 |
| 6 | Multi Axle | 339 | 329 | 519 | 627 | 462 |
| 7 | Oversized Vehicles | 8 | 7 | 5 | 6 | 5 |
| Total | | 2859 | 2821 | 3202 | 4497 | 4295 |

Table 3-4 : Traffic Data at Hologadde Toll Plaza at Km 184.00

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- February 20 to March 20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-----------------|--|--|--|--|--|
| 1 | Car | 2587 | 2759 | 3240 | 5084 | 5297 |
| 2 | Minibus/LCV | 830 | 582 | 266 | 292 | 306 |
| 3 | Bus | 455 | 293 | 343 | 532 | 614 |
| 4 | Truck | 662 | 676 | 693 | 844 | 853 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- February 20 to March 20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|--------------------|--|--|--|--|--|
| 5 | 3 Axle | 312 | 272 | 277 | 303 | 313 |
| 6 | Multi Axle | 888 | 815 | 869 | 1139 | 1186 |
| 7 | Oversized Vehicles | 2 | 5 | 6 | 6 | 5 |
| Total | | 5736 | 5401 | 5693 | 8198 | 8573 |

Table 3-5 : Traffic Data at Shirur Toll Plaza at Km 243.00

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- February 20 to March 20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|--------------------|--|--|--|--|--|
| 1 | Car | 2600 | 2953 | 3644 | 5778 | 6137 |
| 2 | Minibus/LCV | 756 | 602 | 318 | 394 | 397 |
| 3 | Bus | 463 | 295 | 334 | 523 | 582 |
| 4 | Truck | 700 | 684 | 814 | 950 | 941 |
| 5 | 3 Axle | 305 | 273 | 315 | 319 | 325 |
| 6 | Multi Axle | 853 | 805 | 873 | 1123 | 1168 |
| 7 | Oversized Vehicles | 2 | 7 | 6 | 6 | 5 |
| Total | | 5679 | 5619 | 6304 | 9092 | 9554 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-6**.

Table 3-6 : 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 3-7 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|------|--------------------------|------------|------|-----------|
| | Belekeri at Km 119.00 | 2859 | 5557 | 1.94 |

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|---------|--------------------------|------------|-------|-----------|
| 2019-20 | Holegadde at Km 184.00 | 5736 | 12124 | 2.11 |
| | Shirur at Km 243.00 | 5679 | 11986 | 2.11 |
| 2020-21 | Belekeri at Km 119.00 | 2821 | 5150 | 1.83 |
| | Holegadde at Km 184.00 | 5401 | 11043 | 2.04 |
| | Shirur at Km 243.00 | 5619 | 11266 | 2.00 |
| 2021-22 | Belekeri at Km 119.00 | 3202 | 6219 | 1.94 |
| | Holegadde at Km 184.00 | 5693 | 11512 | 2.02 |
| | Shirur at Km 243.00 | 6304 | 12465 | 1.98 |
| 2022-23 | Belekeri at Km 119.00 | 4497 | 8125 | 1.81 |
| | Holegadde at Km 184.00 | 8198 | 15705 | 1.92 |
| | Shirur at Km 243.00 | 9092 | 16823 | 1.85 |
| 2023-24 | Belekeri at Km 119.00 | 4295 | 7276 | 1.69 |
| | Holegadde at Km 184.00 | 8573 | 16452 | 1.92 |
| | Shirur at Km 243.00 | 9554 | 17551 | 1.84 |

It can be observed from above that project traffic has PCU index from 1.8 to 2.0 which is an indicator of good proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at three toll plaza locations.

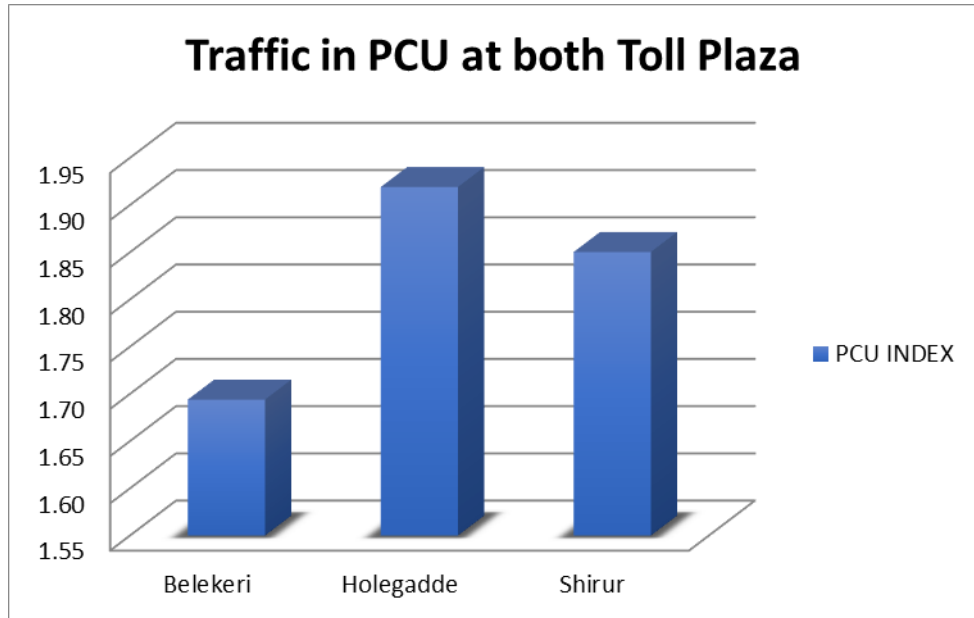
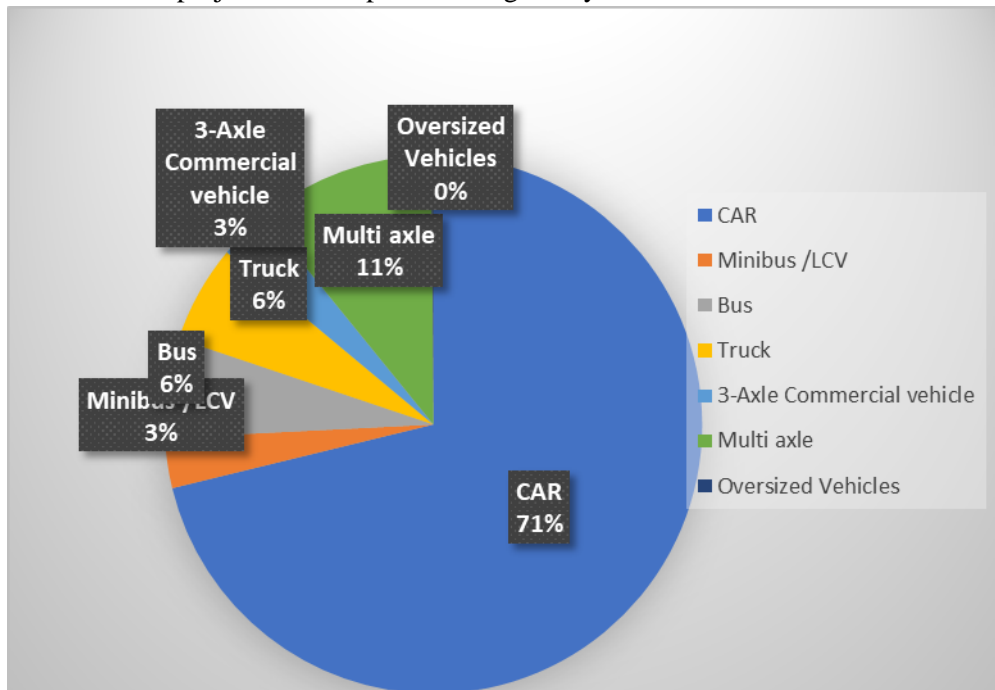


Figure 3-1 : Comparison of PCU Index

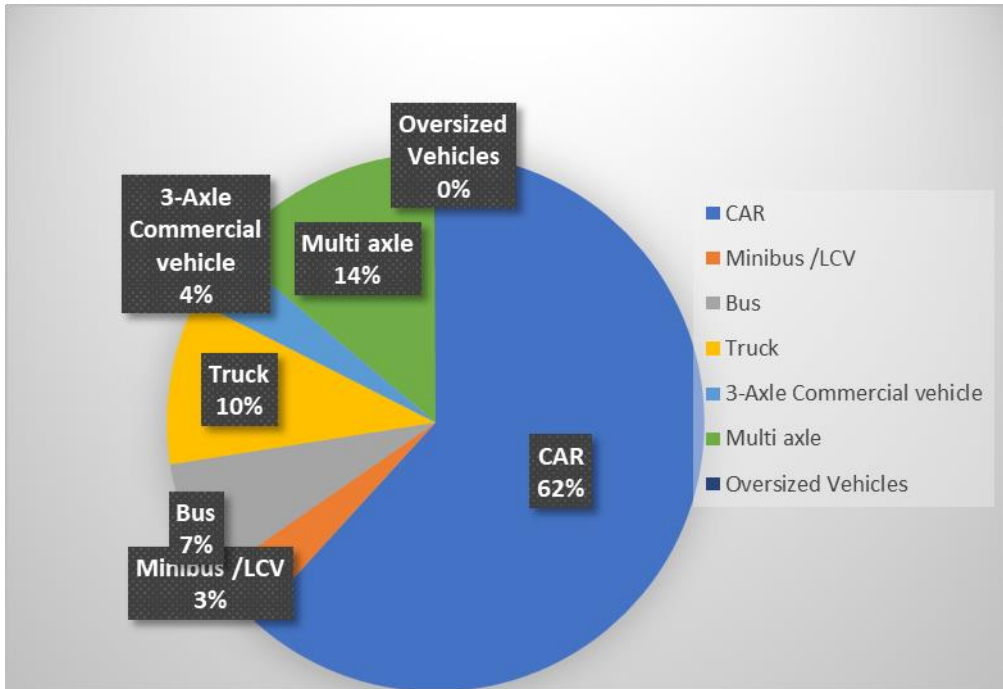
It can be observed that PCU index is consistent at all three plaza locations.

3.4.2 Components of Traffic

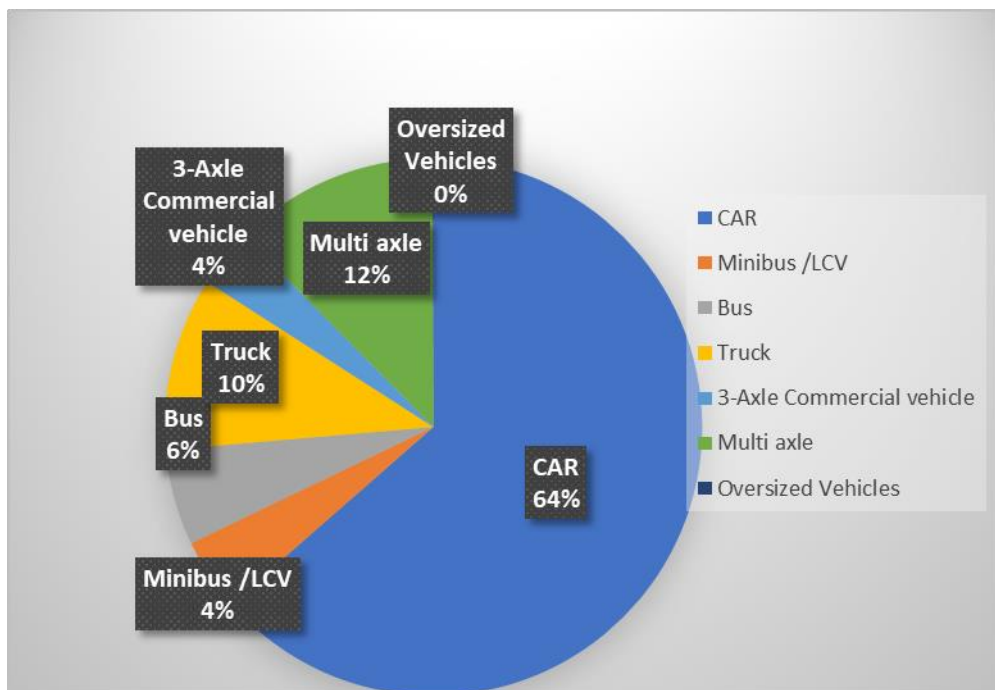
As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential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



Model Split of Tollable Vehicle @ KM 119.000



Model Split of Tollable Vehicle @ KM 184.000



Model Split of Tollable Vehicle @ KM 243.000

It is observed that car traffic forms about 71% of total traffic at toll plaza location 1 while multi axle along with 3 axle commercial vehicles are about 14% of total traffic. Truck / Bus and LCV share about 12% and 3% of traffic volume respectively at toll plaza on 119.000 km.

It is observed that car traffic forms about 62% of total traffic at toll plaza location 2 while multi axle along with 3 axle commercial vehicles are about 18% of total traffic. Truck /

Bus and LCV share about 16% and 4% of traffic volume respectively at toll plaza on 184.000 km.

It is observed that car traffic forms about 62% of total traffic at toll plaza location 3 while multi axle along with 3 axle commercial vehicles are about 18% of total traffic. Truck / Bus and LCV share about 17% and 3% of traffic volume respectively at toll plaza on 243.000 km.

Thus, the project corridor has a good mix of about 60% -70% passenger and 30-40% commercial traffic.

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

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

The following table provides numbers of vehicles falling in each of above category on base years 2019-20, 2020-21, 2021-22, 2022-2023 & April 2023 to November 2023.

Table 3-8 : Journey Type Bifurcation of Traffic at TP-1 KM 119.00

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 2339 |
| 2 | Return Journey | 1788 |
| 3 | Local Commercial Single Journey | 158 |
| 4 | Monthly Pass Local | 2 |
| 5 | Monthly Pass | 8 |

Table 3-9 : Journey Type Bifurcation of Traffic at TP KM 184.00

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 5024 |
| 2 | Return Journey | 3151 |
| 3 | Local Commercial Single Journey | 386 |
| 4 | Monthly Pass Local | 4 |
| 5 | Monthly Pass | 8 |

Table 3-10 : Journey Type Bifurcation of Traffic at TP KM 243.00

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------------|
| 1 | Single Journey | 4951 |
| 2 | Return Journey | 4308 |
| 3 | Local Commercial Single Journey | 276 |
| 4 | Monthly Pass Local | 12 |
| 5 | Monthly Pass | 6 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 54%. Return journey component is 42% and Local Commercial Single Journey is 4% at toll plaza at Km 119.00

The single journey component in total traffic numbers is as high as 59%. Return journey component is 37% and Local Commercial single journey 4% at toll plaza at Km 184.00

The single journey component in total traffic numbers is as high as 52%. Return journey component is 45% and Local Commercial Single Journey is 3% at toll plaza at Km 243.00

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch runs on west coast of India. Most of the roads other than NH-17 run radial to NH-17 as a complimentary network. There are large number of stream and rivers falling into Arabian sea on west coast. Hence any parallel road would require many major bridges. This has prevented any parallel road to NH-17. The following figure shows bird's eye view of project corridor.



Figure 4-1 : Project corridor and radial roads.

Still geographically there can be alternate routes to project road between certain pairs of origin and destinations. The following figure shows such routes which are much longer than project road practically cannot be considered as alternate routes.



Figure 4-2 : Alternate route at regional level.

Thus, practically there is no alternate route to project road between Goa/ Karnataka border and Kundapur. Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road. Further with completion of Mumbai Kanyakumari section of road traffic on project road would get a boost in period 2024-2026 when it would be completed.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Goa/ Karnataka Border – Kundapur section of NH-17 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, In order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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).

The project corridor spreads across state of Karnataka. Toll plazas at Km 119.00, Km 184.00 and 243.00 are in the state of Karnataka. Contribution of Goa / Maharashtra is also substantial at stretch. For elasticity calculations, working data from Karnataka and Maharashtra / Goa has been analysed.

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Karnataka State.

Table 5-1 : Per Capita Income Vs Car Karnataka

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 90269 | 1269430 | 4.96 | 6.10 | | |
| 2013 | 94382 | 1420767 | 4.97 | 6.15 | 5% | |
| 2014 | 101864 | 1572521 | 5.01 | 6.20 | 8% | |
| 2015 | 105703 | 1741831 | 5.02 | 6.24 | 4% | |
| 2016 | 116819 | 1916373 | 5.07 | 6.28 | 11% | |
| 2017 | 131260 | 2110493 | 5.12 | 6.32 | 12% | 7.83% |

Regression analysis of same is given in figure below

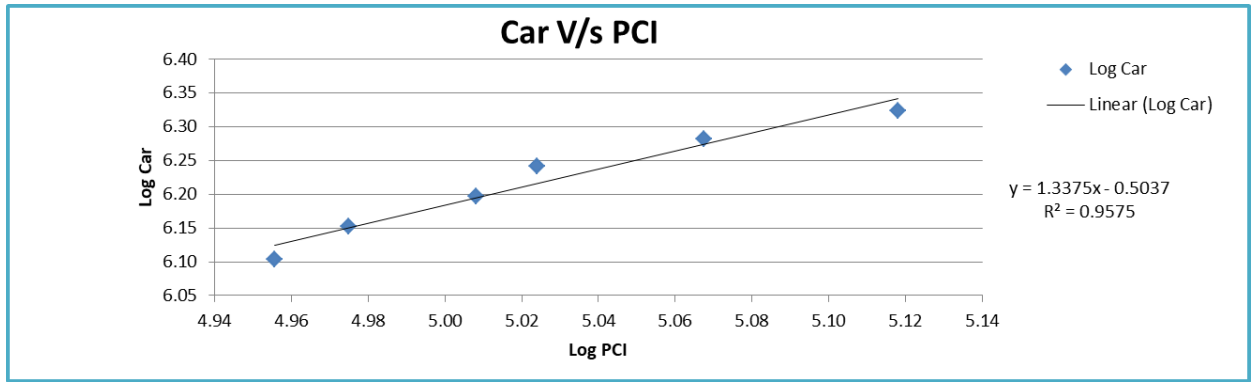


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Karnataka

Table 5-2 : Population Vs Bus Karnataka

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 1458545 | 9513 | 6.16 | 3.98 | | |
| 2013 | 1466020 | 9956 | 6.17 | 4.00 | 1% | |
| 2014 | 1473384 | 10925 | 6.17 | 4.04 | 1% | |
| 2015 | 1480636 | 11224 | 6.17 | 4.05 | 0% | |
| 2016 | 1487779 | 11503 | 6.17 | 4.06 | 0% | |
| 2017 | 1494812 | 11888 | 6.17 | 4.08 | 0% | 0.49% |

Regression analysis of same is given in figure below

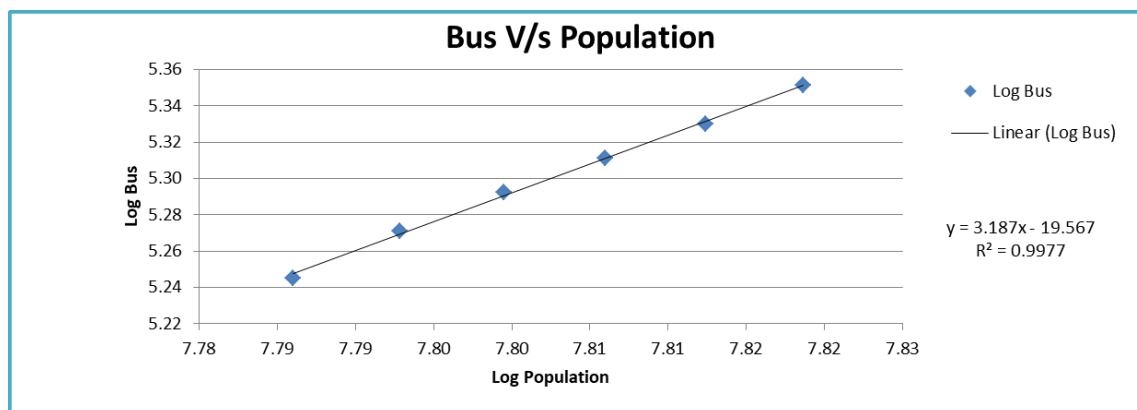


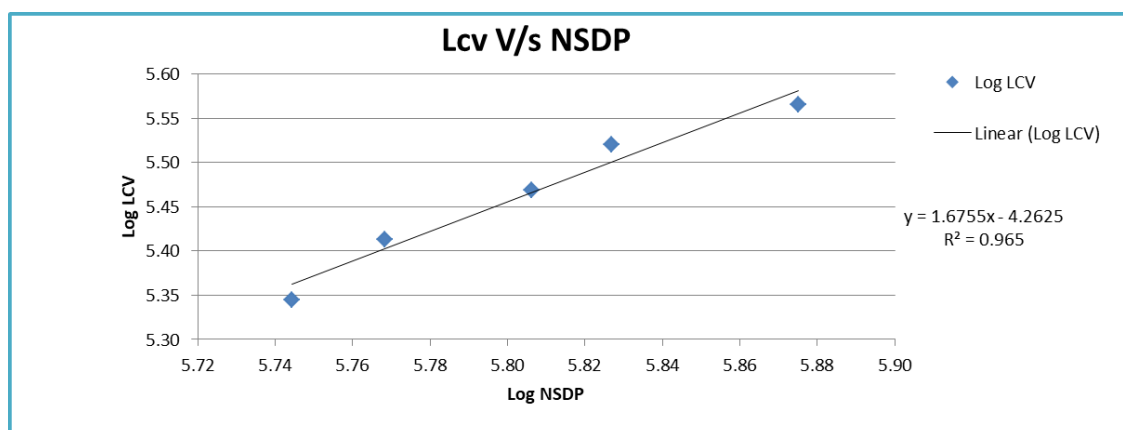
Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Karnataka

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

Table 5-3 : Goods Traffic Vs NSDP Karnataka

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth |
|------|--------|--------|----------|---------|-------------|----------------|
| 2012 | 554990 | 221160 | 5.74 | 5.34 | | |
| 2013 | 586592 | 258701 | 5.77 | 5.41 | 6% | |
| 2014 | 639981 | 294266 | 5.81 | 5.47 | 9% | |
| 2015 | 671322 | 331381 | 5.83 | 5.52 | 5% | |
| 2016 | 749990 | 367572 | 5.88 | 5.57 | 12% | 7.85% |

Following figure depict regression analysis and extrapolation.

**Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Karnataka.****Table 5-4 : Traffic Truck Vs NSDP Karnataka**

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 554990 | 233422 | 5.74 | 5.37 | | |
| 2013 | 586592 | 247639 | 5.77 | 5.39 | 6% | |
| 2014 | 639981 | 260989 | 5.81 | 5.42 | 9% | |
| 2015 | 671322 | 274971 | 5.83 | 5.44 | 5% | |
| 2016 | 749990 | 290415 | 5.88 | 5.46 | 12% | |
| 2017 | 851880 | 306290 | 5.93 | 5.49 | 14% | 9.00% |

Following figure depict regression analysis and extrapolation.

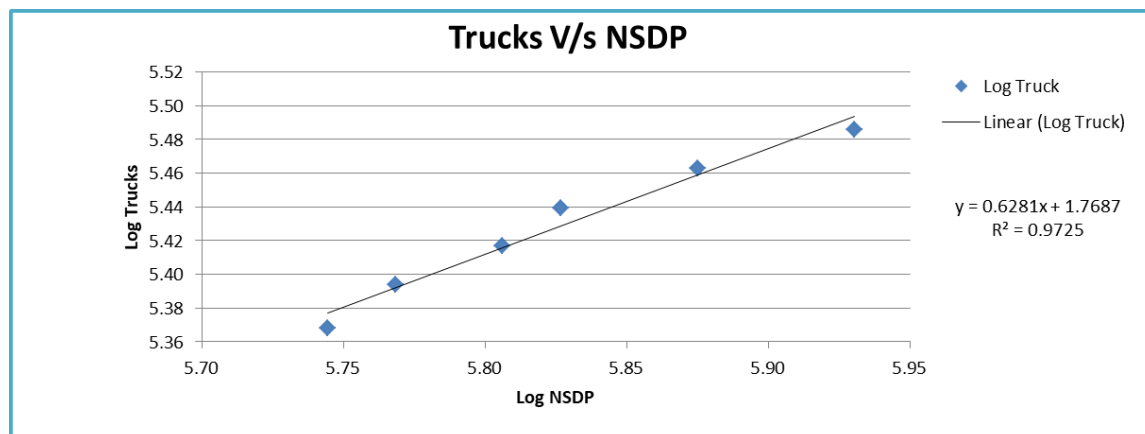


Figure 5-4 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Karnataka.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 5-5 : Summary Regression Analysis Karnataka

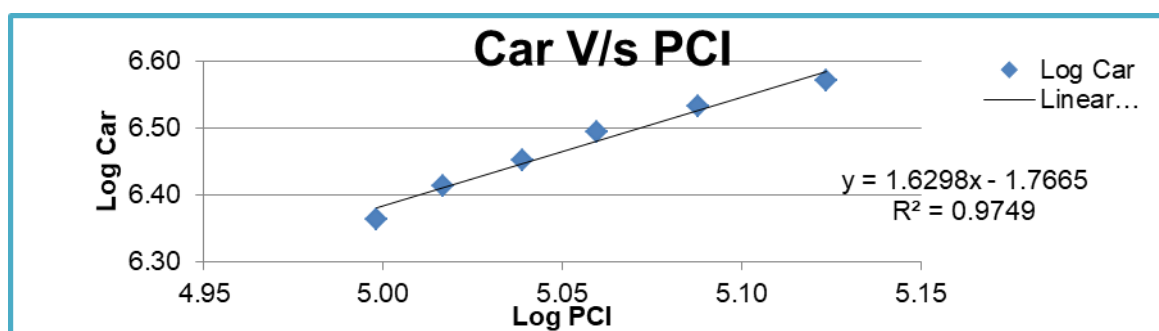
| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-----------|------------------|----------------------|-------------------------|-------------------------|----------------------------|----------------|----------------------|
| Karnataka | Car/Jeep | PCI | $y = 1.3375x + -0.5037$ | R ² = 0.9575 | 1.3375 | 7.83% | 10.47% |
| | Bus | Population | $y = 3.187x - 19.567$ | R ² = 0.9977 | 3.1870 | 1.52% | 4.83% |
| | LCV | NSDP | $y = 1.6755x - -4.2625$ | R ² = 0.965 | 1.6755 | 7.85% | 13.16% |
| | Truck | NSDP | $y = 0.6281x - 1.7687$ | R ² = 0.9725 | 0.6281 | 9.00% | 5.65% |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

Table 5-6 : Per Capita Income Vs Car Maharashtra

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 99564 | 2307841 | 5.00 | 6.36 | | |
| 2013 | 103904 | 2592565 | 5.02 | 6.41 | 4% | |
| 2014 | 109399 | 2834847 | 5.04 | 6.45 | 5% | |
| 2015 | 114746 | 3113773 | 5.06 | 6.49 | 5% | |
| 2016 | 122422 | 3406872 | 5.09 | 6.53 | 7% | |
| 2017 | 132899 | 3715744 | 5.12 | 6.57 | 9% | 5.96% |

Regression analysis of same is given in figure below

**Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Maharashtra****Table 5-7 : Population Vs Bus Maharashtra**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 112374333 | 119298 | 8.05 | 5.08 | | |
| 2013 | 113807248 | 129535 | 8.06 | 5.11 | 1% | |
| 2014 | 115229410 | 140087 | 8.06 | 5.15 | 1% | |
| 2015 | 116640546 | 140102 | 8.07 | 5.15 | 1% | |
| 2016 | 118040394 | 150427 | 8.07 | 5.18 | 1% | |
| 2017 | 119428710 | 160042 | 8.08 | 5.20 | 1% | 1.23% |

Regression analysis of same is given in figure below

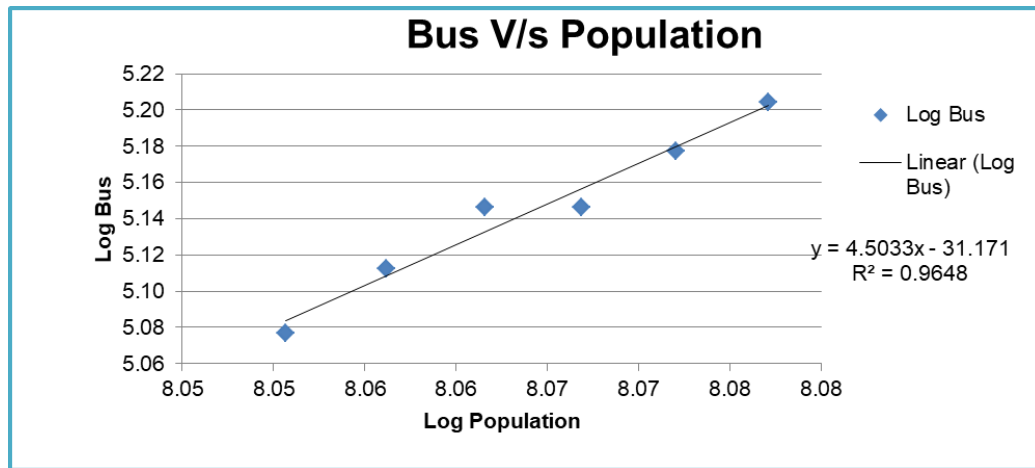


Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra

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

Table 5-8 : LCV Traffic Vs NSDP Maharashtra

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|---------|--------|----------|---------|-------------|-------------------------|
| 2012 | 1126595 | 656407 | 6.05 | 5.82 | | |
| 2013 | 1189711 | 739725 | 6.08 | 5.87 | 6% | |
| 2014 | 1267551 | 803128 | 6.10 | 5.90 | 7% | |
| 2015 | 1345341 | 868632 | 6.13 | 5.94 | 6% | |
| 2016 | 1452439 | 927903 | 6.16 | 5.97 | 8% | 6.56% |

Following figure depict regression analysis and extrapolation.

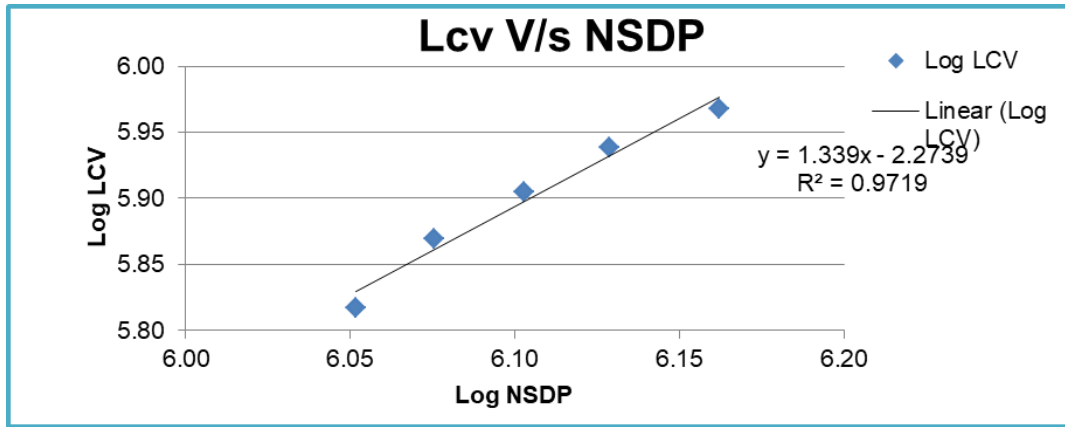


Figure 5-7 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra.

Table 5-9 : Trucks Traffic Vs NSDP Maharashtra

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|---------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 1126595 | 411418 | 6.05 | 5.61 | | |
| 2013 | 1189711 | 402366 | 6.08 | 5.60 | 6% | |
| 2014 | 1267551 | 470128 | 6.10 | 5.67 | 7% | |
| 2015 | 1345341 | 491582 | 6.13 | 5.69 | 6% | |
| 2016 | 1452439 | 468810 | 6.16 | 5.67 | 8% | |
| 2017 | 1595514 | 496439 | 6.20 | 5.70 | 10% | 7.22% |

Following figure depict regression analysis and extrapolation.

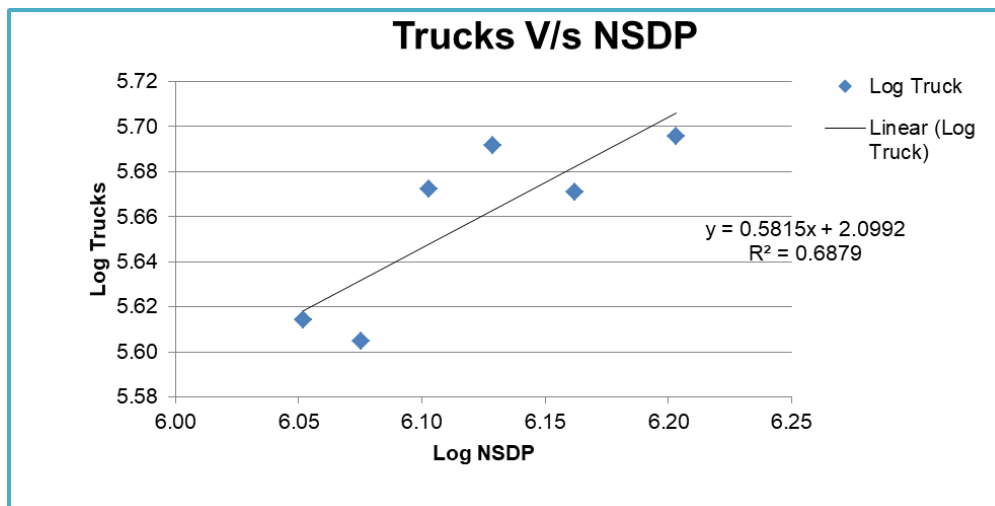


Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra.

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. R² statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R² more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 5-10 : Summary Regression Analysis Maharashtra.

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|----------------|----------------------|
| Maharashtra | Car/Jeep | PCI | $y = 1.6298x + -1.7665$ | R ² = 0.9749 | 1.6298 | 5.96% | 9.71% |
| | Bus | Population | $y = 4.5033x - 31.1713$ | R ² = 0.9648 | 4.5033 | 1.23% | 5.52% |
| | LCV | NSDP | $y = 1.339x - 2.2739$ | R ² = 0.9719 | 1.3390 | 6.56% | 8.78% |
| | Truck | NSDP | $y = 0.5815x - 2.0992$ | R ² = 0.6879 | 0.5815 | 7.22% | 4.20% |

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 proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Goa/ Karnataka Border to Kundapur is under tolling operation with current concessionaire and has only two month of tolling history from February 2020. Further for last two years traffic is impacted by COVID-19 pandemic. Hence sufficient data points to be able to establish a reliable past trend of traffic growth are not available. A minimum of about 5 -6 years' consistent traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economical, 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 5-9 : 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.

Honourable 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 year 2022-23.

5.6 Developments along and around the Project Corridor & State

West Coast Ports - West coast is coast of submergence (except Malabar Coast) while east coast is an emergent coast. These imply that sea is deeper in west coast than sea on east coast. So, west coast has favourable conditions for natural harbours. This is the reason that

ports on west coast of India contribute more in terms of commercial cargo traffic. Expansion of JNPT port may further boost cargo traffic from Kerala, Karnataka and Parts of Tamilnadu on project corridor.

Mangalore - The coastal city of Mangalore is one of the upcoming and fastest developing metropolises of Karnataka. While Mangalore embeds itself in the conventional city affairs, what sets it apart from others is the amalgamation of its heritage, history, culture, food and scenic coastal lines.

Known for its architectural marvels, temples, churches and pristine beaches, the city attracts tourists throughout the year. Some of the popular tourist spots include Mangaladevi temple, St. Aloysius church, Pilikula Nisarga Dhama (a biological park and a picnic spot), Panambur beach and Surathkal beach. Its proximity to Agumbe, Coorg, Kaup beach and temple town Udupi also makes for a quick getaway for city folks.

Mangalore is the largest exporter of coffee in India. One of the flourishing industries in the city is the automobile leaf spring business. Petrochemicals, iron-ore, fertilizers and agricultural processing are some other thriving industries.

In addition, three special economic zones (SEZs) are being set up in the city with IT companies such as TCS, Wipro and Lotus estimated to invest up to Rs.30 billion, creating 67,000 jobs over the next three years. Mangalore is also one of the top five emerging cities of India for outsourcing, according to Alsbridge.

The city is witnessing aggressive industrial development, aiding in its economic growth. Growth of Mangalore as tourism and Industrial hub would have positive impact on growth of traffic on project road

5.7 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. Traffic growth is suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-11 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 | 2046-2050 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 10.02% | 9.29% | 8.50% | 8.14% | 8.03% | 7.57% |
| Bus | 5.59% | 5.28% | 4.97% | 4.90% | 4.75% | 4.52% |
| LCV | 5.80% | 4.95% | 4.12% | 3.72% | 3.70% | 3.28% |
| 2- Axle | 5.71% | 5.04% | 4.36% | 4.04% | 4.02% | 3.68% |
| 3 - Axle | 6.04% | 5.32% | 4.60% | 4.26% | 4.24% | 3.88% |
| 4 to 6 Axle | 7.02% | 6.17% | 5.33% | 4.93% | 4.90% | 4.47% |
| 7 and Above Axle | 7.02% | 6.17% | 5.33% | 4.93% | 4.90% | 4.47% |

Table 5-12 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 | 2046-2050 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.52% | 8.79% | 8.00% | 7.64% | 7.53% | 7.07% |
| Bus | 5.09% | 4.78% | 4.47% | 4.40% | 4.25% | 4.02% |
| LCV | 5.30% | 4.45% | 3.62% | 3.22% | 3.20% | 2.78% |
| 2- Axle | 5.21% | 4.54% | 3.86% | 3.54% | 3.52% | 3.18% |
| 3 - Axle | 5.54% | 4.82% | 4.10% | 3.76% | 3.74% | 3.38% |
| 4 to 6 Axle | 6.52% | 5.67% | 4.83% | 4.43% | 4.40% | 3.97% |
| 7 and Above Axle | 6.52% | 5.67% | 4.83% | 4.43% | 4.40% | 3.97% |

Table 5-13 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 | 2046-2050 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.77% | 9.04% | 8.25% | 7.89% | 7.78% | 7.32% |
| Bus | 5.34% | 5.03% | 4.72% | 4.65% | 4.50% | 4.27% |
| LCV | 5.34% | 5.03% | 4.72% | 4.65% | 4.50% | 4.27% |
| 2- Axle | 5.55% | 4.70% | 3.87% | 3.47% | 3.45% | 3.03% |
| 3 - Axle | 5.46% | 4.79% | 4.11% | 3.79% | 3.77% | 3.43% |
| 4 to 6 Axle | 5.79% | 5.07% | 4.35% | 4.01% | 3.99% | 3.63% |
| 7 and Above Axle | 6.77% | 5.92% | 5.08% | 4.68% | 4.65% | 4.22% |

Project road is part of planned Mumbai- Kochi Economic Corridor under Bharatmala Pariyojna. At present various sections of the corridor are under the advanced stage of construction and planning. Out of total about 1300 km of total length of corridor approximately 900 km is either completed or in under construction. Balance 400 km is to be awarded soon under Bharatmala Pariyojna. It is expected that a substantial part of Mumbai – Kochi Economic Corridor would be operational by year 2024-25. This would be

shorter than the current preferred route of Bangalore highway (NH-48) by about 100 km. In such case it is expected that in the horizon year 2024-25 certain part of traffic between Gujarat / Mumbai and Kochi / Kanyakumari would start using project corridor as most preferred route. Further development of Tuticorin – Kochi economic corridor and ports at Mangalore, Goa and Kochi would also boost traffic on project corridor by year say 2024-25. Same has been considered while taking additional growth of traffic as discussed above. Traffic and revenue have been worked out on the basis of the above growths and some is presented in subsequent chapter of report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- 119 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3058 | 129 | 256 | 253 | 132 | 462 | 5 | 4295 | 7276 |
| 2024-25 | 3364 | 136 | 271 | 268 | 140 | 495 | 6 | 4680 | 7860 |
| 2025-26 | 3676 | 143 | 284 | 282 | 147 | 525 | 6 | 5063 | 8419 |
| 2026-27 | 4017 | 150 | 299 | 296 | 155 | 558 | 6 | 5481 | 9030 |
| 2027-28 | 4390 | 157 | 315 | 311 | 163 | 592 | 6 | 5934 | 9684 |
| 2028-29 | 4798 | 165 | 331 | 327 | 171 | 628 | 6 | 6426 | 10386 |
| 2029-30 | 5243 | 173 | 349 | 344 | 180 | 667 | 6 | 6962 | 11150 |
| 2030-31 | 5688 | 180 | 367 | 359 | 188 | 703 | 6 | 7491 | 11891 |
| 2031-32 | 6171 | 187 | 385 | 375 | 196 | 740 | 6 | 8060 | 12677 |
| 2032-33 | 6695 | 195 | 404 | 391 | 205 | 779 | 6 | 8675 | 13520 |
| 2033-34 | 7264 | 203 | 424 | 408 | 214 | 821 | 6 | 9340 | 14428 |
| 2034-35 | 7881 | 211 | 445 | 426 | 223 | 864 | 6 | 10056 | 15395 |
| 2035-36 | 8522 | 219 | 466 | 443 | 232 | 906 | 6 | 10794 | 16378 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2036-37 | 9215 | 227 | 489 | 461 | 241 | 951 | 6 | 11590 | 17435 |
| 2037-38 | 9965 | 235 | 512 | 480 | 252 | 997 | 6 | 12447 | 18563 |
| 2038-39 | 10776 | 244 | 538 | 499 | 263 | 1046 | 6 | 13372 | 19776 |
| 2039-40 | 11652 | 253 | 564 | 519 | 274 | 1097 | 6 | 14365 | 21066 |
| 2040-41 | 12587 | 262 | 591 | 540 | 286 | 1151 | 6 | 15423 | 22438 |
| 2041-42 | 13598 | 271 | 619 | 562 | 298 | 1208 | 6 | 16562 | 23905 |
| 2042-43 | 14689 | 281 | 648 | 584 | 310 | 1266 | 6 | 17784 | 25461 |
| 2043-44 | 15868 | 291 | 679 | 608 | 323 | 1327 | 6 | 19102 | 27133 |
| 2044-45 | 17143 | 302 | 710 | 632 | 336 | 1391 | 6 | 20520 | 28917 |
| 2045-46 | 18441 | 312 | 741 | 655 | 349 | 1453 | 6 | 21957 | 30710 |
| 2046-47 | 19837 | 322 | 774 | 679 | 362 | 1517 | 6 | 23497 | 32619 |
| 2047-48 | 21339 | 333 | 809 | 703 | 376 | 1584 | 6 | 25150 | 34658 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- 184KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 5297 | 306 | 614 | 853 | 313 | 1186 | 5 | 8573 | 16452 |
| 2024-25 | 5827 | 323 | 647 | 902 | 332 | 1268 | 6 | 9305 | 17688 |
| 2025-26 | 6367 | 339 | 681 | 948 | 349 | 1346 | 6 | 10036 | 18894 |
| 2026-27 | 6958 | 355 | 716 | 996 | 367 | 1428 | 6 | 10826 | 20181 |
| 2027-28 | 7603 | 372 | 754 | 1046 | 386 | 1517 | 6 | 11684 | 21573 |
| 2028-29 | 8309 | 390 | 794 | 1099 | 407 | 1610 | 6 | 12615 | 23066 |
| 2029-30 | 9081 | 409 | 836 | 1154 | 428 | 1710 | 6 | 13624 | 24671 |
| 2030-31 | 9853 | 426 | 878 | 1204 | 448 | 1801 | 6 | 14616 | 26214 |
| 2031-32 | 10691 | 443 | 922 | 1257 | 469 | 1898 | 6 | 15686 | 27868 |
| 2032-33 | 11600 | 461 | 968 | 1312 | 490 | 1999 | 6 | 16836 | 29624 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2033-34 | 12586 | 480 | 1015 | 1368 | 512 | 2106 | 6 | 18073 | 31495 |
| 2034-35 | 13655 | 499 | 1066 | 1427 | 535 | 2218 | 6 | 19406 | 33496 |
| 2035-36 | 14765 | 518 | 1118 | 1485 | 557 | 2327 | 6 | 20776 | 35521 |
| 2036-37 | 15966 | 537 | 1173 | 1544 | 580 | 2442 | 6 | 22248 | 37679 |
| 2037-38 | 17265 | 556 | 1231 | 1607 | 605 | 2562 | 6 | 23832 | 39984 |
| 2038-39 | 18669 | 576 | 1291 | 1672 | 631 | 2688 | 6 | 25533 | 42438 |
| 2039-40 | 20188 | 597 | 1354 | 1740 | 658 | 2820 | 6 | 27363 | 45057 |
| 2040-41 | 21809 | 619 | 1417 | 1810 | 685 | 2958 | 6 | 29304 | 47812 |
| 2041-42 | 23560 | 641 | 1484 | 1883 | 714 | 3104 | 6 | 31392 | 50760 |
| 2042-43 | 25452 | 665 | 1554 | 1958 | 744 | 3256 | 6 | 33635 | 53897 |
| 2043-44 | 27496 | 689 | 1628 | 2037 | 775 | 3416 | 6 | 36047 | 57249 |
| 2044-45 | 29704 | 714 | 1706 | 2119 | 808 | 3583 | 6 | 38640 | 60825 |
| 2045-46 | 31953 | 737 | 1784 | 2198 | 839 | 3743 | 6 | 41260 | 64392 |
| 2046-47 | 34372 | 761 | 1865 | 2279 | 871 | 3911 | 6 | 44065 | 68185 |
| 2047-48 | 36975 | 786 | 1949 | 2363 | 905 | 4086 | 6 | 47070 | 72219 |

**Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 243 KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6137 | 397 | 582 | 941 | 325 | 1168 | 5 | 9554 | 17551 |
| 2024-25 | 6752 | 419 | 613 | 995 | 345 | 1249 | 6 | 10379 | 18887 |
| 2025-26 | 7379 | 440 | 646 | 1045 | 362 | 1326 | 6 | 11204 | 20192 |
| 2026-27 | 8064 | 462 | 680 | 1097 | 381 | 1407 | 6 | 12097 | 21590 |
| 2027-28 | 8813 | 485 | 716 | 1152 | 401 | 1493 | 6 | 13066 | 23093 |
| 2028-29 | 9631 | 509 | 754 | 1209 | 422 | 1585 | 6 | 14116 | 24709 |
| 2029-30 | 10525 | 534 | 794 | 1269 | 444 | 1683 | 6 | 15255 | 26448 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2030-31 | 11419 | 556 | 833 | 1324 | 464 | 1772 | 6 | 16374 | 28117 |
| 2031-32 | 12390 | 579 | 874 | 1381 | 485 | 1866 | 6 | 17581 | 29903 |
| 2032-33 | 13442 | 603 | 918 | 1441 | 507 | 1965 | 6 | 18882 | 31814 |
| 2033-34 | 14584 | 627 | 964 | 1504 | 530 | 2069 | 6 | 20284 | 33856 |
| 2034-35 | 15823 | 653 | 1011 | 1570 | 554 | 2179 | 6 | 21796 | 36040 |
| 2035-36 | 17111 | 677 | 1061 | 1634 | 577 | 2286 | 6 | 23352 | 38257 |
| 2036-37 | 18504 | 702 | 1113 | 1701 | 601 | 2399 | 6 | 25026 | 40625 |
| 2037-38 | 20010 | 728 | 1168 | 1770 | 627 | 2517 | 6 | 26826 | 43151 |
| 2038-39 | 21637 | 754 | 1225 | 1842 | 653 | 2641 | 6 | 28758 | 45840 |
| 2039-40 | 23397 | 782 | 1284 | 1917 | 680 | 2771 | 6 | 30837 | 48710 |
| 2040-41 | 25276 | 810 | 1345 | 1994 | 709 | 2907 | 6 | 33047 | 51744 |
| 2041-42 | 27306 | 840 | 1409 | 2074 | 739 | 3049 | 6 | 35423 | 54980 |
| 2042-43 | 29498 | 870 | 1476 | 2157 | 770 | 3198 | 6 | 37975 | 58430 |
| 2043-44 | 31867 | 903 | 1546 | 2243 | 803 | 3355 | 6 | 40723 | 62122 |
| 2044-45 | 34426 | 937 | 1619 | 2334 | 837 | 3519 | 6 | 43678 | 66064 |
| 2045-46 | 37032 | 967 | 1692 | 2420 | 869 | 3676 | 6 | 46662 | 69995 |
| 2046-47 | 39837 | 999 | 1768 | 2510 | 902 | 3840 | 6 | 49862 | 74183 |
| 2047-48 | 42853 | 1032 | 1848 | 2603 | 936 | 4012 | 6 | 53290 | 78643 |

**Table 6-4 : Total Tollable Traffic @ Toll Plaza 1- Chainage 119 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3058 | 129 | 256 | 253 | 132 | 462 | 5 | 4295 | 7276 |
| 2024-25 | 3349 | 136 | 268 | 266 | 139 | 492 | 6 | 4656 | 7813 |
| 2025-26 | 3643 | 142 | 280 | 278 | 146 | 520 | 6 | 5015 | 8335 |
| 2026-27 | 3962 | 148 | 293 | 291 | 153 | 550 | 6 | 5403 | 8897 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2027-28 | 4310 | 154 | 306 | 305 | 160 | 581 | 6 | 5822 | 9496 |
| 2028-29 | 4688 | 161 | 320 | 319 | 168 | 614 | 6 | 6276 | 10141 |
| 2029-30 | 5100 | 168 | 335 | 333 | 176 | 648 | 6 | 6766 | 10827 |
| 2030-31 | 5508 | 174 | 350 | 346 | 183 | 679 | 6 | 7246 | 11489 |
| 2031-32 | 5948 | 180 | 365 | 360 | 191 | 712 | 6 | 7762 | 12197 |
| 2032-33 | 6424 | 186 | 380 | 374 | 199 | 746 | 6 | 8315 | 12946 |
| 2033-34 | 6937 | 193 | 398 | 388 | 207 | 782 | 6 | 8911 | 13752 |
| 2034-35 | 7492 | 200 | 416 | 403 | 215 | 819 | 6 | 9551 | 14607 |
| 2035-36 | 8064 | 206 | 434 | 417 | 223 | 855 | 6 | 10205 | 15470 |
| 2036-37 | 8680 | 212 | 453 | 431 | 231 | 892 | 6 | 10905 | 16384 |
| 2037-38 | 9342 | 219 | 473 | 447 | 239 | 931 | 6 | 11657 | 17364 |
| 2038-39 | 10055 | 226 | 494 | 463 | 248 | 973 | 6 | 12465 | 18415 |
| 2039-40 | 10823 | 233 | 515 | 479 | 257 | 1016 | 6 | 13329 | 19525 |
| 2040-41 | 11638 | 240 | 536 | 496 | 266 | 1061 | 6 | 14243 | 20694 |
| 2041-42 | 12514 | 248 | 559 | 513 | 276 | 1107 | 6 | 15223 | 21939 |
| 2042-43 | 13456 | 256 | 582 | 531 | 287 | 1156 | 6 | 16274 | 23269 |
| 2043-44 | 14469 | 264 | 607 | 550 | 298 | 1207 | 6 | 17401 | 24689 |
| 2044-45 | 15558 | 272 | 632 | 569 | 309 | 1260 | 6 | 18606 | 26193 |
| 2045-46 | 16658 | 280 | 657 | 587 | 320 | 1310 | 6 | 19818 | 27692 |
| 2046-47 | 17835 | 288 | 683 | 606 | 331 | 1362 | 6 | 21111 | 29283 |
| 2047-48 | 19096 | 296 | 710 | 625 | 342 | 1416 | 6 | 22491 | 30970 |

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 2- Chainage 184 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 5297 | 306 | 614 | 853 | 313 | 1186 | 5 | 8573 | 16452 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2024-25 | 5801 | 322 | 645 | 897 | 331 | 1263 | 6 | 9265 | 17614 |
| 2025-26 | 6310 | 336 | 675 | 937 | 347 | 1334 | 6 | 9945 | 18721 |
| 2026-27 | 6864 | 350 | 707 | 979 | 364 | 1410 | 6 | 10680 | 19911 |
| 2027-28 | 7466 | 366 | 741 | 1024 | 381 | 1489 | 6 | 11473 | 21181 |
| 2028-29 | 8122 | 382 | 776 | 1070 | 399 | 1573 | 6 | 12328 | 22536 |
| 2029-30 | 8835 | 399 | 812 | 1119 | 418 | 1663 | 6 | 13252 | 23991 |
| 2030-31 | 9541 | 413 | 848 | 1163 | 435 | 1743 | 6 | 14149 | 25369 |
| 2031-32 | 10304 | 427 | 887 | 1208 | 453 | 1827 | 6 | 15112 | 26837 |
| 2032-33 | 11128 | 443 | 927 | 1255 | 471 | 1915 | 6 | 16145 | 28396 |
| 2033-34 | 12018 | 459 | 969 | 1304 | 490 | 2008 | 6 | 17254 | 30059 |
| 2034-35 | 12979 | 475 | 1013 | 1354 | 510 | 2105 | 6 | 18442 | 31822 |
| 2035-36 | 13969 | 490 | 1057 | 1403 | 529 | 2198 | 6 | 19652 | 33589 |
| 2036-37 | 15036 | 506 | 1103 | 1453 | 549 | 2296 | 6 | 20949 | 35469 |
| 2037-38 | 16183 | 522 | 1151 | 1504 | 570 | 2398 | 6 | 22334 | 37459 |
| 2038-39 | 17418 | 539 | 1202 | 1557 | 591 | 2505 | 6 | 23818 | 39576 |
| 2039-40 | 18748 | 556 | 1254 | 1612 | 613 | 2616 | 6 | 25405 | 41818 |
| 2040-41 | 20160 | 573 | 1307 | 1668 | 635 | 2731 | 6 | 27080 | 44166 |
| 2041-42 | 21677 | 592 | 1363 | 1726 | 658 | 2851 | 6 | 28873 | 46663 |
| 2042-43 | 23309 | 611 | 1421 | 1787 | 683 | 2977 | 6 | 30794 | 49322 |
| 2043-44 | 25064 | 630 | 1480 | 1851 | 709 | 3107 | 6 | 32847 | 52138 |
| 2044-45 | 26951 | 650 | 1543 | 1916 | 735 | 3243 | 6 | 35044 | 55129 |
| 2045-46 | 28857 | 667 | 1605 | 1977 | 760 | 3372 | 6 | 37244 | 58085 |
| 2046-47 | 30898 | 686 | 1669 | 2041 | 786 | 3506 | 6 | 39592 | 61219 |
| 2047-48 | 33083 | 705 | 1736 | 2106 | 812 | 3645 | 6 | 42093 | 64532 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 3- Chainage 243 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6137 | 397 | 582 | 941 | 325 | 1168 | 5 | 9554 | 17551 |
| 2024-25 | 6721 | 418 | 611 | 989 | 343 | 1243 | 6 | 10331 | 18798 |
| 2025-26 | 7312 | 436 | 640 | 1034 | 359 | 1313 | 6 | 11100 | 20001 |
| 2026-27 | 7954 | 456 | 670 | 1081 | 376 | 1387 | 6 | 11930 | 21288 |
| 2027-28 | 8653 | 477 | 702 | 1130 | 393 | 1465 | 6 | 12826 | 22663 |
| 2028-29 | 9413 | 499 | 736 | 1181 | 412 | 1547 | 6 | 13794 | 24137 |
| 2029-30 | 10240 | 521 | 771 | 1235 | 432 | 1634 | 6 | 14839 | 25716 |
| 2030-31 | 11059 | 540 | 805 | 1283 | 449 | 1713 | 6 | 15855 | 27216 |
| 2031-32 | 11945 | 560 | 841 | 1332 | 467 | 1795 | 6 | 16946 | 28810 |
| 2032-33 | 12901 | 581 | 879 | 1383 | 486 | 1881 | 6 | 18117 | 30508 |
| 2033-34 | 13932 | 602 | 918 | 1437 | 506 | 1972 | 6 | 19373 | 32319 |
| 2034-35 | 15046 | 624 | 959 | 1492 | 526 | 2067 | 6 | 20720 | 34242 |
| 2035-36 | 16195 | 644 | 1001 | 1545 | 546 | 2159 | 6 | 22096 | 36180 |
| 2036-37 | 17431 | 665 | 1045 | 1599 | 566 | 2254 | 6 | 23566 | 38229 |
| 2037-38 | 18761 | 687 | 1091 | 1656 | 587 | 2354 | 6 | 25142 | 40414 |
| 2038-39 | 20194 | 709 | 1139 | 1714 | 609 | 2458 | 6 | 26829 | 42732 |
| 2039-40 | 21736 | 732 | 1189 | 1774 | 632 | 2567 | 6 | 28636 | 45198 |
| 2040-41 | 23372 | 756 | 1240 | 1836 | 655 | 2680 | 6 | 30545 | 47786 |
| 2041-42 | 25132 | 780 | 1292 | 1901 | 679 | 2797 | 6 | 32587 | 50532 |
| 2042-43 | 27024 | 804 | 1347 | 1968 | 705 | 2920 | 6 | 34774 | 53457 |
| 2043-44 | 29059 | 830 | 1404 | 2038 | 731 | 3048 | 6 | 37116 | 56566 |
| 2044-45 | 31248 | 856 | 1463 | 2110 | 758 | 3182 | 6 | 39623 | 59871 |
| 2045-46 | 33457 | 880 | 1521 | 2177 | 784 | 3308 | 6 | 42133 | 63136 |
| 2046-47 | 35822 | 904 | 1582 | 2246 | 810 | 3439 | 6 | 44809 | 66595 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2047-48 | 38355 | 929 | 1645 | 2318 | 837 | 3576 | 6 | 47666 | 70268 |

Traffic projections for Most Likely scenario is given as under

**Table 6-7 : Total Tollable Traffic @ Toll Plaza 1- Chainage 119 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3058 | 129 | 256 | 253 | 132 | 462 | 5 | 4295 | 7276 |
| 2024-25 | 3357 | 136 | 270 | 267 | 140 | 493 | 6 | 4669 | 7838 |
| 2025-26 | 3660 | 142 | 283 | 280 | 147 | 522 | 6 | 5040 | 8379 |
| 2026-27 | 3991 | 148 | 296 | 294 | 154 | 553 | 6 | 5442 | 8961 |
| 2027-28 | 4352 | 155 | 311 | 308 | 162 | 586 | 6 | 5880 | 9592 |
| 2028-29 | 4745 | 162 | 327 | 322 | 170 | 620 | 6 | 6352 | 10262 |
| 2029-30 | 5174 | 169 | 343 | 338 | 178 | 656 | 6 | 6864 | 10984 |
| 2030-31 | 5601 | 175 | 359 | 352 | 186 | 689 | 6 | 7368 | 11682 |
| 2031-32 | 6062 | 182 | 376 | 366 | 194 | 723 | 6 | 7909 | 12424 |
| 2032-33 | 6561 | 189 | 394 | 382 | 202 | 759 | 6 | 8493 | 13221 |
| 2033-34 | 7101 | 196 | 412 | 398 | 210 | 798 | 6 | 9121 | 14073 |
| 2034-35 | 7686 | 203 | 431 | 414 | 219 | 838 | 6 | 9797 | 14981 |
| 2035-36 | 8292 | 210 | 451 | 430 | 228 | 877 | 6 | 10494 | 15908 |
| 2036-37 | 8946 | 217 | 472 | 446 | 237 | 917 | 6 | 11241 | 16890 |
| 2037-38 | 9652 | 224 | 493 | 463 | 246 | 960 | 6 | 12044 | 17941 |
| 2038-39 | 10413 | 232 | 516 | 480 | 255 | 1005 | 6 | 12907 | 19064 |
| 2039-40 | 11233 | 240 | 539 | 498 | 266 | 1051 | 6 | 13833 | 20259 |
| 2040-41 | 12107 | 248 | 562 | 517 | 277 | 1100 | 6 | 14817 | 21524 |
| 2041-42 | 13049 | 257 | 588 | 536 | 288 | 1151 | 6 | 15875 | 22877 |
| 2042-43 | 14065 | 266 | 615 | 556 | 300 | 1205 | 6 | 17013 | 24327 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2043-44 | 15160 | 275 | 643 | 577 | 312 | 1260 | 6 | 18233 | 25866 |
| 2044-45 | 16339 | 284 | 672 | 598 | 324 | 1318 | 6 | 19541 | 27505 |
| 2045-46 | 17534 | 293 | 701 | 619 | 336 | 1373 | 6 | 20862 | 29147 |
| 2046-47 | 18818 | 302 | 730 | 640 | 348 | 1431 | 6 | 22275 | 30892 |
| 2047-48 | 20196 | 311 | 761 | 662 | 360 | 1491 | 6 | 23787 | 32748 |

**Table 6-8 : Total Tollable Traffic @ Toll Plaza 2- Chainage 184 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 5297 | 306 | 614 | 853 | 313 | 1186 | 5 | 8573 | 16452 |
| 2024-25 | 5814 | 322 | 647 | 900 | 331 | 1266 | 6 | 9286 | 17655 |
| 2025-26 | 6339 | 336 | 679 | 944 | 348 | 1341 | 6 | 9993 | 18818 |
| 2026-27 | 6911 | 352 | 713 | 989 | 365 | 1420 | 6 | 10756 | 20057 |
| 2027-28 | 7536 | 368 | 748 | 1036 | 383 | 1504 | 6 | 11581 | 21384 |
| 2028-29 | 8217 | 385 | 786 | 1086 | 402 | 1593 | 6 | 12475 | 22812 |
| 2029-30 | 8959 | 402 | 825 | 1137 | 423 | 1688 | 6 | 13440 | 24340 |
| 2030-31 | 9697 | 418 | 864 | 1184 | 441 | 1774 | 6 | 14384 | 25801 |
| 2031-32 | 10497 | 434 | 904 | 1233 | 460 | 1864 | 6 | 15398 | 27354 |
| 2032-33 | 11363 | 450 | 947 | 1284 | 480 | 1959 | 6 | 16489 | 29014 |
| 2033-34 | 12301 | 467 | 991 | 1337 | 501 | 2059 | 6 | 17662 | 30781 |
| 2034-35 | 13316 | 484 | 1037 | 1392 | 523 | 2164 | 6 | 18922 | 32663 |
| 2035-36 | 14366 | 501 | 1085 | 1445 | 544 | 2265 | 6 | 20212 | 34559 |
| 2036-37 | 15499 | 518 | 1136 | 1500 | 566 | 2371 | 6 | 21596 | 36579 |
| 2037-38 | 16721 | 535 | 1188 | 1556 | 588 | 2482 | 6 | 23076 | 38716 |
| 2038-39 | 18038 | 554 | 1243 | 1615 | 611 | 2598 | 6 | 24665 | 40994 |
| 2039-40 | 19459 | 573 | 1301 | 1676 | 636 | 2719 | 6 | 26370 | 43420 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2040-41 | 20973 | 592 | 1359 | 1740 | 661 | 2845 | 6 | 28176 | 45971 |
| 2041-42 | 22604 | 612 | 1421 | 1806 | 687 | 2976 | 6 | 30112 | 48683 |
| 2042-43 | 24362 | 633 | 1484 | 1874 | 714 | 3115 | 6 | 32188 | 51572 |
| 2043-44 | 26258 | 655 | 1551 | 1944 | 743 | 3260 | 6 | 34417 | 54652 |
| 2044-45 | 28301 | 677 | 1621 | 2017 | 773 | 3411 | 6 | 36806 | 57926 |
| 2045-46 | 30373 | 697 | 1690 | 2086 | 800 | 3556 | 6 | 39208 | 61176 |
| 2046-47 | 32596 | 718 | 1762 | 2157 | 829 | 3706 | 6 | 41774 | 64621 |
| 2047-48 | 34983 | 740 | 1837 | 2231 | 859 | 3863 | 6 | 44519 | 68285 |

**Table 6-9 : Total Tollable Traffic @ Toll Plaza 3- Chainage 230 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6137 | 397 | 582 | 941 | 325 | 1168 | 5 | 9554 | 17551 |
| 2024-25 | 6736 | 419 | 612 | 992 | 345 | 1247 | 6 | 10357 | 18850 |
| 2025-26 | 7344 | 439 | 642 | 1040 | 362 | 1320 | 6 | 11153 | 20102 |
| 2026-27 | 8007 | 460 | 675 | 1090 | 380 | 1398 | 6 | 12016 | 21450 |
| 2027-28 | 8730 | 482 | 709 | 1142 | 399 | 1480 | 6 | 12948 | 22890 |
| 2028-29 | 9519 | 505 | 744 | 1196 | 419 | 1567 | 6 | 13956 | 24432 |
| 2029-30 | 10379 | 529 | 781 | 1253 | 440 | 1660 | 6 | 15048 | 26092 |
| 2030-31 | 11235 | 550 | 817 | 1304 | 459 | 1744 | 6 | 16115 | 27675 |
| 2031-32 | 12162 | 572 | 856 | 1358 | 479 | 1832 | 6 | 17265 | 29370 |
| 2032-33 | 13166 | 594 | 896 | 1414 | 499 | 1925 | 6 | 18500 | 31174 |
| 2033-34 | 14252 | 617 | 938 | 1472 | 520 | 2023 | 6 | 19828 | 33098 |
| 2034-35 | 15428 | 641 | 983 | 1532 | 543 | 2125 | 6 | 21258 | 35153 |
| 2035-36 | 16644 | 663 | 1029 | 1590 | 564 | 2224 | 6 | 22720 | 37223 |
| 2036-37 | 17956 | 686 | 1076 | 1650 | 587 | 2327 | 6 | 24288 | 39423 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2037-38 | 19372 | 710 | 1126 | 1712 | 610 | 2435 | 6 | 25971 | 41766 |
| 2038-39 | 20900 | 734 | 1178 | 1778 | 634 | 2549 | 6 | 27779 | 44269 |
| 2039-40 | 22548 | 760 | 1232 | 1845 | 660 | 2668 | 6 | 29719 | 46932 |
| 2040-41 | 24302 | 786 | 1288 | 1915 | 686 | 2792 | 6 | 31775 | 49739 |
| 2041-42 | 26193 | 812 | 1346 | 1987 | 713 | 2922 | 6 | 33979 | 52725 |
| 2042-43 | 28231 | 840 | 1406 | 2062 | 741 | 3058 | 6 | 36344 | 55906 |
| 2043-44 | 30428 | 868 | 1469 | 2140 | 770 | 3200 | 6 | 38881 | 59294 |
| 2044-45 | 32795 | 898 | 1534 | 2221 | 800 | 3349 | 6 | 41603 | 62905 |
| 2045-46 | 35196 | 924 | 1599 | 2297 | 829 | 3491 | 6 | 44342 | 66494 |
| 2046-47 | 37774 | 952 | 1667 | 2376 | 859 | 3638 | 6 | 47272 | 70306 |
| 2047-48 | 40540 | 980 | 1738 | 2457 | 890 | 3791 | 6 | 50402 | 74352 |

6.2 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 Goa/ Karnataka - Kundarpur project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2022

Target Traffic - 21307 in PCU

The concession period shall be extended as per the above provisions.

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Goa / Karnataka Border- Kundapur section of NH-17 is based on the old toll policy. As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent users monthly pass would be issued for 50 trips in month at 2/3d rate..
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers or whose frequency does not yield any discount from the above categories.
4. Local Discounts: There are several categories of local discounts.
 - a) Local Passenger Car Jeep Van I - Rs. 275 per month as per fee notification
 - b) Local commercial vehicles single at 50% rate for normal single trip

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

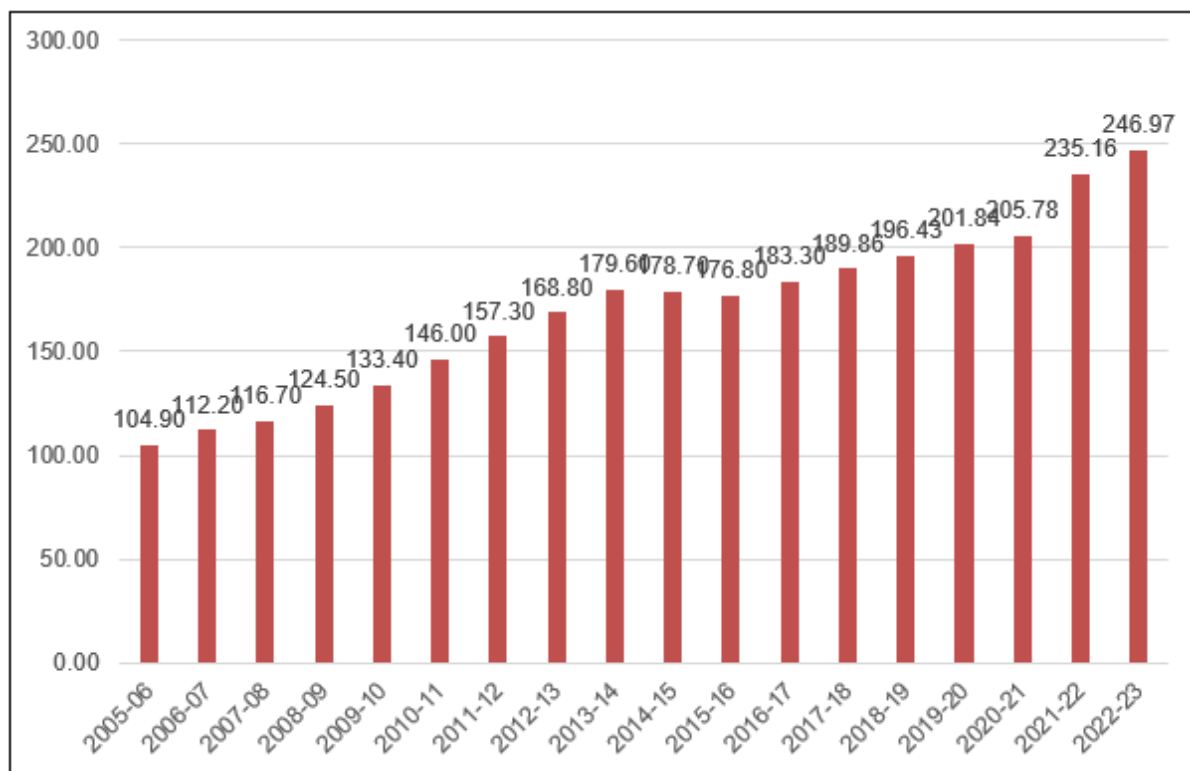


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--------------------------------------|-----------------------------------|
| Oversized Vehicles (7 or more Axles) | 4.20 |

There is no bypass or structure to be factored in for rates calculations.

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

The toll rates have been projected on the basis of existing project length received vide PCOD- III certificate.

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

Table 7-2 : Toll Rates for Single Journey @ Km 119.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 110 | 175 | 360 | 360 | 390 | 550 | 695 |
| 2024-25 | 115 | 180 | 370 | 370 | 405 | 570 | 720 |
| 2025-26 | 120 | 190 | 390 | 390 | 425 | 600 | 755 |
| 2026-27 | 125 | 200 | 410 | 410 | 450 | 630 | 795 |
| 2027-28 | 135 | 210 | 430 | 430 | 470 | 665 | 835 |
| 2028-29 | 140 | 220 | 455 | 455 | 495 | 695 | 880 |
| 2029-30 | 145 | 230 | 475 | 475 | 520 | 735 | 925 |
| 2030-31 | 155 | 245 | 500 | 500 | 550 | 770 | 975 |
| 2031-32 | 165 | 255 | 525 | 525 | 575 | 810 | 1025 |
| 2032-33 | 170 | 270 | 555 | 555 | 605 | 855 | 1075 |
| 2033-34 | 180 | 285 | 585 | 585 | 640 | 895 | 1135 |
| 2034-35 | 190 | 300 | 615 | 615 | 670 | 945 | 1195 |
| 2035-36 | 200 | 315 | 645 | 645 | 705 | 995 | 1255 |
| 2036-37 | 210 | 330 | 680 | 680 | 745 | 1045 | 1320 |
| 2037-38 | 220 | 350 | 715 | 715 | 785 | 1105 | 1390 |
| 2038-39 | 235 | 365 | 755 | 755 | 825 | 1160 | 1465 |
| 2039-40 | 245 | 385 | 795 | 795 | 870 | 1225 | 1545 |
| 2040-41 | 260 | 405 | 840 | 840 | 915 | 1290 | 1630 |
| 2041-42 | 275 | 430 | 885 | 885 | 965 | 1360 | 1715 |
| 2042-43 | 290 | 455 | 930 | 930 | 1020 | 1435 | 1810 |
| 2043-44 | 305 | 475 | 980 | 980 | 1075 | 1510 | 1910 |
| 2044-45 | 320 | 505 | 1035 | 1035 | 1135 | 1595 | 2015 |
| 2045-46 | 340 | 530 | 1095 | 1095 | 1195 | 1680 | 2125 |
| 2046-47 | 355 | 560 | 1155 | 1155 | 1260 | 1775 | 2240 |
| 2047-48 | 375 | 590 | 1215 | 1215 | 1330 | 1870 | 2365 |

Table 7-3 : Toll Rates for Single Journey @ Km 184.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 110 | 170 | 355 | 355 | 390 | 550 | 685 |
| 2024-25 | 110 | 175 | 365 | 365 | 400 | 565 | 710 |
| 2025-26 | 120 | 185 | 385 | 385 | 420 | 595 | 745 |
| 2026-27 | 125 | 195 | 405 | 405 | 445 | 625 | 785 |
| 2027-28 | 130 | 205 | 425 | 425 | 465 | 660 | 825 |
| 2028-29 | 135 | 215 | 445 | 445 | 490 | 690 | 865 |
| 2029-30 | 145 | 225 | 470 | 470 | 515 | 725 | 910 |
| 2030-31 | 150 | 240 | 495 | 495 | 540 | 765 | 955 |
| 2031-32 | 160 | 250 | 520 | 520 | 570 | 805 | 1005 |
| 2032-33 | 165 | 265 | 545 | 545 | 600 | 845 | 1060 |
| 2033-34 | 175 | 280 | 575 | 575 | 630 | 890 | 1115 |
| 2034-35 | 185 | 295 | 605 | 605 | 665 | 935 | 1170 |
| 2035-36 | 195 | 310 | 640 | 640 | 700 | 985 | 1235 |
| 2036-37 | 205 | 325 | 670 | 670 | 735 | 1040 | 1300 |
| 2037-38 | 215 | 340 | 705 | 705 | 775 | 1095 | 1370 |
| 2038-39 | 230 | 360 | 745 | 745 | 815 | 1155 | 1440 |
| 2039-40 | 240 | 380 | 785 | 785 | 860 | 1215 | 1520 |
| 2040-41 | 255 | 400 | 825 | 825 | 905 | 1280 | 1600 |
| 2041-42 | 265 | 420 | 870 | 870 | 955 | 1350 | 1685 |
| 2042-43 | 280 | 445 | 920 | 920 | 1005 | 1420 | 1780 |
| 2043-44 | 295 | 470 | 970 | 970 | 1060 | 1500 | 1875 |
| 2044-45 | 310 | 495 | 1020 | 1020 | 1120 | 1580 | 1975 |
| 2045-46 | 330 | 520 | 1080 | 1080 | 1180 | 1670 | 2085 |
| 2046-47 | 350 | 550 | 1140 | 1140 | 1245 | 1760 | 2200 |
| 2047-48 | 365 | 580 | 1200 | 1200 | 1310 | 1855 | 2320 |

Table 7-4 : Toll Rates for Single Journey @ Km 243.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2023-24 | 100 | 160 | 330 | 330 | 360 | 520 | 630 |
| 2024-25 | 100 | 160 | 340 | 340 | 370 | 530 | 645 |
| 2025-26 | 105 | 170 | 355 | 355 | 390 | 560 | 680 |
| 2026-27 | 110 | 180 | 375 | 375 | 410 | 585 | 715 |
| 2027-28 | 115 | 190 | 395 | 395 | 430 | 615 | 750 |
| 2028-29 | 120 | 195 | 415 | 415 | 450 | 650 | 790 |
| 2029-30 | 130 | 205 | 435 | 435 | 475 | 680 | 830 |
| 2030-31 | 135 | 220 | 455 | 455 | 500 | 715 | 870 |
| 2031-32 | 140 | 230 | 480 | 480 | 525 | 755 | 915 |
| 2032-33 | 150 | 240 | 505 | 505 | 550 | 790 | 965 |
| 2033-34 | 155 | 255 | 530 | 530 | 580 | 835 | 1015 |
| 2034-35 | 165 | 265 | 560 | 560 | 610 | 875 | 1070 |
| 2035-36 | 175 | 280 | 590 | 590 | 640 | 925 | 1125 |
| 2036-37 | 185 | 295 | 620 | 620 | 675 | 970 | 1185 |
| 2037-38 | 195 | 310 | 655 | 655 | 710 | 1025 | 1245 |
| 2038-39 | 205 | 330 | 685 | 685 | 750 | 1080 | 1310 |
| 2039-40 | 215 | 345 | 725 | 725 | 790 | 1135 | 1385 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2040-41 | 225 | 365 | 765 | 765 | 830 | 1195 | 1455 |
| 2041-42 | 240 | 385 | 805 | 805 | 875 | 1260 | 1535 |
| 2042-43 | 250 | 405 | 850 | 850 | 925 | 1330 | 1620 |
| 2043-44 | 265 | 425 | 895 | 895 | 975 | 1400 | 1705 |
| 2044-45 | 280 | 450 | 940 | 940 | 1030 | 1480 | 1800 |
| 2045-46 | 295 | 475 | 995 | 995 | 1085 | 1560 | 1900 |
| 2046-47 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2000 |
| 2047-48 | 325 | 530 | 1105 | 1105 | 1205 | 1735 | 2110 |

Table 7-5 : Toll Rates for Return journey @ Km 119.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 165 | 260 | 535 | 535 | 590 | 825 | 1045 |
| 2024-25 | 170 | 270 | 555 | 555 | 610 | 855 | 1080 |
| 2025-26 | 180 | 285 | 585 | 585 | 640 | 900 | 1135 |
| 2026-27 | 190 | 300 | 615 | 615 | 670 | 945 | 1195 |
| 2027-28 | 200 | 315 | 645 | 645 | 705 | 995 | 1255 |
| 2028-29 | 210 | 330 | 680 | 680 | 745 | 1045 | 1320 |
| 2029-30 | 220 | 345 | 715 | 715 | 780 | 1100 | 1390 |
| 2030-31 | 235 | 365 | 750 | 750 | 820 | 1155 | 1460 |
| 2031-32 | 245 | 385 | 790 | 790 | 865 | 1215 | 1535 |
| 2032-33 | 255 | 405 | 830 | 830 | 910 | 1280 | 1615 |
| 2033-34 | 270 | 425 | 875 | 875 | 955 | 1345 | 1700 |
| 2034-35 | 285 | 445 | 920 | 920 | 1005 | 1415 | 1790 |
| 2035-36 | 300 | 470 | 970 | 970 | 1060 | 1490 | 1885 |
| 2036-37 | 315 | 495 | 1020 | 1020 | 1115 | 1570 | 1985 |
| 2037-38 | 335 | 520 | 1075 | 1075 | 1175 | 1655 | 2090 |
| 2038-39 | 350 | 550 | 1130 | 1130 | 1240 | 1745 | 2200 |
| 2039-40 | 370 | 580 | 1195 | 1195 | 1305 | 1835 | 2320 |
| 2040-41 | 390 | 610 | 1255 | 1255 | 1375 | 1935 | 2445 |
| 2041-42 | 410 | 645 | 1325 | 1325 | 1450 | 2040 | 2575 |
| 2042-43 | 435 | 680 | 1395 | 1395 | 1530 | 2150 | 2715 |
| 2043-44 | 455 | 715 | 1475 | 1475 | 1610 | 2265 | 2865 |
| 2044-45 | 480 | 755 | 1555 | 1555 | 1700 | 2390 | 3020 |
| 2045-46 | 510 | 795 | 1640 | 1640 | 1795 | 2525 | 3185 |
| 2046-47 | 535 | 840 | 1730 | 1730 | 1890 | 2660 | 3360 |
| 2047-48 | 565 | 885 | 1825 | 1825 | 1995 | 2810 | 3545 |

Table 7-6 : Toll Rates for Return Journey @ Km 184.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|--------|------------|--------------------|
| 2023-24 | 165 | 255 | 535 | 535 | 580 | 825 | 1030 |
| 2024-25 | 170 | 265 | 550 | 550 | 600 | 850 | 1065 |
| 2025-26 | 175 | 280 | 580 | 580 | 630 | 895 | 1115 |
| 2026-27 | 185 | 295 | 605 | 605 | 665 | 940 | 1175 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2027-28 | 195 | 310 | 640 | 640 | 700 | 985 | 1235 |
| 2028-29 | 205 | 325 | 670 | 670 | 735 | 1040 | 1295 |
| 2029-30 | 215 | 340 | 705 | 705 | 770 | 1090 | 1365 |
| 2030-31 | 225 | 360 | 740 | 740 | 810 | 1145 | 1435 |
| 2031-32 | 240 | 375 | 780 | 780 | 855 | 1205 | 1510 |
| 2032-33 | 250 | 395 | 820 | 820 | 895 | 1270 | 1585 |
| 2033-34 | 265 | 415 | 865 | 865 | 945 | 1335 | 1670 |
| 2034-35 | 280 | 440 | 910 | 910 | 995 | 1405 | 1760 |
| 2035-36 | 290 | 465 | 955 | 955 | 1045 | 1480 | 1850 |
| 2036-37 | 310 | 485 | 1010 | 1010 | 1100 | 1560 | 1950 |
| 2037-38 | 325 | 515 | 1060 | 1060 | 1160 | 1640 | 2050 |
| 2038-39 | 340 | 540 | 1120 | 1120 | 1220 | 1730 | 2160 |
| 2039-40 | 360 | 570 | 1180 | 1180 | 1290 | 1820 | 2275 |
| 2040-41 | 380 | 600 | 1240 | 1240 | 1355 | 1920 | 2400 |
| 2041-42 | 400 | 630 | 1310 | 1310 | 1430 | 2025 | 2530 |
| 2042-43 | 420 | 665 | 1380 | 1380 | 1510 | 2135 | 2665 |
| 2043-44 | 445 | 705 | 1455 | 1455 | 1590 | 2250 | 2810 |
| 2044-45 | 470 | 740 | 1535 | 1535 | 1675 | 2370 | 2965 |
| 2045-46 | 495 | 780 | 1620 | 1620 | 1770 | 2500 | 3130 |
| 2046-47 | 520 | 825 | 1705 | 1705 | 1865 | 2640 | 3300 |
| 2047-48 | 550 | 870 | 1800 | 1800 | 1970 | 2785 | 3480 |

Table 7-7 : Toll Rates for Return journey @ Km 243.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2023-24 | 145 | 235 | 495 | 495 | 540 | 780 | 950 |
| 2024-25 | 150 | 245 | 510 | 510 | 555 | 800 | 970 |
| 2025-26 | 160 | 255 | 535 | 535 | 585 | 840 | 1020 |
| 2026-27 | 165 | 270 | 560 | 560 | 610 | 880 | 1070 |
| 2027-28 | 175 | 280 | 590 | 590 | 645 | 925 | 1125 |
| 2028-29 | 185 | 295 | 620 | 620 | 675 | 970 | 1185 |
| 2029-30 | 195 | 310 | 650 | 650 | 710 | 1020 | 1245 |
| 2030-31 | 200 | 325 | 685 | 685 | 745 | 1075 | 1310 |
| 2031-32 | 215 | 345 | 720 | 720 | 785 | 1130 | 1375 |
| 2032-33 | 225 | 360 | 760 | 760 | 825 | 1190 | 1445 |
| 2033-34 | 235 | 380 | 795 | 795 | 870 | 1250 | 1520 |
| 2034-35 | 250 | 400 | 840 | 840 | 915 | 1315 | 1600 |
| 2035-36 | 260 | 420 | 885 | 885 | 965 | 1385 | 1685 |
| 2036-37 | 275 | 445 | 930 | 930 | 1015 | 1460 | 1775 |
| 2037-38 | 290 | 465 | 980 | 980 | 1070 | 1535 | 1870 |
| 2038-39 | 305 | 490 | 1030 | 1030 | 1125 | 1615 | 1970 |
| 2039-40 | 320 | 520 | 1085 | 1085 | 1185 | 1705 | 2075 |
| 2040-41 | 340 | 545 | 1145 | 1145 | 1250 | 1795 | 2185 |
| 2041-42 | 355 | 575 | 1205 | 1205 | 1315 | 1890 | 2305 |
| 2042-43 | 375 | 605 | 1270 | 1270 | 1385 | 1995 | 2430 |
| 2043-44 | 395 | 640 | 1340 | 1340 | 1465 | 2100 | 2560 |
| 2044-45 | 420 | 675 | 1415 | 1415 | 1540 | 2215 | 2700 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|--------|------------|--------------------|
| 2045-46 | 440 | 710 | 1490 | 1490 | 1625 | 2340 | 2845 |
| 2046-47 | 465 | 750 | 1575 | 1575 | 1715 | 2465 | 3005 |
| 2047-48 | 490 | 790 | 1660 | 1660 | 1810 | 2600 | 3170 |

Table 7-8 : Toll Rates for Monthly Pass Local Car Ticket @ all Toll Plaza

| Year | Car | Minibus /LCV |
|---------|------|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |
| 2043-44 | 890 | 890 |
| 2044-45 | 940 | 940 |
| 2045-46 | 990 | 990 |
| 2046-47 | 1045 | 1045 |
| 2047-48 | 1105 | 1105 |

Table 7-9 : Toll Rates for Monthly Pass @ Km 119.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 3695 | 5795 | 11935 | 11935 | 13060 | 18380 | 23190 |
| 2024-25 | 3825 | 6000 | 12355 | 12355 | 13520 | 19020 | 24005 |
| 2025-26 | 4020 | 6310 | 12985 | 12985 | 14210 | 19990 | 25235 |
| 2026-27 | 4230 | 6635 | 13655 | 13655 | 14940 | 21015 | 26530 |
| 2027-28 | 4445 | 6975 | 14355 | 14355 | 15710 | 22100 | 27900 |
| 2028-29 | 4675 | 7335 | 15095 | 15095 | 16515 | 23235 | 29330 |
| 2029-30 | 4915 | 7710 | 15870 | 15870 | 17365 | 24425 | 30840 |
| 2030-31 | 5170 | 8110 | 16690 | 16690 | 18265 | 25690 | 32430 |
| 2031-32 | 5435 | 8530 | 17555 | 17555 | 19210 | 27020 | 34115 |
| 2032-33 | 5720 | 8975 | 18470 | 18470 | 20210 | 28430 | 35890 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|--------|------------|--------------------|
| 2033-34 | 6020 | 9440 | 19435 | 19435 | 21270 | 29915 | 37770 |
| 2034-35 | 6335 | 9940 | 20455 | 20455 | 22385 | 31490 | 39755 |
| 2035-36 | 6670 | 10465 | 21535 | 21535 | 23565 | 33150 | 41855 |
| 2036-37 | 7025 | 11020 | 22675 | 22675 | 24815 | 34905 | 44070 |
| 2037-38 | 7400 | 11605 | 23885 | 23885 | 26135 | 36765 | 46415 |
| 2038-39 | 7795 | 12225 | 25160 | 25160 | 27535 | 38725 | 48895 |
| 2039-40 | 8210 | 12880 | 26510 | 26510 | 29010 | 40805 | 51520 |
| 2040-41 | 8655 | 13575 | 27935 | 27935 | 30575 | 43000 | 54295 |
| 2041-42 | 9125 | 14310 | 29445 | 29445 | 32225 | 45325 | 57230 |
| 2042-43 | 9620 | 15085 | 31045 | 31045 | 33975 | 47785 | 60335 |
| 2043-44 | 10140 | 15905 | 32735 | 32735 | 35825 | 50390 | 63625 |
| 2044-45 | 10695 | 16775 | 34525 | 34525 | 37785 | 53140 | 67100 |
| 2045-46 | 11285 | 17695 | 36420 | 36420 | 39855 | 56055 | 70780 |
| 2046-47 | 11905 | 18670 | 38425 | 38425 | 42050 | 59140 | 74675 |
| 2047-48 | 12560 | 19700 | 40545 | 40545 | 44370 | 62405 | 78800 |

Table 7-10 : Toll Rates for Monthly Pass @ Km 184.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 3615 | 5720 | 11835 | 11835 | 12940 | 18315 | 22875 |
| 2024-25 | 3730 | 5905 | 12215 | 12215 | 13355 | 18895 | 23610 |
| 2025-26 | 3920 | 6205 | 12835 | 12835 | 14035 | 19855 | 24815 |
| 2026-27 | 4120 | 6520 | 13490 | 13490 | 14750 | 20870 | 26085 |
| 2027-28 | 4335 | 6855 | 14185 | 14185 | 15510 | 21940 | 27425 |
| 2028-29 | 4555 | 7205 | 14910 | 14910 | 16300 | 23065 | 28830 |
| 2029-30 | 4790 | 7575 | 15675 | 15675 | 17140 | 24250 | 30310 |
| 2030-31 | 5035 | 7970 | 16485 | 16485 | 18025 | 25500 | 31870 |
| 2031-32 | 5300 | 8380 | 17340 | 17340 | 18955 | 26820 | 33525 |
| 2032-33 | 5575 | 8815 | 18240 | 18240 | 19945 | 28215 | 35270 |
| 2033-34 | 5865 | 9280 | 19195 | 19195 | 20985 | 29690 | 37110 |
| 2034-35 | 6175 | 9765 | 20200 | 20200 | 22085 | 31245 | 39060 |
| 2035-36 | 6500 | 10280 | 21265 | 21265 | 23250 | 32895 | 41120 |
| 2036-37 | 6845 | 10825 | 22390 | 22390 | 24485 | 34635 | 43295 |
| 2037-38 | 7205 | 11400 | 23585 | 23585 | 25785 | 36475 | 45595 |
| 2038-39 | 7590 | 12005 | 24840 | 24840 | 27160 | 38420 | 48030 |
| 2039-40 | 8000 | 12650 | 26175 | 26175 | 28615 | 40480 | 50605 |
| 2040-41 | 8430 | 13330 | 27580 | 27580 | 30155 | 42660 | 53325 |
| 2041-42 | 8885 | 14050 | 29070 | 29070 | 31785 | 44965 | 56205 |
| 2042-43 | 9365 | 14815 | 30645 | 30645 | 33505 | 47400 | 59255 |
| 2043-44 | 9875 | 15620 | 32315 | 32315 | 35330 | 49980 | 62480 |
| 2044-45 | 10415 | 16475 | 34080 | 34080 | 37260 | 52710 | 65890 |
| 2045-46 | 10985 | 17375 | 35945 | 35945 | 39300 | 55595 | 69505 |
| 2046-47 | 11590 | 18330 | 37925 | 37925 | 41465 | 58655 | 73325 |
| 2047-48 | 12230 | 19340 | 40015 | 40015 | 43750 | 61890 | 77370 |

Table 7-11 : Toll Rates for Monthly Pass @ Km 243.000

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|--------|------------|--------------------|
| 2023-24 | 3260 | 5265 | 11030 | 11030 | 12035 | 17300 | 21060 |
| 2023-24 | 3340 | 5395 | 11305 | 11305 | 12330 | 17725 | 21580 |
| 2024-25 | 3510 | 5665 | 11875 | 11875 | 12950 | 18620 | 22665 |
| 2025-26 | 3685 | 5955 | 12475 | 12475 | 13605 | 19560 | 23815 |
| 2026-27 | 3870 | 6255 | 13105 | 13105 | 14300 | 20555 | 25020 |
| 2027-28 | 4070 | 6575 | 13775 | 13775 | 15025 | 21600 | 26300 |
| 2028-29 | 4280 | 6910 | 14480 | 14480 | 15795 | 22710 | 27645 |
| 2029-30 | 4500 | 7265 | 15225 | 15225 | 16610 | 23875 | 29065 |
| 2030-31 | 4730 | 7640 | 16010 | 16010 | 17465 | 25110 | 30565 |
| 2031-32 | 4975 | 8040 | 16840 | 16840 | 18375 | 26410 | 32150 |
| 2032-33 | 5235 | 8455 | 17720 | 17720 | 19330 | 27785 | 33825 |
| 2033-34 | 5510 | 8900 | 18645 | 18645 | 20340 | 29240 | 35600 |
| 2034-35 | 5800 | 9365 | 19625 | 19625 | 21410 | 30780 | 37470 |
| 2035-36 | 6105 | 9860 | 20665 | 20665 | 22540 | 32405 | 39445 |
| 2036-37 | 6430 | 10385 | 21760 | 21760 | 23735 | 34120 | 41540 |
| 2037-38 | 6770 | 10935 | 22915 | 22915 | 25000 | 35935 | 43750 |
| 2038-39 | 7135 | 11520 | 24140 | 24140 | 26335 | 37860 | 46090 |
| 2039-40 | 7515 | 12140 | 25435 | 25435 | 27750 | 39890 | 48560 |
| 2040-41 | 7920 | 12795 | 26810 | 26810 | 29245 | 42040 | 51180 |
| 2041-42 | 8350 | 13485 | 28260 | 28260 | 30825 | 44315 | 53945 |
| 2042-43 | 8800 | 14220 | 29790 | 29790 | 32500 | 46720 | 56875 |
| 2043-44 | 9280 | 14995 | 31415 | 31415 | 34270 | 49265 | 59975 |
| 2044-45 | 9790 | 15815 | 33135 | 33135 | 36145 | 51960 | 63255 |
| 2045-46 | 10325 | 16680 | 34950 | 34950 | 38130 | 54810 | 66725 |
| 2046-47 | 10895 | 17600 | 36875 | 36875 | 40230 | 57825 | 70400 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2047-48 starting from the year 2023-24 are shown in tables below.

Table 7-12 : Toll Revenue Optimistic Scenario**(Rs. Crores)**

| Year | TP-1 | TP2 | TP3 | Total |
|---------|-------|-------|-------|---------------|
| 2023-24 | 27.18 | 63.77 | 62.08 | 153.03 |
| 2024-25 | 30.33 | 69.91 | 67.95 | 168.18 |

| Year | TP-1 | TP2 | TP3 | Total |
|----------------|-------------|------------|------------|----------------|
| 2025-26 | 34.14 | 78.93 | 76.44 | 189.51 |
| 2026-27 | 38.40 | 88.37 | 85.36 | 212.14 |
| 2027-28 | 43.76 | 99.49 | 96.21 | 239.47 |
| 2028-29 | 48.96 | 110.85 | 107.78 | 267.58 |
| 2029-30 | 54.99 | 125.00 | 121.61 | 301.60 |
| 2030-31 | 62.04 | 139.13 | 134.86 | 336.02 |
| 2031-32 | 69.86 | 156.58 | 151.41 | 377.85 |
| 2032-33 | 77.55 | 173.28 | 168.97 | 419.80 |
| 2033-34 | 87.23 | 194.32 | 188.09 | 469.64 |
| 2034-35 | 98.03 | 217.53 | 211.22 | 526.79 |
| 2035-36 | 110.02 | 242.84 | 236.35 | 589.20 |
| 2036-37 | 122.62 | 270.79 | 263.21 | 656.62 |
| 2037-38 | 137.57 | 301.61 | 294.39 | 733.57 |
| 2038-39 | 154.59 | 338.06 | 328.47 | 821.11 |
| 2039-40 | 173.52 | 378.01 | 367.39 | 918.92 |
| 2040-41 | 194.50 | 421.75 | 409.48 | 1025.73 |
| 2041-42 | 218.43 | 469.71 | 458.13 | 1146.26 |
| 2042-43 | 245.54 | 524.93 | 511.39 | 1281.86 |
| 2043-44 | 275.71 | 589.58 | 574.16 | 1439.45 |
| 2044-45 | 308.58 | 656.94 | 642.85 | 1608.37 |
| 2045-46 | 346.90 | 735.16 | 715.93 | 1797.99 |
| 2046-47 | 386.67 | 820.67 | 798.72 | 2006.06 |
| 2047-48 | 433.50 | 912.79 | 889.85 | 2236.14 |

Table 7-13 : Toll Revenue Pessimistic Scenario

(Rs. Crores)

| Year | TP-1 | TP2 | TP3 | Total |
|----------------|-------------|------------|------------|---------------|
| 2023-24 | 27.18 | 63.77 | 62.08 | 153.03 |

| Year | TP-1 | TP2 | TP3 | Total |
|----------------|-------------|------------|------------|----------------|
| 2024-25 | 30.19 | 69.60 | 67.66 | 167.45 |
| 2025-26 | 33.86 | 78.21 | 75.76 | 187.84 |
| 2026-27 | 37.90 | 87.21 | 84.21 | 209.31 |
| 2027-28 | 42.95 | 97.71 | 94.44 | 235.11 |
| 2028-29 | 47.83 | 108.35 | 105.30 | 261.48 |
| 2029-30 | 53.49 | 121.65 | 118.28 | 293.42 |
| 2030-31 | 60.03 | 134.73 | 130.57 | 325.33 |
| 2031-32 | 67.27 | 150.90 | 145.90 | 364.07 |
| 2032-33 | 74.35 | 166.23 | 162.04 | 402.61 |
| 2033-34 | 83.23 | 185.62 | 179.55 | 448.41 |
| 2034-35 | 93.18 | 206.79 | 200.65 | 500.62 |
| 2035-36 | 104.17 | 229.78 | 223.49 | 557.44 |
| 2036-37 | 115.57 | 255.01 | 247.69 | 618.27 |
| 2037-38 | 129.07 | 282.71 | 275.73 | 687.51 |
| 2038-39 | 144.36 | 315.31 | 306.17 | 765.84 |
| 2039-40 | 161.31 | 350.85 | 340.92 | 853.08 |
| 2040-41 | 179.92 | 389.63 | 378.22 | 947.77 |
| 2041-42 | 201.08 | 431.94 | 421.26 | 1054.28 |
| 2042-43 | 225.00 | 480.43 | 468.14 | 1173.57 |
| 2043-44 | 251.36 | 537.01 | 523.09 | 1311.46 |
| 2044-45 | 280.01 | 595.54 | 582.92 | 1458.47 |
| 2045-46 | 313.29 | 663.34 | 646.17 | 1622.80 |
| 2046-47 | 347.60 | 736.98 | 717.47 | 1802.05 |
| 2047-48 | 387.73 | 815.78 | 795.52 | 1999.03 |

Table 7-14 : Toll Revenue Most Likely Scenario**(Rs. Crores)**

| Year | TP-1 | TP2 | TP3 | Total |
|----------------|-------------|------------|------------|----------------|
| 2023-24 | 27.18 | 63.77 | 62.08 | 153.03 |
| 2024-25 | 30.25 | 69.75 | 67.84 | 167.84 |
| 2025-26 | 33.96 | 78.56 | 76.18 | 188.70 |
| 2026-27 | 38.11 | 87.77 | 84.85 | 210.73 |
| 2027-28 | 43.30 | 98.57 | 95.42 | 237.29 |
| 2028-29 | 48.36 | 109.59 | 106.65 | 264.59 |
| 2029-30 | 54.19 | 123.27 | 120.06 | 297.52 |
| 2030-31 | 60.97 | 136.88 | 132.85 | 330.69 |
| 2031-32 | 68.49 | 153.71 | 148.77 | 370.98 |
| 2032-33 | 75.86 | 169.75 | 165.62 | 411.23 |
| 2033-34 | 85.11 | 189.95 | 183.97 | 459.02 |
| 2034-35 | 95.48 | 212.08 | 206.05 | 513.61 |
| 2035-36 | 106.94 | 236.16 | 230.05 | 573.16 |
| 2036-37 | 118.94 | 262.66 | 255.55 | 637.14 |
| 2037-38 | 133.13 | 291.90 | 285.06 | 710.09 |
| 2038-39 | 149.19 | 326.44 | 317.35 | 792.99 |
| 2039-40 | 167.06 | 364.09 | 354.11 | 885.26 |
| 2040-41 | 186.77 | 405.25 | 393.85 | 985.88 |
| 2041-42 | 209.21 | 450.32 | 439.68 | 1099.20 |
| 2042-43 | 234.75 | 502.09 | 489.66 | 1226.50 |
| 2043-44 | 262.91 | 562.51 | 548.41 | 1373.83 |
| 2044-45 | 293.55 | 625.33 | 612.53 | 1531.42 |
| 2045-46 | 329.19 | 698.08 | 680.61 | 1707.88 |
| 2046-47 | 366.13 | 777.47 | 757.57 | 1901.17 |
| 2047-48 | 409.40 | 862.66 | 842.04 | 2114.10 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Goa/ Karnataka to Kundapur section of NH-17 in state of Karnataka from km 93.70.000 to km 183.300 is four lane. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the busy and prominent national highway NH-17 which is main link for traffic on west coast to from Rajasthan, Gujarat, Maharashtra to Kerala. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As Indian economy is poised to grow at 6%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the 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 due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road

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



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KISHANGARH TO GULABPURA SECTION
OF NH-79 & NH-79A IN THE STATE OF RAJASTHAN
(LENGTH 90 KM)



**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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, Six Laning of **Kishangarh to Gulabpura** section of NH-79A & NH-79 (length 90.00km) is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s Kishangarh Gulabpura Tollway Ltd.* (Concessionaire) has been awarded the Project for a concession period of 20 years starting from 21st February 2018. The Project has been commissioned and is currently in the operation / maintenance phase. Six laning of project has also been completed in July 2022.

Length of project road is 90.00 Kms. The project road is section of NH-79A & 79 A, which connects Ajmer to Ghat Bilod. Project section of NH-79 passes through the district of Bhiwara and Ajmer.

Project road alignment passes through the small towns of Shreenagar, Nasirabad, Jharwasa, Bandanwara and Bijainagar (Vijay Nagar). The following figure shows alignment of the project road section from Kishangarh to Gulabpura.

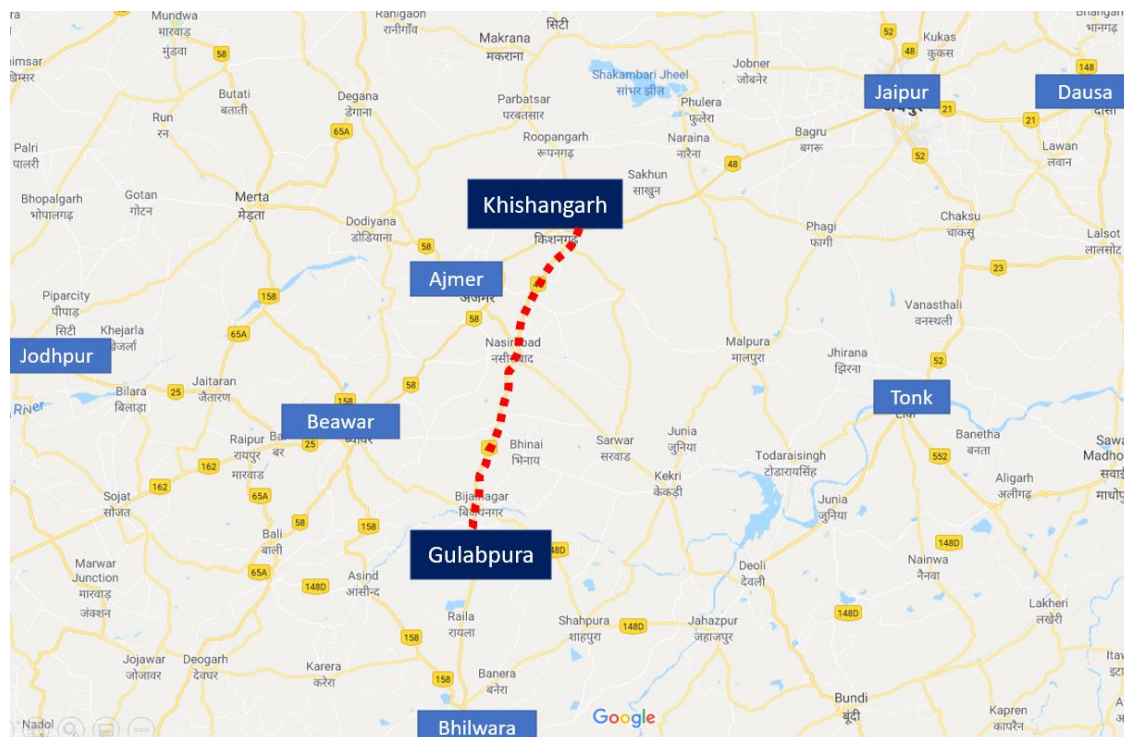


Figure 1-1 : Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

National Highway 79 (NH 79) is an important link for traffic connecting Delhi, Jaipur to Udaipur, Chittorgarh and down south. The project road is the section of the former NH-79A & NH-79 which has now been re-designated as NH-48. The project road section takes off at Kishangarh and ends at Gulabpura, both in the state of Rajasthan. The NH-79A was the section from Kishangarh to Nasirabad and part of NH-79 (Ajmer to Ghata Billod) was the remaining section from Nasirabad to Gulabpura

It is one of the major north-south road connectivity for the traffic from northern states of Haryana, Punjab and Delhi to Industrial and tourist areas of Rajasthan like Jaipur, Chittorgarh, Udaipur and then to Dahod, Ratlam and other parts of Madhya Pradesh.

After renumbering of all national highways by National Highway Authority of India in 2010, the current NH 48 was formed by merging the old NH 8 (Delhi-Mumbai section) and NH 4 (Mumbai-Chennai). National Highway 48 starts at Delhi and terminates at Chennai and goes through Jaipur, Udaipur, Vadodara, Mumbai, Pune and Bengaluru, traversing through six states of India. It has a total length of 2807 km (1744 miles)

2.2 Project Stretch Description

Section of NH-79 from Kishangarh to Gulabpura is part of major transportation link in the area connecting industrial / tourist cities of Jaipur-, Bhilwara, Chittorgarh and Udaipur. Project stretch would be faster connectivity to Udaipur from Jaipur once six laning is complete.

Major mining industries of marble, Zink, felspar, quarts of Udaipur and textile industry of Bhiwara provide are major contributor of commercial traffic on project corridor. Additionally, Jaipur, Ajmer, Udaipur, Chittorgarh and Bhilwara major tourist centers of India. This adds substantial value for passenger traffic on the project corridor section.

Like other parts of India rapid ribbon development is happening around these cities on project highway. This also contributes to sustainable traffic growth.

There is one operative toll plaza at project stretch at Bandanwara at km 61.020. The following figure shows project alignment and toll plaza locations.

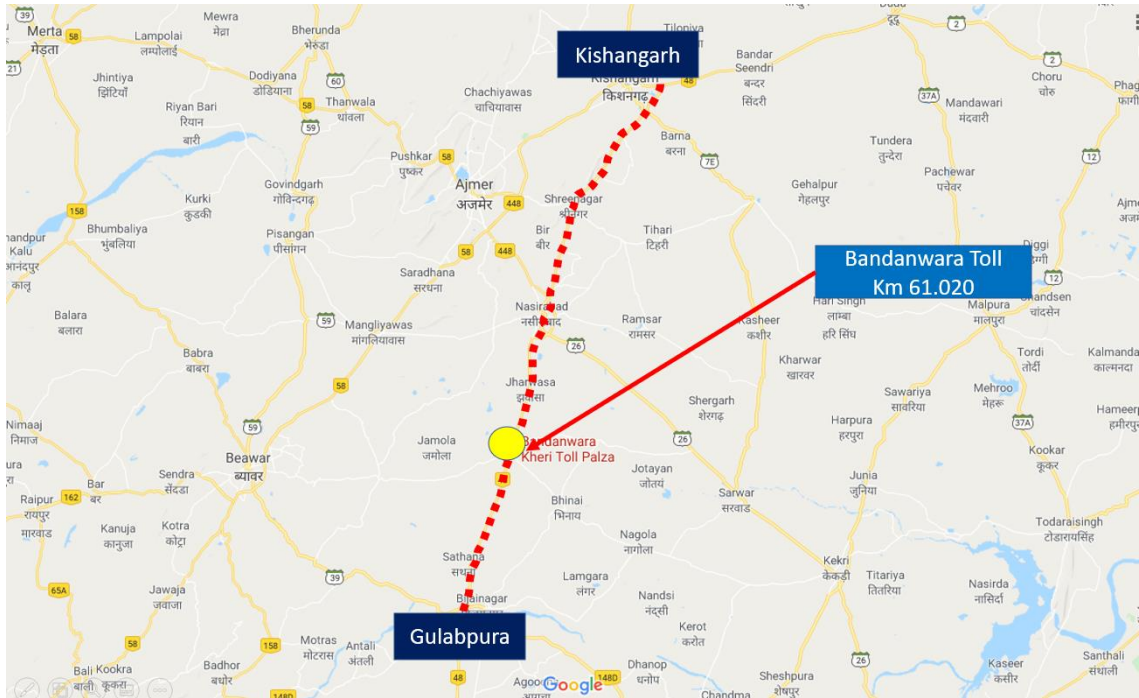


Figure 2-1 : Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Six laning of project stretch is in progress and will be completed soon. The following photographs illustrate the project section along the corridor.



Figure 2-2 : Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza location on Kishangarh – Gulabpura section of NH-79 for year 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|------------------------------------|---|--|--|--|--|
| 1 | Km 61.020 Toll Plaza at Bandanwara | AADT for Year 2018-19, 2019-20, 2020-2021, 2021-2022, 2022-2023 & Eight | For Year 2018-19, 2019-2020, 2020-2021, 2021, 2021-2022, 2022-2023 | For Year 2018-19, 2019-2020, 2020-2021, 2021, 2021-2022, 2022-2023 | For Year 2018-19, 2019-2020, 2020-2021, 2021-2022, 2022-2023 & Eight | For Year 2018-19, 2019-2020, 2020-2021, 2021-2022, 2022-2023 & Eight |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|----------|--|--|--|--|--|
| | | month from April 2023 to November 2023 | & Eight month from April 2023 to November 2023 | & Eight month from April 2023 to November 2023 | month from April 2023 to November 2023 | month from April 2023 to November 2023 |

3.2 Classified traffic volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Truck / Bus
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Additionally, Udaipur Bypass has been opened recently which is expected to attract more long distance traffic onto corridor. It was expected to be opened in monsoon but got slightly delayed. Hence a, taking above factors into consideration, seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Bandanwara Toll Plaza at Km 61.020

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|---------------------------|--|--|--|--|--|
| 1 | Car | 2572 | 448 | 3827 | 5400 | 6428 |
| 2 | Minibus /LCV | 1009 | 326 | 522 | 736 | 868 |
| 3 | Bus | 376 | 38 | 337 | 486 | 624 |
| 4 | Truck | 1511 | 264 | 1756 | 2375 | 2803 |
| 5 | 3-Axle Commercial vehicle | 2095 | 318 | 1805 | 2045 | 2188 |
| 6 | Multi axle | 4421 | 748 | 4141 | 4709 | 5396 |
| 7 | Oversized Vehicle | 19 | 70 | 319 | 296 | 463 |
| Total | | 12003 | 2212 | 12707 | 16046 | 18770 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-4 : 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 3-5 : Traffic in PCU at Project Stretch Base Year 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24

| Toll Plaza Location (Km) | Year | Traffic No | PCU | PCU Index |
|--------------------------|---------|------------|-------|-----------|
| Bandanwara 61.020 | 2019-20 | 12003 | 36011 | 3.00 |
| | 2020-21 | 2212 | 6478 | 2.93 |

| Toll Plaza Location (Km) | Year | Traffic No | PCU | PCU Index |
|--------------------------|---------|------------|-------|-----------|
| | 2021-22 | 12707 | 36374 | 2.86 |
| | 2022-23 | 16046 | 43739 | 2.73 |
| | 2023-24 | 18770 | 50940 | 2.71 |

It can be observed from above that project traffic has PCU index 3 which is an indicator of very high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at four toll plaza locations.

3.4.2 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.

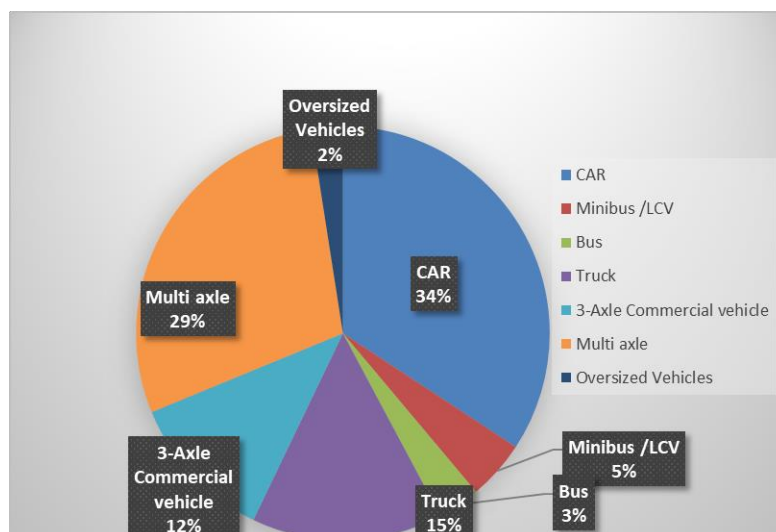


Figure 3-1 : Model Split of Tollable Vehicle

It is observed that car traffic forms about 34% of total traffic at toll plaza locations while multi axle commercial vehicles are about 43% of total traffic. Truck / Bus and LCV share about 18% and 5% of traffic volume respectively.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-6 : Journey Type Bifurcation of Traffic at Bandanwara TP KM 61.020

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 14380 |
| 2 | Return Journey | 3768 |
| 3 | Local Commercial Single Journey | 598 |
| 4 | Monthly Pass Local | 7 |
| 5 | Monthly Pass | 18 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 77%. Return journey component is 20%. The number of Local Commercial Single Journey is 3% and Monthly Pass Local 0% at Bandanwara toll plaza.

It is observed that the project corridor demonstrates pattern of single journey dominated mix of traffic at stretch which is typical of major national highways with high component of long-distance traffic.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch has toll application history from last few years, and it can be assumed that project traffic is settled. At the local level there is no potential competing route bypassing toll plaza between. At regional level, there can be two alternates for Udaipur traffic after Kishangarh. One via project road (Kishangarh – Bhiwara- Chittorgarh- Udaipur) and one via Ajmer, Beawer and Rajsamand. The following maps show these routes in relation to project stretch at regional level.



Figure 4-1 : Alternate route at regional level.

It can be observed that the project highway forms one of the main spines of the corridor between Kishangarh / Jaipur and Chittorgarh. Traffic on project road is now settled and it can be assumed as dedicated traffic on project road for logistic obligations.

At regional level for Udaipur traffic alternate route is faster and traffic is already using this alternate. With six laning now nearing completion, the project stretch would become slightly more attractive due to the improved level of service. In such a case further diversion of traffic from the project road is not envisaged.

The following table provide summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Competing Roads Details

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|---|-----------------|-------------|-------------------|------------------|---|
| Regional Level | | | | | | |
| 1 | Jaipur – Ajmer- Udaipur | Alternate Route | 395 | 61 | 6 Hr 23 Min | At present alternate route via Ajmer is a bit faster but after completion of six laning level of service would increase at project road as well |
| | Jaipur- Bhilwara - Chittorgarh- Udaipur | Project Road | 398 | 51 | 6 Hr 58 Min | |

It may be noted that since the project highway has already been commissioned and has a tolling history, the current traffic traversing the project corridor already factors in traffic diversion (if any) that may have taken place. Further after completion of six laning, level of service would improve on

project corridor, and this would create favorable conditions for traffic. Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road. It is expected that there would be some additional traffic on project corridor once six lane is completed due to improvement in level of service.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Kishangarh to Gulabpur section of NH-79 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

The project corridor spreads across the state of Rajasthan. Toll plaza at Bandanwara is in the state of Rajasthan but it has influence of Gujarat also. For elasticity calculations, working data from Rajasthan and Gujarat has been analyzed.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-1 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2012 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2013 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2014 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2015 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2016 | 68565 | 899307 | 4.84 | 5.95 | 6% | |
| 2017 | 71394 | 988391 | 4.85 | 5.99 | 4% | 4.55% |

Regression analysis of same is given in figure below.

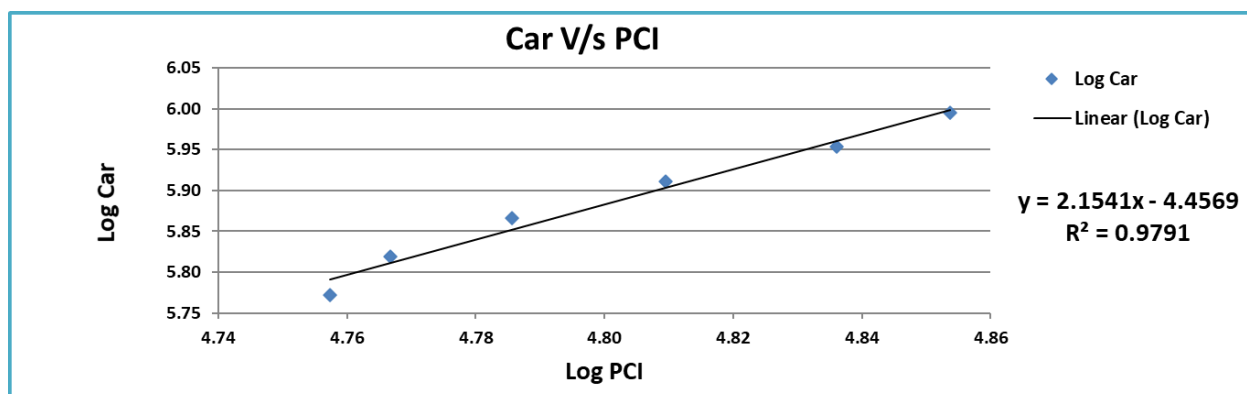
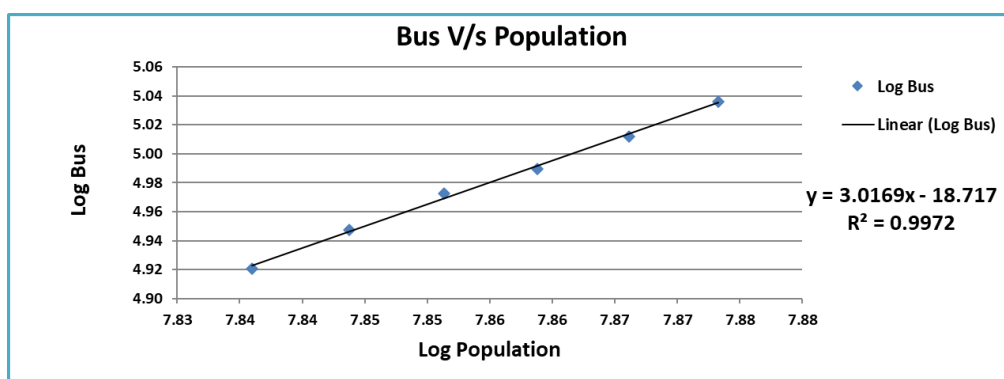


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan**Table 5-2 : Population Vs Bus Rajasthan**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 68548437 | 83345 | 7.84 | 4.92 | | |
| 2013 | 69783885 | 88616 | 7.84 | 4.95 | 2% | |
| 2014 | 71016445 | 93892 | 7.85 | 4.97 | 2% | |
| 2015 | 72245688 | 97650 | 7.86 | 4.99 | 2% | |
| 2016 | 73471198 | 102818 | 7.87 | 5.01 | 2% | |
| 2017 | 74692571 | 108680 | 7.87 | 5.04 | 2% | 1.73% |

Regression analysis of same is given in figure below.

**Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan**

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

The following table represents the data and details.

Table 5-3 : LCV Traffic Vs NSDP Rajasthan

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth |
|------|--------|-------|----------|---------|-------------|----------------|
| 2012 | 395331 | 69509 | 5.60 | 4.84 | | |
| 2013 | 409802 | 76396 | 5.61 | 4.88 | 4% | |
| 2014 | 434292 | 33379 | 5.64 | 4.52 | 6% | |
| 2015 | 465408 | 91787 | 5.67 | 4.96 | 7% | |
| 2016 | 501922 | 99763 | 5.70 | 5.00 | 8% | 6.16% |

The following figure depicts regression analysis and extrapolation.

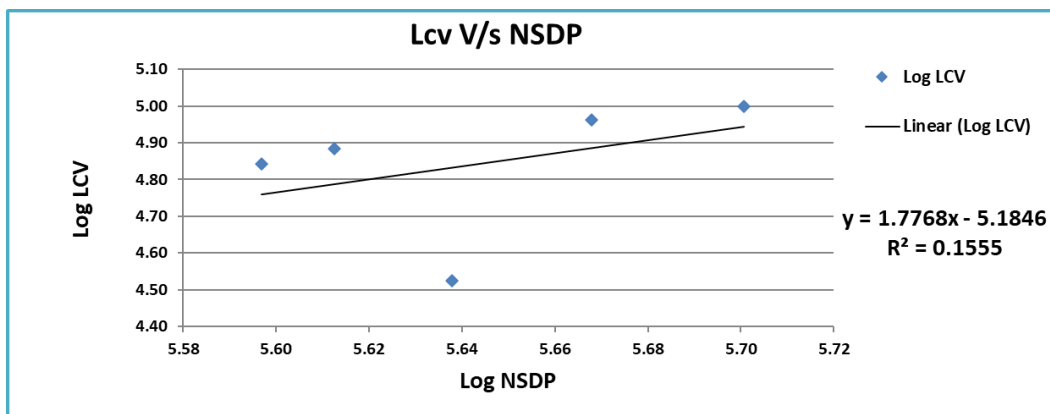


Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.

The following figure depicts regression analysis and extrapolation.

Table 5-4 : Goods Traffic Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|--------|--------|----------|-----------|-------------|----------------|
| 2012 | 395331 | 362028 | 5.60 | 5.56 | | |
| 2013 | 409802 | 401983 | 5.61 | 5.60 | 4% | |
| 2014 | 434292 | 434379 | 5.64 | 5.64 | 6% | |
| 2015 | 465408 | 472365 | 5.67 | 5.67 | 7% | |
| 2016 | 501922 | 517604 | 5.70 | 5.71 | 8% | |
| 2017 | 530172 | 561158 | 5.72 | 5.75 | 6% | 6.06% |

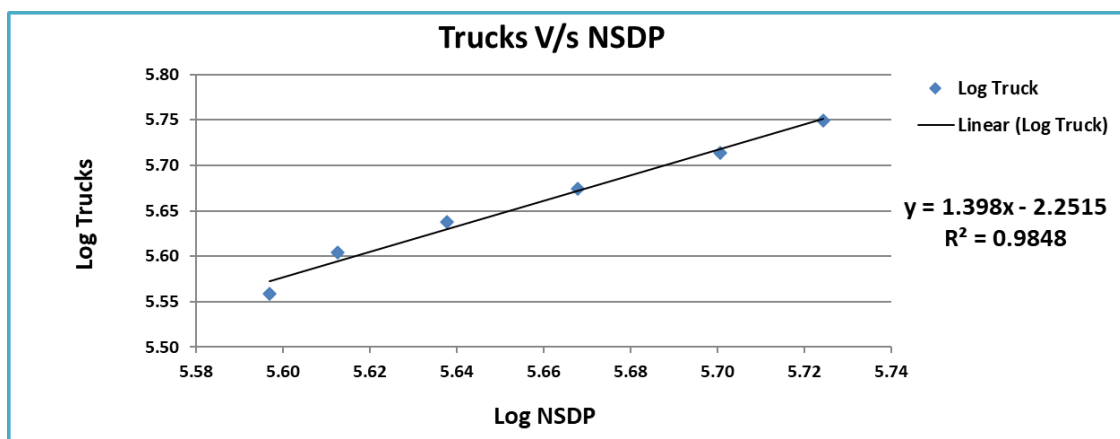


Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

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

Table 5-5 : Summary Regression Analysis Rajasthan

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Rajasthan | Car/Jeep | PCI | $y = 2.1541x - 4.4569$ | $R^2 = 0.9791$ | 2.1541 | 4.55% | 9.79% | Good Regression |
| | Bus | Population | $y = 3.0169x - 18.7174$ | $R^2 = 0.9972$ | 3.0169 | 1.73% | 5.22% | Good Regression |
| | LCV | NSDP | $y = 1.7768x - 5.1846$ | $R^2 = 0.1555$ | 1.7768 | 6.16% | 10.95% | Poor Regression |
| | Truck | NSDP | $y = 1.398x - 2.2515$ | $R^2 = 0.9848$ | 1.3980 | 6.06% | 8.46% | Good Regression |

Table 5-6 : Per Capita Income Vs Car Gujarat

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 87481 | 1411898 | 4.94 | 6.15 | | |
| 2013 | 96683 | 1602129 | 4.99 | 6.20 | 11% | |
| 2014 | 102589 | 1771298 | 5.01 | 6.25 | 6% | |
| 2015 | 111370 | 2008748 | 5.05 | 6.30 | 9% | |
| 2016 | 120683 | 2260084 | 5.08 | 6.35 | 8% | |
| 2017 | 129738 | 2527537 | 5.11 | 6.40 | 8% | 8.21% |

Regression analysis of same is given in figure below.

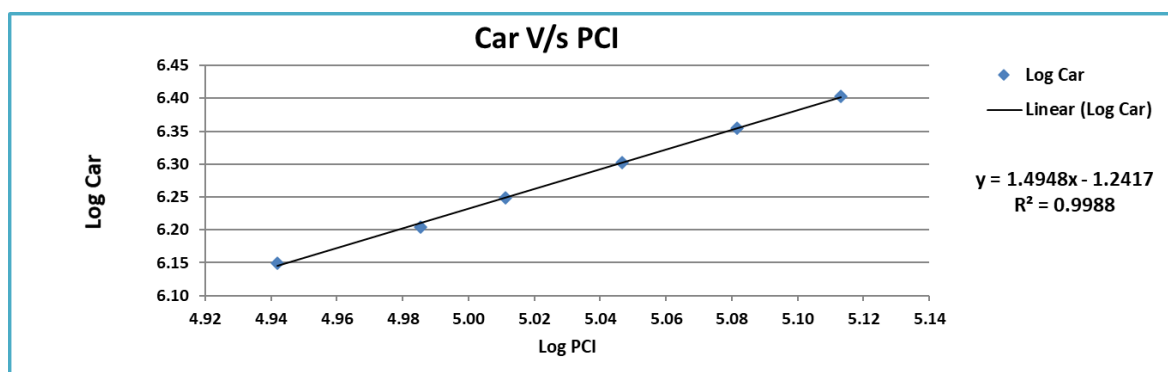


Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Gujarat

Table 5-7 : Population Vs Bus Gujarat

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 60439692 | 67546 | 7.78 | 4.83 | | |
| 2013 | 61563037 | 70615 | 7.79 | 4.85 | 2% | |
| 2014 | 62684375 | 72998 | 7.80 | 4.86 | 2% | |
| 2015 | 63803304 | 76435 | 7.80 | 4.88 | 2% | |
| 2016 | 64919427 | 82734 | 7.81 | 4.92 | 2% | |
| 2017 | 66032362 | 74855 | 7.82 | 4.87 | 2% | 1.79% |

Regression analysis of same is given in figure below.

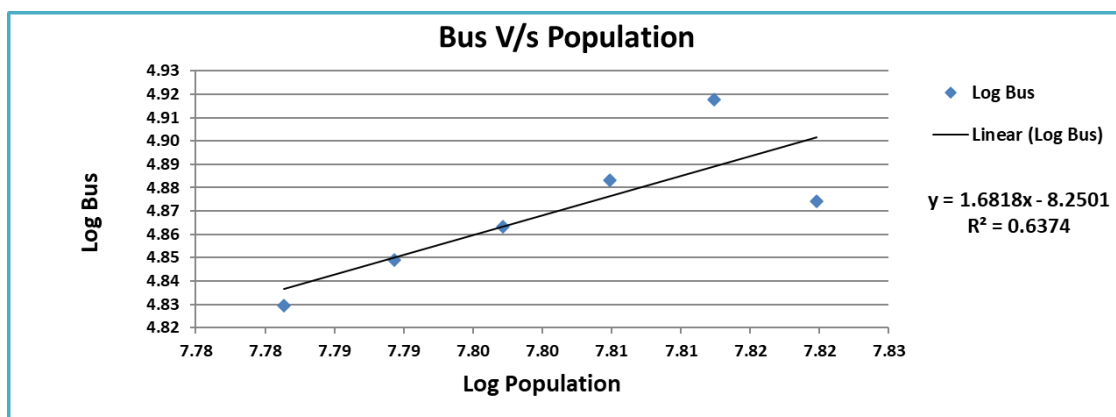


Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-8 : LCV Traffic Vs NSDP Gujarat

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth |
|------|--------|--------|----------|---------|-------------|----------------|
| 2012 | 532809 | 448958 | 5.73 | 5.65 | | |
| 2013 | 596659 | 499277 | 5.78 | 5.70 | 12% | |
| 2014 | 641489 | 542918 | 5.81 | 5.73 | 8% | |
| 2015 | 705629 | 589984 | 5.85 | 5.77 | 10% | |
| 2016 | 774775 | 633599 | 5.89 | 5.80 | 10% | 9.82% |

The following figure depicts regression analysis and extrapolation.

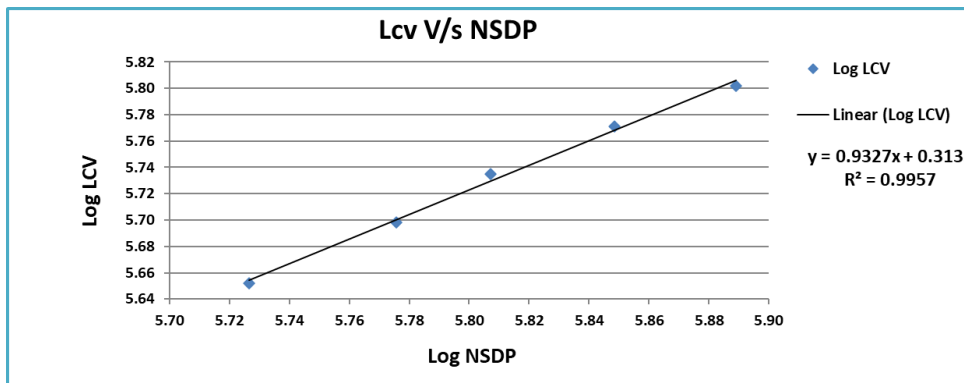


Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat.

The following figure depicts regression analysis and extrapolation.

Table 5-9 : Goods Traffic Vs NSDP Gujarat

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|--------|--------|----------|-----------|-------------|----------------|
| 2012 | 532809 | 301533 | 5.73 | 5.48 | | |
| 2013 | 596659 | 319207 | 5.78 | 5.50 | 12% | |
| 2014 | 641489 | 332185 | 5.81 | 5.52 | 8% | |
| 2015 | 705629 | 352225 | 5.85 | 5.55 | 10% | |
| 2016 | 774775 | 375265 | 5.89 | 5.57 | 10% | |
| 2017 | 843930 | 396061 | 5.93 | 5.60 | 9% | 9.64% |

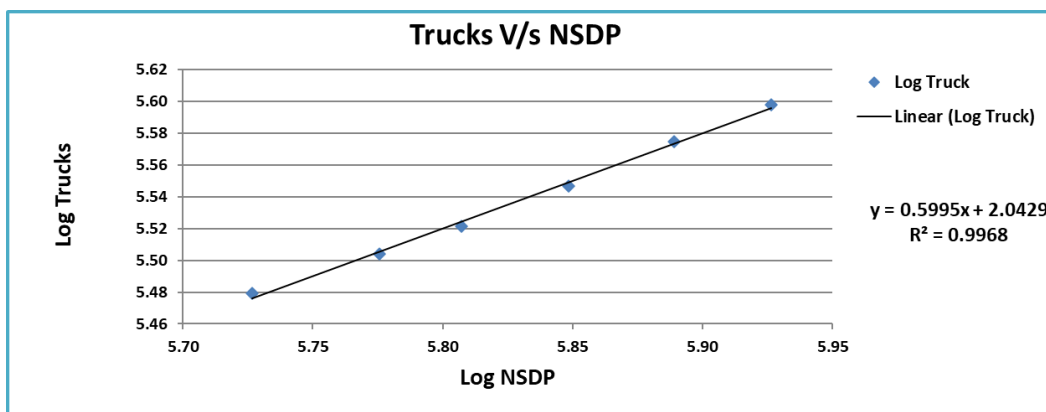


Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Gujarat.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for the good fit regression as reflected by R² values are presented in the Table below.

Table 5-10 : Summary Regression Analysis Gujarat

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Gujarat | Car/Jeep | PCI | $y = 1.4948x + -1.2417$ | $R^2 = 0.9988$ | 1.4948 | 8.21% | 12.27% | Good Regression |
| | Bus | Population | $y = 1.6818x - -8.2501$ | $R^2 = 0.6374$ | 1.6818 | 1.79% | 3.00% | Fair Regression |
| | LCV | NSDP | $y = 0.9327x - 0.3133$ | $R^2 = 0.9957$ | 0.9327 | 9.82% | 9.16% | Good Regression |
| | Truck | NSDP | $y = 0.5995x - 2.0429$ | $R^2 = 0.9968$ | 0.5995 | 9.64% | 5.78% | Good Regression |

The economic model for predicting growth is a good tool, however other local, regional, and 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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Kishangarh to Gulabpura is under tolling operation with current concessionaire and has two year of tolling history from 2018-19. As traffic data is available with the project concessionaire of year two years, we do not have sufficient data points to be able to establish a reliable past trend of traffic growth. A minimum of about 5 -6 years' traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

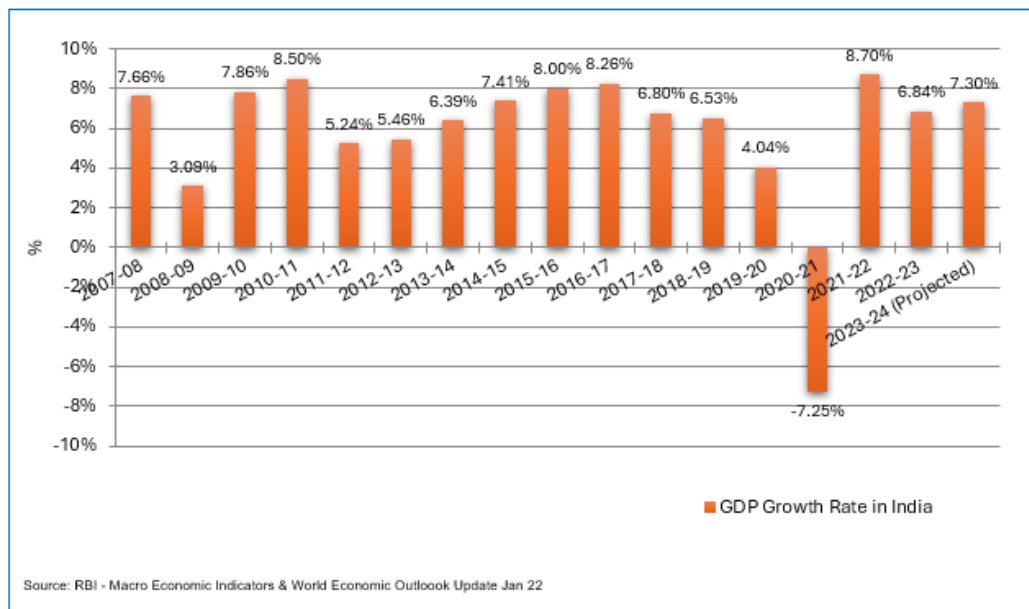


Figure 5-9 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

This Highway passes through Ajmer district of Rajasthan, having Industrial Areas of RIICO Kishangarh and Silora. There are Large Scale Industries of Cement, Marble & Granite and Medium Scale Industries of engineering and instrumentation in this area. Asset primarily serves traffic travelling between Delhi, Rajasthan, Gujarat and Maharashtra. It is observed that the vehicle distribution to be dominated by heavy vehicles. We further noticed several textile industries and marble/granite industries bordering the Asset. Udaipur serves as a big tourism hub as well as a consumption centre which also results in traffic feeding into the demand being generated.

In addition, Chittorgarh has 4 major cement plants located in Chanderiya and Nimbahera villages. There is a regular movement of Cement bulkers to and from these locations along

asset. Chanderiya Lead-Zinc Smelter, is the one of the largest zinc-lead smelting complexes in the world, is also located in Chittorgarh. Bhilwara is home to the textile industry and the only centre in the country producing insulation bricks. Mining is another major sector for large scale mining of sandstone, soap stone feldspar, quartz, mica China clay and granite. Also, Iron Ore, Led, and Zinc are mined and processed in Bhilwara.

growth of Rajasthan has been comparable to the national average economic growth. Rajasthan is rich in natural resources and benefits from its strategic geographic location in India. The state is pre-eminent in quarrying, mining in India and has been a leader in crude oil extraction over the past the few years. Moreover, Rajasthan is also a relevant tourism attractor in India. Considering the scenario, it may be assumed that the traffic growth on the project highway would remain high and there are minimal risks in terms of growth.

Table 5-11 : GDP of India, UP and other important states

| Year | India (GDP) | Bihar | Haryana | Madhya Pradesh | Maharashtra | Odisha | Punjab | Rajasthan | Uttar Pradesh | Uttarakhand | West Bengal | Delhi |
|------------------|-------------|-------|---------|----------------|-------------|--------|--------|-----------|---------------|-------------|-------------|-------|
| 1980-81 | 12336 | 514 | 357 | 623 | 1464 | 529 | 504 | 560 | 1631 | 138 | 830 | 269 |
| 1981-82 | 13030 | 543 | 371 | 639 | 1498 | 528 | 551 | 607 | 1670 | 141 | 808 | 291 |
| 1982-83 | 13411 | 548 | 394 | 668 | 1556 | 497 | 568 | 620 | 1800 | 152 | 840 | 328 |
| 1983-84 | 14464 | 601 | 402 | 702 | 1654 | 597 | 578 | 761 | 1871 | 158 | 939 | 320 |
| 1984-85 | 15037 | 658 | 418 | 668 | 1675 | 569 | 623 | 706 | 1900 | 161 | 964 | 333 |
| 1985-86 | 15663 | 672 | 493 | 726 | 1807 | 635 | 670 | 704 | 1975 | 167 | 1005 | 386 |
| 1986-87 | 16339 | 725 | 493 | 694 | 1832 | 643 | 694 | 771 | 2060 | 174 | 1045 | 411 |
| 1987-88 | 16917 | 685 | 484 | 789 | 1955 | 623 | 730 | 718 | 2154 | 182 | 1101 | 447 |
| 1988-89 | 18635 | 772 | 602 | 847 | 2159 | 754 | 769 | 1014 | 2434 | 206 | 1148 | 486 |
| 1989-90 | 19778 | 759 | 610 | 865 | 2515 | 805 | 834 | 993 | 2502 | 212 | 1188 | 531 |
| 1990-91 | 20824 | 831 | 674 | 987 | 2629 | 668 | 849 | 1149 | 2651 | 224 | 1251 | 553 |
| 1991-92 | 21122 | 784 | 688 | 916 | 2620 | 753 | 888 | 1061 | 2662 | 225 | 1349 | 638 |
| 1992-93 | 22254 | 737 | 688 | 983 | 3017 | 740 | 930 | 1220 | 2690 | 228 | 1389 | 660 |
| 1993-94 | 23519 | 755 | 719 | 1088 | 3349 | 788 | 970 | 1121 | 2757 | 233 | 1490 | 705 |
| 1994-95 | 25023 | 842 | 771 | 1107 | 3414 | 826 | 995 | 1325 | 2901 | 254 | 1594 | 790 |
| 1995-96 | 26846 | 712 | 787 | 1174 | 3791 | 864 | 1032 | 1374 | 2995 | 251 | 1713 | 804 |
| 1996-97 | 28987 | 893 | 879 | 1252 | 3941 | 804 | 1107 | 1535 | 3327 | 267 | 1832 | 915 |
| 1997-98 | 30234 | 850 | 887 | 1318 | 4158 | 920 | 1137 | 1721 | 3292 | 270 | 1985 | 1063 |
| 1998-99 | 32255 | 904 | 934 | 1405 | 4324 | 948 | 1203 | 1797 | 3316 | 274 | 2112 | 1116 |
| 1999-00 | 34837 | 950 | 1002 | 1552 | 4735 | 1008 | 1267 | 1801 | 3440 | 274 | 2264 | 1170 |
| 2000-01 | 36282 | 1106 | 1081 | 1426 | 4589 | 982 | 1309 | 1743 | 3511 | 308 | 2343 | 1215 |
| 2001-02 | 38236 | 1043 | 1165 | 1528 | 4751 | 1042 | 1326 | 1941 | 3575 | 323 | 2512 | 1262 |
| 2002-03 | 39719 | 1175 | 1236 | 1449 | 5079 | 1034 | 1348 | 1708 | 3690 | 353 | 2600 | 1359 |
| 2003-04 | 42883 | 1099 | 1358 | 1611 | 5471 | 1185 | 1433 | 2251 | 3885 | 381 | 2753 | 1433 |
| 2004-05 | 45906 | 1238 | 1475 | 1664 | 5948 | 1340 | 1504 | 2196 | 4079 | 431 | 2936 | 1588 |
| 2005-06 | 50257 | 1207 | 1608 | 1748 | 6810 | 1399 | 1577 | 2344 | 4317 | 492 | 3121 | 1752 |
| 2006-07 | 55066 | 1416 | 1791 | 1907 | 7748 | 1574 | 1748 | 2620 | 4660 | 551 | 3366 | 1969 |
| 2007-08 | 60199 | 1489 | 1931 | 1997 | 8650 | 1708 | 1899 | 2739 | 4959 | 648 | 3627 | 2191 |
| 2008-09 | 64248 | 1716 | 2080 | 2250 | 8786 | 1837 | 2004 | 2969 | 5336 | 716 | 3774 | 2464 |
| 2009-10 | 69769 | 1798 | 2340 | 2463 | 9634 | 1852 | 2132 | 3142 | 5668 | 839 | 4067 | 2667 |
| 2010-11 | 75987 | 2073 | 2498 | 2592 | 10732 | 1968 | 2270 | 3614 | 6120 | 927 | 4313 | 2888 |
| 2011-12 | 81069 | 2285 | 2712 | 2824 | 11222 | 2042 | 2392 | 3953 | 6451 | 1020 | 4471 | 3147 |
| 2012-13 | 85463 | 2369 | 2894 | 3069 | 11842 | 2163 | 2518 | 4098 | 6736 | 1095 | 4838 | 3342 |
| 2013-14 | 90636 | 2469 | 3142 | 3226 | 12671 | 2331 | 2675 | 4343 | 7075 | 1178 | 5247 | 3565 |
| 2014-15 | 97121 | 2557 | 3314 | 3394 | 13322 | 2359 | 2777 | 4656 | 7297 | 1257 | 5633 | 3882 |
| 2015-16 | 105033 | 2749 | 3612 | 3597 | 14417 | 2557 | 2926 | 4981 | 7894 | 1355 | - | 4291 |
| 2016-17 | 112476 | 3033 | 3927 | 4129 | 15744 | 2828 | 3095 | 5352 | 8457 | 1448 | - | 4658 |
| 2017-18 | 119762 | - | - | 4432 | - | 3029 | - | 5736 | 9011 | 1547 | - | 5035 |
| Growth 1981-2018 | 6.34 | 5.05 | 6.88 | 5.44 | 6.82 | 4.83 | 5.17 | 6.49 | 4.73 | 6.75 | 5.79 | 8.24 |
| Growth 1994-2018 | 7.02 | 6.23 | 7.66 | 6.03 | 6.96 | 5.77 | 5.17 | 7.04 | 5.06 | 8.20 | 6.54 | 8.53 |

| | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Growth 2000-2018 | 7.10 | 7.07 | 8.37 | 6.00 | 7.32 | 6.30 | 5.40 | 6.65 | 5.50 | 10.10 | 6.27 | 8.45 |
|------------------|------|------|------|------|------|------|------|------|------|-------|------|------|

5.6.1 Industrial Units along Project Corridor

There are a number of medium and big size industrial establishments along the project corridor. The following figure shows the spread of these industries along project road.

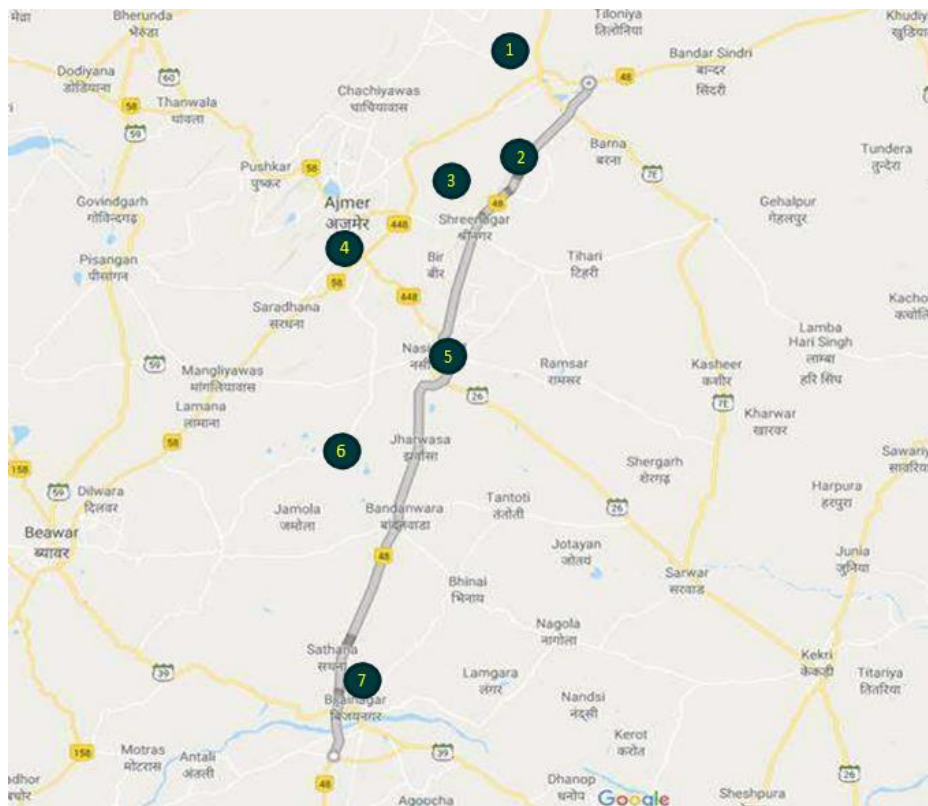


Figure 5-10 : Industrial Units along project corridor.

1. RIICO Industrial Area **Kishangarh** (Marbel & Cement Manufacturing Industries)
2. RIICO **Silora** (Wire Product, Ice Factory)
3. Welding Wire & Plastic Manufacturing Industries
4. Industrial Process Measurement & Control Instruments
5. FMCG & Quartz Manufacturers
6. Brick Manufacturers
7. **Bijainnagar** (Cattle Feed Products Manufacturer – Kapila)

The presence of these units promotes sustainable traffic in the project corridor.

5.7 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 below. The rate of growth is moderate in light of overall regional trends. 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, the rate of growth diminishes. The same growth rate is not sustainable for long. Traffic growth is suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-12 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.26% | 8.70% | 8.16% | 7.62% | 7.58% | 7.03% |
| Bus | 4.38% | 4.12% | 3.88% | 3.64% | 3.57% | 3.33% |
| LCV | 3.56% | 3.74% | 3.92% | 4.10% | 4.27% | 4.44% |
| 2- Axle | 4.39% | 3.95% | 3.52% | 3.09% | 2.86% | 2.41% |
| 3 - Axle | 5.43% | 4.88% | 4.33% | 3.80% | 3.67% | 3.08% |
| 4 to 6 Axle | 6.46% | 5.80% | 5.15% | 4.50% | 4.27% | 3.58% |
| 7 and Above Axle | 6.46% | 5.80% | 5.15% | 4.50% | 4.27% | 3.58% |

Table 5-13 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.76% | 8.20% | 7.66% | 7.12% | 7.08% | 6.53% |
| Bus | 3.88% | 3.62% | 3.38% | 3.14% | 3.07% | 2.83% |
| LCV | 3.06% | 3.24% | 3.42% | 3.60% | 3.77% | 3.94% |
| 2- Axle | 3.89% | 3.45% | 3.02% | 2.59% | 2.36% | 1.91% |
| 3 - Axle | 4.93% | 4.38% | 3.83% | 3.30% | 3.17% | 2.58% |
| 4 to 6 Axle | 5.96% | 5.30% | 4.65% | 4.00% | 3.77% | 3.08% |
| 7 and Above Axle | 5.96% | 5.30% | 4.65% | 4.00% | 3.77% | 3.08% |

Table 5-14 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.01% | 8.45% | 7.91% | 7.37% | 7.33% | 6.78% |
| Bus | 4.13% | 3.87% | 3.63% | 3.39% | 3.32% | 3.08% |
| LCV | 3.31% | 3.49% | 3.67% | 3.85% | 4.02% | 4.19% |
| 2- Axle | 4.14% | 3.70% | 3.27% | 2.84% | 2.61% | 2.16% |
| 3 - Axle | 5.18% | 4.63% | 4.08% | 3.55% | 3.42% | 2.83% |
| 4 to 6 Axle | 6.21% | 5.55% | 4.90% | 4.25% | 4.02% | 3.33% |
| 7 and Above Axle | 6.21% | 5.55% | 4.90% | 4.25% | 4.02% | 3.33% |

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza Chainage KM 61.02
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6428 | 868 | 624 | 2803 | 2188 | 5396 | 463 | 18770 | 50940 |
| 2024-25 | 7024 | 898 | 651 | 2926 | 2308 | 5744 | 493 | 20044 | 54093 |
| 2025-26 | 7636 | 931 | 678 | 3042 | 2420 | 6077 | 522 | 21306 | 57148 |
| 2026-27 | 8300 | 965 | 705 | 3162 | 2537 | 6429 | 552 | 22650 | 60374 |
| 2027-28 | 9022 | 1000 | 734 | 3287 | 2661 | 6801 | 584 | 24089 | 63801 |
| 2028-29 | 9807 | 1037 | 763 | 3416 | 2790 | 7195 | 618 | 25626 | 67428 |
| 2029-30 | 10661 | 1076 | 794 | 3551 | 2925 | 7612 | 654 | 27273 | 71282 |
| 2030-31 | 11531 | 1117 | 825 | 3676 | 3051 | 8003 | 688 | 28891 | 74972 |
| 2031-32 | 12471 | 1160 | 856 | 3805 | 3183 | 8415 | 723 | 30613 | 78864 |
| 2032-33 | 13488 | 1205 | 889 | 3939 | 3320 | 8848 | 760 | 32449 | 82976 |
| 2033-34 | 14588 | 1252 | 923 | 4077 | 3463 | 9303 | 799 | 34405 | 87314 |
| 2034-35 | 15778 | 1301 | 958 | 4220 | 3612 | 9781 | 840 | 36490 | 91894 |
| 2035-36 | 16980 | 1354 | 993 | 4350 | 3748 | 10221 | 878 | 38524 | 96230 |
| 2036-37 | 18274 | 1409 | 1029 | 4484 | 3890 | 10681 | 917 | 40684 | 100788 |
| 2037-38 | 19667 | 1466 | 1066 | 4622 | 4037 | 11162 | 958 | 42978 | 105581 |
| 2038-39 | 21167 | 1525 | 1104 | 4765 | 4189 | 11665 | 1001 | 45416 | 110626 |
| 2039-40 | 22780 | 1587 | 1144 | 4912 | 4348 | 12191 | 1046 | 48008 | 115939 |
| 2040-41 | 24507 | 1654 | 1184 | 5052 | 4507 | 12712 | 1090 | 50706 | 121326 |
| 2041-42 | 26229 | 1727 | 1223 | 5174 | 4646 | 13166 | 1129 | 53294 | 126276 |
| 2042-43 | 28071 | 1803 | 1263 | 5299 | 4789 | 13637 | 1169 | 56031 | 131456 |

Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage KM 61.02
(Pessimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6428 | 868 | 624 | 2803 | 2188 | 5396 | 463 | 18770 | 50940 |
| 2024-25 | 6992 | 895 | 648 | 2912 | 2296 | 5718 | 491 | 19952 | 53843 |
| 2025-26 | 7566 | 924 | 671 | 3012 | 2396 | 6021 | 517 | 21107 | 56610 |
| 2026-27 | 8187 | 954 | 694 | 3116 | 2500 | 6340 | 545 | 22336 | 59531 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2027-28 | 8858 | 985 | 719 | 3224 | 2609 | 6676 | 574 | 23645 | 62617 |
| 2028-29 | 9584 | 1017 | 744 | 3335 | 2723 | 7030 | 604 | 25037 | 65869 |
| 2029-30 | 10370 | 1049 | 771 | 3450 | 2841 | 7402 | 636 | 26519 | 69301 |
| 2030-31 | 11164 | 1084 | 796 | 3554 | 2950 | 7746 | 666 | 27960 | 72544 |
| 2031-32 | 12019 | 1121 | 823 | 3661 | 3063 | 8106 | 697 | 29490 | 75955 |
| 2032-33 | 12939 | 1159 | 850 | 3771 | 3180 | 8483 | 729 | 31111 | 79535 |
| 2033-34 | 13929 | 1198 | 879 | 3885 | 3301 | 8876 | 763 | 32831 | 83297 |
| 2034-35 | 14994 | 1238 | 908 | 4002 | 3427 | 9288 | 798 | 34655 | 87249 |
| 2035-36 | 16061 | 1283 | 936 | 4106 | 3540 | 9659 | 830 | 36415 | 90932 |
| 2036-37 | 17204 | 1329 | 965 | 4212 | 3656 | 10046 | 863 | 38275 | 94787 |
| 2037-38 | 18429 | 1376 | 995 | 4321 | 3776 | 10448 | 897 | 40242 | 98822 |
| 2038-39 | 19741 | 1425 | 1026 | 4432 | 3900 | 10866 | 933 | 42323 | 103048 |
| 2039-40 | 21147 | 1475 | 1058 | 4547 | 4028 | 11300 | 970 | 44525 | 107474 |
| 2040-41 | 22644 | 1530 | 1090 | 4654 | 4155 | 11725 | 1006 | 46804 | 111926 |
| 2041-42 | 24122 | 1589 | 1121 | 4743 | 4262 | 12085 | 1037 | 48959 | 115933 |
| 2042-43 | 25696 | 1651 | 1152 | 4834 | 4372 | 12456 | 1069 | 51230 | 120109 |

**Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage KM 61.02
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6428 | 868 | 624 | 2803 | 2188 | 5396 | 463 | 18770 | 50940 |
| 2024-25 | 7007 | 896 | 649 | 2919 | 2301 | 5731 | 492 | 19995 | 53962 |
| 2025-26 | 7599 | 927 | 674 | 3027 | 2407 | 6049 | 519 | 21202 | 56870 |
| 2026-27 | 8242 | 959 | 699 | 3140 | 2518 | 6385 | 548 | 22491 | 59950 |
| 2027-28 | 8939 | 992 | 726 | 3256 | 2634 | 6739 | 578 | 23864 | 63202 |
| 2028-29 | 9694 | 1026 | 753 | 3376 | 2755 | 7112 | 610 | 25326 | 66634 |
| 2029-30 | 10513 | 1061 | 782 | 3501 | 2882 | 7506 | 644 | 26889 | 70275 |
| 2030-31 | 11343 | 1100 | 810 | 3616 | 2999 | 7873 | 676 | 28417 | 73739 |
| 2031-32 | 12240 | 1140 | 839 | 3734 | 3121 | 8259 | 709 | 30042 | 77388 |
| 2032-33 | 13208 | 1181 | 869 | 3856 | 3248 | 8663 | 744 | 31769 | 81230 |
| 2033-34 | 14252 | 1224 | 900 | 3982 | 3380 | 9087 | 780 | 33605 | 85276 |
| 2034-35 | 15378 | 1268 | 932 | 4111 | 3517 | 9531 | 818 | 35555 | 89531 |
| 2035-36 | 16512 | 1316 | 963 | 4228 | 3642 | 9936 | 853 | 37450 | 93536 |
| 2036-37 | 17729 | 1366 | 995 | 4348 | 3771 | 10358 | 889 | 39456 | 97732 |
| 2037-38 | 19036 | 1418 | 1028 | 4472 | 3904 | 10798 | 927 | 41583 | 102138 |
| 2038-39 | 20440 | 1472 | 1063 | 4599 | 4042 | 11257 | 966 | 43839 | 106764 |
| 2039-40 | 21948 | 1528 | 1099 | 4729 | 4185 | 11735 | 1007 | 46231 | 111618 |
| 2040-41 | 23557 | 1588 | 1135 | 4853 | 4328 | 12207 | 1047 | 48715 | 116530 |
| 2041-42 | 25154 | 1654 | 1170 | 4958 | 4451 | 12612 | 1082 | 51081 | 120995 |
| 2042-43 | 26859 | 1722 | 1206 | 5065 | 4577 | 13031 | 1118 | 53578 | 125657 |

6.2 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 Gulabpura - Chittorgarh project, the Target Date and Target Traffic are defined as under:

Target Date - 1st May 2026

Target Traffic - 76236 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. The probable extension of the concession period is estimated according to article 29 of the concession agreement which comes to about three years. Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 76236 | 60007 | -21% | 32% | 20% | 20 | 4.0 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 76236 | 60441 | -21% | 31% | 20% | 20 | 4.0 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 76236 | 59586 | -22% | 33% | 20% | 20 | 4.0 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Kishangarh- Gulabpura section of NH-79 is based on the old toll policy. As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips in month at 2/3d rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van I - Rs. 275 per
 - b) Local Commercial Vehicles at 50% rate for single journey

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

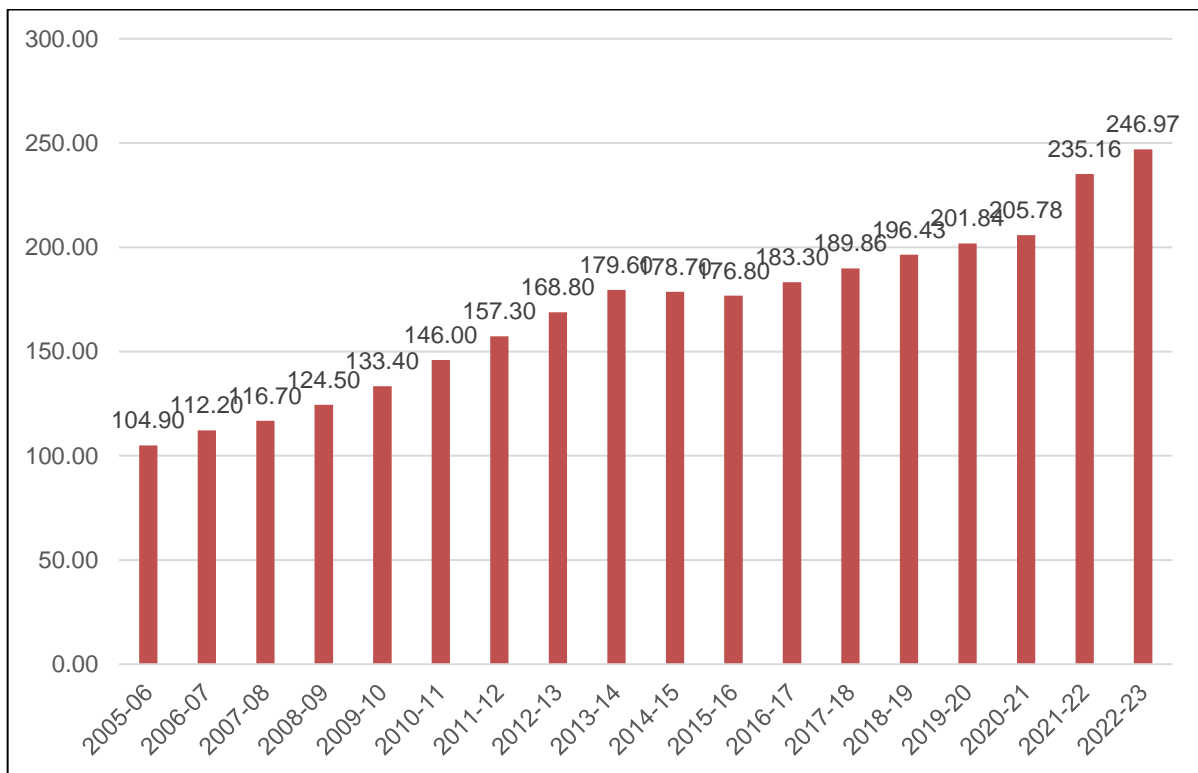


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

There is no bypass or structure to be factored in for rates calculations.

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

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

Table 7-2 : Toll Rates for Single Journey @ Chainage KM 61.02

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------------------------|------------|--------------------|
| 2023-24 | 140 | 225 | 475 | 475 | 515 | 745 | 905 |
| 2024-25 | 145 | 230 | 485 | 485 | 530 | 760 | 925 |
| 2025-26 | 150 | 245 | 510 | 510 | 555 | 800 | 975 |
| 2026-27 | 160 | 255 | 535 | 535 | 585 | 840 | 1025 |
| 2027-28 | 165 | 270 | 565 | 565 | 615 | 885 | 1075 |
| 2028-29 | 175 | 285 | 590 | 590 | 645 | 930 | 1130 |
| 2029-30 | 185 | 295 | 620 | 620 | 680 | 975 | 1190 |
| 2030-31 | 195 | 310 | 655 | 655 | 715 | 1025 | 1250 |
| 2031-32 | 205 | 330 | 690 | 690 | 750 | 1080 | 1315 |
| 2032-33 | 215 | 345 | 725 | 725 | 790 | 1135 | 1380 |
| 2033-34 | 225 | 365 | 760 | 760 | 830 | 1195 | 1455 |
| 2034-35 | 235 | 380 | 800 | 800 | 875 | 1255 | 1530 |
| 2035-36 | 250 | 405 | 845 | 845 | 920 | 1325 | 1610 |
| 2036-37 | 260 | 425 | 890 | 890 | 970 | 1395 | 1695 |
| 2037-38 | 275 | 445 | 935 | 935 | 1020 | 1465 | 1785 |
| 2038-39 | 290 | 470 | 985 | 985 | 1075 | 1545 | 1880 |
| 2039-40 | 305 | 495 | 1040 | 1040 | 1130 | 1625 | 1980 |
| 2040-41 | 325 | 520 | 1095 | 1095 | 1195 | 1715 | 2085 |
| 2041-42 | 340 | 550 | 1150 | 1150 | 1255 | 1805 | 2200 |
| 2042-43 | 360 | 580 | 1215 | 1215 | 1325 | 1905 | 2320 |

Table 7-3 : Toll Rates for Return Journey @ Chainage KM 61.02

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------------------------|------------|--------------------|
| 2023-24 | 210 | 340 | 710 | 710 | 775 | 1115 | 1360 |
| 2024-25 | 215 | 350 | 730 | 730 | 795 | 1145 | 1390 |
| 2025-26 | 225 | 365 | 765 | 765 | 835 | 1200 | 1460 |
| 2026-27 | 240 | 385 | 805 | 805 | 875 | 1260 | 1535 |
| 2027-28 | 250 | 405 | 845 | 845 | 920 | 1325 | 1615 |
| 2028-29 | 260 | 425 | 890 | 890 | 970 | 1395 | 1695 |
| 2029-30 | 275 | 445 | 935 | 935 | 1020 | 1465 | 1780 |
| 2030-31 | 290 | 470 | 980 | 980 | 1070 | 1540 | 1875 |
| 2031-32 | 305 | 495 | 1030 | 1030 | 1125 | 1620 | 1970 |
| 2032-33 | 320 | 520 | 1085 | 1085 | 1185 | 1705 | 2075 |
| 2033-34 | 340 | 545 | 1140 | 1140 | 1245 | 1790 | 2180 |
| 2034-35 | 355 | 575 | 1200 | 1200 | 1310 | 1885 | 2295 |
| 2035-36 | 375 | 605 | 1265 | 1265 | 1380 | 1985 | 2415 |
| 2036-37 | 395 | 635 | 1330 | 1330 | 1455 | 2090 | 2545 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------------------------|------------|--------------------|
| 2037-38 | 415 | 670 | 1405 | 1405 | 1530 | 2200 | 2680 |
| 2038-39 | 435 | 705 | 1475 | 1475 | 1610 | 2315 | 2820 |
| 2039-40 | 460 | 745 | 1555 | 1555 | 1700 | 2440 | 2970 |
| 2040-41 | 485 | 785 | 1640 | 1640 | 1790 | 2570 | 3130 |
| 2041-42 | 510 | 825 | 1730 | 1730 | 1885 | 2710 | 3300 |
| 2042-43 | 540 | 870 | 1820 | 1820 | 1985 | 2855 | 3480 |

Table 7-4 : Toll Rates for Monthly Pass Local@ Chainage KM 61.02

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |

Table 7-5 : Toll Rates for Monthly Pass @ Chainage KM 61.02

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|------|--------------|-------|-------|---------------------------|------------|-------------------|
| 2023-24 | 4670 | 7545 | 15805 | 15805 | 17240 | 24785 | 30170 |
| 2024-25 | 4785 | 7730 | 16195 | 16195 | 17665 | 25395 | 30915 |
| 2025-26 | 5025 | 8120 | 17010 | 17010 | 18555 | 26675 | 32475 |
| 2026-27 | 5280 | 8530 | 17870 | 17870 | 19495 | 28025 | 34115 |
| 2027-28 | 5550 | 8960 | 18780 | 18780 | 20485 | 29445 | 35850 |
| 2028-29 | 5830 | 9420 | 19735 | 19735 | 21530 | 30950 | 37675 |
| 2029-30 | 6130 | 9900 | 20745 | 20745 | 22630 | 32530 | 39605 |
| 2030-31 | 6445 | 10410 | 21810 | 21810 | 23795 | 34205 | 41640 |
| 2031-32 | 6775 | 10950 | 22940 | 22940 | 25025 | 35970 | 43790 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-------|--------------|-------|-------|---------------------------|------------|-------------------|
| 2032-33 | 7130 | 11515 | 24130 | 24130 | 26320 | 37840 | 46065 |
| 2033-34 | 7500 | 12115 | 25385 | 25385 | 27695 | 39810 | 48465 |
| 2034-35 | 7895 | 12750 | 26715 | 26715 | 29145 | 41890 | 51000 |
| 2035-36 | 8310 | 13420 | 28120 | 28120 | 30675 | 44095 | 53680 |
| 2036-37 | 8745 | 14130 | 29600 | 29600 | 32295 | 46420 | 56515 |
| 2037-38 | 9210 | 14875 | 31170 | 31170 | 34005 | 48885 | 59510 |
| 2038-39 | 9700 | 15670 | 32830 | 32830 | 35815 | 51485 | 62680 |
| 2039-40 | 10220 | 16505 | 34585 | 34585 | 37730 | 54240 | 66030 |
| 2040-41 | 10765 | 17395 | 36445 | 36445 | 39755 | 57150 | 69570 |
| 2041-42 | 11345 | 18330 | 38405 | 38405 | 41900 | 60230 | 73320 |
| 2042-43 | 11960 | 19320 | 40485 | 40485 | 44165 | 63485 | 77285 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2042-43 starting from the year 2023-24 are shown in tables below.

Table 7-6 : Toll Revenue Optimistic Scenario

(Rs. Crores)

| Year | TP-1 |
|---------|---------|
| 2023-24 | 284.86 |
| 2024-25 | 308.48 |
| 2025-26 | 341.91 |
| 2026-27 | 379.86 |
| 2027-28 | 422.96 |
| 2028-29 | 467.81 |
| 2029-30 | 519.21 |
| 2030-31 | 574.24 |
| 2031-32 | 637.17 |
| 2032-33 | 702.15 |
| 2033-34 | 776.35 |
| 2034-35 | 857.54 |
| 2035-36 | 950.02 |
| 2036-37 | 1042.60 |
| 2037-38 | 1147.37 |
| 2038-39 | 1265.47 |
| 2039-40 | 1398.62 |
| 2040-41 | 1539.95 |
| 2041-42 | 1683.12 |

| Year | TP-1 |
|---------|---------|
| 2042-43 | 1847.98 |

Table 7-7 : Toll Revenue Pessimistic Scenario

(Rs. Crores)

| Year | TP-1 |
|---------|---------|
| 2023-24 | 284.86 |
| 2024-25 | 307.07 |
| 2025-26 | 338.70 |
| 2026-27 | 374.49 |
| 2027-28 | 415.03 |
| 2028-29 | 456.90 |
| 2029-30 | 504.74 |
| 2030-31 | 555.54 |
| 2031-32 | 613.47 |
| 2032-33 | 672.80 |
| 2033-34 | 740.39 |
| 2034-35 | 813.96 |
| 2035-36 | 897.41 |
| 2036-37 | 980.25 |
| 2037-38 | 1073.61 |
| 2038-39 | 1178.48 |
| 2039-40 | 1296.18 |
| 2040-41 | 1420.21 |
| 2041-42 | 1544.82 |
| 2042-43 | 1688.10 |

Table 7-8 : Toll Revenue Most Likely Scenario

(Rs. Crores)

| Year | TP-1 |
|---------|---------|
| 2023-24 | 284.86 |
| 2024-25 | 307.73 |
| 2025-26 | 340.25 |
| 2026-27 | 377.14 |
| 2027-28 | 418.95 |
| 2028-29 | 462.25 |
| 2029-30 | 511.82 |
| 2030-31 | 564.70 |
| 2031-32 | 625.04 |
| 2032-33 | 687.09 |
| 2033-34 | 757.91 |
| 2034-35 | 835.13 |
| 2035-36 | 923.02 |
| 2036-37 | 1010.61 |
| 2037-38 | 1109.48 |
| 2038-39 | 1220.72 |
| 2039-40 | 1345.89 |

| Year | TP-1 |
|----------------|-------------|
| 2040-41 | 1478.25 |
| 2041-42 | 1611.83 |
| 2042-43 | 1765.48 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Kishangarh to Gulabpura section of NH-79 in state of Rajasthan is nearing completion of six laning. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the busy and prominent national highway NH-79 which connects Kishangarh to Udaipur via Bhiwala and Chittorgarh. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As discussed, the dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

- a) There is a good amount of tollable traffic running on the project.
- b) Project corridor has potential to witness traffic growth @ 7-8% annually in near future due to various development in area and overall development of economy.
- c) The Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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KAITHAL TO RAJASTHAN SECTION OF NH 152/65
(KM 33.250 TO KM 241.580) IN THE STATE OF
HARYANA



MARCH 2024

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**



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(KM 33.250 TO 241.580)
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MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 various NHDP Phases.

The project under consideration, Four Laning of **Kaithal to Rajasthan** section of NH-152/65 from km 33.250 to km 241.580 in the state of Haryana is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s Kaithal Tollway Ltd.* (Concessionaire) has been awarded the Project for a concession period of 27 years starting from appointed date of 15th July 2015. COD was achieved for part length of project in September 2017 and Tolling Operation on Project started. Final COD for full length was achieved on 29th March-2019

Project road section from Kaithal to Rajasthan border is part of important corridor which connects part of Haryana, Punjab, Himachal Pradesh, J&K and certain part of Uttarakhand to Rajasthan, Gujarat and Costal parts of Maharashtra and then to down to south.

Project road section form Kaithal to Rajasthan border passes through three districts of Haryana namely Kaithal, Hisar and Bhiwani. Project road also passes through important towns and development areas of Narwana, Hisar and Siwani in addition to Kaithal.

Following figure shows the project road alignment.

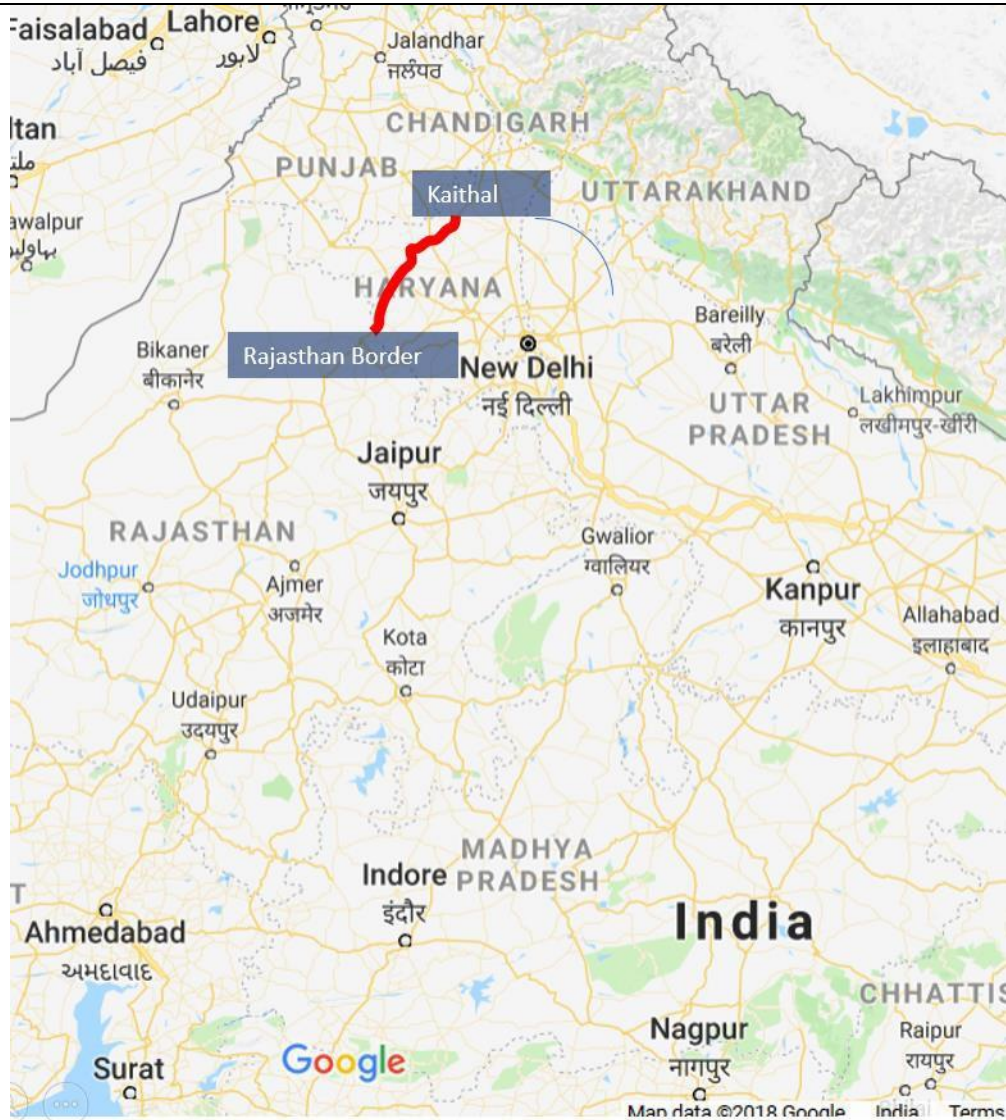


Figure 1-1 : Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

The project road forms part of important connectivity between Northern states like Haryana, Punjab, Himachal Pradesh, J&K and states like Maharashtra, Gujarat (Kandla and Mundra), and parts of Rajasthan. It is the shortest route between Punjab / J&K, Gujarat, Rajasthan, Maharashtra, Goa, Kerala and becomes good alternate route to NH-1 and NH-8 for Gujarat, Rajasthan, Maharashtra Goa and Kerala bound traffic from Haryana, Punjab, J&K Himachal Pradesh.

Project road also caters to local intrastate traffic between districts of Ambala, Chandigarh, Kaithal, Jind, Hisar, Bhiwani in Haryana and Churu, Sikar, Nagaur and Jodhpur in Rajasthan.

2.2 Project Stretch Description

The Project highway from Kaithal to Rajasthan border from Km 33.250 to km 241.580 has been widened to four lanes as per schedules. The project has following bypasses which are part of project road.

Table 2-1 : Bypass Details

| Sr. No | Bypass Name | Length | Toll Plaza |
|--------|---------------------|--------|------------|
| 1 | Kalyat | 3.450 | 125.790 |
| 2 | Dhanaudha | 3.800 | |
| 3 | Narwana | 1.900 | |
| 4 | Barwala | 7.850 | 171.580 |
| 5 | Hisar+Talwandi Rana | | |
| 6 | Barwa | 3.300 | 212.400 |
| 7 | Siwani | 6.150 | |

Full COD for project is achieved on 29th March 2019.

Project road forms part of very important transportation corridor which connects Northern states like Haryana, Punjab, J&K, Himachal etc to Southern states and development centres especially on west coastline of India. In previous years project road from Ambala to onwards was in bad shape. There were large number of congestion points along the route in form of narrow roads inside towns, level crossings and bad riding quality. Project road from Kaithal to Rajasthan Border is almost complete which has taken up bypasses and ROBs. Also, the road from Ambala to Kaithal is under four laning construction as of now. The project is awarded to M/s Sadbhav Engineering Limited and is expected to complete in current year. This would improve the flow of traffic on project corridor to great extent.

Following figure show project alignment and toll plaza locations.

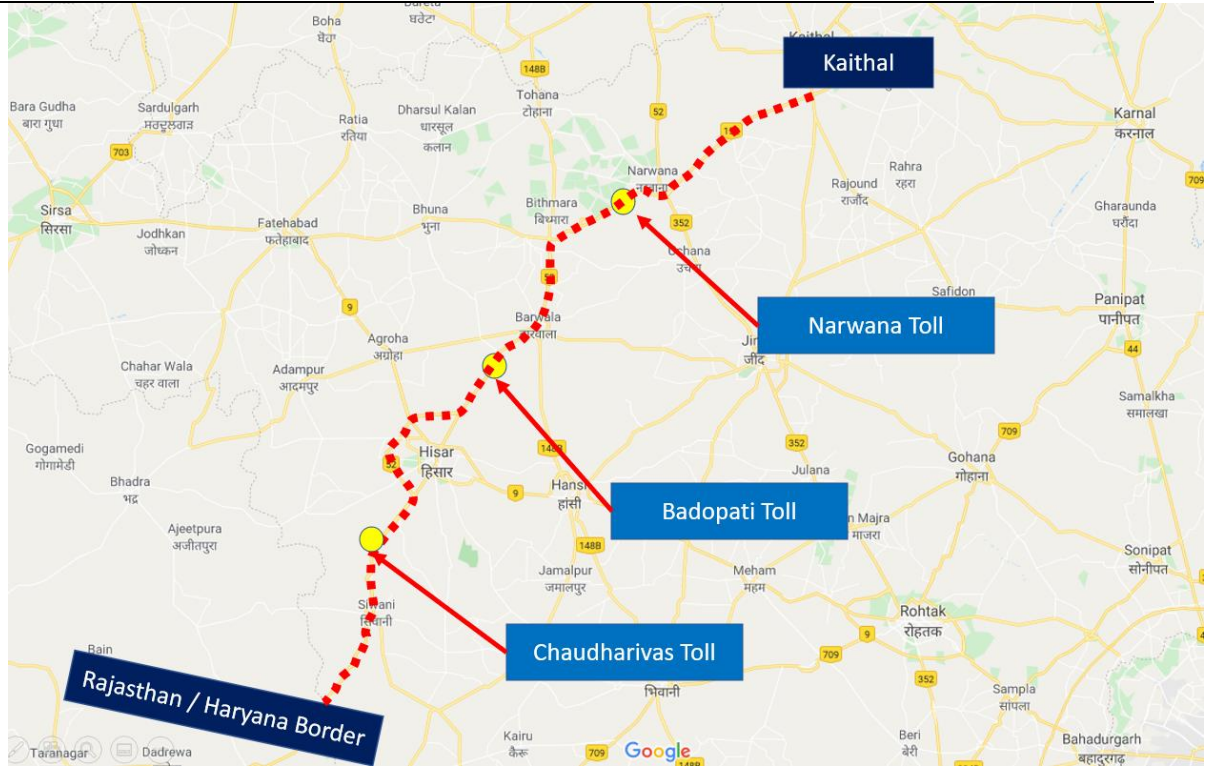


Figure 2-1 : Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Six laning of project stretch is complete. Following photographs illustrate project section along the corridor.





Figure 2-2 : Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from client for project.

- Classified traffic volume counts at three toll plaza locations on Kaithal- Rajasthan Border section of NH-152/65 for year 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|------------------------------|---|---|--|---|--|
| 1 | Km 125 Toll Plaza at Narwana | AADT for Year 2018-19, 2019-20, 2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November |

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|-----------------------------------|--|---|---|---|---|
| | | 2023 | November 2023 | from April 2023 to November 2023 | November 2023 | 2023 |
| 2 | Km 171 Toll Plaza at Badopatti | AADT for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |
| 3 | Km 212 Toll Plaza at Chaudhariwas | AADT for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |

3.2 Classified traffic volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 3-2 : 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 is the type of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Truck / Bus
- Multi Axle

3.3 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.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for year 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. Following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Narwana Toll Plaza at Km 125

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|--------------------|--|--|--|--|--|
| 1 | Car | 2952 | 2657 | 4351 | 4094 | 4282 |
| 2 | Minibus/LCV | 633 | 569 | 381 | 325 | 367 |
| 3 | Bus | 310 | 279 | 315 | 289 | 338 |
| 4 | Truck | 320 | 287 | 529 | 462 | 477 |
| 5 | 3-Axle | 314 | 283 | 416 | 345 | 321 |
| 6 | Multi Axle | 771 | 694 | 1347 | 1343 | 1382 |
| 7 | Oversized Vehicles | 5 | 5 | 20 | 47 | 48 |
| | Total | 5305 | 4774 | 7357 | 6905 | 7215 |

Table 3-4 : Traffic Data at Badopatti Toll Plaza at Km 171

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-----------------|--|--|--|--|--|
| 1 | Car | 5387 | 4850 | 4915 | 4591 | 4132 |
| 2 | Minibus/LCV | 630 | 567 | 374 | 331 | 306 |
| 3 | Bus | 431 | 387 | 395 | 384 | 405 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|--------------------|--|--|--|--|--|
| 4 | Truck | 327 | 295 | 577 | 503 | 437 |
| 5 | 3-Axle | 376 | 339 | 505 | 400 | 336 |
| 6 | Multi Axle | 923 | 831 | 1522 | 1326 | 1130 |
| 7 | Oversized Vehicles | 3 | 3 | 16 | 46 | 55 |
| | Total | 8077 | 7272 | 8303 | 7581 | 6800 |

Table 3-5 : Traffic Data at Chaudhariwas Toll Plaza at Km 212

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|--------------------|--|--|--|--|--|
| 1 | Car | 2947 | 2652 | 4371 | 4076 | 4167 |
| 2 | Minibus/LCV | 592 | 532 | 335 | 335 | 356 |
| 3 | Bus | 162 | 147 | 181 | 159 | 164 |
| 4 | Truck | 367 | 331 | 629 | 522 | 497 |
| 5 | 3-Axle | 470 | 423 | 630 | 537 | 452 |
| 6 | Multi Axle | 1395 | 1257 | 2121 | 1812 | 1656 |
| 7 | Oversized Vehicles | 6 | 5 | 29 | 65 | 65 |
| | Total | 5939 | 5347 | 8295 | 7506 | 7356 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-6**.

Table 3-6 : 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 3-7 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|---------|----------------------------|------------|-------|-----------|
| 2019-20 | Narwana Km 125.79 | 5305 | 10226 | 1.93 |
| | Badopatti Km 171.58 | 8077 | 13901 | 1.72 |
| | Chaudhariwas Km 212.400 | 5939 | 13136 | 2.21 |
| 2020-21 | Narwana Km 125.79 | 4774 | 9203 | 1.93 |
| | Badopatti Km 171.58 | 7272 | 12516 | 1.72 |
| | Chaudhariwas Km 212.400 | 5347 | 11832 | 2.21 |
| 2021-22 | Narwana Km 125.79 | 7357 | 14849 | 2.02 |

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|---------|--------------------------|------------|-------|-----------|
| | Badopatti Km 171.58 | 8303 | 16824 | 2.03 |
| | Chaudhariwas Km 212.400 | 8295 | 18866 | 2.27 |
| 2022-23 | Narwana Km 125.79 | 6905 | 14124 | 2.05 |
| | Badopatti Km 171.58 | 7581 | 15122 | 1.99 |
| | Chaudhariwas Km 212.400 | 7506 | 16679 | 2.22 |
| 2023-24 | Narwana Km 125.79 | 7215 | 14676 | 2.03 |
| | Badopatti Km 171.58 | 6800 | 13455 | 1.98 |
| | Chaudhariwas Km 212.400 | 7356 | 15782 | 2.15 |

It can be observed from above that project traffic has PCU index ranging from 2.0 to 2.3 which is an indicator of good proportion of commercial traffic in traffic mix in project corridor. Following figure illustrates variation of PCU index at three toll plaza locations.

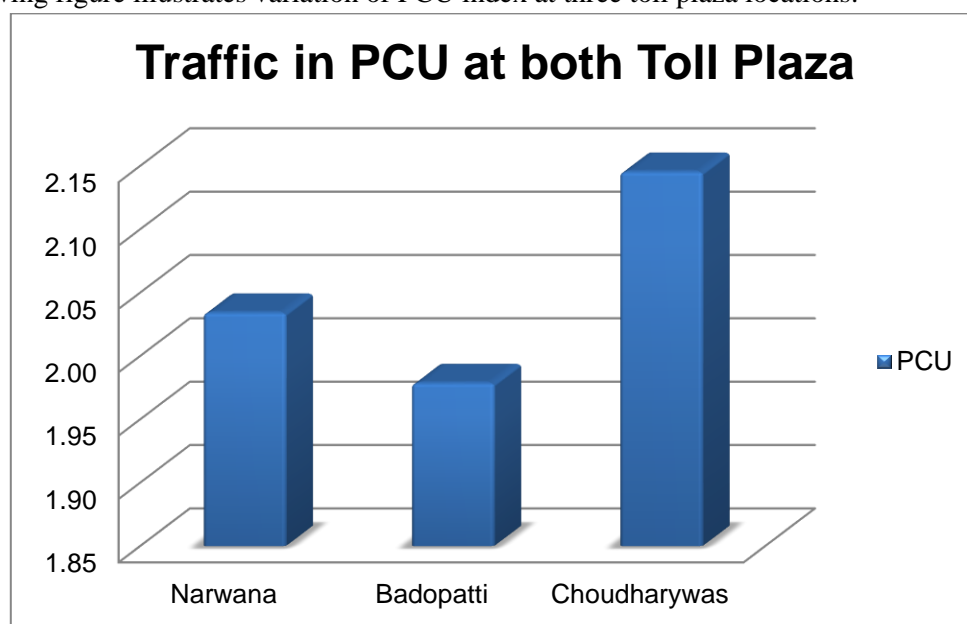


Figure 3-1 : Comparison of PCU Index

3.4.2 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 about 50%- 60% of total traffic at toll plaza locations while multi axle commercial vehicles are about 20% -35% of total traffic. Truck / Bus and LCV share about 12% and 5 % of traffic volume respectively.

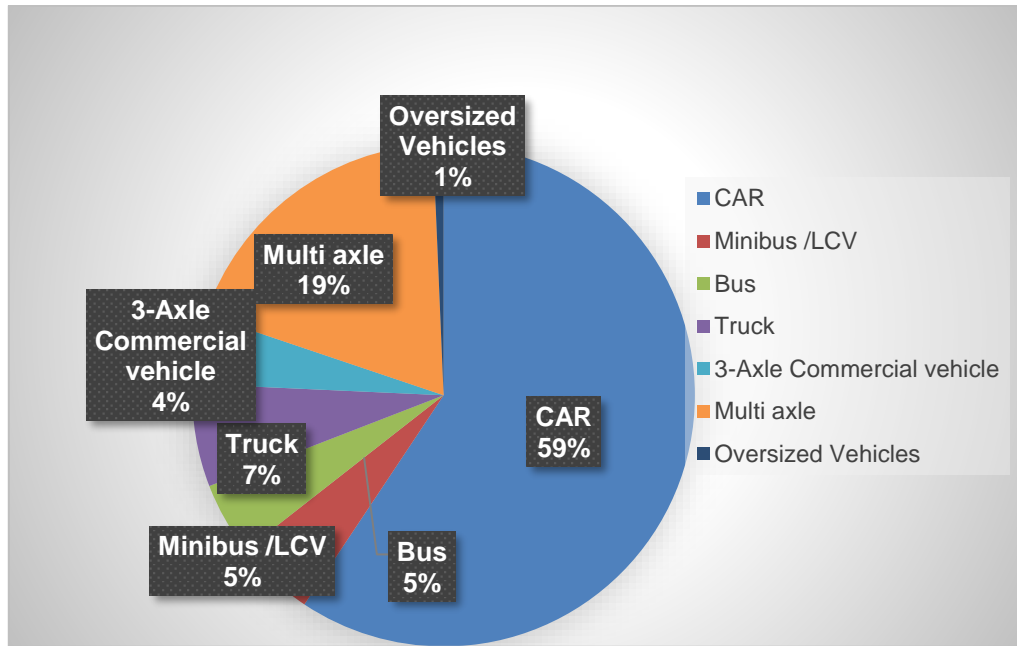


Figure 3-2 :Model Split of Tollable Vehicle-Km 125.790

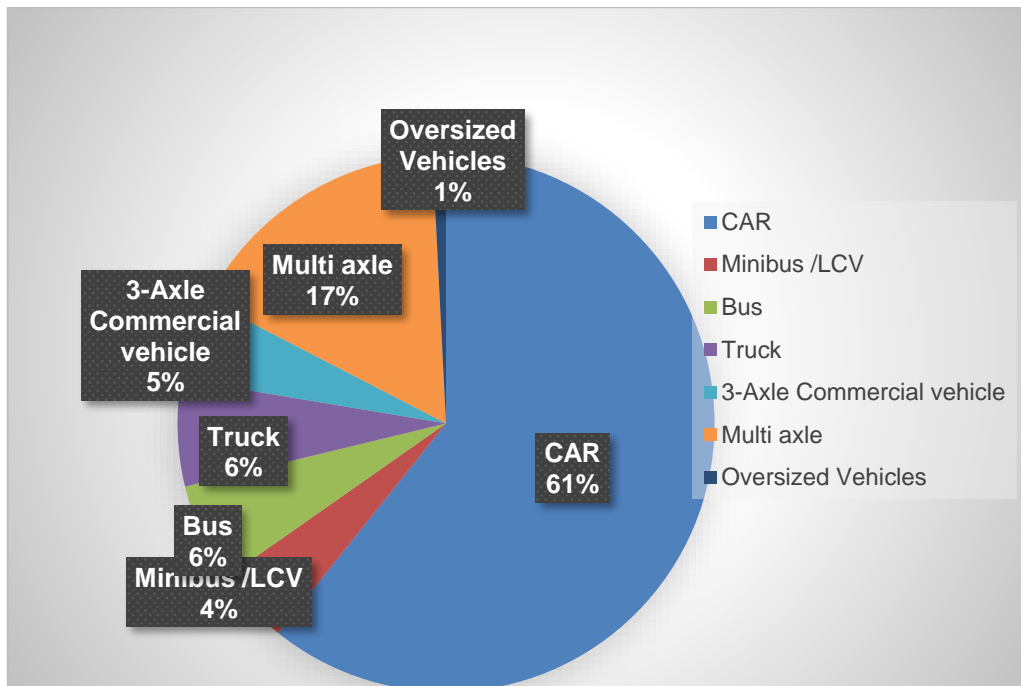


Figure 3-3 :Model Split of Tollable Vehicle-Km 171.58

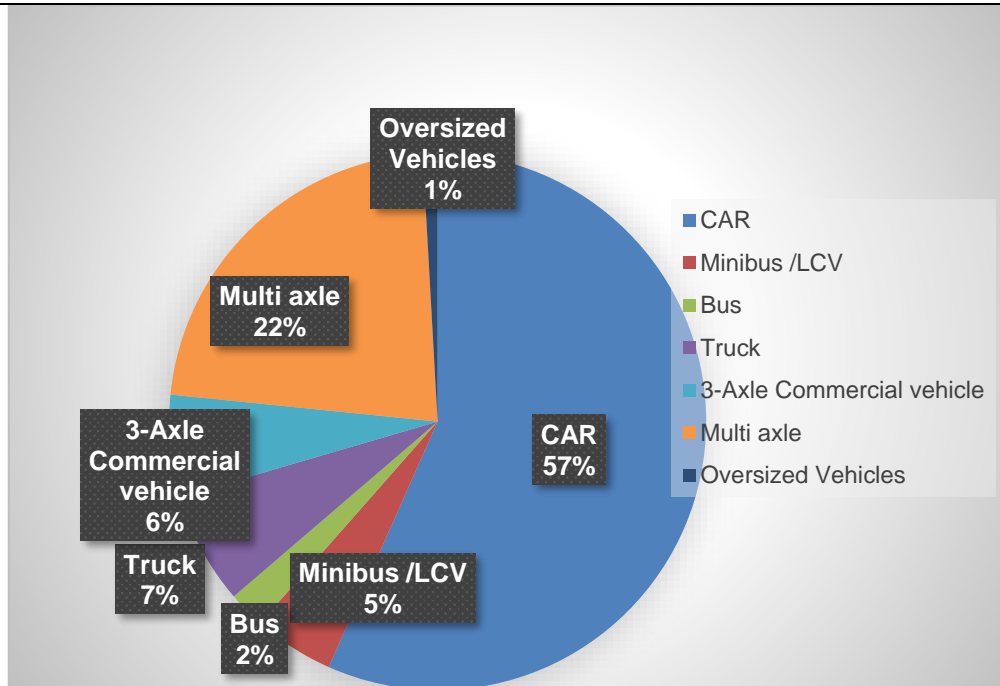


Figure 3-4 :Model Split of Tollable Vehicle-Km 212.400

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-8 : Journey Type Bifurcation of Traffic at Narwana TP-1 KM 125

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 4076 |
| 2 | Return Journey | 3047 |
| 3 | Local Commercial Single Journey | 65 |
| 4 | Monthly Pass Local | 26 |
| 5 | Monthly Pass | 0 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 57%. Return journey component is 42%. The number of monthly pass local is 0% and local commercial single Journey also 1% at Narwana toll plaza.

Following tables give the detail of journey distribution at Badopatti and Chaudhariwas toll plaza.

Table 3-9 : Journey Type Bifurcation of Traffic at Badopatti TP KM 171

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 3696 |
| 2 | Return Journey | 2812 |
| 3 | Local Commercial Single Journey | 184 |
| 4 | Monthly Pass Local | 109 |
| 5 | Monthly Pass | 0 |

Table 3-10 : Journey Type Bifurcation of Traffic at Chaudhariwas TP KM 212

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 4392 |
| 2 | Return Journey | 2825 |
| 3 | Local Commercial Single Journey | 103 |
| 4 | Monthly Pass Local | 37 |
| 5 | Monthly Pass | 0 |

Monthly local pass is very high in proportion at Badopatti toll plaza. At Other toll plazas single journey is dominating pattern of trip.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic pattern and growth on any project corridor. Following is 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 various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit network and more often than not every road is connected to various networks having different origin and destinations. Traffic running on these networks behave like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Though project road has started collecting toll form mid of year 2017-18 but it was for partial completion of project stretch. Some critical location bypasses and ROBs were pending at beginning of toll. Also stretch from Ambala to Kaithal which is just before project stretch is under four laning. In this case project traffic can be considered as under settlement. Shifting of traffic depends on factors such as road length, type, geometry, riding quality and capacity. Competing road analysis was done at two levels. First at regional level and second at local level. Project road forms an optimal route for the traffic between following zones.

Zone-1- J & K, Punjab (Ludhiana, Amritsar parts), Haryana, Himachal, Part of Uttarakhand
Zone-2 – Rajasthan, Gujarat (Kandla, Mundra), Maharashtra (Coastal), Southern States (Coastal).

As alternate routes converge at Ajmer, the Project Influence Area (PIA) is considered between Ambala and Ajmer only.

Following figures show the layout of competing routes between both these Zones.

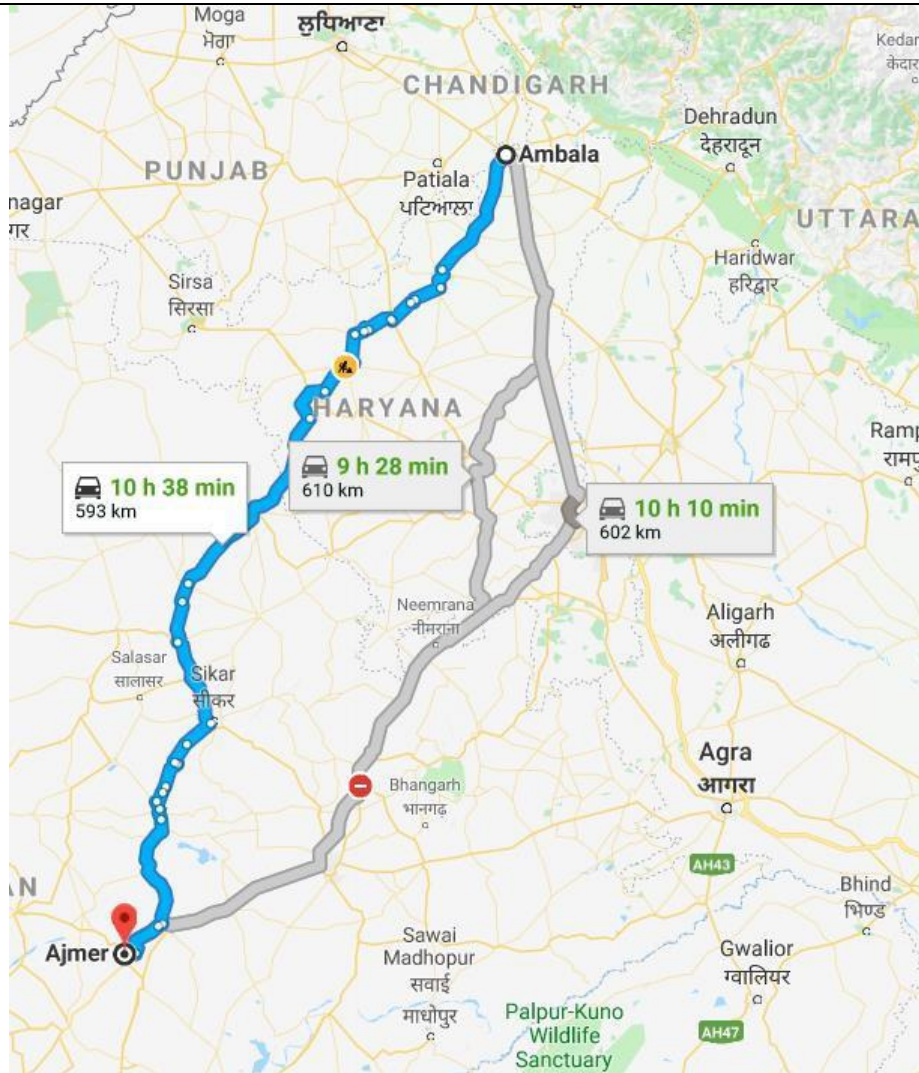


Figure 4-1 : Alternate route at regional level between Zones.

Above figure depicts alternate route between Ambala and Ajmer. Following figure shows alternate routes between Ludhiana and Ajmer

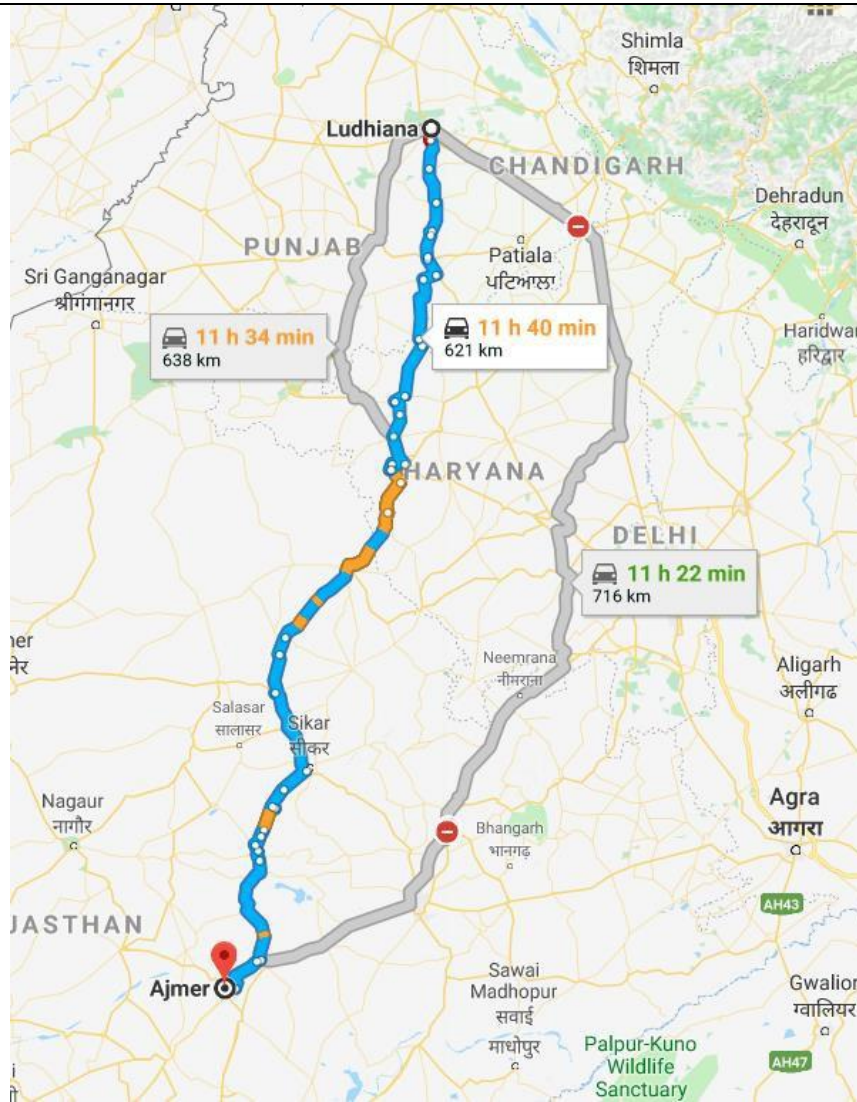


Figure 4-2 : Alternate route at regional level between Ludhiana & Ajmer

From above figures it can be seen that the route containing project alignment has least distance between these origin and destination zones.

Following facts improve probability of target traffic getting attracted to project road.

- Project corridor between Ambala to Rajasthan Border is expected to complete four laning with all bypasses and ROBs.
- Road from Ludhiana to Hisar is part of Bharatmala project and will be converted to four lanes. Currently road from Hisar to Fatehabad only in four lanes.

- Project Corridor is part of ambitious project of Bharatmala which will improve entire length of corridor in terms of capacity and traffic flow. The Government of India has identified the Ludhiana – Ajmer corridor as an optimal route which shall provide time and cost savings to traffic moving from western India to northern India. This will also allow traffic to avoid heavy traffic jams around New Delhi which it is facing on the present route.
- NH-1 and NH-8 which are currently major corridor for traffic between Zone1 and Zone2 will face capacity constraints in coming years. NH-1 for example is four lane road between Ambala and Panipat and runs about 80,000 PCU which is already above its capacity.

At local level it was observed that there is no formidable local alternate route to bypass toll plaza. There can a combination of village roads to form alternate loop around toll plazas, but these are too long as compared to project road between said nodes. Thus, no local diversion of traffic from project road is anticipated.

Following table provide summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Summary Network analysis

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|--|-----------------|-------------|-------------------|------------------|---|
| Regional Level | | | | | | |
| 1 | Ambala-Panipat-Karnal-Rohtak-Ajmer | Alternate Route | 610 | 64 | 9 Hr 28 Min | Alternate route is longer but has shorter travel time. With completion of Ambala - Kaithal four laning of Road induced traffic is expected onto project stretch |
| | Ambala-Kaithal-Hisar-Ajmer | Project Road | 593 | 55 | 10 Hr 38 Min | |
| 2 | Ludhiana-Chandigarh Panipat-Karnal-Ajmer | Alternate Route | 716 | 63 | 11 Hr 22 Min | Alternate route is longer but has shorter travel time. With completion of Ambala - Kaithal four laning of Road induced traffic is expected onto project stretch |
| | Ludhiana - Ambala-Kaithal-Hisar-Ajmer | Project Road | 621 | 53 | 11 Hr 40 Min | |

Table 4-2 : Competing Roads Details

Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 Kaithal – Rajasthan Border section of NH-152/65 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable to projects of short durations say 5-10 years, however for long term projections it would-be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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).

The project corridor spreads across state of Haryana. Toll plazas at Narwana, Badopatti and Choudhariwas are in the state of Haryana, but project stretch is under impact of Rajasthan state as well. In such circumstances for elasticity calculations, working data from above two states has been analysed.

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Haryana State.

Table 5-1 : Per Capita Income Vs Car Haryana

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 106085 | 989519 | 5.03 | 6.00 | | |
| 2013 | 111780 | 1134616 | 5.05 | 6.05 | 5% | |
| 2014 | 119791 | 1278272 | 5.08 | 6.11 | 7% | |
| 2015 | 125032 | 1420621 | 5.10 | 6.15 | 4% | |
| 2016 | 137818 | 1711692 | 5.14 | 6.23 | 10% | |
| 2017 | 150241 | 1851788 | 5.18 | 6.27 | 9% | 7.23% |

Regression analysis of same is given in figure below.

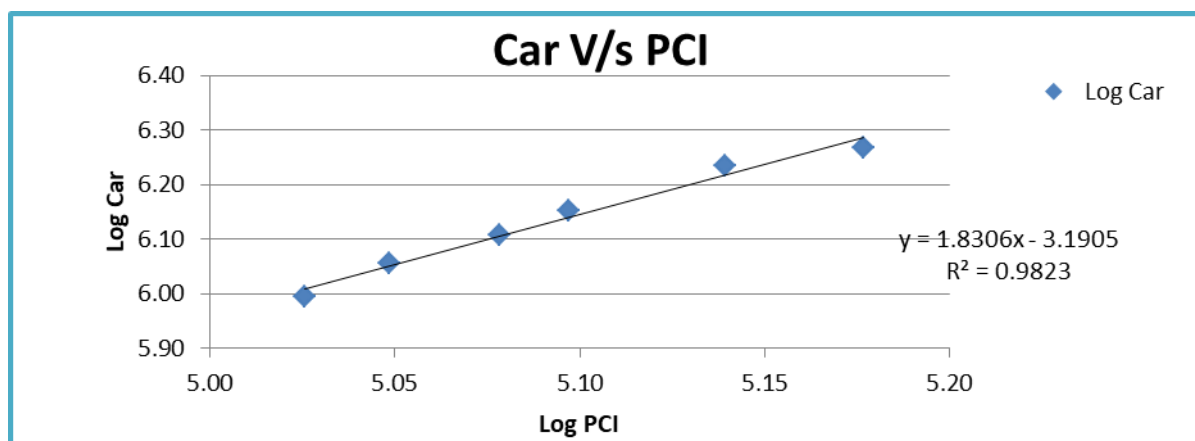
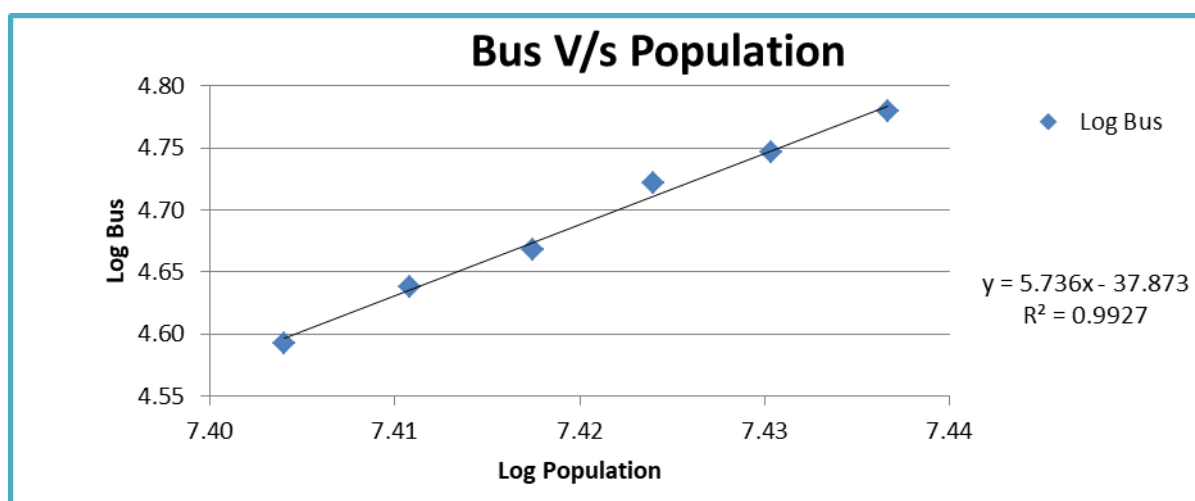


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana**Table 5-2 : Population Vs Bus Haryana**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 25351462 | 39153 | 7.40 | 4.59 | | |
| 2013 | 25751257 | 43456 | 7.41 | 4.64 | 2% | |
| 2014 | 26149236 | 46558 | 7.42 | 4.67 | 2% | |
| 2015 | 26545282 | 52640 | 7.42 | 4.72 | 2% | |
| 2016 | 26939286 | 55781 | 7.43 | 4.75 | 1% | |
| 2017 | 27331141 | 60129 | 7.44 | 4.78 | 1% | 1.52% |

Regression analysis of same is given in figure below.

**Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana**

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

Table 5-3 : LCV Traffic Vs NSDP Haryana

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 271152 | 124897 | 5.43 | 5.10 | | |
| 2013 | 289756 | 137511 | 5.46 | 5.14 | 7% | |
| 2014 | 314931 | 152069 | 5.50 | 5.18 | 9% | |
| 2015 | 333359 | 167901 | 5.52 | 5.23 | 6% | |
| 2016 | 372659 | 182776 | 5.57 | 5.26 | 12% | 8.30% |

Following figure depict regression analysis and extrapolation.

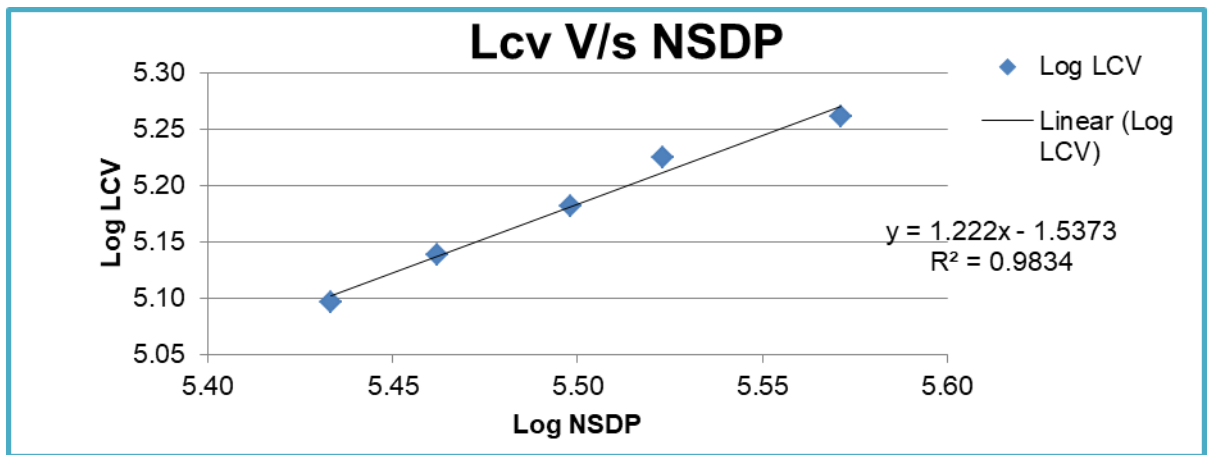


Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Haryana.

Table 5-4 : Goods Traffic Vs NSDP Haryana

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 271152 | 292735 | 5.43 | 5.47 | | |
| 2013 | 289756 | 307509 | 5.46 | 5.49 | 7% | |
| 2014 | 314931 | 327882 | 5.50 | 5.52 | 9% | |
| 2015 | 333359 | 348732 | 5.52 | 5.54 | 6% | |
| 2016 | 372659 | 367730 | 5.57 | 5.57 | 12% | |
| 2017 | 412006 | 390321 | 5.61 | 5.59 | 11% | 8.75% |

Following figure depict regression analysis and extrapolation.

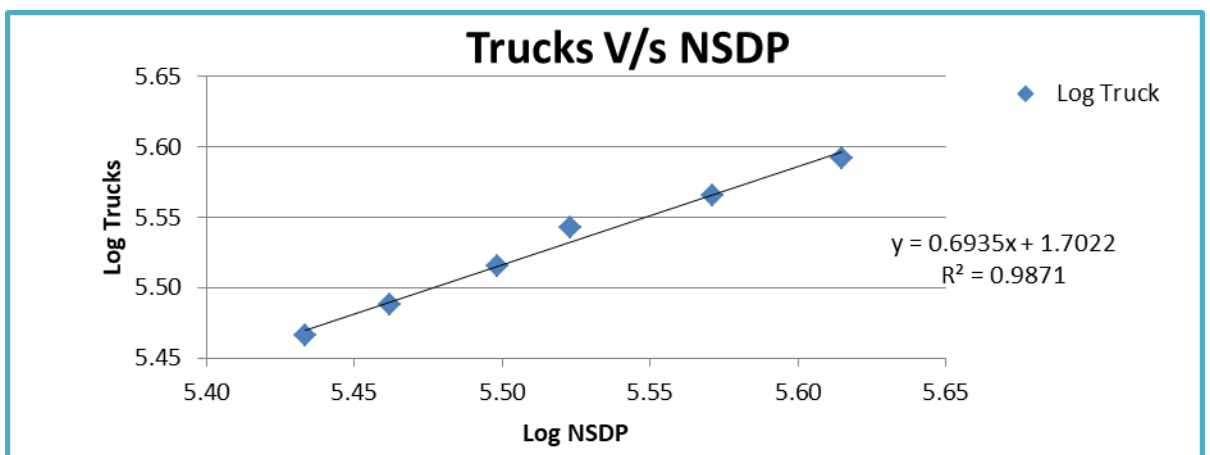


Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Haryana.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for the good fit regression as reflected by R² values are presented in the Table below.

Table 5-5 : Summary Regression Analysis Haryana

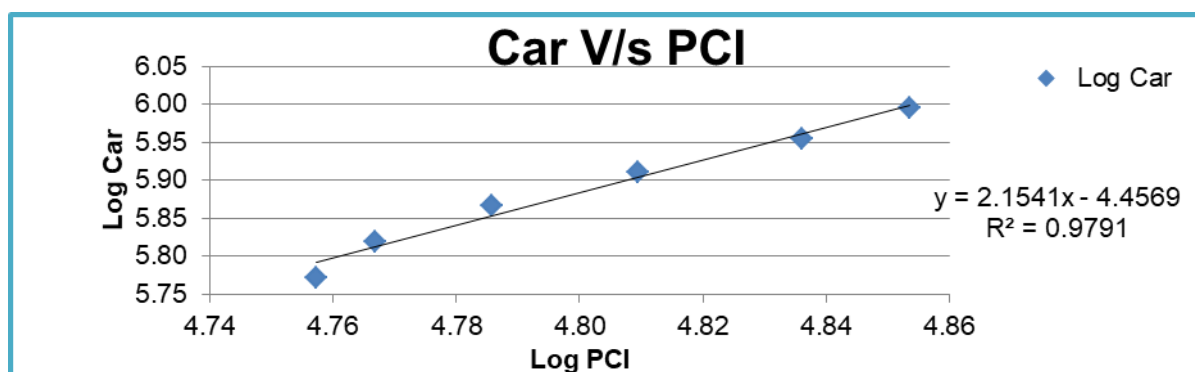
| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------|------------------|----------------------|------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Haryana | Car/Jeep | PCI | $y = 1.8306x - 3.1905$ | $R^2 = 0.9823$ | 1.8306 | 7.23% | 13.24% | Good Regression |
| | Bus | Population | $y = 5.736x - 37.8732$ | $R^2 = 0.9927$ | 5.7360 | 1.52% | 8.69% | Good Regression |
| | LCV | NSDP | $y = 1.222x - 1.5373$ | $R^2 = 0.9834$ | 1.2220 | 8.30% | 10.14% | Good Regression |
| | Truck | NSDP | $y = 0.6935x - 1.7022$ | $R^2 = 0.9871$ | 0.6935 | 8.75% | 6.07% | Good Regression |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-6 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2012 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2013 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2014 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2015 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2016 | 68565 | 899307 | 4.84 | 5.95 | 6% | |
| 2017 | 71394 | 988391 | 4.85 | 5.99 | 4% | 4.55% |

Regression analysis of same is given in figure below.

**Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan****Table 5-7 : Population Vs Bus Rajasthan**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 68548437 | 83345 | 7.84 | 4.92 | | |
| 2013 | 69783885 | 88616 | 7.84 | 4.95 | 2% | |
| 2014 | 71016445 | 93892 | 7.85 | 4.97 | 2% | |
| 2015 | 72245688 | 97650 | 7.86 | 4.99 | 2% | |
| 2016 | 73471198 | 102818 | 7.87 | 5.01 | 2% | |
| 2017 | 74692571 | 108680 | 7.87 | 5.04 | 2% | 1.73% |

Regression analysis of same is given in figure below.

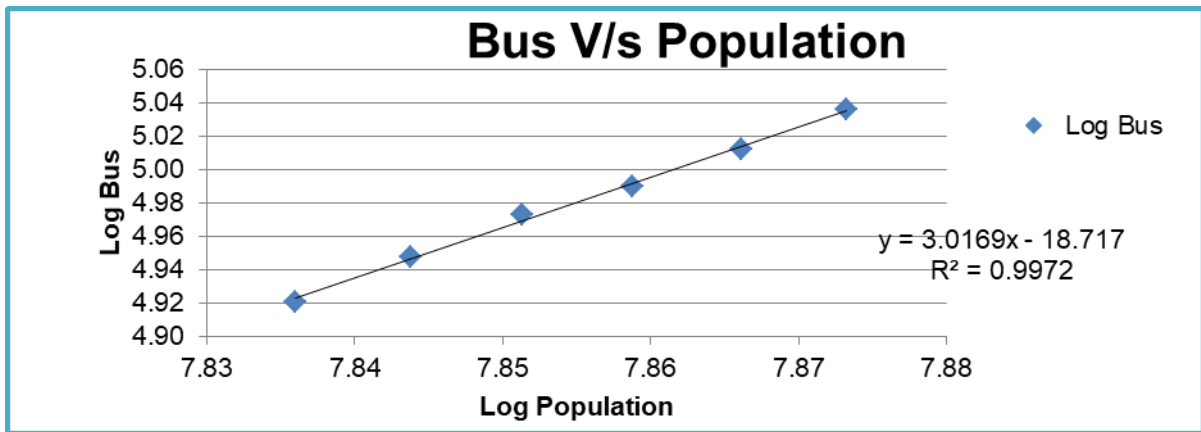


Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

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

Table 5-8 : LCV Traffic Vs NSDP Rajasthan

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|-------|----------|---------|-------------|-------------------------|
| 2012 | 395331 | 69509 | 5.60 | 4.84 | | |
| 2013 | 409802 | 76396 | 5.61 | 4.88 | 4% | |
| 2014 | 434292 | 33379 | 5.64 | 4.52 | 6% | |
| 2015 | 465408 | 91787 | 5.67 | 4.96 | 7% | |
| 2016 | 501922 | 99763 | 5.70 | 5.00 | 8% | 6.16% |

Following figure depict regression analysis and extrapolation.

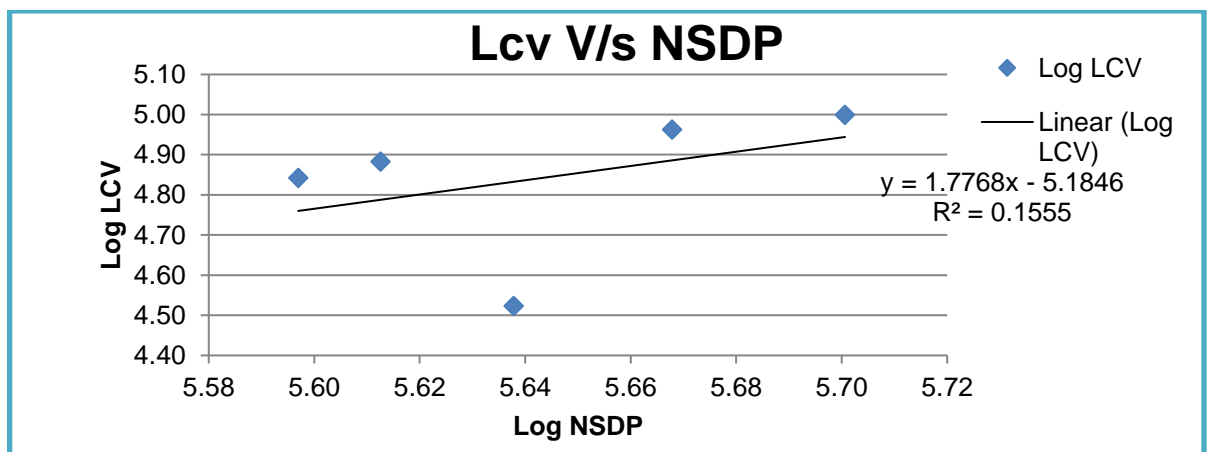
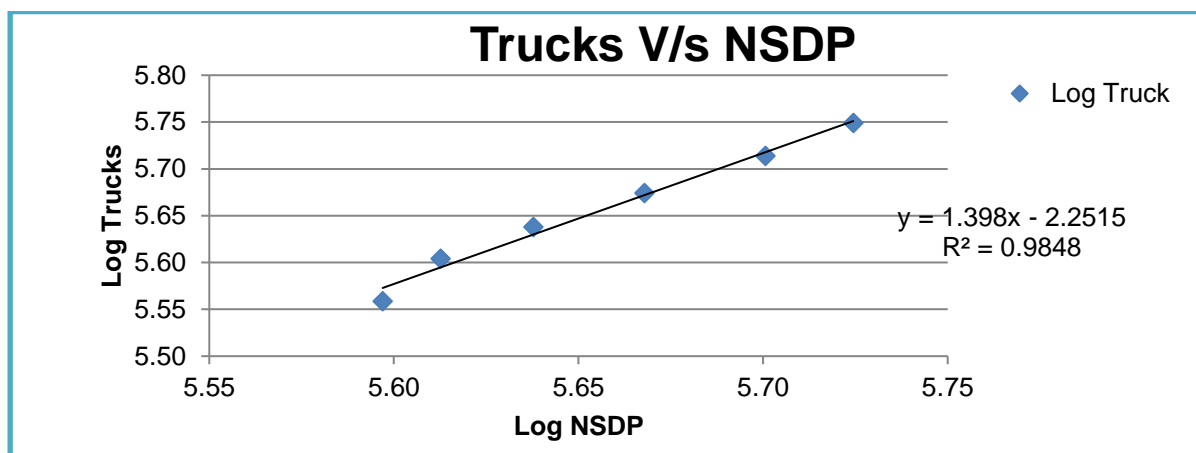


Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.

Table 5-9 : Goods Traffic Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 395331 | 362028 | 5.60 | 5.56 | | |
| 2013 | 409802 | 401983 | 5.61 | 5.60 | 4% | |
| 2014 | 434292 | 434379 | 5.64 | 5.64 | 6% | |
| 2015 | 465408 | 472365 | 5.67 | 5.67 | 7% | |
| 2016 | 501922 | 517604 | 5.70 | 5.71 | 8% | |
| 2017 | 530172 | 561158 | 5.72 | 5.75 | 6% | 6.06% |

Following figure depict regression analysis and extrapolation.

**Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.**

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

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

Table 5-10 : Summary Regression Analysis Rajasthan

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Rajasthan | Car/Jeep | PCI | $y = 2.1541x - 4.4569$ | $R^2 = 0.9791$ | 2.1541 | 4.55% | 9.79% | Good Regression |
| | Bus | Population | $y = 3.0169x - 18.7174$ | $R^2 = 0.9972$ | 3.0169 | 1.73% | 5.22% | Good Regression |
| | LCV | NSDP | $y = 1.7768x - 5.1846$ | $R^2 = 0.1555$ | 1.7768 | 6.16% | 10.95% | Good Regression |

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|-----------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| | Truck | NSDP | $y = 1.398x - 2.2515$ | $R^2 = 0.9848$ | 1.3980 | 6.06% | 8.46% | 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 proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Kaithal to Rajasthan Border is under tolling operation with current concessionaire and has only two years of tolling history from 2018-19. After that traffic was affected due to COVID-19 pandemic. Thus, sufficient data points to be able to establish a reliable past trend of traffic growth are not available. A minimum of about 5 -6 years' consistent traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economical, 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.

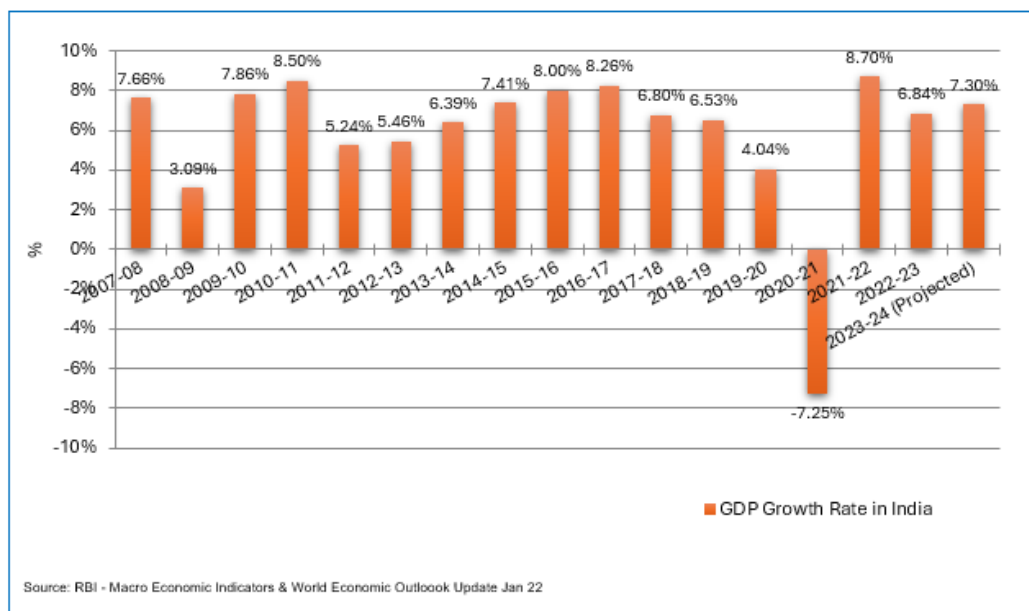


Figure 5-9 : Growth of GDP in India

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. The government took major policy decisions 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.

Honourable 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 year 2022-23.

5.6 Developments along and around the Project Corridor & State

Project stretch falls in region of good development potential. The same is discussed as under.

Haryana is the largest recipient of investment per capita since 2000 in India, and among one of the wealthiest and most economically developed regions in South Asia. Haryana has the sixth highest per capita income among Indian states and union territories. Haryana is also boosted by 30 SEZs (mainly along DMIC, ADKIC and DWPE in NCR), 7% national agricultural exports, 60% of national Basmati rice export, 67% cars, 60% motorbikes, 50% tractors and 50% refrigerators produced in India. In services. Since Haryana surrounds the country's capital Delhi on three sides (north, west and south), consequently a large area of Haryana is included in the economically important National Capital Region for the purposes of planning and development.

Major Cities of Haryana state & their characteristics are as below.

Faridabad is one of the biggest industrial cities of Haryana as well as North India. Faridabad has been described as eighth fastest growing city in the world and third most in India by City Mayors Foundation survey. Faridabad is home to large-scale companies like Escorts Limited, India Yamaha Motor Pvt. Ltd., Havells India Limited, JCB India Limited, Indian Oil (R&D), Larsen & Toubro (L&T), Whirlpool India Ltd., ABB Group, Goodyear India Ltd., Bata India Ltd and Eicher Tractor Ltd. and Beebay Kidswear. Eyewear e-tailer Lenskart and healthcare startup Lybrate have their headquarters in Faridabad. More than 5,000 units of auto parts producers are based in Faridabad.

Many directorates of different union government ministries are headquartered in Faridabad including Central Ground Water Board, Department of Plant Quarantine and Central Insecticide Lab and Union Government Offices from Haryana including the Commissioner of Central Excise within Department of Revenue, Government of India, Department of Explosives, and Department of Labour. The Apex Central Training Institute of the Department of Revenue, Government of India, National Academy of Customs Excise & Narcotics is located at Sector 29. The National Power Training Institute, an autonomous body under Ministry of Power, Government of India has a corporate office in Faridabad. The city also hosts the National Institute of Financial Management, which serves as training academy for accounting and financial services. Also

headquartered here is NHPC Limited which is a Central PSU under Ministry of Power, Government of India and the largest Hydro-power Company in India.

Hisar, city has been identified as a counter-magnet city for the National Capital Region to attract migrants and develop as an alternative centre of growth to Delhi. With upcoming integrated industrial aerocity and aero MRO hub at Hisar Airport, it is a fast-developing city.

The city has a large steel industry and is known as the 'city of steel'. Hisar is India's largest manufacturer of galvanized iron. The Jindal Group is based in Hisar. Jindal Stainless Steel is also the world's largest producer of Stainless-Steel strips for razor blades and India's largest producer of coin blanks. Textile and automobile industry is also a major contributor to the economy of the city. It also has a large number of livestock farms with the Central Livestock Farm, established in 1809 being one of the Asia's largest cattle farms.

Panipat city is famous in India by the name of "City of Weavers" and "Textile City". It is also known as the "cast-off capital" due to being "the global centre for recycling textiles. It is known for its woven modhas or round stools. Panipat has heavy industry, including a refinery operated by the Indian Oil Corporation, a urea manufacturing plant operated by National Fertilizers Limited and a National Thermal Power Corporation power plant. The IOCL refinery in Panipat is one of the major Industry in area which contributes to growth.

Gurugram: Witnessing rapid urbanisation, Gurgaon has become a leading financial and industrial hub with the third-highest per capita income in India. Gurgaon ranks number 1 in India in IT growth rate and existing technology infrastructure, and number 2 in startup ecosystem, innovation and livability.

The city's economic growth story started when the leading Indian automobile manufacturer Maruti Suzuki India Limited established a manufacturing plant in Gurgaon in the 1970s. Today, Gurgaon has local offices for more than 250.

Fortune 500 companies. Various international companies, including Coca-Cola, Pepsi, BMW, Agilent Technologies, Hyundai have chosen Gurugram to be their Indian corporate headquarters.

IMT Minesar, Dundaheera and Sohna are industrial and logistics hub, that also has National Security Guards, Indian Institute of Corporate Affairs, National

Brain Research Centre and National Bomb Data Centre. Retail is an important industry in Gurgaon, with the presence of 26 shopping malls.

Ambala is connected to all the other major cities of north India including Delhi, Panipat, Chandigarh, Ludhiana, Amritsar and Shimla. It is a big interchange for various commuters for all neighboring states. The Ambala Cantt bus stand witnesses roughly 50,000 commuters daily.

National highway NH 1 popularly known as GT road passes through Ambala and connects it to National capital Delhi, Panipat, Ludhiana and Amritsar. NH 22 connects it to state capital Chandigarh and Shimla. National Highway 52 (new NH-165) connects it to Kaithal, Narwana and Hisar.

Being located in the Indo-Gangetic Plain, the land is generally fertile and conducive to agriculture.

Small scale industries form the bulk of the industrial landscape in the district. It is one of the largest producers of scientific and surgical instruments in the country and home to a large number of scientific instrument manufacturers. It produces microscopes and other instruments used in chemistry laboratories. Manufacture of submersible pumps and mixers and grinders is another industry that has traditionally flourished.

Ambala is also an important textile trading centre, besides Delhi and Ludhiana and has a well-known cloth market, which is famous in the region especially for those seeking bridal wear. It also produces rugs, known locally as Durries, and houses many suppliers to Indian defence forces.

Punjab state is one of the most fertile regions in India. The region is ideal for wheat-growing. Rice, sugar cane, fruits and vegetables are also grown. Punjab is called the "Granary of India" or "India's breadbasket". It produces 10.26% of India's cotton, 19.5% of India's wheat, and 11% of India's rice. The Ferozpur and Fazilka Districts are the largest producers of wheat and rice in the state. In worldwide terms, Indian Punjab produces 2% of the world's cotton, 2% of its wheat and 1% of its rice. The largest cultivated crop is wheat. Other important crops are rice, cotton, sugarcane, pearl millet, maize, barley and fruit.

Ludhiana is one of the City in India with best business environment. The riches are brought mostly by small-scale industrial units, which produce industrial goods, machine parts, auto parts, household appliances, hosiery, apparel, and garments. Ludhiana is Asia's

largest hub for bicycle manufacturing and produces more than 50% of India's bicycle consumption of more than 10 million each.

year. Ludhiana produces 60% of India's tractor parts and a large portion of auto.

and two-wheeler parts. Many parts used in German cars are Mercedes and BMW exclusively produced in Ludhiana to satisfy the world requirement. It is one of the largest manufacturers of domestic sewing machines. Hand tools and industrial equipment are other specialties. The apparel industry of Ludhiana is famous all over India for its woollen sweaters and cotton T-shirts; most of the top Indian woollen apparel brands are based in Ludhiana. Ludhiana also has a growing IT sector with multiple software services and product companies having development centers in the city.

Chandigarh has been rated as one of the "Wealthiest Towns" of India. The Reserve Bank of India ranked Chandigarh as the Third largest deposit centre and seventh largest credit centre nationwide.

Chandigarh is ranked 4th in the top 50 cities identified globally as "emerging outsourcing and IT services destinations" ahead of cities like Beijing. Chandigarh IT Park (also known as Rajiv Gandhi Chandigarh Technology Park) is the city's attempt to break into the information technology world. Major Indian firms and multinational corporations like Quark, Infosys, EVRY, Dell, IBM, TechMahindra, Airtel, Amadeus IT Group, DLF have set up base in the city and its suburbs.

Additionally, the government is a major employer in Chandigarh with three governments having their base here i.e. Chandigarh Administration, Punjab government and Haryana government.

Ordnance Cable Factory of the Ordnance Factories Board has been set up by the Government of India. There are about 15 mediums to large industries including two in the public sector. In addition, Chandigarh has over 2500 units registered under small-scale sector. The important industries are paper manufacturing, basic metals and alloys and machinery. Other industries are relating to food products, sanitary ware, auto parts, machine tools, pharmaceuticals and electrical appliances.

Rajasthan state is a fast-developing state. Last year Rajasthan was the leading investment destination in India after Maharashtra and Gujarat because of peaceful environment, relatively better law and order situation, excellent infrastructure, and investment friendly climate. Rajasthan is pre-eminent in quarrying and mining in India. The state is the second largest source of cement. It has rich salt deposits at Sambhar, copper mines at Khetri and zinc mines at Dariba and Zawar. Jaipur is the capital and largest city of Rajasthan. It is also.

known as Pink City of India and a famous travel destination.

There is large amount of information available on open platform including internet regarding this. Relevant information is compiled as under.

Delhi Mumbai Industrial Corridor (DMIC)

Rajasthan is strategically located along the Delhi-Mumbai section of the Golden Quadrilateral highway project, the proposed Dedicated Freight Corridor (DFC) and the Delhi Mumbai Industrial Corridor (DMIC).

Rajasthan has access to 46% of DMIC. It falls within major districts of Jaipur, Alwar, Kota and Bhilwara. Over 58% area of the state falls within the influence area of DMIC. The DMIC will provide high quality environment with state-of-the-art infrastructure for new investors.

The state of Rajasthan has a rich agricultural and mineral base. Key industrial sectors in the state include Cement, Building Stones, Gypsum, Gems & Jewellery, Chemical, Food processing and Textiles. The emerging sectors include IT/ITES, Auto Component and Knowledge Hubs. Based on the strengths of specific regions across the state, five development nodes are identified in the influence area of DMIC. It includes two investment regions and three industrial areas.

Project road would act as feeder road for traffic destined for DMIC logistic hubs from northern states.

5.7 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 Traffic growth is suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-11 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 5.67% | 5.45% | 5.22% | 5.00% | 4.78% | 4.56% |
| Bus | 3.21% | 3.09% | 2.72% | 2.61% | 2.50% | 2.40% |
| LCV | 3.38% | 3.17% | 2.72% | 2.53% | 2.35% | 2.17% |
| 2- Axle | 3.96% | 3.74% | 3.23% | 3.04% | 2.86% | 2.67% |
| 3 - Axle | 3.96% | 3.74% | 3.23% | 3.04% | 2.86% | 2.67% |
| 4 to 6 Axle | 3.96% | 3.74% | 3.53% | 3.32% | 3.12% | 2.91% |
| 7 and Above Axle | 3.96% | 3.74% | 3.53% | 3.32% | 3.12% | 2.91% |

Table 5-12 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2040 | 2041-2046 | 2046-2051 |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 5.17% | 4.95% | 4.72% | 4.50% | 4.28% | 4.06% |
| Bus | 2.71% | 2.59% | 2.22% | 2.11% | 2.00% | 1.90% |
| LCV | 2.88% | 2.67% | 2.22% | 2.03% | 1.85% | 1.67% |

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2040 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2- Axle | 3.46% | 3.24% | 2.73% | 2.54% | 2.36% | 2.17% |
| 3 - Axle | 3.46% | 3.24% | 2.73% | 2.54% | 2.36% | 2.17% |
| 4 to 6 Axle | 3.46% | 3.24% | 3.03% | 2.82% | 2.62% | 2.41% |
| 7 and Above Axle | 3.46% | 3.24% | 3.03% | 2.82% | 2.62% | 2.41% |

Table 5-13 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 5.42% | 5.20% | 4.97% | 4.75% | 4.53% | 4.31% |
| Bus | 2.96% | 2.84% | 2.47% | 2.36% | 2.25% | 2.15% |
| LCV | 3.13% | 2.92% | 2.47% | 2.28% | 2.10% | 1.92% |
| 2- Axle | 3.71% | 3.49% | 2.98% | 2.79% | 2.61% | 2.42% |
| 3 - Axle | 3.71% | 3.49% | 2.98% | 2.79% | 2.61% | 2.42% |
| 4 to 6 Axle | 3.71% | 3.49% | 3.28% | 3.07% | 2.87% | 2.66% |
| 7 and Above Axle | 3.71% | 3.49% | 3.28% | 3.07% | 2.87% | 2.66% |

Traffic and revenue have been worked out on the basis of above growths and same is presented in subsequent chapter of report.

CHAPTER 6

TRAFFIC FORECAST

6.1 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Narwana 125.00 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4282 | 367 | 338 | 477 | 321 | 1382 | 48 | 7215 | 14676 |
| 2024-25 | 4524 | 380 | 349 | 495 | 334 | 1436 | 50 | 7568 | 15315 |
| 2025-26 | 4770 | 392 | 360 | 514 | 347 | 1490 | 52 | 7925 | 15960 |
| 2026-27 | 5030 | 404 | 371 | 533 | 360 | 1546 | 54 | 8298 | 16628 |
| 2027-28 | 5304 | 416 | 382 | 553 | 373 | 1604 | 56 | 8688 | 17322 |
| 2028-29 | 5593 | 429 | 394 | 574 | 387 | 1663 | 58 | 9098 | 18046 |
| 2029-30 | 5898 | 442 | 406 | 596 | 401 | 1725 | 60 | 9528 | 18803 |
| 2030-31 | 6207 | 454 | 417 | 615 | 414 | 1786 | 62 | 9955 | 19542 |
| 2031-32 | 6532 | 466 | 428 | 635 | 427 | 1849 | 64 | 10401 | 20310 |
| 2032-33 | 6873 | 478 | 439 | 655 | 441 | 1915 | 66 | 10867 | 21110 |
| 2033-34 | 7232 | 491 | 451 | 676 | 455 | 1983 | 68 | 11356 | 21944 |
| 2034-35 | 7610 | 504 | 463 | 698 | 469 | 2053 | 70 | 11867 | 22810 |
| 2035-36 | 7990 | 516 | 475 | 719 | 483 | 2121 | 72 | 12376 | 23664 |
| 2036-37 | 8389 | 529 | 487 | 741 | 497 | 2192 | 74 | 12909 | 24555 |
| 2037-38 | 8808 | 542 | 499 | 763 | 512 | 2265 | 76 | 13465 | 25478 |
| 2038-39 | 9248 | 555 | 512 | 786 | 527 | 2341 | 78 | 14047 | 26441 |
| 2039-40 | 9710 | 568 | 525 | 810 | 543 | 2419 | 81 | 14656 | 27446 |
| 2040-41 | 10174 | 581 | 538 | 833 | 558 | 2495 | 83 | 15262 | 28434 |
| 2041-42 | 10659 | 594 | 551 | 857 | 574 | 2573 | 86 | 15894 | 29462 |
| 2042-43 | 11169 | 607 | 564 | 882 | 590 | 2653 | 89 | 16554 | 30527 |
| 2043-44 | 11702 | 621 | 578 | 907 | 607 | 2735 | 92 | 17242 | 31631 |
| 2044-45 | 12261 | 635 | 592 | 933 | 625 | 2820 | 95 | 17961 | 32781 |
| 2045-46 | 12820 | 648 | 606 | 958 | 642 | 2902 | 98 | 18674 | 33910 |
| 2046-47 | 13404 | 661 | 620 | 983 | 660 | 2987 | 101 | 19416 | 35081 |
| 2047-48 | 14016 | 675 | 634 | 1009 | 678 | 3074 | 104 | 20190 | 36293 |
| 2048-49 | 14656 | 689 | 649 | 1036 | 696 | 3164 | 107 | 20997 | 37552 |

Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Badopatti 171.00 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4132 | 306 | 405 | 437 | 336 | 1130 | 55 | 6800 | 13455 |
| 2024-25 | 4366 | 317 | 418 | 454 | 349 | 1175 | 57 | 7136 | 14049 |
| 2025-26 | 4604 | 328 | 432 | 470 | 362 | 1219 | 59 | 7474 | 14639 |
| 2026-27 | 4854 | 339 | 446 | 487 | 375 | 1264 | 61 | 7826 | 15249 |
| 2027-28 | 5118 | 350 | 460 | 505 | 389 | 1311 | 63 | 8196 | 15888 |
| 2028-29 | 5397 | 361 | 474 | 524 | 403 | 1360 | 65 | 8584 | 16554 |
| 2029-30 | 5692 | 373 | 489 | 543 | 418 | 1410 | 67 | 8992 | 17248 |
| 2030-31 | 5990 | 384 | 503 | 560 | 431 | 1459 | 69 | 9396 | 17924 |
| 2031-32 | 6303 | 395 | 517 | 578 | 445 | 1510 | 71 | 9819 | 18630 |
| 2032-33 | 6633 | 406 | 531 | 597 | 459 | 1564 | 73 | 10263 | 19370 |
| 2033-34 | 6979 | 417 | 546 | 616 | 474 | 1619 | 76 | 10727 | 20140 |
| 2034-35 | 7343 | 429 | 561 | 635 | 489 | 1676 | 79 | 11212 | 20939 |
| 2035-36 | 7709 | 440 | 576 | 654 | 504 | 1732 | 82 | 11697 | 21734 |
| 2036-37 | 8095 | 451 | 591 | 674 | 519 | 1789 | 85 | 12204 | 22557 |
| 2037-38 | 8500 | 463 | 606 | 694 | 535 | 1848 | 88 | 12734 | 23412 |
| 2038-39 | 8925 | 475 | 622 | 714 | 551 | 1909 | 91 | 13287 | 24299 |
| 2039-40 | 9371 | 487 | 638 | 735 | 567 | 1973 | 94 | 13865 | 25223 |
| 2040-41 | 9819 | 499 | 654 | 755 | 583 | 2034 | 97 | 14441 | 26133 |
| 2041-42 | 10288 | 511 | 670 | 776 | 599 | 2098 | 100 | 15042 | 27081 |
| 2042-43 | 10780 | 523 | 686 | 797 | 616 | 2164 | 103 | 15669 | 28063 |
| 2043-44 | 11295 | 535 | 703 | 820 | 633 | 2231 | 106 | 16323 | 29082 |
| 2044-45 | 11835 | 547 | 720 | 843 | 651 | 2300 | 109 | 17005 | 30138 |
| 2045-46 | 12375 | 559 | 737 | 866 | 668 | 2367 | 112 | 17684 | 31182 |
| 2046-47 | 12940 | 571 | 754 | 889 | 686 | 2436 | 115 | 18391 | 32263 |
| 2047-48 | 13529 | 583 | 772 | 913 | 704 | 2507 | 118 | 19126 | 33383 |
| 2048-49 | 14147 | 595 | 791 | 937 | 722 | 2580 | 121 | 19893 | 34544 |

Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 212.00 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4167 | 356 | 164 | 497 | 452 | 1656 | 65 | 7356 | 15782 |
| 2024-25 | 4403 | 369 | 169 | 516 | 469 | 1721 | 67 | 7714 | 16465 |
| 2025-26 | 4643 | 381 | 174 | 535 | 487 | 1785 | 69 | 8074 | 17146 |
| 2026-27 | 4895 | 393 | 179 | 555 | 505 | 1852 | 72 | 8451 | 17860 |
| 2027-28 | 5161 | 406 | 184 | 576 | 524 | 1921 | 75 | 8847 | 18604 |
| 2028-29 | 5442 | 419 | 189 | 597 | 544 | 1993 | 78 | 9262 | 19380 |
| 2029-30 | 5738 | 432 | 195 | 619 | 564 | 2067 | 81 | 9696 | 20186 |
| 2030-31 | 6037 | 444 | 200 | 639 | 582 | 2140 | 84 | 10126 | 20974 |
| 2031-32 | 6352 | 456 | 205 | 660 | 601 | 2215 | 87 | 10576 | 21793 |
| 2032-33 | 6683 | 469 | 210 | 681 | 620 | 2294 | 90 | 11047 | 22648 |
| 2033-34 | 7031 | 482 | 215 | 703 | 640 | 2375 | 93 | 11539 | 23534 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2034-35 | 7397 | 495 | 221 | 725 | 661 | 2459 | 96 | 12054 | 24458 |
| 2035-36 | 7766 | 508 | 227 | 747 | 681 | 2541 | 99 | 12569 | 25373 |
| 2036-37 | 8155 | 521 | 233 | 769 | 702 | 2625 | 102 | 13107 | 26320 |
| 2037-38 | 8563 | 534 | 239 | 792 | 723 | 2713 | 105 | 13669 | 27307 |
| 2038-39 | 8991 | 547 | 245 | 816 | 745 | 2803 | 108 | 14255 | 28329 |
| 2039-40 | 9440 | 560 | 251 | 841 | 767 | 2896 | 112 | 14867 | 29393 |
| 2040-41 | 9891 | 573 | 257 | 865 | 789 | 2986 | 115 | 15476 | 30438 |
| 2041-42 | 10364 | 586 | 263 | 890 | 811 | 3079 | 119 | 16112 | 31526 |
| 2042-43 | 10858 | 599 | 269 | 916 | 834 | 3175 | 123 | 16774 | 32655 |
| 2043-44 | 11377 | 613 | 275 | 942 | 857 | 3274 | 127 | 17465 | 33823 |
| 2044-45 | 11921 | 627 | 281 | 969 | 881 | 3376 | 131 | 18186 | 35036 |
| 2045-46 | 12465 | 640 | 287 | 995 | 904 | 3474 | 135 | 18900 | 36224 |
| 2046-47 | 13034 | 653 | 293 | 1022 | 928 | 3575 | 139 | 19644 | 37456 |
| 2047-48 | 13629 | 667 | 300 | 1049 | 952 | 3679 | 143 | 20419 | 38732 |
| 2048-49 | 14251 | 681 | 307 | 1077 | 977 | 3786 | 147 | 21226 | 40054 |

**Table 6-4 : Total Tollable Traffic @ Toll Plaza 1- Chainage 125.000 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4282 | 367 | 338 | 477 | 321 | 1382 | 48 | 7215 | 14676 |
| 2024-25 | 4503 | 377 | 347 | 493 | 332 | 1429 | 50 | 7531 | 15240 |
| 2025-26 | 4726 | 387 | 356 | 509 | 343 | 1476 | 52 | 7849 | 15807 |
| 2026-27 | 4960 | 397 | 365 | 525 | 354 | 1524 | 54 | 8179 | 16389 |
| 2027-28 | 5206 | 407 | 375 | 542 | 366 | 1573 | 56 | 8525 | 16996 |
| 2028-29 | 5464 | 417 | 385 | 560 | 378 | 1624 | 58 | 8886 | 17628 |
| 2029-30 | 5734 | 427 | 395 | 578 | 390 | 1677 | 60 | 9261 | 18280 |
| 2030-31 | 6005 | 436 | 404 | 594 | 401 | 1728 | 62 | 9630 | 18911 |
| 2031-32 | 6288 | 445 | 413 | 610 | 412 | 1780 | 64 | 10012 | 19559 |
| 2032-33 | 6585 | 455 | 422 | 626 | 423 | 1834 | 66 | 10411 | 20231 |
| 2033-34 | 6896 | 465 | 432 | 643 | 435 | 1890 | 68 | 10829 | 20935 |
| 2034-35 | 7223 | 475 | 442 | 661 | 447 | 1947 | 70 | 11265 | 21662 |
| 2035-36 | 7548 | 484 | 451 | 677 | 459 | 2001 | 72 | 11692 | 22364 |
| 2036-37 | 7888 | 494 | 461 | 694 | 471 | 2058 | 74 | 12140 | 23101 |
| 2037-38 | 8243 | 504 | 471 | 712 | 483 | 2116 | 76 | 12605 | 23861 |
| 2038-39 | 8614 | 514 | 481 | 730 | 495 | 2175 | 78 | 13087 | 24642 |
| 2039-40 | 9001 | 524 | 491 | 749 | 508 | 2237 | 80 | 13590 | 25458 |
| 2040-41 | 9386 | 533 | 501 | 767 | 520 | 2295 | 82 | 14084 | 26246 |
| 2041-42 | 9787 | 543 | 511 | 785 | 532 | 2355 | 84 | 14597 | 27061 |
| 2042-43 | 10206 | 553 | 521 | 804 | 545 | 2417 | 86 | 15132 | 27909 |
| 2043-44 | 10642 | 563 | 531 | 823 | 558 | 2480 | 88 | 15685 | 28779 |
| 2044-45 | 11097 | 573 | 542 | 842 | 571 | 2544 | 90 | 16259 | 29675 |
| 2045-46 | 11547 | 582 | 552 | 860 | 583 | 2606 | 92 | 16822 | 30546 |
| 2046-47 | 12016 | 592 | 562 | 879 | 596 | 2669 | 94 | 17408 | 31449 |
| 2047-48 | 12503 | 602 | 573 | 898 | 609 | 2733 | 96 | 18014 | 32377 |
| 2048-49 | 13011 | 612 | 584 | 917 | 622 | 2799 | 98 | 18643 | 33335 |

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 2- Chainage 171.00 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4132 | 306 | 405 | 437 | 336 | 1130 | 55 | 6800 | 13455 |
| 2024-25 | 4345 | 316 | 416 | 452 | 347 | 1168 | 56 | 7100 | 13972 |
| 2025-26 | 4561 | 324 | 427 | 466 | 358 | 1205 | 58 | 7399 | 14484 |
| 2026-27 | 4786 | 332 | 438 | 481 | 370 | 1244 | 60 | 7711 | 15019 |
| 2027-28 | 5022 | 340 | 449 | 496 | 382 | 1285 | 62 | 8036 | 15575 |
| 2028-29 | 5270 | 348 | 461 | 511 | 394 | 1327 | 64 | 8375 | 16150 |
| 2029-30 | 5530 | 356 | 473 | 527 | 407 | 1370 | 66 | 8729 | 16747 |
| 2030-31 | 5790 | 364 | 484 | 541 | 418 | 1412 | 68 | 9077 | 17325 |
| 2031-32 | 6064 | 372 | 495 | 555 | 429 | 1455 | 70 | 9440 | 17922 |
| 2032-33 | 6350 | 380 | 506 | 570 | 441 | 1499 | 72 | 9818 | 18541 |
| 2033-34 | 6650 | 388 | 517 | 585 | 453 | 1544 | 74 | 10211 | 19178 |
| 2034-35 | 6964 | 396 | 528 | 600 | 465 | 1591 | 76 | 10620 | 19839 |
| 2035-36 | 7278 | 404 | 539 | 615 | 477 | 1636 | 78 | 11027 | 20490 |
| 2036-37 | 7605 | 412 | 550 | 630 | 489 | 1682 | 80 | 11448 | 21159 |
| 2037-38 | 7947 | 420 | 562 | 646 | 501 | 1729 | 82 | 11887 | 21854 |
| 2038-39 | 8304 | 428 | 574 | 662 | 514 | 1777 | 84 | 12343 | 22571 |
| 2039-40 | 8678 | 436 | 586 | 678 | 527 | 1827 | 86 | 12818 | 23314 |
| 2040-41 | 9050 | 444 | 598 | 694 | 539 | 1875 | 88 | 13288 | 24043 |
| 2041-42 | 9437 | 452 | 610 | 710 | 552 | 1924 | 90 | 13775 | 24794 |
| 2042-43 | 9841 | 460 | 622 | 726 | 565 | 1974 | 92 | 14280 | 25567 |
| 2043-44 | 10263 | 468 | 634 | 742 | 578 | 2026 | 94 | 14805 | 26367 |
| 2044-45 | 10702 | 476 | 646 | 759 | 591 | 2079 | 96 | 15349 | 27192 |
| 2045-46 | 11137 | 484 | 658 | 775 | 604 | 2129 | 98 | 15885 | 27996 |
| 2046-47 | 11589 | 492 | 670 | 791 | 617 | 2180 | 100 | 16439 | 28821 |
| 2047-48 | 12059 | 500 | 682 | 808 | 630 | 2233 | 102 | 17014 | 29677 |
| 2048-49 | 12550 | 508 | 695 | 825 | 644 | 2287 | 104 | 17613 | 30564 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 3- Chainage 212.00 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4167 | 356 | 164 | 497 | 452 | 1656 | 65 | 7356 | 15782 |
| 2024-25 | 4383 | 368 | 169 | 514 | 467 | 1713 | 67 | 7681 | 16395 |
| 2025-26 | 4599 | 378 | 173 | 530 | 482 | 1769 | 69 | 8000 | 16992 |
| 2026-27 | 4825 | 388 | 177 | 548 | 498 | 1826 | 71 | 8333 | 17613 |
| 2027-28 | 5064 | 398 | 182 | 566 | 515 | 1885 | 73 | 8683 | 18261 |
| 2028-29 | 5314 | 408 | 187 | 585 | 532 | 1946 | 75 | 9047 | 18933 |
| 2029-30 | 5577 | 419 | 192 | 604 | 549 | 2009 | 77 | 9427 | 19628 |
| 2030-31 | 5840 | 429 | 196 | 620 | 564 | 2069 | 79 | 9797 | 20290 |
| 2031-32 | 6115 | 439 | 200 | 637 | 580 | 2132 | 81 | 10184 | 20983 |
| 2032-33 | 6403 | 449 | 204 | 655 | 596 | 2197 | 83 | 10587 | 21702 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2033-34 | 6705 | 459 | 209 | 673 | 613 | 2263 | 85 | 11007 | 22445 |
| 2034-35 | 7021 | 469 | 214 | 692 | 630 | 2331 | 88 | 11445 | 23218 |
| 2035-36 | 7337 | 479 | 219 | 710 | 646 | 2397 | 90 | 11878 | 23972 |
| 2036-37 | 7666 | 489 | 224 | 728 | 663 | 2464 | 92 | 12326 | 24747 |
| 2037-38 | 8011 | 499 | 229 | 747 | 680 | 2533 | 95 | 12794 | 25554 |
| 2038-39 | 8370 | 509 | 234 | 766 | 697 | 2605 | 98 | 13279 | 26388 |
| 2039-40 | 8746 | 519 | 239 | 785 | 715 | 2679 | 101 | 13784 | 27252 |
| 2040-41 | 9120 | 529 | 244 | 804 | 732 | 2750 | 104 | 14283 | 28097 |
| 2041-42 | 9511 | 539 | 249 | 823 | 749 | 2822 | 107 | 14800 | 28963 |
| 2042-43 | 9918 | 549 | 254 | 842 | 767 | 2896 | 110 | 15336 | 29858 |
| 2043-44 | 10343 | 559 | 259 | 862 | 785 | 2971 | 113 | 15892 | 30778 |
| 2044-45 | 10785 | 569 | 264 | 882 | 804 | 3048 | 116 | 16468 | 31727 |
| 2045-46 | 11224 | 579 | 269 | 901 | 822 | 3122 | 119 | 17036 | 32653 |
| 2046-47 | 11680 | 589 | 274 | 921 | 840 | 3197 | 122 | 17623 | 33604 |
| 2047-48 | 12154 | 599 | 279 | 941 | 858 | 3274 | 125 | 18230 | 34582 |
| 2048-49 | 12648 | 609 | 284 | 961 | 877 | 3353 | 128 | 18860 | 35592 |

Traffic projections for Most Likely scenario is given as under

**Table 6-7 : Total Tollable Traffic @ Toll Plaza 1- Chainage 125.000 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4282 | 367 | 338 | 477 | 321 | 1382 | 48 | 7215 | 14676 |
| 2024-25 | 4514 | 378 | 348 | 494 | 333 | 1433 | 50 | 7550 | 15280 |
| 2025-26 | 4748 | 388 | 358 | 511 | 345 | 1483 | 52 | 7885 | 15880 |
| 2026-27 | 4994 | 398 | 368 | 529 | 357 | 1535 | 54 | 8235 | 16504 |
| 2027-28 | 5253 | 409 | 378 | 548 | 370 | 1588 | 56 | 8602 | 17153 |
| 2028-29 | 5526 | 420 | 389 | 567 | 383 | 1643 | 58 | 8986 | 17828 |
| 2029-30 | 5813 | 432 | 400 | 586 | 396 | 1700 | 60 | 9387 | 18527 |
| 2030-31 | 6102 | 442 | 410 | 604 | 408 | 1756 | 62 | 9784 | 19212 |
| 2031-32 | 6405 | 452 | 420 | 622 | 420 | 1814 | 64 | 10197 | 19920 |
| 2032-33 | 6724 | 462 | 430 | 641 | 433 | 1873 | 66 | 10629 | 20655 |
| 2033-34 | 7059 | 473 | 441 | 660 | 446 | 1935 | 68 | 11082 | 21423 |
| 2034-35 | 7410 | 484 | 452 | 679 | 459 | 1998 | 70 | 11552 | 22212 |
| 2035-36 | 7762 | 494 | 463 | 698 | 472 | 2060 | 72 | 12021 | 22996 |
| 2036-37 | 8130 | 505 | 474 | 717 | 485 | 2123 | 74 | 12508 | 23802 |
| 2037-38 | 8516 | 516 | 485 | 737 | 498 | 2188 | 76 | 13016 | 24638 |
| 2038-39 | 8921 | 527 | 496 | 758 | 512 | 2255 | 78 | 13547 | 25508 |
| 2039-40 | 9344 | 538 | 507 | 779 | 526 | 2324 | 80 | 14098 | 26405 |
| 2040-41 | 9767 | 549 | 518 | 799 | 540 | 2391 | 82 | 14646 | 27290 |
| 2041-42 | 10209 | 560 | 529 | 820 | 554 | 2459 | 84 | 15215 | 28202 |
| 2042-43 | 10671 | 571 | 541 | 842 | 568 | 2530 | 86 | 15809 | 29153 |
| 2043-44 | 11154 | 582 | 553 | 864 | 583 | 2602 | 88 | 16426 | 30132 |
| 2044-45 | 11659 | 594 | 565 | 886 | 598 | 2676 | 90 | 17068 | 31144 |
| 2045-46 | 12161 | 605 | 577 | 908 | 612 | 2747 | 92 | 17702 | 32135 |
| 2046-47 | 12686 | 616 | 589 | 930 | 627 | 2820 | 94 | 18362 | 33161 |
| 2047-48 | 13233 | 627 | 601 | 952 | 642 | 2896 | 96 | 19047 | 34223 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2048-49 | 13803 | 638 | 613 | 975 | 657 | 2973 | 99 | 19758 | 35319 |

**Table 6-8 : Total Tollable Traffic @ Toll Plaza 2- Chainage 171.00 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4132 | 306 | 405 | 437 | 336 | 1130 | 55 | 6800 | 13455 |
| 2024-25 | 4356 | 316 | 417 | 453 | 348 | 1171 | 56 | 7117 | 14006 |
| 2025-26 | 4583 | 324 | 429 | 468 | 360 | 1212 | 58 | 7434 | 14555 |
| 2026-27 | 4821 | 333 | 441 | 484 | 373 | 1254 | 60 | 7766 | 15128 |
| 2027-28 | 5071 | 342 | 453 | 500 | 386 | 1298 | 62 | 8112 | 15721 |
| 2028-29 | 5335 | 353 | 465 | 517 | 399 | 1343 | 64 | 8476 | 16339 |
| 2029-30 | 5612 | 364 | 479 | 535 | 413 | 1390 | 66 | 8859 | 16991 |
| 2030-31 | 5891 | 372 | 491 | 550 | 425 | 1435 | 68 | 9232 | 17611 |
| 2031-32 | 6184 | 380 | 503 | 566 | 438 | 1482 | 70 | 9623 | 18259 |
| 2032-33 | 6491 | 389 | 515 | 582 | 451 | 1530 | 72 | 10030 | 18928 |
| 2033-34 | 6814 | 398 | 527 | 599 | 464 | 1580 | 74 | 10456 | 19624 |
| 2034-35 | 7153 | 407 | 540 | 616 | 478 | 1632 | 76 | 10902 | 20352 |
| 2035-36 | 7493 | 416 | 552 | 632 | 491 | 1682 | 78 | 11344 | 21062 |
| 2036-37 | 7848 | 425 | 565 | 649 | 505 | 1734 | 80 | 11806 | 21806 |
| 2037-38 | 8220 | 434 | 579 | 667 | 519 | 1787 | 82 | 12288 | 22577 |
| 2038-39 | 8611 | 443 | 593 | 686 | 533 | 1842 | 84 | 12792 | 23379 |
| 2039-40 | 9021 | 453 | 607 | 705 | 548 | 1899 | 87 | 13320 | 24218 |
| 2040-41 | 9431 | 462 | 621 | 723 | 562 | 1954 | 89 | 13842 | 25036 |
| 2041-42 | 9858 | 471 | 635 | 742 | 576 | 2010 | 91 | 14383 | 25878 |
| 2042-43 | 10305 | 480 | 650 | 761 | 591 | 2067 | 94 | 14948 | 26756 |
| 2043-44 | 10771 | 490 | 665 | 781 | 606 | 2126 | 97 | 15536 | 27666 |
| 2044-45 | 11259 | 500 | 680 | 801 | 622 | 2186 | 100 | 16148 | 28605 |
| 2045-46 | 11745 | 509 | 695 | 820 | 637 | 2244 | 103 | 16753 | 29526 |
| 2046-47 | 12251 | 518 | 710 | 840 | 652 | 2303 | 106 | 17380 | 30475 |
| 2047-48 | 12780 | 527 | 725 | 860 | 668 | 2364 | 109 | 18033 | 31458 |
| 2048-49 | 13330 | 537 | 740 | 880 | 684 | 2427 | 112 | 18710 | 32473 |

**Table 6-9 : Total Tollable Traffic @ Toll Plaza 3- Chainage 212.00 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 4167 | 356 | 164 | 497 | 452 | 1656 | 65 | 7356 | 15782 |
| 2024-25 | 4393 | 368 | 169 | 515 | 468 | 1717 | 67 | 7697 | 16429 |
| 2025-26 | 4622 | 379 | 174 | 533 | 485 | 1777 | 69 | 8039 | 17074 |
| 2026-27 | 4862 | 390 | 179 | 552 | 502 | 1839 | 71 | 8395 | 17741 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2027-28 | 5114 | 402 | 184 | 571 | 520 | 1903 | 73 | 8767 | 18434 |
| 2028-29 | 5380 | 414 | 189 | 591 | 538 | 1969 | 75 | 9156 | 19153 |
| 2029-30 | 5659 | 426 | 194 | 612 | 557 | 2037 | 78 | 9563 | 19905 |
| 2030-31 | 5940 | 436 | 199 | 630 | 574 | 2104 | 80 | 9963 | 20631 |
| 2031-32 | 6235 | 447 | 204 | 649 | 591 | 2173 | 83 | 10382 | 21390 |
| 2032-33 | 6544 | 458 | 209 | 668 | 609 | 2245 | 86 | 10819 | 22179 |
| 2033-34 | 6869 | 470 | 214 | 688 | 627 | 2319 | 89 | 11276 | 22997 |
| 2034-35 | 7210 | 482 | 219 | 708 | 646 | 2395 | 92 | 11752 | 23844 |
| 2035-36 | 7552 | 493 | 224 | 728 | 664 | 2469 | 95 | 12225 | 24678 |
| 2036-37 | 7910 | 505 | 229 | 748 | 683 | 2545 | 98 | 12718 | 25541 |
| 2037-38 | 8286 | 517 | 234 | 769 | 702 | 2623 | 101 | 13232 | 26435 |
| 2038-39 | 8680 | 529 | 239 | 790 | 722 | 2704 | 104 | 13768 | 27363 |
| 2039-40 | 9092 | 541 | 244 | 812 | 742 | 2787 | 107 | 14325 | 28321 |
| 2040-41 | 9504 | 553 | 249 | 833 | 761 | 2867 | 110 | 14877 | 29259 |
| 2041-42 | 9934 | 565 | 254 | 854 | 781 | 2949 | 113 | 15450 | 30228 |
| 2042-43 | 10384 | 577 | 260 | 876 | 801 | 3033 | 116 | 16047 | 31231 |
| 2043-44 | 10854 | 589 | 266 | 898 | 822 | 3120 | 119 | 16668 | 32271 |
| 2044-45 | 11345 | 601 | 272 | 921 | 843 | 3210 | 122 | 17314 | 33349 |
| 2045-46 | 11834 | 613 | 278 | 943 | 863 | 3295 | 125 | 17951 | 34396 |
| 2046-47 | 12344 | 625 | 284 | 965 | 884 | 3383 | 128 | 18613 | 35480 |
| 2047-48 | 12877 | 637 | 290 | 988 | 905 | 3473 | 131 | 19301 | 36600 |
| 2048-49 | 13433 | 649 | 296 | 1012 | 927 | 3565 | 134 | 20016 | 37757 |

6.2 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 Kaithal – Rajasthan Border project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2023

Target Traffic - 21919 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 5 years. Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 21919 | 15061 | -31% | 47% | 20% | 27 | 5.4 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 21919 | 15074 | -31% | 47% | 20% | 27 | 5.4 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 21919 | 15049 | -31% | 47% | 20% | 27 | 5.4 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

As per the Toll Notification (Schedule - R) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued at fee 50 time the single journey fee.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers or whose frequency does not yield any discount from the above categories.
4. Local Discounts: Local Car Jeep Van - Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza) and local commercial and 50% rate of single trip.

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

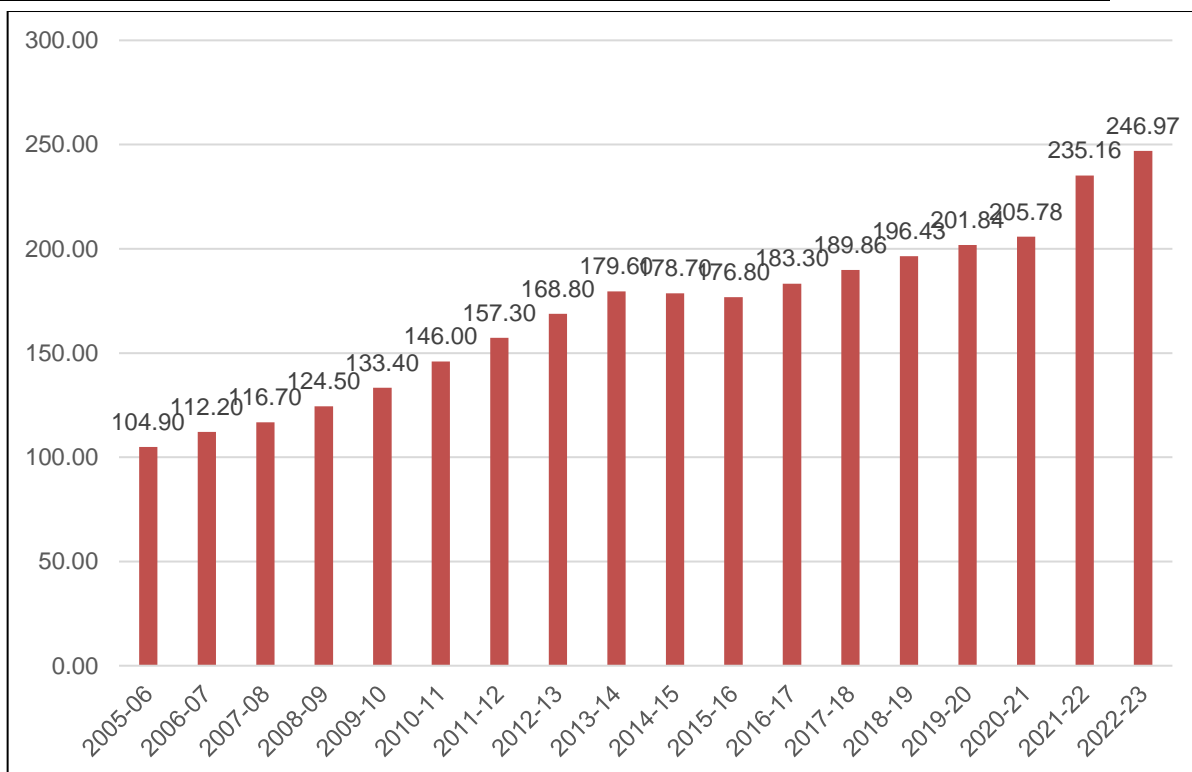


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in last few years is steadily growing. It grew in range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

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

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

Table 7-2 : Toll Rates for Single Journey @ Km 125.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2023-24 | 90 | 140 | 295 | 295 | 325 | 465 | 565 |
| 2024-25 | 90 | 145 | 305 | 305 | 330 | 475 | 580 |
| 2025-26 | 95 | 155 | 320 | 320 | 350 | 500 | 610 |
| 2026-27 | 100 | 160 | 335 | 335 | 365 | 525 | 640 |
| 2027-28 | 105 | 170 | 355 | 355 | 385 | 555 | 675 |
| 2028-29 | 110 | 175 | 370 | 370 | 405 | 580 | 710 |
| 2029-30 | 115 | 185 | 390 | 390 | 425 | 610 | 745 |
| 2030-31 | 120 | 195 | 410 | 410 | 445 | 645 | 785 |
| 2031-32 | 125 | 205 | 430 | 430 | 470 | 675 | 825 |
| 2032-33 | 135 | 215 | 455 | 455 | 495 | 710 | 865 |
| 2033-34 | 140 | 230 | 475 | 475 | 520 | 750 | 910 |
| 2034-35 | 150 | 240 | 500 | 500 | 550 | 785 | 960 |
| 2035-36 | 155 | 250 | 530 | 530 | 575 | 830 | 1010 |
| 2036-37 | 165 | 265 | 555 | 555 | 605 | 875 | 1060 |
| 2037-38 | 175 | 280 | 585 | 585 | 640 | 920 | 1120 |
| 2038-39 | 180 | 295 | 615 | 615 | 675 | 970 | 1180 |
| 2039-40 | 190 | 310 | 650 | 650 | 710 | 1020 | 1240 |
| 2040-41 | 200 | 325 | 685 | 685 | 745 | 1075 | 1310 |
| 2041-42 | 215 | 345 | 720 | 720 | 790 | 1130 | 1380 |
| 2042-43 | 225 | 365 | 760 | 760 | 830 | 1195 | 1455 |
| 2043-44 | 235 | 385 | 800 | 800 | 875 | 1260 | 1530 |
| 2044-45 | 250 | 405 | 845 | 845 | 925 | 1325 | 1615 |
| 2045-46 | 265 | 425 | 890 | 890 | 975 | 1400 | 1705 |
| 2046-47 | 280 | 450 | 940 | 940 | 1025 | 1475 | 1795 |
| 2047-48 | 295 | 475 | 995 | 995 | 1085 | 1555 | 1895 |
| 2048-49 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2000 |

Table 7-3 : Toll Rates for Single Journey @ Km 171.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|----------|------------|--------------------|
| 2023-24 | 120 | 190 | 400 | 400 | 440 | 630 | 765 |
| 2024-25 | 120 | 195 | 410 | 410 | 450 | 645 | 785 |
| 2025-26 | 130 | 205 | 430 | 430 | 470 | 680 | 825 |
| 2026-27 | 135 | 215 | 455 | 455 | 495 | 710 | 865 |
| 2027-28 | 140 | 230 | 475 | 475 | 520 | 750 | 910 |
| 2028-29 | 150 | 240 | 500 | 500 | 545 | 785 | 955 |
| 2029-30 | 155 | 250 | 525 | 525 | 575 | 825 | 1005 |
| 2030-31 | 165 | 265 | 555 | 555 | 605 | 870 | 1060 |
| 2031-32 | 170 | 280 | 585 | 585 | 635 | 915 | 1115 |
| 2032-33 | 180 | 295 | 615 | 615 | 670 | 960 | 1170 |
| 2033-34 | 190 | 310 | 645 | 645 | 705 | 1010 | 1230 |
| 2034-35 | 200 | 325 | 680 | 680 | 740 | 1065 | 1295 |
| 2035-36 | 210 | 340 | 715 | 715 | 780 | 1120 | 1365 |
| 2036-37 | 220 | 360 | 750 | 750 | 820 | 1180 | 1435 |
| 2037-38 | 235 | 380 | 790 | 790 | 865 | 1240 | 1510 |
| 2038-39 | 245 | 400 | 835 | 835 | 910 | 1310 | 1595 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2039-40 | 260 | 420 | 880 | 880 | 960 | 1380 | 1680 |
| 2040-41 | 275 | 440 | 925 | 925 | 1010 | 1450 | 1770 |
| 2041-42 | 290 | 465 | 975 | 975 | 1065 | 1530 | 1865 |
| 2042-43 | 305 | 490 | 1030 | 1030 | 1120 | 1615 | 1965 |
| 2043-44 | 320 | 520 | 1085 | 1085 | 1185 | 1700 | 2070 |
| 2044-45 | 340 | 545 | 1145 | 1145 | 1250 | 1795 | 2185 |
| 2045-46 | 355 | 575 | 1205 | 1205 | 1315 | 1890 | 2305 |
| 2046-47 | 375 | 605 | 1275 | 1275 | 1390 | 1995 | 2430 |
| 2047-48 | 395 | 640 | 1345 | 1345 | 1465 | 2105 | 2565 |
| 2048-49 | 420 | 675 | 1415 | 1415 | 1545 | 2220 | 2705 |

Table 7-4 : Toll Rates for Single Journey @ Km 212.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|----------|------------|--------------------|
| 2023-24 | 70 | 110 | 235 | 235 | 255 | 365 | 445 |
| 2024-25 | 70 | 115 | 240 | 240 | 260 | 375 | 455 |
| 2025-26 | 75 | 120 | 250 | 250 | 275 | 395 | 480 |
| 2026-27 | 80 | 125 | 265 | 265 | 285 | 415 | 500 |
| 2027-28 | 80 | 130 | 275 | 275 | 300 | 435 | 530 |
| 2028-29 | 85 | 140 | 290 | 290 | 315 | 455 | 555 |
| 2029-30 | 90 | 145 | 305 | 305 | 335 | 480 | 585 |
| 2030-31 | 95 | 155 | 320 | 320 | 350 | 505 | 615 |
| 2031-32 | 100 | 160 | 340 | 340 | 370 | 530 | 645 |
| 2032-33 | 105 | 170 | 355 | 355 | 390 | 555 | 680 |
| 2033-34 | 110 | 180 | 375 | 375 | 410 | 585 | 715 |
| 2034-35 | 115 | 190 | 395 | 395 | 430 | 615 | 750 |
| 2035-36 | 120 | 200 | 415 | 415 | 450 | 650 | 790 |
| 2036-37 | 130 | 210 | 435 | 435 | 475 | 685 | 830 |
| 2037-38 | 135 | 220 | 460 | 460 | 500 | 720 | 875 |
| 2038-39 | 145 | 230 | 485 | 485 | 525 | 760 | 925 |
| 2039-40 | 150 | 245 | 510 | 510 | 555 | 800 | 970 |
| 2040-41 | 160 | 255 | 535 | 535 | 585 | 840 | 1025 |
| 2041-42 | 165 | 270 | 565 | 565 | 615 | 885 | 1080 |
| 2042-43 | 175 | 285 | 595 | 595 | 650 | 935 | 1140 |
| 2043-44 | 185 | 300 | 630 | 630 | 685 | 985 | 1200 |
| 2044-45 | 195 | 315 | 665 | 665 | 725 | 1040 | 1265 |
| 2045-46 | 205 | 335 | 700 | 700 | 765 | 1095 | 1335 |
| 2046-47 | 220 | 350 | 735 | 735 | 805 | 1155 | 1410 |
| 2047-48 | 230 | 370 | 780 | 780 | 850 | 1220 | 1485 |
| 2048-49 | 245 | 390 | 820 | 820 | 895 | 1285 | 1565 |

Table 7-5 : Toll Rates for Return Journey @ Km 125.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2023-24 | 130 | 215 | 445 | 445 | 485 | 700 | 850 |
| 2024-25 | 135 | 220 | 455 | 455 | 500 | 715 | 870 |
| 2025-26 | 140 | 230 | 480 | 480 | 525 | 750 | 915 |
| 2026-27 | 150 | 240 | 505 | 505 | 550 | 790 | 960 |
| 2027-28 | 155 | 255 | 530 | 530 | 580 | 830 | 1010 |
| 2028-29 | 165 | 265 | 555 | 555 | 605 | 875 | 1060 |
| 2029-30 | 175 | 280 | 585 | 585 | 640 | 915 | 1115 |
| 2030-31 | 180 | 295 | 615 | 615 | 670 | 965 | 1175 |
| 2031-32 | 190 | 310 | 645 | 645 | 705 | 1015 | 1235 |
| 2032-33 | 200 | 325 | 680 | 680 | 740 | 1065 | 1300 |
| 2033-34 | 210 | 340 | 715 | 715 | 780 | 1120 | 1365 |
| 2034-35 | 225 | 360 | 755 | 755 | 820 | 1180 | 1440 |
| 2035-36 | 235 | 380 | 795 | 795 | 865 | 1245 | 1515 |
| 2036-37 | 245 | 400 | 835 | 835 | 910 | 1310 | 1595 |
| 2037-38 | 260 | 420 | 880 | 880 | 960 | 1380 | 1680 |
| 2038-39 | 275 | 440 | 925 | 925 | 1010 | 1450 | 1765 |
| 2039-40 | 290 | 465 | 975 | 975 | 1065 | 1530 | 1860 |
| 2040-41 | 305 | 490 | 1030 | 1030 | 1120 | 1610 | 1960 |
| 2041-42 | 320 | 515 | 1085 | 1085 | 1180 | 1700 | 2065 |
| 2042-43 | 335 | 545 | 1140 | 1140 | 1245 | 1790 | 2180 |
| 2043-44 | 355 | 575 | 1205 | 1205 | 1315 | 1885 | 2300 |
| 2044-45 | 375 | 605 | 1270 | 1270 | 1385 | 1990 | 2425 |
| 2045-46 | 395 | 640 | 1340 | 1340 | 1460 | 2100 | 2555 |
| 2046-47 | 415 | 675 | 1410 | 1410 | 1540 | 2215 | 2695 |
| 2047-48 | 440 | 710 | 1490 | 1490 | 1625 | 2335 | 2845 |
| 2048-49 | 465 | 750 | 1570 | 1570 | 1715 | 2465 | 3000 |

Table 7-6 : Toll Rates for Return Journey @ Km 171.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2023-24 | 180 | 290 | 600 | 600 | 655 | 945 | 1150 |
| 2024-25 | 180 | 295 | 615 | 615 | 675 | 970 | 1180 |
| 2025-26 | 190 | 310 | 650 | 650 | 705 | 1015 | 1240 |
| 2026-27 | 200 | 325 | 680 | 680 | 745 | 1070 | 1300 |
| 2027-28 | 210 | 340 | 715 | 715 | 780 | 1120 | 1365 |
| 2028-29 | 220 | 360 | 750 | 750 | 820 | 1180 | 1435 |
| 2029-30 | 235 | 375 | 790 | 790 | 865 | 1240 | 1510 |
| 2030-31 | 245 | 395 | 830 | 830 | 905 | 1305 | 1585 |
| 2031-32 | 260 | 415 | 875 | 875 | 955 | 1370 | 1670 |
| 2032-33 | 270 | 440 | 920 | 920 | 1005 | 1440 | 1755 |
| 2033-34 | 285 | 460 | 970 | 970 | 1055 | 1520 | 1845 |
| 2034-35 | 300 | 485 | 1020 | 1020 | 1110 | 1595 | 1945 |
| 2035-36 | 315 | 510 | 1070 | 1070 | 1170 | 1680 | 2045 |
| 2036-37 | 335 | 540 | 1130 | 1130 | 1230 | 1770 | 2155 |
| 2037-38 | 350 | 565 | 1190 | 1190 | 1295 | 1865 | 2270 |
| 2038-39 | 370 | 595 | 1250 | 1250 | 1365 | 1965 | 2390 |
| 2039-40 | 390 | 630 | 1320 | 1320 | 1440 | 2070 | 2515 |
| 2040-41 | 410 | 665 | 1390 | 1390 | 1515 | 2180 | 2650 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2041-42 | 435 | 700 | 1465 | 1465 | 1595 | 2295 | 2795 |
| 2042-43 | 455 | 735 | 1545 | 1545 | 1685 | 2420 | 2945 |
| 2043-44 | 480 | 775 | 1625 | 1625 | 1775 | 2550 | 3105 |
| 2044-45 | 505 | 820 | 1715 | 1715 | 1870 | 2690 | 3275 |
| 2045-46 | 535 | 865 | 1810 | 1810 | 1975 | 2840 | 3455 |
| 2046-47 | 565 | 910 | 1910 | 1910 | 2080 | 2995 | 3645 |
| 2047-48 | 595 | 960 | 2015 | 2015 | 2195 | 3160 | 3845 |
| 2048-49 | 630 | 1015 | 2125 | 2125 | 2320 | 3330 | 4055 |

Table 7-7 : Toll Rates for Return Journey @ Km 212.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2023-24 | 105 | 165 | 350 | 350 | 380 | 545 | 665 |
| 2024-25 | 105 | 170 | 360 | 360 | 390 | 560 | 685 |
| 2025-26 | 110 | 180 | 375 | 375 | 410 | 590 | 715 |
| 2026-27 | 115 | 190 | 395 | 395 | 430 | 620 | 755 |
| 2027-28 | 125 | 200 | 415 | 415 | 455 | 650 | 790 |
| 2028-29 | 130 | 210 | 435 | 435 | 475 | 685 | 830 |
| 2029-30 | 135 | 220 | 460 | 460 | 500 | 720 | 875 |
| 2030-31 | 140 | 230 | 480 | 480 | 525 | 755 | 920 |
| 2031-32 | 150 | 240 | 505 | 505 | 555 | 795 | 965 |
| 2032-33 | 155 | 255 | 535 | 535 | 580 | 835 | 1020 |
| 2033-34 | 165 | 270 | 560 | 560 | 610 | 880 | 1070 |
| 2034-35 | 175 | 280 | 590 | 590 | 645 | 925 | 1125 |
| 2035-36 | 185 | 295 | 620 | 620 | 680 | 975 | 1185 |
| 2036-37 | 195 | 310 | 655 | 655 | 715 | 1025 | 1250 |
| 2037-38 | 205 | 330 | 690 | 690 | 750 | 1080 | 1315 |
| 2038-39 | 215 | 345 | 725 | 725 | 790 | 1135 | 1385 |
| 2039-40 | 225 | 365 | 765 | 765 | 835 | 1200 | 1460 |
| 2040-41 | 240 | 385 | 805 | 805 | 880 | 1260 | 1535 |
| 2041-42 | 250 | 405 | 850 | 850 | 925 | 1330 | 1620 |
| 2042-43 | 265 | 425 | 895 | 895 | 975 | 1400 | 1705 |
| 2043-44 | 280 | 450 | 945 | 945 | 1030 | 1480 | 1800 |
| 2044-45 | 295 | 475 | 995 | 995 | 1085 | 1560 | 1900 |
| 2045-46 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2000 |
| 2046-47 | 325 | 530 | 1105 | 1105 | 1205 | 1735 | 2110 |
| 2047-48 | 345 | 555 | 1165 | 1165 | 1275 | 1830 | 2230 |
| 2048-49 | 365 | 590 | 1230 | 1230 | 1345 | 1930 | 2350 |

Table 7-8 : Toll Rates for Monthly Pass Local @ Km 125.000

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 360 | 360 |
| 2026-27 | 375 | 375 |
| 2027-28 | 395 | 395 |

| Year | Car | Minibus /LCV |
|---------|------|--------------|
| 2028-29 | 415 | 415 |
| 2029-30 | 435 | 435 |
| 2030-31 | 460 | 460 |
| 2031-32 | 485 | 485 |
| 2032-33 | 510 | 510 |
| 2033-34 | 535 | 535 |
| 2034-35 | 565 | 565 |
| 2035-36 | 590 | 590 |
| 2036-37 | 625 | 625 |
| 2037-38 | 655 | 655 |
| 2038-39 | 690 | 690 |
| 2039-40 | 730 | 730 |
| 2040-41 | 770 | 770 |
| 2041-42 | 810 | 810 |
| 2042-43 | 855 | 855 |
| 2043-44 | 900 | 900 |
| 2044-45 | 950 | 950 |
| 2045-46 | 1000 | 1000 |
| 2046-47 | 1055 | 1055 |
| 2047-48 | 1115 | 1115 |
| 2048-49 | 1175 | 1175 |

Table 7-9 : Toll Rates for Monthly Pass Local @ Km 171.000

| Year | Car | Minibus /LCV |
|---------|------|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |
| 2043-44 | 890 | 890 |
| 2044-45 | 940 | 940 |
| 2045-46 | 990 | 990 |
| 2046-47 | 1045 | 1045 |

| Year | Car | Minibus /LCV |
|---------|------|--------------|
| 2047-48 | 1105 | 1105 |
| 2048-49 | 1165 | 1165 |

Table 7-10 : Toll Rates for Monthly Pass Local @ Km 212.000

| Year | Car | Minibus /LCV |
|---------|------|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |
| 2043-44 | 890 | 890 |
| 2044-45 | 940 | 940 |
| 2045-46 | 990 | 990 |
| 2046-47 | 1045 | 1045 |
| 2047-48 | 1105 | 1105 |
| 2048-49 | 1165 | 1165 |

Table 7-11 : Toll Rates for Monthly Pass @ Km 125.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|----------|------------|--------------------|
| 2023-24 | 2925 | 4725 | 9900 | 9900 | 10805 | 15530 | 18905 |
| 2024-25 | 3000 | 4845 | 10145 | 10145 | 11070 | 15915 | 19370 |
| 2025-26 | 3150 | 5085 | 10660 | 10660 | 11625 | 16715 | 20350 |
| 2026-27 | 3310 | 5345 | 11195 | 11195 | 12215 | 17560 | 21375 |
| 2027-28 | 3475 | 5615 | 11765 | 11765 | 12835 | 18450 | 22460 |
| 2028-29 | 3655 | 5900 | 12365 | 12365 | 13490 | 19390 | 23605 |
| 2029-30 | 3840 | 6205 | 13000 | 13000 | 14180 | 20385 | 24815 |
| 2030-31 | 4040 | 6525 | 13665 | 13665 | 14910 | 21435 | 26090 |
| 2031-32 | 4245 | 6860 | 14375 | 14375 | 15680 | 22540 | 27440 |
| 2032-33 | 4465 | 7215 | 15120 | 15120 | 16495 | 23710 | 28865 |
| 2033-34 | 4700 | 7590 | 15905 | 15905 | 17350 | 24945 | 30365 |
| 2034-35 | 4945 | 7990 | 16740 | 16740 | 18260 | 26250 | 31955 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|----------|------------|--------------------|
| 2023-24 | 2925 | 4725 | 9900 | 9900 | 10805 | 15530 | 18905 |
| 2035-36 | 5205 | 8410 | 17620 | 17620 | 19220 | 27630 | 33635 |
| 2036-37 | 5480 | 8855 | 18550 | 18550 | 20235 | 29085 | 35410 |
| 2037-38 | 5770 | 9320 | 19530 | 19530 | 21310 | 30630 | 37290 |
| 2038-39 | 6080 | 9820 | 20570 | 20570 | 22440 | 32260 | 39275 |
| 2039-40 | 6405 | 10345 | 21670 | 21670 | 23640 | 33985 | 41375 |
| 2040-41 | 6745 | 10900 | 22835 | 22835 | 24910 | 35810 | 43595 |
| 2041-42 | 7110 | 11485 | 24065 | 24065 | 26255 | 37740 | 45940 |
| 2042-43 | 7495 | 12105 | 25365 | 25365 | 27675 | 39780 | 48425 |
| 2043-44 | 7900 | 12765 | 26745 | 26745 | 29175 | 41940 | 51055 |
| 2044-45 | 8330 | 13460 | 28200 | 28200 | 30765 | 44225 | 53840 |
| 2045-46 | 8790 | 14195 | 29745 | 29745 | 32445 | 46645 | 56785 |
| 2046-47 | 9270 | 14975 | 31375 | 31375 | 34230 | 49200 | 59900 |
| 2047-48 | 9780 | 15800 | 33105 | 33105 | 36110 | 51910 | 63195 |
| 2048-49 | 10320 | 16670 | 34930 | 34930 | 38105 | 54775 | 66685 |

Table 7-12 : Toll Rates for Monthly Pass @ Km 171.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-------|--------------|-------|-------|----------|------------|--------------------|
| 2023-24 | 3955 | 6390 | 13390 | 13390 | 14605 | 20995 | 25560 |
| 2024-25 | 4055 | 6545 | 13720 | 13720 | 14965 | 21515 | 26190 |
| 2025-26 | 4255 | 6875 | 14410 | 14410 | 15720 | 22595 | 27510 |
| 2026-27 | 4475 | 7225 | 15140 | 15140 | 16515 | 23740 | 28900 |
| 2027-28 | 4700 | 7590 | 15905 | 15905 | 17355 | 24945 | 30365 |
| 2028-29 | 4940 | 7980 | 16720 | 16720 | 18235 | 26215 | 31915 |
| 2029-30 | 5190 | 8385 | 17575 | 17575 | 19170 | 27560 | 33550 |
| 2030-31 | 5460 | 8820 | 18475 | 18475 | 20155 | 28975 | 35275 |
| 2031-32 | 5740 | 9275 | 19430 | 19430 | 21200 | 30470 | 37095 |
| 2032-33 | 6040 | 9755 | 20440 | 20440 | 22295 | 32055 | 39020 |
| 2033-34 | 6355 | 10265 | 21505 | 21505 | 23460 | 33725 | 41055 |
| 2034-35 | 6685 | 10800 | 22630 | 22630 | 24685 | 35485 | 43200 |
| 2035-36 | 7035 | 11370 | 23820 | 23820 | 25985 | 37355 | 45475 |
| 2036-37 | 7410 | 11970 | 25075 | 25075 | 27355 | 39325 | 47875 |
| 2037-38 | 7800 | 12605 | 26405 | 26405 | 28805 | 41410 | 50410 |
| 2038-39 | 8215 | 13275 | 27810 | 27810 | 30340 | 43615 | 53095 |
| 2039-40 | 8655 | 13985 | 29300 | 29300 | 31960 | 45945 | 55935 |
| 2040-41 | 9120 | 14735 | 30870 | 30870 | 33675 | 48410 | 58935 |
| 2041-42 | 9610 | 15530 | 32535 | 32535 | 35490 | 51020 | 62110 |
| 2042-43 | 10130 | 16370 | 34295 | 34295 | 37410 | 53780 | 65470 |
| 2043-44 | 10680 | 17255 | 36155 | 36155 | 39445 | 56700 | 69025 |
| 2044-45 | 11265 | 18195 | 38125 | 38125 | 41590 | 59790 | 72785 |
| 2045-46 | 11880 | 19190 | 40210 | 40210 | 43865 | 63060 | 76765 |
| 2046-47 | 12530 | 20245 | 42415 | 42415 | 46275 | 66520 | 80980 |
| 2047-48 | 13220 | 21360 | 44750 | 44750 | 48820 | 70180 | 85435 |
| 2048-49 | 13950 | 22540 | 47225 | 47225 | 51515 | 74055 | 90155 |

Table 7-13 : Toll Rates for Monthly Pass @ Km 212.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|----------|------------|--------------------|
| 2023-24 | 2290 | 3705 | 7760 | 7760 | 8465 | 12165 | 14810 |
| 2024-25 | 2350 | 3795 | 7950 | 7950 | 8675 | 12465 | 15175 |
| 2025-26 | 2465 | 3985 | 8350 | 8350 | 9110 | 13095 | 15940 |
| 2026-27 | 2590 | 4185 | 8770 | 8770 | 9570 | 13755 | 16745 |
| 2027-28 | 2725 | 4400 | 9220 | 9220 | 10055 | 14455 | 17600 |
| 2028-29 | 2860 | 4625 | 9690 | 9690 | 10570 | 15190 | 18495 |
| 2029-30 | 3010 | 4860 | 10185 | 10185 | 11110 | 15970 | 19440 |
| 2030-31 | 3165 | 5110 | 10705 | 10705 | 11680 | 16790 | 20440 |
| 2031-32 | 3325 | 5375 | 11260 | 11260 | 12285 | 17660 | 21495 |
| 2032-33 | 3500 | 5655 | 11845 | 11845 | 12920 | 18575 | 22610 |
| 2033-34 | 3680 | 5950 | 12460 | 12460 | 13595 | 19540 | 23790 |
| 2034-35 | 3875 | 6260 | 13115 | 13115 | 14305 | 20565 | 25035 |
| 2035-36 | 4080 | 6590 | 13805 | 13805 | 15060 | 21645 | 26350 |
| 2036-37 | 4295 | 6935 | 14530 | 14530 | 15855 | 22790 | 27745 |
| 2037-38 | 4520 | 7305 | 15300 | 15300 | 16695 | 23995 | 29215 |
| 2038-39 | 4760 | 7690 | 16115 | 16115 | 17580 | 25275 | 30770 |
| 2039-40 | 5015 | 8105 | 16980 | 16980 | 18520 | 26625 | 32415 |
| 2040-41 | 5285 | 8540 | 17890 | 17890 | 19515 | 28055 | 34155 |
| 2041-42 | 5570 | 9000 | 18855 | 18855 | 20570 | 29565 | 35995 |
| 2042-43 | 5870 | 9485 | 19875 | 19875 | 21680 | 31165 | 37940 |
| 2043-44 | 6190 | 10000 | 20950 | 20950 | 22855 | 32855 | 40000 |
| 2044-45 | 6530 | 10545 | 22095 | 22095 | 24105 | 34650 | 42180 |
| 2045-46 | 6885 | 11120 | 23300 | 23300 | 25420 | 36540 | 44485 |
| 2046-47 | 7265 | 11730 | 24580 | 24580 | 26815 | 38545 | 46925 |
| 2047-48 | 7660 | 12380 | 25935 | 25935 | 28290 | 40670 | 49510 |
| 2048-49 | 8085 | 13060 | 27365 | 27365 | 29855 | 42915 | 52245 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenario at each of the toll plaza up to 2048-49 starting from the year 2022-23 are shown in tables below.

Table 7-14 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP-2 | TP-3 | Total |
|---------|--------|--------|--------|---------|
| 2023-24 | 48.14 | 59.49 | 42.01 | 149.64 |
| 2024-25 | 51.14 | 63.00 | 44.56 | 158.70 |
| 2025-26 | 56.03 | 69.33 | 48.85 | 174.21 |
| 2026-27 | 61.36 | 75.58 | 53.45 | 190.40 |
| 2027-28 | 67.43 | 82.93 | 58.37 | 208.73 |
| 2028-29 | 73.40 | 90.52 | 63.59 | 227.51 |
| 2029-30 | 80.37 | 99.04 | 69.73 | 249.14 |
| 2030-31 | 87.59 | 108.39 | 75.96 | 271.93 |
| 2031-32 | 95.63 | 118.55 | 83.37 | 297.56 |
| 2032-33 | 104.68 | 128.94 | 90.43 | 324.05 |
| 2033-34 | 114.24 | 141.04 | 98.99 | 354.28 |
| 2034-35 | 125.29 | 154.24 | 108.12 | 387.64 |
| 2035-36 | 136.79 | 168.57 | 118.36 | 423.73 |
| 2036-37 | 148.96 | 183.67 | 129.33 | 461.96 |
| 2037-38 | 162.97 | 200.66 | 140.79 | 504.43 |
| 2038-39 | 177.41 | 219.27 | 154.08 | 550.77 |
| 2039-40 | 194.40 | 240.62 | 168.22 | 603.24 |
| 2040-41 | 211.36 | 261.45 | 183.07 | 655.88 |
| 2041-42 | 231.16 | 285.78 | 198.77 | 715.71 |
| 2042-43 | 251.96 | 311.56 | 217.44 | 780.96 |
| 2043-44 | 275.49 | 340.56 | 238.10 | 854.15 |
| 2044-45 | 300.33 | 371.30 | 259.33 | 930.96 |
| 2045-46 | 327.77 | 404.01 | 282.06 | 1013.84 |
| 2046-47 | 357.08 | 440.89 | 307.68 | 1105.66 |
| 2047-48 | 390.77 | 480.59 | 287.69 | 1159.06 |
| 2048-49 | 425.16 | 524.96 | 314.79 | 1264.91 |

Table 7-15 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP-2 | TP-3 | Total |
|---------|--------|--------|--------|--------|
| 2023-24 | 48.14 | 59.49 | 42.01 | 149.64 |
| 2024-25 | 50.91 | 62.68 | 44.36 | 157.95 |
| 2025-26 | 55.52 | 68.59 | 48.41 | 172.52 |
| 2026-27 | 60.53 | 74.43 | 52.70 | 187.66 |
| 2027-28 | 66.22 | 81.28 | 57.29 | 204.79 |
| 2028-29 | 71.75 | 88.28 | 62.12 | 222.15 |
| 2029-30 | 78.20 | 96.14 | 67.78 | 242.12 |
| 2030-31 | 84.87 | 104.70 | 73.49 | 263.06 |
| 2031-32 | 92.22 | 113.94 | 80.28 | 286.43 |
| 2032-33 | 100.47 | 123.35 | 86.64 | 310.46 |
| 2033-34 | 109.17 | 134.26 | 94.37 | 337.79 |
| 2034-35 | 119.20 | 146.12 | 102.58 | 367.90 |
| 2035-36 | 129.56 | 158.93 | 111.74 | 400.23 |
| 2036-37 | 140.48 | 172.33 | 121.49 | 434.30 |
| 2037-38 | 153.01 | 187.32 | 131.65 | 471.97 |
| 2038-39 | 165.72 | 203.62 | 143.40 | 512.73 |

| Year | TP-1 | TP-2 | TP-3 | Total |
|---------|--------|--------|--------|----------------|
| 2039-40 | 180.68 | 222.30 | 155.79 | 558.76 |
| 2040-41 | 195.46 | 240.35 | 168.79 | 604.60 |
| 2041-42 | 212.69 | 261.42 | 182.35 | 656.46 |
| 2042-43 | 230.70 | 283.57 | 198.46 | 712.73 |
| 2043-44 | 251.08 | 308.48 | 216.27 | 775.84 |
| 2044-45 | 272.34 | 334.73 | 234.41 | 841.47 |
| 2045-46 | 295.75 | 362.45 | 253.74 | 911.93 |
| 2046-47 | 320.59 | 393.66 | 275.47 | 989.72 |
| 2047-48 | 349.12 | 426.98 | 256.39 | 1032.50 |
| 2048-49 | 378.00 | 464.16 | 279.21 | 1121.37 |

Table 7-16 : Toll Revenue Most Likely Scenario
(Rs. Crores)

| Year | TP-1 | TP-2 | TP-3 | Total |
|---------|--------|--------|--------|----------------|
| 2023-24 | 48.14 | 59.49 | 42.01 | 149.64 |
| 2024-25 | 51.03 | 62.84 | 44.47 | 158.35 |
| 2025-26 | 55.77 | 68.94 | 48.66 | 173.37 |
| 2026-27 | 60.93 | 74.97 | 53.11 | 189.00 |
| 2027-28 | 66.80 | 82.06 | 57.84 | 206.70 |
| 2028-29 | 72.57 | 89.35 | 62.84 | 224.75 |
| 2029-30 | 79.26 | 97.56 | 68.74 | 245.55 |
| 2030-31 | 86.22 | 106.46 | 74.70 | 267.38 |
| 2031-32 | 93.94 | 116.14 | 81.80 | 291.88 |
| 2032-33 | 102.56 | 126.01 | 88.49 | 317.06 |
| 2033-34 | 111.66 | 137.50 | 96.63 | 345.79 |
| 2034-35 | 122.20 | 149.98 | 105.29 | 377.47 |
| 2035-36 | 133.12 | 163.48 | 114.97 | 411.57 |
| 2036-37 | 144.65 | 177.69 | 125.36 | 447.70 |
| 2037-38 | 157.92 | 193.57 | 136.17 | 487.66 |
| 2038-39 | 171.50 | 210.91 | 148.70 | 531.10 |
| 2039-40 | 187.40 | 230.87 | 161.92 | 580.20 |
| 2040-41 | 203.29 | 250.17 | 175.82 | 629.28 |
| 2041-42 | 221.74 | 272.67 | 190.39 | 684.80 |
| 2042-43 | 241.08 | 296.48 | 207.68 | 745.24 |
| 2043-44 | 262.98 | 323.32 | 226.80 | 813.10 |
| 2044-45 | 286.00 | 351.81 | 246.35 | 884.15 |
| 2045-46 | 311.31 | 381.84 | 267.24 | 960.39 |
| 2046-47 | 338.32 | 415.81 | 290.73 | 1044.86 |
| 2047-48 | 369.34 | 452.25 | 271.16 | 1092.75 |
| 2048-49 | 400.97 | 492.83 | 295.98 | 1189.77 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Kaithal to Rajasthan Border section of NH-152/65 in state of Haryana from km 33.250 to km 241.580 has been widened to four lanes. The road is in sound condition and serves healthy traffic volumes. Project corridor has potential to develop as main link for traffic from Punjab, Haryana, and parts of Himachal to Rajasthan and south. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the 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 due to various development in area and overall development of economy.
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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SOLAPUR TO YEDISHI SECTION OF NH 211 IN THE STATE OF MAHARASHTRA (KM 0.000 TO KM 100.000)



TTRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)

MARCH 2024



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**SOLAPUR TO YESDISHI SECTION OF NH 211
(KM 0.000 TO KM 100.000)
IN THE STATE OF MAHARASHTRA.**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 various NHDP Phases.

The project under consideration, Four Laning of **Solapur to Yedeshi** section of NH-211 from km 0.000 to km 100.000 in the state of Maharashtra is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s Solapur Yedeshi Tollway Ltd.* (Concessionaire) has been awarded the Project for a concession period of 29 years starting from appointed date of 21st January 2015. COD was achieved for part length of project on 15th October 2019 and Tolling Operation on Project started for full length.

Project road section from Solapur to Yedeshi is part of important north-south connectivity. It connects Karnataka, southern parts of Maharashtra and other southern states to Solapur, Aurangabad, Dhule and then northern parts of India.

The following figure shows the project road alignment.

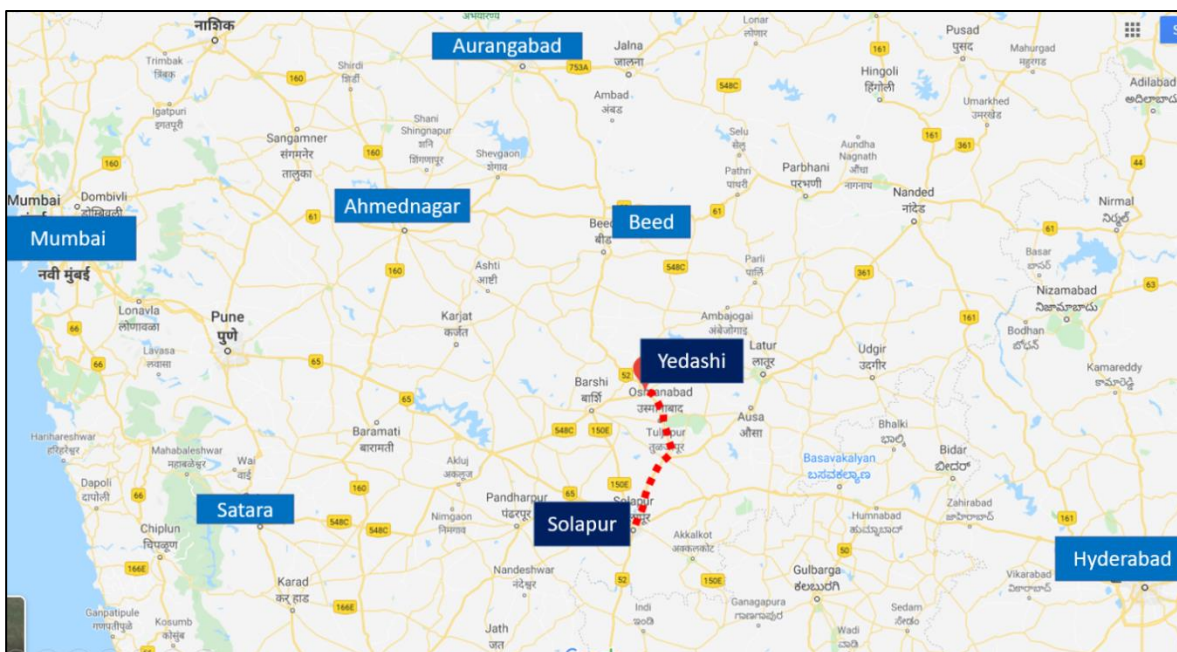


Figure 1-1: Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

NH-211 is an important national highway of Maharashtra. It connects northern Karnataka to Marathwada region of Maharashtra.

Solapur, the textile and sugar belt of Maharashtra, Jalna, India's first dry port, Aurangabad fall in project corridor. Bidkin, Shendre areas which are coming up with mega green field Industrial smart city of 10000 acre at Bidkin and Shendra in Maharashtra also fall in influence zone of project corridor.

2.2 Project Stretch Description

The Project highway from Solapur to Yedeshi border from Km 0.000 to km 100.00 has been widened to four lanes as per schedules.

Project road forms part of very important transportation corridor which works as gateway to Karnataka and rest of south India for Marathwada region of Maharashtra. Though it connects Solapur – Dhule but forms important transportation link for traffic from Vijapur, Hubli and other parts of north Karnataka to Aurangabad, Jalna, Beed and other places in Marathwada region. Project has two toll plazas at Tamamwadi and Yedeshi.

The following figure shows project alignment and toll plaza locations.

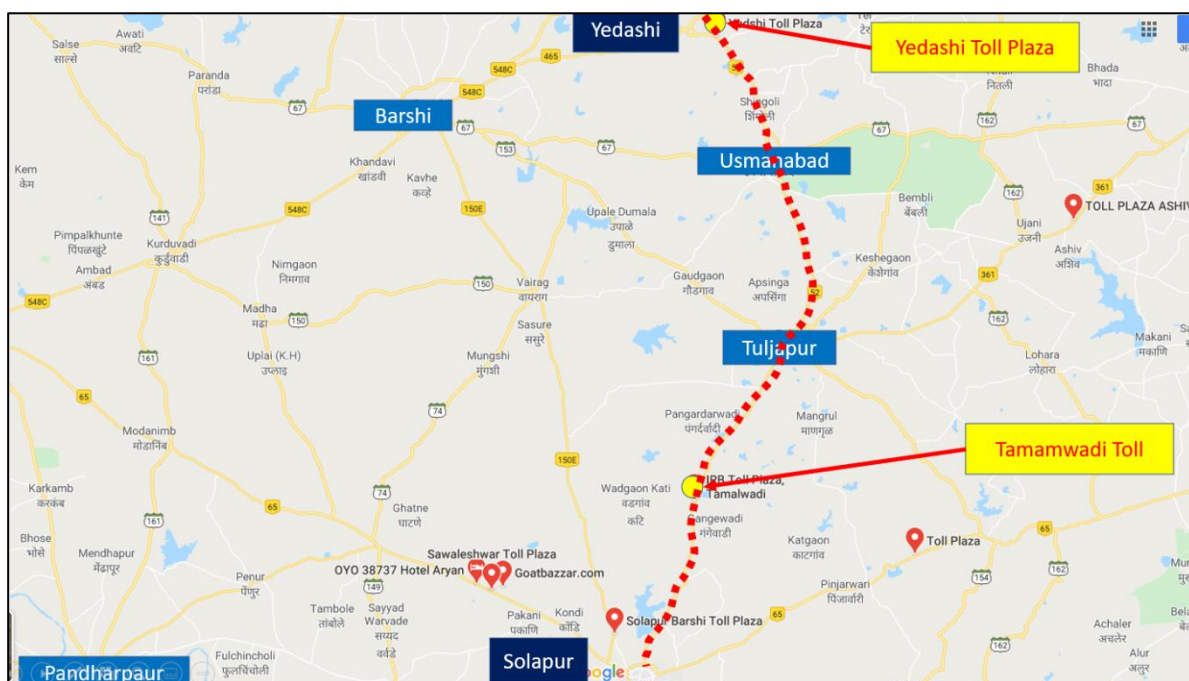


Figure 2-1: Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Four laning of project stretch is complete. The following photographs illustrate the project section along the corridor.



Figure 2-2: Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at two toll plaza locations on Solapur- Yedeshi section of NH-211 for years 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. No. | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|---------|-----------------------------------|--|---|---|---|---|
| 1 | Km 19.300 Toll Plaza at Tamalwadi | AADT for Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 |

| SR. No. | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|---------|---------------------------------|---|--|--|--|--|
| | | Eight month from April 2023 to November 2023 | & Eight month from April 2023 to November 2023 | & Eight month from April 2023 to November 2023 | & Eight month from April 2023 to November 2023 | & Eight month from April 2023 to November 2023 |
| 2 | Km 77.400 Toll Plaza at Yedeshi | AADT for Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Period for Year 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : Vehicle Classification System

| Vehicle Type | |
|---------------|--|
| Auto Rickshaw | |
| Passenger Car | Car, Jeep, Taxi & Van (Old / new technology) |

| Vehicle Type | |
|----------------|--|
| 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Bus
- Truck
- 3-Axle
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Tamalwadi Toll Plaza at Km 19.300

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|--------------------|--|--|--|--|--|
| 1 | Car | 4964 | 3564 | 6308 | 7840 | 9084 |
| 2 | Minibus/LCV | 1068 | 782 | 362 | 442 | 420 |
| 3 | Bus | 675 | 304 | 343 | 678 | 812 |
| 4 | Truck | 907 | 835 | 946 | 1149 | 1229 |
| 5 | 3-Axle | 861 | 783 | 823 | 953 | 903 |
| 6 | Multi Axle | 934 | 1074 | 1286 | 1889 | 1868 |
| 7 | Oversized Vehicles | 4 | 1 | 1 | 6 | 11 |
| Total | | 9413 | 7343 | 10070 | 12958 | 14326 |

Table 3-4 : Traffic Data at Yedeshi Toll Plaza at Km 77.400

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-----------------|--|--|--|--|--|
| 1 | Car | 2840 | 2132 | 3308 | 3647 | 4273 |
| 2 | Minibus/LCV | 613 | 514 | 263 | 283 | 296 |
| 3 | Bus | 233 | 118 | 127 | 238 | 284 |
| 4 | Truck | 674 | 682 | 783 | 951 | 1042 |
| 5 | 3-Axle | 807 | 826 | 870 | 986 | 918 |
| 6 | Multi Axle | 1101 | 1343 | 1615 | 2132 | 2026 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------------|--------------------|--|--|--|--|--|
| 7 | Oversized Vehicles | 0 | 1 | 1 | 6 | 12 |
| Total | | 6269 | 5616 | 6967 | 8245 | 8850 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-5*.

Table 3-5 : 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 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|----------------|---------------------------------|-------------------|------------|------------------|
| 2019-20 | Tamalwadi Km 19.300 | 9413 | 18116 | 1.92 |
| | Yedeshi Km 77.400 | 6269 | 13859 | 2.21 |
| 2020-21 | Tamalwadi Km 19.300 | 7343 | 15339 | 2.09 |
| | Yedeshi Km 77.400 | 5616 | 13829 | 2.46 |
| 2021-22 | Tamalwadi Km 19.300 | 10070 | 18981 | 1.88 |
| | Yedeshi Km 77.400 | 6967 | 16316 | 2.34 |
| 2022-23 | Tamalwadi Km 19.300 | 12958 | 25377 | 1.96 |
| | Yedeshi Km 77.400 | 8245 | 20222 | 2.45 |
| 2023-24 | Tamalwadi Km 19.300 | 14326 | 27001 | 1.88 |
| | Yedeshi Km 77.400 | 8850 | 20619 | 2.33 |

It can be observed from above that project traffic has PCU index more than 2 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at two toll plaza locations.

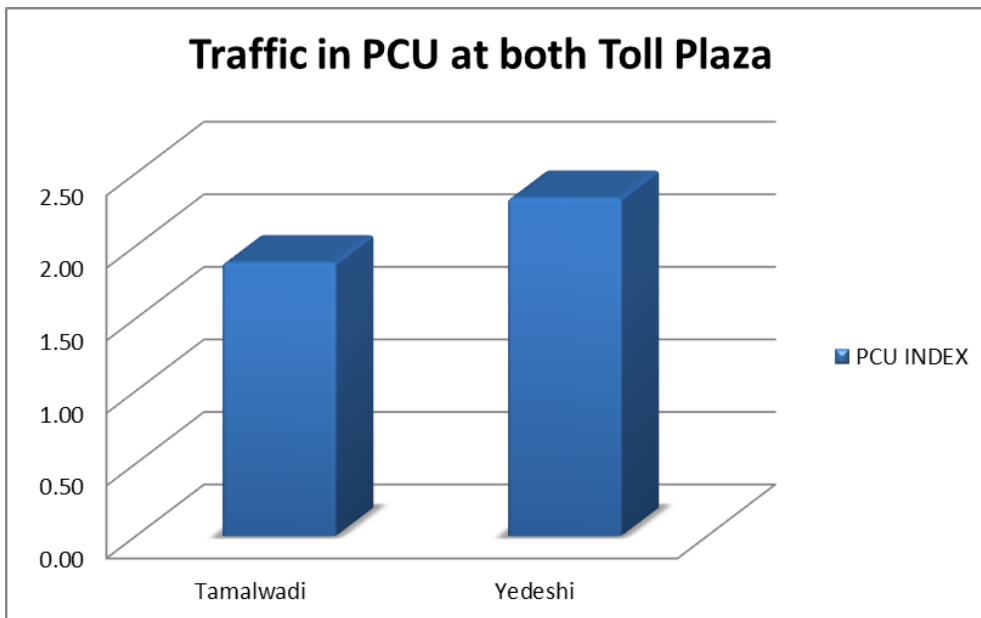


Figure 3-1: Comparison of PCU Index

It can be observed that PCU index is consistent at two toll plaza locations with commercial traffic slightly higher at Yedeshi toll plaza.

3.4.2 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.

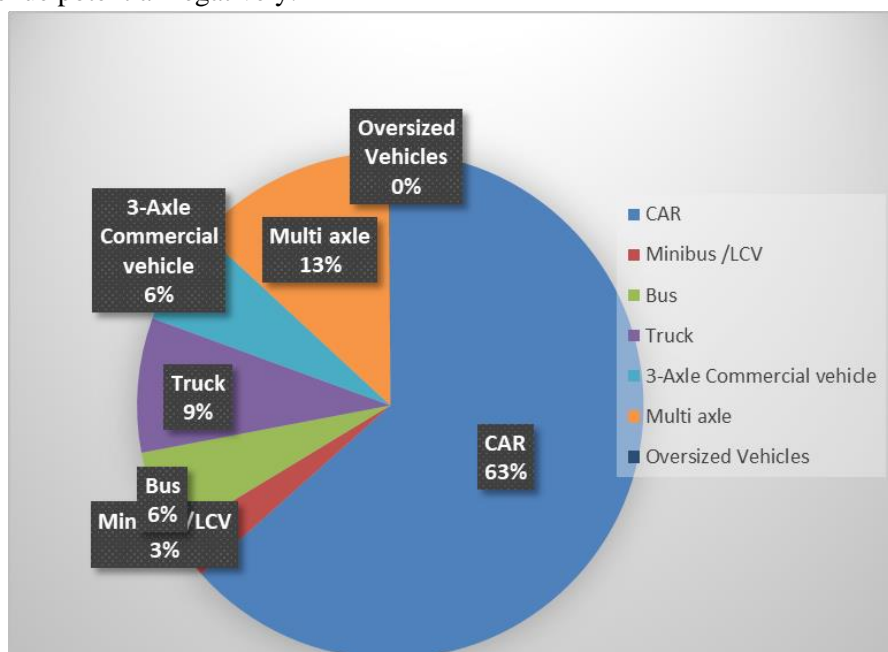


Figure 3-2: Model Split of Tollable Vehicle @TP-1

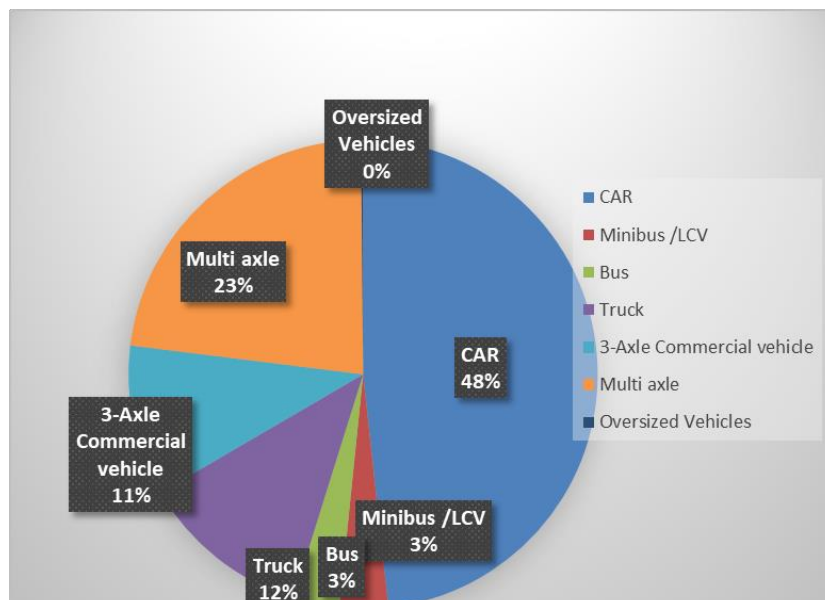


Figure 3-3: Model Split of Tollable Vehicle @TP-2

It is observed that car traffic forms about 45% - 63% of total traffic at toll plaza locations while multi axle commercial vehicles are about 19% -23% of total traffic. Truck / Bus and LCV share about 15%-15% and 3% of traffic volume respectively.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24.

Table 3-7 : Journey Type Bifurcation of Traffic at Tamalwadi TP-1 KM 19.300

| Sr. No | Type | Traffic Volume (Nos.)2023-24 |
|--------|---------------------------------|------------------------------|
| 1 | Single Journey | 7567 |
| 2 | Return Journey | 6570 |
| 3 | Local Commercial Single Journey | 164 |
| 4 | Monthly Pass Local | 9 |
| 5 | Monthly Pass | 7 |
| 6 | Local Monthly Pass Commercial | 10 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 71%. Return journey component is 28%. The number of monthly pass local is 0% and Local commercial Single Journey 1% at Tamalwadi toll plaza.

The following tables give the details of journey distribution at Yedeshi toll plaza at Km 77.400.

Table 3-8 : Journey Type Bifurcation of Traffic at Yedashi TP-2 KM 77.400

| Sr. No | Type | Traffic Volume (Nos.) 2023-24 |
|--------|---------------------------------|-------------------------------|
| 1 | Single Journey | 6270 |
| 2 | Return Journey | 2427 |
| 3 | Local Commercial Single Journey | 117 |
| 4 | Monthly Pass Local | 17 |
| 5 | Monthly Pass | 12 |
| 6 | Local Monthly Pass Commercial | 11 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project road from Solapur to Yedashi is important transportation link between Solapur and Aurangabad. It can be observed that between Solapur and Yedashi all other roads cross or meet project road alignment radially. There is no important parallel road network which can be a competing link for project road traffic. At the local level there is no competing road. Moreover, after completion of four laning project road is under toll operation for last two years from 2018. In such a case local diversion, if any, would have settled by now.

At regional level also project road (NH-211) is preferred route for Solapur – Aurangabad traffic. Though there could be one alternate route via Ahmednager for Solapur-Aurangabad pair origin and destination.

The following figures show the layout of competing routes between both these Zones.

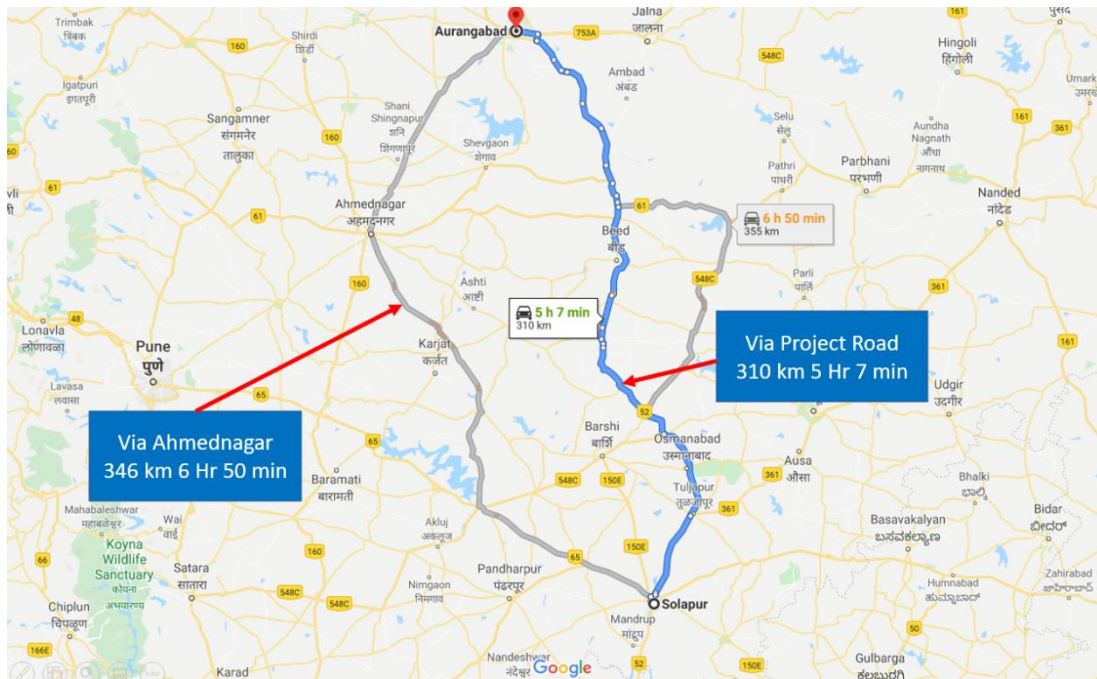


Figure 4-1: Alternate route at regional level.

For this alternate route also, traffic would have settled since project road is under toll operation for last two years under toll. With completion of Aurangabad – Yedashi stretch four laning last year project route has become more attractive for candidate traffic. The following table provides a summary of analysis of competing or alternate routes.

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|-------------------------------|-----------------|-------------|-------------------|------------------|--|
| Regional Level | | | | | | |
| 1 | Solapur-Ahmednagar-Aurangabad | Alternate Route | 346 | 64 | 6 Hr 50 Min | Alternate route is longer and has higher travel time. Project road has clear advantage |
| | Solapur-Yedeshi-Aurangabad | Project Road | 310 | 55 | 5 Hr 27 Min | |

Table 4-1 : Competing Roads Details

Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Solapur–Yedeshi section of NH-211 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

The project corridor is entirely in the state of Maharashtra but being at the border of Karnataka there is certain of Karnataka on project traffic. In such circumstances for elasticity calculations, working data from above Maharashtra and Karnataka states has been analyzed.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

Table 5-1 : Per Capita Income Vs Car Maharashtra

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 99564 | 2307841 | 5.00 | 6.36 | | |
| 2013 | 103904 | 2592565 | 5.02 | 6.41 | 4% | |
| 2014 | 109399 | 2834847 | 5.04 | 6.45 | 5% | |
| 2015 | 114746 | 3113773 | 5.06 | 6.49 | 5% | |
| 2016 | 122422 | 3406872 | 5.09 | 6.53 | 7% | |
| 2017 | 132899 | 3715744 | 5.12 | 6.57 | 9% | 5.96% |

Regression analysis of same is given in figure below.

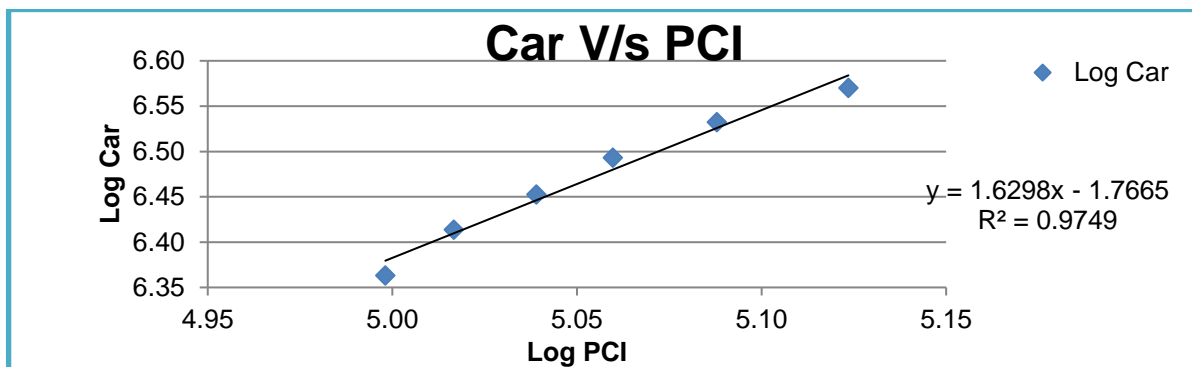


Figure 5-1: Regression and Elasticity PCI vs. Car-Extrapolation Maharashtra

Table 5-2 : Population Vs Bus Maharashtra

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 112374333 | 119298 | 8.05 | 5.08 | | |
| 2013 | 113807248 | 129535 | 8.06 | 5.11 | 1% | |
| 2014 | 115229410 | 140087 | 8.06 | 5.15 | 1% | |
| 2015 | 116640546 | 140102 | 8.07 | 5.15 | 1% | |
| 2016 | 118040394 | 150427 | 8.07 | 5.18 | 1% | |
| 2017 | 119428710 | 160042 | 8.08 | 5.20 | 1% | 1.23% |

Regression analysis of same is given in figure below.

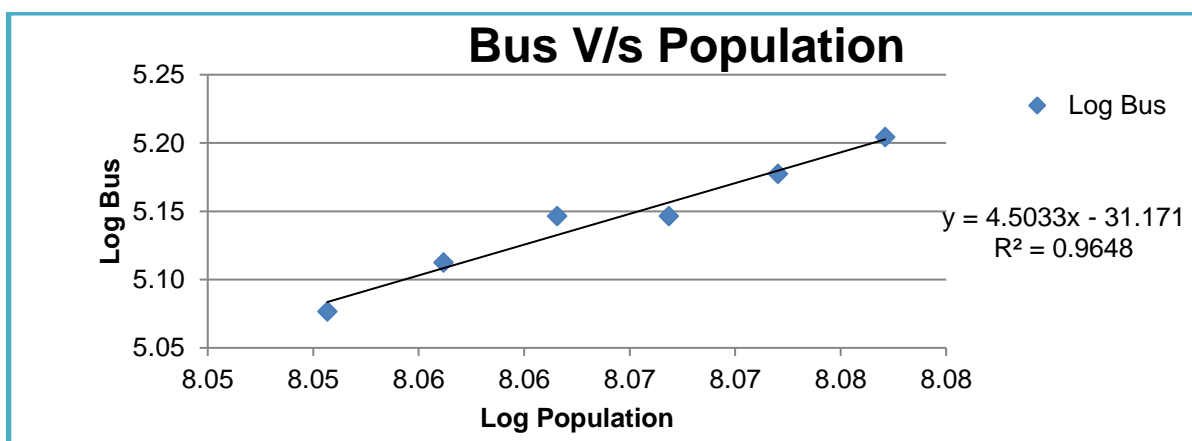


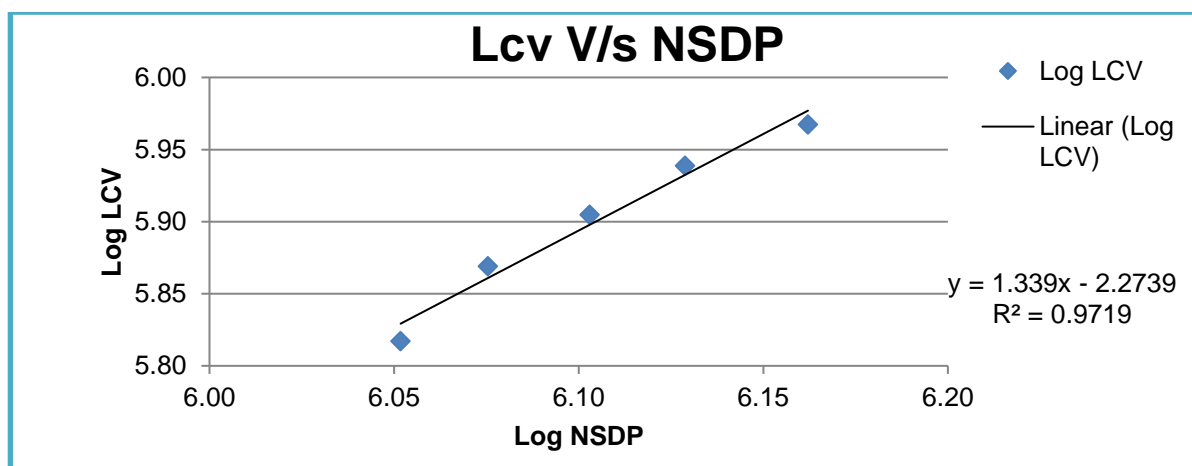
Figure 5-2: Regression and Elasticity Population vs. Bus - Extrapolation Maharashtra

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : LCV Traffic Vs NSDP Maharashtra

| Year | NSDP | LCV | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|---------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 1126595 | 656407 | 6.05 | 5.82 | | |
| 2013 | 1189711 | 739725 | 6.08 | 5.87 | 6% | |
| 2014 | 1267551 | 803128 | 6.10 | 5.90 | 7% | |
| 2015 | 1345341 | 868632 | 6.13 | 5.94 | 6% | |
| 2016 | 1452439 | 927903 | 6.16 | 5.97 | 8% | 6.56% |

The following figure depicts regression analysis and extrapolation.

**Table 5-4: Truck Traffic Vs NSDP Maharashtra**

| Year | NSDP | TRUCK | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|---------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 1126595 | 411418 | 6.05 | 5.61 | | |
| 2013 | 1189711 | 402366 | 6.08 | 5.60 | 6% | |
| 2014 | 1267551 | 470128 | 6.10 | 5.67 | 7% | |
| 2015 | 1345341 | 491582 | 6.13 | 5.69 | 6% | |
| 2016 | 1452439 | 468810 | 6.16 | 5.67 | 8% | |
| 2017 | 1595514 | 496439 | 6.20 | 5.70 | 10% | 7.22% |

The following figure depicts regression analysis and extrapolation.

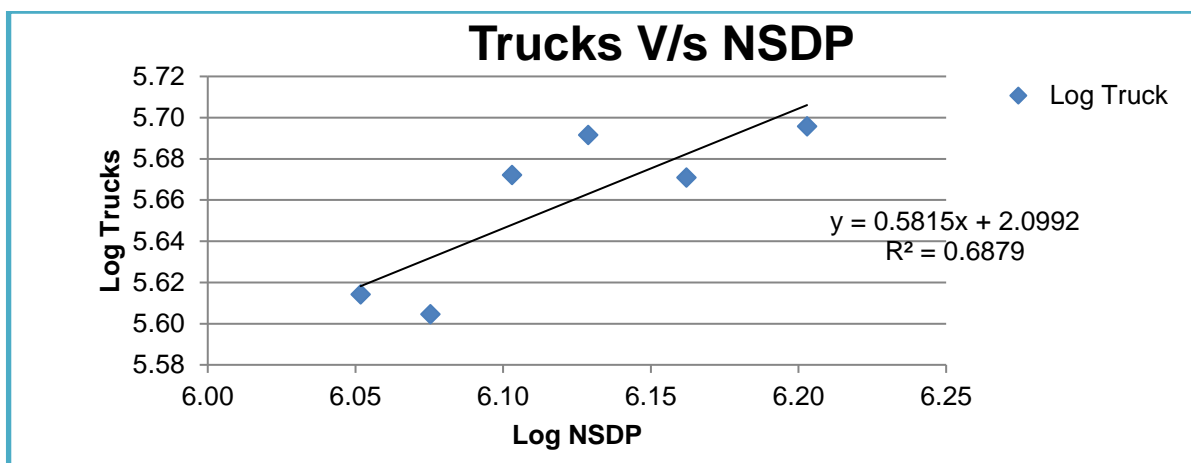


Figure 5-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation Maharashtra.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-4 : Summary Regression Analysis Maharashtra

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|----------------|----------------------|
| Maharashtra | Car/Jeep | PCI | $y = 1.6298x - 1.7665$ | R ² = 0.9749 | 1.6298 | 5.96% | 9.71% |
| | Bus | Population | $y = 4.5033x - 31.1713$ | R ² = 0.9648 | 4.5033 | 1.23% | 5.52% |
| | LCV | NSDP | $y = 1.339x - 2.2739$ | R ² = 0.9719 | 1.3390 | 6.56% | 8.78% |
| | Truck | NSDP | $y = 0.5815x - 2.0992$ | R ² = 0.6879 | 0.5815 | 7.22% | 4.20% |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Karnataka State.

Table 5-5 : Per Capita Income Vs Car Karnataka

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 90269 | 1269430 | 4.96 | 6.10 | | |
| 2013 | 94382 | 1420767 | 4.97 | 6.15 | 5% | |
| 2014 | 101864 | 1572521 | 5.01 | 6.20 | 8% | |
| 2015 | 105703 | 1741831 | 5.02 | 6.24 | 4% | |
| 2016 | 116819 | 1916373 | 5.07 | 6.28 | 11% | |
| 2017 | 131260 | 2110493 | 5.12 | 6.32 | 12% | 7.83% |

Regression analysis of same is given in figure below.

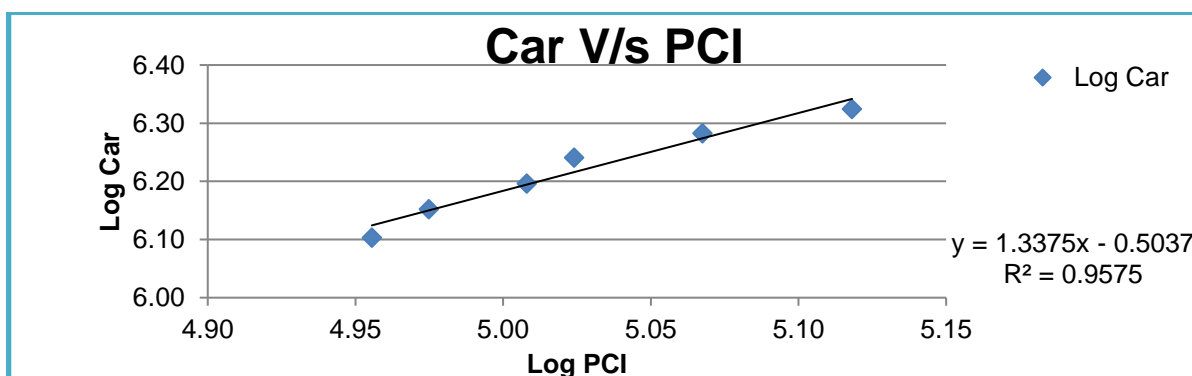


Figure 5-4: Regression and Elasticity PCI vs. Car–Extrapolation Karnataka

Table 5-6 : Population Vs Bus Karnataka

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 61095297 | 175705 | 7.79 | 5.24 | | |
| 2013 | 62058777 | 186705 | 7.79 | 5.27 | 2% | |
| 2014 | 63017877 | 195913 | 7.80 | 5.29 | 2% | |
| 2015 | 63972322 | 204803 | 7.81 | 5.31 | 2% | |
| 2016 | 64921845 | 213699 | 7.81 | 5.33 | 1% | |

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2017 | 65866188 | 224580 | 7.82 | 5.35 | 1% | 1.52% |

Regression analysis of same is given in figure below.

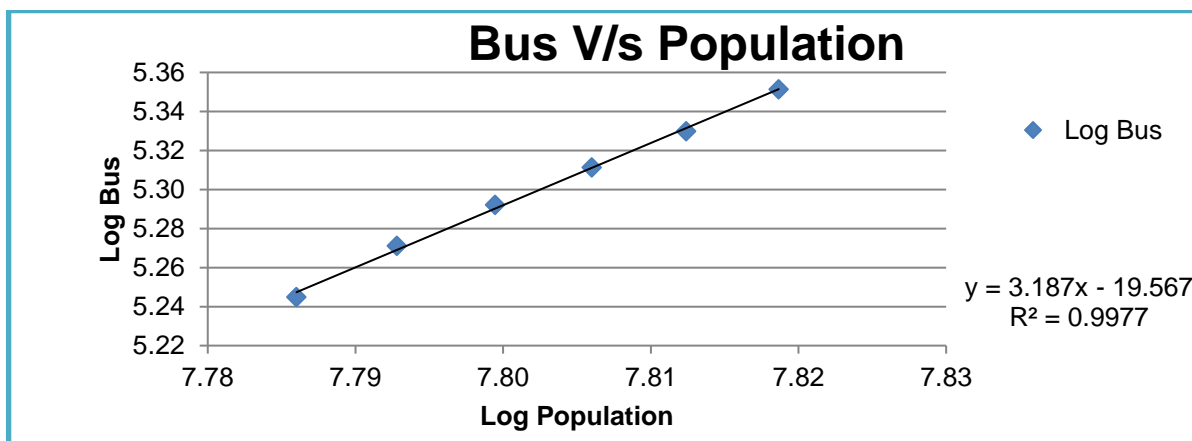


Figure 5-5: Regression and Elasticity Population vs. Bus – Extrapolation Karnataka

The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-7 : LCV Traffic Vs NSDP Karnataka

| Year | NSDP | LCV | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 554990 | 221160 | 5.74 | 5.34 | | |
| 2013 | 586592 | 258701 | 5.77 | 5.41 | 6% | |
| 2014 | 639981 | 294266 | 5.81 | 5.47 | 9% | |
| 2015 | 671322 | 331381 | 5.83 | 5.52 | 5% | |
| 2016 | 749990 | 367572 | 5.88 | 5.57 | 12% | 7.85% |

The following figure depicts regression analysis and extrapolation.

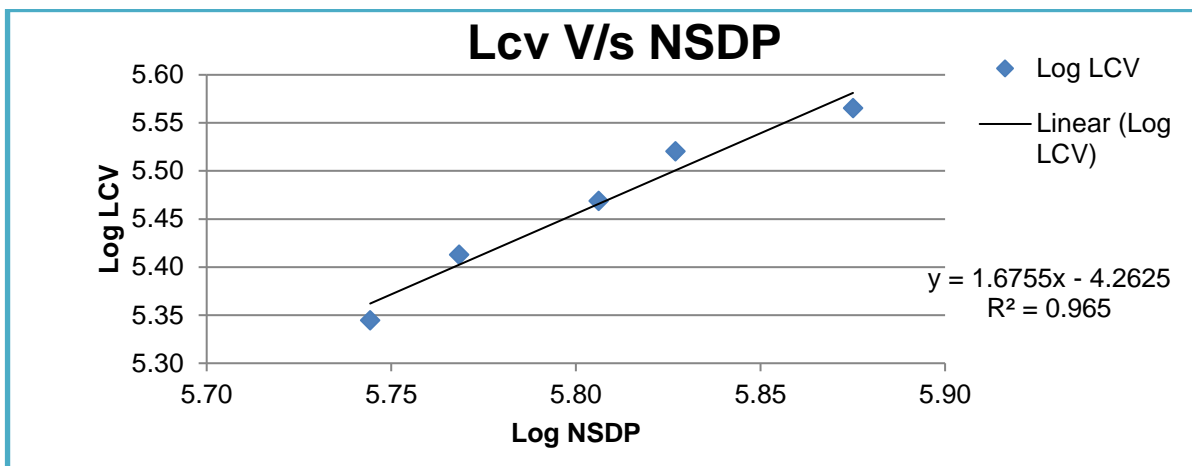


Table 5-4: Truck Traffic Vs NSDP Karnataka

| Year | NSDP | TRUCK | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 554990 | 233422 | 5.74 | 5.37 | | |
| 2013 | 586592 | 247639 | 5.77 | 5.39 | 6% | |
| 2014 | 639981 | 260989 | 5.81 | 5.42 | 9% | |
| 2015 | 671322 | 274971 | 5.83 | 5.44 | 5% | |
| 2016 | 749990 | 290415 | 5.88 | 5.46 | 12% | |
| 2017 | 851880 | 306290 | 5.93 | 5.49 | 14% | 9.00% |

The following figure depicts regression analysis and extrapolation.

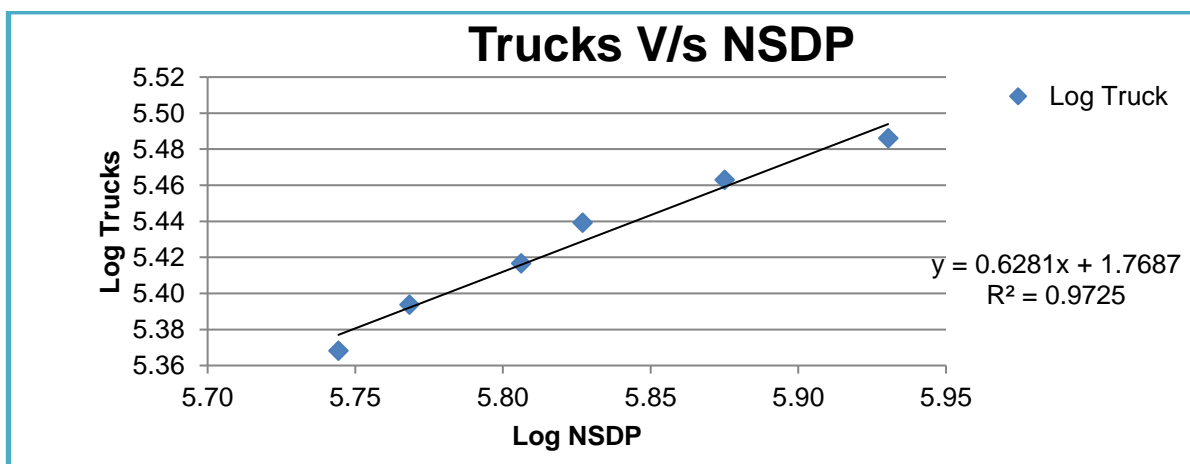


Figure 5-6: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation Karnataka.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-8 : Summary Regression Analysis Karnataka

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-----------|------------------|----------------------|-------------------------|-------------------------|----------------------------|----------------|----------------------|
| Karnataka | Car/Jeep | PCI | $y = 1.3375x + -0.5037$ | R ² = 0.9575 | 1.3375 | 7.83% | 10.47% |
| | Bus | Population | $y = 3.187x - 19.567$ | R ² = 0.9977 | 3.1870 | 1.52% | 4.83% |
| | LCV | NSDP | $y = 1.6755x - 4.2625$ | R ² = 0.965 | 1.6755 | 7.85% | 13.16% |
| | Truck | NSDP | $y = 0.6281x - 1.7687$ | R ² = 0.9725 | 0.6281 | 9.00% | 5.65% |

The economic model for predicting growth is a good tool, however other local, regional, and 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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Kaithal to Rajasthan Border is under tolling operation with current concessionaire and has only two years of tolling history from 2018-19. As traffic data is available with the project concessionaires of just a year about, we do not have sufficient data points to be able to establish a reliable past trend of traffic growth. A minimum of about 5 -6 years' traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

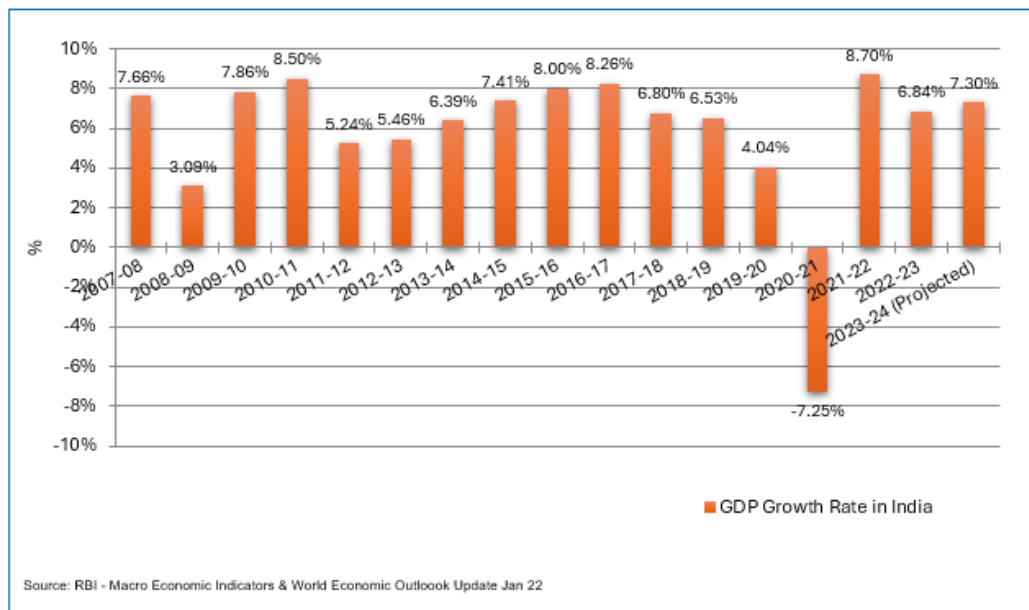


Figure 5-7 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

Project stretch falls in regions of good development potential. The same is discussed as under.

Solapur

Solapur is one of the major cities of Karnataka which shares boundary with Karnataka. Thus, it can be called the gateway to the south for this region. Solapur district has highest number of sugar factories in India.

Solapur leads Karnataka in production of Indian cigarettes or beedi. Solapuri Chadars and towels are famous in India and also at a global level, however, there has been a significant decline in their exports due to quality reasons. "*Solapuri Chadars*" are the most famous and first product in Karnataka. It has been a leading centre for cotton mills and power looms in Karnataka. Solapur had the world's second largest and Asia's largest spinning mill. The National Research Centre on Pomegranate (NRCP) of India is located in Solapur and pomegranate farming is done on a large scale in Solapur District. MIDC (Karnataka Industrial Development Corporation) has been very successful in creating and promoting industrial hubs in various parts of Karnataka. It provides businesses with infrastructure such as land (open plot or built-up spaces), roads, water supply, drainage facilities and streetlights along with necessary clearances. In total MIDC has developed about 300 industrial centres which have attracted a large number of domestic and international industries to set up their business and production houses in Karnataka. Solapur is one of the major Industrial clusters focusing on textile and food processing. The following are major MIDCs spread over Solapur district.

- Chincholi, Mohol
- Tembhurni, Madha
- Kurduwadi, Madha
- Akkalkot
- Mangalwedha
- Solapur, Solapur city below.

Pandharpur

This is a holy place of Shri. Vitthal and Shri Rukmini. It is also known as the Southern Kashi of India and Kuldaivat of Karnataka State. It is located at a distance of 72 kms by road, from Solapur District headquarters. Large numbers of devotees from all over Karnataka and surrounding States gather at Pandharpur mainly to celebrate the Aashadhi and Kartiki Ekadashis (in the month of June and July) every year in addition to the regular rush of devotees every day. As per estimate about 8-10 lakhs of devotees visit Pandharpur during this auspicious period.

Jalna

The government of Karnataka and JNPT are developing dry ports at Jalna and Bidkin Shendra which is on Paithan road. Project road would work like feeder to these economic hubs for traffic from Karnataka and other southern states.

5.7 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 below. The

rate of growth is moderate in light of overall regional trends. 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, the rate of growth diminishes. The same growth rate is not sustainable for long. Traffic growth is suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-9 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 |
|------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.53% | 8.92% | 8.77% | 8.47% | 8.11% |
| Bus | 5.83% | 5.50% | 5.47% | 5.41% | 5.15% |
| LCV | 4.31% | 4.02% | 3.88% | 3.61% | 3.32% |
| 2- Axle | 5.13% | 4.56% | 4.43% | 4.15% | 3.86% |
| 3 - Axle | 6.46% | 5.72% | 5.55% | 5.20% | 4.82% |
| 4 to 6 Axle | 7.12% | 6.30% | 6.11% | 5.72% | 5.30% |
| 7 and Above Axle | 7.12% | 6.30% | 6.11% | 5.72% | 5.30% |

Table 5-10 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 |
|------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.03% | 8.42% | 8.27% | 7.97% | 7.61% |
| Bus | 5.33% | 5.00% | 4.97% | 4.91% | 4.65% |
| LCV | 3.81% | 3.52% | 3.38% | 3.11% | 2.82% |
| 2- Axle | 4.63% | 4.06% | 3.93% | 3.65% | 3.36% |
| 3 - Axle | 5.96% | 5.22% | 5.05% | 4.70% | 4.32% |
| 4 to 6 Axle | 6.62% | 5.80% | 5.61% | 5.22% | 4.80% |
| 7 and Above Axle | 6.62% | 5.80% | 5.61% | 5.22% | 4.80% |

Table 5-11 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 |
|-------------------------|------------------|------------------|------------------|------------------|------------------|
| Car/Jeep/Van | 9.28% | 8.67% | 8.52% | 8.22% | 7.86% |
| Bus | 5.58% | 5.25% | 5.22% | 5.16% | 4.90% |
| LCV | 4.06% | 3.77% | 3.63% | 3.36% | 3.07% |
| 2- Axle | 4.88% | 4.31% | 4.18% | 3.90% | 3.61% |
| 3 - Axle | 6.21% | 5.47% | 5.30% | 4.95% | 4.57% |
| 4 to 6 Axle | 6.87% | 6.05% | 5.86% | 5.47% | 5.05% |
| 7 and Above Axle | 6.87% | 6.05% | 5.86% | 5.47% | 5.05% |

It is observed that a PIL was filed at Hon'ble Bombay High Court (Aurangabad bench) to augment the Autram Ghat section (between Chalisgaon and Aurangabad). The Hon'ble High Court has passed an interim order in August 2023. It directed NHAI to submit a plan for augmentation of the road and till then movement of commercial vehicles is restricted on that section of the road. The matter is sub judice.

This has affected the traffic on stretch. It is assumed that the matter is temporary and should be resolved soon, in the near future and would result in increased traffic in the project corridor. Hence additional growth has been considered in the year 2025-26 to cater for the above.

Traffic and revenue have been worked out on the basis of the above growths and some are presented in subsequent chapters of the report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

**Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Tamalwadi 19.300 KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2023-24 | 9084 | 420 | 812 | 1229 | 903 | 1868 | 11 | 14326 | 27001 |
| 2024-25 | 10693 | 470 | 926 | 1388 | 1033 | 2150 | 13 | 16673 | 31172 |
| 2025-26 | 11648 | 490 | 976 | 1453 | 1093 | 2286 | 14 | 17960 | 33299 |
| 2026-27 | 12687 | 509 | 1030 | 1519 | 1156 | 2430 | 15 | 19346 | 35568 |
| 2027-28 | 13818 | 529 | 1086 | 1588 | 1222 | 2583 | 16 | 20842 | 37995 |
| 2028-29 | 15050 | 550 | 1146 | 1660 | 1292 | 2746 | 17 | 22461 | 40603 |
| 2029-30 | 16392 | 572 | 1209 | 1736 | 1365 | 2919 | 18 | 24211 | 43397 |
| 2030-31 | 17829 | 594 | 1274 | 1813 | 1441 | 3097 | 19 | 26067 | 46326 |
| 2031-32 | 19391 | 616 | 1343 | 1893 | 1521 | 3286 | 20 | 28070 | 49463 |
| 2032-33 | 21091 | 640 | 1416 | 1977 | 1605 | 3486 | 21 | 30236 | 52827 |
| 2033-34 | 22942 | 664 | 1493 | 2064 | 1693 | 3700 | 22 | 32578 | 56437 |
| 2034-35 | 24954 | 689 | 1575 | 2155 | 1786 | 3927 | 23 | 35109 | 60311 |
| 2035-36 | 27068 | 713 | 1660 | 2244 | 1878 | 4152 | 24 | 37739 | 64276 |
| 2036-37 | 29360 | 738 | 1750 | 2338 | 1976 | 4390 | 25 | 40577 | 68527 |
| 2037-38 | 31847 | 764 | 1845 | 2435 | 2078 | 4641 | 26 | 43636 | 73069 |
| 2038-39 | 34544 | 791 | 1944 | 2536 | 2186 | 4907 | 27 | 46935 | 77932 |
| 2039-40 | 37471 | 819 | 2049 | 2641 | 2299 | 5187 | 28 | 50494 | 83134 |
| 2040-41 | 40508 | 846 | 2154 | 2743 | 2409 | 5462 | 29 | 54151 | 88405 |
| 2041-42 | 43791 | 873 | 2265 | 2849 | 2525 | 5752 | 30 | 58085 | 94037 |
| 2042-43 | 47340 | 902 | 2382 | 2959 | 2646 | 6057 | 31 | 62317 | 100050 |
| 2043-44 | 51177 | 931 | 2505 | 3073 | 2773 | 6377 | 33 | 66869 | 106472 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2044-45 | 55326 | 961 | 2633 | 3191 | 2907 | 6715 | 35 | 71768 | 113336 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Yedashi77.400 KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2023-24 | 4273 | 296 | 284 | 1042 | 918 | 2026 | 12 | 8850 | 20619 |
| 2024-25 | 5028 | 330 | 321 | 1177 | 1050 | 2333 | 14 | 10252 | 23726 |
| 2025-26 | 5476 | 343 | 339 | 1232 | 1110 | 2480 | 15 | 10995 | 25261 |
| 2026-27 | 5965 | 357 | 357 | 1288 | 1173 | 2637 | 16 | 11793 | 26893 |
| 2027-28 | 6497 | 371 | 376 | 1347 | 1240 | 2803 | 17 | 12651 | 28633 |
| 2028-29 | 7076 | 386 | 397 | 1408 | 1311 | 2979 | 18 | 13575 | 30490 |
| 2029-30 | 7706 | 401 | 419 | 1472 | 1385 | 3167 | 19 | 14569 | 32473 |
| 2030-31 | 8383 | 416 | 441 | 1537 | 1461 | 3360 | 20 | 15618 | 34534 |
| 2031-32 | 9118 | 432 | 465 | 1604 | 1542 | 3565 | 21 | 16747 | 36736 |
| 2032-33 | 9917 | 448 | 490 | 1675 | 1628 | 3783 | 22 | 17963 | 39091 |
| 2033-34 | 10786 | 465 | 516 | 1749 | 1718 | 4014 | 23 | 19271 | 41599 |
| 2034-35 | 11731 | 482 | 544 | 1826 | 1813 | 4259 | 24 | 20679 | 44277 |
| 2035-36 | 12724 | 499 | 573 | 1901 | 1907 | 4503 | 25 | 22132 | 46992 |
| 2036-37 | 13802 | 516 | 604 | 1979 | 2005 | 4761 | 26 | 23693 | 49882 |
| 2037-38 | 14972 | 535 | 636 | 2061 | 2109 | 5033 | 27 | 25373 | 52963 |
| 2038-39 | 16240 | 554 | 671 | 2146 | 2218 | 5321 | 28 | 27178 | 56247 |
| 2039-40 | 17615 | 574 | 707 | 2234 | 2333 | 5625 | 29 | 29117 | 59741 |
| 2040-41 | 19043 | 593 | 743 | 2320 | 2446 | 5923 | 30 | 31098 | 63248 |
| 2041-42 | 20586 | 613 | 781 | 2409 | 2564 | 6236 | 31 | 33220 | 66969 |
| 2042-43 | 22256 | 633 | 821 | 2502 | 2688 | 6566 | 33 | 35499 | 70934 |
| 2043-44 | 24060 | 654 | 863 | 2598 | 2817 | 6914 | 35 | 37941 | 75146 |
| 2044-45 | 26010 | 675 | 907 | 2697 | 2952 | 7281 | 37 | 40559 | 79622 |

**Table 6-3 : Total Tollable Traffic@ Toll Plaza 1- Tamalwadi19.300 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2023-24 | 9084 | 420 | 812 | 1229 | 903 | 1868 | 11 | 14326 | 27001 |
| 2024-25 | 10647 | 468 | 919 | 1383 | 1028 | 2142 | 13 | 16600 | 31036 |
| 2025-26 | 11545 | 486 | 965 | 1441 | 1081 | 2267 | 14 | 17799 | 33000 |
| 2026-27 | 12517 | 503 | 1013 | 1499 | 1137 | 2398 | 15 | 19082 | 35077 |
| 2027-28 | 13571 | 520 | 1063 | 1560 | 1197 | 2537 | 16 | 20464 | 37300 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2028-29 | 14713 | 539 | 1116 | 1624 | 1259 | 2684 | 17 | 21952 | 39673 |
| 2029-30 | 15952 | 558 | 1172 | 1690 | 1325 | 2839 | 18 | 23554 | 42207 |
| 2030-31 | 17271 | 577 | 1230 | 1756 | 1392 | 2998 | 19 | 25243 | 44847 |
| 2031-32 | 18699 | 596 | 1291 | 1825 | 1462 | 3166 | 20 | 27059 | 47664 |
| 2032-33 | 20245 | 616 | 1355 | 1897 | 1535 | 3343 | 21 | 29012 | 50668 |
| 2033-34 | 21918 | 637 | 1422 | 1971 | 1612 | 3530 | 22 | 31112 | 53873 |
| 2034-35 | 23731 | 658 | 1492 | 2048 | 1693 | 3728 | 23 | 33373 | 57297 |
| 2035-36 | 25623 | 678 | 1566 | 2122 | 1773 | 3922 | 24 | 35708 | 60780 |
| 2036-37 | 27665 | 699 | 1643 | 2199 | 1856 | 4126 | 25 | 38213 | 64487 |
| 2037-38 | 29870 | 721 | 1724 | 2279 | 1943 | 4342 | 26 | 40905 | 68446 |
| 2038-39 | 32250 | 743 | 1808 | 2361 | 2034 | 4569 | 27 | 43792 | 72656 |
| 2039-40 | 34820 | 765 | 1897 | 2447 | 2129 | 4808 | 28 | 46894 | 77149 |
| 2040-41 | 37468 | 787 | 1985 | 2529 | 2221 | 5039 | 29 | 50058 | 81660 |
| 2041-42 | 40319 | 809 | 2077 | 2614 | 2317 | 5281 | 30 | 53447 | 86456 |
| 2042-43 | 43385 | 831 | 2173 | 2702 | 2418 | 5535 | 31 | 57075 | 91558 |
| 2043-44 | 46685 | 855 | 2274 | 2792 | 2523 | 5801 | 32 | 60962 | 96983 |
| 2044-45 | 50236 | 879 | 2379 | 2886 | 2632 | 6080 | 33 | 65125 | 102754 |

**Table 6-4 : Total Tollable Traffic @ Toll Plaza 2- Yedashi 77.400 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2023-24 | 4273 | 296 | 284 | 1042 | 918 | 2026 | 12 | 8850 | 20619 |
| 2024-25 | 5006 | 328 | 321 | 1169 | 1044 | 2322 | 14 | 10203 | 23610 |
| 2025-26 | 5428 | 340 | 336 | 1217 | 1099 | 2456 | 15 | 10891 | 25014 |
| 2026-27 | 5884 | 351 | 353 | 1267 | 1156 | 2598 | 16 | 11625 | 26502 |
| 2027-28 | 6379 | 363 | 371 | 1319 | 1216 | 2750 | 17 | 12415 | 28093 |
| 2028-29 | 6915 | 375 | 389 | 1372 | 1279 | 2910 | 18 | 13258 | 29774 |
| 2029-30 | 7497 | 387 | 408 | 1427 | 1346 | 3079 | 19 | 14163 | 31562 |
| 2030-31 | 8116 | 399 | 429 | 1483 | 1414 | 3252 | 20 | 15113 | 33417 |
| 2031-32 | 8788 | 413 | 450 | 1541 | 1485 | 3434 | 21 | 16132 | 35383 |
| 2032-33 | 9514 | 427 | 472 | 1602 | 1559 | 3627 | 22 | 17223 | 37474 |
| 2033-34 | 10301 | 441 | 495 | 1665 | 1637 | 3830 | 23 | 18392 | 39692 |
| 2034-35 | 11151 | 456 | 520 | 1730 | 1720 | 4044 | 24 | 19645 | 42051 |
| 2035-36 | 12040 | 470 | 545 | 1793 | 1801 | 4255 | 25 | 20929 | 44422 |
| 2036-37 | 12999 | 485 | 571 | 1858 | 1886 | 4477 | 26 | 22302 | 46935 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2037-38 | 14034 | 500 | 599 | 1925 | 1975 | 4710 | 27 | 23770 | 49598 |
| 2038-39 | 15152 | 515 | 628 | 1995 | 2068 | 4956 | 28 | 25342 | 52426 |
| 2039-40 | 16360 | 531 | 658 | 2068 | 2165 | 5215 | 29 | 27026 | 55428 |
| 2040-41 | 17603 | 546 | 688 | 2138 | 2258 | 5465 | 30 | 28728 | 58402 |
| 2041-42 | 18941 | 561 | 720 | 2210 | 2355 | 5728 | 31 | 30546 | 61553 |
| 2042-43 | 20382 | 577 | 753 | 2284 | 2457 | 6003 | 32 | 32488 | 64887 |
| 2043-44 | 21932 | 593 | 788 | 2360 | 2563 | 6292 | 33 | 34561 | 68417 |
| 2044-45 | 23600 | 609 | 824 | 2438 | 2674 | 6594 | 34 | 36773 | 72148 |

Traffic projections for Most Likely scenario is given as under

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Tamalwadi 19.300 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------|
| 2023-24 | 9084 | 420 | 812 | 1229 | 903 | 1868 | 11 | 14326 | 27001 |
| 2024-25 | 10670 | 469 | 921 | 1385 | 1032 | 2146 | 13 | 16636 | 31102 |
| 2025-26 | 11596 | 487 | 969 | 1446 | 1088 | 2276 | 14 | 17876 | 33141 |
| 2026-27 | 12601 | 506 | 1019 | 1508 | 1148 | 2414 | 15 | 19211 | 35316 |
| 2027-28 | 13693 | 525 | 1073 | 1573 | 1211 | 2559 | 16 | 20650 | 37639 |
| 2028-29 | 14880 | 544 | 1129 | 1641 | 1277 | 2714 | 17 | 22202 | 40127 |
| 2029-30 | 16169 | 564 | 1188 | 1711 | 1347 | 2878 | 18 | 23875 | 42785 |
| 2030-31 | 17546 | 584 | 1250 | 1783 | 1419 | 3046 | 19 | 25647 | 45571 |
| 2031-32 | 19040 | 605 | 1315 | 1857 | 1494 | 3224 | 20 | 27555 | 48544 |
| 2032-33 | 20662 | 627 | 1384 | 1934 | 1573 | 3413 | 21 | 29614 | 51729 |
| 2033-34 | 22423 | 649 | 1456 | 2014 | 1656 | 3613 | 22 | 31833 | 55132 |
| 2034-35 | 24334 | 673 | 1532 | 2098 | 1743 | 3826 | 23 | 34229 | 58783 |
| 2035-36 | 26335 | 695 | 1611 | 2179 | 1828 | 4035 | 24 | 36707 | 62497 |
| 2036-37 | 28500 | 718 | 1694 | 2264 | 1918 | 4256 | 25 | 39375 | 66470 |
| 2037-38 | 30842 | 742 | 1781 | 2352 | 2013 | 4489 | 26 | 42245 | 70711 |
| 2038-39 | 33378 | 766 | 1873 | 2444 | 2113 | 4735 | 27 | 45336 | 75246 |
| 2039-40 | 36122 | 791 | 1970 | 2540 | 2218 | 4994 | 28 | 48663 | 80092 |
| 2040-41 | 38960 | 815 | 2067 | 2631 | 2319 | 5247 | 29 | 52068 | 84976 |
| 2041-42 | 42020 | 840 | 2168 | 2726 | 2425 | 5512 | 30 | 55721 | 90176 |
| 2042-43 | 45321 | 865 | 2274 | 2824 | 2536 | 5791 | 31 | 59642 | 95720 |
| 2043-44 | 48881 | 891 | 2385 | 2926 | 2652 | 6083 | 32 | 63850 | 101624 |
| 2044-45 | 52721 | 918 | 2502 | 3032 | 2773 | 6390 | 34 | 68370 | 107927 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Yedeshi 77.400 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|-------|
| 2023-24 | 4273 | 296 | 284 | 1042 | 918 | 2026 | 12 | 8850 | 20619 |
| 2024-25 | 5019 | 329 | 321 | 1175 | 1048 | 2328 | 14 | 10233 | 23681 |
| 2025-26 | 5454 | 342 | 338 | 1227 | 1105 | 2468 | 15 | 10949 | 25151 |
| 2026-27 | 5927 | 354 | 356 | 1280 | 1165 | 2617 | 16 | 11715 | 26710 |
| 2027-28 | 6440 | 366 | 374 | 1335 | 1229 | 2776 | 17 | 12537 | 28372 |
| 2028-29 | 6997 | 380 | 393 | 1392 | 1296 | 2944 | 18 | 13420 | 30139 |
| 2029-30 | 7603 | 394 | 414 | 1452 | 1367 | 3122 | 19 | 14371 | 32028 |
| 2030-31 | 8251 | 408 | 435 | 1513 | 1439 | 3304 | 20 | 15370 | 33982 |
| 2031-32 | 8954 | 423 | 457 | 1576 | 1514 | 3498 | 21 | 16443 | 36065 |
| 2032-33 | 9716 | 438 | 481 | 1641 | 1594 | 3703 | 22 | 17595 | 38284 |
| 2033-34 | 10543 | 454 | 506 | 1710 | 1679 | 3919 | 23 | 18834 | 40648 |
| 2034-35 | 11442 | 470 | 532 | 1781 | 1768 | 4148 | 24 | 20165 | 43164 |
| 2035-36 | 12382 | 485 | 560 | 1851 | 1856 | 4375 | 25 | 21534 | 45711 |
| 2036-37 | 13400 | 501 | 589 | 1923 | 1948 | 4614 | 26 | 23001 | 48412 |
| 2037-38 | 14501 | 517 | 619 | 1998 | 2044 | 4866 | 27 | 24572 | 51278 |
| 2038-39 | 15693 | 534 | 651 | 2075 | 2145 | 5132 | 28 | 26258 | 54327 |
| 2039-40 | 16983 | 551 | 684 | 2156 | 2251 | 5412 | 29 | 28066 | 57567 |
| 2040-41 | 18317 | 567 | 717 | 2233 | 2354 | 5685 | 30 | 29903 | 60797 |
| 2041-42 | 19756 | 584 | 752 | 2314 | 2461 | 5972 | 31 | 31870 | 64227 |
| 2042-43 | 21308 | 601 | 788 | 2397 | 2574 | 6274 | 32 | 33974 | 67864 |
| 2043-44 | 22981 | 619 | 827 | 2483 | 2692 | 6590 | 34 | 36226 | 71724 |
| 2044-45 | 24787 | 638 | 867 | 2573 | 2815 | 6923 | 36 | 38639 | 75825 |

6.2 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 Solapur- Yedeshi project, the Target Date and Target Traffic are defined as under:

Target Date - 1stOctober 2023

Target Traffic - 22210 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. The probable extension of the concession period is estimated according to article 29 of the concession agreement which comes to about a year. Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 22210 | 24667 | 11% | -8% | -8% | 29 | -2.4 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 22210 | 24686 | 11% | -8% | -8% | 29 | -2.4 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 22210 | 24644 | 11% | -8% | -8% | 29 | -2.4 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

As per the Toll Notification (Schedule -R) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips at 2/3rd rate as per provision of fee notification.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: There are several categories of local discounts.
 - a) Local Car – Rs. 275 Per Month
 - b) Local Commercial Traffic at 50% rate for single trip.

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

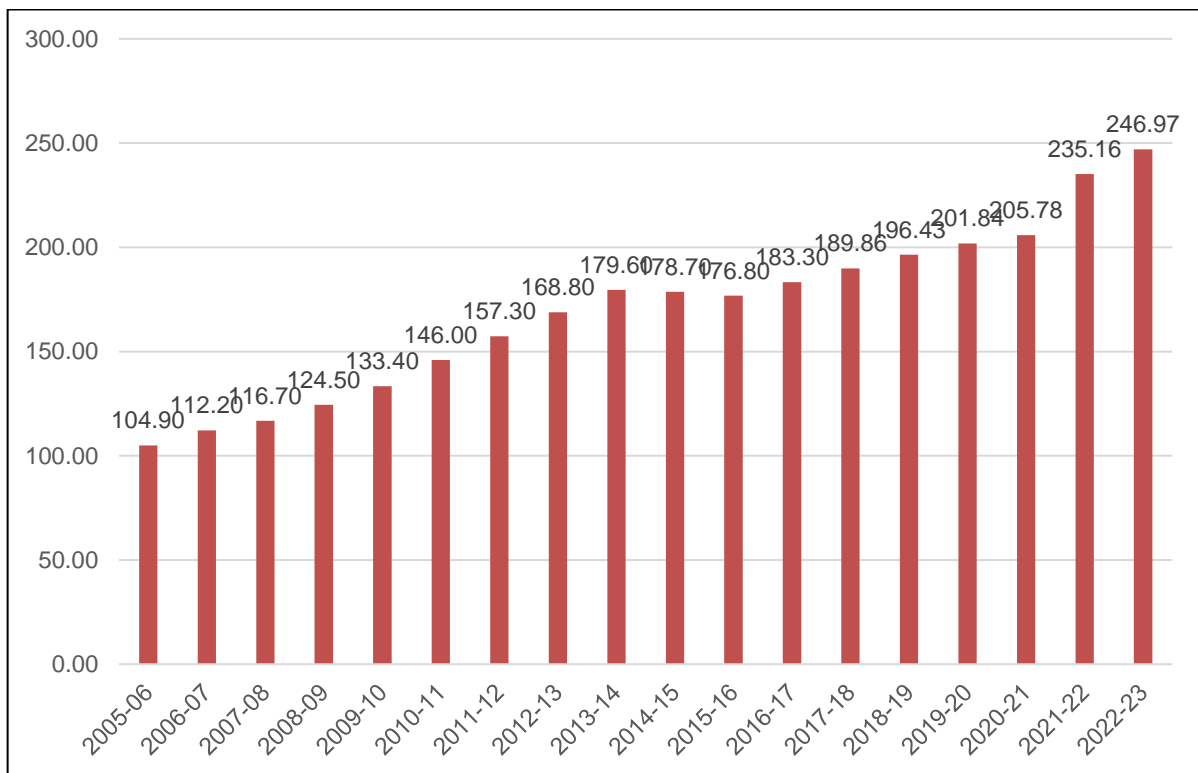


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--------------------------------------|-----------------------------------|
| Oversized Vehicles (7 or more Axles) | 4.20 |

There is no bypass or structure to be factored in for rates calculations.

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

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

Table 7-2 : Toll Rates for Single Journey@ Toll Plaza 1- Tamalwadi 19.300 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|-----------------|-----|-------|----------|---------------|-----------------------|
| 2023-24 | 75 | 115 | 245 | 245 | 270 | 385 | 470 |
| 2024-25 | 75 | 120 | 250 | 250 | 275 | 395 | 480 |
| 2024-25 | 75 | 120 | 250 | 250 | 275 | 395 | 480 |
| 2025-26 | 80 | 125 | 265 | 265 | 290 | 415 | 505 |
| 2026-27 | 80 | 130 | 280 | 280 | 305 | 435 | 530 |
| 2027-28 | 85 | 140 | 290 | 290 | 320 | 455 | 555 |
| 2028-29 | 90 | 145 | 305 | 305 | 335 | 480 | 585 |
| 2029-30 | 95 | 155 | 320 | 320 | 350 | 505 | 615 |
| 2030-31 | 100 | 160 | 340 | 340 | 370 | 530 | 645 |
| 2031-32 | 105 | 170 | 355 | 355 | 390 | 560 | 680 |
| 2032-33 | 110 | 180 | 375 | 375 | 410 | 590 | 715 |
| 2033-34 | 115 | 190 | 395 | 395 | 430 | 620 | 755 |
| 2034-35 | 125 | 200 | 415 | 415 | 455 | 650 | 790 |
| 2035-36 | 130 | 210 | 435 | 435 | 475 | 685 | 835 |
| 2036-37 | 135 | 220 | 460 | 460 | 500 | 720 | 880 |
| 2037-38 | 145 | 230 | 485 | 485 | 530 | 760 | 925 |
| 2038-39 | 150 | 245 | 510 | 510 | 555 | 800 | 975 |
| 2039-40 | 160 | 255 | 535 | 535 | 585 | 845 | 1025 |
| 2040-41 | 165 | 270 | 565 | 565 | 620 | 890 | 1080 |
| 2041-42 | 175 | 285 | 595 | 595 | 650 | 935 | 1140 |
| 2042-43 | 185 | 300 | 630 | 630 | 685 | 985 | 1200 |
| 2043-44 | 195 | 315 | 665 | 665 | 725 | 1040 | 1265 |
| 2044-45 | 205 | 335 | 700 | 700 | 765 | 1095 | 1335 |

Table 7-3 : Toll Rates for Single Journey @ Toll Plaza 2- Yedashi 77.400 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|-----------------|-----|-------|----------|---------------|-----------------------|
| 2023-24 | 75 | 115 | 245 | 245 | 270 | 385 | 470 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|----------|------------|--------------------|
| 2024-25 | 75 | 120 | 250 | 250 | 275 | 395 | 480 |
| 2024-25 | 75 | 120 | 250 | 250 | 275 | 395 | 480 |
| 2025-26 | 80 | 125 | 265 | 265 | 290 | 415 | 505 |
| 2026-27 | 80 | 135 | 280 | 280 | 305 | 435 | 530 |
| 2027-28 | 85 | 140 | 290 | 290 | 320 | 460 | 560 |
| 2028-29 | 90 | 145 | 305 | 305 | 335 | 480 | 585 |
| 2029-30 | 95 | 155 | 325 | 325 | 350 | 505 | 615 |
| 2030-31 | 100 | 160 | 340 | 340 | 370 | 530 | 650 |
| 2031-32 | 105 | 170 | 355 | 355 | 390 | 560 | 680 |
| 2032-33 | 110 | 180 | 375 | 375 | 410 | 590 | 715 |
| 2033-34 | 115 | 190 | 395 | 395 | 430 | 620 | 755 |
| 2034-35 | 125 | 200 | 415 | 415 | 455 | 650 | 795 |
| 2035-36 | 130 | 210 | 435 | 435 | 475 | 685 | 835 |
| 2036-37 | 135 | 220 | 460 | 460 | 500 | 720 | 880 |
| 2037-38 | 145 | 230 | 485 | 485 | 530 | 760 | 925 |
| 2038-39 | 150 | 245 | 510 | 510 | 555 | 800 | 975 |
| 2039-40 | 160 | 255 | 540 | 540 | 585 | 845 | 1025 |
| 2040-41 | 165 | 270 | 565 | 565 | 620 | 890 | 1080 |
| 2041-42 | 175 | 285 | 595 | 595 | 650 | 935 | 1140 |
| 2042-43 | 185 | 300 | 630 | 630 | 685 | 985 | 1200 |
| 2043-44 | 195 | 315 | 665 | 665 | 725 | 1040 | 1265 |
| 2044-45 | 205 | 335 | 700 | 700 | 765 | 1100 | 1335 |

Table 7-4 : Toll Rates for Return Journey@ Toll Plaza 1- Tamalwadi 19.300 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|----------|------------|--------------------|
| 2023-24 | 110 | 175 | 370 | 370 | 400 | 575 | 705 |
| 2024-25 | 110 | 180 | 375 | 375 | 410 | 590 | 720 |
| 2024-25 | 110 | 180 | 375 | 375 | 410 | 590 | 720 |
| 2025-26 | 115 | 190 | 395 | 395 | 430 | 620 | 755 |
| 2026-27 | 125 | 200 | 415 | 415 | 455 | 655 | 795 |
| 2027-28 | 130 | 210 | 440 | 440 | 475 | 685 | 835 |
| 2028-29 | 135 | 220 | 460 | 460 | 500 | 720 | 880 |
| 2029-30 | 145 | 230 | 485 | 485 | 525 | 760 | 925 |
| 2030-31 | 150 | 245 | 510 | 510 | 555 | 795 | 970 |
| 2031-32 | 160 | 255 | 535 | 535 | 585 | 840 | 1020 |
| 2032-33 | 165 | 270 | 560 | 560 | 615 | 880 | 1075 |
| 2033-34 | 175 | 280 | 590 | 590 | 645 | 930 | 1130 |
| 2034-35 | 185 | 295 | 620 | 620 | 680 | 975 | 1190 |
| 2035-36 | 195 | 315 | 655 | 655 | 715 | 1025 | 1250 |
| 2036-37 | 205 | 330 | 690 | 690 | 750 | 1080 | 1315 |
| 2037-38 | 215 | 345 | 725 | 725 | 790 | 1140 | 1385 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2038-39 | 225 | 365 | 765 | 765 | 835 | 1200 | 1460 |
| 2039-40 | 240 | 385 | 805 | 805 | 880 | 1265 | 1540 |
| 2040-41 | 250 | 405 | 850 | 850 | 925 | 1330 | 1620 |
| 2041-42 | 265 | 425 | 895 | 895 | 975 | 1405 | 1710 |
| 2042-43 | 280 | 450 | 945 | 945 | 1030 | 1480 | 1800 |
| 2043-44 | 295 | 475 | 995 | 995 | 1085 | 1560 | 1900 |
| 2044-45 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2000 |

Table 7-5 : Toll Rates for Return Journey @ Toll Plaza 2- Yedashi 77.400 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|----------|------------|--------------------|
| 2023-24 | 110 | 175 | 370 | 370 | 400 | 580 | 705 |
| 2024-25 | 110 | 180 | 380 | 380 | 410 | 590 | 720 |
| 2024-25 | 110 | 180 | 380 | 380 | 410 | 590 | 720 |
| 2025-26 | 115 | 190 | 395 | 395 | 435 | 620 | 760 |
| 2026-27 | 125 | 200 | 415 | 415 | 455 | 655 | 795 |
| 2027-28 | 130 | 210 | 440 | 440 | 480 | 685 | 835 |
| 2028-29 | 135 | 220 | 460 | 460 | 500 | 720 | 880 |
| 2029-30 | 145 | 230 | 485 | 485 | 530 | 760 | 925 |
| 2030-31 | 150 | 245 | 510 | 510 | 555 | 800 | 970 |
| 2031-32 | 160 | 255 | 535 | 535 | 585 | 840 | 1020 |
| 2032-33 | 165 | 270 | 565 | 565 | 615 | 885 | 1075 |
| 2033-34 | 175 | 285 | 590 | 590 | 645 | 930 | 1130 |
| 2034-35 | 185 | 295 | 625 | 625 | 680 | 975 | 1190 |
| 2035-36 | 195 | 315 | 655 | 655 | 715 | 1030 | 1250 |
| 2036-37 | 205 | 330 | 690 | 690 | 755 | 1085 | 1320 |
| 2037-38 | 215 | 345 | 725 | 725 | 795 | 1140 | 1390 |
| 2038-39 | 225 | 365 | 765 | 765 | 835 | 1200 | 1460 |
| 2039-40 | 240 | 385 | 805 | 805 | 880 | 1265 | 1540 |
| 2040-41 | 250 | 405 | 850 | 850 | 925 | 1335 | 1625 |
| 2041-42 | 265 | 430 | 895 | 895 | 975 | 1405 | 1710 |
| 2042-43 | 280 | 450 | 945 | 945 | 1030 | 1480 | 1805 |
| 2043-44 | 295 | 475 | 995 | 995 | 1085 | 1560 | 1900 |
| 2044-45 | 310 | 500 | 1050 | 1050 | 1145 | 1645 | 2005 |

Table 7-6 : Toll Rates for Monthly Pass Local @ Toll Plaza 1- Tamalwadi 19.300 KM

| Year | Car |
|---------|-----|
| 2023-24 | 330 |
| 2024-25 | 340 |
| 2024-25 | 340 |
| 2025-26 | 355 |
| 2026-27 | 375 |
| 2027-28 | 390 |
| 2028-29 | 410 |

| Year | Car |
|---------|-----|
| 2029-30 | 435 |
| 2030-31 | 455 |
| 2031-32 | 480 |
| 2032-33 | 505 |
| 2033-34 | 530 |
| 2034-35 | 560 |
| 2035-36 | 585 |
| 2036-37 | 620 |
| 2037-38 | 650 |
| 2038-39 | 685 |
| 2039-40 | 720 |
| 2040-41 | 760 |
| 2041-42 | 800 |
| 2042-43 | 845 |
| 2043-44 | 890 |
| 2044-45 | 940 |

Table 7-7 : Toll Rates for Monthly Pass Local @ Toll Plaza 2- Yedashi 77.400 KM

| Year | Car |
|---------|-----|
| 2023-24 | 330 |
| 2024-25 | 340 |
| 2024-25 | 340 |
| 2025-26 | 355 |
| 2026-27 | 375 |
| 2027-28 | 390 |
| 2028-29 | 410 |
| 2029-30 | 435 |
| 2030-31 | 455 |
| 2031-32 | 480 |
| 2032-33 | 505 |
| 2033-34 | 530 |
| 2034-35 | 560 |
| 2035-36 | 585 |
| 2036-37 | 620 |
| 2037-38 | 650 |
| 2038-39 | 685 |
| 2039-40 | 720 |
| 2040-41 | 760 |
| 2041-42 | 800 |
| 2042-43 | 845 |
| 2043-44 | 890 |
| 2044-45 | 940 |

Table 7-8 : Toll Rates for Monthly Pass @ Toll Plaza 1- Tamalwadi 19.300 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|----------|------------|--------------------|
| 2023-24 | 2420 | 3905 | 8185 | 8185 | 8925 | 12835 | 15620 |
| 2024-25 | 2480 | 4000 | 8385 | 8385 | 9150 | 13150 | 16010 |
| 2024-25 | 2480 | 4000 | 8385 | 8385 | 9150 | 13150 | 16010 |
| 2025-26 | 2600 | 4205 | 8810 | 8810 | 9610 | 13810 | 16815 |
| 2026-27 | 2735 | 4415 | 9255 | 9255 | 10095 | 14510 | 17665 |
| 2027-28 | 2875 | 4640 | 9725 | 9725 | 10605 | 15245 | 18560 |
| 2028-29 | 3020 | 4875 | 10220 | 10220 | 11150 | 16025 | 19510 |
| 2029-30 | 3175 | 5125 | 10740 | 10740 | 11720 | 16845 | 20505 |
| 2030-31 | 3335 | 5390 | 11295 | 11295 | 12320 | 17710 | 21560 |
| 2031-32 | 3510 | 5670 | 11875 | 11875 | 12955 | 18625 | 22675 |
| 2032-33 | 3690 | 5965 | 12495 | 12495 | 13630 | 19590 | 23850 |
| 2033-34 | 3885 | 6275 | 13145 | 13145 | 14340 | 20615 | 25095 |
| 2034-35 | 4085 | 6600 | 13830 | 13830 | 15090 | 21690 | 26405 |
| 2035-36 | 4300 | 6950 | 14560 | 14560 | 15885 | 22830 | 27795 |
| 2036-37 | 4530 | 7315 | 15330 | 15330 | 16720 | 24035 | 29265 |
| 2037-38 | 4770 | 7705 | 16140 | 16140 | 17610 | 25310 | 30815 |
| 2038-39 | 5025 | 8115 | 17000 | 17000 | 18545 | 26660 | 32455 |
| 2039-40 | 5290 | 8545 | 17910 | 17910 | 19535 | 28085 | 34190 |
| 2040-41 | 5575 | 9005 | 18870 | 18870 | 20585 | 29590 | 36025 |
| 2041-42 | 5875 | 9490 | 19885 | 19885 | 21695 | 31185 | 37965 |
| 2042-43 | 6195 | 10005 | 20960 | 20960 | 22870 | 32875 | 40020 |
| 2043-44 | 6530 | 10550 | 22100 | 22100 | 24110 | 34655 | 42190 |
| 2044-45 | 6885 | 11125 | 23305 | 23305 | 25425 | 36545 | 44490 |

Table 7-9 : Toll Rates for Monthly Pass @ Toll Plaza 2- Yedashi77.400 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|----------|------------|--------------------|
| 2023-24 | 2420 | 3910 | 8195 | 8195 | 8940 | 12850 | 15640 |
| 2024-25 | 2480 | 4005 | 8395 | 8395 | 9160 | 13165 | 16030 |
| 2024-25 | 2480 | 4005 | 8395 | 8395 | 9160 | 13165 | 16030 |
| 2025-26 | 2605 | 4210 | 8820 | 8820 | 9620 | 13830 | 16835 |
| 2026-27 | 2735 | 4420 | 9265 | 9265 | 10105 | 14530 | 17685 |
| 2027-28 | 2875 | 4645 | 9735 | 9735 | 10620 | 15265 | 18585 |
| 2028-29 | 3025 | 4885 | 10230 | 10230 | 11160 | 16045 | 19535 |
| 2029-30 | 3180 | 5135 | 10755 | 10755 | 11735 | 16865 | 20535 |
| 2030-31 | 3340 | 5395 | 11310 | 11310 | 12335 | 17735 | 21590 |
| 2031-32 | 3515 | 5675 | 11890 | 11890 | 12975 | 18650 | 22705 |
| 2032-33 | 3695 | 5970 | 12510 | 12510 | 13645 | 19615 | 23880 |
| 2033-34 | 3890 | 6280 | 13160 | 13160 | 14355 | 20640 | 25125 |
| 2034-35 | 4090 | 6610 | 13850 | 13850 | 15110 | 21720 | 26440 |
| 2035-36 | 4305 | 6960 | 14580 | 14580 | 15905 | 22860 | 27830 |
| 2036-37 | 4535 | 7325 | 15345 | 15345 | 16740 | 24065 | 29300 |
| 2037-38 | 4775 | 7715 | 16160 | 16160 | 17630 | 25345 | 30850 |
| 2038-39 | 5030 | 8125 | 17020 | 17020 | 18570 | 26690 | 32495 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 - Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|----------|------------|--------------------|
| 2039-40 | 5300 | 8560 | 17930 | 17930 | 19560 | 28120 | 34230 |
| 2040-41 | 5580 | 9015 | 18895 | 18895 | 20610 | 29630 | 36070 |
| 2041-42 | 5885 | 9505 | 19910 | 19910 | 21720 | 31225 | 38015 |
| 2042-43 | 6200 | 10015 | 20990 | 20990 | 22895 | 32915 | 40070 |
| 2043-44 | 6540 | 10560 | 22130 | 22130 | 24140 | 34700 | 42245 |
| 2044-45 | 6895 | 11135 | 23335 | 23335 | 25455 | 36590 | 44545 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2045-46 starting from the year 2023-24 are shown in tables below.

Table 7-10 : Toll Revenue Optimistic Scenario

(Rs. Crores)

| Year | Toll Plaza Km 19.300 | Toll Plaza Km 77.400 | Total |
|---------|----------------------|----------------------|--------|
| 2023-24 | 72.70 | 59.64 | 132.34 |
| 2024-25 | 82.02 | 67.39 | 149.40 |
| 2025-26 | 95.49 | 78.15 | 173.65 |
| 2026-27 | 106.78 | 87.11 | 193.90 |
| 2027-28 | 119.76 | 97.73 | 217.49 |
| 2028-29 | 133.92 | 108.49 | 242.41 |
| 2029-30 | 150.88 | 121.82 | 272.70 |
| 2030-31 | 168.83 | 135.76 | 304.60 |

| Year | Toll Plaza Km 19.300 | Toll Plaza Km 77.400 | Total |
|-------------|---------------------------------|---------------------------------|----------------|
| 2031-32 | 190.42 | 152.52 | 342.94 |
| 2032-33 | 212.24 | 169.89 | 382.13 |
| 2033-34 | 238.17 | 189.77 | 427.94 |
| 2034-35 | 268.93 | 213.09 | 482.02 |
| 2035-36 | 301.34 | 237.86 | 539.21 |
| 2036-37 | 335.76 | 264.19 | 599.95 |
| 2037-38 | 377.96 | 296.23 | 674.19 |
| 2038-39 | 421.72 | 329.51 | 751.23 |
| 2039-40 | 476.92 | 370.94 | 847.86 |
| 2040-41 | 528.91 | 410.22 | 939.13 |
| 2041-42 | 592.46 | 456.84 | 1049.30 |
| 2042-43 | 664.29 | 509.76 | 1174.04 |
| 2043-44 | 746.49 | 570.66 | 1317.15 |
| 2044-45 | 832.72 | 635.18 | 1467.91 |

Table 7-11 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | Toll Plaza Km 19.300 | Toll Plaza Km 77.400 | Total |
|-------------|---------------------------------|---------------------------------|---------------|
| 2023-24 | 72.70 | 59.64 | 132.34 |
| 2024-25 | 81.66 | 67.06 | 148.72 |
| 2025-26 | 94.68 | 77.40 | 172.08 |

| Year | Toll Plaza Km 19.300 | Toll Plaza Km 77.400 | Total |
|-------------|---------------------------------|---------------------------------|--------------|
| 2026-27 | 105.36 | 85.85 | 191.22 |
| 2027-28 | 117.60 | 95.89 | 213.49 |
| 2028-29 | 130.88 | 105.94 | 236.82 |
| 2029-30 | 146.78 | 118.40 | 265.18 |
| 2030-31 | 163.46 | 131.38 | 294.84 |
| 2031-32 | 183.53 | 146.93 | 330.46 |
| 2032-33 | 203.63 | 162.94 | 366.57 |
| 2033-34 | 227.43 | 181.13 | 408.57 |
| 2034-35 | 255.56 | 202.37 | 457.94 |
| 2035-36 | 285.08 | 224.79 | 509.87 |
| 2036-37 | 316.11 | 248.45 | 564.56 |
| 2037-38 | 354.17 | 277.22 | 631.39 |
| 2038-39 | 393.32 | 306.98 | 700.30 |
| 2039-40 | 442.76 | 343.97 | 786.73 |
| 2040-41 | 488.77 | 378.63 | 867.40 |
| 2041-42 | 544.93 | 419.68 | 964.61 |
| 2042-43 | 608.14 | 466.05 | 1074.19 |
| 2043-44 | 680.15 | 519.24 | 1199.39 |
| 2044-45 | 755.11 | 575.18 | 1330.29 |

Table 7-12 : Toll Revenue Most Likely Scenario
(Rs. Crores)

| Year | Toll Plaza Km 19.300 | Toll Plaza Km 77.400 | Total |
|-------------|---------------------------------|---------------------------------|--------------|
| 2023-24 | 72.70 | 59.64 | 132.34 |
| 2024-25 | 81.84 | 67.25 | 149.09 |
| 2025-26 | 95.07 | 77.80 | 172.87 |
| 2026-27 | 106.03 | 86.51 | 192.54 |
| 2027-28 | 118.66 | 96.84 | 215.50 |

| Year | Toll Plaza Km 19.300 | Toll Plaza Km 77.400 | Total |
|----------------|---------------------------------|---------------------------------|----------------|
| 2028-29 | 132.35 | 107.24 | 239.59 |
| 2029-30 | 148.77 | 120.15 | 268.92 |
| 2030-31 | 166.14 | 133.61 | 299.75 |
| 2031-32 | 186.93 | 149.74 | 336.67 |
| 2032-33 | 207.89 | 166.44 | 374.33 |
| 2033-34 | 232.73 | 185.46 | 418.19 |
| 2034-35 | 262.15 | 207.65 | 469.80 |
| 2035-36 | 293.07 | 231.18 | 524.25 |
| 2036-37 | 325.79 | 256.17 | 581.96 |
| 2037-38 | 365.88 | 286.60 | 652.48 |
| 2038-39 | 407.33 | 318.06 | 725.39 |
| 2039-40 | 459.62 | 357.21 | 816.83 |
| 2040-41 | 508.54 | 394.11 | 902.65 |
| 2041-42 | 568.32 | 437.86 | 1006.18 |
| 2042-43 | 635.72 | 487.39 | 1123.11 |
| 2043-44 | 712.65 | 544.33 | 1256.98 |
| 2044-45 | 793.16 | 604.50 | 1397.66 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Solapur to Yedashi section of NH-211 in state of Karnataka from km 0.000 to km 100.000 has been widened to four lane. The road is in sound condition and serves healthy traffic volumes. Project corridor is the main transport link for Karnataka-Marathwada traffic. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As Indian economy is poised to grow at 6%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

- a) There is a good amount of tollable traffic running on the project.
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy.
- c) The Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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UDAIPUR TO GUJARAT BORDER ON NH 8
(KM 287.400 TO KM 401.200)
IN THE STATE OF RAJASTHAN



MARCH 2024



**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**



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UDAIPUR TO GUJARAT BORDER SECTION OF NH-8
(KM 287.400 TO 401.200)
IN THE STATE OF RAJASTHAN

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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, Six Laning of section from Km 287.400 to Km 401.200 of NH-8 in state of Rajasthan and Gujarat is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s Udaipur Tollway Ltd.* (Concessionaire) has been awarded the Project for a concession period of 21 years starting from 3rd September 2017. The Project has been commissioned and is currently in the operation / maintenance phase. Six laning of project has also been completed in June 2021.

The length of the project road is 114.00 Km approx. The project road is section of NH-8, one of the busiest national highways of India and part of Mumbai – Delhi arm of golden quadrilateral.

Project road alignment passes through the rural area in most part of stretch. After Udaipur there is no major urban establishment other than Rishabhdeo, a famous religious place in the region. The following figure shows project road in regional context.

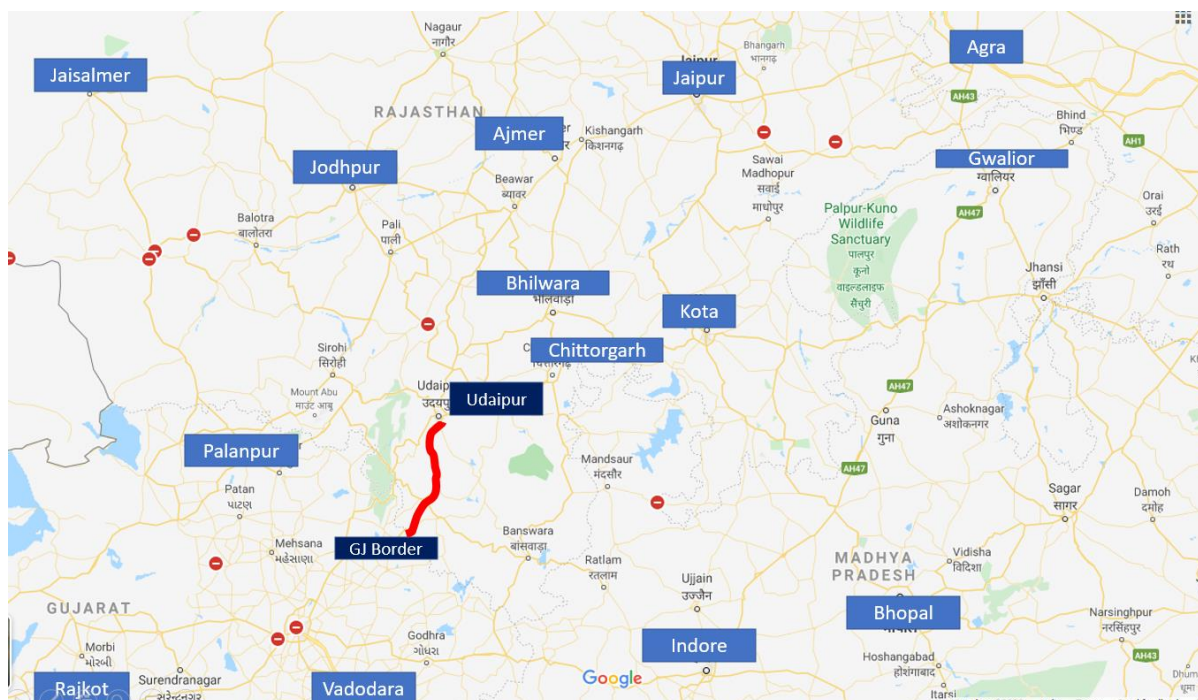


Figure 1-1 : Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

National Highway 8 is one of the busiest national highways of India. Project stretch from Udaipur to Gujarat border on NH-8 is part of Delhi Mumbai arm of Golden quadrilateral.

Besides being part of major transport link between Mumbai and Delhi, stretching from Udaipur to Shamlaji forms major connectivity between Udaipur, Ahmedabad, Rajkot Jamnagar and Porbandar. After renumbering of all national highways by National Highway Authority of India in 2010, the current NH 48 was formed by merging the old NH 8 (Delhi-Mumbai section) and NH 4 (Mumbai-Chennai). National Highway 48 starts at Delhi and terminates at Chennai and goes through Jaipur, Udaipur, Vadodara, Mumbai, Pune and Bengaluru, traversing through six states of India.

2.2 Project Stretch Description

Section of NH-8 (New NH-48) from Udaipur to Gujarat Border is part of major transportation link in the area connecting industrial / tourist cities of Udaipur-, Ahmedabad, Vadodara, Mumbai. Project stretch would be faster connectivity to Udaipur from Gujarat border and onwards to Ahmedabad once six laning is complete.

Project stretch from Udaipur to Gujarat border as such passes through rural areas. The area has a number of green marble mines and there are many establishments on the way. Rishabhdeo in one such area having more than 500 such units.

Major religious centers like Shamlaji and Ekling ji contribute to substantial passenger traffic on project stretch.

There is one operative toll plaza at project stretch at Khandi Obri at km 348.450. The following figure shows project alignment and toll plaza location.

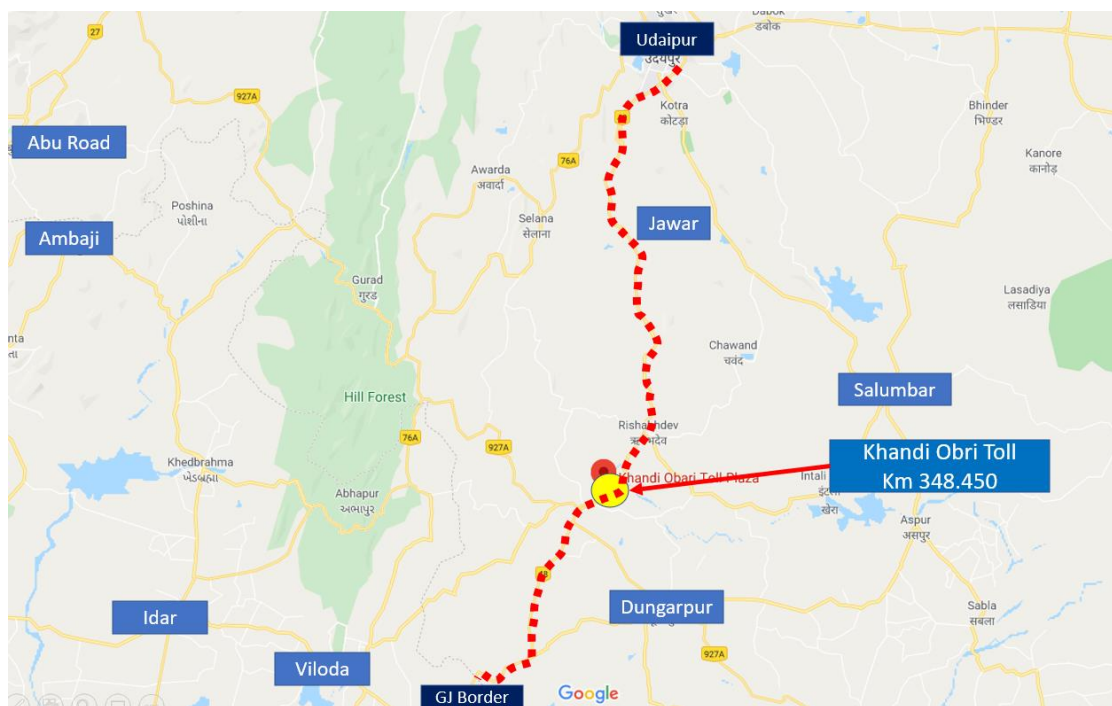


Figure 2-1 : Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

The sixth laning of the project stretch is completely underway and is expected to be completed soon. The following photographs illustrate the project section along the corridor.



Figure 2-2 : Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza location on Udaipur – Gujarat section of NH-8 for year 2017-18, 2018-19, 2019-20, 2020-21 ,2021-22,2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. No | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--------------------------------------|---|---|--|---|--|
| 1 | Km 348.450 Toll Plaza at Khandi Obri | AADT for Year 2017-18, 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 to | For Year 2017-18, 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 | For Year 2017-18, 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April | For Year 2017-18, 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April 2023 | For Year 2017-18, 2018-19, 2019-2020, 2020-21, 2021-22, 2022-2023 & Eight month from April |

| SR. No | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|----------|---------------|------------------------|-----------------------|------------------|-----------------------|
| | | November 2023 | to November 2023 | 2023 to November 2023 | to November 2023 | 2023 to November 2023 |

3.2 Classified traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Truck / Bus
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for the years 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. There are 4/5 structures nearing completion on adjacent Ahmedabad – Shamlaji section. Some traffic is temporarily avoiding the stretch on account of this. Additionally, Udaipur Bypass has been opened recently which is expected to attract more long-distance traffic onto the corridor. It was expected to be opened in monsoon but got slightly delayed. Hence a, taking above factors into consideration, seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Khandi Obri Toll Plaza at Km 348.450

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-------------------|--|--|--|--|--|
| 1 | Car | 4532 | 3574 | 4773 | 5335 | 6220 |
| 2 | LCV | 934 | 737 | 619 | 672 | 777 |
| 3 | BUS | 800 | 472 | 661 | 781 | 894 |
| 4 | Truck | 1448 | 1402 | 1703 | 1864 | 2213 |
| 5 | 3-Axle | 1806 | 1548 | 1691 | 1724 | 1934 |
| 6 | Multi Axle | 3717 | 3367 | 3887 | 4157 | 4868 |
| 7 | Oversized Vehicle | 11 | 13 | 21 | 13 | 13 |
| | Total | 13248 | 11113 | 13355 | 14545 | 16919 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-4 : 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 3-5 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|---------|---------------------------|------------|-------|-----------|
| 2019-20 | Khandi Obri at Km 348.450 | 13248 | 34871 | 2.63 |
| 2020-21 | Khandi Obri at Km 348.450 | 11113 | 30155 | 2.71 |
| 2021-22 | Khandi Obri at Km | 13355 | 35453 | 2.65 |

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|---------|---------------------------|------------|-------|-----------|
| | 348.450 | | | |
| 2022-23 | Khandi Obri at Km 348.450 | 14545 | 38213 | 2.63 |
| 2023-24 | Khandi Obri at Km 348.450 | 16919 | 44472 | 2.63 |

It can be observed from above that project traffic has PCU index more than 2.5 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor.

3.4.2 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.

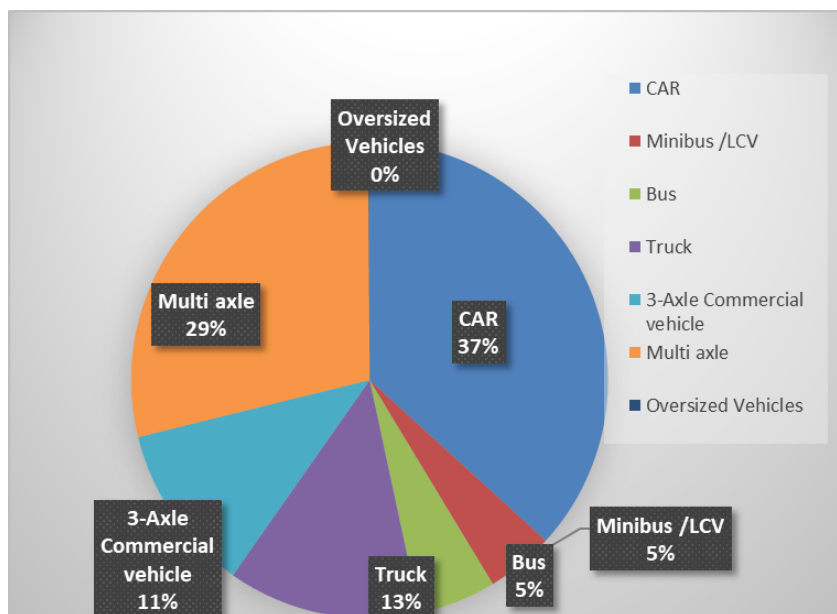


Figure 3-1 : Model Split of Tollable Vehicle

It is observed that car traffic forms about 37% of total traffic at toll plaza locations while multi axle commercial vehicles are about 40% of total traffic. Truck / Bus and LCV share about 18% and 5% of traffic volume respectively.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-6 : Journey Type Bifurcation of Traffic at Khandi Obri TP KM 348.450

| Sr. No | Type | Traffic Volume (Nos.)2023-24 |
|--------|---------------------------------|------------------------------|
| 1 | Single Journey | 13788 |
| 2 | Return Journey | 2915 |
| 3 | Local Commercial Single Journey | 143 |
| 4 | Monthly Pass Local | 72 |
| 5 | Monthly Pass | 2 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 82%. Return journey component is 17%. The number of monthly pass Local is 0% and Local Commercial Single journey is 1% at Khandi Obri toll plaza.

It is observed that the project corridor demonstrates pattern of single journey dominated mix of traffic which is typical of major national highways having more long-distance traffic.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch is part of Delhi – Mumbai arm of golden quadrilateral transport network. Additionally, it also forms good connectivity to Ahmedabad, Rajkot, Jamnagar and other port and industrial establishments in bay of Khambat of Gujarat.

At regional level, there can be three alternates for Udaipur- Ahmedabad pair of Origin & Destination. One via project road (Udaipur – Rishabhdeo- Shamlaji- Ahmedabad), second on east side (via Himmatnagar) and third on far east side via Palanpur- Mehsana.

The following maps show these routes in relation to project stretch at regional level.

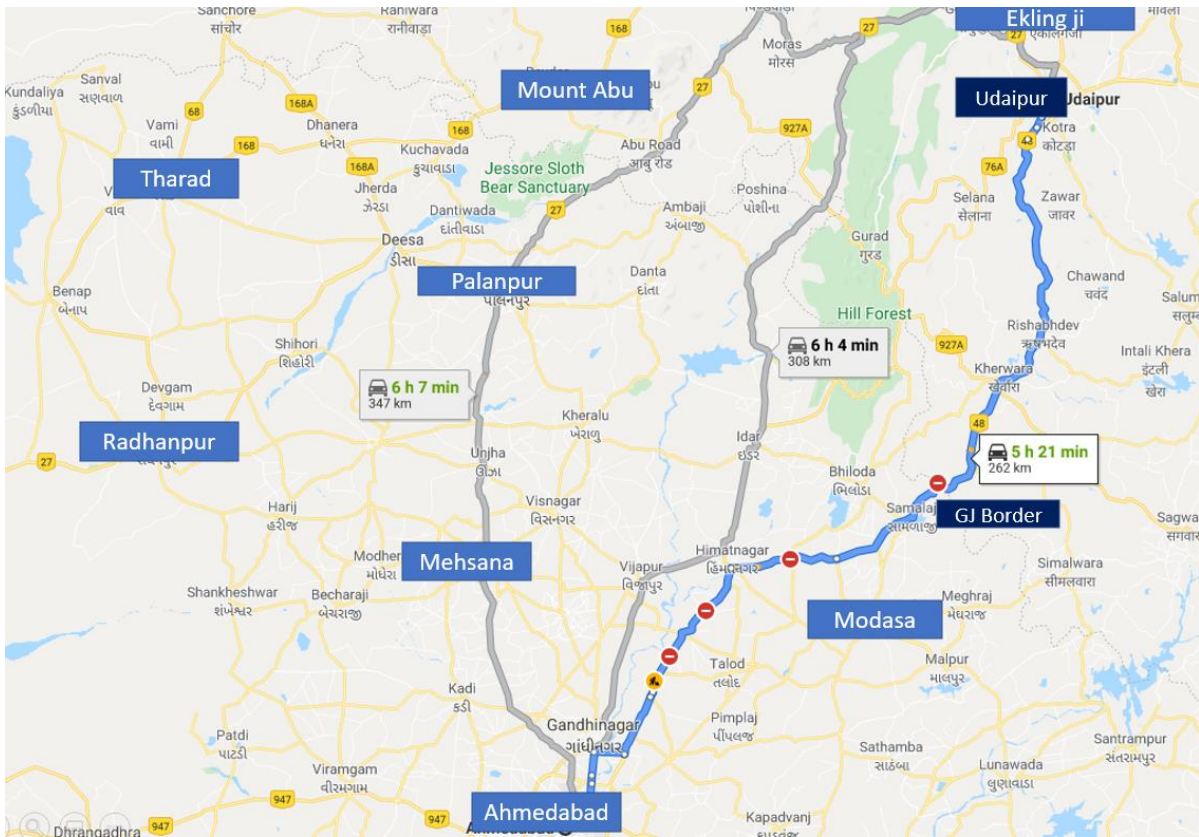


Figure 4-1 : Alternate route at regional level Udaipur - Ahmedabad

The route via project road is the most preferred one due to minimum travel time and shortest length.

On a high level, between Delhi and Vadodara, there can be three alternatives. One via project road (Delhi- Jaipur- Udaipur- Shamlaji -Vadodara), second via Delhi-Sikar-Ahmedabad- Vadodara) and third via Delhi- Jaipur- Mandsaur – Banswara- Godhra- Vadodara. The following map shows these alignments.

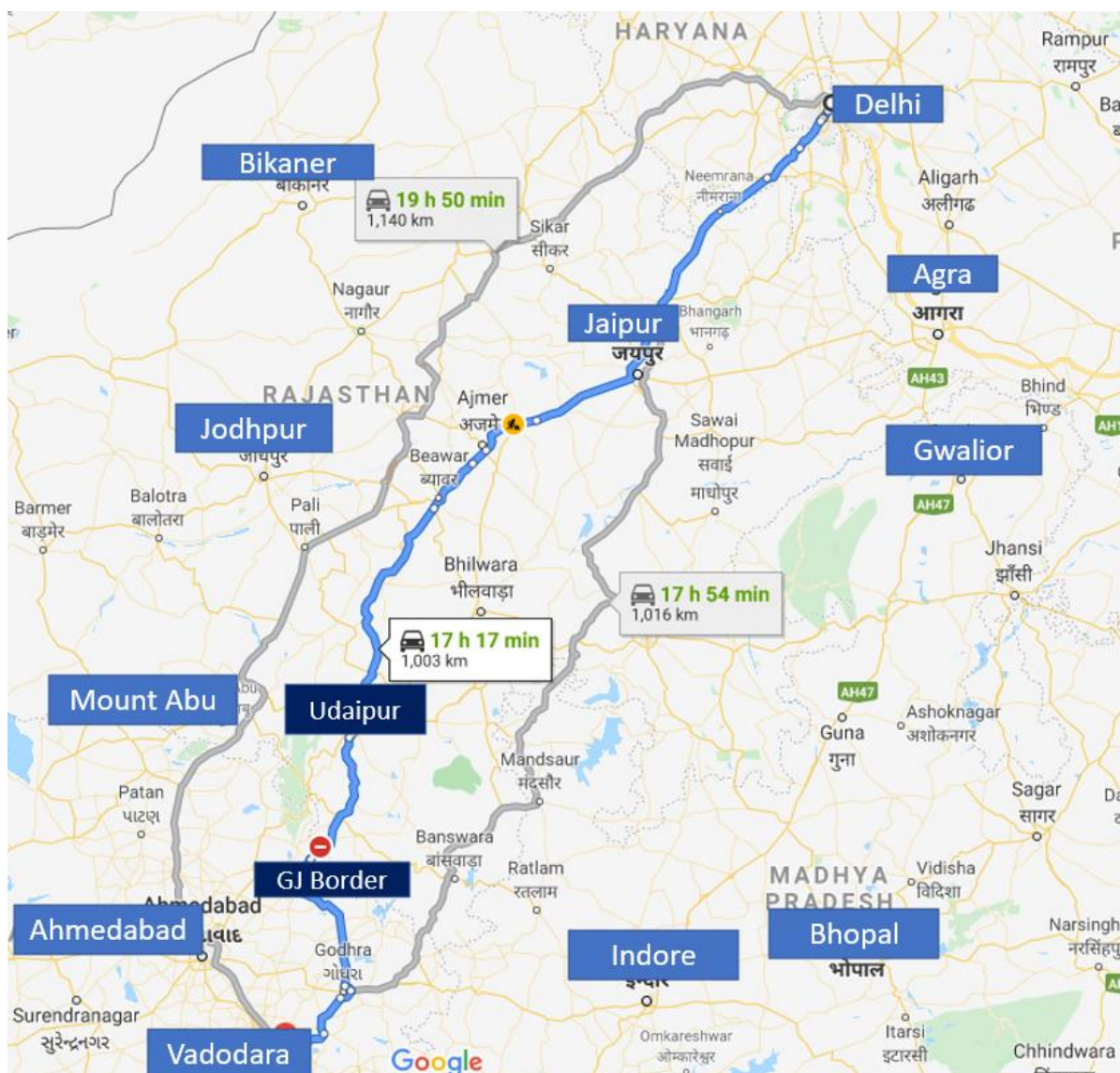


Figure 4-2 : Alternate route at regional level Delhi - Vadodara

For Delhi- Vadodara pair of origin and destination, route via project road (Udaipur – Shamlaji) is most preferred one due to minimum travel time and length of route.

Thus, at regional level project road is preferred route of long-distance traffic between Mumbai- Delhi and Udaipur- Ahmedabad. Project road is under toll operation since long hence traffic on project road is now settled and it can be assumed as dedicated traffic on project road for logistic obligations.

After six laning completion, the project stretch would become slightly more attractive due to improved level of service. In such a case any further diversion of traffic from the project road is not envisaged. It is expected that there could be some attracted traffic on the project road after completion of the six laning of Kishangarh Gulabpura stretch which is connecting section for project corridor.

At the local level there is no potential alternate route to bypass the toll plaza.

The following table provides summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Competing Roads Details

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|--|-----------------|-------------|-------------------|------------------|--|
| Regional Level | | | | | | |
| 1 | Udaipur- Palanpur -Mehsana- Ahmedabad | Alternate Route | 347 | 64 | 6 Hr 7 Min | Project road alternate has minimum travel time and shortest road |
| | Udaipur- Idar - Himmatnagar- Ahmedabad | Alternate Route | 308 | 50 | 6 Hr 8 Min | |
| | Udaipur- Rishabhdeo- Shamlaji- Ahmedabad | Project Road | 262 | 49 | 5 Hr 21 Min | |
| 2 | Delhi- Jaipur- Mandsaur - Banswara- Vadodara | Alternate Route | 1140 | 57 | 19 Hr 50 Min | Project road alternate has minimum travel time and shortest road |
| | Delhi- Sikar- Mt. Abu - Ahmedabad- Vadodara | Alternate Route | 1016 | 57 | 17 Hr 54 Min | |
| | Delhi- Jaipur- Udaipur - Vadodara | Project Road | 1003 | 58 | 17 Hr 54 Min | |

Under these circumstances it is not envisaged that commercial or passenger traffic would switch to alternate roads from the project road. Further, it may be noted that since the project highway has already been commissioned and has a tolling history, the current traffic traversing the project corridor already factors in traffic diversion (if any) that may have taken place. Further after completion of six laning, level of service would improve on project corridor, and this would create favorable conditions for traffic.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Udaipur to Gujarat Border section of NH-8 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would-be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

The project corridor spreads across the state of Rajasthan. Toll plazas at Khondi Obri is in the state of Rajasthan but the traffic on project stretch has certain contribution from other states as well. For elasticity calculations, working data from such states in addition to Rajasthan has been analyzed.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-1 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2012 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2013 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2014 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2015 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2016 | 68565 | 899307 | 4.84 | 5.95 | 6% | |
| 2017 | 71394 | 988391 | 4.85 | 5.99 | 4% | 4.55% |

Regression analysis of same is given in figure below.

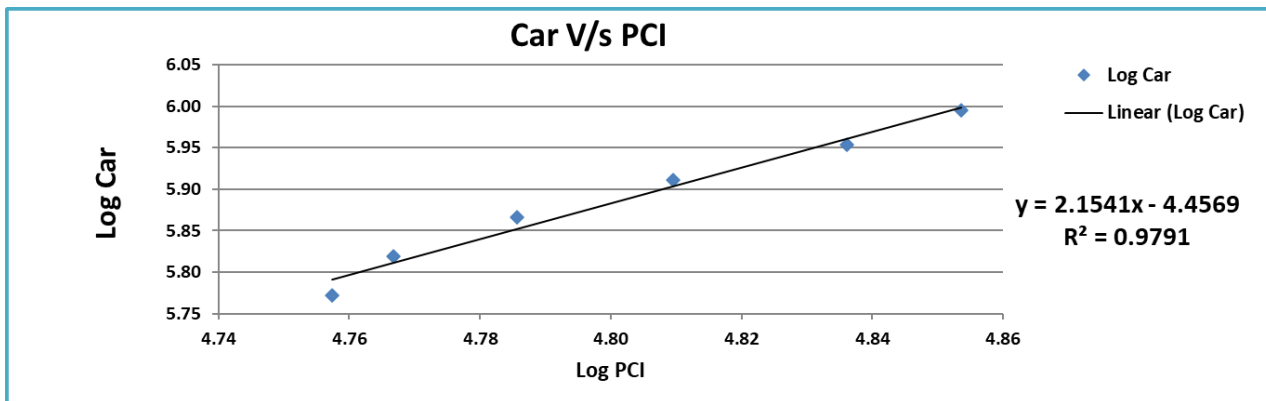


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan

Table 5-2 : Population Vs Bus Rajasthan

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 68548437 | 83345 | 7.84 | 4.92 | | |
| 2013 | 69783885 | 88616 | 7.84 | 4.95 | 2% | |
| 2014 | 71016445 | 93892 | 7.85 | 4.97 | 2% | |
| 2015 | 72245688 | 97650 | 7.86 | 4.99 | 2% | |
| 2016 | 73471198 | 102818 | 7.87 | 5.01 | 2% | |
| 2017 | 74692571 | 108680 | 7.87 | 5.04 | 2% | 1.73% |

Regression analysis of same is given in figure below.

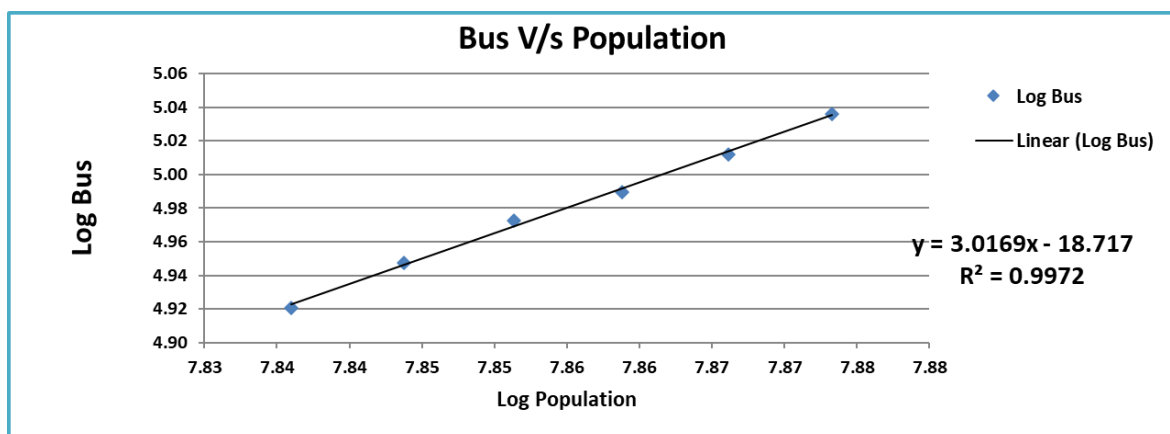


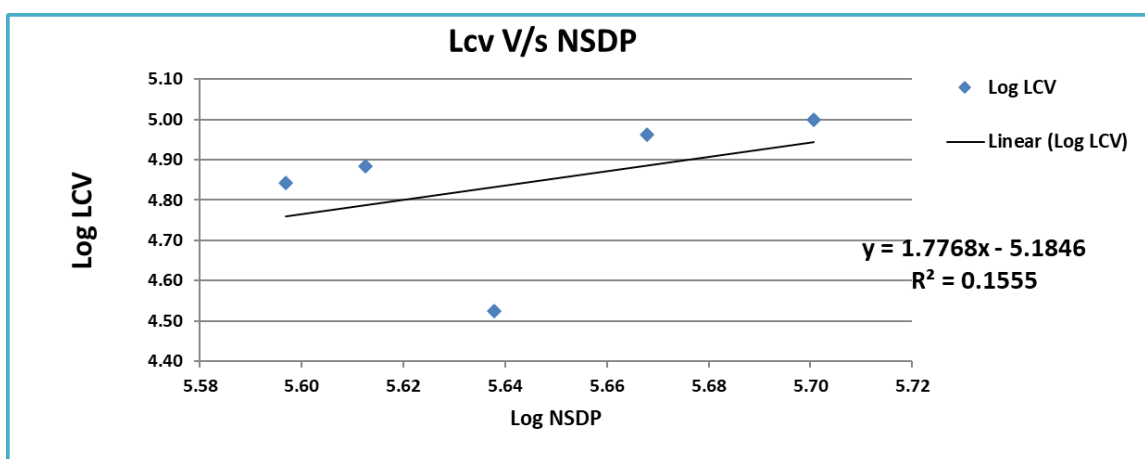
Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

Elasticity of LCV has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : LCV Vs NSDP Rajasthan

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth |
|------|--------|-------|----------|---------|-------------|----------------|
| 2012 | 395331 | 69509 | 5.60 | 4.84 | | |
| 2013 | 409802 | 76396 | 5.61 | 4.88 | 4% | |
| 2014 | 434292 | 33379 | 5.64 | 4.52 | 6% | |
| 2015 | 465408 | 91787 | 5.67 | 4.96 | 7% | |
| 2016 | 501922 | 99763 | 5.70 | 5.00 | 8% | 6.16% |

The following figure depicts regression analysis and extrapolation.

**Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.**

Elasticity of Goods Traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-4 : GOODS Traffic Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth |
|------|--------|--------|----------|-----------|-------------|----------------|
| 2012 | 395331 | 362028 | 5.60 | 5.56 | | |
| 2013 | 409802 | 401983 | 5.61 | 5.60 | 4% | |
| 2014 | 434292 | 434379 | 5.64 | 5.64 | 6% | |
| 2015 | 465408 | 472365 | 5.67 | 5.67 | 7% | |
| 2016 | 501922 | 517604 | 5.70 | 5.71 | 8% | |
| 2017 | 530172 | 561158 | 5.72 | 5.75 | 6% | 6.06% |

Following figure depict regression analysis and extrapolation.

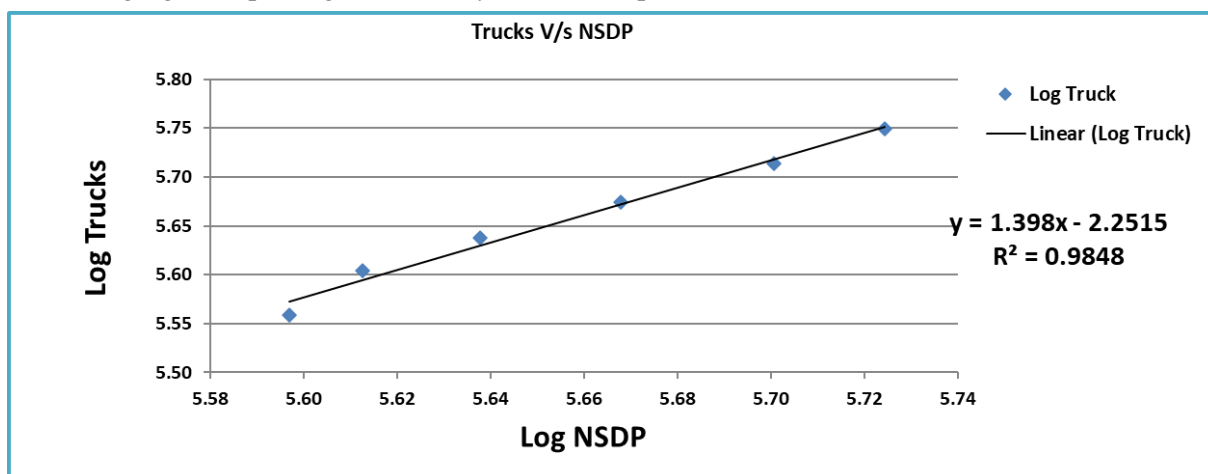


Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-5 : Summary Regression Analysis Rajasthan

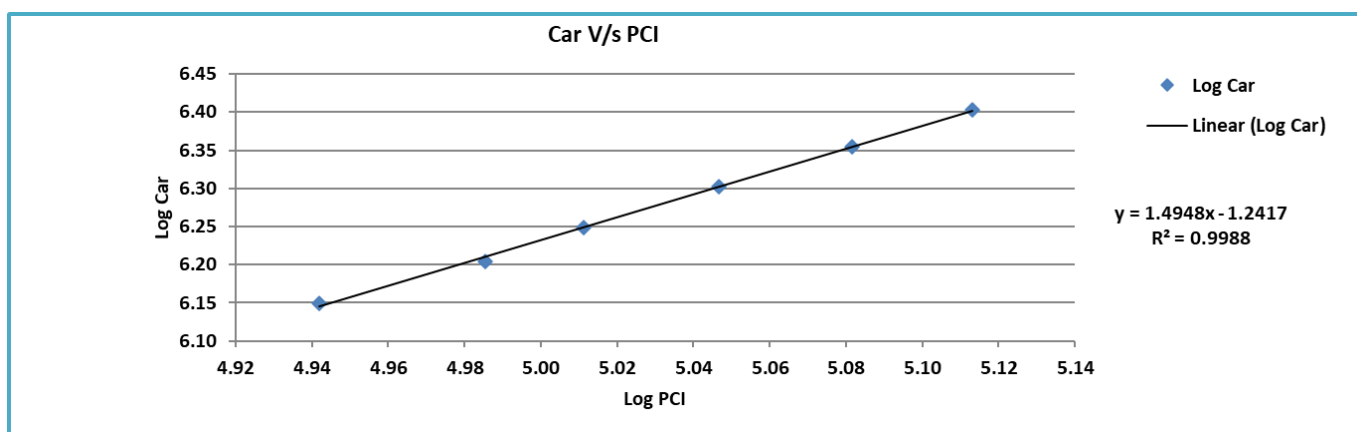
| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|-------------------------|----------------------------|--------------------------|----------------------|-----------------|
| Rajasthan | Car/Jeep | PCI | $y = 2.1541x - 4.4569$ | R ² = 0.9791 | 2.1541 | 4.55% | 9.79% | Good Regression |
| | Bus | Population | $y = 3.0169x - 18.7174$ | R ² = 0.9972 | 3.0169 | 1.73% | 5.22% | Good Regression |
| | LCV | NSDP | $y = 1.7768x - 5.1846$ | R ² = 0.1555 | 1.7768 | 6.16% | 10.95% | Poor Regression |
| | Truck | NSDP | $y = 1.398x - 2.2515$ | R ² = 0.9848 | 1.3980 | 6.06% | 8.46% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-6 : Per Capita Income Vs Car Gujarat

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 87481 | 1411898 | 4.94 | 6.15 | | |
| 2013 | 96683 | 1602129 | 4.99 | 6.20 | 11% | |
| 2014 | 102589 | 1771298 | 5.01 | 6.25 | 6% | |
| 2015 | 111370 | 2008748 | 5.05 | 6.30 | 9% | |
| 2016 | 120683 | 2260084 | 5.08 | 6.35 | 8% | |
| 2017 | 129738 | 2527537 | 5.11 | 6.40 | 8% | 8.21% |

Regression analysis of same is given in figure below.

**Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Gujarat****Table 5-7 : Population Vs Bus Gujarat**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 60439692 | 67546 | 7.78 | 4.83 | | |
| 2013 | 61563037 | 70615 | 7.79 | 4.85 | 2% | |
| 2014 | 62684375 | 72998 | 7.80 | 4.86 | 2% | |
| 2015 | 63803304 | 76435 | 7.80 | 4.88 | 2% | |
| 2016 | 64919427 | 82734 | 7.81 | 4.92 | 2% | |
| 2017 | 66032362 | 74855 | 7.82 | 4.87 | 2% | 1.79% |

Regression analysis of same is given in figure below.

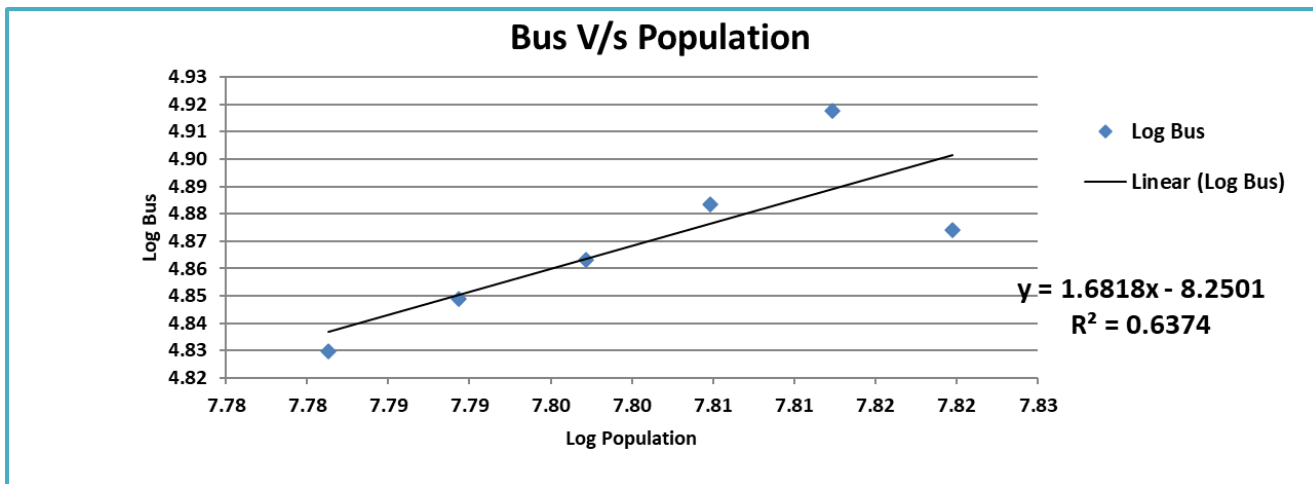


Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat

Elasticity of LCV has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-8 : LCV Vs NSDP Gujarat

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 532809 | 448958 | 5.73 | 5.65 | | |
| 2013 | 596659 | 499277 | 5.78 | 5.70 | 12% | |
| 2014 | 641489 | 542918 | 5.81 | 5.73 | 8% | |
| 2015 | 705629 | 589984 | 5.85 | 5.77 | 10% | |
| 2016 | 774775 | 633599 | 5.89 | 5.80 | 10% | 9.82% |

The following figure depicts regression analysis and extrapolation.

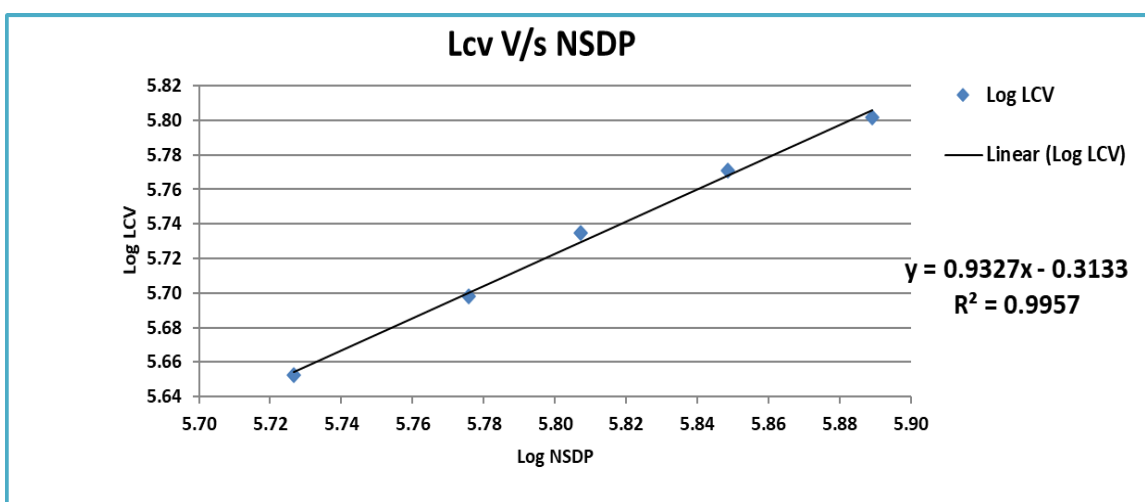


Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat.

Elasticity of Goods Traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-9 : GOODS Traffic Vs NSDP Gujarat

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 532809 | 301533 | 5.73 | 5.48 | | |
| 2013 | 596659 | 319207 | 5.78 | 5.50 | 12% | |
| 2014 | 641489 | 332185 | 5.81 | 5.52 | 8% | |
| 2015 | 705629 | 352225 | 5.85 | 5.55 | 10% | |
| 2016 | 774775 | 375265 | 5.89 | 5.57 | 10% | |
| 2017 | 843930 | 396061 | 5.93 | 5.60 | 9% | 9.64% |

The following figure depicts regression analysis and extrapolation.

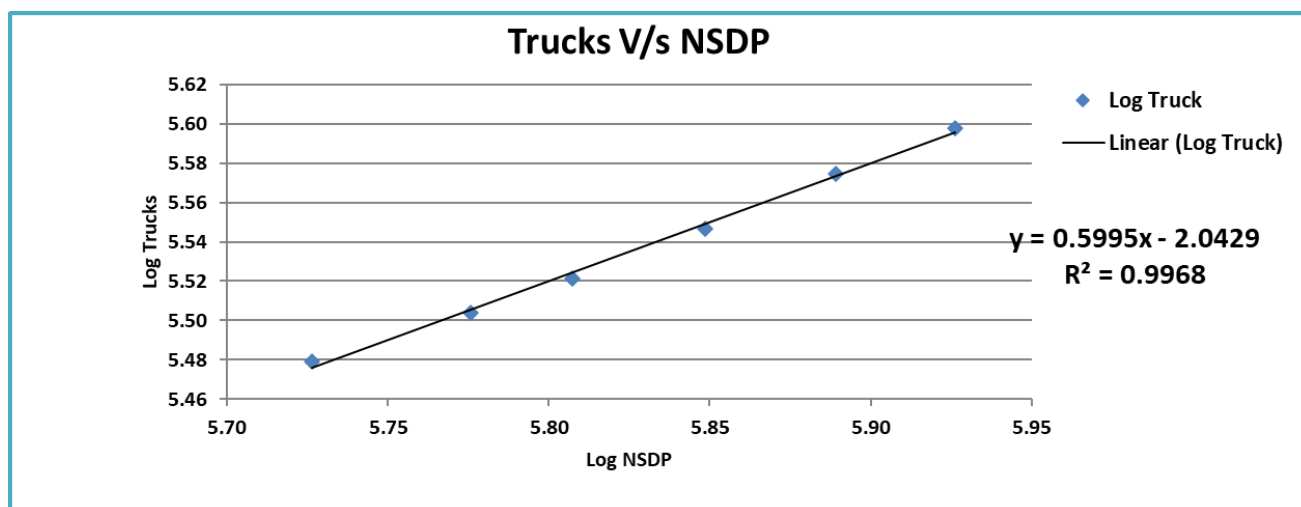


Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Gujarat.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-10 : Summary Regression Analysis Gujarat

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------|------------------|----------------------|------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Gujarat | Car/Jeep | PCI | $y = 1.4948x - 1.2417$ | $R^2 = 0.9988$ | 1.4948 | 8.21% | 12.27% | Good Regression |
| | Bus | Population | $y = 1.6818x - 8.2501$ | $R^2 = 0.6374$ | 1.6818 | 1.79% | 3.00% | Fair Regression |
| | LCV | NSDP | $y = 0.9327x - 0.3133$ | $R^2 = 0.9957$ | 0.9327 | 9.82% | 9.16% | Good Regression |
| | Truck | NSDP | $y = 0.5995x - 2.0429$ | $R^2 = 0.9968$ | 0.5995 | 9.64% | 5.78% | Good Regression |

The economic model for predicting growth is a good tool, however other local, regional, and 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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Udaipur to Gujarat on NH-8 is under tolling operation with current concessionaire and has three year of tolling history from 2017-18 (Part year). As traffic data available with the project concessionaire is of less than three years, we do not have sufficient data points to be able to establish a reliable past trend of traffic growth. A minimum of about 5 -6 years' traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

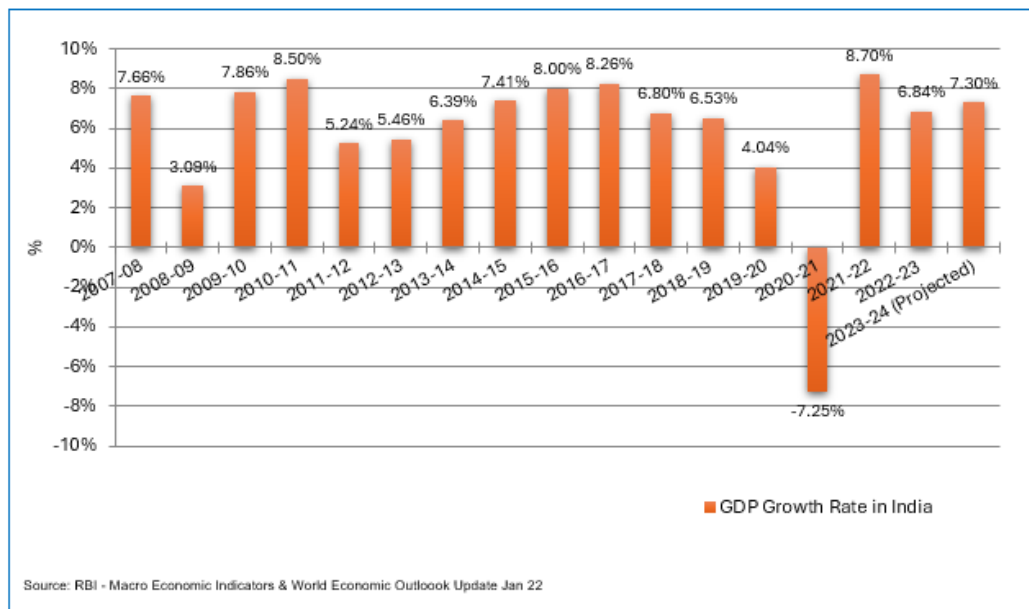


Figure 5-9 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

Project stretch passes through mineral rich belt of marble and minerals.

Tourism, agriculture, and mineral industries contribute to Udaipur's diverse economic base. Udaipur sees major tourist footfall throughout the year owing to its picturesque landscape, lakes, and historic palaces and architecture. Shamlaji is a major Hindu pilgrimage dedicated to God Vishnu. Each year an annual fair is held in October which attracts huge crowds from the surrounding region. Udaipur district is rich in lead, zinc, silver, phosphate, calcite, copper and limestone minerals. Udaipur is known for its marble which is mined, processed, and exported across the world. Nathdwara in the north of asset is one of biggest extractors of marble and limestone minerals. Hindustran Zinc, which is the world's second largest zinc producer, is based out of Udaipur.

Rishbhdeo is one of the major religious and industrial settlement on project corridor. This region has more than 200 mines of green marble. Rishabhdeo is the largest miner of green

marble. 90 per-cent of green marble in the world is produced in Rishabhdev. The turnover of marble industry is more than 500 crores. It also gives employment to many labourers. Beyond this the town also has spinning and weaving mill by Injbhilwara group. Thus, it gives employment to 10000 local workers. The presence of temple also leads to income of many people.

The growth of Rajasthan has been comparable to the national average economic growth. Rajasthan is rich in natural resources and benefits from its strategic geographic location in India. The state is pre-eminent in quarrying, mining in India and has been a leader in crude oil extraction over the past the few years. Moreover, Rajasthan is also a relevant tourism attractor in India. Considering the scenario, it may be assumed that the traffic growth on the project highway would remain high and there are minimal risks in terms of growth.

Table 5-11 : GDP of India, Rajasthan and other important states

| Year | India (GDP) | Bihar | Haryana | Madhya Pradesh | Maharashtra | Odisha | Punjab | Rajasthan | Uttar Pradesh | Uttarakhand | West Bengal | Delhi |
|------------------|-------------|-------|---------|----------------|-------------|--------|--------|-----------|---------------|-------------|-------------|-------|
| 1980-81 | 12336 | 514 | 357 | 623 | 1464 | 529 | 504 | 560 | 1631 | 138 | 830 | 269 |
| 1981-82 | 13030 | 543 | 371 | 639 | 1498 | 528 | 551 | 607 | 1670 | 141 | 808 | 291 |
| 1982-83 | 13411 | 548 | 394 | 668 | 1556 | 497 | 568 | 620 | 1800 | 152 | 840 | 328 |
| 1983-84 | 14464 | 601 | 402 | 702 | 1654 | 597 | 578 | 761 | 1871 | 158 | 939 | 320 |
| 1984-85 | 15037 | 658 | 418 | 668 | 1675 | 569 | 623 | 706 | 1900 | 161 | 964 | 333 |
| 1985-86 | 15663 | 672 | 493 | 726 | 1807 | 635 | 670 | 704 | 1975 | 167 | 1005 | 386 |
| 1986-87 | 16339 | 725 | 493 | 694 | 1832 | 643 | 694 | 771 | 2060 | 174 | 1045 | 411 |
| 1987-88 | 16917 | 685 | 484 | 789 | 1955 | 623 | 730 | 718 | 2154 | 182 | 1101 | 447 |
| 1988-89 | 18635 | 772 | 602 | 847 | 2159 | 754 | 769 | 1014 | 2434 | 206 | 1148 | 486 |
| 1989-90 | 19778 | 759 | 610 | 865 | 2515 | 805 | 834 | 993 | 2502 | 212 | 1188 | 531 |
| 1990-91 | 20824 | 831 | 674 | 987 | 2629 | 668 | 849 | 1149 | 2651 | 224 | 1251 | 553 |
| 1991-92 | 21122 | 784 | 688 | 916 | 2620 | 753 | 888 | 1061 | 2662 | 225 | 1349 | 638 |
| 1992-93 | 22254 | 737 | 688 | 983 | 3017 | 740 | 930 | 1220 | 2690 | 228 | 1389 | 660 |
| 1993-94 | 23519 | 755 | 719 | 1088 | 3349 | 788 | 970 | 1121 | 2757 | 233 | 1490 | 705 |
| 1994-95 | 25023 | 842 | 771 | 1107 | 3414 | 826 | 995 | 1325 | 2901 | 254 | 1594 | 790 |
| 1995-96 | 26846 | 712 | 787 | 1174 | 3791 | 864 | 1032 | 1374 | 2995 | 251 | 1713 | 804 |
| 1996-97 | 28987 | 893 | 879 | 1252 | 3941 | 804 | 1107 | 1535 | 3327 | 267 | 1832 | 915 |
| 1997-98 | 30234 | 850 | 887 | 1318 | 4158 | 920 | 1137 | 1721 | 3292 | 270 | 1985 | 1063 |
| 1998-99 | 32255 | 904 | 934 | 1405 | 4324 | 948 | 1203 | 1797 | 3316 | 274 | 2112 | 1116 |
| 1999-00 | 34837 | 950 | 1002 | 1552 | 4735 | 1008 | 1267 | 1801 | 3440 | 274 | 2264 | 1170 |
| 2000-01 | 36282 | 1106 | 1081 | 1426 | 4589 | 982 | 1309 | 1743 | 3511 | 308 | 2343 | 1215 |
| 2001-02 | 38236 | 1043 | 1165 | 1528 | 4751 | 1042 | 1326 | 1941 | 3575 | 323 | 2512 | 1262 |
| 2002-03 | 39719 | 1175 | 1236 | 1449 | 5079 | 1034 | 1348 | 1708 | 3690 | 353 | 2600 | 1359 |
| 2003-04 | 42883 | 1099 | 1358 | 1611 | 5471 | 1185 | 1433 | 2251 | 3885 | 381 | 2753 | 1433 |
| 2004-05 | 45906 | 1238 | 1475 | 1664 | 5948 | 1340 | 1504 | 2196 | 4079 | 431 | 2936 | 1588 |
| 2005-06 | 50257 | 1207 | 1608 | 1748 | 6810 | 1399 | 1577 | 2344 | 4317 | 492 | 3121 | 1752 |
| 2006-07 | 55066 | 1416 | 1791 | 1907 | 7748 | 1574 | 1748 | 2620 | 4660 | 551 | 3366 | 1969 |
| 2007-08 | 60199 | 1489 | 1931 | 1997 | 8650 | 1708 | 1899 | 2739 | 4959 | 648 | 3627 | 2191 |
| 2008-09 | 64248 | 1716 | 2080 | 2250 | 8786 | 1837 | 2004 | 2969 | 5336 | 716 | 3774 | 2464 |
| 2009-10 | 69769 | 1798 | 2340 | 2463 | 9634 | 1852 | 2132 | 3142 | 5668 | 839 | 4067 | 2667 |
| 2010-11 | 75987 | 2073 | 2498 | 2592 | 10732 | 1968 | 2270 | 3614 | 6120 | 927 | 4313 | 2888 |
| 2011-12 | 81069 | 2285 | 2712 | 2824 | 11222 | 2042 | 2392 | 3953 | 6451 | 1020 | 4471 | 3147 |
| 2012-13 | 85463 | 2369 | 2894 | 3069 | 11842 | 2163 | 2518 | 4098 | 6736 | 1095 | 4838 | 3342 |
| 2013-14 | 90636 | 2469 | 3142 | 3226 | 12671 | 2331 | 2675 | 4343 | 7075 | 1178 | 5247 | 3565 |
| 2014-15 | 97121 | 2557 | 3314 | 3394 | 13322 | 2359 | 2777 | 4656 | 7297 | 1257 | 5633 | 3882 |
| 2015-16 | 105033 | 2749 | 3612 | 3597 | 14417 | 2557 | 2926 | 4981 | 7894 | 1355 | - | 4291 |
| 2016-17 | 112476 | 3033 | 3927 | 4129 | 15744 | 2828 | 3095 | 5352 | 8457 | 1448 | - | 4658 |
| 2017-18 | 119762 | - | - | 4432 | - | 3029 | - | 5736 | 9011 | 1547 | - | 5035 |
| Growth 1981-2018 | 6.34 | 5.05 | 6.88 | 5.44 | 6.82 | 4.83 | 5.17 | 6.49 | 4.73 | 6.75 | 5.79 | 8.24 |
| Growth 1994-2018 | 7.02 | 6.23 | 7.66 | 6.03 | 6.96 | 5.77 | 5.17 | 7.04 | 5.06 | 8.20 | 6.54 | 8.53 |

| | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Growth 2000-2018 | 7.10 | 7.07 | 8.37 | 6.00 | 7.32 | 6.30 | 5.40 | 6.65 | 5.50 | 10.10 | 6.27 | 8.45 |
|------------------|------|------|------|------|------|------|------|------|------|-------|------|------|

5.7 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 below. The rate of growth is moderate in light of overall regional trends. 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, the rate of growth diminishes. The same growth rate is not sustainable for long. Traffic growth is suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-12 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.44% | 8.82% | 8.21% | 7.60% | 7.01% | 6.43% |
| Bus | 5.26% | 4.95% | 4.64% | 4.35% | 4.07% | 3.79% |
| LCV | 3.55% | 3.09% | 2.64% | 2.19% | 1.75% | 1.31% |
| 2- Axle | 3.73% | 3.35% | 2.96% | 2.58% | 2.21% | 1.84% |
| 3 - Axle | 5.82% | 5.20% | 4.59% | 3.99% | 3.39% | 2.80% |
| 4 to6 Axle | 6.52% | 5.82% | 5.13% | 4.45% | 3.78% | 3.12% |
| 7 and Above Axle | 6.52% | 5.82% | 5.13% | 4.45% | 3.78% | 3.12% |

Table 5-13 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.94% | 8.32% | 7.71% | 7.10% | 6.51% | 5.93% |
| Bus | 4.76% | 4.45% | 4.14% | 3.85% | 3.57% | 3.29% |
| LCV | 3.05% | 2.59% | 2.14% | 1.69% | 1.25% | 0.81% |
| 2- Axle | 3.23% | 2.85% | 2.46% | 2.08% | 1.71% | 1.34% |
| 3 - Axle | 5.32% | 4.70% | 4.09% | 3.49% | 2.89% | 2.30% |
| 4 to6 Axle | 6.02% | 5.32% | 4.63% | 3.95% | 3.28% | 2.62% |
| 7 and Above Axle | 6.02% | 5.32% | 4.63% | 3.95% | 3.28% | 2.62% |

Table 5-14 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.19% | 8.57% | 7.96% | 7.35% | 6.76% | 6.18% |
| Bus | 5.01% | 4.70% | 4.39% | 4.10% | 3.82% | 3.54% |

| Category / Year | 2024-2026 | 2026-2031 | 2031-2036 | 2036-2041 | 2041-2046 | 2046-2051 |
|-------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| LCV | 3.30% | 2.84% | 2.39% | 1.94% | 1.50% | 1.06% |
| 2- Axle | 3.48% | 3.10% | 2.71% | 2.33% | 1.96% | 1.59% |
| 3 - Axle | 5.57% | 4.95% | 4.34% | 3.74% | 3.14% | 2.55% |
| 4 to6 Axle | 6.27% | 5.57% | 4.88% | 4.20% | 3.53% | 2.87% |
| 7 and Above Axle | 6.27% | 5.57% | 4.88% | 4.20% | 3.53% | 2.87% |

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza - 348.450 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6220 | 777 | 894 | 2213 | 1934 | 4868 | 13 | 16919 | 44472 |
| 2024-25 | 6808 | 804 | 941 | 2296 | 2047 | 5185 | 14 | 18095 | 47262 |
| 2025-26 | 7408 | 829 | 988 | 2373 | 2153 | 5486 | 15 | 19252 | 49948 |
| 2026-27 | 8062 | 854 | 1036 | 2452 | 2266 | 5805 | 16 | 20491 | 52800 |
| 2027-28 | 8773 | 880 | 1087 | 2534 | 2384 | 6143 | 17 | 21818 | 55828 |
| 2028-29 | 9546 | 907 | 1140 | 2619 | 2508 | 6501 | 18 | 23239 | 59043 |
| 2029-30 | 10388 | 934 | 1196 | 2706 | 2638 | 6879 | 19 | 24760 | 62450 |
| 2030-31 | 11241 | 959 | 1251 | 2786 | 2759 | 7232 | 20 | 26248 | 65702 |
| 2031-32 | 12163 | 984 | 1309 | 2869 | 2885 | 7603 | 21 | 27834 | 69136 |
| 2032-33 | 13161 | 1010 | 1369 | 2954 | 3017 | 7993 | 22 | 29526 | 72764 |
| 2033-34 | 14240 | 1036 | 1433 | 3041 | 3156 | 8404 | 23 | 31333 | 76606 |
| 2034-35 | 15408 | 1063 | 1500 | 3130 | 3301 | 8836 | 24 | 33262 | 80666 |
| 2035-36 | 16580 | 1087 | 1566 | 3210 | 3432 | 9229 | 25 | 35129 | 84478 |
| 2036-37 | 17840 | 1111 | 1635 | 3293 | 3569 | 9640 | 26 | 37114 | 88495 |
| 2037-38 | 19196 | 1135 | 1706 | 3378 | 3711 | 10070 | 27 | 39223 | 92720 |
| 2038-39 | 20656 | 1160 | 1780 | 3465 | 3858 | 10518 | 28 | 41465 | 97162 |
| 2039-40 | 22227 | 1185 | 1857 | 3554 | 4011 | 10986 | 29 | 43849 | 101838 |
| 2040-41 | 23785 | 1206 | 1932 | 3632 | 4147 | 11402 | 30 | 46134 | 106171 |
| 2041-42 | 25454 | 1227 | 2010 | 3712 | 4288 | 11834 | 31 | 48556 | 110717 |
| 2042-43 | 27240 | 1248 | 2091 | 3794 | 4433 | 12281 | 32 | 51119 | 115475 |

Table 6-2 : Total Tollable Traffic @ Toll Plaza - Chainage 348.450 KM
(Pessimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6220 | 777 | 894 | 2213 | 1934 | 4868 | 13 | 16919 | 44472 |
| 2024-25 | 6776 | 800 | 937 | 2284 | 2036 | 5160 | 13 | 18006 | 47026 |
| 2025-26 | 7339 | 820 | 979 | 2349 | 2132 | 5435 | 14 | 19068 | 49470 |
| 2026-27 | 7949 | 841 | 1023 | 2416 | 2233 | 5724 | 15 | 20201 | 52052 |
| 2027-28 | 8610 | 862 | 1068 | 2484 | 2338 | 6029 | 16 | 21407 | 54776 |
| 2028-29 | 9325 | 884 | 1115 | 2554 | 2448 | 6350 | 17 | 22693 | 57654 |
| 2029-30 | 10101 | 906 | 1165 | 2627 | 2564 | 6688 | 18 | 24069 | 60705 |
| 2030-31 | 10879 | 925 | 1213 | 2692 | 2669 | 6998 | 19 | 25395 | 63565 |
| 2031-32 | 11718 | 945 | 1263 | 2758 | 2778 | 7322 | 20 | 26804 | 66572 |
| 2032-33 | 12621 | 965 | 1315 | 2826 | 2892 | 7661 | 21 | 28301 | 69737 |
| 2033-34 | 13593 | 985 | 1369 | 2895 | 3011 | 8016 | 22 | 29891 | 73067 |
| 2034-35 | 14640 | 1006 | 1425 | 2966 | 3134 | 8387 | 23 | 31581 | 76569 |
| 2035-36 | 15680 | 1024 | 1479 | 3027 | 3243 | 8719 | 24 | 33196 | 79807 |
| 2036-37 | 16794 | 1042 | 1535 | 3090 | 3357 | 9063 | 25 | 34906 | 83199 |
| 2037-38 | 17987 | 1060 | 1594 | 3155 | 3474 | 9421 | 26 | 36717 | 86758 |
| 2038-39 | 19264 | 1078 | 1655 | 3221 | 3595 | 9793 | 27 | 38633 | 90484 |
| 2039-40 | 20632 | 1096 | 1719 | 3288 | 3720 | 10180 | 28 | 40663 | 94393 |
| 2040-41 | 21976 | 1110 | 1780 | 3344 | 3827 | 10514 | 29 | 42580 | 97938 |
| 2041-42 | 23408 | 1124 | 1843 | 3401 | 3937 | 10859 | 30 | 44602 | 101638 |
| 2042-43 | 24933 | 1138 | 1909 | 3459 | 4051 | 11215 | 31 | 46736 | 105504 |

Traffic projections for Most Likely scenario is given as under

**Table 6-3 : Total Tollable Traffic @ Toll Plaza - Chainage 348.450 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6220 | 777 | 894 | 2213 | 1934 | 4868 | 13 | 16919 | 44472 |
| 2024-25 | 6791 | 802 | 938 | 2290 | 2042 | 5173 | 14 | 18050 | 47146 |
| 2025-26 | 7373 | 824 | 982 | 2360 | 2143 | 5461 | 15 | 19158 | 49706 |
| 2026-27 | 8004 | 848 | 1027 | 2433 | 2249 | 5766 | 16 | 20343 | 52422 |
| 2027-28 | 8690 | 872 | 1075 | 2508 | 2361 | 6087 | 17 | 21610 | 55298 |
| 2028-29 | 9435 | 897 | 1125 | 2585 | 2478 | 6426 | 18 | 22964 | 58343 |
| 2029-30 | 10243 | 922 | 1178 | 2664 | 2601 | 6784 | 19 | 24411 | 61569 |
| 2030-31 | 11057 | 943 | 1229 | 2737 | 2714 | 7115 | 20 | 25815 | 64619 |
| 2031-32 | 11936 | 965 | 1282 | 2811 | 2832 | 7462 | 21 | 27309 | 67832 |
| 2032-33 | 12886 | 988 | 1338 | 2887 | 2955 | 7826 | 22 | 28902 | 71224 |
| 2033-34 | 13911 | 1012 | 1397 | 2965 | 3083 | 8208 | 23 | 30599 | 74804 |
| 2034-35 | 15018 | 1036 | 1458 | 3045 | 3217 | 8610 | 24 | 32408 | 78585 |
| 2035-36 | 16122 | 1056 | 1517 | 3115 | 3337 | 8972 | 25 | 34144 | 82100 |
| 2036-37 | 17308 | 1076 | 1579 | 3188 | 3461 | 9349 | 26 | 35987 | 85794 |
| 2037-38 | 18581 | 1097 | 1644 | 3262 | 3590 | 9741 | 27 | 37942 | 89671 |
| 2038-39 | 19947 | 1118 | 1712 | 3338 | 3724 | 10151 | 28 | 40018 | 93752 |
| 2039-40 | 21414 | 1139 | 1783 | 3416 | 3863 | 10578 | 29 | 42222 | 98040 |
| 2040-41 | 22863 | 1157 | 1851 | 3483 | 3984 | 10951 | 30 | 44319 | 101967 |
| 2041-42 | 24410 | 1175 | 1922 | 3551 | 4109 | 11337 | 31 | 46535 | 106075 |
| 2042-43 | 26061 | 1193 | 1996 | 3620 | 4238 | 11738 | 32 | 48878 | 110378 |

6.2 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 Udaipur – Gujarat Border on NH-8 project stretch, the Target Date and Target Traffic are defined as under:

Target Date – 21st September 2026

Target Traffic - 61435 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. The probable extension of the concession period is estimated according to article 29 of the concession agreement which comes to about a year. Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 61435 | 52475 | -15% | 22% | 20% | 21 | 4.2 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 61435 | 52859 | -14% | 21% | 20% | 21 | 4.2 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2026 | 61435 | 52099 | -15% | 23% | 20% | 21 | 4.2 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Udaipur- Gujarat Border section of NH-8 is based on the old toll policy. As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued at fee 30 time the single journey fee.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van I - Rs. 275 per month
 - b) Other local Commercial at 50% of the regular single journey toll fee

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

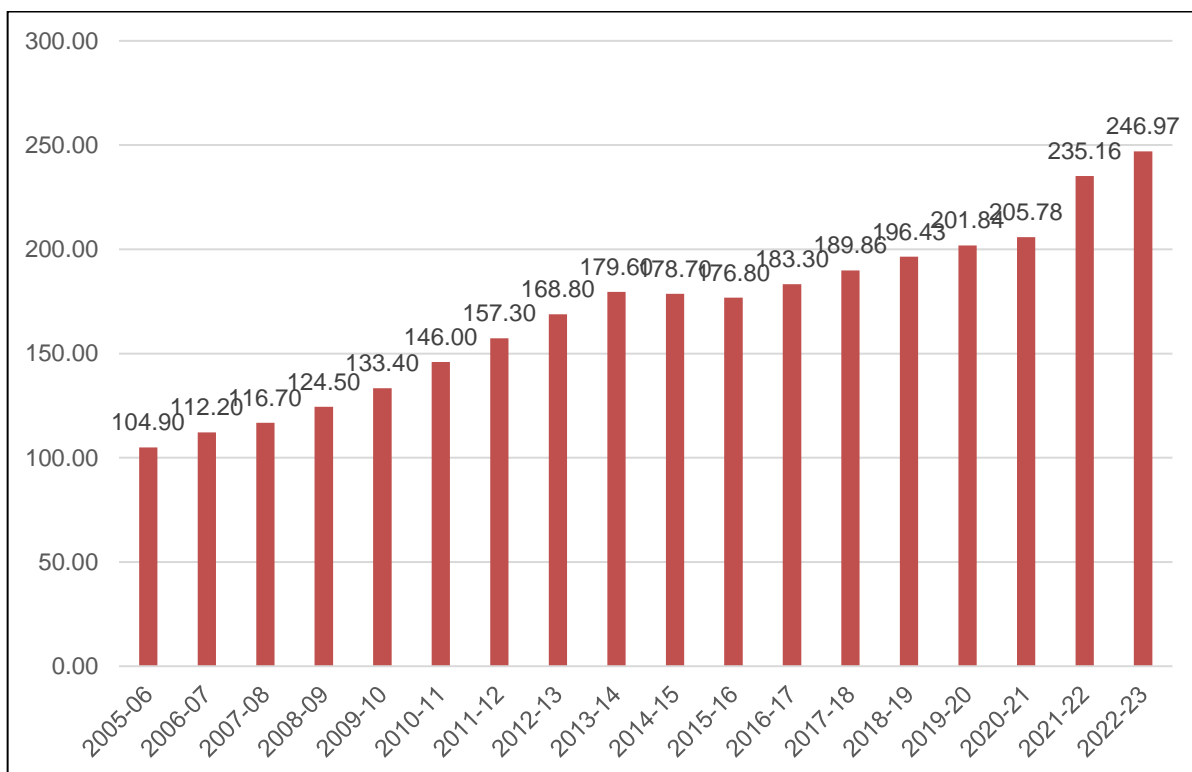


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

There is no bypass or structure to be factored in for rates calculations.

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

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

Table 7-2 : Toll Rates for Single Journey @ Km TP-348.450 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-----|--------------|------|-------|---------------------------|------------|-------------------|
| 2023-24 | 175 | 280 | 585 | 585 | 635 | 915 | 1115 |
| 2024-25 | 175 | 285 | 600 | 600 | 655 | 940 | 1145 |
| 2025-26 | 185 | 300 | 630 | 630 | 685 | 985 | 1200 |
| 2026-27 | 195 | 315 | 660 | 660 | 720 | 1035 | 1260 |
| 2027-28 | 205 | 330 | 695 | 695 | 755 | 1090 | 1325 |
| 2028-29 | 215 | 350 | 730 | 730 | 795 | 1145 | 1390 |
| 2029-30 | 225 | 365 | 765 | 765 | 835 | 1200 | 1465 |
| 2030-31 | 240 | 385 | 805 | 805 | 880 | 1265 | 1540 |
| 2031-32 | 250 | 405 | 850 | 850 | 925 | 1330 | 1620 |
| 2032-33 | 265 | 425 | 890 | 890 | 975 | 1400 | 1700 |
| 2033-34 | 275 | 450 | 940 | 940 | 1025 | 1470 | 1790 |
| 2034-35 | 290 | 470 | 985 | 985 | 1075 | 1550 | 1885 |
| 2035-36 | 305 | 495 | 1040 | 1040 | 1135 | 1630 | 1985 |
| 2036-37 | 325 | 520 | 1095 | 1095 | 1195 | 1715 | 2090 |
| 2037-38 | 340 | 550 | 1150 | 1150 | 1255 | 1805 | 2200 |
| 2038-39 | 360 | 580 | 1215 | 1215 | 1325 | 1905 | 2315 |
| 2039-40 | 380 | 610 | 1280 | 1280 | 1395 | 2005 | 2440 |
| 2040-41 | 400 | 645 | 1345 | 1345 | 1470 | 2110 | 2570 |
| 2041-42 | 420 | 675 | 1420 | 1420 | 1550 | 2225 | 2710 |
| 2042-43 | 440 | 715 | 1495 | 1495 | 1630 | 2345 | 2855 |

Table 7-3 : Toll Rates for Return Journey @ TP-348.450 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-----|--------------|------|-------|---------------------------|------------|-------------------|
| 2023-24 | 260 | 420 | 875 | 875 | 955 | 1375 | 1675 |
| 2024-25 | 265 | 430 | 900 | 900 | 980 | 1410 | 1715 |
| 2025-26 | 280 | 450 | 945 | 945 | 1030 | 1480 | 1800 |
| 2026-27 | 295 | 475 | 990 | 990 | 1080 | 1555 | 1890 |
| 2027-28 | 310 | 495 | 1040 | 1040 | 1135 | 1630 | 1985 |
| 2028-29 | 325 | 520 | 1095 | 1095 | 1195 | 1715 | 2090 |
| 2029-30 | 340 | 550 | 1150 | 1150 | 1255 | 1805 | 2195 |
| 2030-31 | 355 | 575 | 1210 | 1210 | 1320 | 1895 | 2310 |
| 2031-32 | 375 | 605 | 1270 | 1270 | 1385 | 1995 | 2430 |
| 2032-33 | 395 | 640 | 1340 | 1340 | 1460 | 2100 | 2555 |
| 2033-34 | 415 | 670 | 1405 | 1405 | 1535 | 2205 | 2685 |
| 2034-35 | 440 | 705 | 1480 | 1480 | 1615 | 2320 | 2825 |
| 2035-36 | 460 | 745 | 1560 | 1560 | 1700 | 2445 | 2975 |
| 2036-37 | 485 | 785 | 1640 | 1640 | 1790 | 2575 | 3135 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-----|--------------|------|-------|---------------------------|------------|-------------------|
| 2037-38 | 510 | 825 | 1730 | 1730 | 1885 | 2710 | 3300 |
| 2038-39 | 540 | 870 | 1820 | 1820 | 1985 | 2855 | 3475 |
| 2039-40 | 565 | 915 | 1915 | 1915 | 2090 | 3005 | 3660 |
| 2040-41 | 595 | 965 | 2020 | 2020 | 2205 | 3170 | 3855 |
| 2041-42 | 630 | 1015 | 2130 | 2130 | 2325 | 3340 | 4065 |
| 2042-43 | 665 | 1070 | 2245 | 2245 | 2450 | 3520 | 4285 |

Table 7-4 : Toll Rates for Monthly Pass Local @ TP-348.450 KM

| Year | Car |
|---------|-----|
| 2023-24 | 330 |
| 2024-25 | 340 |
| 2025-26 | 355 |
| 2026-27 | 375 |
| 2027-28 | 390 |
| 2028-29 | 410 |
| 2029-30 | 435 |
| 2030-31 | 455 |
| 2031-32 | 480 |
| 2032-33 | 505 |
| 2033-34 | 530 |
| 2034-35 | 560 |
| 2035-36 | 585 |
| 2036-37 | 620 |
| 2037-38 | 650 |
| 2038-39 | 685 |
| 2039-40 | 720 |
| 2040-41 | 760 |
| 2041-42 | 800 |
| 2042-43 | 845 |

Table 7-5 : Toll Rates for Monthly Pass @ TP-348.450 KM

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-------|--------------|-------|-------|---------------------------|------------|-------------------|
| 2023-24 | 5750 | 9290 | 19470 | 19470 | 21240 | 30530 | 37170 |
| 2024-25 | 5895 | 9520 | 19950 | 19950 | 21765 | 31285 | 38085 |
| 2025-26 | 6190 | 10000 | 20955 | 20955 | 22860 | 32860 | 40005 |
| 2026-27 | 6505 | 10505 | 22015 | 22015 | 24015 | 34525 | 42025 |
| 2027-28 | 6835 | 11040 | 23130 | 23130 | 25235 | 36275 | 44160 |
| 2028-29 | 7185 | 11605 | 24310 | 24310 | 26520 | 38125 | 46415 |
| 2029-30 | 7550 | 12195 | 25555 | 25555 | 27880 | 40075 | 48790 |
| 2030-31 | 7940 | 12825 | 26870 | 26870 | 29315 | 42135 | 51300 |
| 2031-32 | 8350 | 13485 | 28260 | 28260 | 30825 | 44315 | 53945 |
| 2032-33 | 8780 | 14185 | 29725 | 29725 | 32425 | 46610 | 56745 |
| 2033-34 | 9240 | 14925 | 31270 | 31270 | 34115 | 49040 | 59700 |
| 2034-35 | 9725 | 15705 | 32910 | 32910 | 35900 | 51605 | 62825 |
| 2035-36 | 10235 | 16530 | 34640 | 34640 | 37790 | 54320 | 66130 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|----------------|-------|--------------|-------|-------|---------------------------|------------|-------------------|
| 2036-37 | 10775 | 17405 | 36465 | 36465 | 39780 | 57185 | 69620 |
| 2037-38 | 11345 | 18330 | 38400 | 38400 | 41890 | 60220 | 73310 |
| 2038-39 | 11950 | 19305 | 40445 | 40445 | 44120 | 63425 | 77215 |
| 2039-40 | 12590 | 20335 | 42605 | 42605 | 46480 | 66815 | 81340 |
| 2040-41 | 13265 | 21425 | 44895 | 44895 | 48975 | 70400 | 85705 |
| 2041-42 | 13980 | 22580 | 47315 | 47315 | 51615 | 74195 | 90325 |
| 2042-43 | 14735 | 23805 | 49870 | 49870 | 54405 | 78210 | 95210 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2042-43 years starting from the year 2023-24 are shown in tables below.

Table 7-6 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | TP-1 | Total |
|----------------|---------|----------------|
| 2023-24 | 311.30 | 311.30 |
| 2024-25 | 337.93 | 337.93 |
| 2025-26 | 374.51 | 374.51 |
| 2026-27 | 415.70 | 415.70 |
| 2027-28 | 463.27 | 463.27 |
| 2028-29 | 513.08 | 513.08 |
| 2029-30 | 568.54 | 568.54 |
| 2030-31 | 630.35 | 630.35 |
| 2031-32 | 698.56 | 698.56 |
| 2032-33 | 771.45 | 771.45 |
| 2033-34 | 851.72 | 851.72 |
| 2034-35 | 943.40 | 943.40 |
| 2035-36 | 1041.88 | 1041.88 |
| 2036-37 | 1146.12 | 1146.12 |
| 2037-38 | 1261.10 | 1261.10 |
| 2038-39 | 1394.16 | 1394.16 |
| 2039-40 | 1541.23 | 1541.23 |
| 2040-41 | 1685.00 | 1685.00 |
| 2041-42 | 1849.98 | 1849.98 |
| 2042-43 | 2028.74 | 2028.74 |

Table 7-7 : Toll Revenue Pessimistic Scenario**(Rs. Crores)**

| Year | TP-1 | Total |
|----------------|-------------|----------------|
| 2023-24 | 311.30 | 311.30 |
| 2024-25 | 336.21 | 336.21 |
| 2025-26 | 370.88 | 370.88 |
| 2026-27 | 409.72 | 409.72 |
| 2027-28 | 454.47 | 454.47 |
| 2028-29 | 501.07 | 501.07 |
| 2029-30 | 552.65 | 552.65 |
| 2030-31 | 609.81 | 609.81 |
| 2031-32 | 672.54 | 672.54 |
| 2032-33 | 739.28 | 739.28 |
| 2033-34 | 812.29 | 812.29 |
| 2034-35 | 895.47 | 895.47 |
| 2035-36 | 984.17 | 984.17 |
| 2036-37 | 1077.43 | 1077.43 |
| 2037-38 | 1179.75 | 1179.75 |
| 2038-39 | 1298.03 | 1298.03 |
| 2039-40 | 1427.93 | 1427.93 |
| 2040-41 | 1553.63 | 1553.63 |
| 2041-42 | 1697.48 | 1697.48 |
| 2042-43 | 1852.60 | 1852.60 |

Table 7-8 : Toll Revenue Most Likely Scenario**(Rs. Crores)**

| Year | TP-1 | Total |
|----------------|-------------|----------------|
| 2023-24 | 311.30 | 311.30 |
| 2024-25 | 337.04 | 337.04 |
| 2025-26 | 372.65 | 372.65 |
| 2026-27 | 412.64 | 412.64 |
| 2027-28 | 458.82 | 458.82 |
| 2028-29 | 506.96 | 506.96 |
| 2029-30 | 560.37 | 560.37 |
| 2030-31 | 619.86 | 619.86 |
| 2031-32 | 685.20 | 685.20 |
| 2032-33 | 754.88 | 754.88 |
| 2033-34 | 831.51 | 831.51 |
| 2034-35 | 918.86 | 918.86 |
| 2035-36 | 1012.28 | 1012.28 |
| 2036-37 | 1110.92 | 1110.92 |
| 2037-38 | 1219.48 | 1219.48 |
| 2038-39 | 1344.98 | 1344.98 |
| 2039-40 | 1483.37 | 1483.37 |

| Year | TP-1 | Total |
|----------------|-------------|----------------|
| 2040-41 | 1617.87 | 1617.87 |
| 2041-42 | 1771.98 | 1771.98 |
| 2042-43 | 1938.76 | 1938.76 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Udaipur to Gujarat Border section of NH-8 in state of Rajasthan is nearing completion of six laning. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the busy and prominent national highway NH-8 which connects Mumbai to Delhi and is part of golden quadrilateral. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As discussed, the dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

- a) There is a good amount of tollable traffic running on the project.
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy.
- c) The Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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YEDISHI TO AURANGABAD SECTION OF NH-211 (KM 100.000 TO KM 290.200) IN THE STATE OF MAHARASHTRA



TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)



MARCH 2024

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**YEDISHI TO AURANGABAD SECTION OF NH-211
(KM 100.000 TO KM 290.200)
IN THE STATE OF MAHARASHTRA**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 various NHDP Phases.

The project under consideration, four laning of **Yedeshi** to **Aurangabad** section of NH-211 from km 100.000 to km 290.200 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s YA Tollway Ltd.* (Concessionaire) has been awarded the Project for a concession period of 26 years starting from 1st July 2015. Four laning of project has also been completed in September 2020.

Length of project road is 189.090 Kms. The project road is section of NH-211, is one of the important transportation link in Maharashtra which connects Solapur to Dhule and then at Dhule it can join other important highway like NH-3 (Mumbai – Agra Road) and NH-6 (east-west highway). The project road passes through the important places like Chausala, Beed, Adul, Chitegaon and then Aurangabad. The Project Road passes through the districts of Beed and Aurangabad.

The following figure shows alignment of project road section from Yedeshi to Aurangabad.



Figure 1-1 : Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST 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 “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

National Highway 211 which is now part of NH-52. The national highway 52 was numbered after amalgamating many existing national highways of India.

It connects the important places like Chausala, Beed, Adul, Chitegaon and then Aurangabad. The Project Road passes through the districts of Beed and Aurangabad. Following are the major centers of development around project road.

Project Stretch Description

Like other parts of India rapid ribbon development is happening around these cities on project highway. This also contributes to sustainable traffic growth.

There are three operative toll plazas at project stretch. The first is at Yedeshi at Km 134.000, second at Padalshingi at Km 194.000 and third at Bhokarwadi at Km 254.000. The following figure show project alignment and toll plaza locations.

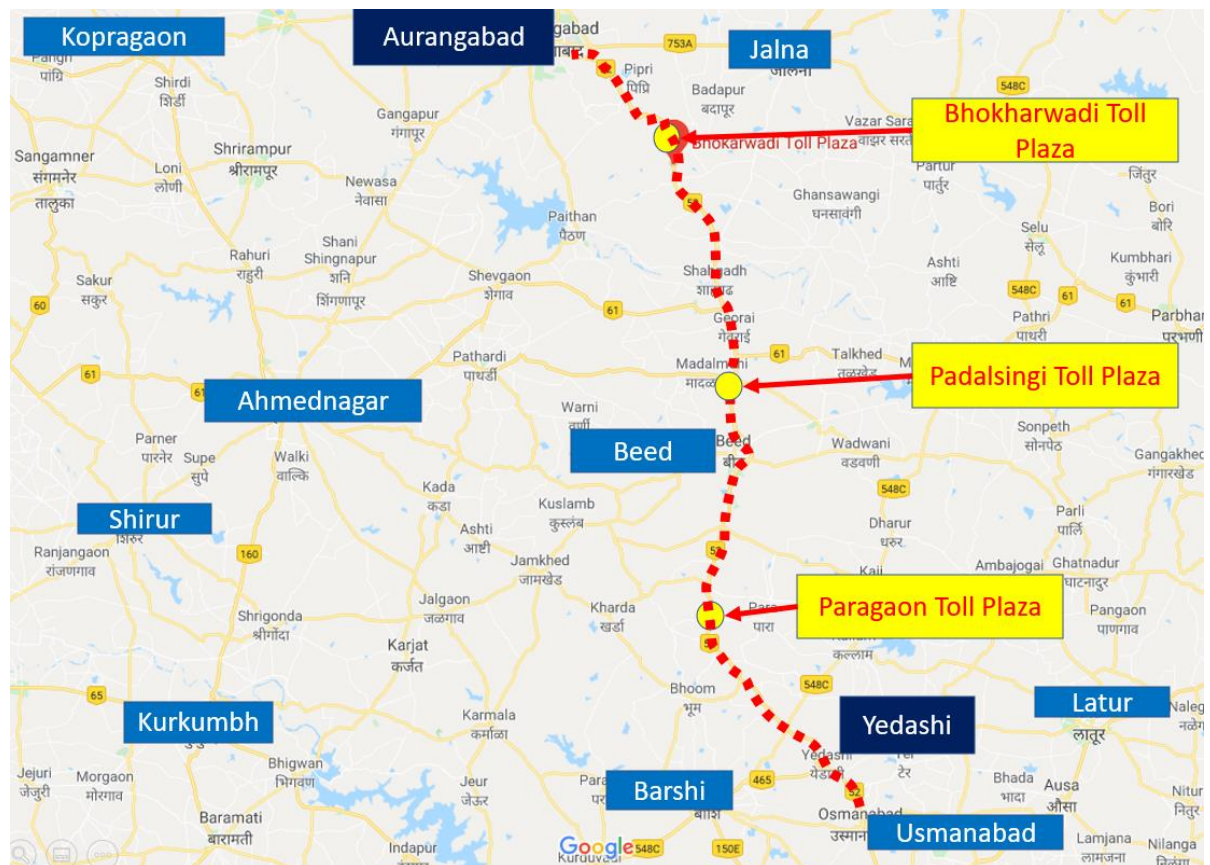


Figure 2-1 : Project Alignment with Toll Plaza

2.2 Project Corridor Illustration

Four laning of project stretch is complete. The following photographs illustrate the project section along the corridor.



Figure 2-2 : Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Yedeshi - Aurangabad section of NH-211 for years 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, 2022-23 and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--|--|---|---|---|---|
| 1 | Km 134.000 Toll Plaza at Pargaon | AADT for Year 2019-20, 2020-2021, 2021- 22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |
| 2 | Km 194.000 Toll Plaza at Padalshingi | AADT for Year 2019-20, 2020-2021, 2021- 22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |
| 3 | Km 254.000 Toll Plaza at Maliwadi | AADT for Year 2019-20, 2020-2021, 2021- 22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 | For Year 2019-20 ,2020-2021, 2021-22, 2022-2023 & Eight month from April 2023 to November 2023 |

All toll plazas are located in Maharashtra.

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 3-2 : 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Bus
- Truck /
- 3 Axle commercial vehicle
- Multi Axle

3.3 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.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for year 2019-20 ,2020-21, 2021-22, 2022-23 and from April 2023 to November 2023.

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. Following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Pargaon Toll Plaza at Km 134.000

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|---------------------------|--|--|--|--|--|
| 1 | Car | 1641 | 1439 | 2426 | 2863 | 3388 |
| 2 | Minibus /LCV | 658 | 482 | 257 | 317 | 332 |
| 3 | Bus | 199 | 109 | 110 | 215 | 244 |
| 4 | Truck | 635 | 704 | 786 | 988 | 1078 |
| 5 | 3-Axle Commercial vehicle | 793 | 845 | 876 | 967 | 924 |
| 6 | Multi axle | 1081 | 1284 | 1567 | 2164 | 2089 |
| 7 | Oversize Vehicle | 0 | 50 | 74 | 31 | 29 |
| | Total | 5007 | 4913 | 6096 | 7544 | 8084 |

Table 3-4 : Traffic Data at Padalshingi Toll Plaza at Km 194.000

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|---------------------------|--|--|--|--|--|
| 1 | Car | 4114 | 3166 | 4969 | 5458 | 6558 |
| 2 | Minibus /LCV | 1095 | 883 | 383 | 451 | 483 |
| 3 | Bus | 473 | 260 | 252 | 478 | 547 |
| 4 | Truck | 788 | 839 | 891 | 1159 | 1324 |
| 5 | 3-Axle Commercial vehicle | 944 | 1049 | 1098 | 1119 | 1145 |
| 6 | Multi axle | 1134 | 1363 | 1641 | 2290 | 2270 |
| 7 | Oversize Vehicle | 1 | 60 | 65 | 29 | 28 |
| | Total | 8549 | 7620 | 9299 | 10985 | 12357 |

Table 3-5 : Traffic Data at Maliwadi Toll Plaza at Km 254.000

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|---------------------------|--|--|--|--|--|
| 1 | Car | 3089 | 2492 | 3992 | 4717 | 5799 |
| 2 | Minibus /LCV | 687 | 546 | 192 | 295 | 353 |
| 3 | Bus | 347 | 177 | 177 | 341 | 388 |
| 4 | Truck | 547 | 579 | 567 | 892 | 1075 |
| 5 | 3-Axle Commercial vehicle | 679 | 737 | 718 | 841 | 928 |
| 6 | Multi axle | 866 | 1046 | 1164 | 1914 | 1918 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2019-20 | Annual Average Daily Traffic (Nos.)- 2020-21 | Annual Average Daily Traffic (Nos.)- 2021-22 | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|------------------|--|--|--|--|--|
| 7 | Oversize Vehicle | 1 | 47 | 52 | 23 | 21 |
| | Total | 6216 | 5623 | 6862 | 9023 | 10484 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-6.

Table 3-6 : 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 3-7 : Traffic in PCU at Project Stretch

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|------------------|---|-------------------|------------|------------------|
| 2019-2020 | Km 134.000 Toll Plaza at Pargaon | 5007 | 12373 | 2.47 |
| | Km 194.000 Toll Plaza at Padalshingi | 8549 | 17479 | 2.04 |
| | Km 254.000 Toll Plaza at Maliwadi | 6216 | 12740 | 2.05 |
| 2020-2021 | Km 134.000 Toll Plaza at Pargaon | 4913 | 13136 | 2.67 |
| | Km 194.000 Toll Plaza at Padalshingi | 7620 | 17339 | 2.28 |
| | Km 254.000 Toll Plaza at Maliwadi | 5623 | 12706 | 2.26 |
| 2021-2022 | Km 134.000 Toll Plaza at Pargaon | 6096 | 15511 | 2.54 |
| | Km 194.000 Toll Plaza at Padalshingi | 9299 | 19945 | 2.14 |
| | Km 254.000 Toll Plaza at Maliwadi | 6862 | 14138 | 2.06 |
| 2022-2023 | Km 134.000 Toll Plaza at Pargaon | 7544 | 19724 | 2.61 |
| | Km 194.000 Toll Plaza at Padalshingi | 10985 | 24840 | 2.26 |
| | Km 254.000 Toll Plaza at | 9023 | 20097 | 2.23 |

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|--|------------|-------|-----------|
| | Maliwadi | | | |
| 2023-2024 | Km 134.000 Toll Plaza at Pargaon | 8084 | 20153 | 2.49 |
| | Km 194.000 Toll Plaza at Padalshingi | 12357 | 26677 | 2.16 |
| | Km 254.000 Toll Plaza at Maliwadi | 10484 | 22233 | 2.12 |

It can be observed from above that project traffic has PCU index 2 to 2.6 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at three toll plaza locations.

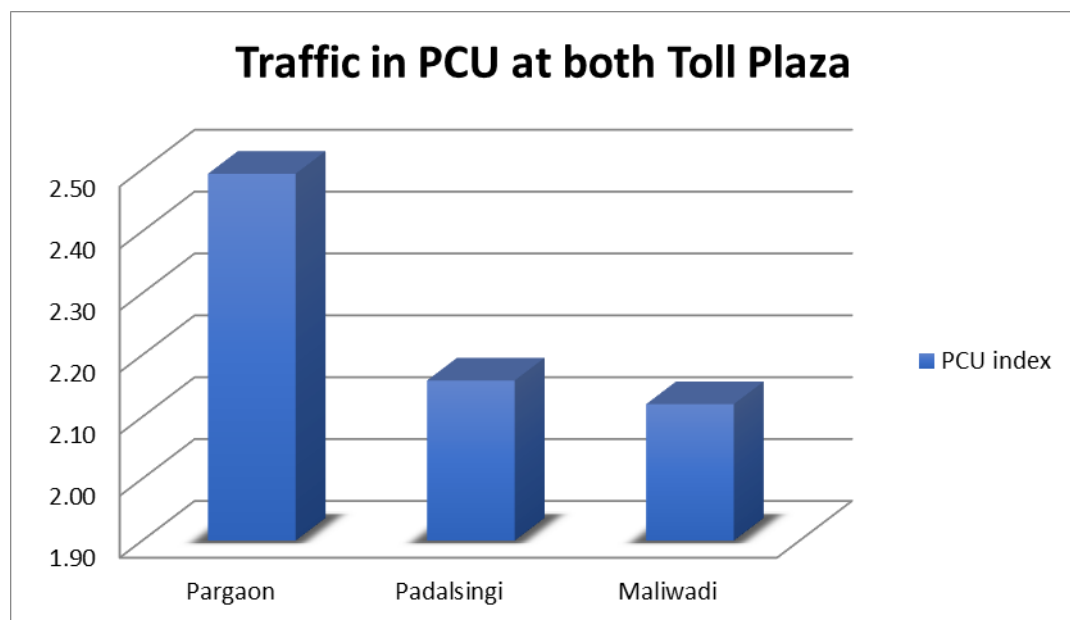


Figure 3-1 : Comparison of PCU Index

It can be observed that PCU index is consistent at all three toll plaza locations.

3.4.2 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.

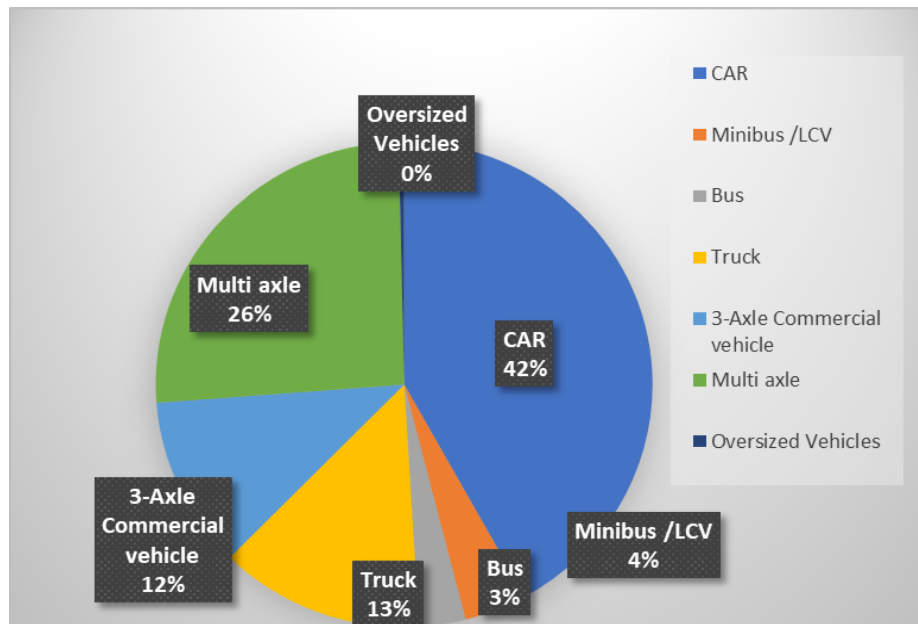


Figure 3-2: Model split of tollable vehicle @ Km 134.000

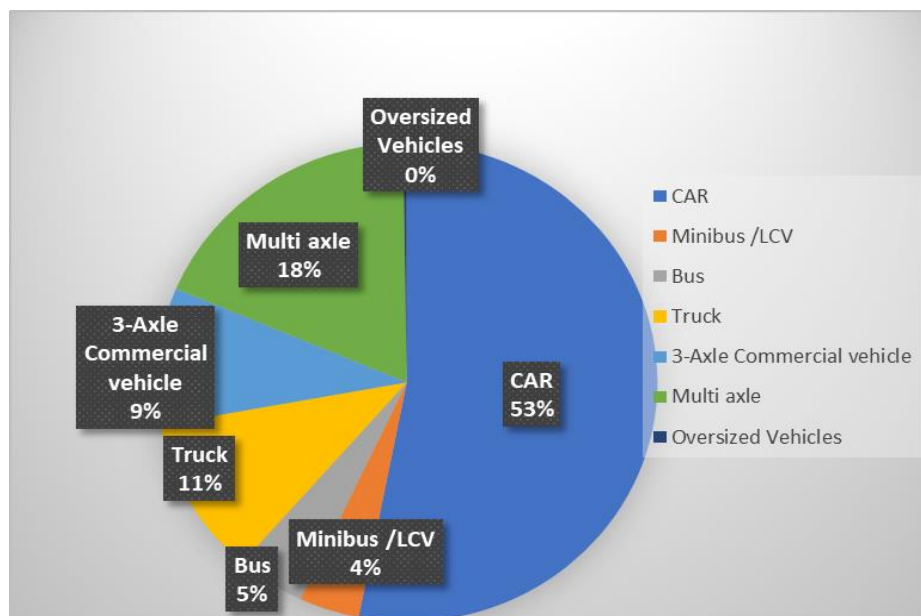


Figure 3-3: Model split of tollable vehicle @ Km 194.000

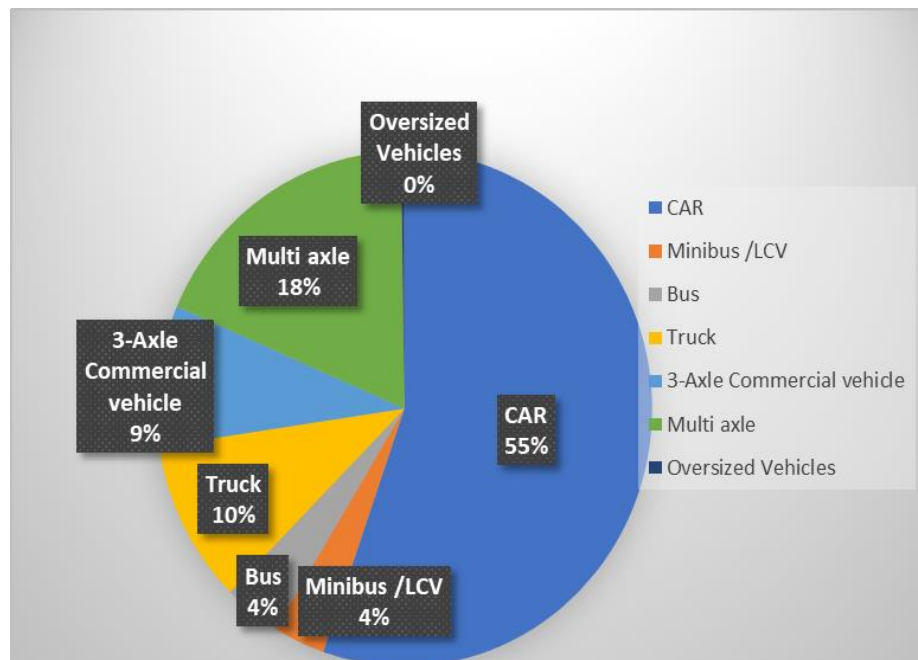


Figure 3-3: Model split of tollable vehicle @ Km 254.000

It is observed that car traffic forms about 42% of total traffic at toll plaza location KM 134.000 while multi axle commercial vehicles are about 38% of total traffic. Truck / Bus and LCV share about 16% and 4% of traffic volume respectively.

It is observed that car traffic forms about 53% of total traffic at toll plaza location KM 194.000 while multi axle commercial vehicles are about 27% of total traffic. Truck / Bus and LCV share about 16% and 4% of traffic volume respectively.

It is observed that car traffic forms about 55% of total traffic at toll plaza location KM 254.000 while multi axle commercial vehicles are about 27% of total traffic. Truck / Bus and LCV share about 14% and 4% of traffic volume respectively.

At second & third toll plaza passenger traffic component is higher due to urban settlement around.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-8 : Journey Type Bifurcation of Traffic at Pargaon Toll Plaza KM 134.000

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 6051 |
| 2 | Return Journey | 1989 |
| 3 | Local Commercial Single Journey | 36 |
| 4 | Monthly Pass Local | 9 |
| 5 | Monthly Pass | 0 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 75%. Return journey component is 25%. The number of monthly pass Local is 0% and Local Commercial single Journey 0% at Pargaon toll plaza.

The following tables give the details of journey distribution at Padalshingi toll plaza at Km 194.000 and Km 254.000.

Table 3-9 : Journey Type Bifurcation of Traffic at Padalshingi Toll Plaza KM 194.000

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 7419 |
| 2 | Return Journey | 4481 |
| 3 | Local Commercial Single Journey | 363 |
| 4 | Monthly Pass Local | 92 |
| 5 | Monthly Pass | 1 |

**Table 3-10 : Journey Type Bifurcation of Traffic at Maliwadi Toll Plaza KM
254.000**

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|--------------------------|
| | | 2023-24 |
| 1 | Single Journey | 6502 |
| 2 | Return Journey | 3903 |
| 3 | Local Commercial Single Journey | 33 |
| 4 | Monthly Pass Local | 39 |
| 5 | Monthly Pass | 7 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

In BOT projects there is always a risk factor of traffic shifting on competing roads after imposition of toll. Shifting of traffic depends on factors such as road length, type, geometry, riding quality and capacity. Competing road networks were identified around section and a speed delay analysis was conducted. In this detail of competing roads are provided and a comparison with project road is made. There can be some alternate route between Yedashi and Aurangabad. The following figure provides alignment of competing road network between Yedashi and Aurangabad.

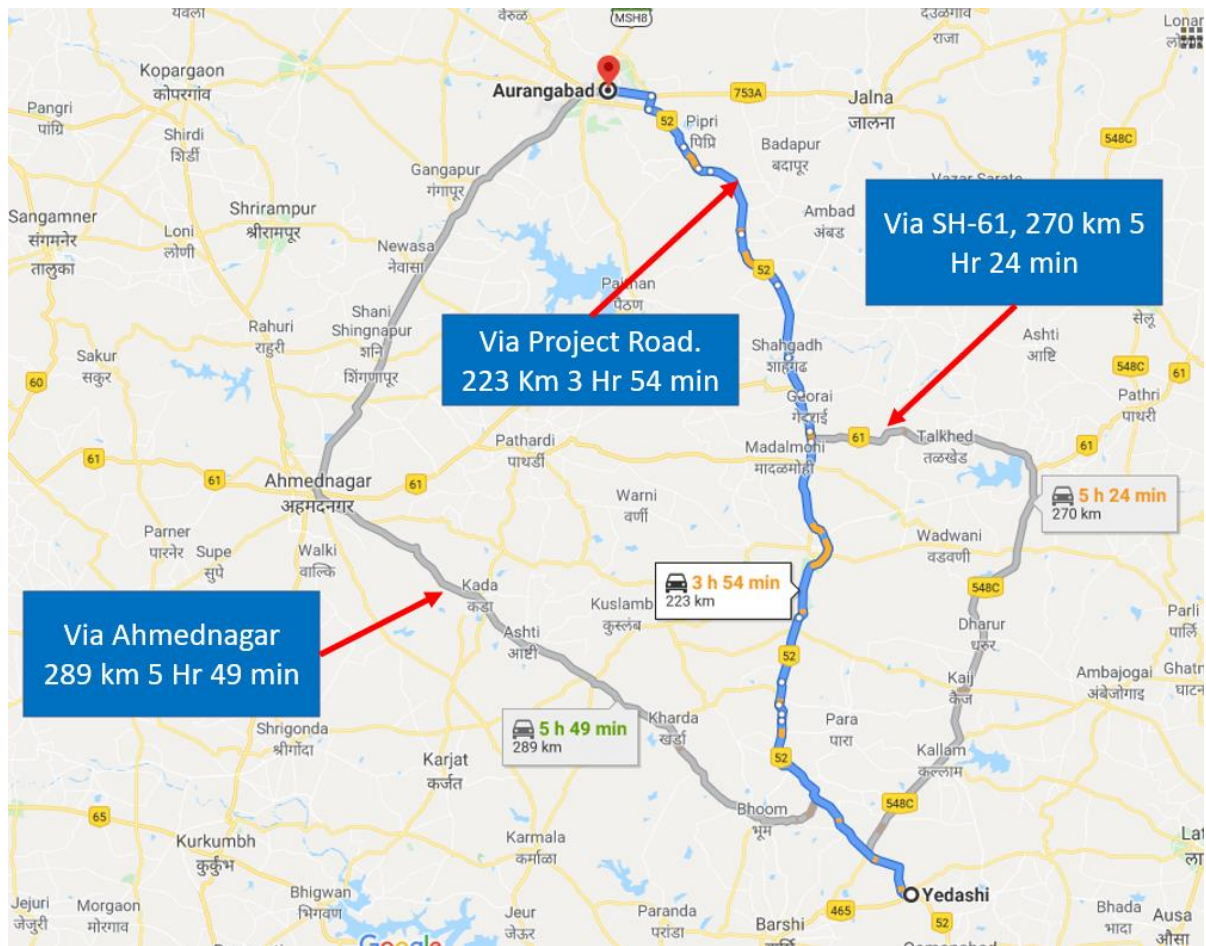


Figure 4-1 : Alternate routes – Yedashi- Aurangabad

It can be observed that alternate routes are quite long and take more time to travel. Hence project road remains the most preferred option for travel between Yedashi and Aurangabad.

Similarly, at regional level there can be alternate via Ahmednagar for travel between Solapur and Aurangabad. The following figure shows competing networks in area.

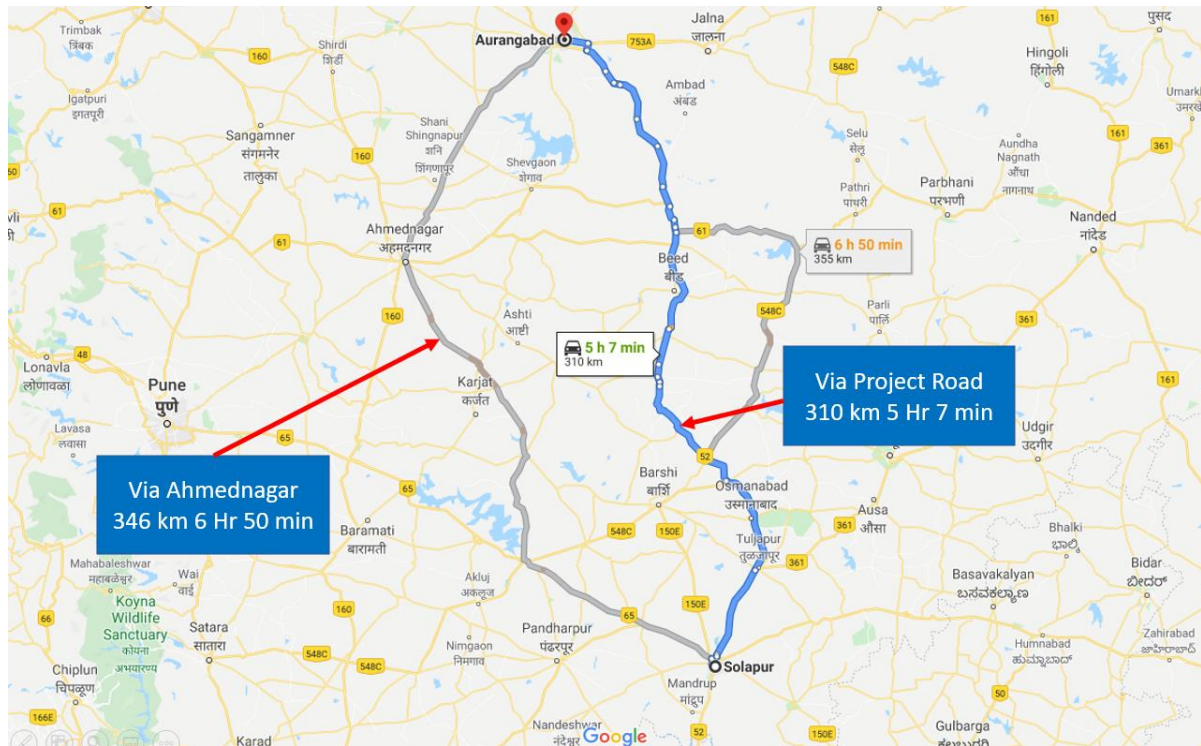


Figure 4-2 : Alternate route Between Solapur and Aurangabad

For travel between Solapur and Aurangabad as well project road is the most preferred option due to shorter length and less travel time. Completion of four laning of Solapur Yedashi section has complemented travel on this route.

The following table provides summary of analysis of alternate route/ roads discussed above.

Table 4-1 : Competing Roads Details

| Sr. No | Route Details | Designation | Length (Km) | Avg. Speed (KMPH) | Time Taken (Min) | Observations |
|-----------------------|--|-----------------|-------------|-------------------|------------------|--|
| Regional Level | | | | | | |
| 1 | Solapur-Ahmednagar-Aurangabad | Alternate Route | 346 | 50 | 6 Hr 50 Min | Project road has minimum travel time and shortest road |
| | Solapur- Yedashi- Aurangabad | Project Road | 310 | 60 | 5 Hr 10 Min | |
| 2 | Yedashi- Kalam-Madalmoni- Aurangabad (SH-61) | Alternate Route | 270 | 50 | 5 Hr 24 Min | Project road has minimum travel time and shortest road |
| | Yedashi- Ahmednagar- Aurangabad | Alternate Route | 289 | 50 | 5 Hr 49 Min | |
| | Yedashi- Beed- Aurangabad | Project Road | 223 | 57 | 3 Hr 54 Min | |

In light of the above discussion project road remains most preferred route for the traffic of influence area. Moreover, project stretch is under toll operation for last one year. Hence any shifting of traffic, if any, would have settled by now and any further shifting of traffic is not envisaged from project road.

Regional Network

Project corridor is an important transportation link for the traffic between Karnataka and Rajasthan / Delhi and other northern states. Part of this traffic uses the Bijapur- Solapur- Ahmednagar- Shirdi route to join back at Dhule and proceed towards northern parts of country. The length of route between Bijapur via project road and route via Ahmednagar is almost equal. Thus, it is expected that some part traffic will come back on the project road as the four laning is complete. The following figures show the route between Bijapur and Dhule via Project Road and via Ahmednagar for better understanding.

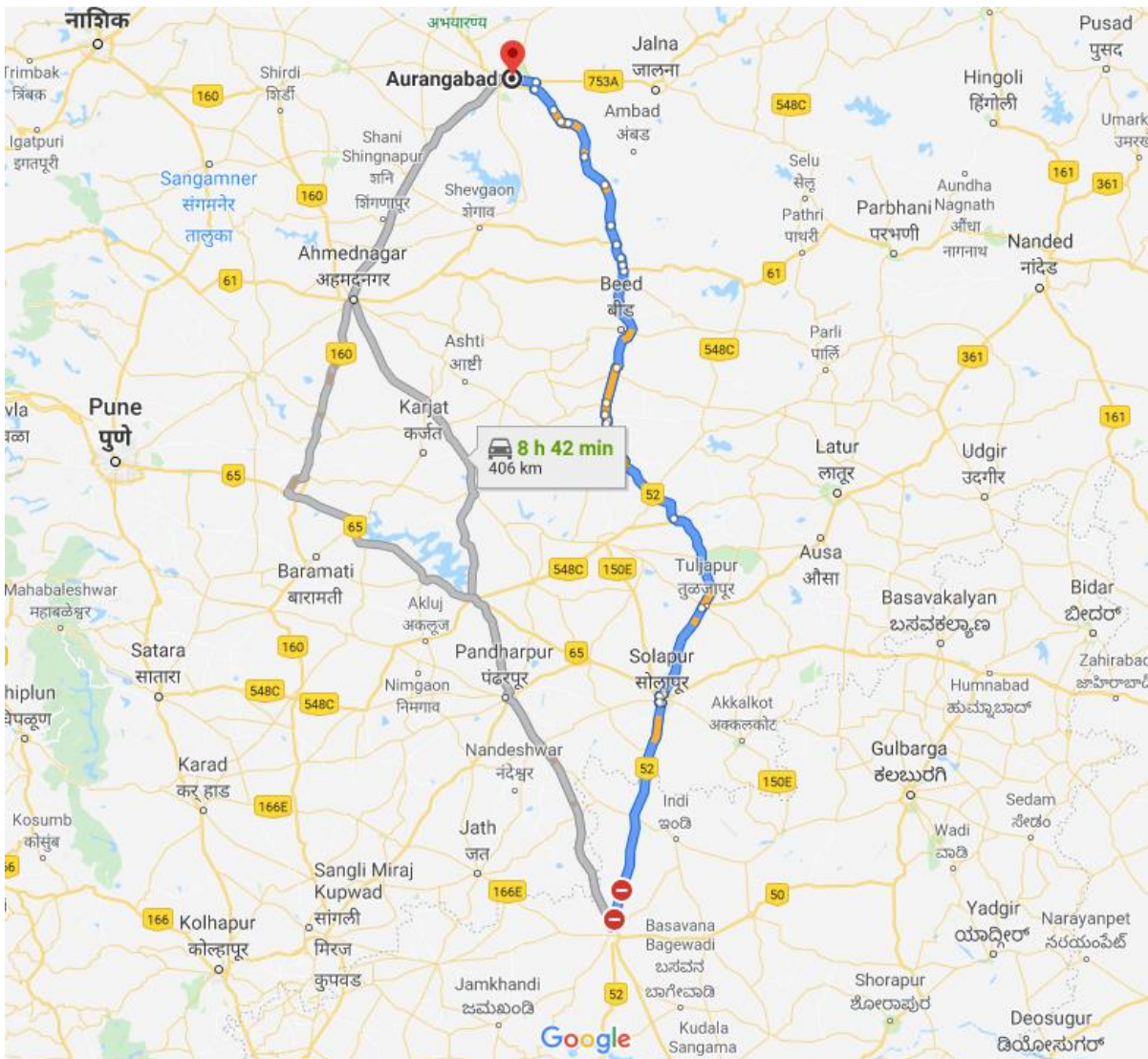


Figure 4-3 : Project Road in regional network.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Yedeshi - Aurangabad section of NH-8 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable to projects of short durations say 5-10 years, however for long term projections it would-be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-12015-Guidelines for Traffic Prediction on Rural Highways**.

In this method the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income

- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, In order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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).

The project corridor spreads across state of Maharashtra. Toll plazas at Paragaon, Padalsingi and Bhokharwadi are in the state of Maharashtra. Project traffic share of many states like Karnataka, Gujarat & Haryana also. For elasticity calculations, working data from these states also has been analyzed.

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

Table 5-1 : Per Capita Income Vs Car Maharashtra

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 99564 | 2307841 | 5.00 | 6.36 | | |
| 2013 | 103904 | 2592565 | 5.02 | 6.41 | 4% | |
| 2014 | 109399 | 2834847 | 5.04 | 6.45 | 5% | |
| 2015 | 114746 | 3113773 | 5.06 | 6.49 | 5% | |
| 2016 | 122422 | 3406872 | 5.09 | 6.53 | 7% | |
| 2017 | 132899 | 3715744 | 5.12 | 6.57 | 9% | 5.96% |

Regression analysis of same is given in figure below

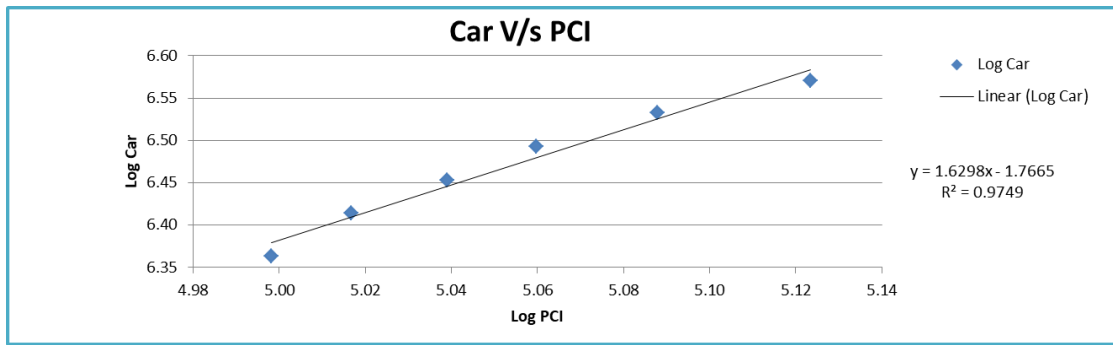


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Maharashtra

Table 5-2 : Population Vs Bus Maharashtra

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 112374333 | 119298 | 8.05 | 5.08 | | |
| 2013 | 113807248 | 129535 | 8.06 | 5.11 | 1% | |
| 2014 | 115229410 | 140087 | 8.06 | 5.15 | 1% | |
| 2015 | 116640546 | 140102 | 8.07 | 5.15 | 1% | |
| 2016 | 118040394 | 150427 | 8.07 | 5.18 | 1% | |
| 2017 | 119428710 | 160042 | 8.08 | 5.20 | 1% | 1.23% |

Regression analysis of same is given in figure below

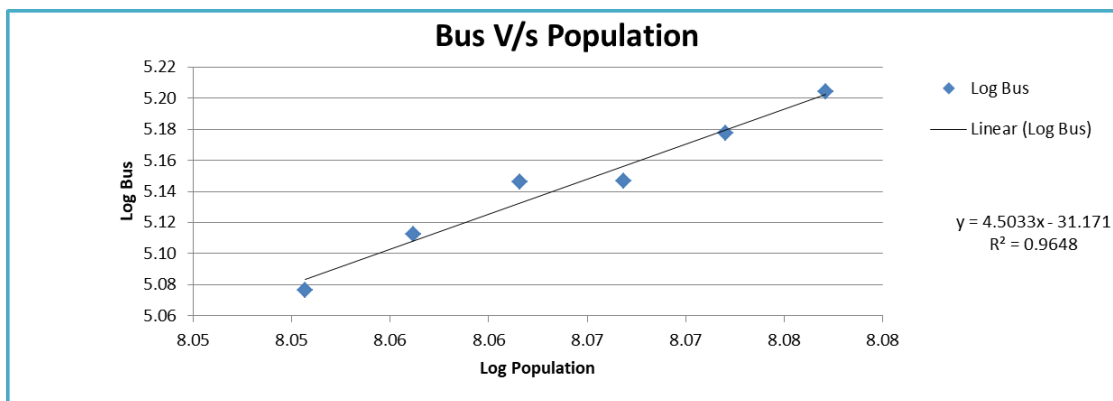


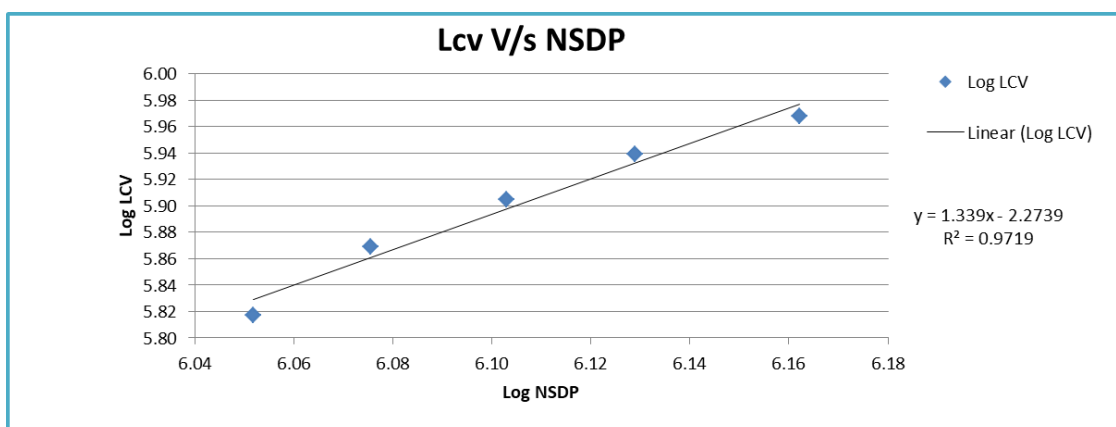
Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra

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

Table 5-3 : LCV Traffic Vs NSDP Maharashtra

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|---------|--------|----------|---------|-------------|-------------------------|
| 2012 | 1126595 | 656407 | 6.05 | 5.82 | | |
| 2013 | 1189711 | 739725 | 6.08 | 5.87 | 6% | |
| 2014 | 1267551 | 803128 | 6.10 | 5.90 | 7% | |
| 2015 | 1345341 | 868632 | 6.13 | 5.94 | 6% | |
| 2016 | 1452439 | 927903 | 6.16 | 5.97 | 8% | 6.56% |

Following figure depict regression analysis and extrapolation.

**Table 5-4 : Truck Traffic Vs NSDP Maharashtra**

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|---------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 1126595 | 411418 | 6.05 | 5.61 | | |
| 2013 | 1189711 | 402366 | 6.08 | 5.60 | 6% | |
| 2014 | 1267551 | 470128 | 6.10 | 5.67 | 7% | |
| 2015 | 1345341 | 491582 | 6.13 | 5.69 | 6% | |
| 2016 | 1452439 | 468810 | 6.16 | 5.67 | 8% | |
| 2017 | 1595514 | 496439 | 6.20 | 5.70 | 10% | 7.22% |

Following figure depict regression analysis and extrapolation

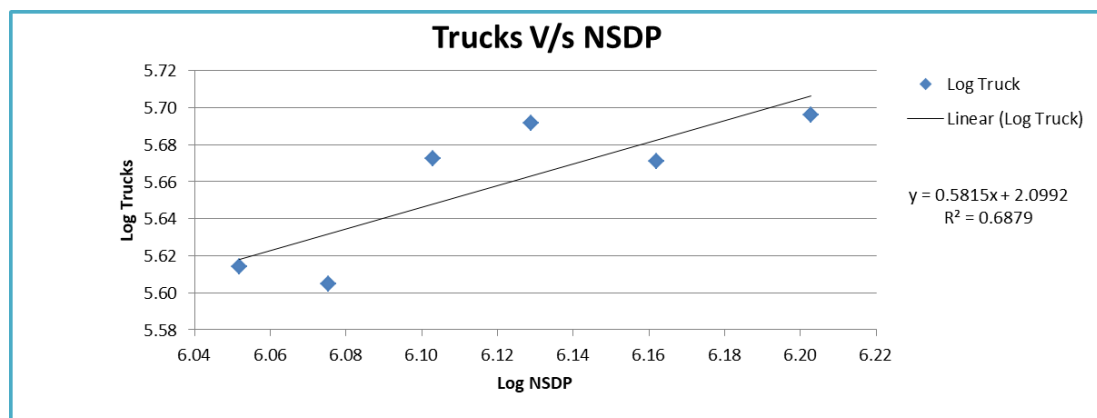


Figure 5-3 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Maharashtra.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-5 : Summary Regression Analysis Maharashtra

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|----------------|----------------------|
| Maharashtra | Car/Jeep | PCI | $y = 1.6298x + -1.7665$ | R ² = 0.9749 | 1.6298 | 5.96% | 9.71% |
| | Bus | Population | $y = 4.5033x - 31.1713$ | R ² = 0.9648 | 4.5033 | 1.23% | 5.52% |
| | LCV | NSDP | $y = 1.339x - 2.2739$ | R ² = 0.9719 | 1.3390 | 6.56% | 8.78% |
| | Truck | NSDP | $y = 0.5815x - 2.0992$ | R ² = 0.6879 | 0.5815 | 7.22% | 4.20% |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Gujrat State.

Table 5-6 : Per Capita Income Vs Car Gujarat

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 87481 | 1411898 | 4.94 | 6.15 | | |
| 2013 | 96683 | 1602129 | 4.99 | 6.20 | 11% | |
| 2014 | 102589 | 1771298 | 5.01 | 6.25 | 6% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2015 | 111370 | 2008748 | 5.05 | 6.30 | 9% | |
| 2016 | 120683 | 2260084 | 5.08 | 6.35 | 8% | |
| 2017 | 129738 | 2527537 | 5.11 | 6.40 | 8% | 8.21% |

Regression analysis of same is given in figure below

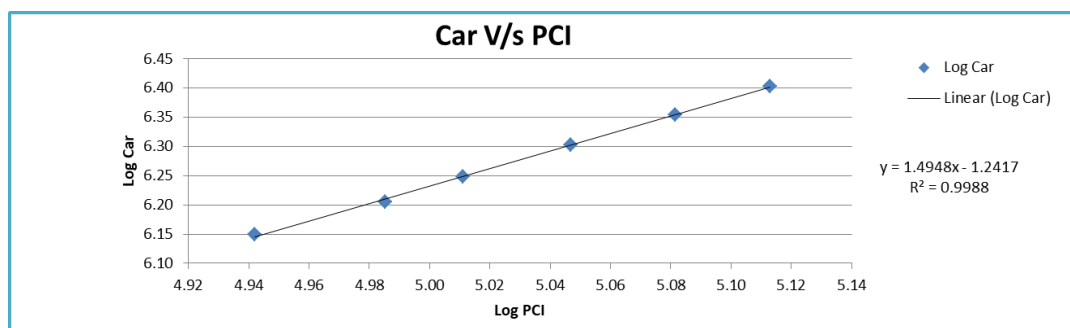


Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh

Table 5-7 : Population Vs Bus Gujrat

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 60439692 | 67546 | 7.78 | 4.83 | | |
| 2013 | 61563037 | 70615 | 7.79 | 4.85 | 2% | |
| 2014 | 62684375 | 72998 | 7.80 | 4.86 | 2% | |
| 2015 | 63803304 | 76435 | 7.80 | 4.88 | 2% | |
| 2016 | 64919427 | 82734 | 7.81 | 4.92 | 2% | |
| 2017 | 66032362 | 74855 | 7.82 | 4.87 | 2% | 1.79% |

Regression analysis of same is given in figure below

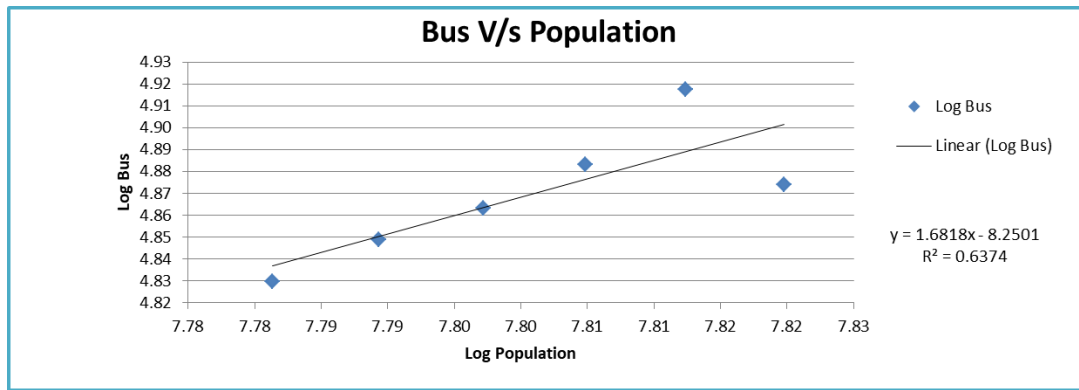


Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat

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

Table 5-8 : LCV Traffic Vs NSDP Gujarat

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 532809 | 448958 | 5.73 | 5.65 | | |
| 2013 | 596659 | 499277 | 5.78 | 5.70 | 12% | |
| 2014 | 641489 | 542918 | 5.81 | 5.73 | 8% | |
| 2015 | 705629 | 589984 | 5.85 | 5.77 | 10% | |
| 2016 | 774775 | 633599 | 5.89 | 5.80 | 10% | 9.82% |

Following figure depict regression analysis and extrapolation.

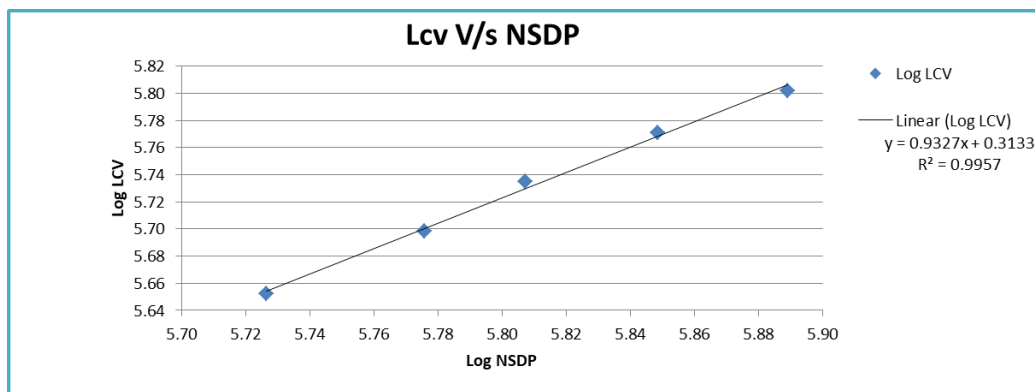
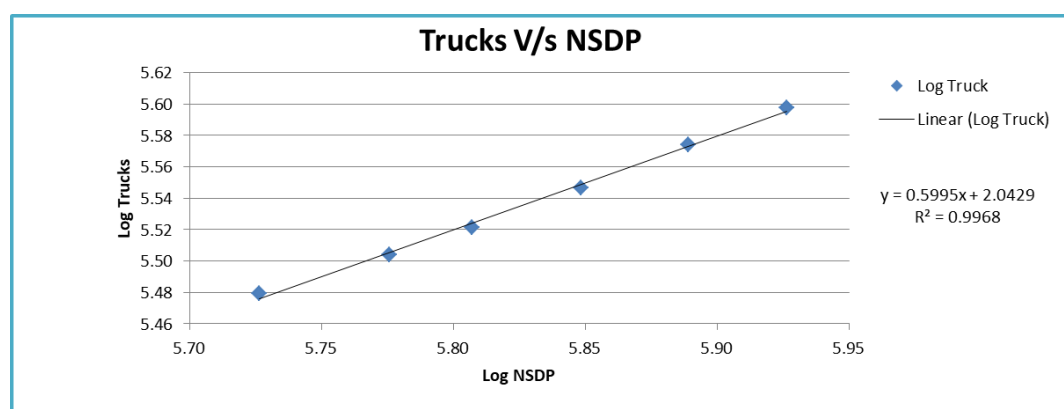


Table 5-9 : Truck Traffic Vs NSDP Gujarat

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 532809 | 301533 | 5.73 | 5.48 | | |
| 2013 | 596659 | 319207 | 5.78 | 5.50 | 12% | |
| 2014 | 641489 | 332185 | 5.81 | 5.52 | 8% | |
| 2015 | 705629 | 352225 | 5.85 | 5.55 | 10% | |
| 2016 | 774775 | 375265 | 5.89 | 5.57 | 10% | |
| 2017 | 843930 | 396061 | 5.93 | 5.60 | 9% | 9.64% |

Following figure depict regression analysis and extrapolation

**Figure 5-6 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Gujarat.**

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 5-10 : Summary Regression Analysis Gujrat

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|---------|------------------|----------------------|-------------------------|----------------|----------------------------|----------------|----------------------|
| Gujarat | Car/Jeep | PCI | $y = 1.4948x + -1.2417$ | $R^2 = 0.9988$ | 1.4948 | 8.21% | 12.27% |
| | Bus | Population | $y = 1.6818x - 8.2501$ | $R^2 = 0.6374$ | 1.6818 | 1.79% | 3.00% |
| | LCV | NSDP | $y = 0.9327x - 0.3133$ | $R^2 = 0.9957$ | 0.9327 | 9.82% | 9.16% |
| | Truck | NSDP | $y = 0.5995x - 2.0429$ | $R^2 = 0.9968$ | 0.5995 | 9.64% | 5.78% |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Haryana State.

Table 5-11 : Per Capita Income Vs Car Haryana

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 106085 | 1134514 | 5.03 | 6.05 | | |
| 2013 | 111780 | 1293065 | 5.05 | 6.11 | 5% | |
| 2014 | 119791 | 1454182 | 5.08 | 6.16 | 7% | |
| 2015 | 125032 | 1609544 | 5.10 | 6.21 | 4% | |
| 2016 | 137818 | 1764448 | 5.14 | 6.25 | 10% | |
| 2017 | 150241 | 1879587 | 5.18 | 6.27 | 9% | 7.23% |

Regression analysis of same is given in figure below

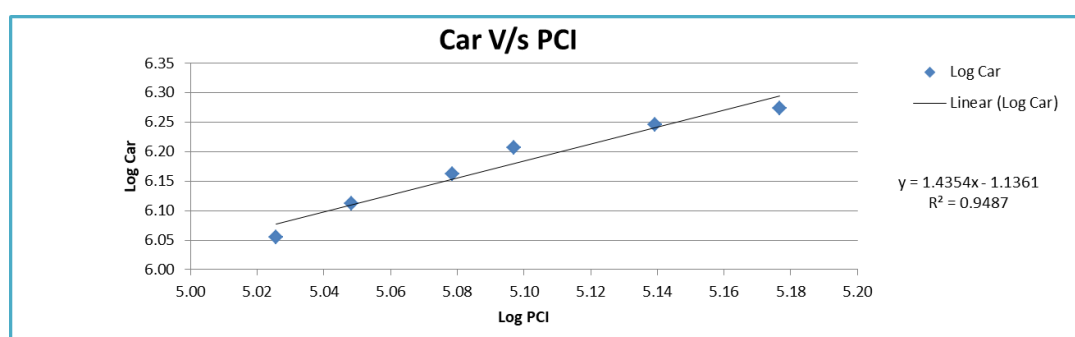
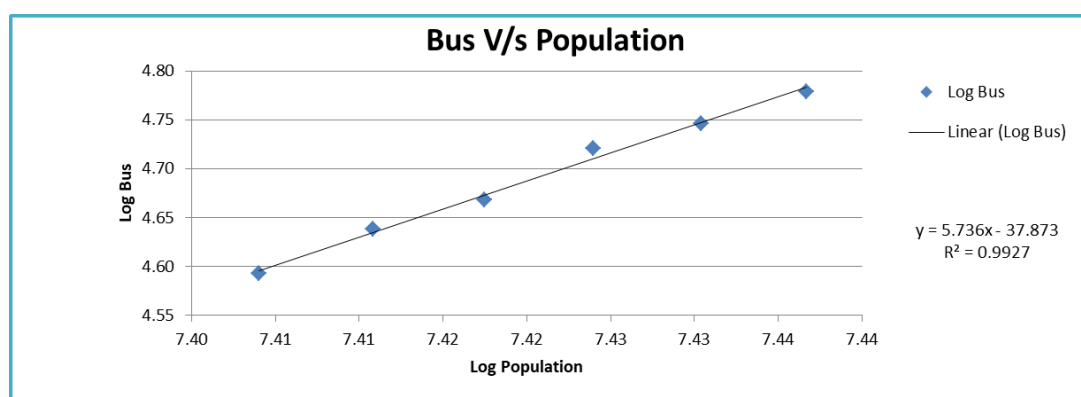
**Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana**

Table 5-12 : Population Vs Bus Haryana

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2012 | 25351462 | 39153 | 7.40 | 4.59 | | |
| 2013 | 25751257 | 43456 | 7.41 | 4.64 | 2% | |
| 2014 | 26149236 | 46558 | 7.42 | 4.67 | 2% | |
| 2015 | 26545282 | 52640 | 7.42 | 4.72 | 2% | |
| 2016 | 26939286 | 55781 | 7.43 | 4.75 | 1% | |
| 2017 | 27331141 | 60129 | 7.44 | 4.78 | 1% | 1.52% |

Regression analysis of same is given in figure below

**Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana**

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

Table 5-13 : LCV Traffic Vs NSDP Haryana

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 271152 | 124897 | 5.43 | 5.10 | | |
| 2013 | 289756 | 137511 | 5.46 | 5.14 | 7% | |
| 2014 | 314931 | 152069 | 5.50 | 5.18 | 9% | |
| 2015 | 333359 | 167901 | 5.52 | 5.23 | 6% | |

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2016 | 372659 | 182776 | 5.57 | 5.26 | 12% | 8.30% |

Following figure depict regression analysis and extrapolation.

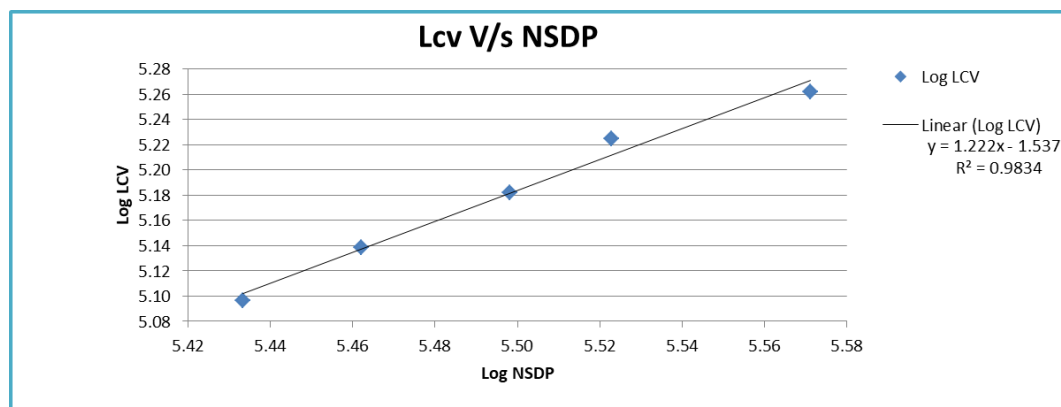


Figure 5-9 : Regression and Elasticity NSDP vs. Lcv – Extrapolation Haryana

Table 5-14 : Truck Traffic Vs NSDP Haryana

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 271152 | 292735 | 5.43 | 5.47 | | |
| 2013 | 289756 | 307509 | 5.46 | 5.49 | 7% | |
| 2014 | 314931 | 327882 | 5.50 | 5.52 | 9% | |
| 2015 | 333359 | 348732 | 5.52 | 5.54 | 6% | |
| 2016 | 372659 | 367730 | 5.57 | 5.57 | 12% | |
| 2017 | 412006 | 390321 | 5.61 | 5.59 | 11% | 8.75% |

Following figure depict regression analysis and extrapolation

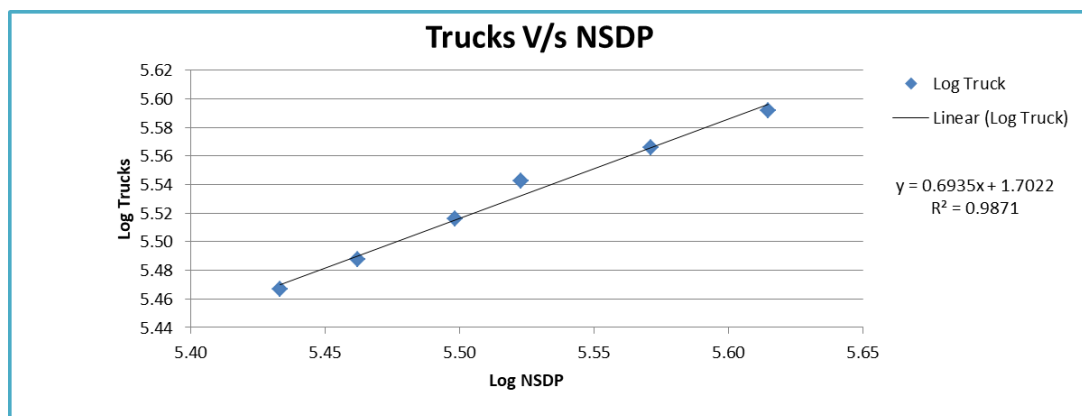


Figure 5-10 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Haryana.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 5-15 : Summary Regression Analysis Haryana

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|---------|------------------|----------------------|------------------------|-------------------------|----------------------------|----------------|----------------------|
| Haryana | Car/Jeep | PCI | $y = 1.4354x - 1.1361$ | R ² = 0.9487 | 1.4354 | 7.23% | 10.38% |
| | Bus | Population | $y = 5.736x - 37.8732$ | R ² = 0.9927 | 5.7360 | 1.52% | 8.69% |
| | LCV | NSDP | $y = 1.222x - 1.5373$ | R ² = 0.9834 | 1.2220 | 8.30% | 10.14% |
| | Truck | NSDP | $y = 0.6935x - 1.7022$ | R ² = 0.9871 | 0.6935 | 8.75% | 6.07% |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Karnataka State.

Table 5-16 : Per Capita Income Vs Car Karnataka

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2012 | 90269 | 1454309 | 4.96 | 6.16 | | |
| 2013 | 94382 | 1626924 | 4.97 | 6.21 | 5% | |
| 2014 | 101864 | 1798035 | 5.01 | 6.25 | 8% | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2015 | 105703 | 1992262 | 5.02 | 6.30 | 4% | |
| 2016 | 116819 | 2207852 | 5.07 | 6.34 | 11% | |
| 2017 | 131260 | 2203562 | 5.12 | 6.34 | 12% | 7.83% |

Regression analysis of same is given in figure below

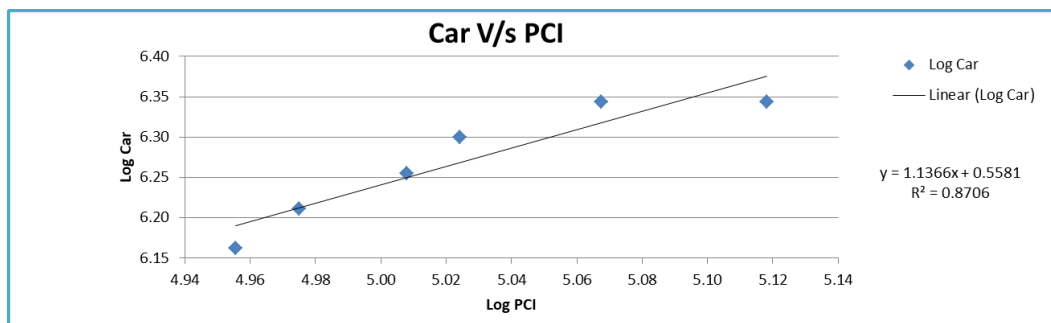


Figure 5-11 : Regression and Elasticity PCI vs. Car – Extrapolation Karnataka

Table 5-17 : Population Vs Bus Karnataka

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2012 | 61095297 | 175705 | 7.79 | 5.24 | | |
| 2013 | 62058777 | 186705 | 7.79 | 5.27 | 2% | |
| 2014 | 63017877 | 195913 | 7.80 | 5.29 | 2% | |
| 2015 | 63972322 | 204803 | 7.81 | 5.31 | 2% | |
| 2016 | 64921845 | 213699 | 7.81 | 5.33 | 1% | |
| 2017 | 65866188 | 224580 | 7.82 | 5.35 | 1% | 1.52% |

Regression analysis of same is given in figure below

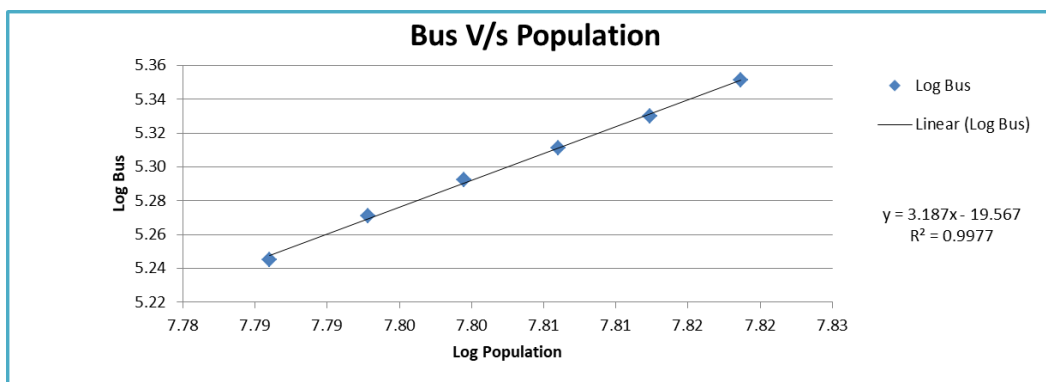


Figure 5-12 : Regression and Elasticity Population vs. Bus – Extrapolation Karnataka

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

Table 5-18 : LCV Traffic Vs NSDP Karnataka

| Year | NSDP | LCV | Log NSDP | Log LCV | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|---------|-------------|-------------------------|
| 2012 | 554990 | 221160 | 5.74 | 5.34 | | |
| 2013 | 586592 | 258701 | 5.77 | 5.41 | 6% | |
| 2014 | 639981 | 294266 | 5.81 | 5.47 | 9% | |
| 2015 | 671322 | 331381 | 5.83 | 5.52 | 5% | |
| 2016 | 749990 | 367572 | 5.88 | 5.57 | 12% | 8% |

Following figure depict regression analysis and extrapolation.

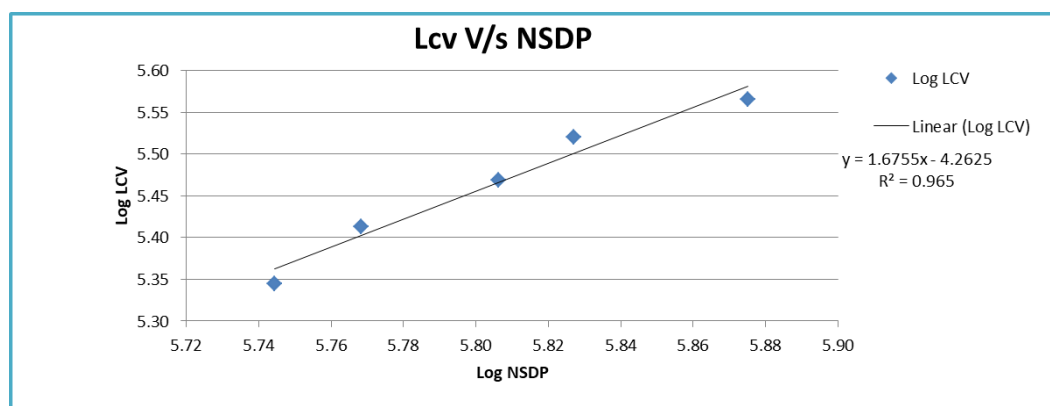


Figure 5-13 : Regression and Elasticity NSDP vs. Lcv – Extrapolation Karnataka

Table 5-19 : Truck Traffic Vs NSDP Karnataka

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2012 | 554990 | 233422 | 5.74 | 5.37 | | |
| 2013 | 586592 | 247639 | 5.77 | 5.39 | 6% | |
| 2014 | 639981 | 260989 | 5.81 | 5.42 | 9% | |
| 2015 | 671322 | 274971 | 5.83 | 5.44 | 5% | |
| 2016 | 749990 | 290415 | 5.88 | 5.46 | 12% | |
| 2017 | 851880 | 306290 | 5.93 | 5.49 | 14% | 9.00% |

Following figure depict regression analysis and extrapolation

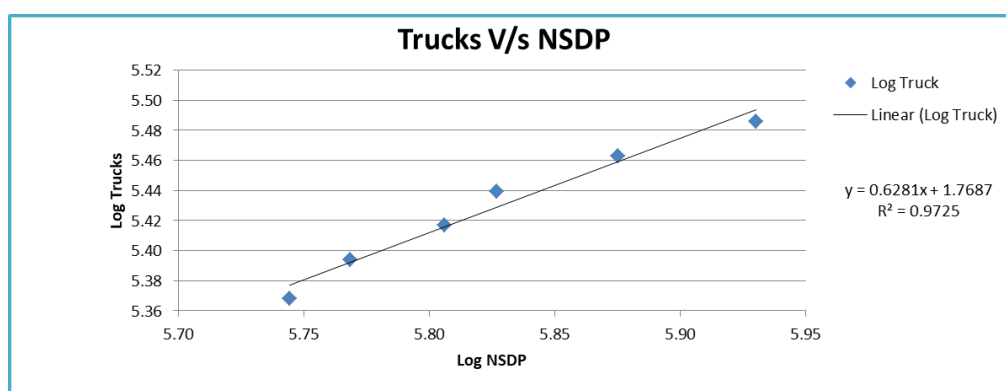


Figure 5-14 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Karnataka.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-20 : Summary Regression Analysis Karnataka

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth | Growth Elastic Model |
|-----------|------------------|----------------------|------------------------|----------------|----------------------------|----------------|----------------------|
| Karnataka | Car/Jeep | PCI | $y = 1.1366x - 0.5581$ | $R^2 = 0.8706$ | 1.1366 | 7.83% | 8.90% |
| | Bus | Population | $y = 3.187x - 19.567$ | $R^2 = 0.9977$ | 3.1870 | 1.52% | 4.83% |
| | LCV | NSDP | $y = 1.6755x - 4.2625$ | $R^2 = 0.965$ | 1.6755 | 7.85% | 13.16% |
| | Truck | NSDP | $y = 0.6281x - 1.7687$ | $R^2 = 0.9725$ | 0.6281 | 9.00% | 5.65% |

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 proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Yedashi to Aurangabad has recently been commissioned and is under tolling operation since March 2019. As traffic data available for last two years was affected due to COVID-19 the same cannot be taken as representative. A minimum of about 5 -6 years' consistent traffic data is required for establishing a reliable past trend.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

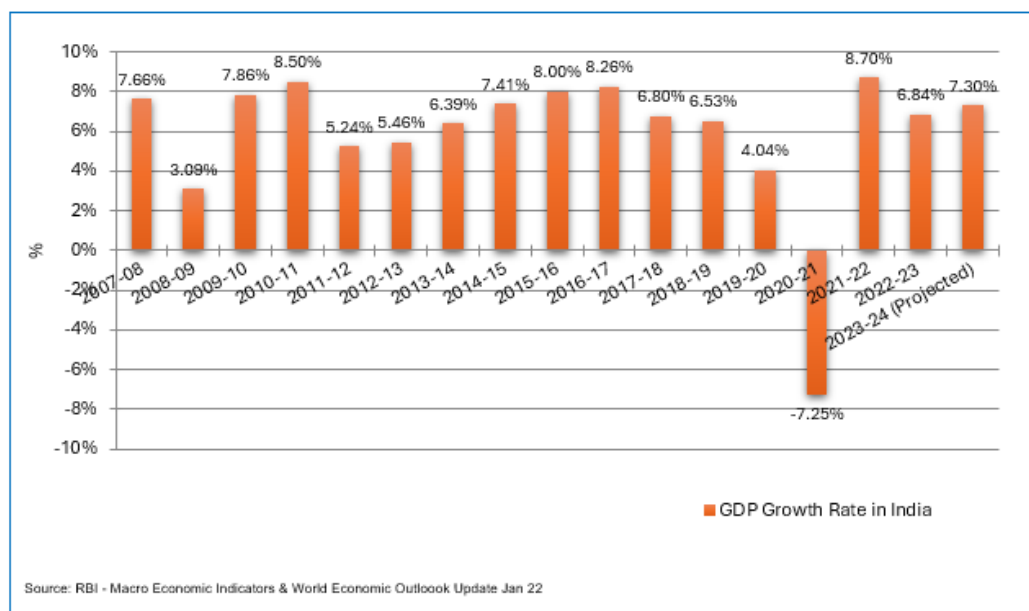


Figure 5-15 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. The World Economic Outlook update also has predicted a growth rate of about 7.5 % in the year 2022-23.

5.6 Developments along and around the Project Corridor & State

Aurangabad: is the fifth largest city in Maharashtra. It lies on a major trade route that used to connect north-west India's sea and land ports to the Deccan region. Aurangabad is administrative headquarters of the Aurangabad Division or Marathwada region.

Beed: Agriculture is the main business in Beed, and it is largely dependent on monsoon rain. Beed also is a district which provides a large number of laborers in India specially in the form of sugarcane cutters.

Jalna: is connected to major towns of the state-by-state highways. Road connectivity is excellent, roads connecting to Aurangabad, Pune, Ahmednagar, Nagpur, Beed, Mumbai having been upgraded to four-lane highways. A New Nagpur-Aurangabad-Mumbai highway,

passing through Jalna, is being developed. There are various cotton-ginning & oil-pressing factories in Jalna.

Until 1960 Aurangabad was a undeveloped city and industrially backward area. After 1960 Growth began when the Maharashtra Industrial Development Corporation (MIDC) began acquiring land and setting up industrial estates. Aurangabad is a now classic example of efforts of a state government towards the balanced industrialisation of the state. Major Industrial areas of Aurangabad are Chikhalthana MIDC, Shendra MIDC and Waluj MIDC. Many of the large India and multinational firms have established themselves in Industrial areas of Shendra, Waluj, Paithan.

Some of the big names include Audi, Skoda, Videocon, Siemens, Bajaj, Forbes, Goodyear, Wockhardt, Johnson & Johnson, Kenstar which have set up their production houses in Industrial areas of Aurangabad.

DMIC

Delhi Mumbai Industrial Corridor (DMIC) which is passing close to PIA envisaged to influence the pattern of development and industrialization of the region. To tap the development potential of the proposed freight corridor, an area spanning 150 kilometers wide on both sides of the freight corridor has been identified as Influence Region and is proposed to be developed as Delhi-Mumbai Industrial Corridor (DMIC). One of the Nashik Sinnar Igatpuri Investment Region's identified early bird projects is an industrial area comprising of total 40 sq. km to be developed into two parts one of 8 sq. km in Shendra and other with an area of 32 sq. km at Bidkin some 24 km from Aurangabad on the Paithan road.

The Aurangabad Industrial City (AURIC) Bidkin Industrial Area (BIA) is strategically positioned and directly connected to the major state highways which are Paithan Road, NH-211 and SH-178 (Jalna Road). The nearest major city is Aurangabad which is served by NH-211, Major State Highway (MSH) 6 and MSH-8, and SH-16, SH-60 and SH-148.

Considering the scenario, it may be assumed that the traffic growth on the project highway would remain high and there are minimal risks in terms of growth.

5.7 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. Traffic growth has been suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Maharashtra Part of Stretch

Table 5-21 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2025 | 2025-2030 | 2031-2035 | 2036-2040 | 2041-2045 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.46% | 7.71% | 7.08% | 6.77% | 6.72% |
| Bus | 6.00% | 4.79% | 4.27% | 4.01% | 4.01% |
| Minibus | 6.00% | 4.79% | 4.27% | 4.01% | 4.01% |
| LCV | 5.98% | 4.10% | 3.41% | 3.07% | 3.00% |
| 2- Axle | 4.92% | 3.69% | 3.17% | 2.91% | 2.86% |
| 3 - Axle | 6.19% | 4.75% | 4.05% | 3.71% | 3.65% |
| 4 to6 Axle | 6.82% | 4.75% | 4.05% | 3.71% | 3.65% |
| 7 and Above Axle | 6.82% | 4.75% | 4.05% | 3.71% | 3.65% |

Table 5-22 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2025 | 2025-2030 | 2031-2035 | 2036-2040 | 2041-2045 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.96% | 7.21% | 6.58% | 6.27% | 6.22% |
| Bus | 5.50% | 4.29% | 3.77% | 3.51% | 3.51% |
| Minibus | 5.50% | 4.29% | 3.77% | 3.51% | 3.51% |
| LCV | 5.48% | 3.60% | 2.91% | 2.57% | 2.50% |
| 2- Axle | 4.42% | 3.19% | 2.67% | 2.41% | 2.36% |
| 3 - Axle | 5.69% | 4.25% | 3.55% | 3.21% | 3.15% |
| 4 to6 Axle | 6.32% | 4.25% | 3.55% | 3.21% | 3.15% |
| 7 and Above Axle | 6.32% | 4.25% | 3.55% | 3.21% | 3.15% |

Table 5-23 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2025 | 2025-2030 | 2031-2035 | 2036-2040 | 2041-2045 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.21% | 7.46% | 6.83% | 6.52% | 6.47% |
| Bus | 5.75% | 4.54% | 4.02% | 3.76% | 3.76% |
| Minibus | 5.75% | 4.54% | 4.02% | 3.76% | 3.76% |
| LCV | 5.73% | 3.85% | 3.16% | 2.82% | 2.75% |
| 2- Axle | 4.67% | 3.44% | 2.92% | 2.66% | 2.61% |
| 3 - Axle | 5.94% | 4.50% | 3.80% | 3.46% | 3.40% |
| 4 to6 Axle | 6.57% | 4.50% | 3.80% | 3.46% | 3.40% |
| 7 and Above Axle | 6.57% | 4.50% | 3.80% | 3.46% | 3.40% |

It is observed that a PIL was filed at Hon'ble Bombay High Court (Aurangabad bench) to augment the Autram Ghat section (between Chalisgaon and Aurangabad). The Hon'ble High Court has passed an interim order in August 2023. It directed NHAI to submit a plan for

augmentation of the road and till then movement of commercial vehicles is restricted on that section of the road. The matter is sub judice.

This has affected the traffic on stretch. It is assumed that the matter is temporary and should be resolved soon, in the near future and would result in increased traffic in the project corridor. Hence additional growth has been considered in the year 2025-26 to cater for the above.

Traffic and revenue have been worked out on the basis of the above growths and some are presented in subsequent chapters of the report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 134.000 KM
(Optimistic Growth Scenario)

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3388 | 332 | 244 | 1078 | 924 | 2089 | 29 | 8084 | 20153 |
| 2024-25 | 3985 | 379 | 278 | 1217 | 1053 | 2399 | 32 | 9343 | 23137 |
| 2025-26 | 4293 | 394 | 291 | 1262 | 1103 | 2513 | 33 | 9889 | 24309 |
| 2026-27 | 4624 | 410 | 305 | 1308 | 1155 | 2633 | 34 | 10469 | 25545 |
| 2027-28 | 4980 | 426 | 319 | 1356 | 1210 | 2758 | 36 | 11085 | 26847 |
| 2028-29 | 5364 | 443 | 334 | 1406 | 1267 | 2889 | 38 | 11741 | 28221 |
| 2029-30 | 5777 | 461 | 350 | 1458 | 1327 | 3026 | 40 | 12439 | 29671 |
| 2030-31 | 6185 | 476 | 365 | 1504 | 1381 | 3149 | 42 | 13102 | 31009 |
| 2031-32 | 6622 | 492 | 380 | 1551 | 1437 | 3277 | 44 | 13803 | 32409 |
| 2032-33 | 7090 | 508 | 397 | 1600 | 1495 | 3410 | 46 | 14546 | 33880 |
| 2033-34 | 7591 | 525 | 414 | 1651 | 1555 | 3548 | 48 | 15332 | 35421 |
| 2034-35 | 8128 | 542 | 432 | 1703 | 1618 | 3691 | 50 | 16164 | 37035 |
| 2035-36 | 8678 | 558 | 449 | 1752 | 1677 | 3828 | 52 | 16994 | 38609 |
| 2036-37 | 9265 | 575 | 467 | 1803 | 1739 | 3970 | 54 | 17873 | 40263 |
| 2037-38 | 9891 | 592 | 485 | 1856 | 1804 | 4118 | 56 | 18802 | 41997 |
| 2038-39 | 10560 | 609 | 505 | 1910 | 1871 | 4271 | 58 | 19784 | 43812 |
| 2039-40 | 11275 | 628 | 525 | 1965 | 1940 | 4429 | 60 | 20822 | 45708 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2040-41 | 12032 | 647 | 546 | 2021 | 2011 | 4590 | 62 | 21909 | 47671 |
| 2041-42 | 12839 | 666 | 568 | 2078 | 2084 | 4757 | 64 | 23056 | 49723 |
| 2042-43 | 13702 | 686 | 591 | 2137 | 2160 | 4930 | 66 | 24272 | 51877 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 194.000 KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6558 | 483 | 547 | 1324 | 1145 | 2270 | 28 | 12357 | 26677 |
| 2024-25 | 7717 | 550 | 622 | 1493 | 1308 | 2608 | 32 | 14330 | 30690 |
| 2025-26 | 8313 | 573 | 652 | 1548 | 1371 | 2732 | 33 | 15222 | 32328 |
| 2026-27 | 8954 | 596 | 683 | 1605 | 1436 | 2863 | 34 | 16171 | 34057 |
| 2027-28 | 9643 | 621 | 715 | 1664 | 1504 | 3000 | 35 | 17182 | 35881 |
| 2028-29 | 10386 | 646 | 749 | 1725 | 1576 | 3143 | 36 | 18261 | 37811 |
| 2029-30 | 11187 | 672 | 785 | 1789 | 1651 | 3292 | 38 | 19414 | 39855 |
| 2030-31 | 11979 | 695 | 819 | 1846 | 1718 | 3426 | 39 | 20522 | 41763 |
| 2031-32 | 12827 | 719 | 854 | 1904 | 1787 | 3565 | 40 | 21696 | 43763 |
| 2032-33 | 13734 | 744 | 891 | 1964 | 1859 | 3710 | 41 | 22943 | 45872 |
| 2033-34 | 14706 | 769 | 929 | 2026 | 1935 | 3860 | 43 | 24268 | 48093 |
| 2034-35 | 15746 | 795 | 968 | 2090 | 2014 | 4017 | 45 | 25675 | 50434 |
| 2035-36 | 16811 | 820 | 1007 | 2150 | 2089 | 4166 | 47 | 27090 | 52738 |
| 2036-37 | 17948 | 845 | 1048 | 2213 | 2167 | 4321 | 49 | 28591 | 55165 |
| 2037-38 | 19163 | 871 | 1090 | 2277 | 2247 | 4482 | 51 | 30181 | 57710 |
| 2038-39 | 20461 | 897 | 1134 | 2343 | 2330 | 4648 | 53 | 31866 | 60382 |
| 2039-40 | 21845 | 925 | 1179 | 2411 | 2416 | 4820 | 55 | 33651 | 63188 |
| 2040-41 | 23312 | 953 | 1226 | 2479 | 2504 | 4995 | 57 | 35526 | 66103 |
| 2041-42 | 24877 | 981 | 1276 | 2550 | 2596 | 5178 | 59 | 37517 | 69181 |
| 2042-43 | 26549 | 1010 | 1327 | 2623 | 2691 | 5367 | 61 | 39628 | 72413 |

**Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 254.000 KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 5799 | 353 | 388 | 1075 | 928 | 1918 | 21 | 10484 | 22233 |
| 2024-25 | 6824 | 402 | 444 | 1212 | 1061 | 2201 | 24 | 12166 | 25585 |
| 2025-26 | 7351 | 418 | 466 | 1256 | 1112 | 2306 | 25 | 12934 | 26970 |
| 2026-27 | 7918 | 435 | 489 | 1303 | 1166 | 2415 | 26 | 13752 | 28429 |
| 2027-28 | 8528 | 452 | 512 | 1351 | 1222 | 2530 | 27 | 14622 | 29968 |
| 2028-29 | 9185 | 471 | 536 | 1401 | 1280 | 2650 | 28 | 15551 | 31594 |
| 2029-30 | 9892 | 490 | 561 | 1452 | 1341 | 2775 | 29 | 16540 | 33307 |
| 2030-31 | 10592 | 506 | 585 | 1498 | 1396 | 2887 | 30 | 17494 | 34915 |
| 2031-32 | 11342 | 523 | 610 | 1546 | 1453 | 3004 | 31 | 18509 | 36611 |
| 2032-33 | 12144 | 540 | 636 | 1595 | 1512 | 3125 | 32 | 19584 | 38390 |
| 2033-34 | 13003 | 559 | 664 | 1645 | 1574 | 3251 | 33 | 20729 | 40269 |
| 2034-35 | 13922 | 578 | 693 | 1697 | 1638 | 3383 | 34 | 21945 | 42250 |
| 2035-36 | 14864 | 595 | 721 | 1746 | 1699 | 3508 | 35 | 23168 | 44198 |
| 2036-37 | 15869 | 614 | 750 | 1797 | 1762 | 3638 | 36 | 24466 | 46250 |
| 2037-38 | 16943 | 633 | 780 | 1849 | 1827 | 3773 | 37 | 25842 | 48406 |
| 2038-39 | 18090 | 652 | 811 | 1902 | 1894 | 3913 | 38 | 27300 | 50669 |
| 2039-40 | 19314 | 672 | 844 | 1958 | 1965 | 4058 | 39 | 28850 | 53060 |
| 2040-41 | 20611 | 692 | 878 | 2014 | 2037 | 4206 | 40 | 30478 | 55543 |
| 2041-42 | 21996 | 712 | 913 | 2072 | 2111 | 4359 | 41 | 32204 | 58152 |
| 2042-43 | 23474 | 734 | 949 | 2131 | 2188 | 4518 | 42 | 34036 | 60899 |

**Table 6-4 : Total Tollable Traffic @ Toll Plaza 1- Chainage 134.000 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3388 | 332 | 244 | 1078 | 924 | 2089 | 29 | 8084 | 20153 |
| 2024-25 | 3968 | 378 | 278 | 1210 | 1048 | 2388 | 32 | 9302 | 23033 |
| 2025-26 | 4256 | 392 | 289 | 1248 | 1093 | 2489 | 33 | 9800 | 24083 |
| 2026-27 | 4563 | 406 | 302 | 1288 | 1140 | 2594 | 34 | 10327 | 25188 |
| 2027-28 | 4892 | 420 | 315 | 1329 | 1188 | 2704 | 35 | 10883 | 26344 |
| 2028-29 | 5245 | 435 | 329 | 1371 | 1238 | 2819 | 36 | 11473 | 27559 |
| 2029-30 | 5622 | 450 | 343 | 1415 | 1290 | 2939 | 37 | 12096 | 28833 |
| 2030-31 | 5992 | 463 | 356 | 1452 | 1336 | 3043 | 38 | 12680 | 29983 |
| 2031-32 | 6386 | 477 | 370 | 1490 | 1384 | 3151 | 39 | 13297 | 31189 |
| 2032-33 | 6805 | 491 | 384 | 1530 | 1433 | 3262 | 40 | 13945 | 32442 |
| 2033-34 | 7252 | 505 | 398 | 1571 | 1484 | 3378 | 41 | 14629 | 33754 |
| 2034-35 | 7729 | 519 | 413 | 1613 | 1536 | 3498 | 42 | 15350 | 35124 |
| 2035-36 | 8214 | 532 | 427 | 1651 | 1585 | 3610 | 43 | 16062 | 36440 |
| 2036-37 | 8728 | 546 | 442 | 1691 | 1636 | 3726 | 44 | 16813 | 37819 |
| 2037-38 | 9275 | 560 | 457 | 1732 | 1688 | 3846 | 45 | 17603 | 39256 |
| 2038-39 | 9855 | 574 | 473 | 1774 | 1742 | 3970 | 46 | 18434 | 40755 |
| 2039-40 | 10472 | 589 | 490 | 1817 | 1798 | 4097 | 47 | 19310 | 42319 |
| 2040-41 | 11123 | 604 | 507 | 1860 | 1854 | 4226 | 48 | 20222 | 43925 |
| 2041-42 | 11814 | 619 | 525 | 1904 | 1912 | 4359 | 49 | 21182 | 45602 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2042-43 | 12548 | 634 | 543 | 1949 | 1972 | 4496 | 50 | 22192 | 47348 |

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 2- Chainage 194.000 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6558 | 483 | 547 | 1324 | 1145 | 2270 | 28 | 12357 | 26677 |
| 2024-25 | 7682 | 547 | 620 | 1488 | 1301 | 2596 | 32 | 14266 | 30554 |
| 2025-26 | 8237 | 567 | 647 | 1536 | 1356 | 2707 | 33 | 15083 | 32035 |
| 2026-27 | 8831 | 588 | 675 | 1585 | 1414 | 2822 | 34 | 15949 | 33587 |
| 2027-28 | 9468 | 610 | 704 | 1636 | 1475 | 2942 | 35 | 16870 | 35225 |
| 2028-29 | 10150 | 632 | 734 | 1688 | 1538 | 3068 | 36 | 17846 | 36946 |
| 2029-30 | 10881 | 655 | 765 | 1742 | 1603 | 3199 | 37 | 18882 | 38756 |
| 2030-31 | 11598 | 674 | 793 | 1789 | 1660 | 3313 | 38 | 19865 | 40415 |
| 2031-32 | 12360 | 694 | 823 | 1837 | 1720 | 3431 | 39 | 20904 | 42156 |
| 2032-33 | 13173 | 714 | 854 | 1886 | 1782 | 3553 | 40 | 22002 | 43979 |
| 2033-34 | 14039 | 735 | 886 | 1936 | 1845 | 3680 | 41 | 23162 | 45887 |
| 2034-35 | 14963 | 757 | 920 | 1987 | 1910 | 3811 | 42 | 24390 | 47888 |
| 2035-36 | 15901 | 777 | 952 | 2035 | 1972 | 3933 | 43 | 25613 | 49836 |
| 2036-37 | 16898 | 797 | 986 | 2084 | 2035 | 4060 | 44 | 26904 | 51877 |
| 2037-38 | 17957 | 818 | 1021 | 2134 | 2100 | 4191 | 45 | 28266 | 54011 |
| 2038-39 | 19082 | 840 | 1056 | 2185 | 2167 | 4326 | 46 | 29702 | 56240 |
| 2039-40 | 20277 | 862 | 1093 | 2237 | 2236 | 4465 | 47 | 31217 | 58572 |
| 2040-41 | 21537 | 884 | 1131 | 2289 | 2306 | 4606 | 48 | 32801 | 60984 |
| 2041-42 | 22876 | 906 | 1170 | 2343 | 2379 | 4751 | 49 | 34474 | 63511 |
| 2042-43 | 24298 | 929 | 1211 | 2399 | 2454 | 4900 | 50 | 36241 | 66159 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 3- Chainage 254.000 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 5799 | 353 | 388 | 1075 | 928 | 1918 | 21 | 10484 | 22233 |
| 2024-25 | 6793 | 399 | 441 | 1206 | 1057 | 2192 | 24 | 12111 | 25470 |
| 2025-26 | 7284 | 413 | 460 | 1245 | 1102 | 2286 | 25 | 12815 | 26724 |
| 2026-27 | 7808 | 428 | 479 | 1285 | 1148 | 2383 | 26 | 13557 | 28027 |
| 2027-28 | 8370 | 444 | 499 | 1326 | 1196 | 2484 | 27 | 14346 | 29399 |
| 2028-29 | 8973 | 460 | 521 | 1368 | 1246 | 2590 | 28 | 15186 | 30849 |
| 2029-30 | 9619 | 476 | 544 | 1411 | 1299 | 2700 | 29 | 16078 | 32376 |
| 2030-31 | 10251 | 490 | 564 | 1449 | 1345 | 2796 | 30 | 16925 | 33777 |
| 2031-32 | 10925 | 504 | 586 | 1488 | 1392 | 2896 | 31 | 17822 | 35251 |
| 2032-33 | 11642 | 518 | 608 | 1528 | 1441 | 2999 | 32 | 18768 | 36790 |
| 2033-34 | 12408 | 533 | 631 | 1569 | 1491 | 3106 | 33 | 19771 | 38406 |
| 2034-35 | 13224 | 549 | 655 | 1611 | 1544 | 3216 | 34 | 20833 | 40103 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2035-36 | 14053 | 563 | 678 | 1650 | 1593 | 3319 | 35 | 21891 | 41754 |
| 2036-37 | 14933 | 577 | 702 | 1690 | 1643 | 3426 | 36 | 23007 | 43483 |
| 2037-38 | 15868 | 592 | 726 | 1731 | 1696 | 3536 | 37 | 24186 | 45294 |
| 2038-39 | 16861 | 607 | 751 | 1773 | 1750 | 3649 | 38 | 25429 | 47185 |
| 2039-40 | 17918 | 623 | 777 | 1815 | 1806 | 3766 | 39 | 26744 | 49169 |
| 2040-41 | 19032 | 639 | 805 | 1858 | 1862 | 3884 | 40 | 28120 | 51224 |
| 2041-42 | 20215 | 655 | 833 | 1901 | 1920 | 4006 | 41 | 29571 | 53371 |
| 2042-43 | 21472 | 671 | 862 | 1945 | 1980 | 4131 | 42 | 31103 | 55618 |

Traffic projections for Most Likely scenario is given as under

**Table 6-7 : Total Tollable Traffic @ Toll Plaza 1- Chainage 134.000 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 3388 | 332 | 244 | 1078 | 924 | 2089 | 29 | 8084 | 20153 |
| 2024-25 | 3976 | 378 | 278 | 1213 | 1050 | 2394 | 32 | 9321 | 23083 |
| 2025-26 | 4273 | 392 | 291 | 1255 | 1097 | 2501 | 33 | 9842 | 24193 |
| 2026-27 | 4591 | 407 | 304 | 1298 | 1146 | 2613 | 34 | 10393 | 25357 |
| 2027-28 | 4933 | 422 | 318 | 1343 | 1197 | 2731 | 35 | 10979 | 26587 |
| 2028-29 | 5301 | 438 | 332 | 1389 | 1251 | 2854 | 36 | 11601 | 27879 |
| 2029-30 | 5696 | 454 | 347 | 1436 | 1307 | 2982 | 38 | 12260 | 29237 |
| 2030-31 | 6084 | 468 | 361 | 1478 | 1357 | 3096 | 39 | 12883 | 30482 |
| 2031-32 | 6499 | 483 | 375 | 1521 | 1408 | 3214 | 40 | 13540 | 31779 |
| 2032-33 | 6942 | 498 | 390 | 1565 | 1461 | 3336 | 41 | 14233 | 33134 |
| 2033-34 | 7416 | 513 | 406 | 1610 | 1516 | 3463 | 42 | 14966 | 34554 |
| 2034-35 | 7922 | 529 | 423 | 1657 | 1573 | 3594 | 44 | 15742 | 36046 |
| 2035-36 | 8438 | 544 | 439 | 1701 | 1627 | 3718 | 45 | 16512 | 37489 |
| 2036-37 | 8987 | 559 | 456 | 1746 | 1683 | 3847 | 46 | 17324 | 38999 |
| 2037-38 | 9572 | 574 | 473 | 1792 | 1741 | 3980 | 48 | 18180 | 40577 |
| 2038-39 | 10195 | 590 | 491 | 1839 | 1801 | 4117 | 50 | 19083 | 42225 |
| 2039-40 | 10859 | 606 | 509 | 1887 | 1864 | 4259 | 52 | 20036 | 43948 |
| 2040-41 | 11561 | 622 | 529 | 1936 | 1928 | 4403 | 54 | 21033 | 45730 |
| 2041-42 | 12308 | 639 | 549 | 1986 | 1994 | 4553 | 56 | 22085 | 47594 |
| 2042-43 | 13104 | 656 | 570 | 2038 | 2062 | 4708 | 58 | 23196 | 49545 |

**Table 6-8 : Total Tollable Traffic @ Toll Plaza 2- Chainage 194.000 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|------|-----|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
|------|-----|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 6558 | 483 | 547 | 1324 | 1145 | 2270 | 28 | 12357 | 26677 |
| 2024-25 | 7698 | 547 | 622 | 1490 | 1304 | 2601 | 32 | 14294 | 30614 |
| 2025-26 | 8272 | 569 | 650 | 1541 | 1364 | 2718 | 33 | 15147 | 32170 |
| 2026-27 | 8889 | 591 | 679 | 1594 | 1426 | 2840 | 34 | 16053 | 33806 |
| 2027-28 | 9552 | 614 | 710 | 1649 | 1490 | 2969 | 35 | 17019 | 35538 |
| 2028-29 | 10264 | 637 | 742 | 1706 | 1557 | 3103 | 36 | 18045 | 37360 |
| 2029-30 | 11029 | 662 | 776 | 1764 | 1626 | 3243 | 37 | 19137 | 39280 |
| 2030-31 | 11781 | 683 | 807 | 1815 | 1688 | 3366 | 38 | 20178 | 41054 |
| 2031-32 | 12586 | 705 | 839 | 1868 | 1752 | 3495 | 39 | 21284 | 42924 |
| 2032-33 | 13445 | 727 | 873 | 1923 | 1818 | 3628 | 40 | 22454 | 44884 |
| 2033-34 | 14363 | 750 | 908 | 1979 | 1887 | 3766 | 41 | 23694 | 46942 |
| 2034-35 | 15344 | 773 | 945 | 2037 | 1959 | 3909 | 42 | 25009 | 49106 |
| 2035-36 | 16345 | 795 | 980 | 2092 | 2026 | 4045 | 43 | 26326 | 51228 |
| 2036-37 | 17410 | 817 | 1017 | 2148 | 2095 | 4185 | 44 | 27716 | 53446 |
| 2037-38 | 18544 | 840 | 1055 | 2205 | 2167 | 4330 | 45 | 29186 | 55773 |
| 2038-39 | 19751 | 863 | 1094 | 2263 | 2243 | 4480 | 46 | 30740 | 58213 |
| 2039-40 | 21038 | 888 | 1135 | 2323 | 2321 | 4636 | 47 | 32388 | 60781 |
| 2040-41 | 22398 | 913 | 1177 | 2383 | 2400 | 4794 | 48 | 34113 | 63437 |
| 2041-42 | 23847 | 938 | 1221 | 2445 | 2481 | 4957 | 49 | 35938 | 66222 |
| 2042-43 | 25390 | 964 | 1267 | 2509 | 2566 | 5125 | 51 | 37872 | 69154 |

**Table 6-9 : Total Tollable Traffic @ Toll Plaza 3- Chainage 254.000 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|-----|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 5799 | 353 | 388 | 1075 | 928 | 1918 | 21 | 10484 | 22233 |
| 2024-25 | 6809 | 400 | 441 | 1210 | 1059 | 2197 | 24 | 12138 | 25528 |
| 2025-26 | 7318 | 416 | 461 | 1251 | 1106 | 2296 | 25 | 12873 | 26841 |
| 2026-27 | 7865 | 432 | 482 | 1294 | 1155 | 2399 | 26 | 13653 | 28219 |
| 2027-28 | 8452 | 448 | 504 | 1338 | 1206 | 2507 | 27 | 14482 | 29671 |
| 2028-29 | 9082 | 465 | 527 | 1384 | 1260 | 2620 | 28 | 15366 | 31209 |
| 2029-30 | 9759 | 482 | 551 | 1432 | 1316 | 2738 | 29 | 16307 | 32831 |
| 2030-31 | 10425 | 497 | 573 | 1474 | 1365 | 2842 | 30 | 17206 | 34331 |
| 2031-32 | 11136 | 513 | 596 | 1517 | 1416 | 2950 | 31 | 18159 | 35907 |
| 2032-33 | 11897 | 529 | 620 | 1561 | 1470 | 3062 | 32 | 19171 | 37567 |
| 2033-34 | 12709 | 545 | 645 | 1606 | 1525 | 3178 | 33 | 20241 | 39304 |
| 2034-35 | 13577 | 562 | 671 | 1653 | 1582 | 3298 | 34 | 21377 | 41132 |
| 2035-36 | 14462 | 578 | 696 | 1697 | 1636 | 3412 | 35 | 22516 | 42928 |
| 2036-37 | 15404 | 594 | 722 | 1742 | 1692 | 3530 | 36 | 23720 | 44810 |
| 2037-38 | 16407 | 611 | 750 | 1789 | 1750 | 3652 | 37 | 24996 | 46791 |
| 2038-39 | 17476 | 628 | 778 | 1837 | 1811 | 3778 | 38 | 26346 | 48868 |
| 2039-40 | 18614 | 645 | 807 | 1886 | 1873 | 3909 | 39 | 27773 | 51046 |
| 2040-41 | 19818 | 662 | 837 | 1935 | 1936 | 4042 | 40 | 29270 | 53304 |
| 2041-42 | 21098 | 681 | 868 | 1985 | 2001 | 4179 | 41 | 30853 | 55672 |
| 2042-43 | 22463 | 700 | 901 | 2036 | 2068 | 4321 | 42 | 32531 | 58162 |

6.2 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 Yedeshi – Aurangabad project, the Target Date and Target Traffic are defined as under:

Target Date - 1st October 2023

Target Traffic -24407 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic in all scenarios. Probable extension of concession period is estimated according to article 29 of concession agreement which comes to about 4-5 years Traffic forecast and revenue projections are done for probable extended period accordingly.

Most Likely

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 24407 | 23661 | -3% | 5% | 5% | 26 | 1.2 |

Optimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 24407 | 23682 | -3% | 4% | 4% | 26 | 1.2 |

Pessimistic

| Target Year | Target Traffic | Actual Traffic | % of Excess / Short traffic | % Revision (+ or -) in CP as per CA | % Variation in CP | Original CP | Change in CP (In Years) |
|-------------|----------------|----------------|-----------------------------|-------------------------------------|-------------------|-------------|-------------------------|
| 2023 | 24407 | 23642 | -3% | 5% | 5% | 26 | 1.2 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Surat- Dahisar section of NH-8 is based on the old toll policy. As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3rd rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers or whose frequency does not yield any discount from the above categories.
4. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van - Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

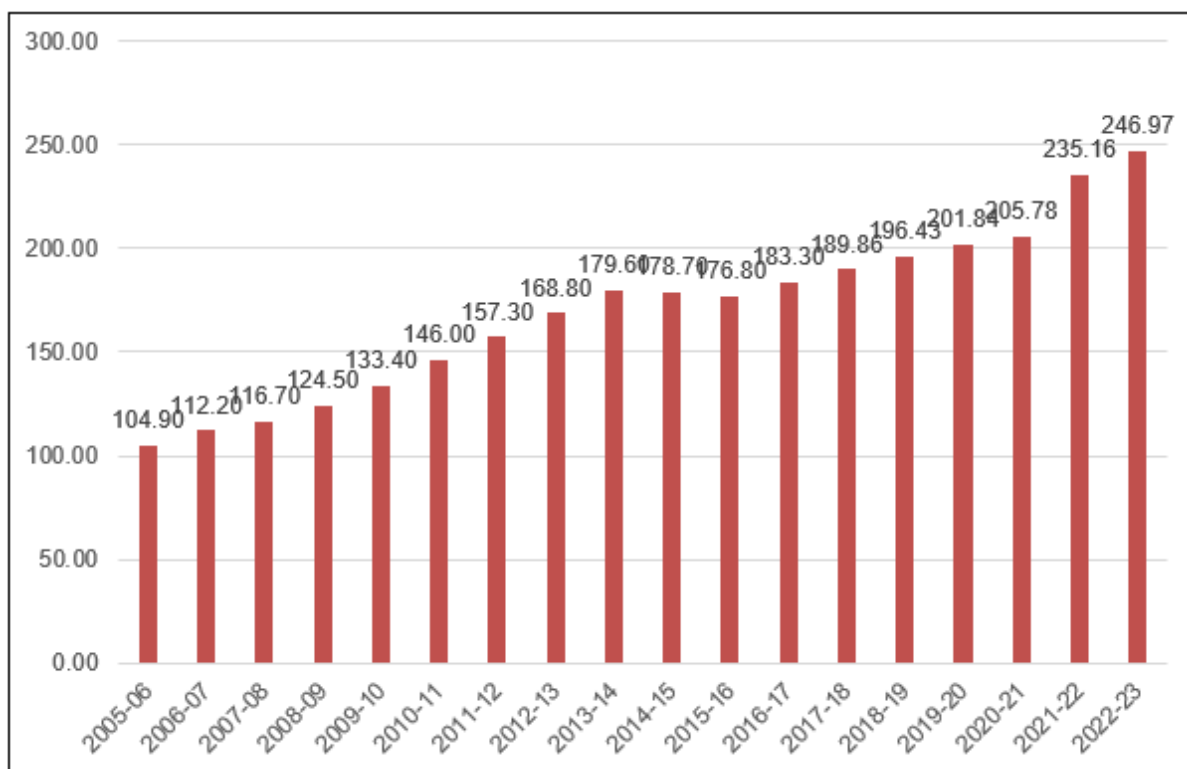


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--------------------------------------|-----------------------------------|
| Oversized Vehicles (7 or more Axles) | 4.20 |

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 7-2 : Toll Rates for Single Journey @ Km 134.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|---------|------------|--------------------|
| 2023-24 | 80 | 125 | 265 | 265 | 285 | 415 | 505 |
| 2024-25 | 80 | 130 | 270 | 270 | 295 | 425 | 515 |
| 2024-25 | 80 | 130 | 270 | 270 | 295 | 425 | 515 |
| 2025-26 | 85 | 135 | 285 | 285 | 310 | 445 | 540 |
| 2026-27 | 90 | 140 | 300 | 300 | 325 | 465 | 570 |
| 2027-28 | 90 | 150 | 315 | 315 | 340 | 490 | 595 |
| 2028-29 | 95 | 155 | 330 | 330 | 360 | 515 | 630 |
| 2029-30 | 100 | 165 | 345 | 345 | 375 | 540 | 660 |
| 2030-31 | 105 | 175 | 365 | 365 | 395 | 570 | 695 |
| 2031-32 | 115 | 180 | 380 | 380 | 415 | 600 | 730 |
| 2032-33 | 120 | 190 | 400 | 400 | 440 | 630 | 765 |
| 2033-34 | 125 | 200 | 425 | 425 | 460 | 665 | 805 |
| 2034-35 | 130 | 210 | 445 | 445 | 485 | 700 | 850 |
| 2035-36 | 140 | 225 | 470 | 470 | 510 | 735 | 895 |
| 2036-37 | 145 | 235 | 495 | 495 | 540 | 775 | 940 |
| 2037-38 | 155 | 250 | 520 | 520 | 565 | 815 | 990 |
| 2038-39 | 160 | 260 | 545 | 545 | 595 | 860 | 1045 |
| 2039-40 | 170 | 275 | 575 | 575 | 630 | 905 | 1100 |
| 2040-41 | 180 | 290 | 605 | 605 | 660 | 950 | 1160 |
| 2041-42 | 190 | 305 | 640 | 640 | 700 | 1005 | 1220 |
| 2042-43 | 200 | 320 | 675 | 675 | 735 | 1060 | 1290 |

Table 7-3 : Toll Rates for Single Journey @ Km 194.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|---------|------------|--------------------|
| 2023-24 | 110 | 175 | 365 | 365 | 395 | 570 | 695 |
| 2024-25 | 110 | 180 | 375 | 375 | 405 | 585 | 715 |
| 2024-25 | 110 | 180 | 375 | 375 | 405 | 585 | 715 |
| 2025-26 | 115 | 185 | 390 | 390 | 430 | 615 | 750 |
| 2026-27 | 120 | 195 | 410 | 410 | 450 | 645 | 785 |
| 2027-28 | 130 | 205 | 435 | 435 | 470 | 680 | 825 |
| 2028-29 | 135 | 215 | 455 | 455 | 495 | 715 | 870 |
| 2029-30 | 140 | 230 | 480 | 480 | 520 | 750 | 915 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|---------|------------|--------------------|
| 2030-31 | 150 | 240 | 505 | 505 | 550 | 790 | 960 |
| 2031-32 | 155 | 250 | 530 | 530 | 575 | 830 | 1010 |
| 2032-33 | 165 | 265 | 555 | 555 | 605 | 870 | 1060 |
| 2033-34 | 175 | 280 | 585 | 585 | 640 | 915 | 1115 |
| 2034-35 | 180 | 295 | 615 | 615 | 670 | 965 | 1175 |
| 2035-36 | 190 | 310 | 650 | 650 | 705 | 1015 | 1235 |
| 2036-37 | 200 | 325 | 680 | 680 | 745 | 1070 | 1300 |
| 2037-38 | 210 | 345 | 720 | 720 | 785 | 1125 | 1370 |
| 2038-39 | 225 | 360 | 755 | 755 | 825 | 1185 | 1445 |
| 2039-40 | 235 | 380 | 795 | 795 | 870 | 1250 | 1520 |
| 2040-41 | 250 | 400 | 840 | 840 | 915 | 1315 | 1605 |
| 2041-42 | 260 | 420 | 885 | 885 | 965 | 1390 | 1690 |
| 2042-43 | 275 | 445 | 935 | 935 | 1020 | 1465 | 1780 |

Table 7-4 : Toll Rates for Single Journey @ Km 243.00

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|---------|------------|--------------------|
| 2023-24 | 105 | 170 | 355 | 355 | 390 | 560 | 680 |
| 2024-25 | 110 | 175 | 365 | 365 | 400 | 570 | 695 |
| 2024-25 | 110 | 175 | 365 | 365 | 400 | 570 | 695 |
| 2025-26 | 115 | 185 | 385 | 385 | 420 | 600 | 730 |
| 2026-27 | 120 | 190 | 405 | 405 | 440 | 630 | 770 |
| 2027-28 | 125 | 200 | 425 | 425 | 460 | 665 | 810 |
| 2028-29 | 130 | 210 | 445 | 445 | 485 | 695 | 850 |
| 2029-30 | 140 | 225 | 465 | 465 | 510 | 735 | 890 |
| 2030-31 | 145 | 235 | 490 | 490 | 535 | 770 | 940 |
| 2031-32 | 155 | 245 | 515 | 515 | 565 | 810 | 985 |
| 2032-33 | 160 | 260 | 545 | 545 | 595 | 855 | 1040 |
| 2033-34 | 170 | 275 | 570 | 570 | 625 | 895 | 1090 |
| 2034-35 | 180 | 285 | 600 | 600 | 655 | 945 | 1150 |
| 2035-36 | 185 | 300 | 635 | 635 | 690 | 995 | 1210 |
| 2036-37 | 195 | 320 | 665 | 665 | 730 | 1045 | 1275 |
| 2037-38 | 210 | 335 | 700 | 700 | 765 | 1100 | 1340 |
| 2038-39 | 220 | 355 | 740 | 740 | 805 | 1160 | 1410 |
| 2039-40 | 230 | 370 | 780 | 780 | 850 | 1220 | 1490 |
| 2040-41 | 245 | 390 | 820 | 820 | 895 | 1290 | 1570 |
| 2041-42 | 255 | 415 | 865 | 865 | 945 | 1355 | 1650 |
| 2042-43 | 270 | 435 | 910 | 910 | 995 | 1430 | 1740 |

Table 7-5 : Toll Rates for Return Journey @ Km 134.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|-----|-------|---------|------------|--------------------|
| 2023-24 | 115 | 190 | 395 | 395 | 430 | 620 | 755 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2024-25 | 120 | 195 | 405 | 405 | 440 | 635 | 775 |
| 2024-25 | 120 | 195 | 405 | 405 | 440 | 635 | 775 |
| 2025-26 | 125 | 205 | 425 | 425 | 465 | 665 | 810 |
| 2026-27 | 130 | 215 | 445 | 445 | 485 | 700 | 855 |
| 2027-28 | 140 | 225 | 470 | 470 | 510 | 735 | 895 |
| 2028-29 | 145 | 235 | 495 | 495 | 540 | 775 | 940 |
| 2029-30 | 155 | 245 | 520 | 520 | 565 | 815 | 990 |
| 2030-31 | 160 | 260 | 545 | 545 | 595 | 855 | 1040 |
| 2031-32 | 170 | 275 | 575 | 575 | 625 | 900 | 1095 |
| 2032-33 | 180 | 290 | 605 | 605 | 660 | 945 | 1150 |
| 2033-34 | 185 | 305 | 635 | 635 | 690 | 995 | 1210 |
| 2034-35 | 195 | 320 | 670 | 670 | 730 | 1045 | 1275 |
| 2035-36 | 210 | 335 | 705 | 705 | 765 | 1100 | 1340 |
| 2036-37 | 220 | 355 | 740 | 740 | 805 | 1160 | 1410 |
| 2037-38 | 230 | 370 | 780 | 780 | 850 | 1220 | 1485 |
| 2038-39 | 240 | 390 | 820 | 820 | 895 | 1285 | 1565 |
| 2039-40 | 255 | 415 | 865 | 865 | 945 | 1355 | 1650 |
| 2040-41 | 270 | 435 | 910 | 910 | 995 | 1430 | 1740 |
| 2041-42 | 285 | 460 | 960 | 960 | 1045 | 1505 | 1830 |
| 2042-43 | 300 | 485 | 1010 | 1010 | 1105 | 1585 | 1930 |

Table 7-6 : Toll Rates for Return journey @ Km 194.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2023-24 | 160 | 260 | 545 | 545 | 595 | 855 | 1045 |
| 2024-25 | 165 | 265 | 560 | 560 | 610 | 880 | 1070 |
| 2024-25 | 165 | 265 | 560 | 560 | 610 | 880 | 1070 |
| 2025-26 | 175 | 280 | 590 | 590 | 640 | 920 | 1125 |
| 2026-27 | 185 | 295 | 620 | 620 | 675 | 970 | 1180 |
| 2027-28 | 190 | 310 | 650 | 650 | 710 | 1020 | 1240 |
| 2028-29 | 200 | 325 | 680 | 680 | 745 | 1070 | 1300 |
| 2029-30 | 210 | 340 | 715 | 715 | 780 | 1125 | 1370 |
| 2030-31 | 225 | 360 | 755 | 755 | 825 | 1185 | 1440 |
| 2031-32 | 235 | 380 | 795 | 795 | 865 | 1245 | 1515 |
| 2032-33 | 245 | 400 | 835 | 835 | 910 | 1310 | 1590 |
| 2033-34 | 260 | 420 | 880 | 880 | 955 | 1375 | 1675 |
| 2034-35 | 275 | 440 | 925 | 925 | 1005 | 1450 | 1765 |
| 2035-36 | 285 | 465 | 970 | 970 | 1060 | 1525 | 1855 |
| 2036-37 | 300 | 490 | 1025 | 1025 | 1115 | 1605 | 1955 |
| 2037-38 | 320 | 515 | 1080 | 1080 | 1175 | 1690 | 2055 |
| 2038-39 | 335 | 540 | 1135 | 1135 | 1240 | 1780 | 2165 |
| 2039-40 | 355 | 570 | 1195 | 1195 | 1305 | 1875 | 2285 |
| 2040-41 | 370 | 600 | 1260 | 1260 | 1375 | 1975 | 2405 |
| 2041-42 | 390 | 635 | 1330 | 1330 | 1450 | 2080 | 2535 |
| 2042-43 | 415 | 670 | 1400 | 1400 | 1525 | 2195 | 2670 |

Table 7-7 : Toll Rates for Return journey @ Km 243.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|-----|--------------|------|-------|---------|------------|--------------------|
| 2023-24 | 160 | 255 | 535 | 535 | 585 | 840 | 1020 |
| 2024-25 | 160 | 260 | 545 | 545 | 595 | 860 | 1045 |
| 2024-25 | 160 | 260 | 545 | 545 | 595 | 860 | 1045 |
| 2025-26 | 170 | 275 | 575 | 575 | 625 | 900 | 1100 |
| 2026-27 | 180 | 290 | 605 | 605 | 660 | 945 | 1155 |
| 2027-28 | 190 | 305 | 635 | 635 | 690 | 995 | 1210 |
| 2028-29 | 195 | 320 | 665 | 665 | 730 | 1045 | 1275 |
| 2029-30 | 205 | 335 | 700 | 700 | 765 | 1100 | 1340 |
| 2030-31 | 220 | 350 | 735 | 735 | 805 | 1155 | 1410 |
| 2031-32 | 230 | 370 | 775 | 775 | 845 | 1215 | 1480 |
| 2032-33 | 240 | 390 | 815 | 815 | 890 | 1280 | 1555 |
| 2033-34 | 255 | 410 | 860 | 860 | 935 | 1345 | 1640 |
| 2034-35 | 265 | 430 | 905 | 905 | 985 | 1415 | 1725 |
| 2035-36 | 280 | 455 | 950 | 950 | 1035 | 1490 | 1815 |
| 2036-37 | 295 | 480 | 1000 | 1000 | 1090 | 1570 | 1910 |
| 2037-38 | 310 | 505 | 1055 | 1055 | 1150 | 1650 | 2010 |
| 2038-39 | 330 | 530 | 1110 | 1110 | 1210 | 1740 | 2120 |
| 2039-40 | 345 | 560 | 1170 | 1170 | 1275 | 1835 | 2230 |
| 2040-41 | 365 | 590 | 1230 | 1230 | 1345 | 1930 | 2350 |
| 2041-42 | 385 | 620 | 1300 | 1300 | 1415 | 2035 | 2480 |
| 2042-43 | 405 | 655 | 1370 | 1370 | 1495 | 2145 | 2615 |

Table 7-8 : Toll Rates for Monthly Pass Local@ all Toll Plaza

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2023-24 | 330 | 330 |
| 2024-25 | 340 | 340 |
| 2024-25 | 340 | 340 |
| 2025-26 | 355 | 355 |
| 2026-27 | 375 | 375 |
| 2027-28 | 390 | 390 |
| 2028-29 | 410 | 410 |
| 2029-30 | 435 | 435 |
| 2030-31 | 455 | 455 |
| 2031-32 | 480 | 480 |
| 2032-33 | 505 | 505 |
| 2033-34 | 530 | 530 |
| 2034-35 | 560 | 560 |
| 2035-36 | 585 | 585 |
| 2036-37 | 620 | 620 |
| 2037-38 | 650 | 650 |
| 2038-39 | 685 | 685 |
| 2039-40 | 720 | 720 |
| 2040-41 | 760 | 760 |

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2041-42 | 800 | 800 |
| 2042-43 | 845 | 845 |

Table 7-9 : Toll Rates for Monthly Pass @ Km 134.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|---------|------------|--------------------|
| 2023-24 | 2595 | 4190 | 8775 | 8775 | 9575 | 13765 | 16755 |
| 2024-25 | 2655 | 4295 | 8995 | 8995 | 9810 | 14105 | 17170 |
| 2024-25 | 2655 | 4295 | 8995 | 8995 | 9810 | 14105 | 17170 |
| 2025-26 | 2790 | 4510 | 9445 | 9445 | 10305 | 14815 | 18035 |
| 2026-27 | 2930 | 4735 | 9925 | 9925 | 10825 | 15565 | 18945 |
| 2027-28 | 3080 | 4975 | 10430 | 10430 | 11375 | 16355 | 19910 |
| 2028-29 | 3240 | 5230 | 10960 | 10960 | 11955 | 17190 | 20925 |
| 2029-30 | 3405 | 5500 | 11520 | 11520 | 12570 | 18070 | 21995 |
| 2030-31 | 3580 | 5780 | 12115 | 12115 | 13215 | 18995 | 23125 |
| 2031-32 | 3765 | 6080 | 12740 | 12740 | 13900 | 19980 | 24320 |
| 2032-33 | 3960 | 6395 | 13400 | 13400 | 14620 | 21015 | 25585 |
| 2033-34 | 4165 | 6730 | 14100 | 14100 | 15380 | 22110 | 26915 |
| 2034-35 | 4385 | 7080 | 14835 | 14835 | 16185 | 23265 | 28325 |
| 2035-36 | 4615 | 7455 | 15615 | 15615 | 17035 | 24490 | 29815 |
| 2036-37 | 4855 | 7845 | 16440 | 16440 | 17935 | 25780 | 31385 |
| 2037-38 | 5115 | 8265 | 17310 | 17310 | 18885 | 27150 | 33050 |
| 2038-39 | 5385 | 8705 | 18235 | 18235 | 19890 | 28595 | 34810 |
| 2039-40 | 5675 | 9170 | 19210 | 19210 | 20955 | 30120 | 36670 |
| 2040-41 | 5980 | 9660 | 20240 | 20240 | 22080 | 31740 | 38640 |
| 2041-42 | 6300 | 10180 | 21330 | 21330 | 23270 | 33450 | 40720 |
| 2042-43 | 6645 | 10730 | 22485 | 22485 | 24530 | 35260 | 42925 |

Table 7-10 : Toll Rates for Monthly Pass @ Km 194.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|---------|------------|--------------------|
| 2023-24 | 3585 | 5795 | 12140 | 12140 | 13245 | 19040 | 23180 |
| 2024-25 | 3675 | 5940 | 12440 | 12440 | 13570 | 19510 | 23750 |
| 2024-25 | 3675 | 5940 | 12440 | 12440 | 13570 | 19510 | 23750 |
| 2025-26 | 3860 | 6235 | 13070 | 13070 | 14255 | 20495 | 24950 |
| 2026-27 | 4055 | 6550 | 13730 | 13730 | 14975 | 21530 | 26210 |
| 2027-28 | 4260 | 6885 | 14425 | 14425 | 15735 | 22620 | 27540 |
| 2028-29 | 4480 | 7235 | 15160 | 15160 | 16540 | 23775 | 28945 |
| 2029-30 | 4710 | 7605 | 15935 | 15935 | 17385 | 24995 | 30425 |
| 2030-31 | 4950 | 8000 | 16755 | 16755 | 18280 | 26280 | 31990 |
| 2031-32 | 5205 | 8410 | 17620 | 17620 | 19225 | 27635 | 33645 |
| 2032-33 | 5475 | 8845 | 18535 | 18535 | 20220 | 29070 | 35390 |
| 2033-34 | 5760 | 9310 | 19500 | 19500 | 21275 | 30585 | 37230 |
| 2034-35 | 6065 | 9795 | 20525 | 20525 | 22390 | 32185 | 39180 |
| 2035-36 | 6380 | 10310 | 21600 | 21600 | 23565 | 33875 | 41240 |

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|---------|------------|--------------------|
| 2036-37 | 6720 | 10855 | 22740 | 22740 | 24810 | 35665 | 43415 |
| 2037-38 | 7075 | 11430 | 23950 | 23950 | 26125 | 37555 | 45720 |
| 2038-39 | 7450 | 12040 | 25220 | 25220 | 27515 | 39555 | 48150 |
| 2039-40 | 7850 | 12680 | 26570 | 26570 | 28985 | 41670 | 50725 |
| 2040-41 | 8270 | 13360 | 27995 | 27995 | 30540 | 43905 | 53450 |
| 2041-42 | 8720 | 14080 | 29505 | 29505 | 32190 | 46270 | 56330 |
| 2042-43 | 9190 | 14845 | 31100 | 31100 | 33930 | 48775 | 59375 |

Table 7-11 : Toll Rates for Monthly Pass @ Km 243.000

| Year | Car | Minibus /LCV | Bus | Truck | 3 -Axle | Multi axle | Oversized Vehicles |
|---------|------|--------------|-------|-------|---------|------------|--------------------|
| 2023-24 | 3505 | 5665 | 11870 | 11870 | 12950 | 18615 | 22665 |
| 2024-25 | 3595 | 5805 | 12165 | 12165 | 13270 | 19075 | 23225 |
| 2024-25 | 3595 | 5805 | 12165 | 12165 | 13270 | 19075 | 23225 |
| 2025-26 | 3775 | 6100 | 12775 | 12775 | 13940 | 20035 | 24395 |
| 2026-27 | 3965 | 6405 | 13425 | 13425 | 14645 | 21050 | 25625 |
| 2027-28 | 4165 | 6730 | 14105 | 14105 | 15385 | 22120 | 26930 |
| 2028-29 | 4380 | 7075 | 14825 | 14825 | 16170 | 23245 | 28300 |
| 2029-30 | 4605 | 7435 | 15585 | 15585 | 17000 | 24435 | 29750 |
| 2030-31 | 4840 | 7820 | 16385 | 16385 | 17875 | 25695 | 31280 |
| 2031-32 | 5090 | 8225 | 17230 | 17230 | 18795 | 27020 | 32895 |
| 2032-33 | 5355 | 8650 | 18125 | 18125 | 19770 | 28420 | 34600 |
| 2033-34 | 5635 | 9100 | 19070 | 19070 | 20800 | 29905 | 36405 |
| 2034-35 | 5930 | 9575 | 20065 | 20065 | 21890 | 31470 | 38310 |
| 2035-36 | 6240 | 10080 | 21120 | 21120 | 23040 | 33120 | 40325 |
| 2036-37 | 6570 | 10615 | 22235 | 22235 | 24260 | 34870 | 42450 |
| 2037-38 | 6920 | 11175 | 23415 | 23415 | 25545 | 36720 | 44700 |
| 2038-39 | 7285 | 11770 | 24660 | 24660 | 26905 | 38675 | 47080 |
| 2039-40 | 7675 | 12400 | 25980 | 25980 | 28340 | 40740 | 49600 |
| 2040-41 | 8090 | 13065 | 27375 | 27375 | 29865 | 42930 | 52260 |
| 2041-42 | 8525 | 13770 | 28850 | 28850 | 31470 | 45240 | 55075 |
| 2042-43 | 8985 | 14515 | 30410 | 30410 | 33175 | 47690 | 58055 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2043-44 years starting from the year 2023-24 are shown in tables below.

Table 7-12 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP-2 | TP-3 | Total |
|----------------|--------|--------|--------|----------------|
| 2023-24 | 63.62 | 110.08 | 91.03 | 264.73 |
| 2024-25 | 71.93 | 124.73 | 102.97 | 299.63 |
| 2025-26 | 82.16 | 142.85 | 118.16 | 343.16 |
| 2026-27 | 90.36 | 157.66 | 130.56 | 378.58 |
| 2027-28 | 99.79 | 175.24 | 144.90 | 419.92 |
| 2028-29 | 109.83 | 192.95 | 158.86 | 461.65 |
| 2029-30 | 121.02 | 213.12 | 176.70 | 510.84 |
| 2030-31 | 133.10 | 235.80 | 194.23 | 563.13 |
| 2031-32 | 147.04 | 259.01 | 214.83 | 620.87 |
| 2032-33 | 161.10 | 283.90 | 235.73 | 680.72 |
| 2033-34 | 176.90 | 313.57 | 259.64 | 750.11 |
| 2034-35 | 194.12 | 344.72 | 286.16 | 825.00 |
| 2035-36 | 214.12 | 379.21 | 314.78 | 908.11 |
| 2036-37 | 233.95 | 415.73 | 345.04 | 994.72 |
| 2037-38 | 256.50 | 457.86 | 380.41 | 1094.77 |
| 2038-39 | 280.56 | 503.95 | 419.25 | 1203.76 |
| 2039-40 | 309.42 | 556.27 | 461.61 | 1327.30 |
| 2040-41 | 338.00 | 609.97 | 508.39 | 1456.36 |
| 2041-42 | 372.31 | 670.99 | 558.45 | 1601.75 |
| 2042-43 | 408.71 | 740.67 | 615.57 | 1764.95 |

Table 7-13 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | TP-1 | TP-2 | TP-3 | Total |
|----------------|--------|--------|--------|----------------|
| 2023-24 | 63.62 | 110.08 | 91.03 | 264.73 |
| 2024-25 | 71.60 | 124.17 | 102.51 | 298.28 |
| 2025-26 | 81.39 | 141.55 | 117.07 | 340.01 |
| 2026-27 | 89.09 | 155.51 | 128.71 | 373.31 |
| 2027-28 | 97.89 | 172.01 | 142.10 | 412.00 |
| 2028-29 | 107.21 | 188.49 | 155.00 | 450.70 |
| 2029-30 | 117.52 | 207.12 | 171.57 | 496.21 |
| 2030-31 | 128.61 | 228.10 | 187.67 | 544.38 |
| 2031-32 | 141.39 | 249.45 | 206.58 | 597.41 |
| 2032-33 | 154.11 | 272.10 | 225.55 | 651.76 |
| 2033-34 | 168.37 | 299.03 | 247.24 | 714.64 |
| 2034-35 | 183.86 | 327.10 | 271.13 | 782.09 |
| 2035-36 | 201.81 | 358.06 | 296.78 | 856.66 |
| 2036-37 | 219.42 | 390.65 | 323.71 | 933.78 |
| 2037-38 | 239.40 | 428.15 | 355.19 | 1022.73 |
| 2038-39 | 260.61 | 468.97 | 389.57 | 1119.15 |
| 2039-40 | 286.09 | 515.11 | 426.83 | 1228.03 |
| 2040-41 | 311.06 | 562.13 | 467.81 | 1341.00 |
| 2041-42 | 340.98 | 615.26 | 511.41 | 1467.65 |

| Year | TP-1 | TP-2 | TP-3 | Total |
|----------------|--------|--------|--------|----------------|
| 2042-43 | 372.45 | 675.94 | 560.98 | 1609.38 |

Table 7-14 : Toll Revenue Most Likely Scenario
(Rs. Crores)

| Year | TP-1 | TP-2 | TP-3 | Total |
|----------------|--------|--------|--------|----------------|
| 2023-24 | 63.62 | 110.08 | 91.03 | 264.73 |
| 2024-25 | 71.76 | 124.43 | 102.74 | 298.92 |
| 2025-26 | 81.75 | 142.14 | 117.58 | 341.47 |
| 2026-27 | 89.70 | 156.50 | 129.61 | 375.82 |
| 2027-28 | 98.80 | 173.52 | 143.46 | 415.77 |
| 2028-29 | 108.46 | 190.54 | 156.85 | 455.85 |
| 2029-30 | 119.21 | 209.88 | 174.10 | 503.20 |
| 2030-31 | 130.76 | 231.66 | 190.88 | 553.30 |
| 2031-32 | 144.04 | 253.88 | 210.61 | 608.54 |
| 2032-33 | 157.35 | 277.54 | 230.51 | 665.40 |
| 2033-34 | 172.34 | 305.72 | 253.22 | 731.28 |
| 2034-35 | 188.73 | 335.22 | 278.42 | 802.37 |
| 2035-36 | 207.65 | 367.83 | 305.45 | 880.92 |
| 2036-37 | 226.31 | 402.23 | 333.94 | 962.47 |
| 2037-38 | 247.56 | 441.90 | 367.42 | 1056.89 |
| 2038-39 | 270.15 | 485.21 | 404.11 | 1159.46 |
| 2039-40 | 297.31 | 534.37 | 443.90 | 1275.58 |
| 2040-41 | 324.11 | 584.55 | 487.77 | 1396.43 |
| 2041-42 | 356.20 | 641.42 | 534.48 | 1532.10 |
| 2042-43 | 390.05 | 706.44 | 587.76 | 1684.25 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Yedeshi to Aurangabad section of NH-211 in state of Maharashtra from km 100.000 to km 290.200 is currently four lane road. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the important regional network connecting Maharashtra with Karnataka and other southern states. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As discussed, dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the 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 due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road

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



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PALSIT TO DANKUNI SECTION OF NH 19 IN THE STATE OF WEST BENGAL (KM 588.870 TO KM 652.700)



MARCH 2024

**TTRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**



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MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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, **Palsit to Dankuni** section of NH-19 from km 588.870 to km 652.700 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s Palsit Dankuni Tollway. Ltd.* (Concessionaire) has been awarded the Project for a concession period of 17 years starting from 2nd April 2022. The Project has been commissioned and is currently under construction for six laning. Six laning of project is underway and expected to complete soon.

Project stretch from Palsit to Dankuni is part of new NH-19 Which was previously referred as Delhi -Kolkata. During renumbering of National Highway, Delhi to Agra route was numbered as NH-44 and Agra to Kolkata has been assigned as NH-19. From a transportation point of view, it is Delhi – Kolkata corridor.

New NH-19 connects industrial cities like Agra, Kanpur, Allahabad, Varanasi, Dhanbad, Durgapur, Bardhaman and terminates at Dankuni near Kolkata. Close proximity to Kolkata and Howrah has given impetus to industrial development around project highway at various locations.

Old Delhi Road (GT Road) lies east of project highway from Palsit onwards. Project stretch is developed at new alignment between Palsit and Dankuni and is known as Durgapur Expressway. The following figure shows the alignment of project stretch.

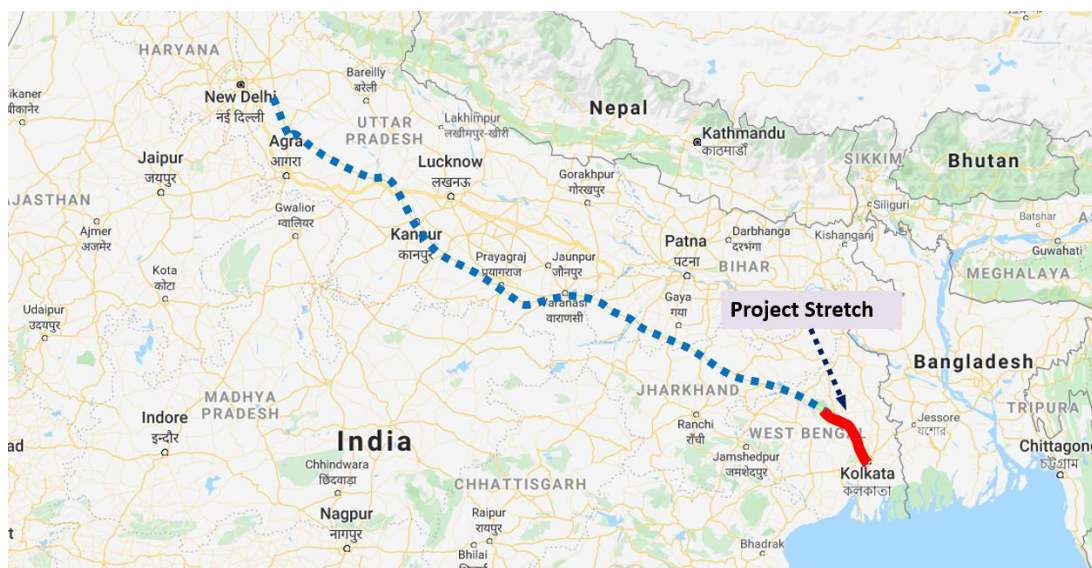


Figure 1-1: Alignment of Project Stretch

1.2 Objective of the Study

M/s IRB INFRASTRUCTURE TRUST has engaged *GMD Consultants* to assess the future traffic and toll potential of project stretch.

This report named as “**Traffic Study & Toll Revenue Projection Report**” mainly focuses on traffic and revenue 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

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

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

National Highway 2 (NH 2) which is now renumbered as NH-19 is oldest highway in India and connects state of Delhi, Haryana, Uttar Pradesh, Bihar, Jharkhand and West Bengal. It constitutes a major portion of the historical grand truck road.

It connects the national capital Delhi to Kolkata, as well as important cities Mathura, Agra, Kanpur, Allahabad, Varanasi, Dhanbad, Asansol, Durgapur and Bardhman. The highway is part of the Golden Quadrilateral project undertaken by National Highways Authority of India (NHAI).

The project road is the final link on Kolkata side between Palsit and Dankuni in the state of West Bengal. Dankuni is just out the outskirts of Kolkata on the northern side. The main project influence area of the project road consists of Dhanbad, Durgapur and Kolkata.

2.2 Project Stretch Description

Section of NH-19 from Palsit to Dankuni is part of the major transportation link in the area connecting industrial cities of Dhanbad, Asansol, Durgapur and Kolkata. Project stretch is basically and gateway link to Kolkata from northern India. Being just on the outskirts of the major metro city Kolkata, a large number of warehouses and logistic hubs are established on project road. This also contributes to sustainable traffic and growth on project highway.

There is one operative toll plaza at project stretch which is at Dankuni at km 646.005. The following figure shows project alignment and toll plaza location.

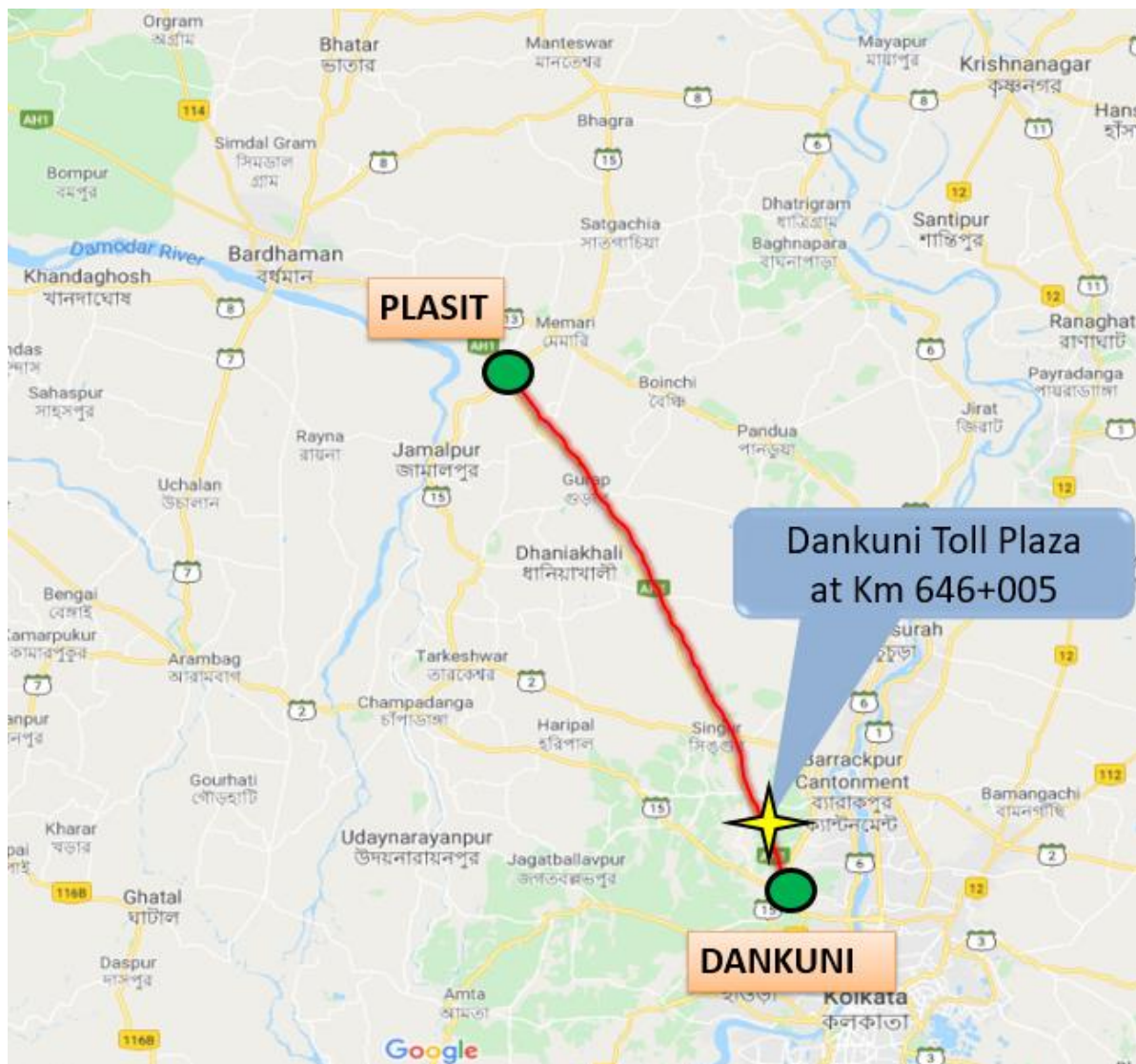


Figure 2-1: Project Alignment with Toll Plaza

2.3 Project Corridor Illustration

Four lane project is under operation. Six laning has commenced on corridor. The following photographs illustrate the project section along the corridor.





Figure 2-2: Photographs showing Project Corridor

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza location on Palsit - Dankuni section of NH-19 for Yr. 2022-23 & and traffic data from April 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|----------------------------------|---|---|---|---|---|
| 1 | Toll Plaza Dankuni at km 646.005 | AADT for Yr. 2022-23 & Eight month from April 2023 to November 2023 | AADT for Yr. 2022-23 & Eight month from April 2023 to November 2023 | AADT for Yr. 2022-23 & Eight month from April 2023 to November 2023 | AADT for Yr. 2022-23 & Eight month from April 2023 to November 2023 | AADT for Yr. 2022-23 & Eight month from April 2023 to November 2023 |

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI.

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 the table below.

Table 3-2 : 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Bus
- Truck
- 3-Axle
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data for base Year 2022-23, and from April 2023 to November 2023. as under for toll plaza–

Since the traffic data available for this update is for only eight months, from April 2023 to November 2023, it may not represent the whole year traffic. Construction of stretch is nearing completion which will improve traffic on project. Hence a seasonality factor for balance part of year has been applied to average traffic of current eight months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24.

Table 3-3 : Traffic Data at Dankuni Toll Plaza at Km 646.005

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2022-23 | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|------------------|--|--|
| 1 | Car | 10514 | 10935 |
| 2 | LCV | 1398 | 1031 |
| 3 | Bus | 789 | 788 |
| 4 | Truck | 3707 | 2542 |
| 5 | 3-Axle | 3061 | 2018 |
| 6 | Multi Axle | 8974 | 8799 |
| 7 | Oversize Vehicle | 8 | 9 |
| | Total | 28451 | 26121 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-4 : 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 3-5 : Traffic in PCU at Project Stretch Base Year 2022-23

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|--------------------------|------------|-------|-----------|
| 2022-2023 | Dankuni Km 646.005 | 28451 | 75699 | 2.66 |
| 2023-2024 | Dankuni Km 646.005 | 26121 | 68159 | 2.61 |

It can be observed from above that project traffic has PCU index More than 2.5 at Dankuni which is an indicator of high proportion of commercial traffic in traffic mix.

3.4.2 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.

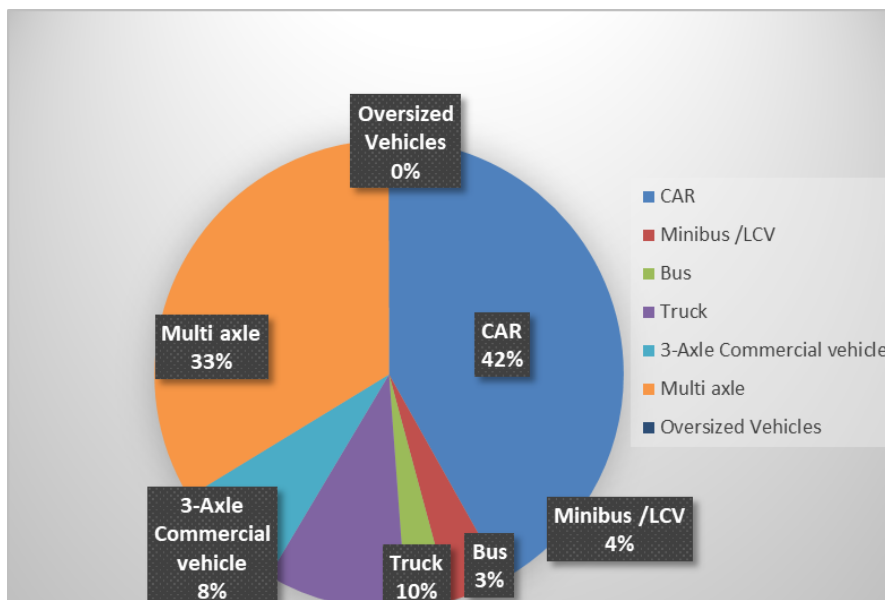


Figure 3-1 :Model Split of Tollable Vehicle-Dankuni Km 646.005

It is observed that car traffic forms about 42% of total traffic at Dankuni toll plaza location while multi axle commercial vehicles and trucks are about 58% of total traffic.

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

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

The following table provides numbers of vehicles falling in each of above category on base year 2023-24

Table 3-6 : Journey Type Bifurcation of Traffic at Dankuni Toll Plaza KM 646.005

| Sr. No | Type | Traffic Volume (Nos.) |
|--------|---------------------------------|-----------------------|
| | | 2023-24 |
| 1 | Single Journey | 12664 |
| 2 | Return Journey | 13442 |
| 3 | Local Commercial Single Journey | 0 |
| 4 | Monthly Pass Local | 11 |
| 5 | Monthly Pass | 4 |

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is as high as 51%. Return journey component is 49%. The number of monthly passes is 0% at Dankuni toll plaza. This indicates a higher share of long traffic.

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Competing / Alternate route

Project stretch from Palsit to Dankuni is part of Golden Quadrilateral connecting four metros of India which has been widened to four lanes in year 2005. Part of the stretch, from Palsit to Dankuni, known as Durgapur Expressway, was constructed at different alignment to the east of old NH-2. Old NH-2, still known as GT road passes through congested built-up areas like Memari, Boinchi, Saptagram etc. It has a number of level rail crossings as well. Thus, traffic at project stretch is settled and as such has not much scope of diversion.

There are few alternate routes to project stretch. These are discussed in subsequent sections including their potential impact on project traffic.

Old NH-2 (GT Road)

Between Palsit and Dankuni old NH-2 is an available alternate route to project stretch (Durgapur Expressway). The following figure shows both Durgapur Expressway and GT road.

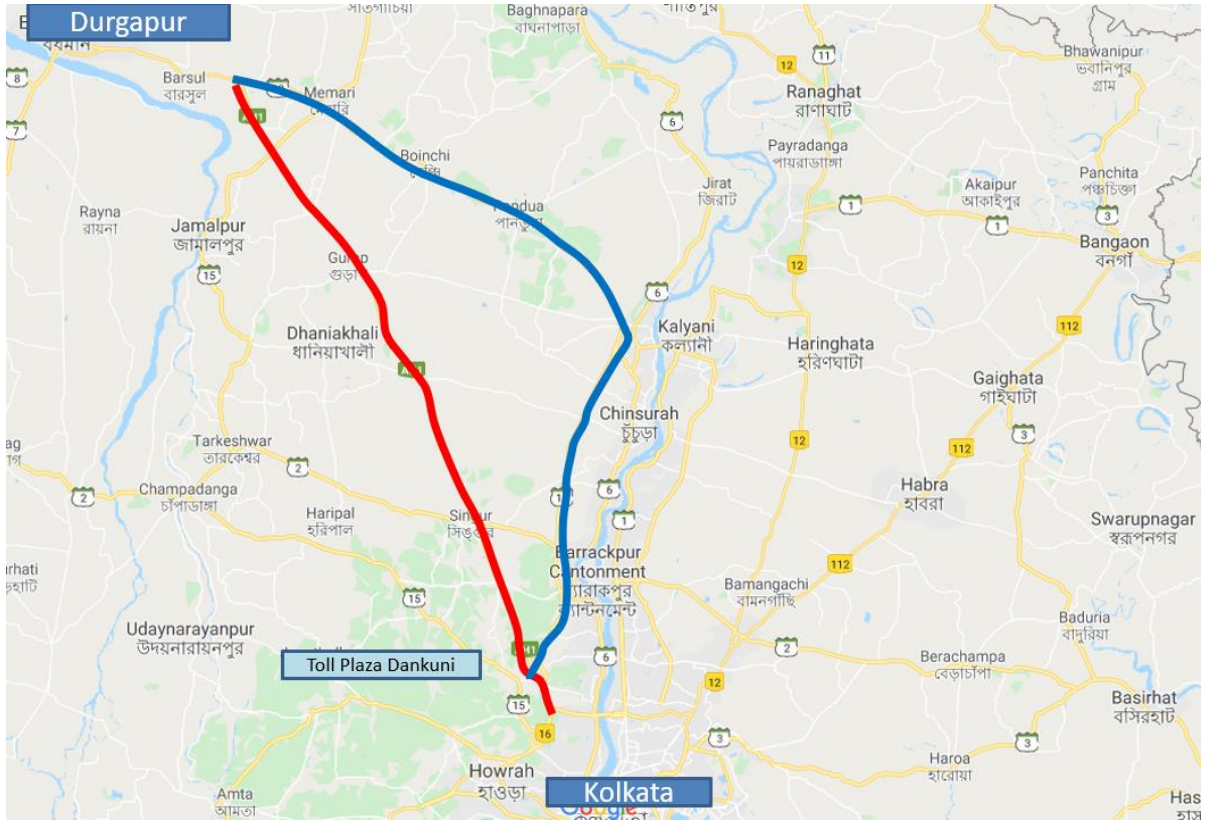


Figure 4-1 Project stretch and alternate GT Road

GT road passes through congested locations and is two lanes currently in most of the stretch. The following figure shows the typical condition of GT road as compared to project stretch.

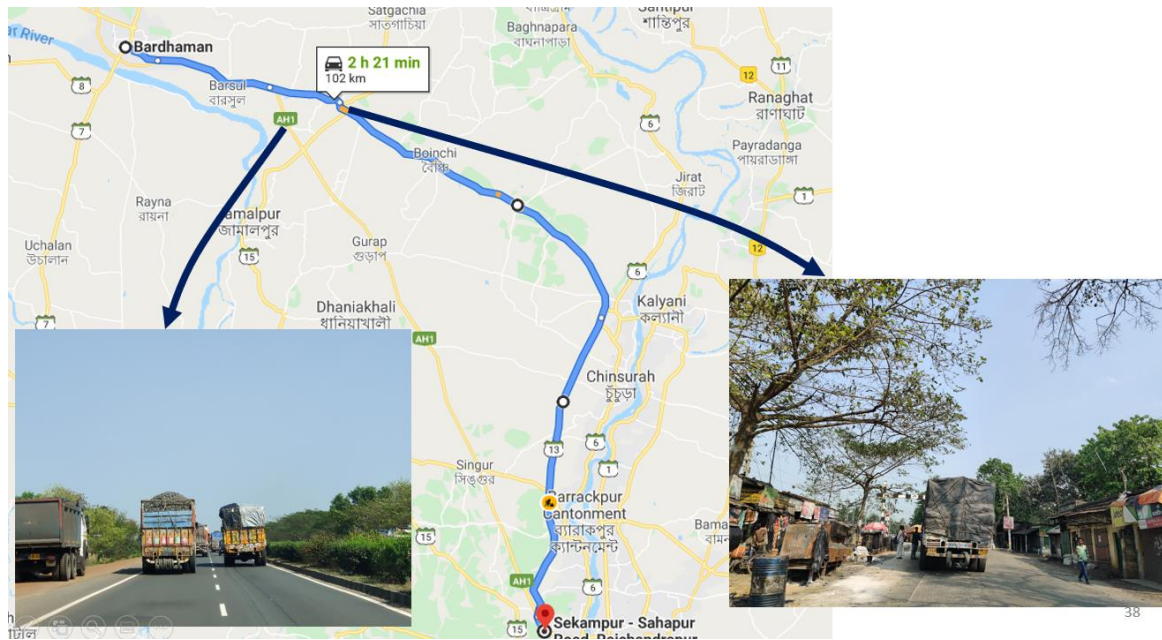


Figure 4-2 Project stretch and alternate GT Road Condition

There are as many as 5 level crossings on GT road which cause traffic congestion. The following figure shows one such typical crossing.



Figure 4-3 Railway level crossing at GT road.

The following table shows comparison of length and travel time via both project stretch and old GT road between Bardhaman and Dankuni.

Table 4-1 Project Road and GT road comparison

| Route | Distance (Km) | Time (Min) | Remarks |
|--|---------------|------------|--|
| Bardhaman -Kolkata Via Old NH-2 GT Road | 102 | 141 | Road is two lanes in most places and passes through congested built-up areas (Alikhoja, Memari, Boinchi, Saptagram) and 7 level crossings. |
| Bardhaman -Kolkata Via Project Road | 84 | 79 | Preferred Route |

Project road is quite short and saves lot of time. In such case any material shift of traffic from project stretch to old GT road is not envisaged.

B. Toll Plaza Local Leakage Roads

As such leakage roads are not there at toll plazas but there can be a longer detour to avoid toll plazas. The following figure shows the location and alignment of these roads at Dankuni Toll plaza.

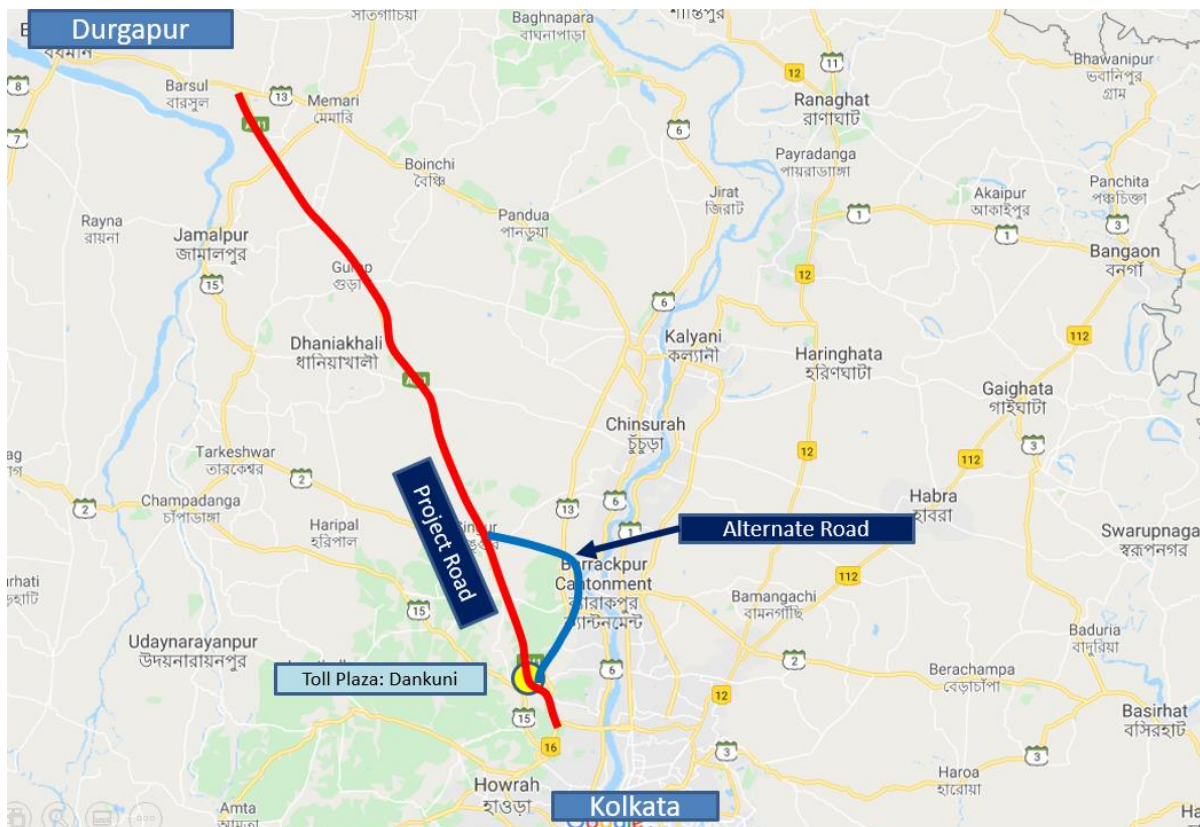


Figure 4-4 Local roads bypassing toll plaza.

At **Dankuni Toll Plaza**, there can be one alternate route via Singur- Baidyavati (Tarkeshwar) – Dankuni. The link from Singur to old Delhi Road is intermediate/ two lane. It’s quite congested and geometrically very poor. Moreover, this road is used by pilgrims to reach the famous Tarkeshwar temple of Lord Shiva. Almost all through the year people walk in large groups on the way to Tarkeshwar. The major concentration of this Yatra is in the months of February to March and July- August. The following figure shows the typical condition of this link.



Old GT Road from Tarkeshwar to Dankuni is under widening to four lanes. There is one ROB under construction. Toll plaza is also under construction at GT Road. The following figures show under construction ROB and Toll Plaza at GT Road.



Figure 4-5 ROB & Toll Plaza under construction.

The following table provides comparison between project road and this alternate route around Dankuni toll plaza.

Table 4-2 Length time comparison of alternate route at Dankuni Toll

| Route | Distance (Km) | Time (Min) | Remarks |
|------------------------------------|---------------|------------|--|
| Via Singur - Delhi Road (Old NH02) | 27 | 41 | From Singur to NH-2 road is intermediate lane and congested. Delhi road under four laning. Toll plaza under construction |
| Via Project Road (Dankuni) | 21.4 | 24 | Preferred Route |

Between Singur and Kolkata- Road from Singur to Old NH-2 is two lane and quite congested. Currently part of NH-2 is under 4 laning and there is no toll as of now. Already passenger vehicles are using. Heavy commercial traffic is not allowed on existing bridge. Hence when ROB will be opened to traffic, certain amount of commercial traffic may divert to alternate route of Singur- NH-2.

Part of alternate route is congested and there is habitation on both sides. Progress on ROB at GT road has been very slow which is further impacted by pandemic COVI-19. As the route is existing since long and traffic is settled on both project stretch and GT road, it is unlikely that any further diversion of passenger traffic would take place. After completion of six laning of project stretch some passenger traffic may also divert to project stretch due to better traffic conditions at project stretch. However same is ignored for current analysis and projections.

At present heavy commercial traffic is not allowed on existing ROB on NH-2 however light commercial traffic is using the same. Hence some part of above diversion has already taken place.

Geometrics and condition of road from Singur to GT road is not good but still some amount of commercial traffic may divert to old GT road after ROB at GT road is completed. Following table shows potential diversion of traffic commercial traffic is taken into consideration for projection of traffic. Considering the above facts following diversion of commercial traffic has been assumed for traffic projections in 2025-26.

- Optimistic Case- 5%
- Most Likely Case- 10%
- Pessimistic Case- 15%

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 Surat- Dahisar section of NH-8 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would-be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

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 the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population

- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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 cars 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).

As observed in OD analysis, the project stretch has a share of traffic from mainly three states of West Bengal, Jharkhand and Bihar and some traffic from Uttar Pradesh and Delhi. Hence regression of dependent variable and traffic has been done for these three states. The following tables and graphs present a summary of elasticity model of growth for project corridor.

Table 5-1 : Per Capita Income Vs. Car- West Bengal

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2011 | 31314 | 610218 | 4.50 | 5.79 | | |
| 2012 | 32164 | 695463 | 4.51 | 5.84 | 3% | |
| 2013 | 34177 | 791069 | 4.53 | 5.90 | 6% | |
| 2014 | 36293 | 829478 | 4.56 | 5.92 | 6% | |
| 2015 | 38624 | 916475 | 4.59 | 5.96 | 6% | 5.40% |

Regression analysis of above is given in following figure.

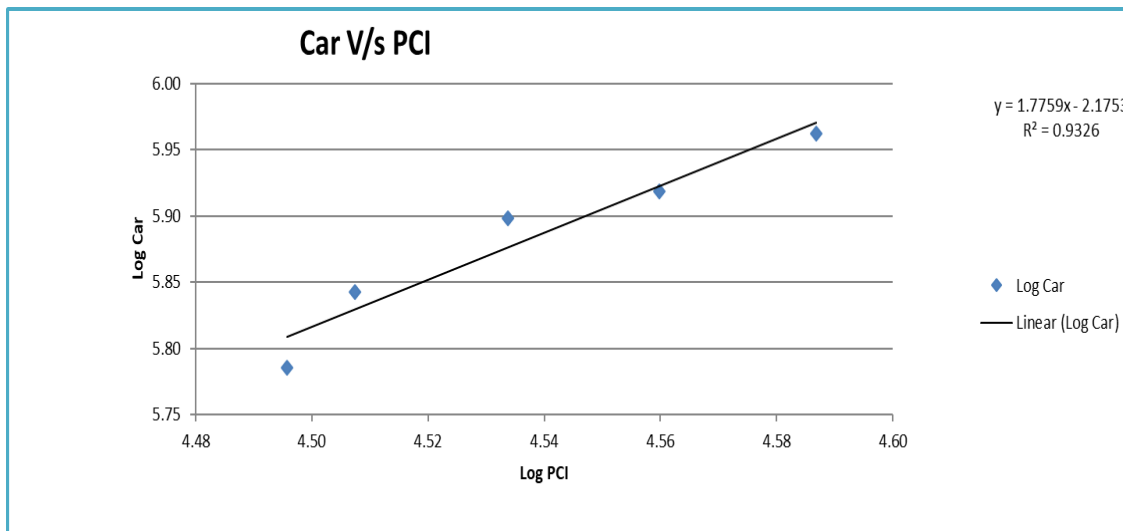


Figure 5-1 : Regression Analysis Car Vs. PCI West Bengal

Table 5-2 : NSDP Vs. Truck- West Bengal

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 27919100 | 285733 | 7.45 | 5.46 | | |
| 2012 | 28943200 | 318573 | 7.46 | 5.50 | 4% | |
| 2013 | 31033800 | 344816 | 7.49 | 5.54 | 7% | |
| 2014 | 33242500 | 350565 | 7.52 | 5.54 | 7% | |
| 2015 | 35684500 | 377636 | 7.55 | 5.58 | 7% | 6.34% |

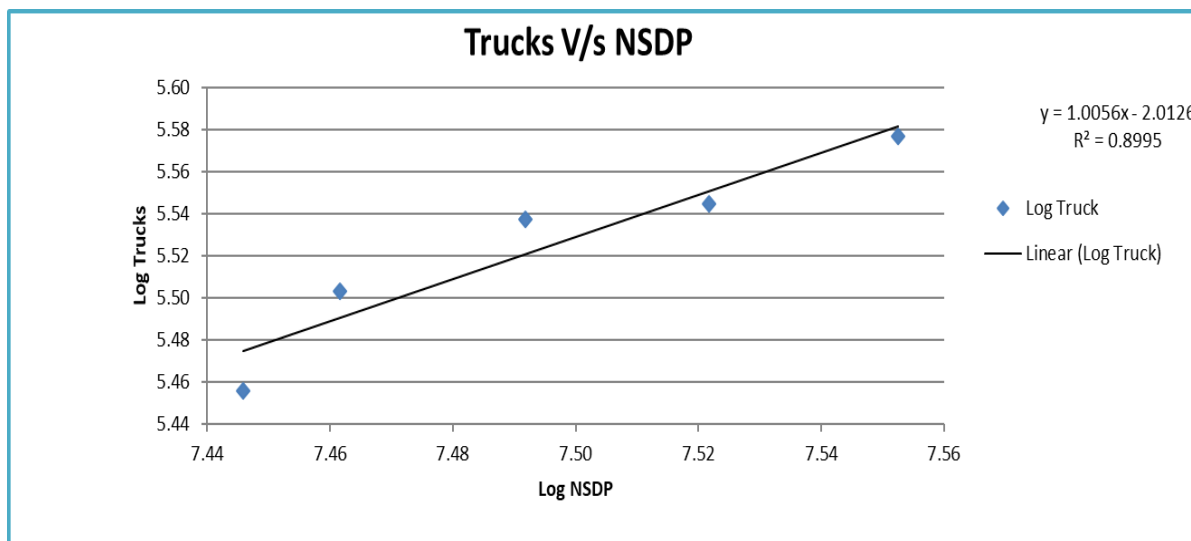


Figure 5-2 : Regression Analysis NSDP Vs. Truck West Bengal

Summary of regression analysis for elasticity and growth estimation for West Bengal are given in following table.

Table 5-3 : Summary Regression Analysis- West Bengal

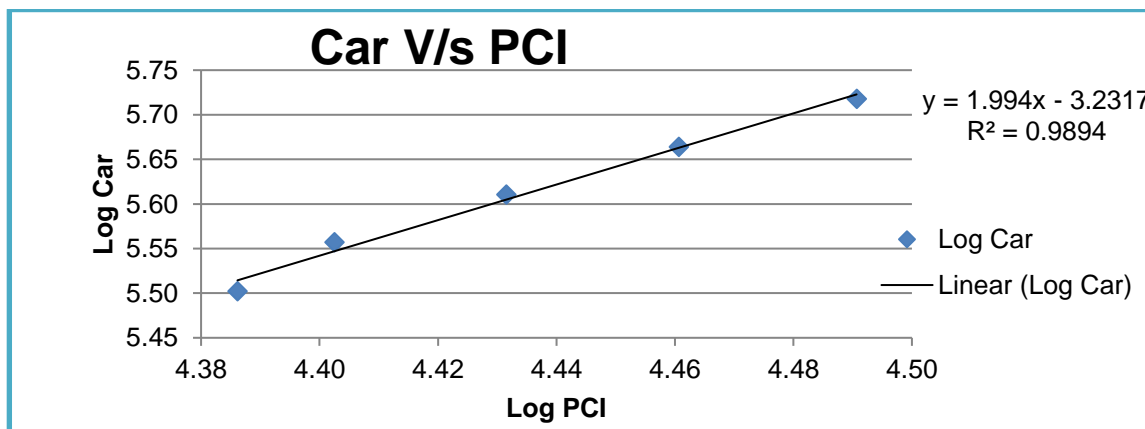
| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-------------|------------------|----------------------|------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| West Bengal | Car/Jeep | PCI | $y = 1.7759x - 2.1753$ | $R^2 = 0.9326$ | 1.7759 | 5.40% | 9.58% | Good Regression |
| | Bus | Population | $y = 0.5092x - 0.5636$ | $R^2 = 0.0364$ | 0.5092 | 0.89% | 0.46% | Poor Regression |
| | Truck | NSDP | $y = 1.0056x - 2.0126$ | $R^2 = 0.8995$ | 1.0056 | 6.34% | 6.37% | Good Regression |

Similarly, regression tables and graphs of economic model for Jharkhand are given as below.

Table 5-4 : Per Capita Income Vs. Car- Jharkhand

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2011 | 24330 | 317931 | 4.39 | 5.50 | | |
| 2012 | 25265 | 360662 | 4.40 | 5.56 | 4% | |
| 2013 | 27010 | 408016 | 4.43 | 5.61 | 7% | |
| 2014 | 28882 | 461587 | 4.46 | 5.66 | 7% | |
| 2015 | 30950 | 522192 | 4.49 | 5.72 | 7% | 6.2% |

Regression analysis of above is given in following figure.

**Figure 5-3 : Regression Analysis Car Vs. PCI Jharkhand****Table 5-5 : Population Vs. Bus- Jharkhand**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2011 | 31292000 | 12847 | 7.50 | 4.11 | | |
| 2012 | 31726000 | 13561 | 7.50 | 4.13 | 1% | |

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2013 | 32159000 | 14189 | 7.51 | 4.15 | 1% | |
| 2014 | 32588000 | 14846 | 7.51 | 4.17 | 1% | |
| 2015 | 33020000 | 15534 | 7.52 | 4.19 | 1% | 1.35% |

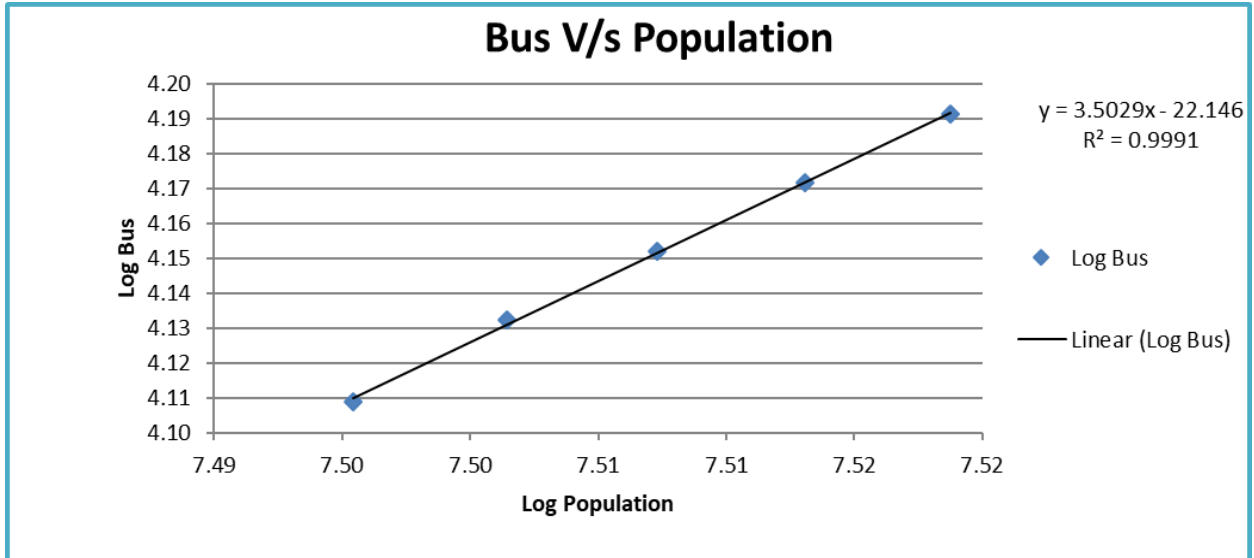


Figure 5-4 : Regression Analysis Population Vs. Bus Jharkhand

Table 5-6 : NSDP Vs. Truck- Jharkhand

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|--------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 76134 | 100257 | 4.88 | 5.00 | | |
| 2012 | 80157 | 107769 | 4.90 | 5.03 | 5% | |
| 2013 | 86861 | 114903 | 4.94 | 5.06 | 8% | |
| 2014 | 94121 | 121031 | 4.97 | 5.08 | 8% | |
| 2015 | 102196 | 127374 | 5.01 | 5.11 | 9% | 7.65% |

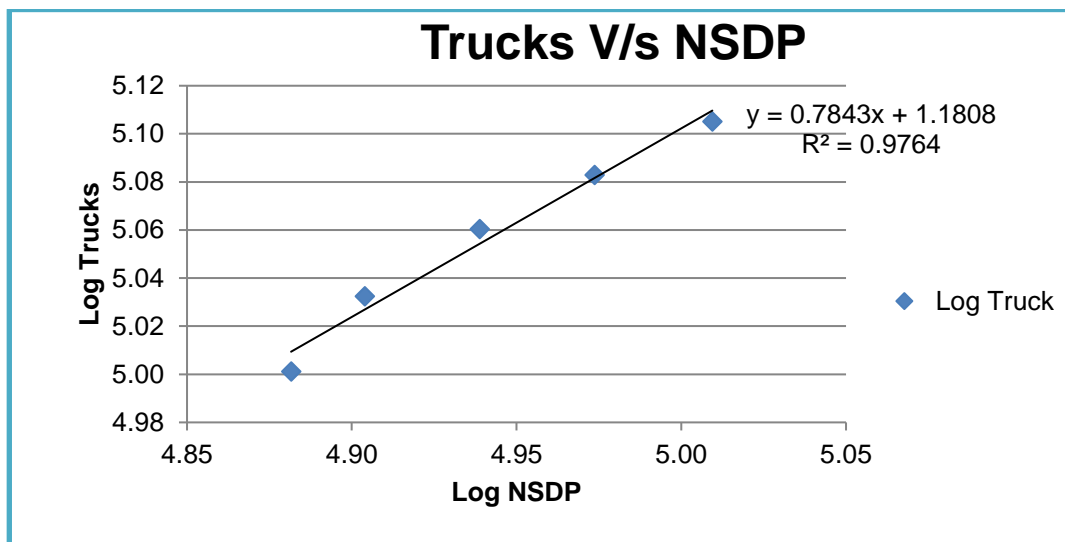


Figure 5-5 : Regression Analysis NSDP Vs. Jharkhand

Summary of regression analysis for elasticity and growth estimation for Jharkhand are given in following table.

Table 5-7 : Summary Regression Analysis- Jharkhand

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| JHARKHAND | Car/Jeep | PCI | $y = 1.994x - 3.2317$ | $R^2 = 0.9894$ | 1.9940 | 6.21% | 12.38% | Good Regression |
| | Bus | Population | $y = 3.5029x - 22.1461$ | $R^2 = 0.9991$ | 3.5029 | 1.35% | 4.74% | Good Regression |
| | Truck | NSDP | $y = 0.7843x - 1.1808$ | $R^2 = 0.9764$ | 0.7843 | 7.65% | 6.00% | Good Regression |

Similar analysis for the state of Bihar is presented in the table and regression graphs given below.

Table 5-8 : Per Capita Income Vs. Car- Bihar

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|--------|---------|---------|------------|----------------|
| 2011 | 12090 | 136845 | 4.08 | 5.14 | | |
| 2012 | 13149 | 160340 | 4.12 | 5.21 | 9% | |
| 2013 | 14356 | 184792 | 4.16 | 5.27 | 9% | |
| 2014 | 15506 | 208205 | 4.19 | 5.32 | 8% | |
| 2015 | 16801 | 235762 | 4.23 | 5.37 | 8% | 8.6% |

Regression analysis of above is given in following figure.

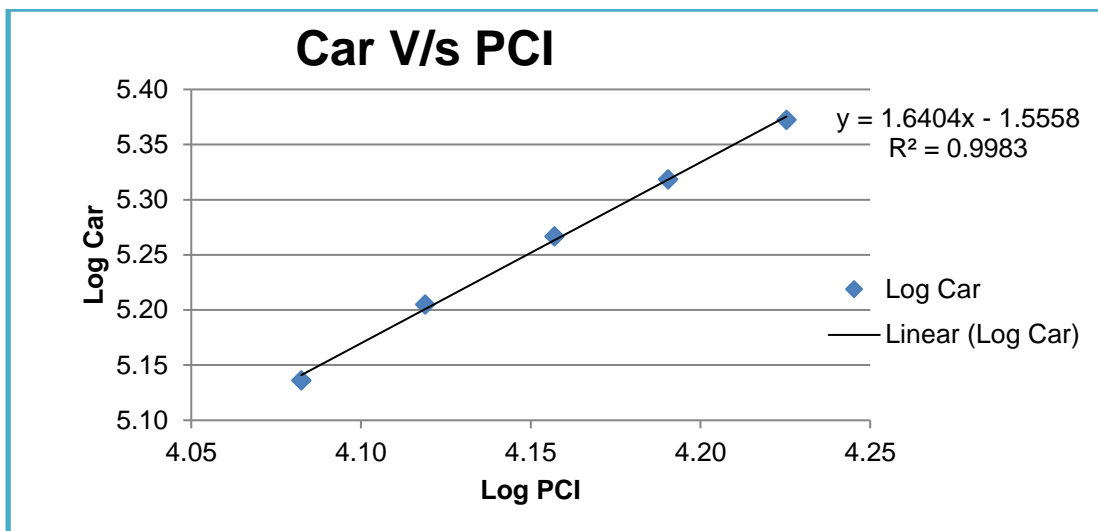


Figure 5-6 : Regression Analysis Car Vs. PCI Bihar

Table 5-9 : Population Vs. Bus- Bihar

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2011 | 104099452 | 22703 | 8.02 | 4.36 | | |
| 2012 | 106763632 | 24097 | 8.03 | 4.38 | 3% | |
| 2013 | 109441349 | 25992 | 8.04 | 4.41 | 3% | |
| 2014 | 112131327 | 27638 | 8.05 | 4.44 | 2% | |
| 2015 | 114832300 | 29384 | 8.06 | 4.47 | 2% | 2% |

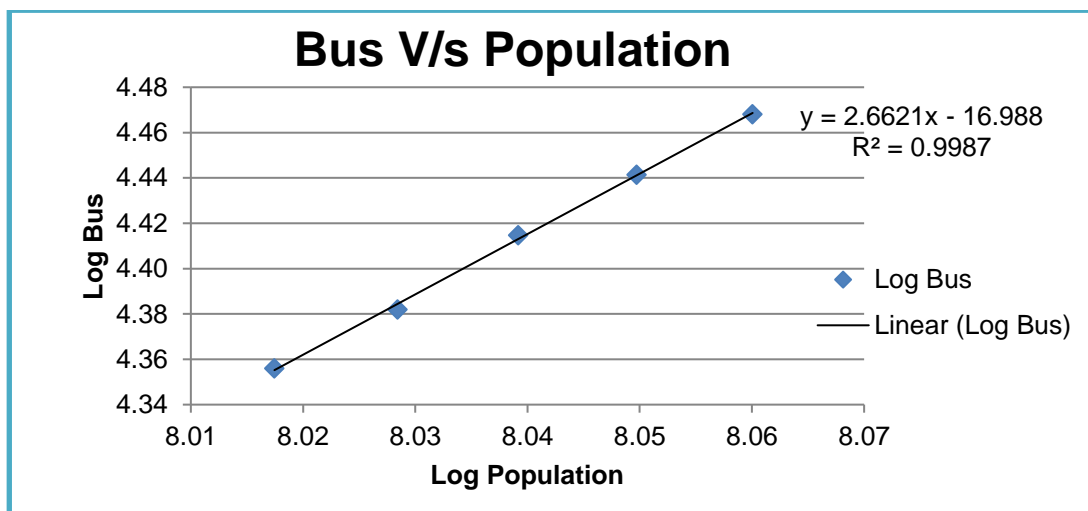


Figure 5-7 : Regression Analysis Population Vs. Bus Bihar

Table 5-10 : NSDP Vs. Truck- Bihar

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 11750314 | 73472 | 7.07 | 4.87 | | |
| 2012 | 12952142 | 83191 | 7.11 | 4.92 | 10% | |
| 2013 | 14324962 | 103211 | 7.16 | 5.01 | 11% | |
| 2014 | 15667055 | 109010 | 7.19 | 5.04 | 9% | |
| 2015 | 17180244 | 123744 | 7.24 | 5.09 | 10% | 10% |

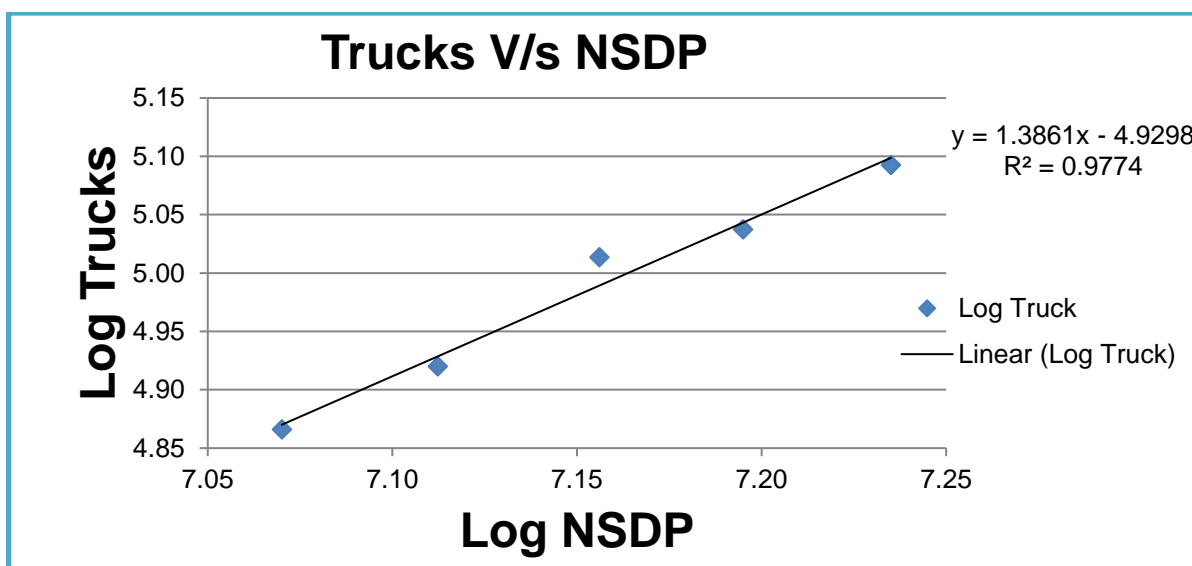


Figure 5-8 : Regression Analysis NSDP Vs. Truck Bihar

Summary of regression analysis for elasticity and growth estimation for Biharis given in following table

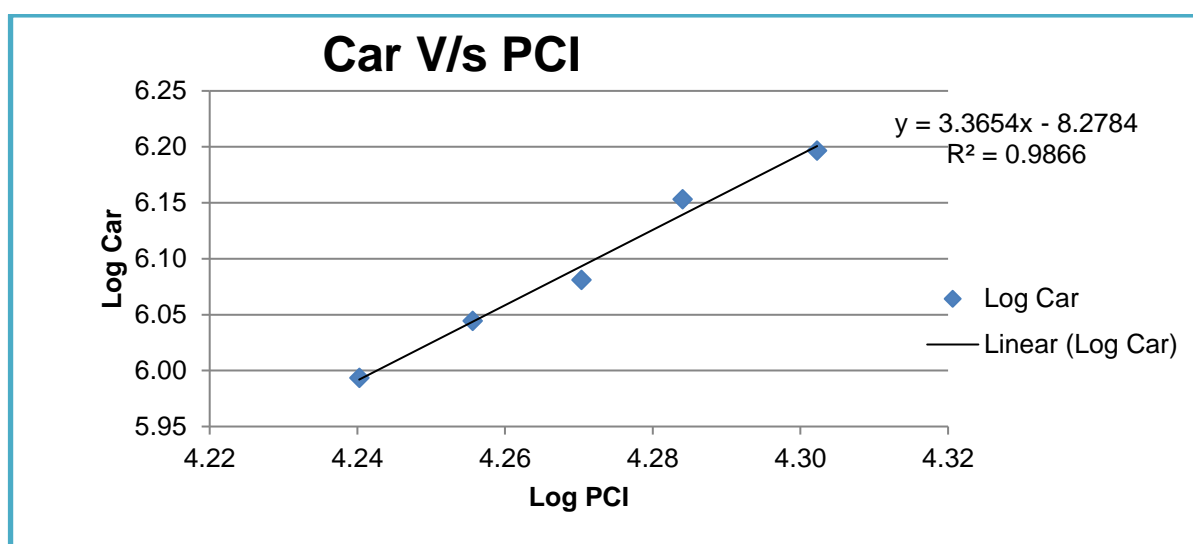
Table 5-11 : Summary Regression Analysis- Bihar

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| BIHAR | Car/Jeep | PCI | $y = 1.6404x - 1.5558$ | $R^2 = 0.9983$ | 1.6404 | 8.58% | 14.07% | Good Regression |
| | Bus | Population | $y = 2.6621x - 16.988$ | $R^2 = 0.9987$ | 2.6621 | 2.48% | 6.61% | Good Regression |
| | Truck | NSDP | $y = 1.3861x - 4.9298$ | $R^2 = 0.9774$ | 1.3861 | 9.96% | 13.81% | Good Regression |

Table 5-12 : Per Capita Income Vs. Car- Uttar Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|-------|---------|---------|---------|------------|----------------|
| 2011 | 17388 | 984937 | 4.24 | 5.99 | | |
| 2012 | 18014 | 1108100 | 4.26 | 6.04 | 4% | |
| 2013 | 18635 | 1205374 | 4.27 | 6.08 | 3% | |
| 2014 | 19233 | 1423020 | 4.28 | 6.15 | 3% | |
| 2015 | 20057 | 1572217 | 4.30 | 6.20 | 4% | 4% |

Regression analysis of above is given in following figure.

**Figure 5-9 : Regression Analysis Car Vs. PCI Uttar Pradesh****Table 5-13 : Population Vs. Bus- Uttar Pradesh**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|-------|---------|---------|------------|----------------|
| 2011 | 199812341 | 31922 | 8.30 | 4.50 | | |
| 2012 | 203382046 | 34428 | 8.31 | 4.54 | 2% | |
| 2013 | 206942855 | 40501 | 8.32 | 4.61 | 2% | |
| 2014 | 210493544 | 45607 | 8.32 | 4.66 | 2% | |
| 2015 | 214032922 | 51866 | 8.33 | 4.71 | 2% | 2% |

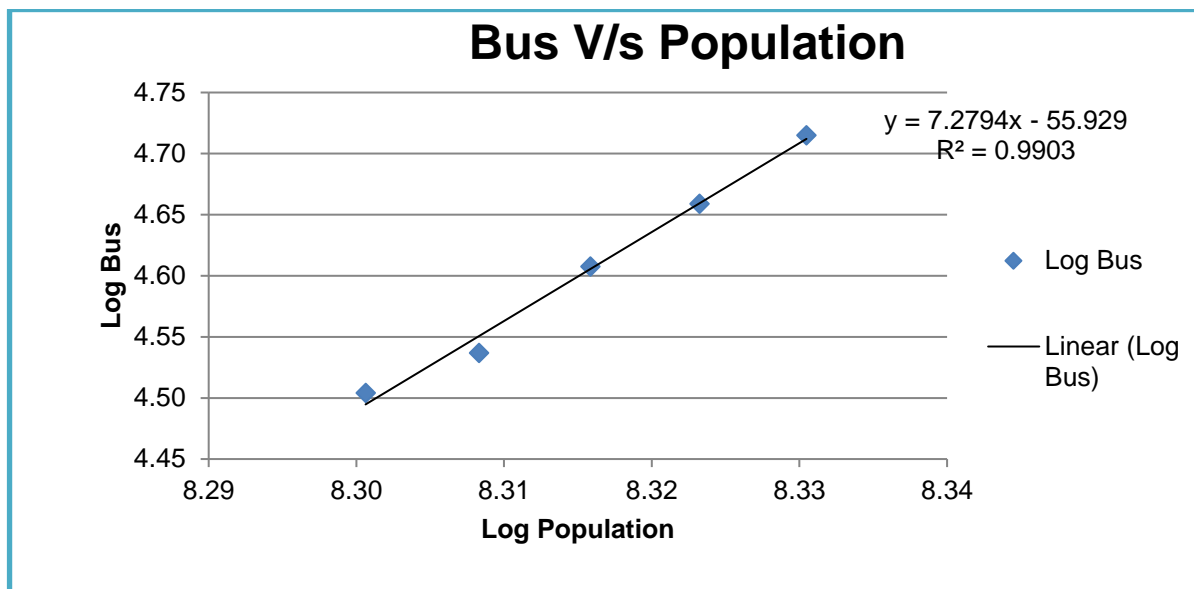


Figure 5-10 : Regression Analysis Population Vs. Bus Uttar Pradesh

Table 5-14 : NSDP Vs. Truck- Uttar Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 34662085 | 307058 | 7.54 | 5.49 | | |
| 2012 | 36537453 | 338977 | 7.56 | 5.53 | 5% | |
| 2013 | 38445814 | 400061 | 7.58 | 5.60 | 5% | |
| 2014 | 40350882 | 467786 | 7.61 | 5.67 | 5% | |
| 2015 | 42775892 | 511631 | 7.63 | 5.71 | 6% | 5% |

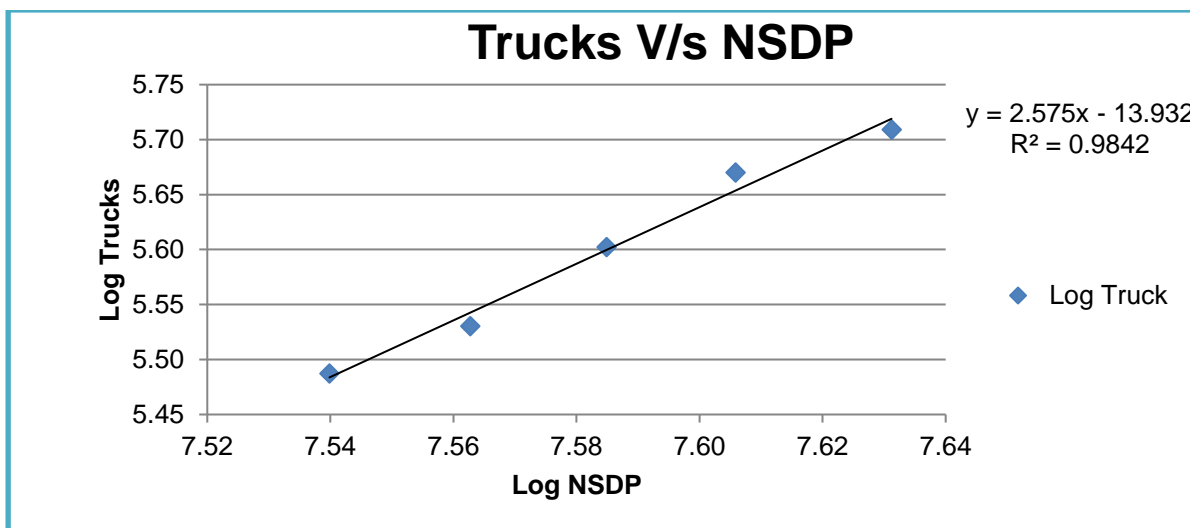


Figure 5-11 : Regression Analysis NSDP Vs. Truck Uttar Pradesh

Summary of regression analysis for elasticity and growth estimation for Uttar Pradesh are given in following table.

Table 5-15 : Summary Regression Analysis- Uttar Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|---------------|------------------|----------------------|-------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Uttar Pradesh | Car/Jeep | PCI | $y = 3.3654x - 8.2784$ | $R^2 = 0.9866$ | 3.3654 | 3.64% | 12.23% | Good Regression |
| | Bus | Population | $y = 7.2794x - 55.9289$ | $R^2 = 0.9903$ | 7.2794 | 1.73% | 12.62% | Good Regression |
| | Truck | NSDP | $y = 2.575x - 13.9315$ | $R^2 = 0.9842$ | 2.5750 | 5.40% | 13.90% | Good Regression |

Table 5-16 : Per Capita Income Vs. Car- Delhi

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth |
|------|--------|---------|---------|---------|------------|----------------|
| 2011 | 103619 | 2258434 | 5.02 | 6.35 | | |
| 2012 | 106677 | 2303052 | 5.03 | 6.36 | 3% | |
| 2013 | 112441 | 2497167 | 5.05 | 6.40 | 5% | |
| 2014 | 118411 | 2691282 | 5.07 | 6.43 | 5% | |
| 2015 | 124698 | 2859620 | 5.10 | 6.46 | 5% | 5% |

Regression analysis of above is given in following figure.

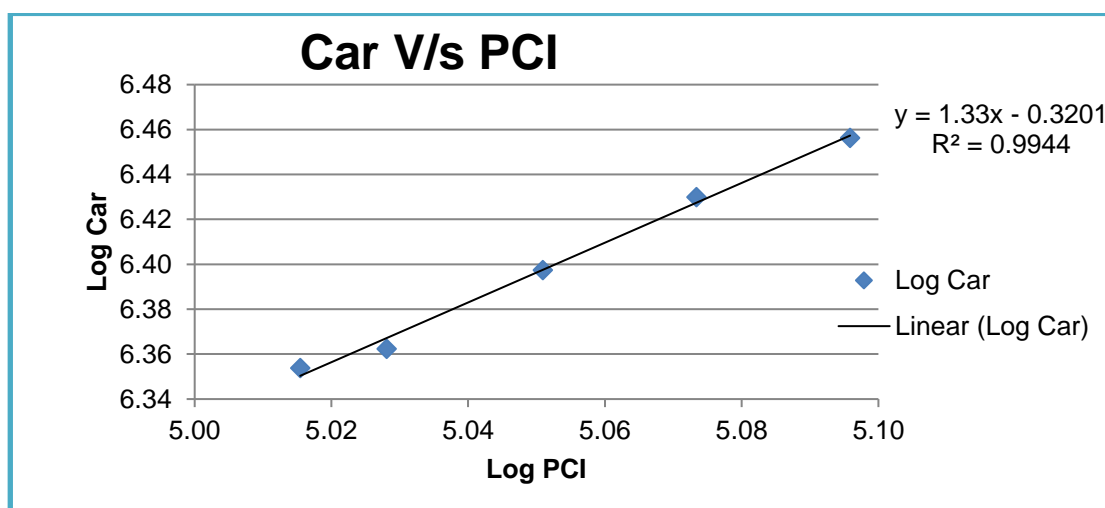
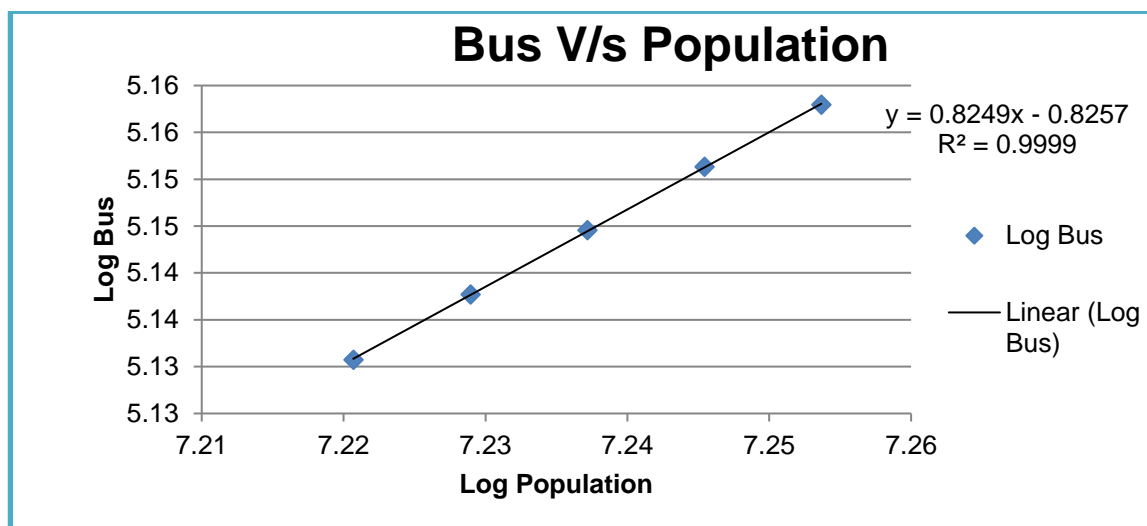


Figure 5-12 : Regression Analysis Car Vs. PCI Delhi

Table 5-17 : Population Vs. Bus- Delhi

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth |
|------|------------|--------|---------|---------|------------|----------------|
| 2011 | 16622000 | 135125 | 7.22 | 5.13 | | |
| 2012 | 16941000 | 137310 | 7.23 | 5.14 | 2% | |
| 2013 | 17266000 | 139495 | 7.24 | 5.14 | 2% | |
| 2014 | 17597000 | 141680 | 7.25 | 5.15 | 2% | |
| 2015 | 17934000 | 143865 | 7.25 | 5.16 | 2% | 1.92% |

**Figure 5-13 : Regression Analysis Population Vs. Bus Delhi****Table 5-18 : NSDP Vs. Truck- Delhi**

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (5 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 17223524 | 86301 | 7.24 | 4.94 | | |
| 2012 | 18072223 | 87166 | 7.26 | 4.94 | 5% | |
| 2013 | 19414032 | 88031 | 7.29 | 4.94 | 7% | |
| 2014 | 20836819 | 88896 | 7.32 | 4.95 | 7% | |
| 2015 | 22562961 | 89761 | 7.35 | 4.95 | 8% | 7% |

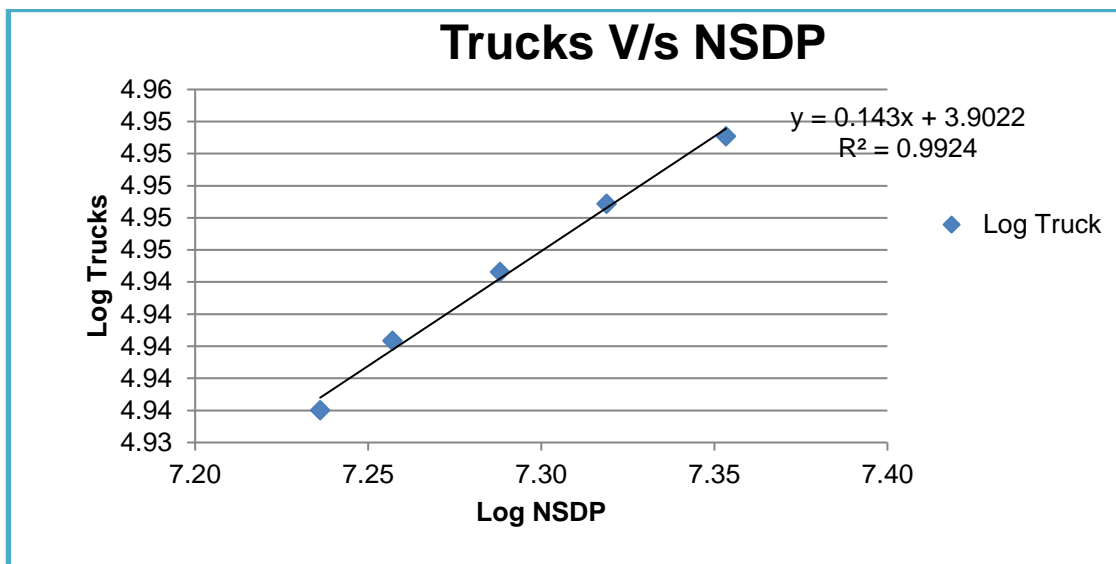


Figure 5-14 : Regression Analysis NSDP Vs. Truck Delhi

Summary of regression analysis for elasticity and growth estimation for Delhi are given in following table.

Table 5-19 : Summary Regression Analysis- Delhi

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average IV Growth (5yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|------------------------|----------------|----------------------------|--------------------------|----------------------|-----------------|
| Delhi | Car/Jeep | PCI | $y = 1.33x - 0.3201$ | $R^2 = 0.9944$ | 1.3300 | 4.74% | 6.31% | Good Regression |
| | Bus | Population | $y = 0.8249x - 0.8257$ | $R^2 = 0.9999$ | 0.8249 | 1.92% | 1.58% | Good Regression |
| | Truck | NSDP | $y = 0.143x - 3.9022$ | $R^2 = 0.9924$ | 0.1430 | 6.99% | 1.00% | Good Regression |

Since most of the passenger traffic is from West Bengal and Jharkhand only, growth from economical model is considered only from these states. For commercial traffic weighted impact of these states in ratio of their respective share is considered

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trends of growth. Project stretch of Agra to Etawah has recently been commissioned and is under tolling operation since 2022 with concessionaire. Hence, we do not have sufficient data points to be able to establish a reliable past trend of traffic growth. Moreover, the past two years traffic is affected by COVID-19 impact. A minimum of about 5 -6 years' traffic data is required for establishing a reliable past trend.

5.5 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.

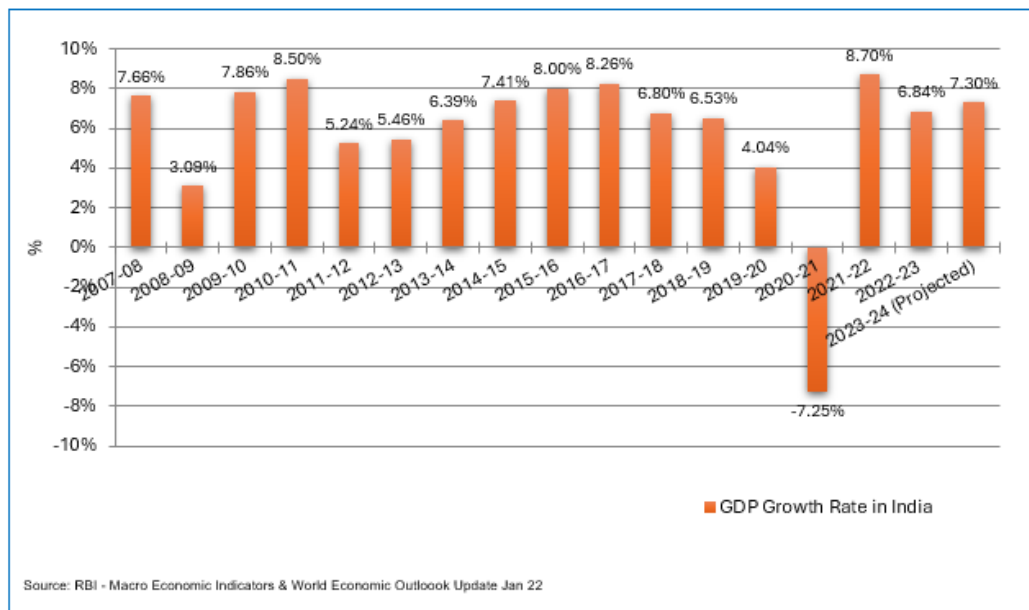


Figure 5-15 : Growth of GDP in India

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. The government took major policy decisions 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 an 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

5.6 Developments along and around the Project Corridor & State

Project stretch falls in one of the most mineral rich areas of India. Major Industries are developed for extraction of minerals and related manufacturing. The following are some major industrial establishments and areas in PIA.

Howrah - Often termed as Sheffield of the East, Howrah is known as an engineering hub, mainly in the area of light engineering industry. In 1823, Bishop Reginald Heber described Howrah as the place "chiefly inhabited by shipbuilders". There are small engineering firms

all over Howrah, particularly around Belilios Road area near Howrah station. There are many foundries in Liluah area.

Burn Standard Company, a major company in the heavy engineering industry, has its oldest manufacturing unit located in Howrah. The Howrah plant of Shalimar Paints (established in 1902) was the first large-scale paint manufacturing plant to be set up not only in India but in entire Southeast Asia. The jute industry suffered during the Partition of Bengal (1947), when the larger jute production area became part of East Pakistan (now Bangladesh). The foundry industry saw a decline in demand due to growth in the steel industry. Still Howrah is a major industrial hub in area and Howrah being major terminal on Delhi – Kolkata rail attracts lot of goods movement.



Bardhaman - Burdwan was one of the premier districts in India in terms of minerals. The Raniganj coalfield was the birthplace of the Indian coal industry. Besides coal, important minerals found in the district are iron ores, calcium carbonate, abrasives, silica bricks and molding sands, glass sands, building materials, manganese, bauxite, laterite etc. Chittaranjan Locomotives, Bengal Iron Works, IISCO- India Iron and Steel Co are some of major industrial establishments in district.

Dhanbad - Dhanbad have one of the oldest markets of region and is also a hotbed of large-scale industries. It is famous for its coal mines and industrial establishments; the city is surrounded by about 112 coal mines with a total production of 27.5 million tonnes and an annual income of 7000 million rupees through coal business. There are a number of coal washeries present there. BCCL have it headquarter in Dhanbad and SAIL, Tata Steel and Eastern Coalfields (at Mugma) also operates their mines. Om Besco Rail Products.Ltd, a public limited rail wagon manufacturing company at Mugma, Hindustan Zinc Ltd (now Vendanta Resources) had a lead smelting pilot plant at Tundu, MaithonPower.Ltda J.V of Tata Power & DVC (first PPP project of India), HindusthanMalleables& Forgings Ltd, etc. are also operational in and around Dhanbad. Fertilizers Corporation of India (closed), Projects & Development IndiaLtd and ACC.Ltd at Sindri are also available and being one of the 5 divisions of South Eastern Railway zone, Indian Railways is also a big employer in Dhanbad. Also, Kandra Industrial Area at Gobindpur houses some small & middle scale industries



Durgapur- Durgapur is one of the biggest industrial hubs of India and was planned as an integrated industrial town. It lays on the banks of DamodarRiver and coalfields of Raniganj. Durgapur was a dream of former prime minister of India, Jawaharlal Nehru and chief minister of West Bengal, Bidhan Chandra Roy. The first project in Durgapur was Damodar Valley Corporation's Durgapur Barrage which attracted many public sector units. Durgapur Steel Plant was the first PSU established in the region in 1955 with the help of U.K which was later undertook by SAIL.

Durgapur Steel plant

Durgapur Steel Plant set up in late fifties is a leading producer of long products & only producer of Forged Railway Wheels & Axles in the country. Plant started production with an initial crude steel capacity of 1 MPTA (million ton per annum) in 1959, which has been progressively increased to 1.8 MTPA during the modernization in nineties and further to 2.2 MTPA during recently completed Modernization & Expansion Plan (MEP). The present Plant capacity is about 2.12 MTPA saleable steel.

Durgapur is also an emerging I.T and real estate hub has many proposed residential areas like DLF's Durgapur Township.

Kolkata - is the capital of the Indian state of West Bengal. According to the 2011 Indian census, it is the seventh most populous city in India; the city had a population of 4.5 million, while the suburb population brought the total to 14.1 million, making it the third-most populous metropolitan area in India. Kolkata Megalopolis is the area surrounding Kolkata Metropolitan city with additional population. Located on the east bank of the Hooghly River approximately 80 kilometres west of the border with Bangladesh, it is the principal commercial, cultural, and educational centre of East India, while the Port of Kolkata is India's oldest operating port and its sole major riverine port. The city nicknamed the "City of Joy" is widely regarded as the "cultural capital" of India and as of 2019, six Nobel Laureates have been associated with the city. Recent estimates of Kolkata Metropolitan Area's economy have ranged from \$60 to \$150 billion (GDP adjusted for purchasing power parity) making it the third most-productive metropolitan area in India, after Mumbai and Delhi. One end of project stretch at Dankuni is major gate to city from northern part of India.

Logistics and Warehousing—It is observed that as project stretch is the main connectivity between Kolkata and rest of India (specially north), there are large number of logistic and warehousing establishments on project stretch between Dankuni and Bardhaman. Most computer companies have warehouses in Dankuni. As per a recent report an investment of Rs.4300 cr is expected in West Bengal by 2020 (May be delayed now due to COVID-19.)

5.7 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. Traffic growth is suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Traffic for Project Stretch

Table 5-20 : Recommended Growth Rates Optimistic

| Category / Year | 2024-2025 | 2025-2030 | 2030-2035 | 2035-2040 | 2039-2044 | 2044-2049 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.39% | 8.58% | 5.99% | 6.35% | 5.18% | 4.05% |
| Bus | 5.69% | 5.26% | 4.81% | 4.53% | 4.21% | 3.93% |
| Minibus | 5.69% | 5.26% | 4.81% | 4.53% | 4.21% | 3.93% |
| LCV | 2.32% | 2.11% | 1.71% | 1.32% | 0.93% | 0.55% |
| 2- Axle | 3.69% | 3.34% | 2.68% | 2.03% | 1.38% | 0.75% |
| 3 - Axle | 5.41% | 4.89% | 3.89% | 2.91% | 1.95% | 0.99% |
| 4 to 6 Axle | 6.45% | 5.82% | 4.62% | 3.45% | 2.29% | 1.14% |
| 7 and Above Axle | 6.45% | 5.82% | 4.62% | 3.45% | 2.29% | 1.14% |

Table 5-21 : Recommended Growth Rates Pessimistic

| Category / Year | 2024-2025 | 2025-2030 | 2030-2035 | 2035-2040 | 2039-2044 | 2044-2049 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 8.89% | 8.08% | 5.49% | 5.85% | 4.68% | 3.55% |
| Bus | 5.19% | 4.76% | 4.31% | 4.03% | 3.71% | 3.43% |
| Minibus | 5.19% | 4.76% | 4.31% | 4.03% | 3.71% | 3.43% |
| LCV | 1.82% | 1.61% | 1.21% | 0.82% | 0.43% | 0.05% |
| 2- Axle | 3.19% | 2.84% | 2.18% | 1.53% | 0.88% | 0.25% |
| 3 - Axle | 4.91% | 4.39% | 3.39% | 2.41% | 1.45% | 0.49% |
| 4 to 6 Axle | 5.95% | 5.32% | 4.12% | 2.95% | 1.79% | 0.64% |
| 7 and Above Axle | 5.95% | 5.32% | 4.12% | 2.95% | 1.79% | 0.64% |

Table 5-22 : Recommended Growth Rates Most Likely

| Category / Year | 2024-2025 | 2025-2030 | 2030-2035 | 2035-2040 | 2039-2044 | 2044-2049 |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 9.14% | 8.33% | 5.74% | 6.10% | 4.93% | 3.80% |
| Bus | 5.44% | 5.01% | 4.56% | 4.28% | 3.96% | 3.68% |
| Minibus | 5.44% | 5.01% | 4.56% | 4.28% | 3.96% | 3.68% |
| LCV | 2.07% | 1.86% | 1.46% | 1.07% | 0.68% | 0.30% |

| Category / Year | 2024-2025 | 2025-2030 | 2030-2035 | 2035-2040 | 2039-2044 | 2044-2049 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2- Axle | 3.44% | 3.09% | 2.43% | 1.78% | 1.13% | 0.50% |
| 3 - Axle | 5.16% | 4.64% | 3.64% | 2.66% | 1.70% | 0.74% |
| 4 to 6 Axle | 6.20% | 5.57% | 4.37% | 3.20% | 2.04% | 0.89% |
| 7 and Above Axle | 6.20% | 5.57% | 4.37% | 3.20% | 2.04% | 0.89% |

Traffic and revenue have been worked out on the basis of the above growths and some is presented in subsequent chapter of report.

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

**Table 6-1 : Total Tollable Traffic @ Toll Plaza Dankuni- Chainage 646.005 KM
(Optimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 10935 | 1031 | 788 | 2542 | 2018 | 8799 | 9 | 26121 | 68159 |
| 2024-25 | 11962 | 1054 | 832 | 2636 | 2127 | 9366 | 9 | 27986 | 72516 |
| 2025-26 | 12987 | 1076 | 876 | 2724 | 2231 | 9911 | 9 | 29814 | 76734 |
| 2026-27 | 14101 | 1099 | 922 | 2816 | 2340 | 10488 | 9 | 31775 | 81220 |
| 2027-28 | 15310 | 1122 | 971 | 2910 | 2454 | 11098 | 9 | 33874 | 85980 |
| 2028-29 | 16622 | 1145 | 1022 | 3007 | 2574 | 11744 | 9 | 36123 | 91037 |
| 2029-30 | 18047 | 1169 | 1076 | 3107 | 2699 | 12427 | 9 | 38534 | 96409 |
| 2030-31 | 19128 | 1189 | 1127 | 3191 | 2804 | 13002 | 9 | 40450 | 100827 |
| 2031-32 | 20274 | 1209 | 1181 | 3276 | 2913 | 13603 | 9 | 42465 | 105452 |
| 2032-33 | 21488 | 1229 | 1237 | 3364 | 3026 | 14232 | 9 | 44585 | 110297 |
| 2033-34 | 22775 | 1250 | 1297 | 3454 | 3143 | 14890 | 9 | 46818 | 115378 |
| 2034-35 | 24139 | 1271 | 1359 | 3546 | 3265 | 15578 | 9 | 49167 | 120697 |
| 2035-36 | 25671 | 1287 | 1420 | 3618 | 3360 | 16115 | 9 | 51480 | 125354 |
| 2036-37 | 27300 | 1304 | 1485 | 3692 | 3458 | 16670 | 9 | 53918 | 130217 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza Dankuni- Chainage 646.005 KM
(Pessimistic Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversize d Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|---------------------|------------------------|--------------------------|
| 2023-24 | 10935 | 1031 | 788 | 2542 | 2018 | 8799 | 9 | 26121 | 68159 |
| 2024-25 | 11907 | 1050 | 828 | 2623 | 2118 | 9323 | 9 | 27858 | 72183 |
| 2025-26 | 12869 | 1066 | 867 | 2697 | 2211 | 9819 | 9 | 29538 | 76019 |
| 2026-27 | 13908 | 1084 | 908 | 2774 | 2308 | 10341 | 9 | 31332 | 80079 |
| 2027-28 | 15031 | 1102 | 951 | 2853 | 2409 | 10891 | 9 | 33246 | 84373 |
| 2028-29 | 16245 | 1120 | 996 | 2934 | 2514 | 11470 | 9 | 35288 | 88913 |
| 2029-30 | 17557 | 1138 | 1044 | 3018 | 2624 | 12080 | 9 | 37470 | 93723 |

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2030-31 | 18521 | 1152 | 1089 | 3084 | 2713 | 12579 | 9 | 39147 | 97553 |
| 2031-32 | 19538 | 1166 | 1135 | 3151 | 2805 | 13098 | 9 | 40902 | 101542 |
| 2032-33 | 20611 | 1180 | 1184 | 3220 | 2901 | 13638 | 9 | 42743 | 105708 |
| 2033-34 | 21742 | 1194 | 1235 | 3291 | 2999 | 14201 | 9 | 44671 | 110053 |
| 2034-35 | 22935 | 1208 | 1289 | 3363 | 3101 | 14787 | 9 | 46692 | 114588 |
| 2035-36 | 24276 | 1217 | 1341 | 3414 | 3176 | 15222 | 9 | 48655 | 118434 |
| 2036-37 | 25696 | 1227 | 1395 | 3466 | 3253 | 15670 | 9 | 50716 | 122434 |

Traffic projections for Most Likely scenario is given as under

**Table 6-3 : Total Tollable Traffic @ Toll Plaza Dankuni- Chainage 646.005 KM
(Most Likely Growth Scenario)**

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial vehicle | Multi axle | Oversized Vehicles | Total Tollable Traffic | PCU (Including Exempted) |
|---------|-------|--------------|------|-------|---------------------------|------------|--------------------|------------------------|--------------------------|
| 2023-24 | 10935 | 1031 | 788 | 2542 | 2018 | 8799 | 9 | 26121 | 68159 |
| 2024-25 | 11934 | 1052 | 831 | 2630 | 2122 | 9344 | 9 | 27922 | 72350 |
| 2025-26 | 12928 | 1072 | 873 | 2712 | 2220 | 9865 | 9 | 29679 | 76384 |
| 2026-27 | 14004 | 1092 | 917 | 2796 | 2323 | 10415 | 9 | 31556 | 80658 |
| 2027-28 | 15170 | 1112 | 963 | 2883 | 2431 | 10995 | 9 | 33563 | 85187 |
| 2028-29 | 16433 | 1132 | 1011 | 2972 | 2544 | 11607 | 9 | 35708 | 89984 |
| 2029-30 | 17801 | 1153 | 1061 | 3064 | 2662 | 12253 | 9 | 38003 | 95071 |
| 2030-31 | 18823 | 1169 | 1110 | 3138 | 2759 | 12789 | 9 | 39797 | 99189 |
| 2031-32 | 19904 | 1186 | 1160 | 3214 | 2860 | 13348 | 9 | 41681 | 103492 |
| 2032-33 | 21047 | 1204 | 1213 | 3292 | 2964 | 13932 | 9 | 43661 | 107995 |
| 2033-34 | 22255 | 1222 | 1268 | 3372 | 3072 | 14542 | 9 | 45740 | 112704 |
| 2034-35 | 23532 | 1240 | 1326 | 3454 | 3184 | 15178 | 9 | 47923 | 117626 |
| 2035-36 | 24967 | 1253 | 1382 | 3515 | 3269 | 15663 | 9 | 50058 | 121869 |
| 2036-37 | 26490 | 1266 | 1441 | 3578 | 3356 | 16164 | 9 | 52304 | 126293 |

6.2 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 Palsit - Dankuni project three target traffic have been defined in Article 29.

Target Date - 1st May 2026 Target Traffic 65830

Target Date - 1st May 2031 Target Traffic 100822

Target Date - 1st May 2036 Target Traffic 130452

It was observed that as per traffic projections, average traffic volume exceeds target traffic in the first two target points. Probable shortening of concession period is estimated according to Article 29 of concession agreement for all cases which comes to about 3 years.

Pessimistic

| Sr. No | Target Date | Target Traffic | Actual Traffic | Variation in CP as per CA % | Change in CP (Days) | Total Variation in CP Years |
|--------|-------------|----------------|----------------|-----------------------------|---------------------|-----------------------------|
| 1 | 01-May-26 | 65830 | 80079 | -16.65% | -785 | -2.2 |
| 2 | 01-May-31 | 98003 | 101542 | 0.00% | 0 | |
| 3 | 01-May-36 | 125125 | 122434 | 0.00% | 0 | |

Optimistic

| Sr. No | Target Date | Target Traffic | Actual Traffic | Variation in CP as per CA % | Change in CP (Days) | Total Variation in CP Years |
|--------|-------------|----------------|----------------|-----------------------------|---------------------|-----------------------------|
| 1 | 01-May-26 | 65830 | 81220 | -18.38% | -867 | -2.5 |
| 2 | 01-May-31 | 99459 | 105452 | -1.02% | -30 | |
| 3 | 01-May-36 | 128286 | 130217 | 0.00% | 0 | |

Most Likely

| Sr. No | Target Date | Target Traffic | Actual Traffic | Variation in CP as per CA % | Change in CP (Days) | Total Variation in CP Years |
|--------|-------------|----------------|----------------|-----------------------------|---------------------|-----------------------------|
| 1 | 01-May-26 | 65830 | 80658 | -17.52% | -827 | -2.3 |
| 2 | 01-May-31 | 98742 | 103492 | 0.00% | 0 | |
| 3 | 01-May-36 | 126069 | 126293 | 0.00% | 0 | |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

The fee schedule in the CA of Surat-Dahisar section of NH-8 is based on the old toll policy. As per the Toll Notification (Schedule -G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent user's monthly pass would be issued at fee 50 time the single journey fee at 2/3rd Rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times 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. Local Discounts: Local Car Jeep Van -Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza). Additionally, local commercial vehicles are charged at 50% rate of single journey.

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) 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 years 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.

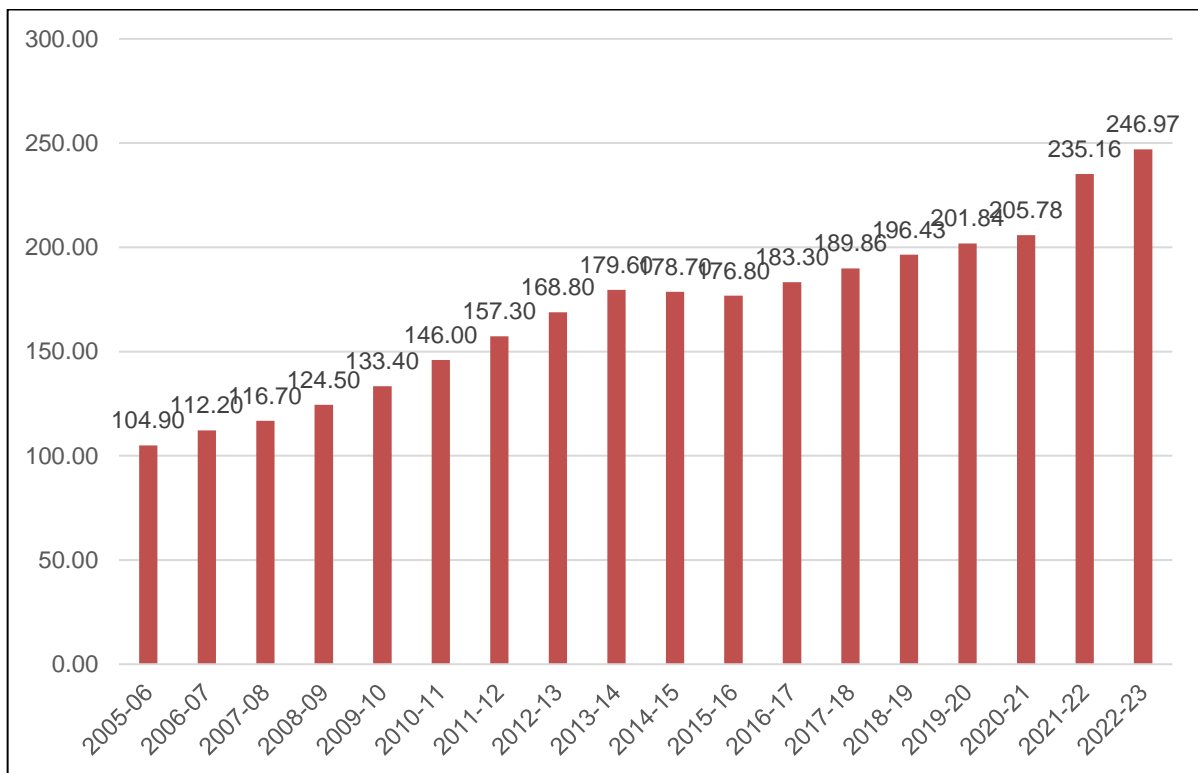


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |
| Oversized Vehicles (7 or more Axles) | 4.20 |

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

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

Table 7-2 : Toll Rates for Single Journey Dankuni @ Km 646.005

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-----|--------------|-----|-------|---------------------------|------------|-------------------|
| 2023-24 | 75 | 120 | 250 | 250 | 270 | 390 | 475 |
| 2024-25 | 75 | 120 | 250 | 250 | 270 | 390 | 475 |
| 2024-25 | 115 | 185 | 380 | 380 | 415 | 600 | 730 |
| 2025-26 | 120 | 190 | 395 | 395 | 430 | 620 | 750 |
| 2026-27 | 125 | 200 | 415 | 415 | 455 | 650 | 790 |
| 2027-28 | 135 | 210 | 435 | 435 | 475 | 685 | 830 |
| 2028-29 | 140 | 220 | 460 | 460 | 500 | 720 | 875 |
| 2029-30 | 145 | 235 | 485 | 485 | 525 | 755 | 920 |
| 2030-31 | 155 | 245 | 510 | 510 | 555 | 795 | 965 |
| 2031-32 | 160 | 260 | 535 | 535 | 585 | 835 | 1015 |
| 2032-33 | 170 | 270 | 560 | 560 | 615 | 880 | 1070 |
| 2033-34 | 180 | 285 | 590 | 590 | 645 | 925 | 1125 |
| 2034-35 | 190 | 300 | 625 | 625 | 680 | 975 | 1185 |
| 2035-36 | 200 | 315 | 655 | 655 | 715 | 1025 | 1245 |
| 2036-37 | 210 | 335 | 690 | 690 | 755 | 1080 | 1310 |

Table 7-3: Toll Rates for Return Journey Dankuni @ Km 646.005

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|-----|--------------|------|-------|---------------------------|------------|-------------------|
| 2023-24 | 110 | 175 | 370 | 370 | 405 | 585 | 710 |
| 2024-25 | 110 | 175 | 370 | 370 | 405 | 585 | 710 |
| 2024-25 | 170 | 275 | 575 | 575 | 625 | 900 | 1090 |
| 2025-26 | 180 | 285 | 595 | 595 | 650 | 930 | 1130 |
| 2026-27 | 190 | 300 | 625 | 625 | 680 | 975 | 1185 |
| 2027-28 | 200 | 315 | 655 | 655 | 715 | 1025 | 1245 |
| 2028-29 | 210 | 335 | 690 | 690 | 750 | 1075 | 1310 |
| 2029-30 | 220 | 350 | 725 | 725 | 790 | 1135 | 1375 |
| 2030-31 | 230 | 370 | 765 | 765 | 830 | 1190 | 1450 |
| 2031-32 | 245 | 385 | 800 | 800 | 875 | 1255 | 1525 |
| 2032-33 | 255 | 405 | 845 | 845 | 920 | 1320 | 1605 |
| 2033-34 | 270 | 430 | 890 | 890 | 970 | 1385 | 1685 |
| 2034-35 | 285 | 450 | 935 | 935 | 1020 | 1460 | 1775 |
| 2035-36 | 295 | 475 | 985 | 985 | 1070 | 1535 | 1870 |
| 2036-37 | 315 | 500 | 1035 | 1035 | 1130 | 1620 | 1970 |

Table 7-4: Toll Rates for Monthly pass Local Dankuni @ Km 646.005

| Year | Car | Minibus /LCV |
|---------|-----|--------------|
| 2023-24 | 315 | 315 |
| 2024-25 | 315 | 315 |
| 2024-25 | 340 | 340 |
| 2025-26 | 350 | 350 |
| 2026-27 | 365 | 365 |
| 2027-28 | 385 | 385 |
| 2028-29 | 405 | 405 |
| 2029-30 | 425 | 425 |
| 2030-31 | 445 | 445 |
| 2031-32 | 470 | 470 |
| 2032-33 | 495 | 495 |
| 2033-34 | 520 | 520 |
| 2034-35 | 550 | 550 |
| 2035-36 | 580 | 580 |
| 2036-37 | 610 | 610 |

Table 7-5: Toll Rates for Monthly Pass Dankuni @ Km 646.005

| Year | Car | Minibus /LCV | Bus | Truck | 3-Axle Commercial Vehicle | Multi Axle | Oversized Vehicle |
|---------|------|--------------|-------|-------|---------------------------|------------|-------------------|
| 2023-24 | 2440 | 3945 | 8265 | 8265 | 9015 | 12960 | 15775 |
| 2024-25 | 2440 | 3945 | 8265 | 8265 | 9015 | 12960 | 15775 |
| 2024-25 | 3820 | 6125 | 12745 | 12745 | 13900 | 19950 | 24270 |
| 2025-26 | 4010 | 6385 | 13205 | 13205 | 14390 | 20620 | 25070 |
| 2026-27 | 4210 | 6705 | 13875 | 13875 | 15120 | 21670 | 26345 |
| 2027-28 | 4425 | 7045 | 14580 | 14580 | 15890 | 22775 | 27690 |
| 2028-29 | 4645 | 7405 | 15325 | 15325 | 16705 | 23940 | 29110 |
| 2029-30 | 4885 | 7780 | 16115 | 16115 | 17565 | 25170 | 30605 |
| 2030-31 | 5135 | 8180 | 16945 | 16945 | 18470 | 26470 | 32185 |
| 2031-32 | 5395 | 8605 | 17820 | 17820 | 19425 | 27845 | 33855 |
| 2032-33 | 5675 | 9050 | 18750 | 18750 | 20435 | 29295 | 35620 |
| 2033-34 | 5970 | 9520 | 19730 | 19730 | 21505 | 30825 | 37485 |
| 2034-35 | 6280 | 10015 | 20765 | 20765 | 22630 | 32445 | 39455 |
| 2035-36 | 6605 | 10545 | 21855 | 21855 | 23825 | 34155 | 41535 |
| 2036-37 | 6955 | 11100 | 23015 | 23015 | 25085 | 35965 | 43735 |

7.3 Toll Revenue

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

7.4 Toll Revenue at all toll plazas under Scenarios

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

Table 7-3 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Year | TP-1 | Total |
|---------|--------|--------|
| 2023-24 | 185.82 | 185.82 |
| 2024-25 | 250.82 | 250.82 |
| 2025-26 | 332.28 | 332.28 |
| 2026-27 | 368.88 | 368.88 |
| 2027-28 | 412.13 | 412.13 |
| 2028-29 | 456.71 | 456.71 |
| 2029-30 | 507.53 | 507.53 |
| 2030-31 | 558.47 | 558.47 |
| 2031-32 | 615.54 | 615.54 |
| 2032-33 | 675.18 | 675.18 |
| 2033-34 | 742.81 | 742.81 |
| 2034-35 | 819.03 | 819.03 |
| 2035-36 | 894.57 | 894.57 |
| 2036-37 | 977.07 | 977.07 |

Table 7-4 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

| Year | TP-1 | Total |
|---------|--------|--------|
| 2023-24 | 185.82 | 185.82 |
| 2024-25 | 249.62 | 249.62 |
| 2025-26 | 329.13 | 329.13 |
| 2026-27 | 363.66 | 363.66 |
| 2027-28 | 404.37 | 404.37 |
| 2028-29 | 446.03 | 446.03 |
| 2029-30 | 493.37 | 493.37 |
| 2030-31 | 540.22 | 540.22 |
| 2031-32 | 592.59 | 592.59 |
| 2032-33 | 646.92 | 646.92 |
| 2033-34 | 708.39 | 708.39 |
| 2034-35 | 777.39 | 777.39 |
| 2035-36 | 844.99 | 844.99 |
| 2036-37 | 918.45 | 918.45 |

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

| Year | TP-1 | Total |
|----------------|-------------|---------------|
| 2023-24 | 185.82 | 185.82 |
| 2024-25 | 250.21 | 250.21 |
| 2025-26 | 330.70 | 330.70 |
| 2026-27 | 366.25 | 366.25 |
| 2027-28 | 408.22 | 408.22 |
| 2028-29 | 451.35 | 451.35 |
| 2029-30 | 500.44 | 500.44 |
| 2030-31 | 549.33 | 549.33 |
| 2031-32 | 604.00 | 604.00 |
| 2032-33 | 660.97 | 660.97 |
| 2033-34 | 725.50 | 725.50 |
| 2034-35 | 797.97 | 797.97 |
| 2035-36 | 869.43 | 869.43 |
| 2036-37 | 947.34 | 947.34 |

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Palsit to Dankuni section of NH-19 from km 588.870 to km 652.700 in state of West Bengal is currently four lane road and being upgraded to six lanes. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the most busy and prominent national highway NH-19 which connects political and cultural capitals of India. This is one of the most important trunk roads which spreads across many states. There are large number of townships, industrial corridors and other business establishments coming up along the project corridor. As discussed, the dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give a positive impact to traffic flow on the project. The following can be considered as major outcomes of the study.

- a) There is a good amount of tollable traffic running on the project.
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy.
- c) The Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road.

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



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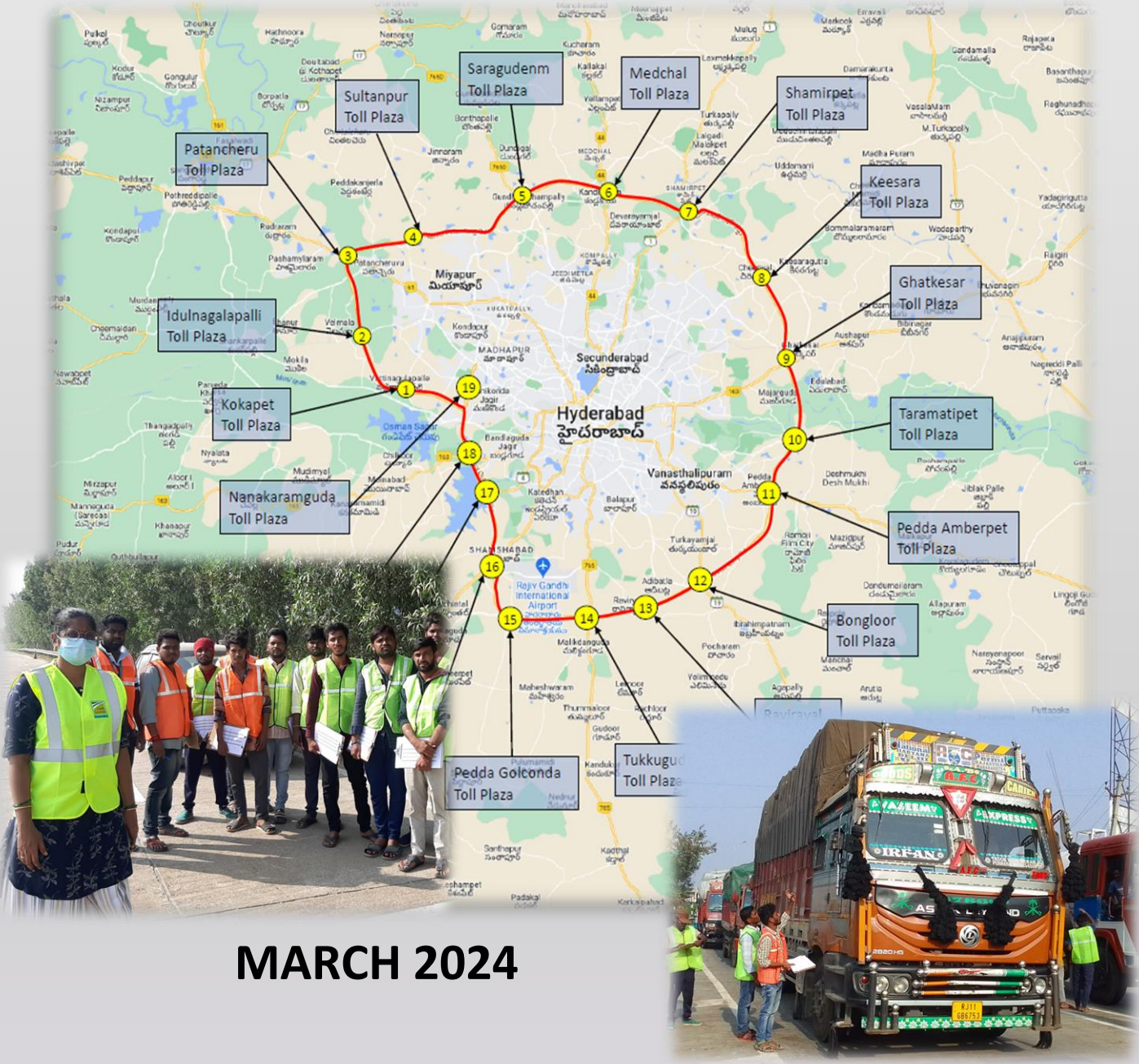
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Nehru Outer Ring Road in Hyderabad from Km 0.000 to Km 158.000 in State of Telangana on TOT mode



MARCH 2024

TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)



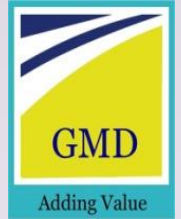
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**TRAFFIC STUDY & REVENUE PROJECTION REPORT
(FINAL)**

MARCH 2024



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CHAPTER 1

INTRODUCTION

1.1 Background

The Outer Ring Road, officially as, Jawaharlal Nehru Outer Ring Road and abbreviated as, O.R.R., is a 158 kilometer, 8-lanes ring road expressway encircling Hyderabad, capital of the Indian state of Telangana. The expressway is designed for speeds up to 100 km/h. A large part, 124 km (covering urban nodes viz., Hi- Tech city, Nanakramguda Financial District, Rajiv Gandhi International Airport, IKP Knowledge park, Hardware Park, Telangana State Police Academy, Singapore Financial District, and Games village) of the 158-km was opened by December 2012. Rest of the length of Outer Ring Road was opened to traffic in year 2015-16. Hence onward, for ease of reference, Nehru Outer Ring Road will be referred as NORR or ORR.

ORR is one of the most important infrastructural developments which has complimented growth of Hyderabad as major metro of India. On Eastern side it has provided express connectivity to major commercial and upscale residential centres of Gachibowli, Banjara Hills, Jublee Hills, Hitec- City, Manikonda, Nanakramguda. As a result, large number of residential and commercial projects have come up on this north-east part of ORR. Tellapur, Mokila, Kollur, Narsingi can be named as few of these. On north and western side ORR connects to Shamirpet and Genome Valley.

ORR also provides fast connectivity to various radial state and national highways connecting to Mumbai, Nagpur, Karimnagar, Warangal, Suryapet, Vijayawada, Bengaluru. Regional traffic now does not need to go into congested network of Hyderabad.

The Outer Ring Road also helps in reducing the travel time from Rajiv Gandhi International Airport to cities like Nizamabad & Adilabad as it connects to NH44. The expressway is fenced, and 33 radial roads connect it with the Inner Ring Road.

ORR is fully accessing controlled road and traffic can enter or exit from designated locations only. There is total 19 locations from where ORR can be entered or exited. Toll plaza and or booths have been placed at all such entry / exit points.

ORR has been developed by Hyderabad Metropolitan Development Authority (HMDA). It's maintained by HMDA and special purpose vehicle Hyderabad Growth Corridor Limited (HGCL). The bid for Operation, Maintenance of ORR for a longer concession period of 30 years on TOT model is invited by HMDA and HGCL.

Following figure show alignment of Hyderabad Outer Ring Road in regional context.

.



Figure 1-1: Location & Alignment of ORR in Regional Context

M/s IRB Infrastructure Developers Limited (IRB) intends to participate in bidding for Nehru Outer Ring Road (NORR) on TOT basis.

GMD Consultants have been assigned by M/s IRB for the work of conducting traffic study and developing revenue model based on traffic projections and forecast.

For making the proper assessment of traffic volume on project stretch, base year traffic and its projection.

CHAPTER 2

PROJECT DETAILS

2.1 Brief Description of the Project Influence Area (PIA)

Nehru Outer Ring Road is a 158 km access-controlled transportation ring around city of Hyderabad and Secunderabad. Average radial distance of ORR from city centre is about 20-25 km. Hyderabad is fourth most populous city of India. It is capital of one of the fastest growing states of India, Telangana. Hyderabad is merging and the major global hub in field of IT, IT&ES, Pharmaceutical & Biotechnical Research. As discussed previously it provides fast connectivity to Airport (near Shamsabad) from various parts of city. Following figure shows positioning of ORR in city context.

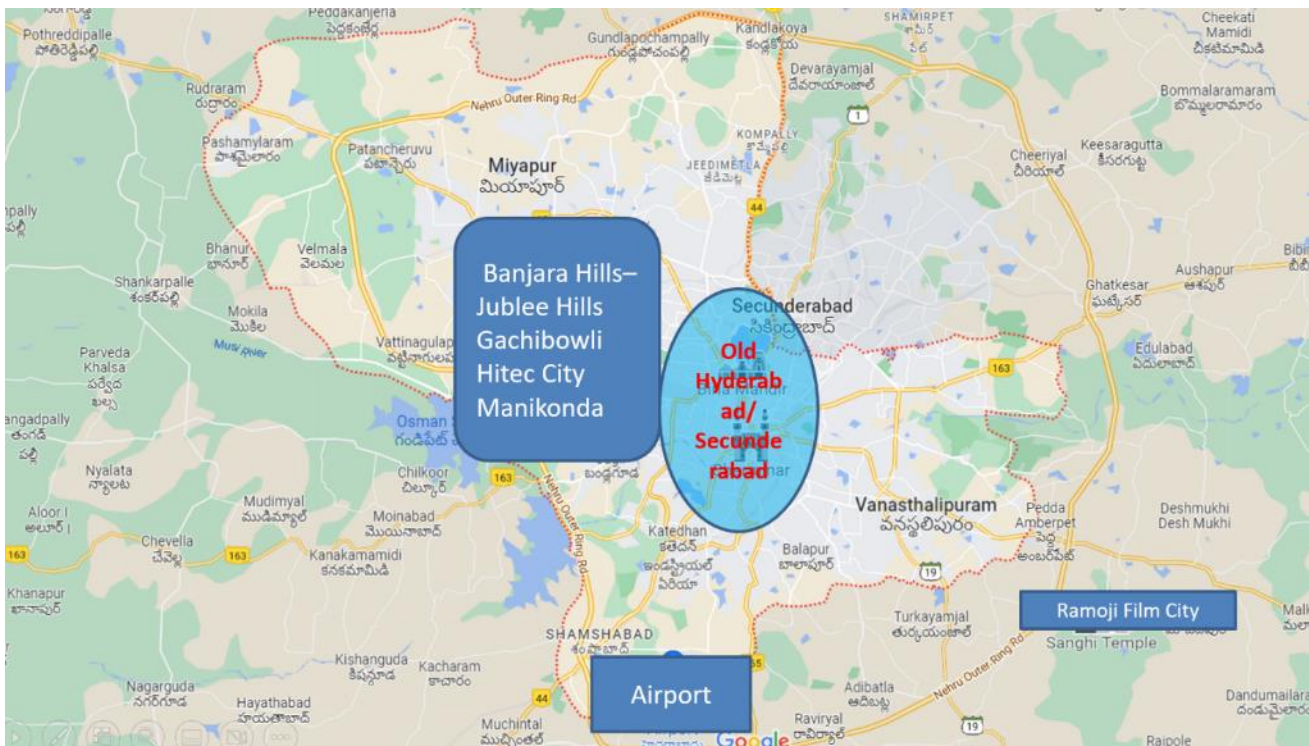


Figure 2-1: Positioning of ORR in city context.

NORR makes a complete circle around city of Hyderabad and Secunderabad. It provides fast connectivity to all part of Hyderabad Metropolitan Area (HMA). Hyderabad Metropolitan Area includes part of following districts.

- **Hyderabad** - Hyderabad district is a most populous district in the state of Telangana in India that contains a part of the metropolitan area of Hyderabad.
- **Rangareddy** – This is basically rural Hyderabad area. It has head quarter in Lakdi ka Pul which is basically part of Hyderabad City only. Ranga Reddy has maximum per capita income in entire state.

- **Nalgonda** – Nalgonda is another district which is part of HMA. This touches southeastern boundary of Hyderabad
- **Mahboob Nagar** - Mahabubnagar district is a district in **Telangana**. Mahabubnagar is the district headquarters which is popularly known as Palamoor. The district shares boundaries with Narayanapet, Vikarabad, Rangareddy, Nagarkurnool, Wanaparthy and Jogulamba Gadwal districts. It is famous for its milk production. It is on southwestern boundary of Hyderabad.
- **Medak** – It was one of the most backward districts of Andhra Pradesh. Now part of this district is in HMA. Geographically it on northwest side of Hyderabad. This is the most developing part of HMA now.

Hence all of HMA fall in immediate influence zone of ORR. In addition to Hyderabad city centre large number of suburban areas which are either developed or are upcoming, are part of PIA. Following figure shows major urban and commercial hubs in relation to ORR.

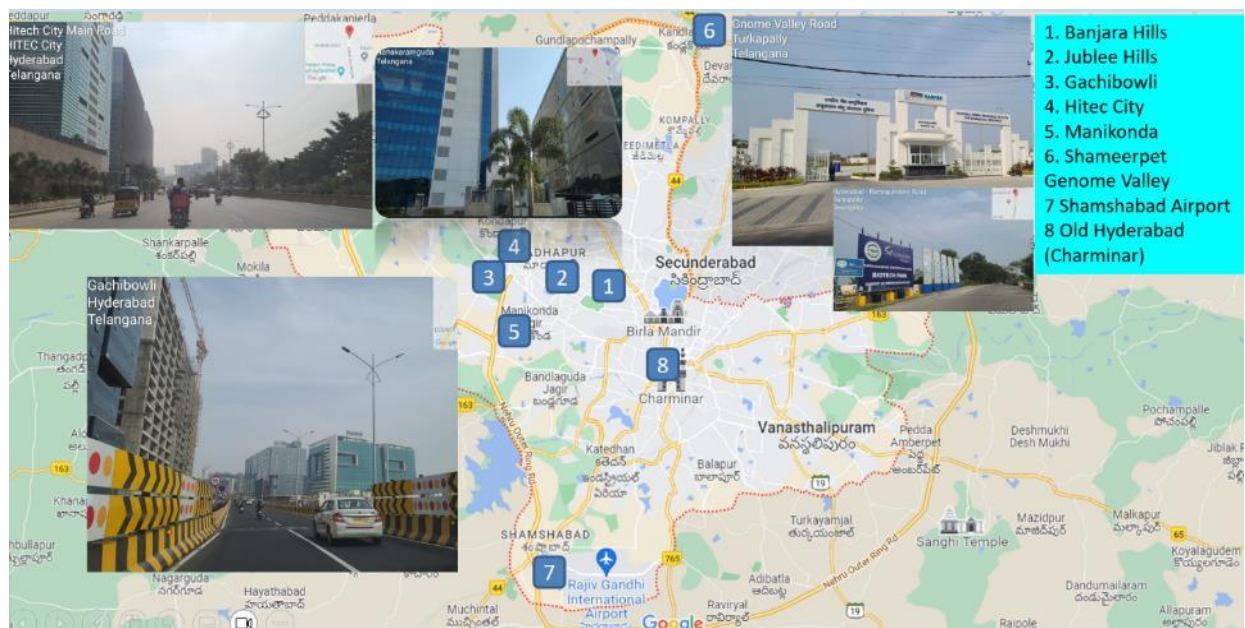


Figure 2-2: Major urban & commercial hubs.

Additionally large number of new commercial and urban centres are in various phase of development around ORR. In fact, ORR has been one of the reasons for developing of these centres. Most of these centres are coming up in northwest corner of Hyderabad in which major commercial and residential centres like Gachibowli. Manikonda, Banjara Hills, Jublee Hills etc have already developed along with Financial District and Hitec City. Following figure shows these locations in context of ORR.

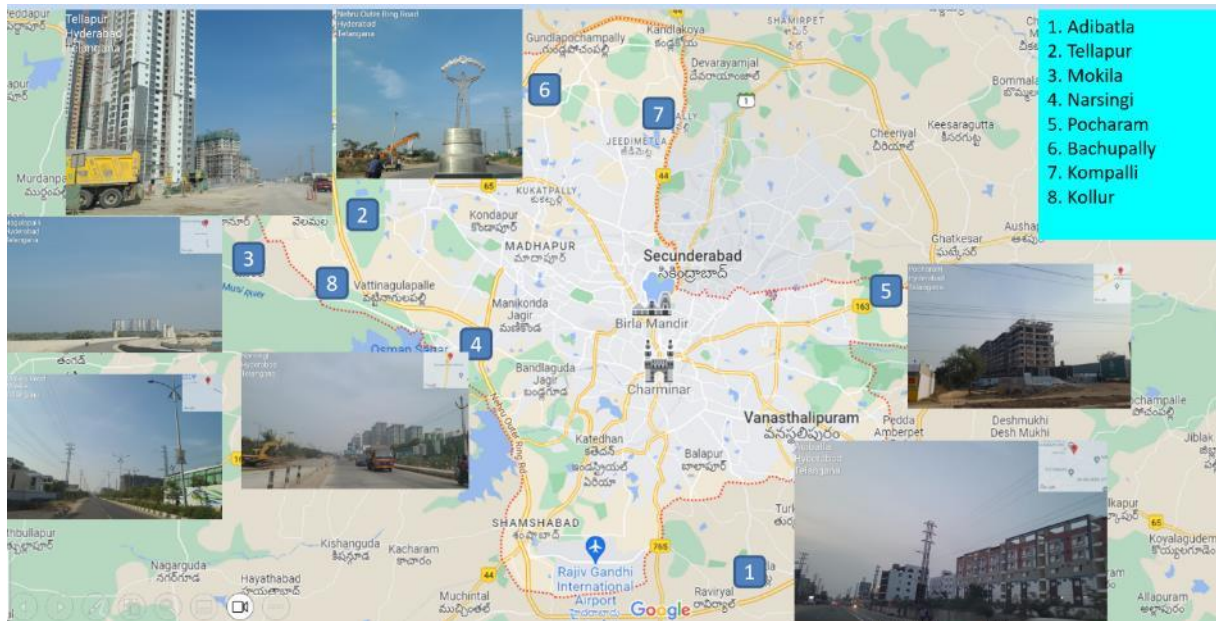


Figure 2-3: Upcoming Development Locations in context of ORR.

Prominent of above are discussed as under.

Tellapur

Being in close proximity to Gachibowli, Kondapur, and Madhapur, Tellapur is an ideal settlement place for IT Professionals. Since it is around 15 km from Hitech city and 9-10 km from Gachibowli, the new investment options in the area are relatively better and easier to settle as well. Tellapur comes in the Medak district.

Narsingi

The western outskirts are home to Narsingi. This area is attracting many potential investors due to the presence of multiple residential options like villas, gated communities, community apartments, and so on. It is the best option for people who are family oriented and would want to settle down there. Housing investment options are available in Narsingi. If you’re a modern home buyer, Narsingi is an ideal option.

Adibatla

Adibatla is an area located in Ranga Reddy district and is a fast-upcoming residential area that offers budget-friendly properties starting from 20 lakhs only. The main attraction of the area is ITIR (Information Technology Investment Region) as it is said that there will be many IT Parks as it’s SEZ (Special Economic Zone). As a result of IT and aviation companies setting up offices in the area, Adibatla has already transformed into a modern infrastructural hub.

Mokila

Located approximately 35 kilometres away from Hyderabad city, Mokila’s biggest advantage is its proximity to HiTech City, IT hubs like Kokapet, and prime neighbourhoods like Gachibowli. Well-connected via the Outer Ring Road (ORR), Mokila has witnessed a consistent increase in prices in recent years. The airport is around 40 kilometres away but takes just under an hour to reach via the ORR while Nagulapalli and Shankarpalli railway stations, and Miyapur metro station are both within a 10-kilometre radius.

Pocharam

The demand for residential real estate in Pocharam soared incredibly after the AP Housing Board set up the Singapore Township in 2005-06, which was a fully integrated and well-planned township comprising 2000 houses. Later, Infosys set up a 440-acre campus and with other IT companies following suit the area has seen increased commercial real estate activity, as well.

In addition to above ORR connects following radial arterial roads which connect Hyderabad to various important parts of state and country. Following figure shows such radial roads in context of ORR.



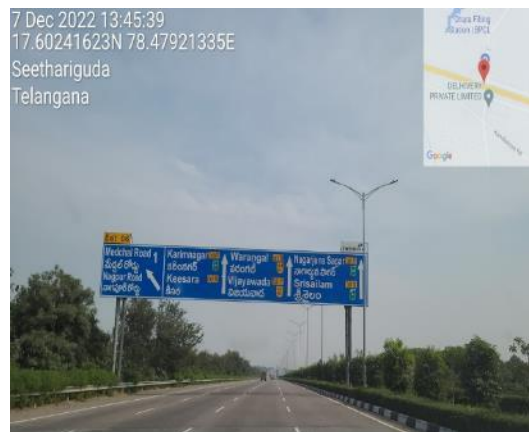
Figure 2-4: Regional context of ORR.

1. **NH-165** – This is major highway which connects to Maharashtra / Pune / Solapur on western side and Suryapet, Vijayawada and Machilipatnam on eastern side. Interchange and toll plaza is constructed at Patancheru and Pedda Amberpet at crossing locations of ORR and NH-165
2. **NH-44** – This north south connecting NH connects Hyderabad with Nagpur on north side and Bengaluru on south side. Medchal and Shamshabad interchange and Toll plazas are built at crossing of NH-44 on north and south side respectively.
3. **SH-163** – This connects Hyderabad to Warangal. Ghatshekar toll plaza and interchange is constructed at crossing of SH-163 with ORR
4. **Karimnagar Road** – This road connects city of Karimnagar and Siddipet to Hyderabad. Shamirpet Toll plaza and interchange are entry and exit point for this road.
5. **NH- 765** – It's a new national highway connects Hyderabad to Tokapelle. This highway crosses from very near to Airport. There are some residential and commercial projects coming up on either side of this road in influence zone area of Hyderabad Airport.

2.2 Project Appreciation

Nehru Outer Ring Road of Hyderabad was built in phases and the complete ring was thrown open to public in year 2016. ORR is 8 lane expressway kind of specification. Pavement is flexible except that at toll plazas where rigid pavement is provided. Condition of pavement is good in general in

entire stretch of 158 Km. ORR is fully access controlled road. There is no leakage point and entry / exit can happen from toll plaza location only. Safety items like crash barriers, lighting, delineators, signage and markings etc are well placed and are in good condition. Following photographs show general condition of road.



ORR has 19 locations at which currently toll is in operation. Toll plaza configuration and arrangement of movement is not same at all such locations. Depending on availability of land and other constraints. Following table presents location of toll plaza and type of interchange at such locations.

Table 2-1: Details of Toll plazas locations

| Hyderabad Ring Road | | | | |
|---------------------|---------------------|----------------|-------------------------------------|-----------------------|
| Sr. No | Name of Interchange | Chainage in Km | Type of Interchange | Number of Toll booths |
| 1 | Kokapet | 2+000 | Rotary | 4 |
| 1A | Neopolis | 3+700 | Single Trumpet (Under Construction) | |
| 2 | Idulnagalapalli | 13+900 | Rotary | 4 |
| 3 | Patancheru | 22+500 | Double Trumpet | 1 |
| 4 | Sultanpur | 31+000 | Rotary | 4 |
| 4A | Mallampet | 37+000 | Double Trumpet (Under Construction) | |
| 5 | Saragudem | 42+700 | Double Trumpet | 1 |

| Hyderabad Ring Road | | | | |
|---------------------|--------------------------------------|----------------|--|-----------------------|
| Sr. No | Name of Interchange | Chainage in Km | Type of Interchange | Number of Toll booths |
| 6 | Medchal | 52+200 | Double Trumpet | 1 |
| 7 | Shamirpet | 61+100 | Double Trumpet | 1 |
| 8 | Keesara | 73+000 | Rotary | 4 |
| 9 | Ghatkesar | 81+550 | Double Trumpet | 1 |
| 10 | Taramatipet | 89+750 | Rotary | 4 |
| 11 | Pedda Amberpet | 96+650 | Double Trumpet | 1 |
| 12 | Bongloor | 108+900 | Double Trumpet | 1 |
| 13 | Ravirayal | 116+000 | Diamond | 4 |
| 14 | Tukuguda | 121+500 | Diamond | 4 |
| 15 | Pedda Golconda | 129+750 | Rotary | 4 |
| 16 | Shamshabad | 136+100 | Partial Clover Leaf with directional Ramps | 4 |
| 17 | Rajandranagar-1&2 | 142+620 | Rotary | 2 |
| 18 | TSPA | 147+650 | Diamond | 4 |
| 18A | Narsingi (One Entry + One Exit Ramp) | 152+000 | (Under Construction) | |
| 19 | Nanakramguda | 154+350 | Toll Plaza | 1 |

Configuration and movement pattern of above types of toll plaza is shown in following figures.

1. Rotary Type interchange – with 4 toll booths

Kokapet, Idulnagalpalli, Sultanpur, Keesara, Taramatipet, Shamsabad, have such type of arrangement. Following image shows typical location (Kokapet) of toll booths and movement pattern for such type of arrangements. All above locations have similar arrangements.

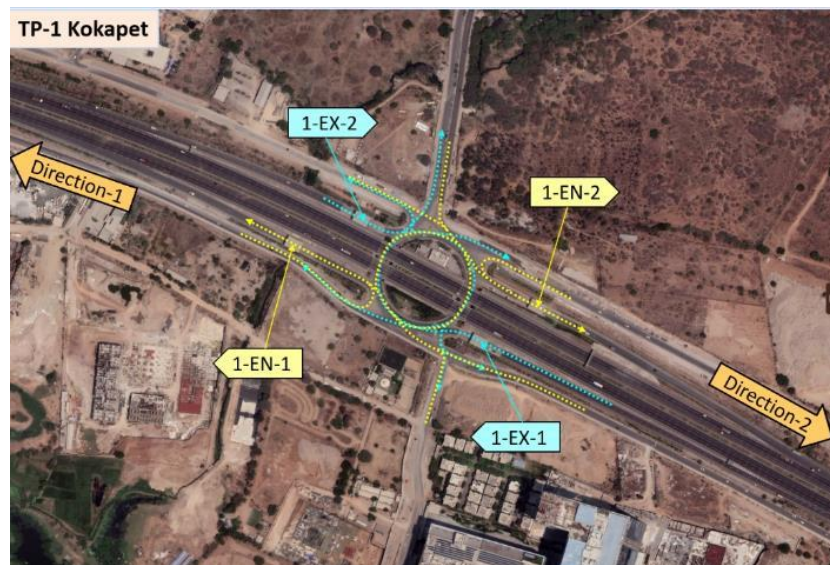


Figure 2-5 : Rotary Type Interchange with 4 toll booths.

2. Diamond Type interchange – with 4 toll booths

Ravirayal, Tukuguda and TSPA have diamond type interchange with four booth arrangement. Following image shows the general arrangement and movement pattern.

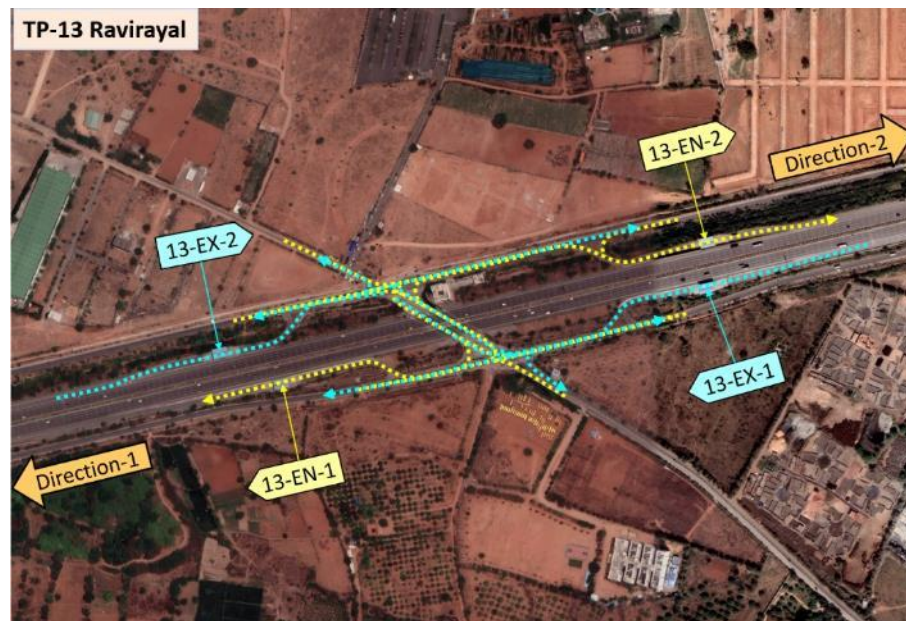


Figure 2-6 : Diamond Type Interchange with 4 toll booths.

3. Double Trumpet Type Interchange with Single Toll Plaza

Patancheru, Saragudam, Medchal, Shamirpet, Ghatkesar, Pedda Amberpet, Bongolor and Nanakramguda locations have double trumpet interchange in which all the movements are brought to one location for toll payment.



Figure 2-7 : Double Trumpet Type Interchange

4. Partial Cloverleaf with directional ramps

Shamshabad interchange is partial cloverleaf type with directional ramps. It also has four toll booths.

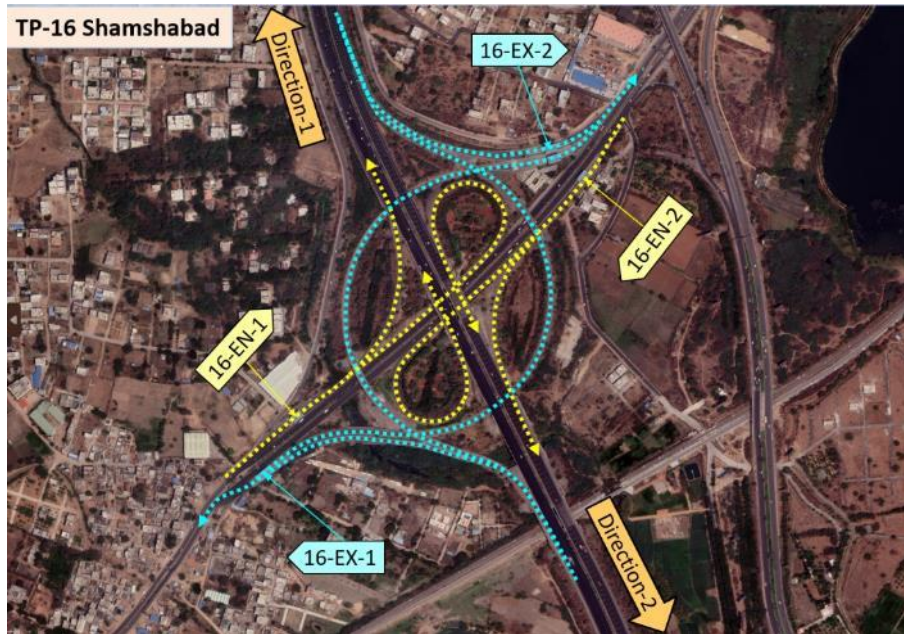


Figure 2-8 : Shamshabad Interchange and Ramps

5. Single Toll Plaza at Nanakramguda

Nanakram Guda has special arrangement. At this location all movement which enter or exit at this location are brought to one side road on which toll plaza is constructed.

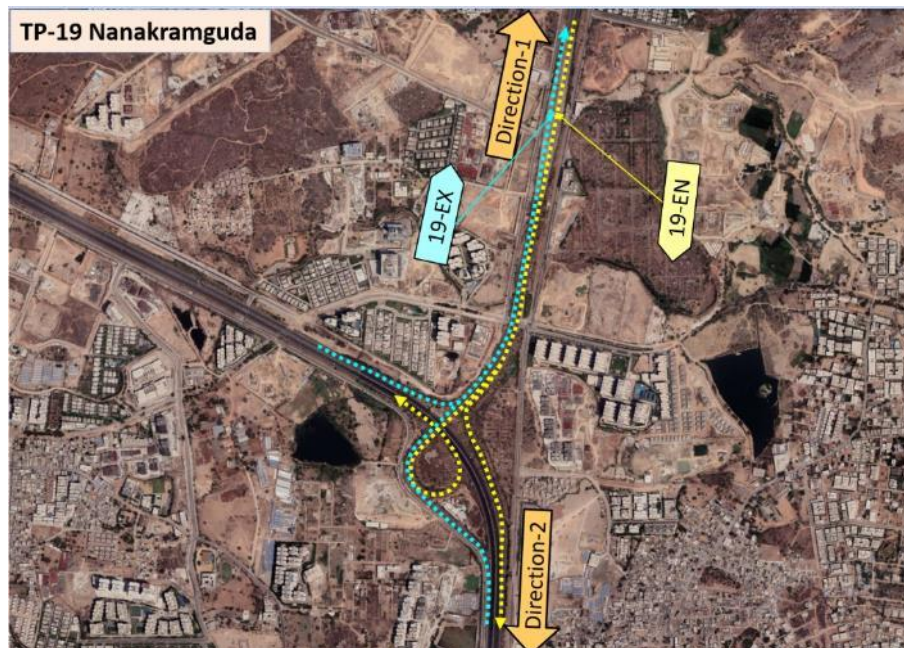


Figure 2-9 : Toll Plaza Nanakramguda and movements.

In addition to above 19 toll plaza locations two are under construction at following locations.

- Neopolis- Single Trumpet
- Narsingi – One Entry and one Exit Ramp

2.3 Project Corridor Illustration

The following photographs illustrate the project section along the corridor.

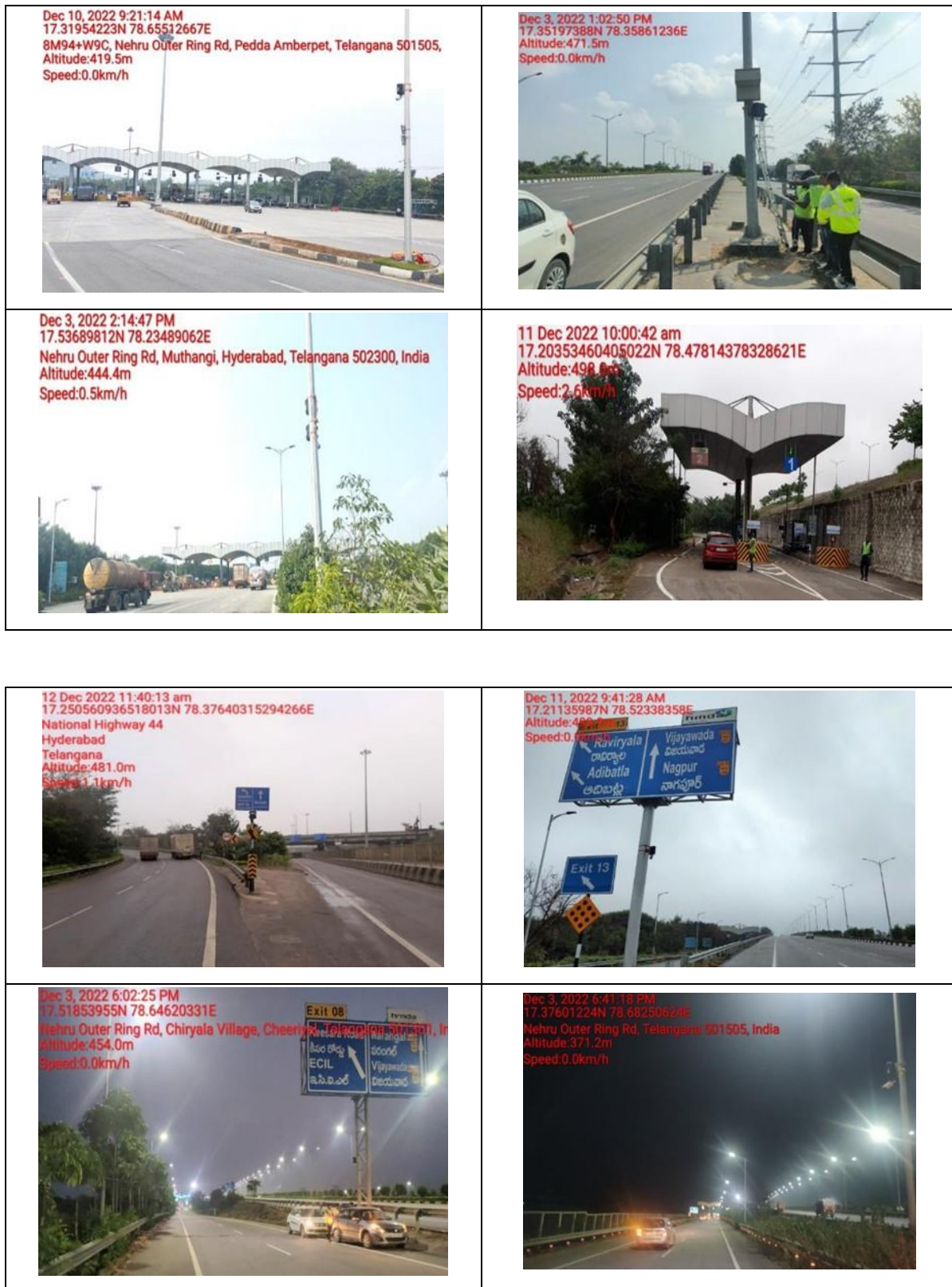


Figure 2-10 : Photographs showing Project Corrido

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants have carried out a reconnaissance survey of the project corridor to understand the general traffic and travel characteristics on the corridor.

Traffic data forecast is one of the important inputs required for a TOT/BOT/DBFO highway/roadway project. In order to arrive at a fair estimate of traffic forecast it is necessary to collect data, analyse, model, validate and then forecast. The Consultants have carried out a reconnaissance survey of the project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic studies have been carried out for the project.

- Classified traffic volume counts at toll plaza location on 8-lanes ring road expressway encircling Hyderabad, traffic data from August 2023 to November 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. No | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|---|--|-----------------------------------|-----------------------|-----------------------|-----------------------|
| 1 | Km 158.000 22 Toll Plaza Neharu Outer | AADT for Four months from August | For Four months from August | For Four months | For Four months | For Four months |

| SR. No | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|------------------------|----------------------|------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | Ring Road at Hyderabad | 2023 to November2023 | 2023 to November2023 | from August 2023 to November 2023 | from August 2023 to November 2023 | from August 2023 to November 2023 |

3.2 Classified Traffic Volume

The objective of conducting Classified Traffic Volume Count is to understand the traffic flow pattern on a roadway. The Classified Traffic Volume has been provided by the concessionaire of project road actual traffic data gathered at toll plaza locations.

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 the table below.

Table 3-2 : Vehicles 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, Two-Wheeler, Three-Wheeler |

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected corresponds to category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Truck / Bus
- Multi Axle

3.3 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 the report.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data from August 2023 to November 2023.

Since the traffic data available for this update is for only four months, from August 2023 to November 2023, it may not represent the whole year traffic. Hence a seasonality factor for balance part of year has been applied to average traffic of current four months to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. The following table shows historical traffic on project stretch and Annual Average Daily Traffic (AADT) for year 2023-24. Traffic volume for all toll plaza pairs is given in the table below.

Following tables show base traffic matrix of each category of vehicles for each pair of traffic Base year 2023-24

Table 3-3 : Tollable Annual Average Daily Traffic (AADT) Matrix for Car/Jeep/Van

SINGLE JOURNEY
CLASS – 01

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | |
|-----|------|----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|------|-----|-----|------|-----|------|------|------|-----|------|---|
| 1 | 0 | 0 | 352 | 692 | 100 | 48 | 141 | 243 | 219 | 35 | 80 | 14 | 243 | 173 | 89 | 137 | 56 | 1592 | 710 | 669 | 2 | 1905 | |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 293 | 0 | 0 | 557 | 84 | 49 | 150 | 336 | 164 | 47 | 69 | 4 | 61 | 36 | 14 | 37 | 94 | 224 | 140 | 139 | 0 | 546 | |
| 3 | 590 | 0 | 407 | 0 | 356 | 183 | 637 | 568 | 503 | 192 | 263 | 34 | 233 | 117 | 29 | 153 | 25 | 1279 | 1172 | 566 | 91 | 1380 | |
| 4 | 166 | 0 | 110 | 452 | 0 | 70 | 348 | 367 | 349 | 116 | 225 | 24 | 163 | 19 | 6 | 29 | 9 | 170 | 61 | 61 | 0 | 719 | |
| 4A | 109 | 0 | 64 | 304 | 71 | 0 | 115 | 200 | 312 | 80 | 172 | 14 | 153 | 16 | 3 | 15 | 6 | 101 | 18 | 31 | 0 | 91 | |
| 5 | 297 | 0 | 123 | 732 | 268 | 77 | 0 | 608 | 1043 | 271 | 633 | 65 | 612 | 75 | 8 | 38 | 13 | 239 | 58 | 71 | 0 | 125 | |
| 6 | 268 | 0 | 256 | 672 | 321 | 165 | 582 | 0 | 551 | 262 | 550 | 116 | 571 | 125 | 16 | 112 | 29 | 520 | 100 | 125 | 0 | 285 | |
| 7 | 223 | 0 | 155 | 640 | 286 | 234 | 848 | 464 | 0 | 237 | 609 | 164 | 443 | 129 | 18 | 300 | 91 | 137 | 42 | 100 | 1 | 258 | |
| 8 | 47 | 0 | 45 | 216 | 106 | 58 | 248 | 297 | 315 | 0 | 267 | 86 | 355 | 90 | 16 | 185 | 73 | 51 | 5 | 27 | 4 | 51 | |
| 9 | 72 | 0 | 67 | 264 | 203 | 136 | 709 | 525 | 713 | 334 | 0 | 247 | 864 | 258 | 46 | 492 | 230 | 176 | 28 | 159 | 75 | 328 | |
| 10 | 12 | 0 | 3 | 45 | 25 | 15 | 82 | 149 | 252 | 125 | 461 | 0 | 86 | 45 | 9 | 43 | 28 | 17 | 3 | 17 | 8 | 39 | |
| 11 | 202 | 0 | 68 | 227 | 145 | 138 | 604 | 534 | 482 | 350 | 953 | 91 | 0 | 222 | 64 | 591 | 239 | 287 | 42 | 256 | 209 | 1655 | |
| 12 | 126 | 0 | 37 | 114 | 14 | 12 | 61 | 119 | 133 | 152 | 261 | 43 | 235 | 0 | 93 | 960 | 464 | 241 | 30 | 193 | 109 | 637 | |
| 13 | 35 | 0 | 10 | 25 | 4 | 1 | 5 | 12 | 15 | 10 | 29 | 6 | 47 | 66 | 0 | 99 | 88 | 100 | 17 | 66 | 35 | 241 | |
| 14 | 99 | 0 | 35 | 99 | 18 | 10 | 33 | 81 | 233 | 137 | 559 | 41 | 410 | 817 | 96 | 0 | 330 | 403 | 39 | 181 | 109 | 686 | |
| 15 | 45 | 0 | 14 | 28 | 7 | 4 | 8 | 18 | 83 | 58 | 207 | 63 | 219 | 390 | 92 | 213 | 0 | 585 | 34 | 96 | 59 | 293 | |
| 16 | 1050 | 0 | 181 | 540 | 107 | 60 | 187 | 372 | 141 | 55 | 213 | 24 | 628 | 303 | 136 | 485 | 452 | 0 | 194 | 1345 | 889 | 6744 | |
| 17 | 709 | 0 | 163 | 1226 | 104 | 50 | 66 | 109 | 44 | 7 | 36 | 3 | 43 | 35 | 15 | 35 | 29 | 112 | 0 | 1355 | 429 | 1741 | |
| 18 | 639 | 0 | 139 | 308 | 44 | 20 | 78 | 118 | 102 | 31 | 200 | 22 | 289 | 409 | 87 | 239 | 117 | 1742 | 1002 | 0 | 207 | 4068 | |
| 18A | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 7 | 86 | 10 | 197 | 124 | 43 | 119 | 63 | 985 | 318 | 128 | 0 | 3 | |
| 19 | 1419 | 0 | 557 | 1291 | 94 | 36 | 126 | 243 | 259 | 46 | 309 | 46 | 1501 | 687 | 241 | 1036 | 325 | 9334 | 1392 | 3820 | 4 | 1 | |

Table 3-4 : Tollable Annual Average Daily Traffic (AADT) Matrix for Minibus/LCV
SINGLE JOURNEY
CLASS – 02

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|-----|----|----|-----|-----|----|----|----|----|-----|----|----|----|----|-----|----|----|-----|-----|
| 1 | 0 | 0 | 13 | 32 | 3 | 1 | 6 | 11 | 3 | 1 | 1 | 0 | 2 | 3 | 6 | 2 | 1 | 14 | 18 | 11 | 0 | 26 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 11 | 0 | 0 | 35 | 3 | 1 | 5 | 29 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 9 | 3 | 5 | 4 | 0 | 8 |
| 3 | 34 | 0 | 26 | 0 | 58 | 12 | 134 | 138 | 55 | 32 | 33 | 4 | 102 | 23 | 4 | 16 | 6 | 161 | 90 | 18 | 3 | 19 |
| 4 | 3 | 0 | 3 | 59 | 0 | 2 | 15 | 15 | 6 | 4 | 3 | 1 | 7 | 1 | 1 | 1 | 1 | 17 | 6 | 1 | 0 | 8 |
| 4A | 1 | 0 | 1 | 14 | 1 | 0 | 5 | 12 | 7 | 2 | 2 | 1 | 5 | 1 | 0 | 1 | 0 | 4 | 1 | 1 | 0 | 0 |
| 5 | 9 | 0 | 6 | 171 | 21 | 4 | 0 | 70 | 54 | 20 | 29 | 4 | 50 | 12 | 1 | 6 | 2 | 62 | 14 | 5 | 0 | 3 |
| 6 | 13 | 0 | 12 | 160 | 20 | 12 | 65 | 0 | 35 | 37 | 56 | 9 | 146 | 24 | 3 | 33 | 6 | 177 | 32 | 9 | 0 | 9 |
| 7 | 4 | 0 | 2 | 56 | 7 | 8 | 33 | 21 | 0 | 12 | 36 | 8 | 57 | 15 | 2 | 19 | 25 | 13 | 4 | 7 | 0 | 2 |
| 8 | 1 | 0 | 1 | 32 | 6 | 3 | 23 | 41 | 19 | 0 | 8 | 3 | 15 | 4 | 1 | 5 | 8 | 5 | 0 | 1 | 0 | 0 |
| 9 | 1 | 0 | 1 | 30 | 3 | 2 | 30 | 48 | 35 | 12 | 0 | 28 | 70 | 19 | 2 | 18 | 36 | 17 | 0 | 3 | 1 | 1 |
| 10 | 0 | 0 | 0 | 6 | 1 | 1 | 4 | 14 | 12 | 5 | 14 | 0 | 3 | 2 | 0 | 3 | 3 | 1 | 0 | 1 | 1 | 1 |
| 11 | 3 | 0 | 2 | 89 | 7 | 4 | 53 | 146 | 60 | 16 | 68 | 4 | 0 | 17 | 3 | 39 | 56 | 33 | 2 | 10 | 5 | 10 |
| 12 | 3 | 0 | 1 | 18 | 1 | 1 | 7 | 21 | 18 | 10 | 17 | 1 | 24 | 0 | 2 | 35 | 50 | 14 | 1 | 10 | 4 | 12 |
| 13 | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 2 | 8 | 2 | 1 | 2 | 1 | 13 |
| 14 | 2 | 0 | 1 | 16 | 2 | 1 | 5 | 23 | 20 | 3 | 30 | 2 | 37 | 28 | 2 | 0 | 29 | 17 | 1 | 8 | 3 | 12 |
| 15 | 0 | 0 | 1 | 4 | 0 | 0 | 1 | 3 | 16 | 4 | 22 | 3 | 42 | 31 | 5 | 16 | 0 | 8 | 1 | 2 | 1 | 5 |
| 16 | 17 | 0 | 4 | 101 | 16 | 2 | 51 | 161 | 19 | 5 | 20 | 3 | 58 | 20 | 3 | 18 | 11 | 0 | 7 | 31 | 20 | 132 |
| 17 | 28 | 0 | 5 | 77 | 9 | 2 | 14 | 27 | 3 | 0 | 1 | 0 | 3 | 2 | 0 | 2 | 2 | 6 | 0 | 45 | 18 | 33 |
| 18 | 7 | 0 | 3 | 9 | 1 | 0 | 4 | 8 | 4 | 1 | 3 | 1 | 9 | 17 | 3 | 8 | 3 | 29 | 35 | 0 | 4 | 49 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 2 | 1 | 8 | 7 | 2 | 0 | 0 |
| 19 | 25 | 0 | 5 | 24 | 1 | 0 | 3 | 8 | 2 | 1 | 1 | 0 | 8 | 8 | 16 | 22 | 8 | 120 | 32 | 74 | 0 | 0 |

Table 3-5 : Tollable Annual Average Daily Traffic (AADT) Matrix for
Bus/2- Axle
SINGLE JOURNEY
CLASS – 03

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|-----|----|----|-----|-----|----|----|----|----|-----|----|----|----|----|-----|-----|----|-----|-----|
| 1 | 0 | 0 | 5 | 9 | 1 | 0 | 3 | 4 | 1 | 0 | 0 | 0 | 3 | 3 | 4 | 1 | 1 | 8 | 10 | 5 | 0 | 12 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 6 | 0 | 0 | 17 | 1 | 1 | 4 | 47 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 10 | 5 | 3 | 1 | 0 | 2 |
| 3 | 17 | 0 | 13 | 0 | 38 | 7 | 121 | 212 | 44 | 35 | 42 | 7 | 250 | 28 | 3 | 39 | 15 | 216 | 134 | 22 | 1 | 30 |
| 4 | 1 | 0 | 2 | 34 | 0 | 1 | 17 | 11 | 4 | 2 | 2 | 1 | 9 | 1 | 1 | 1 | 0 | 15 | 4 | 1 | 0 | 6 |
| 4A | 0 | 0 | 0 | 8 | 1 | 0 | 5 | 7 | 4 | 1 | 2 | 0 | 7 | 1 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 |
| 5 | 5 | 0 | 4 | 119 | 20 | 4 | 0 | 70 | 41 | 16 | 23 | 2 | 73 | 6 | 0 | 4 | 2 | 58 | 6 | 3 | 0 | 1 |
| 6 | 5 | 0 | 7 | 241 | 15 | 9 | 69 | 0 | 21 | 54 | 57 | 7 | 289 | 19 | 3 | 44 | 12 | 517 | 14 | 9 | 0 | 4 |
| 7 | 1 | 0 | 1 | 72 | 3 | 3 | 21 | 25 | 0 | 11 | 20 | 3 | 45 | 9 | 1 | 14 | 20 | 17 | 2 | 1 | 0 | 1 |
| 8 | 0 | 0 | 1 | 36 | 3 | 1 | 18 | 61 | 16 | 0 | 11 | 4 | 15 | 2 | 1 | 3 | 7 | 6 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 1 | 45 | 3 | 2 | 33 | 55 | 25 | 11 | 0 | 19 | 81 | 26 | 2 | 22 | 47 | 19 | 0 | 7 | 1 | 1 |
| 10 | 0 | 0 | 0 | 6 | 1 | 1 | 4 | 10 | 5 | 5 | 16 | 0 | 12 | 5 | 1 | 2 | 3 | 1 | 0 | 2 | 0 | 1 |
| 11 | 3 | 0 | 2 | 220 | 7 | 6 | 72 | 301 | 47 | 22 | 71 | 4 | 0 | 20 | 5 | 58 | 70 | 53 | 3 | 10 | 3 | 11 |
| 12 | 2 | 0 | 1 | 26 | 1 | 1 | 5 | 15 | 9 | 9 | 15 | 2 | 23 | 0 | 1 | 20 | 35 | 13 | 3 | 6 | 1 | 8 |
| 13 | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 3 | 1 | 0 | 2 | 7 | 5 | 2 | 5 | 1 | 11 |
| 14 | 1 | 0 | 2 | 36 | 1 | 0 | 4 | 29 | 9 | 3 | 26 | 1 | 51 | 24 | 2 | 0 | 13 | 16 | 1 | 4 | 2 | 4 |
| 15 | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 5 | 18 | 4 | 26 | 3 | 43 | 25 | 8 | 11 | 0 | 16 | 3 | 5 | 1 | 2 |
| 16 | 9 | 0 | 5 | 177 | 10 | 1 | 47 | 489 | 26 | 9 | 20 | 2 | 96 | 18 | 4 | 19 | 16 | 0 | 9 | 20 | 8 | 166 |
| 17 | 6 | 0 | 3 | 66 | 6 | 2 | 7 | 14 | 2 | 0 | 1 | 0 | 4 | 3 | 1 | 2 | 4 | 8 | 0 | 22 | 6 | 17 |
| 18 | 3 | 0 | 1 | 7 | 1 | 0 | 2 | 5 | 1 | 1 | 3 | 1 | 10 | 13 | 5 | 6 | 4 | 19 | 20 | 0 | 1 | 14 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 6 | 6 | 1 | 0 | 0 |
| 19 | 7 | 0 | 1 | 10 | 1 | 0 | 1 | 3 | 1 | 0 | 1 | 0 | 9 | 10 | 18 | 16 | 2 | 152 | 19 | 16 | 0 | 0 |

Table 3-6 : Tollable Annual Average Daily Traffic (AADT) Matrix for
3 - Axle
SINGLE JOURNEY
CLASS – 04

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|-----|-----|----|----|----|-----|----|----|----|----|-----|----|----|----|----|-----|----|----|-----|----|
| 1 | 0 | 0 | 54 | 34 | 4 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 2 | 3 | 18 | 22 | 38 | 0 | 18 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 29 | 0 | 0 | 127 | 10 | 0 | 2 | 29 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 2 | 10 | 0 | 8 |
| 3 | 72 | 0 | 243 | 0 | 43 | 3 | 84 | 116 | 32 | 21 | 30 | 5 | 134 | 15 | 1 | 11 | 5 | 115 | 76 | 8 | 1 | 20 |
| 4 | 14 | 0 | 18 | 35 | 0 | 1 | 9 | 7 | 3 | 3 | 2 | 0 | 4 | 0 | 0 | 1 | 0 | 6 | 1 | 1 | 0 | 4 |
| 4A | 0 | 0 | 1 | 5 | 0 | 0 | 2 | 5 | 1 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 |
| 5 | 3 | 0 | 6 | 82 | 17 | 2 | 0 | 45 | 22 | 9 | 11 | 3 | 27 | 1 | 0 | 1 | 1 | 23 | 3 | 1 | 0 | 0 |
| 6 | 1 | 0 | 4 | 100 | 11 | 7 | 54 | 0 | 13 | 27 | 39 | 3 | 185 | 9 | 2 | 8 | 5 | 367 | 24 | 2 | 0 | 0 |
| 7 | 0 | 0 | 1 | 56 | 3 | 1 | 39 | 13 | 0 | 5 | 10 | 3 | 23 | 6 | 1 | 5 | 16 | 6 | 1 | 1 | 0 | 0 |
| 8 | 0 | 0 | 0 | 20 | 4 | 1 | 11 | 34 | 5 | 0 | 11 | 4 | 8 | 2 | 0 | 1 | 2 | 3 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 1 | 33 | 2 | 1 | 19 | 32 | 11 | 5 | 0 | 8 | 40 | 10 | 1 | 12 | 19 | 22 | 0 | 3 | 0 | 1 |
| 10 | 1 | 0 | 0 | 6 | 0 | 0 | 2 | 6 | 3 | 3 | 9 | 0 | 8 | 6 | 2 | 5 | 2 | 1 | 0 | 3 | 0 | 1 |
| 11 | 2 | 0 | 1 | 146 | 2 | 2 | 25 | 184 | 26 | 9 | 49 | 11 | 0 | 13 | 6 | 26 | 35 | 32 | 2 | 6 | 1 | 2 |
| 12 | 1 | 0 | 0 | 16 | 0 | 0 | 1 | 11 | 3 | 4 | 9 | 2 | 12 | 0 | 2 | 8 | 14 | 8 | 0 | 2 | 0 | 0 |
| 13 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 9 | 0 | 5 | 4 | 3 | 1 | 4 | 4 | 2 |
| 14 | 2 | 0 | 0 | 13 | 1 | 1 | 1 | 7 | 4 | 1 | 17 | 2 | 16 | 13 | 3 | 0 | 7 | 17 | 7 | 5 | 2 | 3 |
| 15 | 1 | 0 | 1 | 5 | 0 | 0 | 0 | 2 | 3 | 1 | 6 | 2 | 16 | 9 | 2 | 3 | 0 | 9 | 3 | 3 | 1 | 0 |
| 16 | 7 | 0 | 2 | 85 | 6 | 1 | 25 | 350 | 8 | 6 | 15 | 1 | 66 | 10 | 2 | 18 | 7 | 0 | 9 | 15 | 11 | 38 |
| 17 | 17 | 0 | 3 | 43 | 5 | 1 | 5 | 11 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 5 | 3 | 5 | 0 | 51 | 25 | 51 |
| 18 | 19 | 0 | 3 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 4 | 7 | 2 | 5 | 4 | 15 | 29 | 0 | 5 | 9 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 7 | 9 | 1 | 0 | 0 |
| 19 | 17 | 0 | 5 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 7 | 1 | 11 | 39 | 11 | 0 | 0 |

Table 3-7 : Tollable Annual Average Daily Traffic (AADT) Matrix for
4 to 6 - Axle
SINGLE JOURNEY
CLASS – 05

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|-----|----|----|-----|-----|-----|----|-----|----|-----|----|----|----|-----|-----|----|----|-----|----|
| 1 | 0 | 0 | 11 | 46 | 3 | 0 | 3 | 6 | 7 | 0 | 2 | 1 | 20 | 4 | 3 | 4 | 2 | 30 | 7 | 15 | 0 | 8 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2 | 0 | 0 | 60 | 5 | 0 | 4 | 53 | 9 | 0 | 2 | 0 | 11 | 1 | 0 | 1 | 17 | 17 | 1 | 2 | 0 | 1 |
| 3 | 69 | 0 | 96 | 0 | 77 | 6 | 169 | 186 | 116 | 42 | 75 | 15 | 552 | 56 | 3 | 32 | 11 | 294 | 90 | 18 | 3 | 27 |
| 4 | 16 | 0 | 15 | 43 | 0 | 1 | 12 | 11 | 19 | 2 | 5 | 0 | 15 | 1 | 0 | 1 | 1 | 15 | 1 | 1 | 0 | 5 |
| 4A | 0 | 0 | 0 | 6 | 1 | 0 | 7 | 4 | 10 | 1 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 5 | 6 | 0 | 3 | 125 | 7 | 5 | 0 | 45 | 77 | 10 | 22 | 2 | 82 | 10 | 0 | 3 | 2 | 64 | 2 | 2 | 0 | 0 |
| 6 | 14 | 0 | 12 | 169 | 9 | 5 | 59 | 0 | 21 | 21 | 79 | 4 | 193 | 17 | 1 | 11 | 11 | 560 | 6 | 8 | 0 | 1 |
| 7 | 7 | 0 | 11 | 168 | 19 | 19 | 101 | 17 | 0 | 26 | 44 | 5 | 48 | 15 | 2 | 9 | 61 | 72 | 4 | 5 | 0 | 3 |
| 8 | 1 | 0 | 1 | 24 | 2 | 0 | 10 | 20 | 18 | 0 | 8 | 2 | 17 | 2 | 0 | 1 | 5 | 5 | 0 | 0 | 0 | 0 |
| 9 | 1 | 0 | 4 | 72 | 6 | 5 | 52 | 60 | 44 | 6 | 0 | 12 | 184 | 20 | 8 | 34 | 72 | 38 | 2 | 15 | 1 | 1 |
| 10 | 7 | 0 | 0 | 9 | 1 | 0 | 3 | 7 | 13 | 4 | 14 | 0 | 62 | 23 | 5 | 8 | 3 | 7 | 10 | 18 | 3 | 6 |
| 11 | 32 | 0 | 14 | 453 | 21 | 7 | 120 | 261 | 71 | 23 | 200 | 14 | 0 | 49 | 39 | 68 | 105 | 121 | 19 | 52 | 16 | 25 |
| 12 | 4 | 0 | 1 | 91 | 1 | 0 | 6 | 15 | 12 | 8 | 17 | 6 | 27 | 0 | 1 | 14 | 32 | 16 | 2 | 7 | 1 | 1 |
| 13 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 2 | 11 | 1 | 0 | 1 | 4 | 3 | 0 | 2 | 0 | 0 |
| 14 | 17 | 0 | 1 | 23 | 0 | 0 | 2 | 9 | 6 | 1 | 58 | 2 | 46 | 14 | 3 | 0 | 11 | 17 | 27 | 9 | 3 | 9 |
| 15 | 1 | 0 | 1 | 6 | 0 | 0 | 1 | 2 | 11 | 2 | 36 | 5 | 38 | 20 | 2 | 5 | 0 | 6 | 0 | 2 | 0 | 1 |
| 16 | 41 | 0 | 26 | 212 | 18 | 1 | 69 | 656 | 83 | 7 | 55 | 4 | 182 | 35 | 6 | 20 | 9 | 0 | 16 | 31 | 16 | 72 |
| 17 | 8 | 0 | 2 | 27 | 6 | 2 | 3 | 5 | 5 | 0 | 2 | 3 | 10 | 3 | 1 | 7 | 2 | 9 | 0 | 55 | 11 | 14 |
| 18 | 16 | 0 | 4 | 8 | 1 | 0 | 2 | 4 | 6 | 1 | 14 | 5 | 46 | 30 | 3 | 11 | 2 | 24 | 57 | 0 | 4 | 39 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 1 | 0 | 6 | 1 | 5 | 6 | 1 | 0 | 0 |
| 19 | 4 | 0 | 1 | 10 | 0 | 0 | 2 | 2 | 3 | 0 | 2 | 1 | 9 | 2 | 0 | 13 | 1 | 32 | 7 | 20 | 0 | 0 |

Table 3-8 : Tollable Annual Average Daily Traffic (AADT) Matrix for

7 & Above - Axle

SINGLE JOURNEY

CLASS – 06

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | |
|-----|---|----|---|---|---|----|---|---|---|---|---|----|----|----|----|----|----|----|----|----|-----|----|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 3-9 : Tollable Annual Average Daily Traffic (AADT) Matrix for Car/Jeep/Van
**RETURN JOURNEY
CLASS – 01**

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|------|-----|------|-----|------|
| 1 | 0 | 0 | 70 | 160 | 57 | 48 | 40 | 65 | 42 | 14 | 14 | 2 | 19 | 39 | 6 | 18 | 4 | 182 | 275 | 276 | 0 | 461 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 128 | 0 | 0 | 94 | 27 | 20 | 31 | 50 | 28 | 11 | 11 | 0 | 8 | 8 | 1 | 5 | 1 | 23 | 43 | 42 | 0 | 194 |
| 3 | 175 | 0 | 233 | 0 | 162 | 126 | 289 | 237 | 118 | 78 | 77 | 12 | 32 | 33 | 4 | 13 | 2 | 89 | 419 | 92 | 0 | 423 |
| 4 | 28 | 0 | 24 | 74 | 0 | 23 | 85 | 78 | 45 | 30 | 31 | 5 | 12 | 1 | 0 | 1 | 0 | 11 | 13 | 10 | 0 | 30 |
| 4A | 8 | 0 | 11 | 32 | 14 | 0 | 17 | 29 | 35 | 12 | 17 | 2 | 9 | 1 | 0 | 0 | 0 | 4 | 2 | 2 | 0 | 5 |
| 5 | 46 | 0 | 57 | 165 | 134 | 29 | 0 | 178 | 214 | 85 | 142 | 22 | 76 | 11 | 0 | 5 | 1 | 33 | 17 | 22 | 0 | 40 |
| 6 | 57 | 0 | 51 | 137 | 121 | 63 | 215 | 0 | 97 | 102 | 145 | 43 | 116 | 30 | 1 | 12 | 2 | 54 | 26 | 26 | 0 | 58 |
| 7 | 56 | 0 | 54 | 87 | 119 | 104 | 397 | 188 | 0 | 100 | 212 | 88 | 126 | 34 | 1 | 25 | 24 | 10 | 7 | 23 | 0 | 59 |
| 8 | 6 | 0 | 11 | 40 | 33 | 24 | 85 | 66 | 47 | 0 | 107 | 43 | 70 | 20 | 1 | 12 | 9 | 4 | 1 | 5 | 1 | 8 |
| 9 | 11 | 0 | 21 | 70 | 73 | 48 | 218 | 172 | 167 | 66 | 0 | 169 | 300 | 79 | 3 | 48 | 60 | 33 | 5 | 49 | 20 | 67 |
| 10 | 1 | 0 | 0 | 5 | 5 | 2 | 12 | 19 | 26 | 21 | 53 | 0 | 14 | 10 | 1 | 4 | 3 | 4 | 0 | 3 | 1 | 5 |
| 11 | 26 | 0 | 8 | 44 | 26 | 21 | 105 | 124 | 98 | 87 | 254 | 12 | 0 | 43 | 6 | 54 | 66 | 37 | 5 | 44 | 29 | 194 |
| 12 | 26 | 0 | 7 | 20 | 3 | 3 | 17 | 33 | 30 | 29 | 80 | 10 | 31 | 0 | 8 | 181 | 84 | 57 | 5 | 51 | 31 | 170 |
| 13 | 14 | 0 | 4 | 8 | 2 | 1 | 2 | 5 | 5 | 6 | 16 | 1 | 16 | 28 | 0 | 24 | 31 | 37 | 3 | 30 | 16 | 108 |
| 14 | 37 | 0 | 9 | 28 | 6 | 3 | 7 | 22 | 74 | 52 | 190 | 9 | 192 | 370 | 16 | 0 | 46 | 139 | 7 | 70 | 40 | 353 |
| 15 | 14 | 0 | 3 | 5 | 2 | 1 | 2 | 3 | 13 | 16 | 44 | 6 | 41 | 138 | 12 | 68 | 0 | 130 | 7 | 35 | 21 | 134 |
| 16 | 418 | 0 | 58 | 275 | 34 | 22 | 52 | 131 | 18 | 9 | 28 | 2 | 43 | 58 | 13 | 88 | 159 | 0 | 14 | 554 | 293 | 3743 |
| 17 | 121 | 0 | 29 | 248 | 8 | 3 | 9 | 14 | 4 | 1 | 3 | 0 | 3 | 4 | 1 | 3 | 2 | 16 | 0 | 224 | 71 | 285 |
| 18 | 169 | 0 | 35 | 61 | 13 | 8 | 14 | 27 | 14 | 6 | 30 | 3 | 34 | 58 | 10 | 34 | 11 | 305 | 418 | 0 | 12 | 1588 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1 | 14 | 17 | 4 | 12 | 6 | 97 | 70 | 13 | 0 | 0 |
| 19 | 561 | 0 | 174 | 370 | 42 | 33 | 27 | 55 | 37 | 10 | 61 | 5 | 175 | 186 | 55 | 147 | 26 | 1574 | 528 | 1776 | 0 | 0 |

Table 3-10 : Tollable Annual Average Daily Traffic (AADT) Matrix for Minibus/LCV
**RETURN JOURNEY
CLASS – 02**

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|---|
| 1 | 0 | 0 | 6 | 16 | 0 | 0 | 2 | 5 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 18 | 2 | 0 | 9 | |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 6 | 0 | 0 | 11 | 1 | 0 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | |
| 3 | 11 | 0 | 16 | 0 | 24 | 4 | 62 | 53 | 10 | 10 | 5 | 1 | 16 | 7 | 1 | 4 | 1 | 29 | 26 | 2 | 0 | 7 | |
| 4 | 0 | 0 | 0 | 25 | 0 | 0 | 8 | 6 | 2 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | |
| 4A | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 1 | 0 | 0 | 42 | 3 | 0 | 0 | 19 | 9 | 7 | 4 | 1 | 12 | 2 | 0 | 1 | 0 | 10 | 4 | 0 | 0 | 0 | |
| 6 | 1 | 0 | 2 | 48 | 2 | 3 | 23 | 0 | 3 | 14 | 9 | 3 | 35 | 6 | 0 | 8 | 0 | 31 | 8 | 1 | 0 | 1 | |
| 7 | 1 | 0 | 0 | 19 | 2 | 3 | 29 | 16 | 0 | 8 | 11 | 4 | 17 | 6 | 0 | 8 | 4 | 2 | 0 | 1 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 9 | 0 | 1 | 6 | 12 | 2 | 0 | 3 | 1 | 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 13 | 0 | 1 | 14 | 23 | 12 | 1 | 0 | 3 | 23 | 7 | 0 | 6 | 7 | 3 | 0 | 1 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 2 | 1 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 17 | 1 | 1 | 10 | 27 | 16 | 2 | 14 | 1 | 0 | 4 | 0 | 7 | 9 | 5 | 0 | 1 | 0 | 1 | |
| 12 | 1 | 0 | 0 | 8 | 0 | 0 | 4 | 8 | 6 | 1 | 6 | 0 | 2 | 0 | 0 | 8 | 9 | 2 | 0 | 2 | 0 | 2 | |
| 13 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 10 | |
| 14 | 0 | 0 | 0 | 7 | 0 | 0 | 2 | 9 | 4 | 2 | 6 | 1 | 10 | 14 | 0 | 0 | 3 | 6 | 0 | 3 | 1 | 7 | |
| 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | 7 | 0 | 14 | 15 | 2 | 6 | 0 | 2 | 0 | 0 | 0 | 2 | |
| 16 | 3 | 0 | 1 | 34 | 2 | 0 | 14 | 23 | 1 | 0 | 1 | 0 | 9 | 2 | 0 | 5 | 1 | 0 | 1 | 8 | 2 | 44 | |
| 17 | 2 | 0 | 1 | 28 | 1 | 0 | 4 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 1 | 6 | |
| 18 | 4 | 0 | 2 | 4 | 0 | 0 | 1 | 3 | 2 | 0 | 1 | 0 | 3 | 4 | 0 | 3 | 0 | 7 | 15 | 0 | 0 | 39 | |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | |
| 19 | 5 | 0 | 4 | 4 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 3 | 1 | 38 | 9 | 11 | 0 | 0 | |

Table 3-11 : Tollable Annual Average Daily Traffic (AADT) Matrix for
Bus/2- Axle
RETURN JOURNEY
CLASS – 03

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|---|----|---|----|---|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|-----|----|
| 1 | 0 | 0 | 4 | 3 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 1 | 0 | 1 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 0 | 3 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 3 | 1 | 0 | 3 | 0 | 9 | 1 | 24 | 39 | 6 | 14 | 8 | 2 | 15 | 5 | 1 | 2 | 1 | 27 | 10 | 1 | 0 | 2 |
| 4 | 0 | 0 | 0 | 14 | 0 | 0 | 10 | 4 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 4A | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 1 | 37 | 5 | 1 | 0 | 17 | 6 | 8 | 7 | 1 | 17 | 1 | 0 | 1 | 0 | 10 | 1 | 0 | 0 | 0 |
| 6 | 0 | 0 | 1 | 52 | 1 | 2 | 15 | 0 | 6 | 31 | 18 | 3 | 35 | 4 | 0 | 2 | 0 | 27 | 1 | 1 | 0 | 0 |
| 7 | 0 | 0 | 0 | 12 | 1 | 2 | 27 | 10 | 0 | 8 | 11 | 2 | 6 | 3 | 0 | 2 | 4 | 2 | 0 | 0 | 0 | 1 |
| 8 | 0 | 0 | 0 | 8 | 0 | 0 | 5 | 23 | 3 | 0 | 2 | 1 | 4 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 1 | 11 | 0 | 1 | 11 | 22 | 6 | 2 | 0 | 4 | 28 | 7 | 0 | 5 | 12 | 2 | 0 | 1 | 0 | 0 |
| 10 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 4 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 13 | 1 | 1 | 6 | 32 | 8 | 2 | 37 | 2 | 0 | 2 | 0 | 6 | 10 | 4 | 0 | 1 | 0 | 1 |
| 12 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 5 | 2 | 0 | 12 | 2 | 4 | 0 | 0 | 8 | 8 | 2 | 1 | 1 | 0 | 3 |
| 13 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 4 | 2 | 0 | 2 | 0 | 9 |
| 14 | 0 | 0 | 0 | 14 | 1 | 0 | 1 | 10 | 4 | 1 | 10 | 1 | 16 | 5 | 0 | 0 | 3 | 4 | 0 | 1 | 0 | 2 |
| 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 14 | 1 | 11 | 10 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| 16 | 1 | 0 | 2 | 30 | 1 | 0 | 7 | 28 | 1 | 0 | 1 | 0 | 4 | 1 | 1 | 2 | 2 | 0 | 0 | 5 | 1 | 84 |
| 17 | 1 | 0 | 1 | 19 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 1 |
| 18 | 1 | 0 | 0 | 4 | 0 | 0 | 1 | 5 | 0 | 0 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 6 | 5 | 0 | 0 | 8 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 19 | 4 | 0 | 1 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 1 | 0 | 95 | 2 | 4 | 0 | 0 |

Table 3-12 : Tollable Annual Average Daily Traffic (AADT) Matrix for
3- Axle
RETURN JOURNEY
CLASS – 04

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|
| 1 | 0 | 0 | 19 | 48 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 3 | 8 | 10 | 0 | 8 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 42 | 0 | 0 | 180 | 11 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 |
| 3 | 15 | 0 | 65 | 0 | 10 | 0 | 21 | 12 | 7 | 9 | 6 | 0 | 7 | 6 | 0 | 1 | 0 | 12 | 4 | 0 | 0 | 2 |
| 4 | 1 | 0 | 4 | 25 | 0 | 0 | 10 | 4 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 |
| 4A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 31 | 2 | 0 | 0 | 20 | 13 | 3 | 4 | 1 | 2 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 28 | 1 | 1 | 13 | 0 | 3 | 17 | 9 | 2 | 12 | 1 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 9 | 0 | 0 | 10 | 4 | 0 | 2 | 3 | 1 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 5 | 1 | 0 | 3 | 11 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 10 | 0 | 0 | 2 | 7 | 2 | 4 | 0 | 4 | 21 | 2 | 0 | 5 | 2 | 2 | 0 | 1 | 0 | 0 |
| 10 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 0 | 8 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 8 | 4 | 1 | 18 | 2 | 0 | 3 | 0 | 3 | 2 | 2 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 2 | 1 | 5 | 2 | 3 | 0 | 7 | 8 | 2 | 1 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 1 |
| 14 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 7 | 3 | 9 | 3 | 3 | 0 | 1 | 4 | 2 | 1 | 0 | 0 |
| 15 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 5 | 3 | 1 | 2 | 0 | 1 | 2 | 1 | 1 | 0 |
| 16 | 8 | 0 | 0 | 15 | 1 | 0 | 3 | 7 | 0 | 0 | 1 | 0 | 3 | 1 | 1 | 7 | 3 | 0 | 1 | 6 | 3 | 1 |
| 17 | 9 | 0 | 1 | 9 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 5 | 3 | 17 |
| 18 | 20 | 0 | 8 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 7 | 11 | 0 | 0 | 4 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 6 | 0 | 0 | 0 |
| 19 | 7 | 0 | 5 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 11 | 28 | 4 | 0 | 0 |

Table 3-13 : Tollable Annual Average Daily Traffic (AADT) Matrix for
4 to 6 - Axle
RETURN JOURNEY
CLASS – 05

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|----|---|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|-----|----|
| 1 | 0 | 0 | 0 | 47 | 9 | 0 | 0 | 5 | 3 | 0 | 0 | 5 | 14 | 2 | 0 | 14 | 0 | 15 | 4 | 5 | 0 | 1 |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 0 | 68 | 9 | 0 | 1 | 4 | 5 | 0 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 8 | 1 | 1 | 0 | 0 |
| 3 | 11 | 0 | 18 | 0 | 3 | 0 | 11 | 19 | 17 | 3 | 6 | 3 | 31 | 3 | 1 | 2 | 1 | 35 | 2 | 1 | 0 | 3 |
| 4 | 1 | 0 | 1 | 36 | 0 | 0 | 2 | 2 | 8 | 1 | 2 | 0 | 6 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| 4A | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 1 | 6 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 57 | 1 | 3 | 0 | 17 | 43 | 3 | 12 | 1 | 28 | 1 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| 6 | 1 | 0 | 3 | 44 | 0 | 1 | 11 | 0 | 4 | 5 | 5 | 3 | 39 | 1 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 17 | 3 | 4 | 27 | 1 | 0 | 6 | 6 | 3 | 16 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 8 | 0 | 0 | 3 | 4 | 9 | 0 | 1 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 17 | 0 | 1 | 2 | 6 | 9 | 2 | 0 | 3 | 55 | 4 | 0 | 19 | 13 | 6 | 0 | 1 | 1 | 0 |
| 10 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 3 | 0 | 5 | 0 | 6 | 3 | 1 | 0 | 0 | 0 | 2 | 3 | 0 | 0 |
| 11 | 0 | 0 | 0 | 18 | 0 | 0 | 3 | 6 | 6 | 2 | 37 | 8 | 0 | 1 | 4 | 3 | 3 | 6 | 0 | 2 | 0 | 0 |
| 12 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 1 | 2 | 1 | 6 | 11 | 15 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 2 | 21 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 1 | 0 | 0 | 5 | 0 | 0 | 0 | 1 | 3 | 0 | 21 | 3 | 29 | 2 | 0 | 0 | 2 | 4 | 3 | 2 | 1 | 0 |
| 15 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 11 | 1 | 17 | 3 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 |
| 16 | 4 | 0 | 1 | 23 | 0 | 0 | 4 | 8 | 3 | 0 | 1 | 2 | 22 | 1 | 0 | 3 | 1 | 0 | 1 | 4 | 0 | 3 |
| 17 | 1 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 4 | 10 | 0 | 0 | 22 | 0 | 2 | 0 | 11 | 2 | 1 |
| 18 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 3 | 12 | 1 | 0 | 2 | 0 | 8 | 8 | 0 | 0 | 6 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 0 | 2 | 0 | 3 | 2 | 0 | 0 | 0 |
| 19 | 5 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 9 | 0 | 0 | 2 | 0 | 19 | 4 | 15 | 0 | 0 |

**Table 3-14 : Tollable Annual Average Daily Traffic (AADT) Matrix for
7 & Above - Axle**

RETURN JOURNEY

CLASS – 06

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | |
|-----|---|----|---|---|---|----|---|---|---|---|---|----|----|----|----|----|----|----|----|----|-----|----|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

3.4 Traffic Characteristic

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-1515**.

Table 3-15 : 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 3-16 : Traffic in PCU at Project Stretch Base Year 2023-24

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|---------|--------------------------|------------|--------|-----------|
| 2023-24 | Hyderabad ORR At all TP | 205075 | 283848 | 1.38 |

It can be observed from above that project traffic has PCU index less than 1.5 which is an indicator of high proportion of Passenger traffic.

3.4.2 Components of Traffic

As discussed previously, components of total traffic volume play an important role in determining project revenue. Modal split of total traffic on project corridor is given in table below.

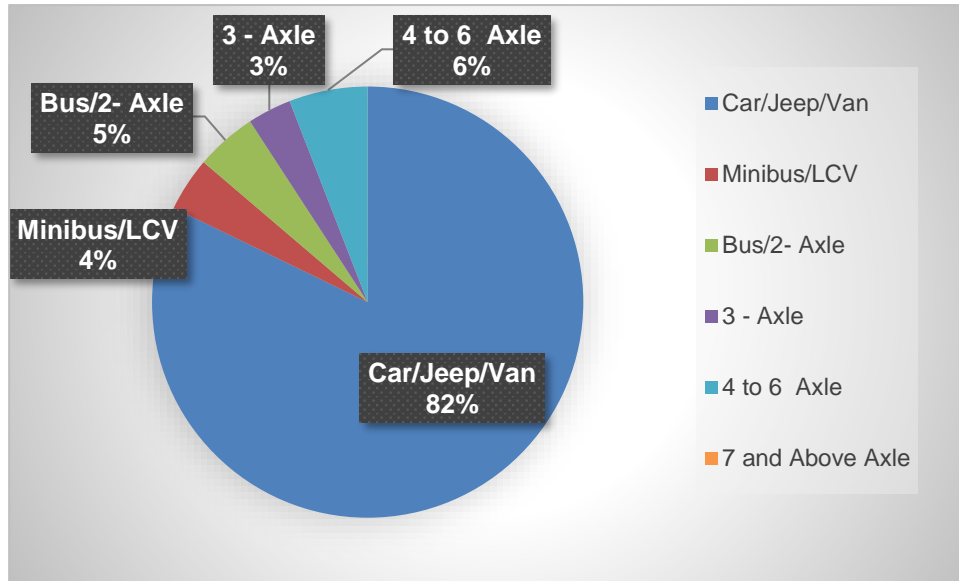


Figure 3-1 : Model Split of Tollable Vehicle

It is observed that car traffic forms about 82% of total traffic at toll plaza locations while multi axle commercial vehicles are about 9% of total traffic. Truck / Bus and LCV share about 5% and 3% of traffic volume respectively.

CHAPTER 4

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

4.1 Introduction

Traffic is generated and grows as a result 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. Further these factors have uncertainties associated with them. Forecasts of traffic have, therefore, to be 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 limited degree of accuracy and hence the forecasting of future traffic levels cannot be precise. The success of any road project with private sector participation hinges on the accuracy and robustness with which the future traffic and revenues are estimated.

Further, future traffic forms the basis of the design of the transportation infrastructure facility and also determines the viability of the project. The following section deals with different methods, techniques, and considerations used in traffic forecast for the project under study.

4.2 Secondary Data Collection

In addition to the above-mentioned traffic surveys, secondary data was also collected from the sources wherever the data available. This data is effectively used to determine and estimate past trends of growth and future pattern. Following secondary data was collected for study:

1. Vehicle registration data of Andhra Pradesh, Telangana, Karnataka and Maharashtra as these are the state which make most of the influence on traffic.
2. Data of Indian national GDP (Gross Domestic Product), NSDP (Net State Domestic Product) of Andhra Pradesh, Telangana, Karnataka and Maharashtra.
3. Estimated population data of Andhra Pradesh, Telangana, Karnataka and Maharashtra.

This data is utilized in the study to estimate the growth factors along the project corridor. Relevant part of secondary data is placed at Annexure.

4.3 Development in the Project Influence Area

The **Outer Ring Road**, officially as, **Jawaharlal Nehru Outer Ring Road** and abbreviated as, **O.R.R.**, is a 158 kilometer, 8-lanes ring road expressway encircling Hyderabad, capital of the Indian state of Telangana. The expressway is designed for speeds up to 100 km/h. A large part, 124 km (covering urban nodes viz., Hi- Tech city, Nanakramguda Financial District, Rajiv Gandhi International Airport, IKP Knowledge park, Hardware Park, Telangana State Police Academy, Singapore Financial District, and Games village) of the 158-km was opened by December 2012. Rest of the stretch was opened by 2016. Thus from 2016 onwards ORR is under operation and has contributed to great extent not only to ease out traffic flow but also has influenced the development of Hyderabad around ORR. Most of the development which are happening on periphery of Hyderabad take positioning with respect to ORR into account. It

gives an easy connectivity between NH 44, NH 65, NH 161, NH 765 and NH 163 from Hyderabad to Vijayawada and Warangal as well as state highways leading to Vikarabad Nagarjuna Sagar and Karimnagar /Mancherial. The Outer Ring Road also helps in reducing the travel time from Rajiv Gandhi International Airport to cities like Nizamabad & Adilabad as it connects to NH44. The expressway is fenced, and 33 radial roads connect it with the Inner Ring Road.

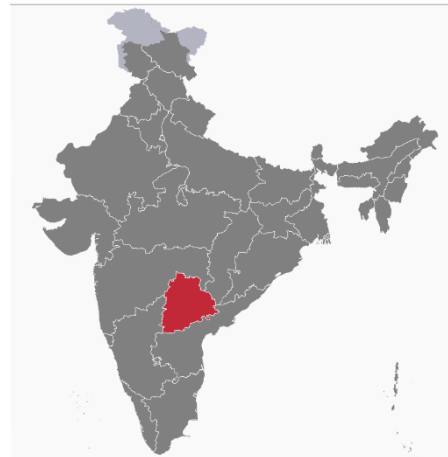
Telangana State



Telangana is one of the fastest-growing states in India posing average annual growth rate of 13.90% over the last five years. Telangana's nominal gross state domestic product for the year 2020-21 stands at ₹12.05 lakh crore (US\$170 billion).

Service sector

is the largest contributor to the Telangana's economy with a share of about 65% in the year 2018-19. Growth in services has largely been fuelled by IT services with the State holding leading position in IT & ITeS in the country in terms of production and exports.



Traffic growth on NORR would be synonym with growth of Hyderabad. Hence various aspects of Growth of Hyderabad are relevant and discussed as under.

Hyderabad.

Hyderabad is among the top-10 fastest growing cities in the world, according to the World Economic Forum (WEF). Interestingly, all 10 of the fastest-growing cities in the world are in India. And, going by Gross Domestic Product (GDP) growth, this is likely to be the case till 2035, says research institute Oxford Economics. Hyderabad, with an 8.47% GDP growth, holds the second place among metropolitan cities in India.

By some estimates Hyderabad will be the second-fastest growing city in the world. It is just marginally behind Bengaluru, and should become number one (in India), since the projections are on a time-series trajectory, and Hyderabad's actual growth has been geometrically exponential.

A city with rich history and magnificent olden structures is slowly became host to some of the most modern buildings, a blend of both the bygone kingdoms and the new corporate revolution. To boost Hyderabad's development, the then Chief Minister of Andhra Pradesh Chandrababu Naidu successfully bid for the National Games in 2002 and the Afro Asian games in 2003, along with a strong bid to create a Formula One circuit in the state. These endeavours led to the

development of efficient sports infrastructure in Hyderabad. The Indian School of Business (ISB) and IIT were also established in a similar endeavour to boost modern education.

The resulting urban agglomeration now has an area of over eight hundred square kilometres and consists of Hyderabad and other municipal entities surrounding it. The city population is expected to exceed one hundred and thirty-six lakhs in 2021.

As development picked up pace at the end of the nineties, the old city has declined, and the newer peripheral regions started to gain prominence. By 2001, the city was the sixth largest urban agglomeration in India; and during the last decade it registered a growth of 32%.



Developed land on the outskirts of Hyderabad has been utilised for large scale development just outside the Cybercity. The city itself is on its way to become the leader in e-governance. It has been predicted about Hyderabad that it would become a leading information-based society in the next two decades.

Rapid industrialisation has led to the increase in land prices while simultaneously driving the demand for infrastructure development. Commercial growth, therefore, has been concentrated in the Municipal Corporation of Hyderabad area while the metropolis has experienced pressure in residential growth. As workers prefer proximity to the workplace, their daily commute has resulted in the improvement of the road networks as well.

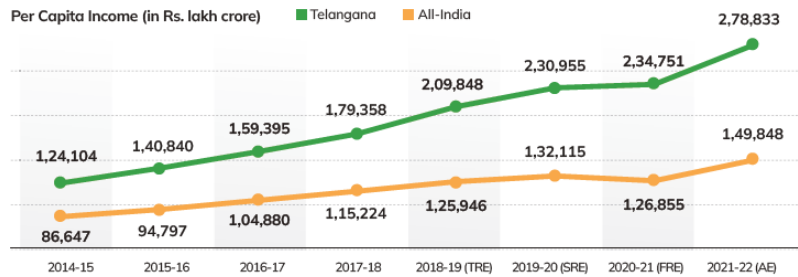


Growth of IT Sector

Ever since the 1990s, Andhra Pradesh had been promoting itself as a world class IT location and Hyderabad City, as a result, has managed to attract investment from companies such as IBM, Oracle, and Microsoft. The Hyderabad Technology Park has seen hundreds of IT companies registering themselves as soon as spaces are available. The objective of this elaborate promotional program has been to attract the right number of companies which

together would form a critical mass for the city to develop as a high-tech city which would rub shoulders with Silicon Valley and Malaysia’s Multimedia Super Corridor. During the nineties, several initiatives were taken up by the state government towards promotion of IT sector. These included setting up of IT training institutes, initiatives in e-governance, development of a Hi-Tech city and promoting the Software Technology Park as a preferred destination for private sector companies. Steps were then taken even further to allow the development of a Hardware Park, creation of a knowledge Park, and establishment of a financial district. The state government started tapping resources to invest in the biotechnology sector and, as a first step towards making the region specialized, a Biotech Park was introduced.

Per Capita Income at Current Prices for Telangana and India (2014-15 to 2021-22)



The result of these efforts can be seen in the form of various parks. One called Gnome Valley has been set up to focus on research and training in biomedicine for industrial production. Within this valley are also established the IKP Knowledge Park and Alexandria Knowledge Park with areas of two hundred acres and three hundred acres respectively. These parks cover Ameerpet, Medchal, Uppal, and a number of other parts of the Hyderabad Metropolitan region. The thrust areas of research here include vaccines, bioinformatics, seeds etc. Some of the biggest global pharmaceutical and research firms have setup their offices here. Similarly, a Hardware Park of one thousand seven hundred acres in area is also being developed.

The economic activities particularly related to manufacturing and associated activities, are concentrated in Ramachandrapuram, Patancheru, Balanagar, Uppal, Cherlapalli, Jeedimetla, and Moula Ali. These developments, on one hand, contributed to the economic growth of the city and, on the other hand, are responsible for the spatial growth, particularly the growth of the surrounding areas.

Development of Relevant Infrastructure

With expansion in infrastructure capabilities and progressive state policy framework, Hyderabad is not only providing strong impetus to its leading industries: IT/ITES, pharmaceuticals but also laying strong foundation for its growth sectors: aerospace, automotive and electric vehicle, textiles and emerging technologies. I strongly believe that the metropolis is on an ambitious journey to become one of the most diverse business hubs of the world by 2035.

The city’s infrastructure is providing for evolving needs of massive commercial growth. Hyderabad’s metro rail is India’s second longest operational metro network after the Delhi Metro. In phase 1, 67 kilometers (kms) are operational of planned 72 kms. The route covers three major traffic corridors through 60 stations. The next phase aims to connect airport at Shamshabad with major economic zones of the greater Hyderabad region. Another groundwork

capability worth mentioning is logistics parks. The Hyderabad Metropolitan Development Authority has developed 6 logistics parks in last 5 years and 8 more to come by 2025. The facilities are catering to over 340 logistics companies and 100 major manufacturing firms, making Hyderabad one of the largest logistics hubs of the country. In addition to the above, the metropolitan offers second cheapest office rentals amongst the major cities of India, adding to cost effectiveness of doing business in the city. In 2021, Hyderabad accounted for 36% country's share of office spaces.

It also holds the badge of most liveable city in the country for last five consecutive years as per Mercer's quality of living index. The city attracts talent pool from across the nation as well as from other world economies due to its notable social infrastructure: healthcare, education, housing, recreation, and personal freedom.

Telangana is a state known for its robust economic initiatives and trade friendly policies since its inception in 2014. A key example is state's TS I-pass industrial policy that is best in the country. It provides single window application clearance process capped at 15 days for all capital investment projects. This policy enabled Amazon to get clearance in just 11 days for its largest campus in the world to be built in Hyderabad. The state is poised to keep pace with technological advancements and thus first in India to launch actionable framework for AI and other emerging technologies. It has partnered with NASSCOM to formulate and execute the strategy. Telangana has taken many sectors specific initiatives that has improved ease of doing business and garnered foreign direct investments in the metro. Telangana's Electric vehicle and energy storage policy has aided Fiat Chrysler to set up global digital hub in Hyderabad. With availability of largest commercial land bank in the country, Telangana offers 1.45 lakhs acres of land to investors. This has enabled aerospace companies to set up production facilities in the city. Boeing and Safran have announced new manufacturing lines in Hyderabad. Airbus is setting up helicopter manufacturing plant in Shamshabad and committed to investment of INR 2500 Crores. The city ranked first in the Aerospace cities of the future in 2020-21.

The city's primary sectors, IT and pharma, continue to grow and bring in public and private investments. Google is investing INR 1000 Crores in its biggest facility outside US. This commercial space is set to be functional in Hyderabad by early 2023 and will be home to 13000 employees. The metro's Genome Valley is witnessing Biopharma scale-up facility, a public-private partnership between the state and Cytiva life sciences. The state is also developing 800-acre new pharma park in Rangareddy district.

Though Hyderabad faced the heat in 2020, the pandemic and subsequent lockdown compelled considerable layoffs in IT and SME sectors. Office space absorption rate declined, strongly

indicating many firms shutting shops or reducing operations in the city. Few economic experts questioned Hyderabad’s potential as a growing business hub. However, I find the argument short sighted and reactive. The city strongly stood the test of time, India’s first ICMR approved RT-PCR kits and first indigenously developed vaccine for COVID-19 came from Hyderabad. In 2021, the city’s economy started showing green shoots. It contributed to 30% of the pharmaceutical production of the country. It also gained momentum as the “Vaccine capital of the world” with 4 out of 5 leading vaccine manufacturers in India already present in Genome Valley. The same year, the city also had the highest net office absorption rate (of existing stock) at 20% and highest office completion rate in the country. It also witnessed lowest office space vacancies: 7.1% in comparison to its other metro counterparts.

Hyderabad’s strong economic fundamentals with respect to infrastructure, social capital and economic policies, equip it to meet future challenges of global economies. It is poised for long-term growth and on a progressive path to become world’s prominent commercial hub. With current GDP of \$74 billion, it is projected to move forward with 8.47% CAGR and set to deliver as \$201.4 billion economy by 2035.



IT INCUBATION CENTERS – HYDERABAD

Hyderabad has witnessed a very growth of IT incubation centers. Some are summarized below.

- Hyderabad is recognised as the leading IT hubs globally; the city houses more than 1500 IT and ITES companies.
- IT SEZs -53
- State contributes 11.6% of India’s IT exports in 2019-20
- Accounts for 23.5% of India’s IT export growth 2019-20
- T-HUB Phase-II, Hyderabad Built-up Area: 3.72 L sft; India’s Largest start-up Incubator
- Plug & play facility in E city Built-up Area: 1.8 lakh sft with an integrated testing & training facility.
- T-Works, Hyderabad Built-up Area: 78,000 sft – Phase 1; India’s largest prototyping facility
- Image Tower, Hyderabad Built-up Area: 460,000 sft A one of its kind plugs & Play Facility for Animation and Gaming companies. Expected completion: March 2023
- Incubation Centre, Warangal(U) Built-up Area: 15000 sft Plug & Play Facility for startups.

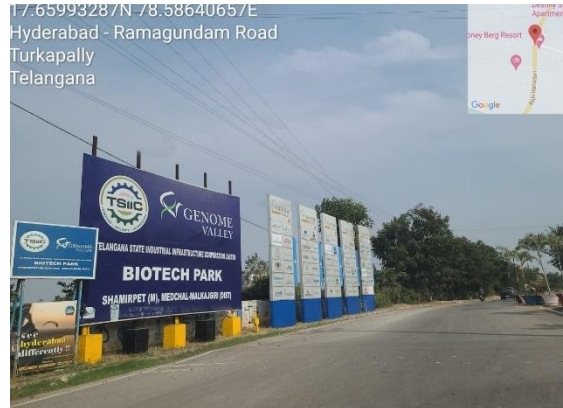
LIFE SCIENCES - HYDERABAD

Life Sciences sector continues to continue to consolidate the position of the State as one of the most important life sciences hubs in the world.

International Companies including **Sandoz Research and Development Laboratories, Chemo India Formulations, Jamp India Pharmaceutical, Ferring Laboratories and Tokyo Chemical Industry**, among others have established their footprint in the State.

Telangana is the leading contributor of Pharma Exports from the Country since 2015-16 (28% share in FY 2020-21)

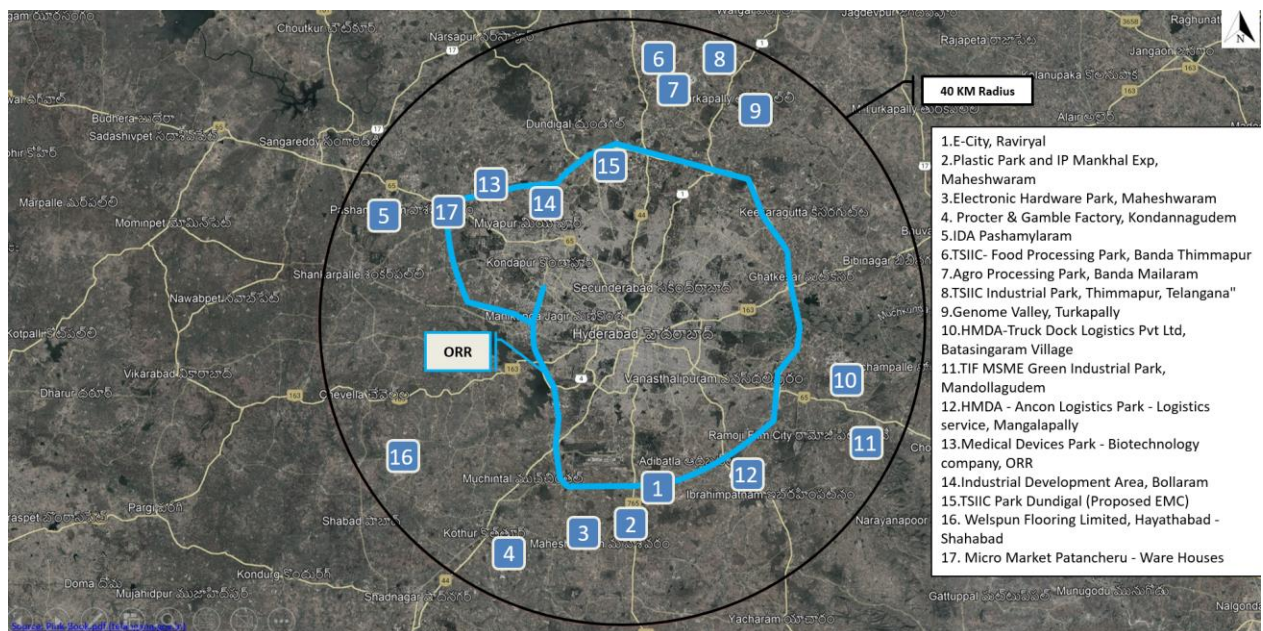
Hyderabad Pharma City: world’s largest integrated pharma cluster spread over approx 19,333 acres. The cluster has been recognized as National Investment and Manufacturing Zone (NIMZ) by Government of India, given its national and international importance.



Genome Valley: Built over 1200 acres in three phases, more land is being added to the cluster along with more ready built lab space (more than 2 million square foot) Genome Valley houses more than 200 companies with a scientific workforce of about 15,000 professionals.

Medical Devices Park: Spread across 302 acres, 105 acres have already been allotted (more than 60 percent of the allottable land) to 40 companies. The park will house Asia’s largest Stent manufacturing facility established by Sahajanand Medical Technologies

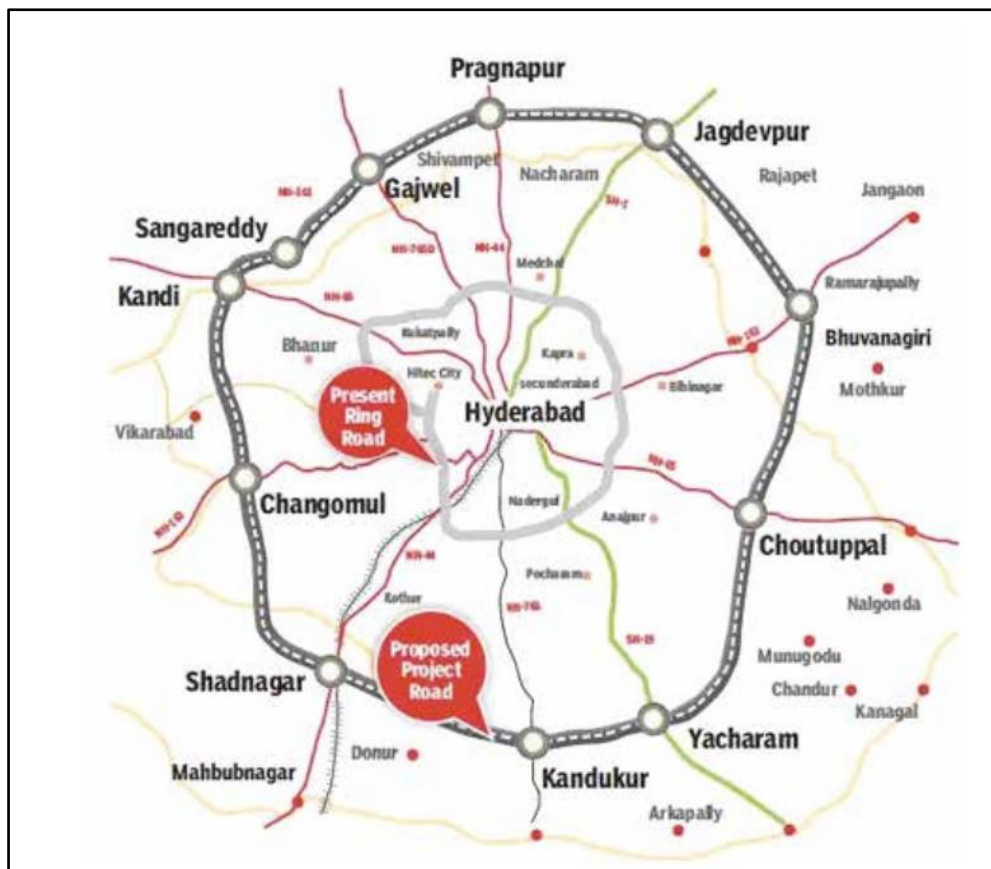
There is considerable industrial development on peripheries of Hyderabad as well. ORR being a fast connectivity has provided boost to such development. Following figure marks such developments on periphery of Hyderabad.



All above discussion indicates that Hyderabad is going to witness a good growth in near decade and would sustain on that.

Proposed Regional Ring Road (RRR)- Hydearabad

- An 8-lane expressway stretched over 340 km of length with a project cost Rs 17,000 crore is proposed to strengthen the existing roads connecting major national highways passing through Telangana, easing the regional road connectivity.
- The road will be developed at par with international standards over a stretch from Sangareddy to Kandi via Narsapur, Toopran, Gajwel, Jagdevpur, Bhongir, Choutuppal, Ibrahimpatnam, Chevella and Shankarapalli
- The RRR will have amenities such as parking, food courts, toilets, parks, children play area, malls, and drinking water facilities.
- The RRR will connect the surrounding districts with Hyderabad and to the Industrial Clusters, covering 40% of the region's population and will link 20 towns with National Highways.



Source: Pink-Book.pdf (telangana.gov.in)

As Proposed Regional Ring Road (RRR) would have faster connectivity to all important urban/commercial establishment, development of RRR has potential to alter focus of growth around Hyderabad Metropolitan Region.

4.4 Trend Analysis

Time series data of vehicle Registered in state of concerned states is taken from respective authorized websites and the same is used as the base data for analysis of growth.

Growth of vehicle traffic depends on type of vehicle. Traffic growth on any highway typically depends on number of economic parameters like

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

- Population

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. Same is recommended in IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways.

Following can be pair of vehicle type and independent variable for elasticity modelling of growth.

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

Same is used in analysis below.

Vehicle Registered at the end of financial year in the state of Delhi, Haryana and Uttar Pradesh is given in tables below and also compared with the growth rate achieved in terms of vehicle registered on all India bases.

4.5 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: 108-1996 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). The graphical presentation of the elasticity is presented in figures below:

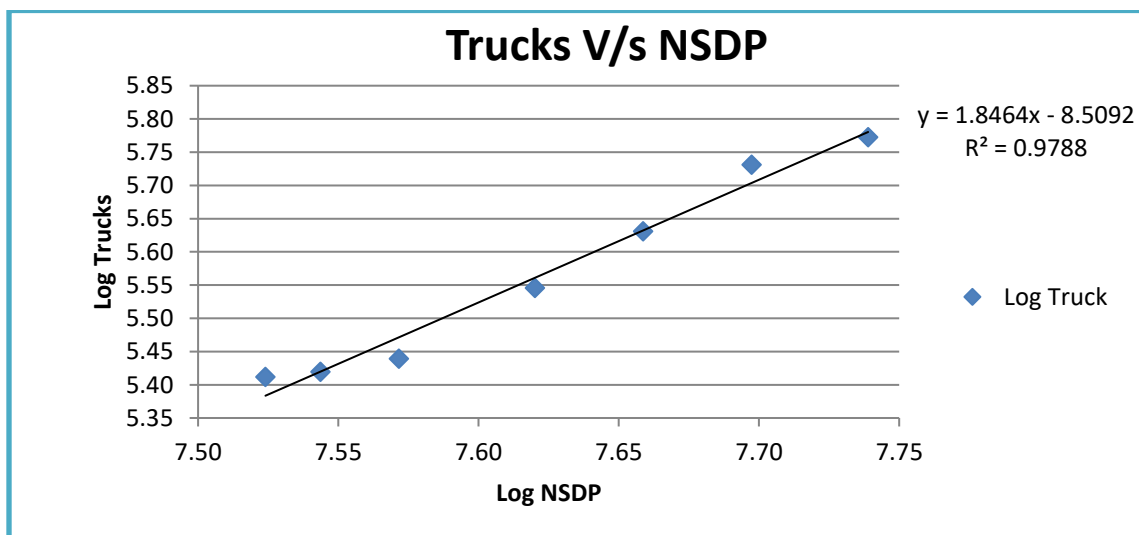
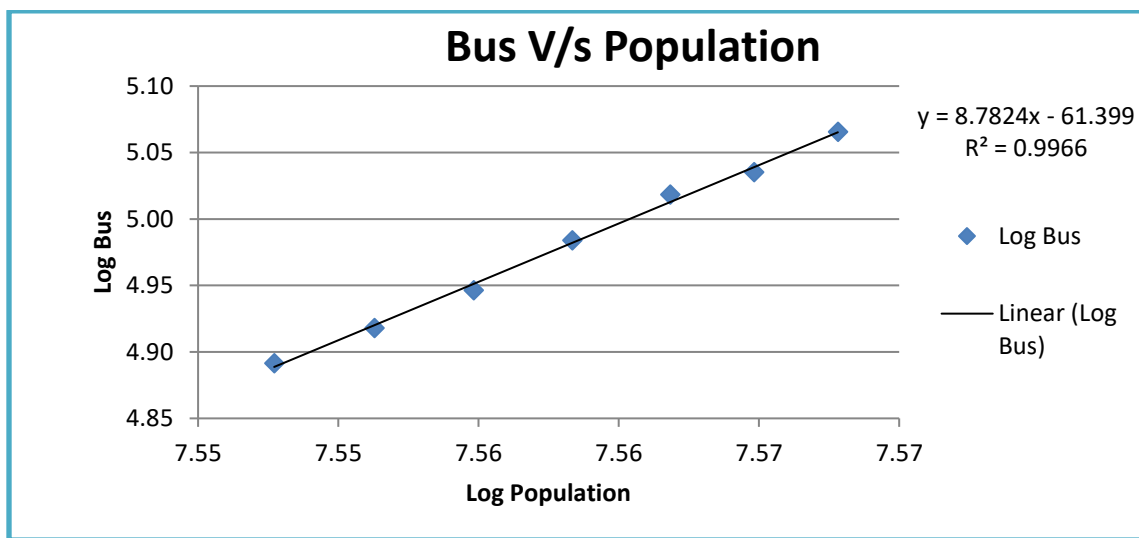
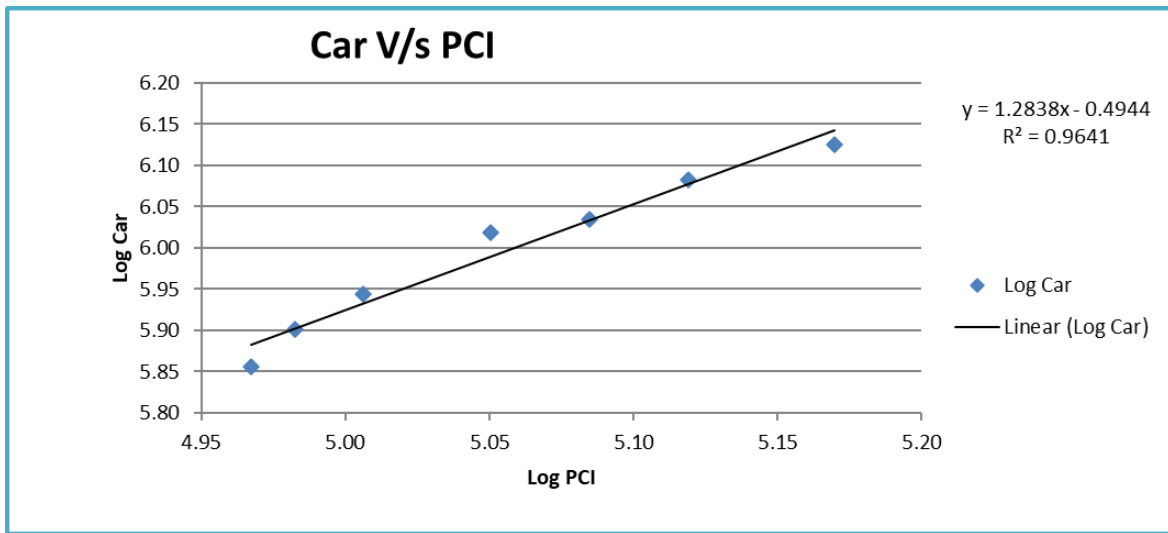


Figure 4-1: Elasticity by Graphical Extrapolation for Telangana

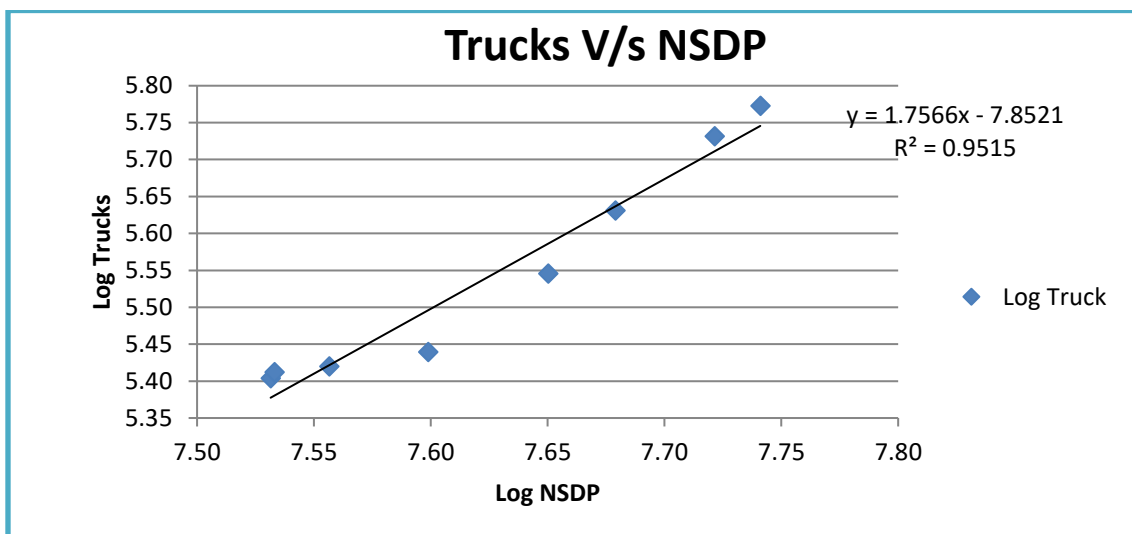
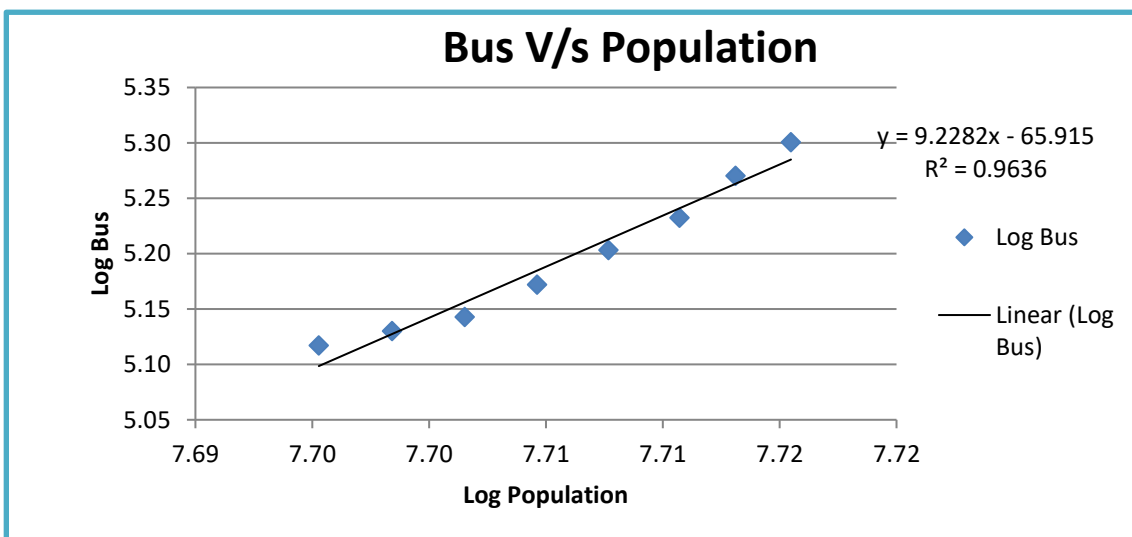
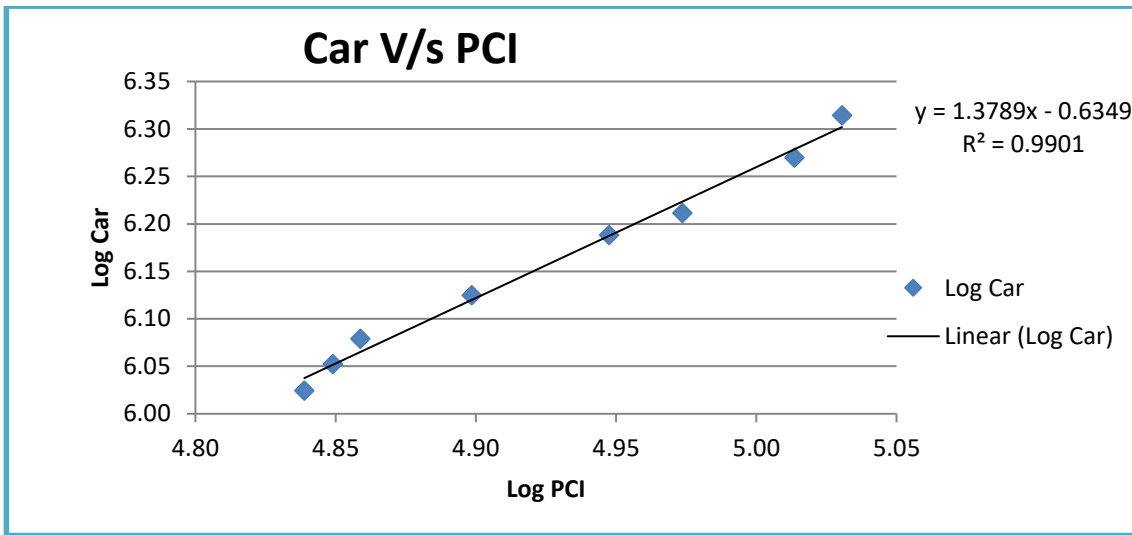


Figure 4-2: Elasticity by Graphical Extrapolation for Andhra Pradesh

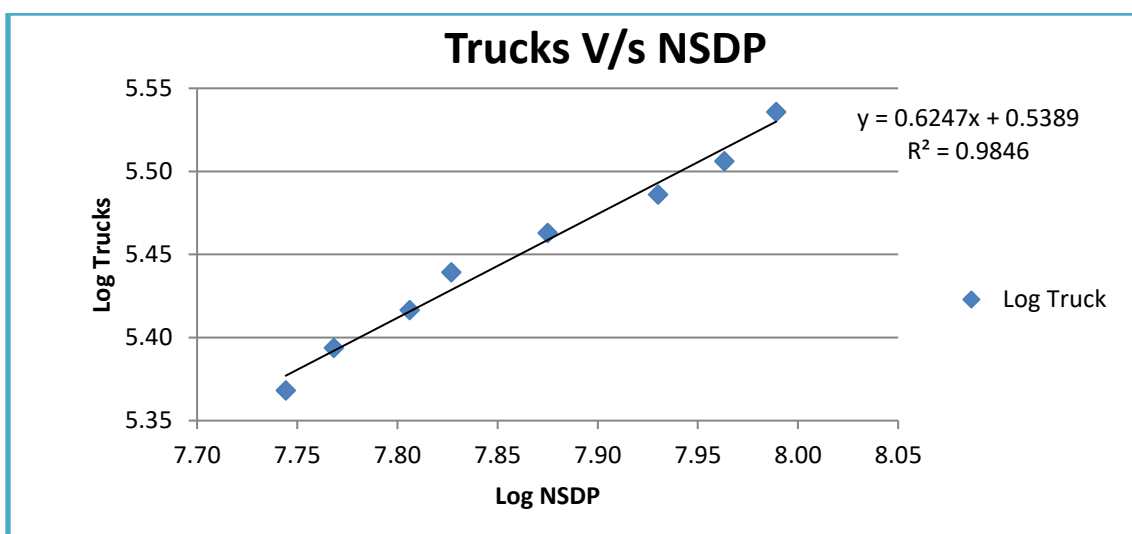
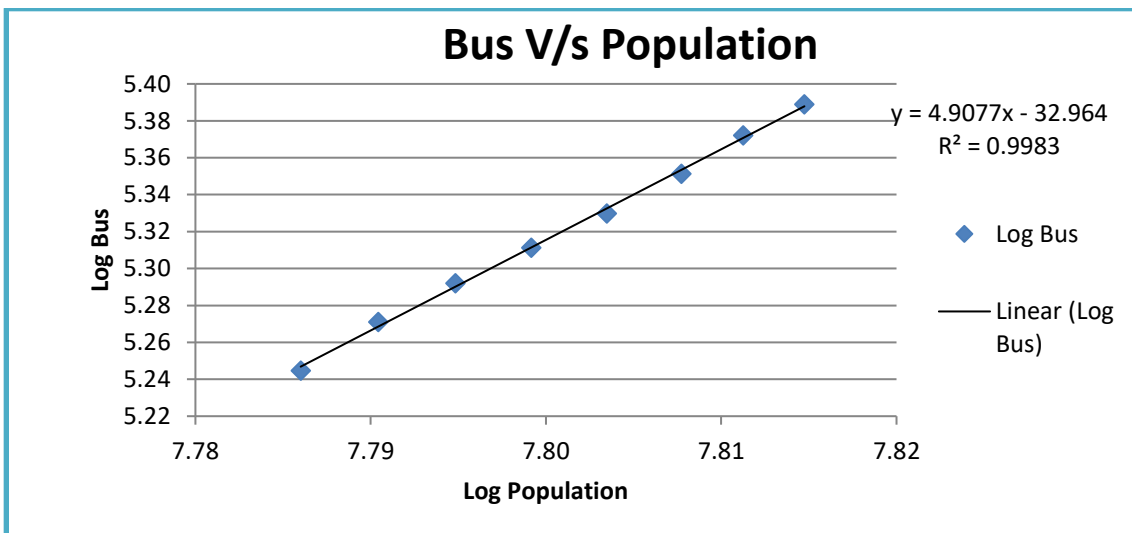
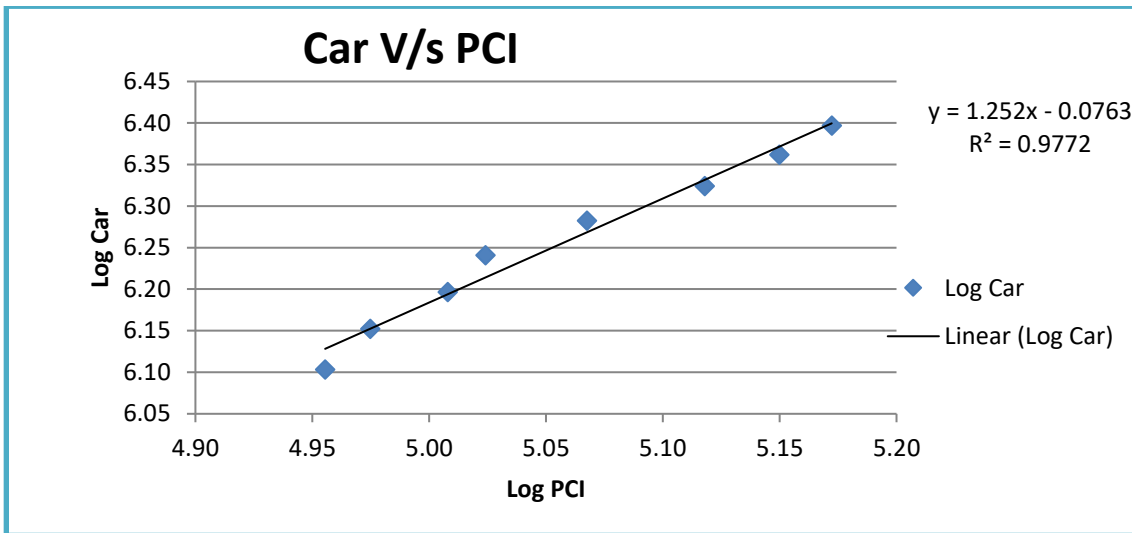


Figure 4-3: Elasticity by Graphical Extrapolation for Karnataka

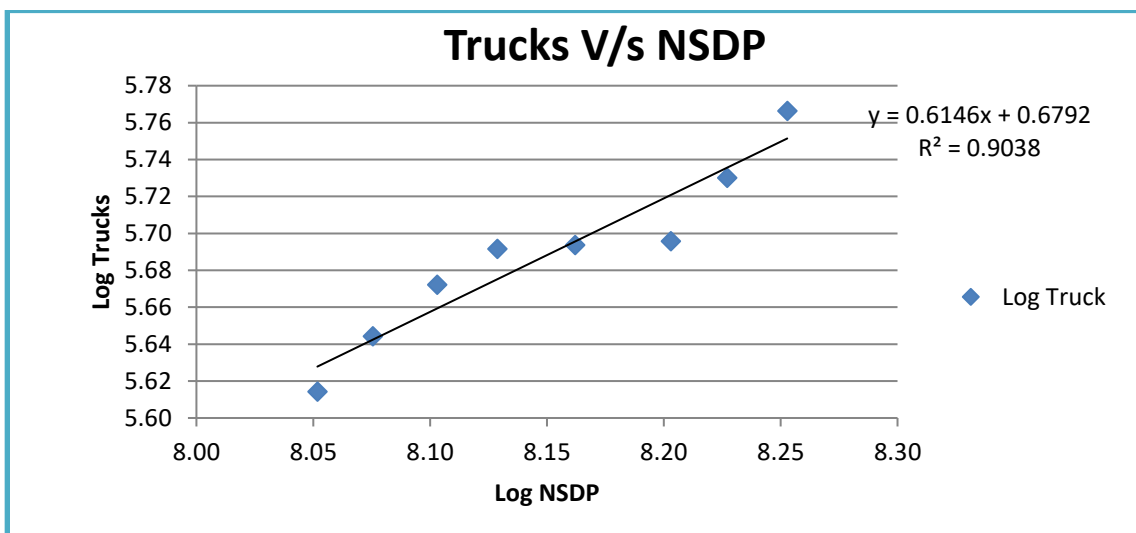
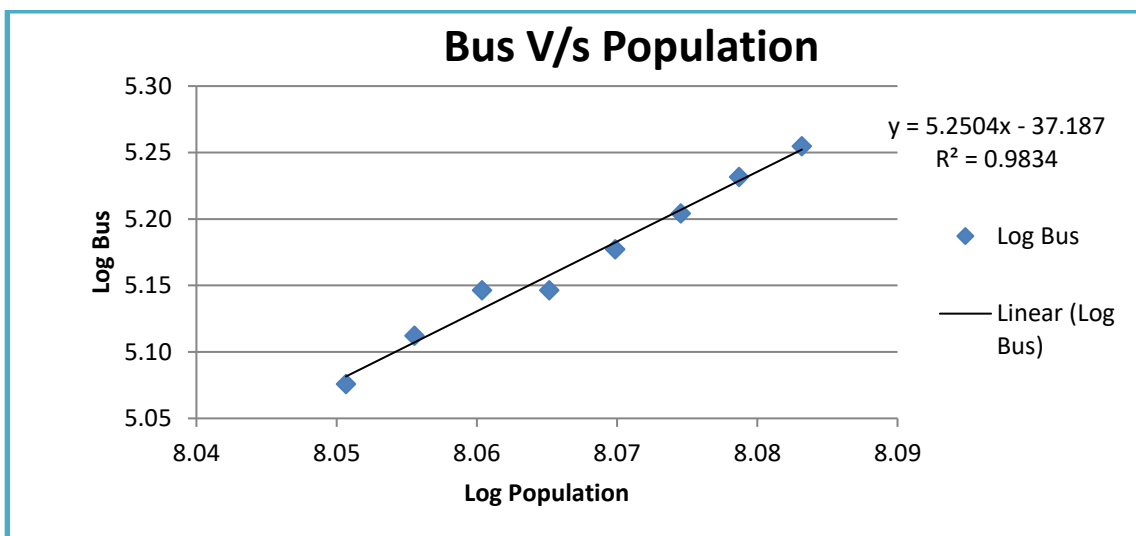
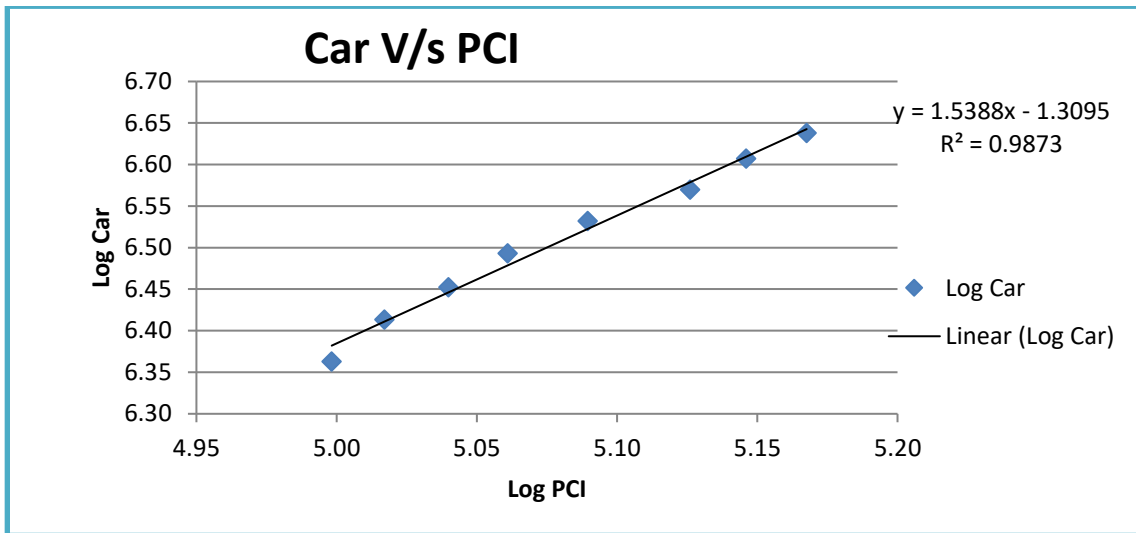


Figure 4-4: Elasticity by Graphical Extrapolation for Maharashtra

It shall be noted that the growth rates for various modes are not same as they are influenced by different parameters. In other words, whilst the growth of the passenger vehicles (cars, Jeeps, two wheelers and even buses) could be attributed to the growth in the per capita income,

population growth and vehicle registration growth, the growth of the LCV, Trucks, Multi Axle Trucks are found to be influenced with factors including the industrial production and growth of the National or state Domestic products.

For establishing the elasticity equations, details regarding NSDP/GDP, per capita income, population growth and registered vehicles in the state have been collected for the past few years and are presented in the Annexure. Based on this data, Log-Log regression curve fits have been developed for each type of vehicle with the most suitable parameters and the elasticity values obtained.

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

Table 4-1 : Results of Regression analysis

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient |
|--------------|------------------|----------------------|-------------------------|----------------|------------------------|
| TELANGANA | Car/Jeep | PCI | $y = 1.2838x - 0.4944$ | $R^2 = 0.9641$ | 1.2838 |
| | Bus | Population | $y = 8.7824x - 61.3985$ | $R^2 = 0.9966$ | 8.7824 |
| | Truck | NSDP | $y = 1.8464x - 8.5092$ | $R^2 = 0.9788$ | 1.8464 |
| ANDRAPRADESH | Car/Jeep | PCI | $y = 1.3789x - 0.6349$ | $R^2 = 0.9901$ | 1.3789 |
| | Bus | Population | $y = 9.2282x - 65.9151$ | $R^2 = 0.9636$ | 9.2282 |
| | Truck | NSDP | $y = 1.7566x - 7.8521$ | $R^2 = 0.9515$ | 1.7566 |
| KARNATAKA | Car/Jeep | PCI | $y = 1.252x - 0.0763$ | $R^2 = 0.9772$ | 1.252 |
| | Bus | Population | $y = 4.9077x - 32.9642$ | $R^2 = 0.9983$ | 4.9077 |
| | Truck | NSDP | $y = 0.6247x - 0.5389$ | $R^2 = 0.9846$ | 0.6247 |
| MAHARASHTRA | Car/Jeep | PCI | $y = 1.5388x - 1.3095$ | $R^2 = 0.9873$ | 1.5388 |
| | Bus | Population | $y = 5.2504x - 37.1874$ | $R^2 = 0.9834$ | 5.2504 |
| | Truck | NSDP | $y = 0.6146x - 0.6792$ | $R^2 = 0.9038$ | 0.6146 |

However, considering factors such as proposed developments and other influencing economic factors moderated growth factors as listed below are considered. Change all tables.

4.6 Basis for arriving at growth rates.

Arriving at growth rates for each mode on particular road stretch is always a complex issue. Transportation planners before arriving at such growth rates have to have a comprehensive understanding of the various disciplines such as land use, economy, automobile industry, anticipated changes in the region, traffic, and other related issues.

Giving due consideration to all the factors elaborated in the previous sections, three growth scenarios are suggested with a wide range of growth rates which are resilient and ready to respond to the changes in socio-economic conditions which are likely to influence the project corridor.

4.7 Growth of Economy and Projection of GDP in India and States

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.

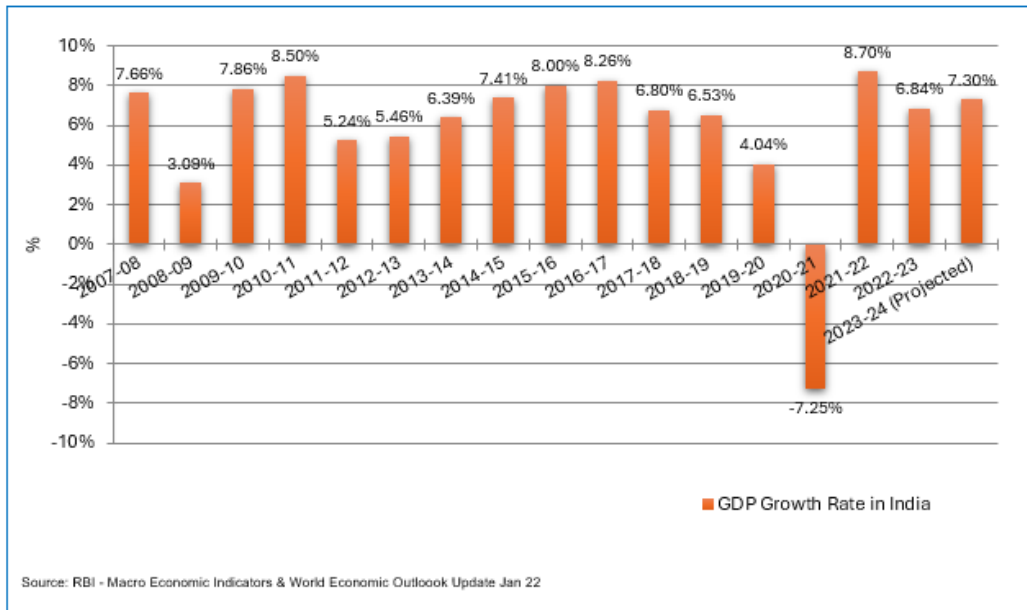


Figure 4-5 : Growth of GDP in India

After witnessing a slowdown during previous years, the economy is expected to firm up further in coming years. The growth outlook for the Indian economy in the medium and long term remains upbeat and positive. Therefore, in this study, in base case scenario, it is assumed that a GDP growth rate of around 8% will be sustained up to the year 2028 and thereafter for every five-year period the GDP growth rate is reduced. Similarly other independent variables of Per Capita Income (PCI) and Population is growth is assumed. Following table shows summary of such assumption.

Table 4-2 : Growth of Independent Variables

| Assumed Growth Rate of Independent Indicators | | | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Indicator | 2024-2028 | 2028-2033 | 2033-2038 | 2038-2043 | 2043-2048 | 2048-2053 | 2053-2058 |
| PCI | 7.71% | 6.71% | 5.00% | 4.50% | 4.00% | 3.50% | 3.50% |
| Population | 0.76% | 0.71% | 0.66% | 0.61% | 0.56% | 0.51% | 0.51% |
| NSDP | 8.15% | 6.15% | 4.15% | 3.15% | 2.15% | 1.15% | 1.15% |

4.7.1 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 are as under.

Table 4-3: Recommended Growth Rates Pessimistic case

| Category / Year | 2024-2028 | 2028-2033 | 2033-2038 | 2038-2043 | 2043-2048 | 2048-2053 | 2053-2058 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 6.81% | 5.43% | 3.63% | 2.77% | 2.01% | 1.36% | 1.36% |
| Bus | 4.67% | 4.26% | 3.87% | 3.49% | 3.12% | 2.76% | 2.76% |
| Minibus | 4.67% | 4.26% | 3.87% | 3.49% | 3.12% | 2.76% | 2.76% |
| LCV | 3.02% | 2.03% | 1.16% | 0.73% | 0.35% | 0.04% | 0.04% |
| 2- Axle | 3.02% | 2.03% | 1.16% | 0.73% | 0.35% | 0.04% | 0.04% |
| 3 - Axle | 4.10% | 2.79% | 1.64% | 1.05% | 0.55% | 0.13% | 0.13% |
| 4 to6 Axle | 4.10% | 2.79% | 1.64% | 1.05% | 0.55% | 0.13% | 0.13% |
| 7 and Above Axle | 4.10% | 2.79% | 1.64% | 1.05% | 0.55% | 0.13% | 0.13% |

Table 4-4: Recommended Growth Rates Most likely case

| Category / Year | 2024-2028 | 2028-2033 | 2033-2038 | 2038-2043 | 2043-2048 | 2048-2053 | 2053-2058 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 7.06% | 5.68% | 3.88% | 3.02% | 2.26% | 1.61% | 1.61% |
| Bus | 4.92% | 4.51% | 4.12% | 3.74% | 3.37% | 3.01% | 3.01% |
| Minibus | 4.92% | 4.51% | 4.12% | 3.74% | 3.37% | 3.01% | 3.01% |
| LCV | 3.27% | 2.28% | 1.41% | 0.98% | 0.60% | 0.29% | 0.29% |
| 2- Axle | 3.27% | 2.28% | 1.41% | 0.98% | 0.60% | 0.29% | 0.29% |
| 3 - Axle | 4.35% | 3.04% | 1.89% | 1.30% | 0.80% | 0.38% | 0.38% |
| 4 to6 Axle | 4.35% | 3.04% | 1.89% | 1.30% | 0.80% | 0.38% | 0.38% |
| 7 and Above Axle | 4.35% | 3.04% | 1.89% | 1.30% | 0.80% | 0.38% | 0.38% |

Table 4-5: Recommended Growth Rates Optimistic case

| Category / Year | 2024-2028 | 2028-2033 | 2033-2038 | 2038-2043 | 2043-2048 | 2048-2053 | 2053-2058 |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Car/Jeep/Van | 7.31% | 5.93% | 4.13% | 3.27% | 2.51% | 1.86% | 1.86% |
| Bus | 5.17% | 4.76% | 4.37% | 3.99% | 3.62% | 3.26% | 3.26% |
| Minibus | 5.17% | 4.76% | 4.37% | 3.99% | 3.62% | 3.26% | 3.26% |
| LCV | 3.52% | 2.53% | 1.66% | 1.23% | 0.85% | 0.54% | 0.54% |
| 2- Axle | 3.52% | 2.53% | 1.66% | 1.23% | 0.85% | 0.54% | 0.54% |
| 3 - Axle | 4.60% | 3.29% | 2.14% | 1.55% | 1.05% | 0.63% | 0.63% |
| 4 to6 Axle | 4.60% | 3.29% | 2.14% | 1.55% | 1.05% | 0.63% | 0.63% |
| 7 and Above Axle | 4.60% | 3.29% | 2.14% | 1.55% | 1.05% | 0.63% | 0.63% |

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

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

5.2 Toll Rate Guidelines

Toll rates at NORR are governed by “Nehru Outer Ring Road Hyderabad (Toll) Rules -2012 issued by Municipal Administration and Urban Development Department / Hyderabad Metropolitan Area Development Authority and Hyderabad Growth Corridor Limited. This policy was recently amended by circular dated 12th January 2023.

The policy is similar to NHAI toll rate policy. Basic rate and rate revision policy same as NHAI Policy. The basic per km rate however have been enhanced for categories as under.

| Sl. No. | Vehicle types | Enhancement factor |
|---------|---|--------------------|
| 1. | Cars/ Jeep/ Van/ LMV/ SUV/ MPV | 50% |
| 2. | LCV/ Mini Bus | 50% |
| 3. | Bus/ 2-axle Truck | 27% |
| 4. | 3-axle commercial vehicles | 50% |
| 5. | Heavy Construction Machinery/ Earth Moving Equipment/ 4/5/6 axle trucks | 50% |
| 6. | Oversized vehicles (7 or more axles) | 50% |

Figure 5-1: Base Rate (Per Km) enhancement as per NORR amendment Policy.

In amendment of policy provision of penalty for entering to fast tag lane without having valid fast tag and also for overloading of vehicles has been added. Penalty for fast tag lane violation is double the normal fee and overloaded vehicles would have to pay 10 times the toll rate for category. These are similar to NHAI policy.

5.4 Discounts

As per the Fee Notification (Schedule-R) fee discounts shall be provided to project users as under

- Local discount for non-commercial vehicle owner with in 20 km of toll plaza is not included in schedule M.

5.4 Travel Passes

As per the Fee Notification (Schedule-R) fee discounts shall be provided to project users as under

1. Monthly Pass: For frequent user's monthly pass would have not more than 50 trips per month at 2/3rd 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 travellers or whose frequency does not yield any discount from the above categories.

5.2 Segmentation of traffic

Journet type traffic segmentation has been provided by Concessionaire for all toll plazas. Same has been used for future revenue working as well.

5.2 Estimation of Toll Rates

As per the notification issued for toll policy the following Base rate of fee for the categories mentioned are applicable as base rate.

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 |

These rates are then modified for as per procedure provided in guidelines of notification taking into account factors listed below.

- These base rates have been enhanced by factors as mentioned in amendment to NORR Toll Policy dated 12th January 2023.
- Annual revision of fee rate - @3%

- Application of WPI
- a growth rate of 5% is assumed for WPI of future years.
- As fee for structures is included in equivalent length at each toll plaza same shall not be considered separately

Applicable length for journey type at each toll plaza as per schedule M is given as under

Table 5-2 : Tollable Length

| Name of IC | | Kokapet | Neopolis | Edula nagulapally | Patancheru | Sultanpur | Mallampet | Dindigal/ Saragudem | Medchal | Shamirpet | Keesara | Ghatkesar | Taramptipet | Pedda Amberpet | Bonguluru | Raviryal | Tukkuguda | Pedda Golconda | Shamshabad | Rajendra Nagar | TSPA | Narsingi | Nanakramguda |
|---------------------|-----|---------|----------|-------------------|------------|-----------|-----------|---------------------|---------|-----------|---------|-----------|-------------|----------------|-----------|----------|-----------|----------------|------------|----------------|--------|----------|--------------|
| | F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
| Kokapet | 1 | 0.000 | 1.700 | 11.900 | 20.500 | 29.000 | 35.000 | 40.700 | 50.200 | 59.100 | 71.000 | 74.112 | 65.862 | 58.962 | 46.712 | 39.612 | 34.112 | 25.862 | 19.512 | 11.262 | 7.962 | 3.612 | 7.252 |
| Neopolis | 1A | 1.700 | 0.000 | 10.200 | 18.800 | 27.300 | 33.300 | 39.000 | 48.500 | 57.400 | 69.300 | 75.760 | 67.562 | 60.662 | 48.412 | 41.312 | 35.812 | 27.562 | 21.212 | 12.962 | 9.662 | 5.312 | 8.952 |
| Edula nagulapally | 2 | 11.900 | 10.200 | 0.000 | 8.600 | 17.100 | 23.100 | 28.800 | 38.300 | 47.200 | 59.100 | 67.650 | 75.850 | 70.862 | 58.612 | 51.512 | 46.012 | 37.762 | 31.412 | 23.162 | 19.862 | 15.512 | 19.152 |
| Patancheru | 3 | 20.500 | 18.800 | 8.600 | 0.000 | 8.500 | 14.500 | 20.200 | 29.700 | 38.600 | 50.500 | 59.050 | 67.250 | 74.150 | 67.212 | 60.112 | 54.612 | 46.362 | 40.012 | 31.762 | 28.462 | 24.112 | 27.752 |
| Sultanpur | 4 | 29.000 | 27.300 | 17.100 | 8.500 | 0.000 | 6.000 | 11.700 | 21.200 | 30.100 | 42.000 | 50.550 | 58.750 | 65.650 | 75.712 | 68.612 | 63.112 | 54.862 | 48.512 | 40.262 | 36.962 | 32.612 | 36.252 |
| Mallampet | 4A | 35.000 | 33.300 | 23.100 | 14.500 | 6.000 | 0.000 | 5.700 | 15.200 | 24.100 | 36.000 | 44.550 | 52.750 | 59.650 | 71.900 | 74.612 | 69.112 | 60.862 | 54.512 | 46.262 | 42.962 | 38.612 | 42.252 |
| Dindigal/ Saragudem | 5 | 40.700 | 39.000 | 28.800 | 20.200 | 11.700 | 5.700 | 0.000 | 9.500 | 18.400 | 30.300 | 38.850 | 47.050 | 53.950 | 66.200 | 73.300 | 74.812 | 66.562 | 60.212 | 51.962 | 48.662 | 44.312 | 47.952 |
| Medchal | 6 | 50.200 | 48.500 | 38.300 | 29.700 | 21.200 | 15.200 | 9.500 | 0.000 | 8.900 | 20.800 | 29.350 | 37.550 | 44.450 | 56.700 | 63.800 | 69.300 | 76.062 | 69.712 | 61.462 | 58.162 | 53.812 | 57.452 |
| Shamirpet | 7 | 59.100 | 57.400 | 47.200 | 38.600 | 30.100 | 24.100 | 18.400 | 8.900 | 0.000 | 11.900 | 20.450 | 28.650 | 35.550 | 47.800 | 54.900 | 60.400 | 68.650 | 75.000 | 70.362 | 67.062 | 62.712 | 66.352 |
| Keesara | 8 | 71.000 | 69.300 | 59.100 | 50.500 | 42.000 | 36.000 | 30.300 | 20.800 | 11.900 | 0.000 | 8.550 | 16.750 | 23.650 | 35.900 | 43.000 | 48.500 | 56.750 | 63.100 | 71.350 | 74.650 | 74.612 | 78.252 |
| Ghatkesar | 9 | 74.112 | 75.760 | 67.650 | 59.050 | 50.550 | 44.550 | 38.850 | 29.350 | 20.450 | 8.550 | 0.000 | 8.200 | 15.100 | 27.350 | 34.450 | 39.950 | 48.200 | 54.550 | 62.800 | 66.100 | 70.450 | 76.610 |
| Taramptipet | 10 | 65.862 | 67.562 | 75.850 | 67.250 | 58.750 | 52.750 | 47.050 | 37.550 | 28.650 | 16.750 | 8.200 | 0.000 | 6.900 | 19.150 | 26.250 | 31.750 | 40.000 | 46.350 | 54.600 | 57.900 | 62.250 | 68.410 |
| Pedda Amberpet | 11 | 58.962 | 60.662 | 70.862 | 74.150 | 65.650 | 59.650 | 53.950 | 44.450 | 35.550 | 23.650 | 15.100 | 6.900 | 0.000 | 12.250 | 19.350 | 24.850 | 33.100 | 39.450 | 47.700 | 51.000 | 55.350 | 61.510 |
| Bonguluru | 12 | 46.712 | 48.412 | 58.612 | 67.212 | 75.712 | 71.900 | 66.200 | 56.700 | 47.800 | 35.900 | 27.350 | 19.150 | 12.250 | 0.000 | 7.100 | 12.600 | 20.850 | 27.200 | 35.450 | 38.750 | 43.100 | 49.260 |
| Raviryal | 13 | 39.612 | 41.312 | 51.512 | 60.112 | 68.612 | 74.612 | 73.300 | 63.800 | 54.900 | 43.000 | 34.450 | 26.250 | 19.350 | 7.100 | 0.000 | 5.500 | 13.750 | 20.100 | 28.350 | 31.650 | 36.000 | 42.160 |
| Tukkuguda | 14 | 34.112 | 35.812 | 46.012 | 54.612 | 63.112 | 69.112 | 74.812 | 69.300 | 60.400 | 48.500 | 39.950 | 31.750 | 24.850 | 12.600 | 5.500 | 0.000 | 8.250 | 14.600 | 22.850 | 26.150 | 30.500 | 36.660 |
| Pedda Golconda | 15 | 25.862 | 27.562 | 37.762 | 46.362 | 54.862 | 60.862 | 66.562 | 76.062 | 68.650 | 56.750 | 48.200 | 40.000 | 33.100 | 20.850 | 13.750 | 8.250 | 0.000 | 6.350 | 14.600 | 17.900 | 22.250 | 28.410 |
| Shamshabad | 16 | 19.512 | 21.212 | 31.412 | 40.012 | 48.512 | 54.512 | 60.212 | 69.712 | 75.000 | 63.100 | 54.550 | 46.350 | 39.450 | 27.200 | 20.100 | 14.600 | 6.350 | 0.000 | 8.250 | 11.550 | 15.900 | 22.060 |
| Rajendra Nagar | 17 | 11.262 | 12.962 | 23.162 | 31.762 | 40.262 | 46.262 | 51.962 | 61.462 | 70.362 | 71.350 | 62.800 | 54.600 | 47.700 | 35.450 | 28.350 | 22.850 | 14.600 | 8.250 | 0.000 | 3.300 | 7.650 | 13.810 |
| TSPA | 18 | 7.962 | 9.662 | 19.862 | 28.462 | 36.962 | 42.962 | 48.662 | 58.162 | 67.062 | 74.650 | 66.100 | 57.900 | 51.000 | 38.750 | 31.650 | 26.150 | 17.900 | 11.550 | 3.300 | 0.000 | 4.350 | 10.510 |
| Narsingi | 18A | 3.612 | 5.312 | 15.512 | 24.112 | 32.612 | 38.612 | 44.312 | 53.812 | 62.712 | 74.612 | 70.450 | 62.250 | 55.350 | 43.100 | 36.000 | 30.500 | 22.250 | 15.900 | 7.650 | 4.350 | 0.000 | 6.160 |
| Nanakramguda | 19 | 7.252 | 8.952 | 19.152 | 27.752 | 36.252 | 42.252 | 47.952 | 57.452 | 66.352 | 78.252 | 76.610 | 68.410 | 61.510 | 49.260 | 42.160 | 36.660 | 28.410 | 22.060 | 13.810 | 10.510 | 6.160 | 0.000 |

Accordingly on the basis of above tollable lengths, toll rates of various categories of vehicle at different toll plaza locations are calculated. The adopted Toll Rates for all categories of vehicles for base year are given tables below.

Single Journey

Table 5-3: Car/Jeep/Van Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 30 | 50 | 70 | 80 | 90 | 110 | 130 | 160 | 170 | 150 | 130 | 110 | 90 | 80 | 60 | 40 | 30 | 20 | 10 | 20 |
| 1A | 10 | 0 | 20 | 40 | 60 | 80 | 90 | 110 | 130 | 160 | 170 | 150 | 140 | 110 | 90 | 80 | 60 | 50 | 30 | 20 | 10 | 20 |
| 2 | 30 | 20 | 0 | 20 | 40 | 50 | 70 | 90 | 110 | 130 | 150 | 170 | 160 | 130 | 120 | 100 | 90 | 70 | 50 | 40 | 40 | 40 |
| 3 | 50 | 40 | 20 | 0 | 20 | 30 | 50 | 70 | 90 | 110 | 130 | 150 | 170 | 150 | 140 | 120 | 100 | 90 | 70 | 60 | 50 | 60 |
| 4 | 70 | 60 | 40 | 20 | 0 | 10 | 30 | 50 | 70 | 90 | 110 | 130 | 150 | 170 | 150 | 140 | 120 | 110 | 90 | 80 | 70 | 80 |
| 4A | 80 | 80 | 50 | 30 | 10 | 0 | 10 | 30 | 50 | 80 | 100 | 120 | 130 | 160 | 170 | 160 | 140 | 120 | 100 | 100 | 90 | 100 |
| 5 | 90 | 90 | 70 | 50 | 30 | 10 | 0 | 20 | 40 | 70 | 90 | 110 | 120 | 150 | 170 | 170 | 150 | 140 | 120 | 110 | 100 | 110 |
| 6 | 110 | 110 | 90 | 70 | 50 | 30 | 20 | 0 | 20 | 50 | 70 | 80 | 100 | 130 | 140 | 160 | 170 | 160 | 140 | 130 | 120 | 130 |
| 7 | 130 | 130 | 110 | 90 | 70 | 50 | 40 | 20 | 0 | 30 | 50 | 60 | 80 | 110 | 120 | 140 | 150 | 170 | 160 | 150 | 140 | 150 |
| 8 | 160 | 160 | 130 | 110 | 90 | 80 | 70 | 50 | 30 | 0 | 20 | 40 | 50 | 80 | 100 | 110 | 130 | 140 | 160 | 170 | 170 | 180 |
| 9 | 170 | 170 | 150 | 130 | 110 | 100 | 90 | 70 | 50 | 20 | 0 | 20 | 30 | 60 | 80 | 90 | 110 | 120 | 140 | 150 | 160 | 170 |
| 10 | 150 | 150 | 170 | 150 | 130 | 120 | 110 | 80 | 60 | 40 | 20 | 0 | 20 | 40 | 60 | 70 | 90 | 100 | 120 | 130 | 140 | 150 |
| 11 | 130 | 140 | 160 | 170 | 150 | 130 | 120 | 100 | 80 | 50 | 30 | 20 | 0 | 30 | 40 | 60 | 70 | 90 | 110 | 120 | 120 | 140 |
| 12 | 110 | 110 | 130 | 150 | 170 | 160 | 150 | 130 | 110 | 80 | 60 | 40 | 30 | 0 | 20 | 30 | 50 | 60 | 80 | 90 | 100 | 110 |
| 13 | 90 | 90 | 120 | 140 | 150 | 170 | 170 | 140 | 120 | 100 | 80 | 60 | 40 | 20 | 0 | 10 | 30 | 50 | 60 | 70 | 80 | 100 |
| 14 | 80 | 80 | 100 | 120 | 140 | 160 | 170 | 160 | 140 | 110 | 90 | 70 | 60 | 30 | 10 | 0 | 20 | 30 | 50 | 60 | 70 | 80 |
| 15 | 60 | 60 | 90 | 100 | 120 | 140 | 150 | 170 | 150 | 130 | 110 | 90 | 70 | 50 | 30 | 20 | 0 | 10 | 30 | 40 | 50 | 60 |
| 16 | 40 | 50 | 70 | 90 | 110 | 120 | 140 | 160 | 170 | 140 | 120 | 100 | 90 | 60 | 50 | 30 | 10 | 0 | 20 | 30 | 40 | 50 |
| 17 | 30 | 30 | 50 | 70 | 90 | 100 | 120 | 140 | 160 | 160 | 140 | 120 | 110 | 80 | 60 | 50 | 30 | 20 | 0 | 10 | 20 | 30 |
| 18 | 20 | 20 | 40 | 60 | 80 | 100 | 110 | 130 | 150 | 170 | 150 | 130 | 120 | 90 | 70 | 60 | 40 | 30 | 10 | 0 | 10 | 20 |
| 18A | 10 | 10 | 40 | 50 | 70 | 90 | 100 | 120 | 140 | 170 | 160 | 140 | 120 | 100 | 80 | 70 | 50 | 40 | 20 | 10 | 0 | 10 |
| 19 | 20 | 20 | 40 | 60 | 80 | 100 | 110 | 130 | 150 | 180 | 170 | 150 | 140 | 110 | 100 | 80 | 60 | 50 | 30 | 20 | 10 | 0 |

Table 5-4: Minibus/LCV Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 40 | 70 | 110 | 130 | 150 | 180 | 220 | 260 | 270 | 240 | 220 | 170 | 140 | 120 | 90 | 70 | 40 | 30 | 10 | 30 |
| 1A | 10 | 0 | 40 | 70 | 100 | 120 | 140 | 180 | 210 | 250 | 280 | 250 | 220 | 180 | 150 | 130 | 100 | 80 | 50 | 40 | 20 | 30 |
| 2 | 40 | 40 | 0 | 30 | 60 | 80 | 110 | 140 | 170 | 220 | 250 | 280 | 260 | 210 | 190 | 170 | 140 | 110 | 80 | 70 | 60 | 70 |
| 3 | 70 | 70 | 30 | 0 | 30 | 50 | 70 | 110 | 140 | 180 | 220 | 250 | 270 | 250 | 220 | 200 | 170 | 150 | 120 | 100 | 90 | 100 |
| 4 | 110 | 100 | 60 | 30 | 0 | 20 | 40 | 80 | 110 | 150 | 180 | 210 | 240 | 280 | 250 | 230 | 200 | 180 | 150 | 130 | 120 | 130 |
| 4A | 130 | 120 | 80 | 50 | 20 | 0 | 20 | 60 | 90 | 130 | 160 | 190 | 220 | 260 | 270 | 250 | 220 | 200 | 170 | 160 | 140 | 150 |
| 5 | 150 | 140 | 110 | 70 | 40 | 20 | 0 | 30 | 70 | 110 | 140 | 170 | 200 | 240 | 270 | 270 | 240 | 220 | 190 | 180 | 160 | 170 |
| 6 | 180 | 180 | 140 | 110 | 80 | 60 | 30 | 0 | 30 | 80 | 110 | 140 | 160 | 210 | 230 | 250 | 280 | 250 | 220 | 210 | 200 | 210 |
| 7 | 220 | 210 | 170 | 140 | 110 | 90 | 70 | 30 | 0 | 40 | 70 | 100 | 130 | 170 | 200 | 220 | 250 | 270 | 260 | 240 | 230 | 240 |
| 8 | 260 | 250 | 220 | 180 | 150 | 130 | 110 | 80 | 40 | 0 | 30 | 60 | 90 | 130 | 160 | 180 | 210 | 230 | 260 | 270 | 270 | 290 |
| 9 | 270 | 280 | 250 | 220 | 180 | 160 | 140 | 110 | 70 | 30 | 0 | 30 | 60 | 100 | 130 | 150 | 180 | 200 | 230 | 240 | 260 | 280 |
| 10 | 240 | 250 | 280 | 250 | 210 | 190 | 170 | 140 | 100 | 60 | 30 | 0 | 30 | 70 | 100 | 120 | 150 | 170 | 200 | 210 | 230 | 250 |
| 11 | 220 | 220 | 260 | 270 | 240 | 220 | 200 | 160 | 130 | 90 | 60 | 30 | 0 | 40 | 70 | 90 | 120 | 140 | 170 | 190 | 200 | 220 |
| 12 | 170 | 180 | 210 | 250 | 280 | 260 | 240 | 210 | 170 | 130 | 100 | 70 | 40 | 0 | 30 | 50 | 80 | 100 | 130 | 140 | 160 | 180 |
| 13 | 140 | 150 | 190 | 220 | 250 | 270 | 270 | 230 | 200 | 160 | 130 | 100 | 70 | 30 | 0 | 20 | 50 | 70 | 100 | 120 | 130 | 150 |
| 14 | 120 | 130 | 170 | 200 | 230 | 250 | 270 | 250 | 220 | 180 | 150 | 120 | 90 | 50 | 20 | 0 | 30 | 50 | 80 | 100 | 110 | 130 |
| 15 | 90 | 100 | 140 | 170 | 200 | 220 | 240 | 280 | 250 | 210 | 180 | 150 | 120 | 80 | 50 | 30 | 0 | 20 | 50 | 70 | 80 | 100 |
| 16 | 70 | 80 | 110 | 150 | 180 | 200 | 220 | 250 | 270 | 230 | 200 | 170 | 140 | 100 | 70 | 50 | 20 | 0 | 30 | 40 | 60 | 80 |
| 17 | 40 | 50 | 80 | 120 | 150 | 170 | 190 | 220 | 260 | 260 | 230 | 200 | 170 | 130 | 100 | 80 | 50 | 30 | 0 | 10 | 30 | 50 |
| 18 | 30 | 40 | 70 | 100 | 130 | 160 | 180 | 210 | 240 | 270 | 240 | 210 | 190 | 140 | 120 | 100 | 70 | 40 | 10 | 0 | 20 | 40 |
| 18A | 10 | 20 | 60 | 90 | 120 | 140 | 160 | 200 | 230 | 270 | 260 | 230 | 200 | 160 | 130 | 110 | 80 | 60 | 30 | 20 | 0 | 20 |
| 19 | 30 | 30 | 70 | 100 | 130 | 150 | 170 | 210 | 240 | 290 | 280 | 250 | 220 | 180 | 150 | 130 | 100 | 80 | 50 | 40 | 20 | 0 |

Table 5-5: Bus/2-axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 80 | 130 | 190 | 230 | 260 | 320 | 380 | 460 | 480 | 430 | 380 | 300 | 260 | 220 | 170 | 130 | 70 | 50 | 20 | 50 |
| 1A | 10 | 0 | 70 | 120 | 180 | 220 | 250 | 310 | 370 | 450 | 490 | 440 | 390 | 310 | 270 | 230 | 180 | 140 | 80 | 60 | 30 | 60 |
| 2 | 80 | 70 | 0 | 60 | 110 | 150 | 190 | 250 | 310 | 380 | 440 | 490 | 460 | 380 | 330 | 300 | 240 | 200 | 150 | 130 | 100 | 120 |
| 3 | 130 | 120 | 60 | 0 | 50 | 90 | 130 | 190 | 250 | 330 | 380 | 440 | 480 | 430 | 390 | 350 | 300 | 260 | 210 | 180 | 160 | 180 |
| 4 | 190 | 180 | 110 | 50 | 0 | 40 | 80 | 140 | 190 | 270 | 330 | 380 | 420 | 490 | 440 | 410 | 350 | 310 | 260 | 240 | 210 | 230 |
| 4A | 230 | 220 | 150 | 90 | 40 | 0 | 40 | 100 | 160 | 230 | 290 | 340 | 390 | 470 | 480 | 450 | 390 | 350 | 300 | 280 | 250 | 270 |
| 5 | 260 | 250 | 190 | 130 | 80 | 40 | 0 | 60 | 120 | 200 | 250 | 300 | 350 | 430 | 470 | 480 | 430 | 390 | 340 | 310 | 290 | 310 |
| 6 | 320 | 310 | 250 | 190 | 140 | 100 | 60 | 0 | 60 | 130 | 190 | 240 | 290 | 370 | 410 | 450 | 490 | 450 | 400 | 380 | 350 | 370 |
| 7 | 380 | 370 | 310 | 250 | 190 | 160 | 120 | 60 | 0 | 80 | 130 | 190 | 230 | 310 | 360 | 390 | 440 | 490 | 460 | 430 | 410 | 430 |
| 8 | 460 | 450 | 380 | 330 | 270 | 230 | 200 | 130 | 80 | 0 | 60 | 110 | 150 | 230 | 280 | 310 | 370 | 410 | 460 | 480 | 480 | 510 |
| 9 | 480 | 490 | 440 | 380 | 330 | 290 | 250 | 190 | 130 | 60 | 0 | 50 | 100 | 180 | 220 | 260 | 310 | 350 | 410 | 430 | 460 | 500 |
| 10 | 430 | 440 | 490 | 440 | 380 | 340 | 300 | 240 | 190 | 110 | 50 | 0 | 40 | 120 | 170 | 210 | 260 | 300 | 350 | 370 | 400 | 440 |
| 11 | 380 | 390 | 460 | 480 | 420 | 390 | 350 | 290 | 230 | 150 | 100 | 40 | 0 | 80 | 130 | 160 | 210 | 260 | 310 | 330 | 360 | 400 |
| 12 | 300 | 310 | 380 | 430 | 490 | 470 | 430 | 370 | 310 | 230 | 180 | 120 | 80 | 0 | 50 | 80 | 130 | 180 | 230 | 250 | 280 | 320 |
| 13 | 260 | 270 | 330 | 390 | 440 | 480 | 470 | 410 | 360 | 280 | 220 | 170 | 130 | 50 | 0 | 40 | 90 | 130 | 180 | 200 | 230 | 270 |
| 14 | 220 | 230 | 300 | 350 | 410 | 450 | 480 | 450 | 390 | 310 | 260 | 210 | 160 | 80 | 40 | 0 | 50 | 90 | 150 | 170 | 200 | 240 |
| 15 | 170 | 180 | 240 | 300 | 350 | 390 | 430 | 490 | 440 | 370 | 310 | 260 | 210 | 130 | 90 | 50 | 0 | 40 | 90 | 120 | 140 | 180 |
| 16 | 130 | 140 | 200 | 260 | 310 | 350 | 390 | 450 | 490 | 410 | 350 | 300 | 260 | 180 | 130 | 90 | 40 | 0 | 50 | 70 | 100 | 140 |
| 17 | 70 | 80 | 150 | 210 | 260 | 300 | 340 | 400 | 460 | 460 | 410 | 350 | 310 | 230 | 180 | 150 | 90 | 50 | 0 | 20 | 50 | 90 |
| 18 | 50 | 60 | 130 | 180 | 240 | 280 | 310 | 380 | 430 | 480 | 430 | 370 | 330 | 250 | 200 | 170 | 120 | 70 | 20 | 0 | 30 | 70 |
| 18A | 20 | 30 | 100 | 160 | 210 | 250 | 290 | 350 | 410 | 480 | 460 | 400 | 360 | 280 | 230 | 200 | 140 | 100 | 50 | 30 | 0 | 40 |
| 19 | 50 | 60 | 120 | 180 | 230 | 270 | 310 | 370 | 430 | 510 | 500 | 440 | 400 | 320 | 270 | 240 | 180 | 140 | 90 | 70 | 40 | 0 |

Table 5-6: 3-axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 100 | 170 | 240 | 290 | 340 | 420 | 490 | 590 | 620 | 550 | 490 | 390 | 330 | 280 | 220 | 160 | 90 | 70 | 30 | 60 |
| 1A | 10 | 0 | 90 | 160 | 230 | 280 | 330 | 400 | 480 | 580 | 630 | 560 | 510 | 400 | 340 | 300 | 230 | 180 | 110 | 80 | 40 | 70 |
| 2 | 100 | 90 | 0 | 70 | 140 | 190 | 240 | 320 | 390 | 490 | 560 | 630 | 590 | 490 | 430 | 380 | 310 | 260 | 190 | 170 | 130 | 160 |
| 3 | 170 | 160 | 70 | 0 | 70 | 120 | 170 | 250 | 320 | 420 | 490 | 560 | 620 | 560 | 500 | 460 | 390 | 330 | 260 | 240 | 200 | 230 |
| 4 | 240 | 230 | 140 | 70 | 0 | 50 | 100 | 180 | 250 | 350 | 420 | 490 | 550 | 630 | 570 | 530 | 460 | 400 | 340 | 310 | 270 | 300 |
| 4A | 290 | 280 | 190 | 120 | 50 | 0 | 50 | 130 | 200 | 300 | 370 | 440 | 500 | 600 | 620 | 580 | 510 | 450 | 390 | 360 | 320 | 350 |
| 5 | 340 | 330 | 240 | 170 | 100 | 50 | 0 | 80 | 150 | 250 | 320 | 390 | 450 | 550 | 610 | 620 | 550 | 500 | 430 | 410 | 370 | 400 |
| 6 | 420 | 400 | 320 | 250 | 180 | 130 | 80 | 0 | 70 | 170 | 240 | 310 | 370 | 470 | 530 | 580 | 630 | 580 | 510 | 480 | 450 | 480 |
| 7 | 490 | 480 | 390 | 320 | 250 | 200 | 150 | 70 | 0 | 100 | 170 | 240 | 300 | 400 | 460 | 500 | 570 | 630 | 590 | 560 | 520 | 550 |
| 8 | 590 | 580 | 490 | 420 | 350 | 300 | 250 | 170 | 100 | 0 | 70 | 140 | 200 | 300 | 360 | 400 | 470 | 530 | 590 | 620 | 620 | 650 |
| 9 | 620 | 630 | 560 | 490 | 420 | 370 | 320 | 240 | 170 | 70 | 0 | 70 | 130 | 230 | 290 | 330 | 400 | 450 | 520 | 550 | 590 | 640 |
| 10 | 550 | 560 | 630 | 560 | 490 | 440 | 390 | 310 | 240 | 140 | 70 | 0 | 60 | 160 | 220 | 260 | 330 | 390 | 460 | 480 | 520 | 570 |
| 11 | 490 | 510 | 590 | 620 | 550 | 500 | 450 | 370 | 300 | 200 | 130 | 60 | 0 | 100 | 160 | 210 | 280 | 330 | 400 | 430 | 460 | 510 |
| 12 | 390 | 400 | 490 | 560 | 630 | 600 | 550 | 470 | 400 | 300 | 230 | 160 | 100 | 0 | 60 | 110 | 170 | 230 | 300 | 320 | 360 | 410 |
| 13 | 330 | 340 | 430 | 500 | 570 | 620 | 610 | 530 | 460 | 360 | 290 | 220 | 160 | 60 | 0 | 50 | 110 | 170 | 240 | 260 | 300 | 350 |
| 14 | 280 | 300 | 380 | 460 | 530 | 580 | 620 | 580 | 500 | 400 | 330 | 260 | 210 | 110 | 50 | 0 | 70 | 120 | 190 | 220 | 250 | 310 |
| 15 | 220 | 230 | 310 | 390 | 460 | 510 | 550 | 630 | 570 | 470 | 400 | 330 | 280 | 170 | 110 | 70 | 0 | 50 | 120 | 150 | 190 | 240 |
| 16 | 160 | 180 | 260 | 330 | 400 | 450 | 500 | 580 | 630 | 530 | 450 | 390 | 330 | 230 | 170 | 120 | 50 | 0 | 70 | 100 | 130 | 180 |
| 17 | 90 | 110 | 190 | 260 | 340 | 390 | 430 | 510 | 590 | 590 | 520 | 460 | 400 | 300 | 240 | 190 | 120 | 70 | 0 | 30 | 60 | 120 |
| 18 | 70 | 80 | 170 | 240 | 310 | 360 | 410 | 480 | 560 | 620 | 550 | 480 | 430 | 320 | 260 | 220 | 150 | 100 | 30 | 0 | 40 | 90 |
| 18A | 30 | 40 | 130 | 200 | 270 | 320 | 370 | 450 | 520 | 620 | 590 | 520 | 460 | 360 | 300 | 250 | 190 | 130 | 60 | 40 | 0 | 50 |
| 19 | 60 | 70 | 160 | 230 | 300 | 350 | 400 | 480 | 550 | 650 | 640 | 570 | 510 | 410 | 350 | 310 | 240 | 180 | 120 | 90 | 50 | 0 |

Table 5-7: 4 to 6 axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 20 | 140 | 250 | 350 | 420 | 490 | 600 | 710 | 850 | 890 | 790 | 710 | 560 | 470 | 410 | 310 | 230 | 130 | 100 | 40 | 90 |
| 1A | 20 | 0 | 120 | 230 | 330 | 400 | 470 | 580 | 690 | 830 | 910 | 810 | 730 | 580 | 490 | 430 | 330 | 250 | 160 | 120 | 60 | 110 |
| 2 | 140 | 120 | 0 | 100 | 200 | 280 | 350 | 460 | 570 | 710 | 810 | 910 | 850 | 700 | 620 | 550 | 450 | 380 | 280 | 240 | 190 | 230 |
| 3 | 250 | 230 | 100 | 0 | 100 | 170 | 240 | 360 | 460 | 610 | 710 | 810 | 890 | 810 | 720 | 650 | 560 | 480 | 380 | 340 | 290 | 330 |
| 4 | 350 | 330 | 200 | 100 | 0 | 70 | 140 | 250 | 360 | 500 | 610 | 700 | 790 | 910 | 820 | 760 | 660 | 580 | 480 | 440 | 390 | 430 |
| 4A | 420 | 400 | 280 | 170 | 70 | 0 | 70 | 180 | 290 | 430 | 530 | 630 | 710 | 860 | 890 | 830 | 730 | 650 | 550 | 510 | 460 | 510 |
| 5 | 490 | 470 | 350 | 240 | 140 | 70 | 0 | 110 | 220 | 360 | 470 | 560 | 650 | 790 | 880 | 900 | 800 | 720 | 620 | 580 | 530 | 570 |
| 6 | 600 | 580 | 460 | 360 | 250 | 180 | 110 | 0 | 110 | 250 | 350 | 450 | 530 | 680 | 760 | 830 | 910 | 840 | 740 | 700 | 640 | 690 |
| 7 | 710 | 690 | 570 | 460 | 360 | 290 | 220 | 110 | 0 | 140 | 250 | 340 | 430 | 570 | 660 | 720 | 820 | 900 | 840 | 800 | 750 | 790 |
| 8 | 850 | 830 | 710 | 610 | 500 | 430 | 360 | 250 | 140 | 0 | 100 | 200 | 280 | 430 | 520 | 580 | 680 | 760 | 850 | 890 | 890 | 940 |
| 9 | 890 | 910 | 810 | 710 | 610 | 530 | 470 | 350 | 250 | 100 | 0 | 100 | 180 | 330 | 410 | 480 | 580 | 650 | 750 | 790 | 840 | 920 |
| 10 | 790 | 810 | 910 | 810 | 700 | 630 | 560 | 450 | 340 | 200 | 100 | 0 | 80 | 230 | 310 | 380 | 480 | 560 | 650 | 690 | 750 | 820 |
| 11 | 710 | 730 | 850 | 890 | 790 | 710 | 650 | 530 | 430 | 280 | 180 | 80 | 0 | 150 | 230 | 300 | 400 | 470 | 570 | 610 | 660 | 740 |
| 12 | 560 | 580 | 700 | 810 | 910 | 860 | 790 | 680 | 570 | 430 | 330 | 230 | 150 | 0 | 90 | 150 | 250 | 330 | 420 | 460 | 520 | 590 |
| 13 | 470 | 490 | 620 | 720 | 820 | 890 | 880 | 760 | 660 | 520 | 410 | 310 | 230 | 90 | 0 | 70 | 160 | 240 | 340 | 380 | 430 | 510 |
| 14 | 410 | 430 | 550 | 650 | 760 | 830 | 900 | 830 | 720 | 580 | 480 | 380 | 300 | 150 | 70 | 0 | 100 | 170 | 270 | 310 | 370 | 440 |
| 15 | 310 | 330 | 450 | 560 | 660 | 730 | 800 | 910 | 820 | 680 | 580 | 480 | 400 | 250 | 160 | 100 | 0 | 80 | 170 | 210 | 270 | 340 |
| 16 | 230 | 250 | 380 | 480 | 580 | 650 | 720 | 840 | 900 | 760 | 650 | 560 | 470 | 330 | 240 | 170 | 80 | 0 | 100 | 140 | 190 | 260 |
| 17 | 130 | 160 | 280 | 380 | 480 | 550 | 620 | 740 | 840 | 850 | 750 | 650 | 570 | 420 | 340 | 270 | 170 | 100 | 0 | 40 | 90 | 170 |
| 18 | 100 | 120 | 240 | 340 | 440 | 510 | 580 | 700 | 800 | 890 | 790 | 690 | 610 | 460 | 380 | 310 | 210 | 140 | 40 | 0 | 50 | 130 |
| 18A | 40 | 60 | 190 | 290 | 390 | 460 | 530 | 640 | 750 | 890 | 840 | 750 | 660 | 520 | 430 | 370 | 270 | 190 | 90 | 50 | 0 | 70 |
| 19 | 90 | 110 | 230 | 330 | 430 | 510 | 570 | 690 | 790 | 940 | 920 | 820 | 740 | 590 | 510 | 440 | 340 | 260 | 170 | 130 | 70 | 0 |

Table 5-8: 7 & above axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 0 | 20 | 170 | 300 | 420 | 510 | 590 | 730 | 860 | 1040 | 1080 | 960 | 860 | 680 | 580 | 500 | 380 | 280 | 160 | 120 | 50 | 110 |
| 1A | 20 | 0 | 150 | 270 | 400 | 490 | 570 | 710 | 840 | 1010 | 1110 | 990 | 880 | 710 | 600 | 520 | 400 | 310 | 190 | 140 | 80 | 130 |
| 2 | 170 | 150 | 0 | 130 | 250 | 340 | 420 | 560 | 690 | 860 | 990 | 1110 | 1030 | 850 | 750 | 670 | 550 | 460 | 340 | 290 | 230 | 280 |
| 3 | 300 | 270 | 130 | 0 | 120 | 210 | 290 | 430 | 560 | 740 | 860 | 980 | 1080 | 980 | 880 | 800 | 680 | 580 | 460 | 420 | 350 | 400 |
| 4 | 420 | 400 | 250 | 120 | 0 | 90 | 170 | 310 | 440 | 610 | 740 | 860 | 960 | 1100 | 1000 | 920 | 800 | 710 | 590 | 540 | 480 | 530 |
| 4A | 510 | 490 | 340 | 210 | 90 | 0 | 80 | 220 | 350 | 530 | 650 | 770 | 870 | 1050 | 1090 | 1010 | 890 | 800 | 670 | 630 | 560 | 620 |
| 5 | 590 | 570 | 420 | 290 | 170 | 80 | 0 | 140 | 270 | 440 | 570 | 690 | 790 | 970 | 1070 | 1090 | 970 | 880 | 760 | 710 | 650 | 700 |
| 6 | 730 | 710 | 560 | 430 | 310 | 220 | 140 | 0 | 130 | 300 | 430 | 550 | 650 | 830 | 930 | 1010 | 1110 | 1020 | 900 | 850 | 780 | 840 |
| 7 | 860 | 840 | 690 | 560 | 440 | 350 | 270 | 130 | 0 | 170 | 300 | 420 | 520 | 700 | 800 | 880 | 1000 | 1090 | 1030 | 980 | 910 | 970 |
| 8 | 1040 | 1010 | 860 | 740 | 610 | 530 | 440 | 300 | 170 | 0 | 120 | 240 | 340 | 520 | 630 | 710 | 830 | 920 | 1040 | 1090 | 1090 | 1140 |
| 9 | 1080 | 1110 | 990 | 860 | 740 | 650 | 570 | 430 | 300 | 120 | 0 | 120 | 220 | 400 | 500 | 580 | 700 | 800 | 920 | 960 | 1030 | 1120 |
| 10 | 960 | 990 | 1110 | 980 | 860 | 770 | 690 | 550 | 420 | 240 | 120 | 0 | 100 | 280 | 380 | 460 | 580 | 680 | 800 | 840 | 910 | 1000 |
| 11 | 860 | 880 | 1030 | 1080 | 960 | 870 | 790 | 650 | 520 | 340 | 220 | 100 | 0 | 180 | 280 | 360 | 480 | 580 | 700 | 740 | 810 | 900 |
| 12 | 680 | 710 | 850 | 980 | 1100 | 1050 | 970 | 830 | 700 | 520 | 400 | 280 | 180 | 0 | 100 | 180 | 300 | 400 | 520 | 570 | 630 | 720 |
| 13 | 580 | 600 | 750 | 880 | 1000 | 1090 | 1070 | 930 | 800 | 630 | 500 | 380 | 280 | 100 | 0 | 80 | 200 | 290 | 410 | 460 | 530 | 610 |
| 14 | 500 | 520 | 670 | 800 | 920 | 1010 | 1090 | 1010 | 880 | 710 | 580 | 460 | 360 | 180 | 80 | 0 | 120 | 210 | 330 | 380 | 440 | 530 |
| 15 | 380 | 400 | 550 | 680 | 800 | 890 | 970 | 1110 | 1000 | 830 | 700 | 580 | 480 | 300 | 200 | 120 | 0 | 90 | 210 | 260 | 320 | 410 |
| 16 | 280 | 310 | 460 | 580 | 710 | 800 | 880 | 1020 | 1090 | 920 | 800 | 680 | 580 | 400 | 290 | 210 | 90 | 0 | 120 | 170 | 230 | 320 |
| 17 | 160 | 190 | 340 | 460 | 590 | 670 | 760 | 900 | 1030 | 1040 | 920 | 800 | 700 | 520 | 410 | 330 | 210 | 120 | 0 | 50 | 110 | 200 |
| 18 | 120 | 140 | 290 | 420 | 540 | 630 | 710 | 850 | 980 | 1090 | 960 | 840 | 740 | 570 | 460 | 380 | 260 | 170 | 50 | 0 | 60 | 150 |
| 18A | 50 | 80 | 230 | 350 | 480 | 560 | 650 | 780 | 910 | 1090 | 1030 | 910 | 810 | 630 | 530 | 440 | 320 | 230 | 110 | 60 | 0 | 90 |
| 19 | 110 | 130 | 280 | 400 | 530 | 620 | 700 | 840 | 970 | 1140 | 1120 | 1000 | 900 | 720 | 610 | 530 | 410 | 320 | 200 | 150 | 90 | 0 |

Return Journey

Table 5-9: Car/Jeep/Van Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|
| 1 | 0 | 5 | 15 | 25 | 35 | 40 | 45 | 55 | 65 | 80 | 85 | 75 | 65 | 55 | 45 | 40 | 30 | 20 | 15 | 10 | 5 | 10 |
| 1A | 5 | 0 | 10 | 20 | 30 | 40 | 45 | 55 | 65 | 80 | 85 | 75 | 70 | 55 | 45 | 40 | 30 | 25 | 15 | 10 | 5 | 10 |
| 2 | 15 | 10 | 0 | 10 | 20 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 80 | 65 | 60 | 50 | 45 | 35 | 25 | 20 | 20 | 20 |
| 3 | 25 | 20 | 10 | 0 | 10 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 75 | 70 | 60 | 50 | 45 | 35 | 30 | 25 | 30 |
| 4 | 35 | 30 | 20 | 10 | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 75 | 70 | 60 | 55 | 45 | 40 | 35 | 40 |
| 4A | 40 | 40 | 25 | 15 | 5 | 0 | 5 | 15 | 25 | 40 | 50 | 60 | 65 | 80 | 85 | 80 | 70 | 60 | 50 | 50 | 45 | 50 |
| 5 | 45 | 45 | 35 | 25 | 15 | 5 | 0 | 10 | 20 | 35 | 45 | 55 | 60 | 75 | 85 | 85 | 75 | 70 | 60 | 55 | 50 | 55 |
| 6 | 55 | 55 | 45 | 35 | 25 | 15 | 10 | 0 | 10 | 25 | 35 | 40 | 50 | 65 | 70 | 80 | 85 | 80 | 70 | 65 | 60 | 65 |
| 7 | 65 | 65 | 55 | 45 | 35 | 25 | 20 | 10 | 0 | 15 | 25 | 30 | 40 | 55 | 60 | 70 | 75 | 85 | 80 | 75 | 70 | 75 |
| 8 | 80 | 80 | 65 | 55 | 45 | 40 | 35 | 25 | 15 | 0 | 10 | 20 | 25 | 40 | 50 | 55 | 65 | 70 | 80 | 85 | 85 | 90 |
| 9 | 85 | 85 | 75 | 65 | 55 | 50 | 45 | 35 | 25 | 10 | 0 | 10 | 15 | 30 | 40 | 45 | 55 | 60 | 70 | 75 | 80 | 85 |
| 10 | 75 | 75 | 85 | 75 | 65 | 60 | 55 | 40 | 30 | 20 | 10 | 0 | 10 | 20 | 30 | 35 | 45 | 50 | 60 | 65 | 70 | 75 |
| 11 | 65 | 70 | 80 | 85 | 75 | 65 | 60 | 50 | 40 | 25 | 15 | 10 | 0 | 15 | 20 | 30 | 35 | 45 | 55 | 60 | 60 | 70 |
| 12 | 55 | 55 | 65 | 75 | 85 | 80 | 75 | 65 | 55 | 40 | 30 | 20 | 15 | 0 | 10 | 15 | 25 | 30 | 40 | 45 | 50 | 55 |
| 13 | 45 | 45 | 60 | 70 | 75 | 85 | 85 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | 5 | 15 | 25 | 30 | 35 | 40 | 50 |
| 14 | 40 | 40 | 50 | 60 | 70 | 80 | 85 | 80 | 70 | 55 | 45 | 35 | 30 | 15 | 5 | 0 | 10 | 15 | 25 | 30 | 35 | 40 |
| 15 | 30 | 30 | 45 | 50 | 60 | 70 | 75 | 85 | 75 | 65 | 55 | 45 | 35 | 25 | 15 | 10 | 0 | 5 | 15 | 20 | 25 | 30 |
| 16 | 20 | 25 | 35 | 45 | 55 | 60 | 70 | 80 | 85 | 70 | 60 | 50 | 45 | 30 | 25 | 15 | 5 | 0 | 10 | 15 | 20 | 25 |
| 17 | 15 | 15 | 25 | 35 | 45 | 50 | 60 | 70 | 80 | 80 | 70 | 60 | 55 | 40 | 30 | 25 | 15 | 10 | 0 | 5 | 10 | 15 |
| 18 | 10 | 10 | 20 | 30 | 40 | 50 | 55 | 65 | 75 | 85 | 75 | 65 | 60 | 45 | 35 | 30 | 20 | 15 | 5 | 0 | 5 | 10 |
| 18A | 5 | 5 | 20 | 25 | 35 | 45 | 50 | 60 | 70 | 85 | 80 | 70 | 60 | 50 | 40 | 35 | 25 | 20 | 10 | 5 | 0 | 5 |
| 19 | 10 | 10 | 20 | 30 | 40 | 50 | 55 | 65 | 75 | 90 | 85 | 75 | 70 | 55 | 50 | 40 | 30 | 25 | 15 | 10 | 5 | 0 |

Table 5-10: Minibus/LCV Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 5 | 20 | 35 | 55 | 65 | 75 | 90 | 110 | 130 | 135 | 120 | 110 | 85 | 70 | 60 | 45 | 35 | 20 | 15 | 5 | 15 |
| 1A | 5 | 0 | 20 | 35 | 50 | 60 | 70 | 90 | 105 | 125 | 140 | 125 | 110 | 90 | 75 | 65 | 50 | 40 | 25 | 20 | 10 | 15 |
| 2 | 20 | 20 | 0 | 15 | 30 | 40 | 55 | 70 | 85 | 110 | 125 | 140 | 130 | 105 | 95 | 85 | 70 | 55 | 40 | 35 | 30 | 35 |
| 3 | 35 | 35 | 15 | 0 | 15 | 25 | 35 | 55 | 70 | 90 | 110 | 125 | 135 | 125 | 110 | 100 | 85 | 75 | 60 | 50 | 45 | 50 |
| 4 | 55 | 50 | 30 | 15 | 0 | 10 | 20 | 40 | 55 | 75 | 90 | 105 | 120 | 140 | 125 | 115 | 100 | 90 | 75 | 65 | 60 | 65 |
| 4A | 65 | 60 | 40 | 25 | 10 | 0 | 10 | 30 | 45 | 65 | 80 | 95 | 110 | 130 | 135 | 125 | 110 | 100 | 85 | 80 | 70 | 75 |
| 5 | 75 | 70 | 55 | 35 | 20 | 10 | 0 | 15 | 35 | 55 | 70 | 85 | 100 | 120 | 135 | 135 | 120 | 110 | 95 | 90 | 80 | 85 |
| 6 | 90 | 90 | 70 | 55 | 40 | 30 | 15 | 0 | 15 | 40 | 55 | 70 | 80 | 105 | 115 | 125 | 140 | 125 | 110 | 105 | 100 | 105 |
| 7 | 110 | 105 | 85 | 70 | 55 | 45 | 35 | 15 | 0 | 20 | 35 | 50 | 65 | 85 | 100 | 110 | 125 | 135 | 130 | 120 | 115 | 120 |
| 8 | 130 | 125 | 110 | 90 | 75 | 65 | 55 | 40 | 20 | 0 | 15 | 30 | 45 | 65 | 80 | 90 | 105 | 115 | 130 | 135 | 135 | 145 |
| 9 | 135 | 140 | 125 | 110 | 90 | 80 | 70 | 55 | 35 | 15 | 0 | 15 | 30 | 50 | 65 | 75 | 90 | 100 | 115 | 120 | 130 | 140 |
| 10 | 120 | 125 | 140 | 125 | 105 | 95 | 85 | 70 | 50 | 30 | 15 | 0 | 15 | 35 | 50 | 60 | 75 | 85 | 100 | 105 | 115 | 125 |
| 11 | 110 | 110 | 130 | 135 | 120 | 110 | 100 | 80 | 65 | 45 | 30 | 15 | 0 | 20 | 35 | 45 | 60 | 70 | 85 | 95 | 100 | 110 |
| 12 | 85 | 90 | 105 | 125 | 140 | 130 | 120 | 105 | 85 | 65 | 50 | 35 | 20 | 0 | 15 | 25 | 40 | 50 | 65 | 70 | 80 | 90 |
| 13 | 70 | 75 | 95 | 110 | 125 | 135 | 135 | 115 | 100 | 80 | 65 | 50 | 35 | 15 | 0 | 10 | 25 | 35 | 50 | 60 | 65 | 75 |
| 14 | 60 | 65 | 85 | 100 | 115 | 125 | 135 | 125 | 110 | 90 | 75 | 60 | 45 | 25 | 10 | 0 | 15 | 25 | 40 | 50 | 55 | 65 |
| 15 | 45 | 50 | 70 | 85 | 100 | 110 | 120 | 140 | 125 | 105 | 90 | 75 | 60 | 40 | 25 | 15 | 0 | 10 | 25 | 35 | 40 | 50 |
| 16 | 35 | 40 | 55 | 75 | 90 | 100 | 110 | 125 | 135 | 115 | 100 | 85 | 70 | 50 | 35 | 25 | 10 | 0 | 15 | 20 | 30 | 40 |
| 17 | 20 | 25 | 40 | 60 | 75 | 85 | 95 | 110 | 130 | 130 | 115 | 100 | 85 | 65 | 50 | 40 | 25 | 15 | 0 | 5 | 15 | 25 |
| 18 | 15 | 20 | 35 | 50 | 65 | 80 | 90 | 105 | 120 | 135 | 120 | 105 | 95 | 70 | 60 | 50 | 35 | 20 | 5 | 0 | 10 | 20 |
| 18A | 5 | 10 | 30 | 45 | 60 | 70 | 80 | 100 | 115 | 135 | 130 | 115 | 100 | 80 | 65 | 55 | 40 | 30 | 15 | 10 | 0 | 10 |
| 19 | 15 | 15 | 35 | 50 | 65 | 75 | 85 | 105 | 120 | 145 | 140 | 125 | 110 | 90 | 75 | 65 | 50 | 40 | 25 | 20 | 10 | 0 |

Table 5-11: Bus/2-axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 5 | 40 | 65 | 95 | 115 | 130 | 160 | 190 | 230 | 240 | 215 | 190 | 150 | 130 | 110 | 85 | 65 | 35 | 25 | 10 | 25 |
| 1A | 5 | 0 | 35 | 60 | 90 | 110 | 125 | 155 | 185 | 225 | 245 | 220 | 195 | 155 | 135 | 115 | 90 | 70 | 40 | 30 | 15 | 30 |
| 2 | 40 | 35 | 0 | 30 | 55 | 75 | 95 | 125 | 155 | 190 | 220 | 245 | 230 | 190 | 165 | 150 | 120 | 100 | 75 | 65 | 50 | 60 |
| 3 | 65 | 60 | 30 | 0 | 25 | 45 | 65 | 95 | 125 | 165 | 190 | 220 | 240 | 215 | 195 | 175 | 150 | 130 | 105 | 90 | 80 | 90 |
| 4 | 95 | 90 | 55 | 25 | 0 | 20 | 40 | 70 | 95 | 135 | 165 | 190 | 210 | 245 | 220 | 205 | 175 | 155 | 130 | 120 | 105 | 115 |
| 4A | 115 | 110 | 75 | 45 | 20 | 0 | 20 | 50 | 80 | 115 | 145 | 170 | 195 | 235 | 240 | 225 | 195 | 175 | 150 | 140 | 125 | 135 |
| 5 | 130 | 125 | 95 | 65 | 40 | 20 | 0 | 30 | 60 | 100 | 125 | 150 | 175 | 215 | 235 | 240 | 215 | 195 | 170 | 155 | 145 | 155 |
| 6 | 160 | 155 | 125 | 95 | 70 | 50 | 30 | 0 | 30 | 65 | 95 | 120 | 145 | 185 | 205 | 225 | 245 | 225 | 200 | 190 | 175 | 185 |
| 7 | 190 | 185 | 155 | 125 | 95 | 80 | 60 | 30 | 0 | 40 | 65 | 95 | 115 | 155 | 180 | 195 | 220 | 245 | 230 | 215 | 205 | 215 |
| 8 | 230 | 225 | 190 | 165 | 135 | 115 | 100 | 65 | 40 | 0 | 30 | 55 | 75 | 115 | 140 | 155 | 185 | 205 | 230 | 240 | 240 | 255 |
| 9 | 240 | 245 | 220 | 190 | 165 | 145 | 125 | 95 | 65 | 30 | 0 | 25 | 50 | 90 | 110 | 130 | 155 | 175 | 205 | 215 | 230 | 250 |
| 10 | 215 | 220 | 245 | 220 | 190 | 170 | 150 | 120 | 95 | 55 | 25 | 0 | 20 | 60 | 85 | 105 | 130 | 150 | 175 | 185 | 200 | 220 |
| 11 | 190 | 195 | 230 | 240 | 210 | 195 | 175 | 145 | 115 | 75 | 50 | 20 | 0 | 40 | 65 | 80 | 105 | 130 | 155 | 165 | 180 | 200 |
| 12 | 150 | 155 | 190 | 215 | 245 | 235 | 215 | 185 | 155 | 115 | 90 | 60 | 40 | 0 | 25 | 40 | 65 | 90 | 115 | 125 | 140 | 160 |
| 13 | 130 | 135 | 165 | 195 | 220 | 240 | 235 | 205 | 180 | 140 | 110 | 85 | 65 | 25 | 0 | 20 | 45 | 65 | 90 | 100 | 115 | 135 |
| 14 | 110 | 115 | 150 | 175 | 205 | 225 | 240 | 225 | 195 | 155 | 130 | 105 | 80 | 40 | 20 | 0 | 25 | 45 | 75 | 85 | 100 | 120 |
| 15 | 85 | 90 | 120 | 150 | 175 | 195 | 215 | 245 | 220 | 185 | 155 | 130 | 105 | 65 | 45 | 25 | 0 | 20 | 45 | 60 | 70 | 90 |
| 16 | 65 | 70 | 100 | 130 | 155 | 175 | 195 | 225 | 245 | 205 | 175 | 150 | 130 | 90 | 65 | 45 | 20 | 0 | 25 | 35 | 50 | 70 |
| 17 | 35 | 40 | 75 | 105 | 130 | 150 | 170 | 200 | 230 | 230 | 205 | 175 | 155 | 115 | 90 | 75 | 45 | 25 | 0 | 10 | 25 | 45 |
| 18 | 25 | 30 | 65 | 90 | 120 | 140 | 155 | 190 | 215 | 240 | 215 | 185 | 165 | 125 | 100 | 85 | 60 | 35 | 10 | 0 | 15 | 35 |
| 18A | 10 | 15 | 50 | 80 | 105 | 125 | 145 | 175 | 205 | 240 | 230 | 200 | 180 | 140 | 115 | 100 | 70 | 50 | 25 | 15 | 0 | 20 |
| 19 | 25 | 30 | 60 | 90 | 115 | 135 | 155 | 185 | 215 | 255 | 250 | 220 | 200 | 160 | 135 | 120 | 90 | 70 | 45 | 35 | 20 | 0 |

Table 5-12: 3-axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 5 | 50 | 85 | 120 | 145 | 170 | 210 | 245 | 295 | 310 | 275 | 245 | 195 | 165 | 140 | 110 | 80 | 45 | 35 | 15 | 30 |
| 1A | 5 | 0 | 45 | 80 | 115 | 140 | 165 | 200 | 240 | 290 | 315 | 280 | 255 | 200 | 170 | 150 | 115 | 90 | 55 | 40 | 20 | 35 |
| 2 | 50 | 45 | 0 | 35 | 70 | 95 | 120 | 160 | 195 | 245 | 280 | 315 | 295 | 245 | 215 | 190 | 155 | 130 | 95 | 85 | 65 | 80 |
| 3 | 85 | 80 | 35 | 0 | 35 | 60 | 85 | 125 | 160 | 210 | 245 | 280 | 310 | 280 | 250 | 230 | 195 | 165 | 130 | 120 | 100 | 115 |
| 4 | 120 | 115 | 70 | 35 | 0 | 25 | 50 | 90 | 125 | 175 | 210 | 245 | 275 | 315 | 285 | 265 | 230 | 200 | 170 | 155 | 135 | 150 |
| 4A | 145 | 140 | 95 | 60 | 25 | 0 | 25 | 65 | 100 | 150 | 185 | 220 | 250 | 300 | 310 | 290 | 255 | 225 | 195 | 180 | 160 | 175 |
| 5 | 170 | 165 | 120 | 85 | 50 | 25 | 0 | 40 | 75 | 125 | 160 | 195 | 225 | 275 | 305 | 310 | 275 | 250 | 215 | 205 | 185 | 200 |
| 6 | 210 | 200 | 160 | 125 | 90 | 65 | 40 | 0 | 35 | 85 | 120 | 155 | 185 | 235 | 265 | 290 | 315 | 290 | 255 | 240 | 225 | 240 |
| 7 | 245 | 240 | 195 | 160 | 125 | 100 | 75 | 35 | 0 | 50 | 85 | 120 | 150 | 200 | 230 | 250 | 285 | 315 | 295 | 280 | 260 | 275 |
| 8 | 295 | 290 | 245 | 210 | 175 | 150 | 125 | 85 | 50 | 0 | 35 | 70 | 100 | 150 | 180 | 200 | 235 | 265 | 295 | 310 | 310 | 325 |
| 9 | 310 | 315 | 280 | 245 | 210 | 185 | 160 | 120 | 85 | 35 | 0 | 35 | 65 | 115 | 145 | 165 | 200 | 225 | 260 | 275 | 295 | 320 |
| 10 | 275 | 280 | 315 | 280 | 245 | 220 | 195 | 155 | 120 | 70 | 35 | 0 | 30 | 80 | 110 | 130 | 165 | 195 | 230 | 240 | 260 | 285 |
| 11 | 245 | 255 | 295 | 310 | 275 | 250 | 225 | 185 | 150 | 100 | 65 | 30 | 0 | 50 | 80 | 105 | 140 | 165 | 200 | 215 | 230 | 255 |
| 12 | 195 | 200 | 245 | 280 | 315 | 300 | 275 | 235 | 200 | 150 | 115 | 80 | 50 | 0 | 30 | 55 | 85 | 115 | 150 | 160 | 180 | 205 |
| 13 | 165 | 170 | 215 | 250 | 285 | 310 | 305 | 265 | 230 | 180 | 145 | 110 | 80 | 30 | 0 | 25 | 55 | 85 | 120 | 130 | 150 | 175 |
| 14 | 140 | 150 | 190 | 230 | 265 | 290 | 310 | 290 | 250 | 200 | 165 | 130 | 105 | 55 | 25 | 0 | 35 | 60 | 95 | 110 | 125 | 155 |
| 15 | 110 | 115 | 155 | 195 | 230 | 255 | 275 | 315 | 285 | 235 | 200 | 165 | 140 | 85 | 55 | 35 | 0 | 25 | 60 | 75 | 95 | 120 |
| 16 | 80 | 90 | 130 | 165 | 200 | 225 | 250 | 290 | 315 | 265 | 225 | 195 | 165 | 115 | 85 | 60 | 25 | 0 | 35 | 50 | 65 | 90 |
| 17 | 45 | 55 | 95 | 130 | 170 | 195 | 215 | 255 | 295 | 295 | 260 | 230 | 200 | 150 | 120 | 95 | 60 | 35 | 0 | 15 | 30 | 60 |
| 18 | 35 | 40 | 85 | 120 | 155 | 180 | 205 | 240 | 280 | 310 | 275 | 240 | 215 | 160 | 130 | 110 | 75 | 50 | 15 | 0 | 20 | 45 |
| 18A | 15 | 20 | 65 | 100 | 135 | 160 | 185 | 225 | 260 | 310 | 295 | 260 | 230 | 180 | 150 | 125 | 95 | 65 | 30 | 20 | 0 | 25 |
| 19 | 30 | 35 | 80 | 115 | 150 | 175 | 200 | 240 | 275 | 325 | 320 | 285 | 255 | 205 | 175 | 155 | 120 | 90 | 60 | 45 | 25 | 0 |

Table 5-13: 4 to 6 axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 70 | 125 | 175 | 210 | 245 | 300 | 355 | 425 | 445 | 395 | 355 | 280 | 235 | 205 | 155 | 115 | 65 | 50 | 20 | 45 |
| 1A | 10 | 0 | 60 | 115 | 165 | 200 | 235 | 290 | 345 | 415 | 455 | 405 | 365 | 290 | 245 | 215 | 165 | 125 | 80 | 60 | 30 | 55 |
| 2 | 70 | 60 | 0 | 50 | 100 | 140 | 175 | 230 | 285 | 355 | 405 | 455 | 425 | 350 | 310 | 275 | 225 | 190 | 140 | 120 | 95 | 115 |
| 3 | 125 | 115 | 50 | 0 | 50 | 85 | 120 | 180 | 230 | 305 | 355 | 405 | 445 | 405 | 360 | 325 | 280 | 240 | 190 | 170 | 145 | 165 |
| 4 | 175 | 165 | 100 | 50 | 0 | 35 | 70 | 125 | 180 | 250 | 305 | 350 | 395 | 455 | 410 | 380 | 330 | 290 | 240 | 220 | 195 | 215 |
| 4A | 210 | 200 | 140 | 85 | 35 | 0 | 35 | 90 | 145 | 215 | 265 | 315 | 355 | 430 | 445 | 415 | 365 | 325 | 275 | 255 | 230 | 255 |
| 5 | 245 | 235 | 175 | 120 | 70 | 35 | 0 | 55 | 110 | 180 | 235 | 280 | 325 | 395 | 440 | 450 | 400 | 360 | 310 | 290 | 265 | 285 |
| 6 | 300 | 290 | 230 | 180 | 125 | 90 | 55 | 0 | 55 | 125 | 175 | 225 | 265 | 340 | 380 | 415 | 455 | 420 | 370 | 350 | 320 | 345 |
| 7 | 355 | 345 | 285 | 230 | 180 | 145 | 110 | 55 | 0 | 70 | 125 | 170 | 215 | 285 | 330 | 360 | 410 | 450 | 420 | 400 | 375 | 395 |
| 8 | 425 | 415 | 355 | 305 | 250 | 215 | 180 | 125 | 70 | 0 | 50 | 100 | 140 | 215 | 260 | 290 | 340 | 380 | 425 | 445 | 445 | 470 |
| 9 | 445 | 455 | 405 | 355 | 305 | 265 | 235 | 175 | 125 | 50 | 0 | 50 | 90 | 165 | 205 | 240 | 290 | 325 | 375 | 395 | 420 | 460 |
| 10 | 395 | 405 | 455 | 405 | 350 | 315 | 280 | 225 | 170 | 100 | 50 | 0 | 40 | 115 | 155 | 190 | 240 | 280 | 325 | 345 | 375 | 410 |
| 11 | 355 | 365 | 425 | 445 | 395 | 355 | 325 | 265 | 215 | 140 | 90 | 40 | 0 | 75 | 115 | 150 | 200 | 235 | 285 | 305 | 330 | 370 |
| 12 | 280 | 290 | 350 | 405 | 455 | 430 | 395 | 340 | 285 | 215 | 165 | 115 | 75 | 0 | 45 | 75 | 125 | 165 | 210 | 230 | 260 | 295 |
| 13 | 235 | 245 | 310 | 360 | 410 | 445 | 440 | 380 | 330 | 260 | 205 | 155 | 115 | 45 | 0 | 35 | 80 | 120 | 170 | 190 | 215 | 255 |
| 14 | 205 | 215 | 275 | 325 | 380 | 415 | 450 | 415 | 360 | 290 | 240 | 190 | 150 | 75 | 35 | 0 | 50 | 85 | 135 | 155 | 185 | 220 |
| 15 | 155 | 165 | 225 | 280 | 330 | 365 | 400 | 455 | 410 | 340 | 290 | 240 | 200 | 125 | 80 | 50 | 0 | 40 | 85 | 105 | 135 | 170 |
| 16 | 115 | 125 | 190 | 240 | 290 | 325 | 360 | 420 | 450 | 380 | 325 | 280 | 235 | 165 | 120 | 85 | 40 | 0 | 50 | 70 | 95 | 130 |
| 17 | 65 | 80 | 140 | 190 | 240 | 275 | 310 | 370 | 420 | 425 | 375 | 325 | 285 | 210 | 170 | 135 | 85 | 50 | 0 | 20 | 45 | 85 |
| 18 | 50 | 60 | 120 | 170 | 220 | 255 | 290 | 350 | 400 | 445 | 395 | 345 | 305 | 230 | 190 | 155 | 105 | 70 | 20 | 0 | 25 | 65 |
| 18A | 20 | 30 | 95 | 145 | 195 | 230 | 265 | 320 | 375 | 445 | 420 | 375 | 330 | 260 | 215 | 185 | 135 | 95 | 45 | 25 | 0 | 35 |
| 19 | 45 | 55 | 115 | 165 | 215 | 255 | 285 | 345 | 395 | 470 | 460 | 410 | 370 | 295 | 255 | 220 | 170 | 130 | 85 | 65 | 35 | 0 |

Table 5-14: 7 & above axle Toll Rates for Year 2023-2024 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 85 | 150 | 210 | 255 | 295 | 365 | 430 | 520 | 540 | 480 | 430 | 340 | 290 | 250 | 190 | 140 | 80 | 60 | 25 | 55 |
| 1A | 10 | 0 | 75 | 135 | 200 | 245 | 285 | 355 | 420 | 505 | 555 | 495 | 440 | 355 | 300 | 260 | 200 | 155 | 95 | 70 | 40 | 65 |
| 2 | 85 | 75 | 0 | 65 | 125 | 170 | 210 | 280 | 345 | 430 | 495 | 555 | 515 | 425 | 375 | 335 | 275 | 230 | 170 | 145 | 115 | 140 |
| 3 | 150 | 135 | 65 | 0 | 60 | 105 | 145 | 215 | 280 | 370 | 430 | 490 | 540 | 490 | 440 | 400 | 340 | 290 | 230 | 210 | 175 | 200 |
| 4 | 210 | 200 | 125 | 60 | 0 | 45 | 85 | 155 | 220 | 305 | 370 | 430 | 480 | 550 | 500 | 460 | 400 | 355 | 295 | 270 | 240 | 265 |
| 4A | 255 | 245 | 170 | 105 | 45 | 0 | 40 | 110 | 175 | 265 | 325 | 385 | 435 | 525 | 545 | 505 | 445 | 400 | 335 | 315 | 280 | 310 |
| 5 | 295 | 285 | 210 | 145 | 85 | 40 | 0 | 70 | 135 | 220 | 285 | 345 | 395 | 485 | 535 | 545 | 485 | 440 | 380 | 355 | 325 | 350 |
| 6 | 365 | 355 | 280 | 215 | 155 | 110 | 70 | 0 | 65 | 150 | 215 | 275 | 325 | 415 | 465 | 505 | 555 | 510 | 450 | 425 | 390 | 420 |
| 7 | 430 | 420 | 345 | 280 | 220 | 175 | 135 | 65 | 0 | 85 | 150 | 210 | 260 | 350 | 400 | 440 | 500 | 545 | 515 | 490 | 455 | 485 |
| 8 | 520 | 505 | 430 | 370 | 305 | 265 | 220 | 150 | 85 | 0 | 60 | 120 | 170 | 260 | 315 | 355 | 415 | 460 | 520 | 545 | 545 | 570 |
| 9 | 540 | 555 | 495 | 430 | 370 | 325 | 285 | 215 | 150 | 60 | 0 | 60 | 110 | 200 | 250 | 290 | 350 | 400 | 460 | 480 | 515 | 560 |
| 10 | 480 | 495 | 555 | 490 | 430 | 385 | 345 | 275 | 210 | 120 | 60 | 0 | 50 | 140 | 190 | 230 | 290 | 340 | 400 | 420 | 455 | 500 |
| 11 | 430 | 440 | 515 | 540 | 480 | 435 | 395 | 325 | 260 | 170 | 110 | 50 | 0 | 90 | 140 | 180 | 240 | 290 | 350 | 370 | 405 | 450 |
| 12 | 340 | 355 | 425 | 490 | 550 | 525 | 485 | 415 | 350 | 260 | 200 | 140 | 90 | 0 | 50 | 90 | 150 | 200 | 260 | 285 | 315 | 360 |
| 13 | 290 | 300 | 375 | 440 | 500 | 545 | 535 | 465 | 400 | 315 | 250 | 190 | 140 | 50 | 0 | 40 | 100 | 145 | 205 | 230 | 265 | 305 |
| 14 | 250 | 260 | 335 | 400 | 460 | 505 | 545 | 505 | 440 | 355 | 290 | 230 | 180 | 90 | 40 | 0 | 60 | 105 | 165 | 190 | 220 | 265 |
| 15 | 190 | 200 | 275 | 340 | 400 | 445 | 485 | 555 | 500 | 415 | 350 | 290 | 240 | 150 | 100 | 60 | 0 | 45 | 105 | 130 | 160 | 205 |
| 16 | 140 | 155 | 230 | 290 | 355 | 400 | 440 | 510 | 545 | 460 | 400 | 340 | 290 | 200 | 145 | 105 | 45 | 0 | 60 | 85 | 115 | 160 |
| 17 | 80 | 95 | 170 | 230 | 295 | 335 | 380 | 450 | 515 | 520 | 460 | 400 | 350 | 260 | 205 | 165 | 105 | 60 | 0 | 25 | 55 | 100 |
| 18 | 60 | 70 | 145 | 210 | 270 | 315 | 355 | 425 | 490 | 545 | 480 | 420 | 370 | 285 | 230 | 190 | 130 | 85 | 25 | 0 | 30 | 75 |
| 18A | 25 | 40 | 115 | 175 | 240 | 280 | 325 | 390 | 455 | 545 | 515 | 455 | 405 | 315 | 265 | 220 | 160 | 115 | 55 | 30 | 0 | 45 |
| 19 | 55 | 65 | 140 | 200 | 265 | 310 | 350 | 420 | 485 | 570 | 560 | 500 | 450 | 360 | 305 | 265 | 205 | 160 | 100 | 75 | 45 | 0 |

Single Journey

Table 5-15: Car/Jeep/Van Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 30 | 50 | 70 | 80 | 100 | 120 | 140 | 170 | 170 | 150 | 140 | 110 | 90 | 80 | 60 | 50 | 30 | 20 | 10 | 20 |
| 1A | 10 | 0 | 20 | 40 | 60 | 80 | 90 | 110 | 130 | 160 | 180 | 160 | 140 | 110 | 100 | 80 | 60 | 50 | 30 | 20 | 10 | 20 |
| 2 | 30 | 20 | 0 | 20 | 40 | 50 | 70 | 90 | 110 | 140 | 160 | 180 | 170 | 140 | 120 | 110 | 90 | 70 | 50 | 50 | 40 | 40 |
| 3 | 50 | 40 | 20 | 0 | 20 | 30 | 50 | 70 | 90 | 120 | 140 | 160 | 170 | 160 | 140 | 130 | 110 | 90 | 70 | 70 | 60 | 60 |
| 4 | 70 | 60 | 40 | 20 | 0 | 10 | 30 | 50 | 70 | 100 | 120 | 140 | 150 | 180 | 160 | 150 | 130 | 110 | 90 | 90 | 80 | 80 |
| 4A | 80 | 80 | 50 | 30 | 10 | 0 | 10 | 40 | 60 | 80 | 100 | 120 | 140 | 170 | 170 | 160 | 140 | 130 | 110 | 100 | 90 | 100 |
| 5 | 100 | 90 | 70 | 50 | 30 | 10 | 0 | 20 | 40 | 70 | 90 | 110 | 130 | 150 | 170 | 170 | 160 | 140 | 120 | 110 | 100 | 110 |
| 6 | 120 | 110 | 90 | 70 | 50 | 40 | 20 | 0 | 20 | 50 | 70 | 90 | 100 | 130 | 150 | 160 | 180 | 160 | 140 | 140 | 130 | 130 |
| 7 | 140 | 130 | 110 | 90 | 70 | 60 | 40 | 20 | 0 | 30 | 50 | 70 | 80 | 110 | 130 | 140 | 160 | 180 | 160 | 160 | 150 | 160 |
| 8 | 170 | 160 | 140 | 120 | 100 | 80 | 70 | 50 | 30 | 0 | 20 | 40 | 60 | 80 | 100 | 110 | 130 | 150 | 170 | 170 | 170 | 180 |
| 9 | 170 | 180 | 160 | 140 | 120 | 100 | 90 | 70 | 50 | 20 | 0 | 20 | 40 | 60 | 80 | 90 | 110 | 130 | 150 | 150 | 160 | 180 |
| 10 | 150 | 160 | 180 | 160 | 140 | 120 | 110 | 90 | 70 | 40 | 20 | 0 | 20 | 40 | 60 | 70 | 90 | 110 | 130 | 140 | 150 | 160 |
| 11 | 140 | 140 | 170 | 170 | 150 | 140 | 130 | 100 | 80 | 60 | 40 | 20 | 0 | 30 | 50 | 60 | 80 | 90 | 110 | 120 | 130 | 140 |
| 12 | 110 | 110 | 140 | 160 | 180 | 170 | 150 | 130 | 110 | 80 | 60 | 40 | 30 | 0 | 20 | 30 | 50 | 60 | 80 | 90 | 100 | 120 |
| 13 | 90 | 100 | 120 | 140 | 160 | 170 | 170 | 150 | 130 | 100 | 80 | 60 | 50 | 20 | 0 | 10 | 30 | 50 | 70 | 70 | 80 | 100 |
| 14 | 80 | 80 | 110 | 130 | 150 | 160 | 170 | 160 | 140 | 110 | 90 | 70 | 60 | 30 | 10 | 0 | 20 | 30 | 50 | 60 | 70 | 90 |
| 15 | 60 | 60 | 90 | 110 | 130 | 140 | 160 | 180 | 160 | 130 | 110 | 90 | 80 | 50 | 30 | 20 | 0 | 10 | 30 | 40 | 50 | 70 |
| 16 | 50 | 50 | 70 | 90 | 110 | 130 | 140 | 160 | 180 | 150 | 130 | 110 | 90 | 60 | 50 | 30 | 10 | 0 | 20 | 30 | 40 | 50 |
| 17 | 30 | 30 | 50 | 70 | 90 | 110 | 120 | 140 | 160 | 170 | 150 | 130 | 110 | 80 | 70 | 50 | 30 | 20 | 0 | 10 | 20 | 30 |
| 18 | 20 | 20 | 50 | 70 | 90 | 100 | 110 | 140 | 160 | 170 | 150 | 140 | 120 | 90 | 70 | 60 | 40 | 30 | 10 | 0 | 10 | 20 |
| 18A | 10 | 10 | 40 | 60 | 80 | 90 | 100 | 130 | 150 | 170 | 160 | 150 | 130 | 100 | 80 | 70 | 50 | 40 | 20 | 10 | 0 | 10 |
| 19 | 20 | 20 | 40 | 60 | 80 | 100 | 110 | 130 | 160 | 180 | 180 | 160 | 140 | 120 | 100 | 90 | 70 | 50 | 30 | 20 | 10 | 0 |

Table 5-16: Minibus/LCV Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 40 | 80 | 110 | 130 | 150 | 190 | 220 | 270 | 280 | 250 | 220 | 180 | 150 | 130 | 100 | 70 | 40 | 30 | 10 | 30 |
| 1A | 10 | 0 | 40 | 70 | 100 | 130 | 150 | 180 | 220 | 260 | 290 | 260 | 230 | 180 | 160 | 140 | 100 | 80 | 50 | 40 | 20 | 30 |
| 2 | 40 | 40 | 0 | 30 | 60 | 90 | 110 | 140 | 180 | 220 | 260 | 290 | 270 | 220 | 190 | 170 | 140 | 120 | 90 | 80 | 60 | 70 |
| 3 | 80 | 70 | 30 | 0 | 30 | 50 | 80 | 110 | 150 | 190 | 220 | 250 | 280 | 250 | 230 | 210 | 180 | 150 | 120 | 110 | 90 | 100 |
| 4 | 110 | 100 | 60 | 30 | 0 | 20 | 40 | 80 | 110 | 160 | 190 | 220 | 250 | 290 | 260 | 240 | 210 | 180 | 150 | 140 | 120 | 140 |
| 4A | 130 | 130 | 90 | 50 | 20 | 0 | 20 | 60 | 90 | 140 | 170 | 200 | 230 | 270 | 280 | 260 | 230 | 210 | 170 | 160 | 150 | 160 |
| 5 | 150 | 150 | 110 | 80 | 40 | 20 | 0 | 40 | 70 | 110 | 150 | 180 | 200 | 250 | 280 | 280 | 250 | 230 | 200 | 180 | 170 | 180 |
| 6 | 190 | 180 | 140 | 110 | 80 | 60 | 40 | 0 | 30 | 80 | 110 | 140 | 170 | 210 | 240 | 260 | 290 | 260 | 230 | 220 | 200 | 220 |
| 7 | 220 | 220 | 180 | 150 | 110 | 90 | 70 | 30 | 0 | 40 | 80 | 110 | 130 | 180 | 210 | 230 | 260 | 280 | 270 | 250 | 240 | 250 |
| 8 | 270 | 260 | 220 | 190 | 160 | 140 | 110 | 80 | 40 | 0 | 30 | 60 | 90 | 140 | 160 | 180 | 210 | 240 | 270 | 280 | 280 | 300 |
| 9 | 280 | 290 | 260 | 220 | 190 | 170 | 150 | 110 | 80 | 30 | 0 | 30 | 60 | 100 | 130 | 150 | 180 | 210 | 240 | 250 | 270 | 290 |
| 10 | 250 | 260 | 290 | 250 | 220 | 200 | 180 | 140 | 110 | 60 | 30 | 0 | 30 | 70 | 100 | 120 | 150 | 180 | 210 | 220 | 240 | 260 |
| 11 | 220 | 230 | 270 | 280 | 250 | 230 | 200 | 170 | 130 | 90 | 60 | 30 | 0 | 50 | 70 | 90 | 130 | 150 | 180 | 190 | 210 | 230 |
| 12 | 180 | 180 | 220 | 250 | 290 | 270 | 250 | 210 | 180 | 140 | 100 | 70 | 50 | 0 | 30 | 50 | 80 | 100 | 130 | 150 | 160 | 190 |
| 13 | 150 | 160 | 190 | 230 | 260 | 280 | 280 | 240 | 210 | 160 | 130 | 100 | 70 | 30 | 0 | 20 | 50 | 80 | 110 | 120 | 140 | 160 |
| 14 | 130 | 140 | 170 | 210 | 240 | 260 | 280 | 260 | 230 | 180 | 150 | 120 | 90 | 50 | 20 | 0 | 30 | 60 | 90 | 100 | 120 | 140 |
| 15 | 100 | 100 | 140 | 180 | 210 | 230 | 250 | 290 | 260 | 210 | 180 | 150 | 130 | 80 | 50 | 30 | 0 | 20 | 60 | 70 | 80 | 110 |
| 16 | 70 | 80 | 120 | 150 | 180 | 210 | 230 | 260 | 280 | 240 | 210 | 180 | 150 | 100 | 80 | 60 | 20 | 0 | 30 | 40 | 60 | 80 |
| 17 | 40 | 50 | 90 | 120 | 150 | 170 | 200 | 230 | 270 | 270 | 240 | 210 | 180 | 130 | 110 | 90 | 60 | 30 | 0 | 10 | 30 | 50 |
| 18 | 30 | 40 | 80 | 110 | 140 | 160 | 180 | 220 | 250 | 280 | 250 | 220 | 190 | 150 | 120 | 100 | 70 | 40 | 10 | 0 | 20 | 40 |
| 18A | 10 | 20 | 60 | 90 | 120 | 150 | 170 | 200 | 240 | 280 | 270 | 240 | 210 | 160 | 140 | 120 | 80 | 60 | 30 | 20 | 0 | 20 |
| 19 | 30 | 30 | 70 | 100 | 140 | 160 | 180 | 220 | 250 | 300 | 290 | 260 | 230 | 190 | 160 | 140 | 110 | 80 | 50 | 40 | 20 | 0 |

Table 5-17: Bus/2-axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 80 | 140 | 190 | 230 | 270 | 340 | 400 | 480 | 500 | 440 | 400 | 310 | 270 | 230 | 170 | 130 | 80 | 50 | 20 | 50 |
| 1A | 10 | 0 | 70 | 130 | 180 | 220 | 260 | 330 | 380 | 460 | 510 | 450 | 410 | 320 | 280 | 240 | 180 | 140 | 90 | 60 | 40 | 60 |
| 2 | 80 | 70 | 0 | 60 | 110 | 150 | 190 | 260 | 320 | 400 | 450 | 510 | 470 | 390 | 350 | 310 | 250 | 210 | 160 | 130 | 100 | 130 |
| 3 | 140 | 130 | 60 | 0 | 60 | 100 | 140 | 200 | 260 | 340 | 400 | 450 | 500 | 450 | 400 | 370 | 310 | 270 | 210 | 190 | 160 | 190 |
| 4 | 190 | 180 | 110 | 60 | 0 | 40 | 80 | 140 | 200 | 280 | 340 | 390 | 440 | 510 | 460 | 420 | 370 | 330 | 270 | 250 | 220 | 240 |
| 4A | 230 | 220 | 150 | 100 | 40 | 0 | 40 | 100 | 160 | 240 | 300 | 350 | 400 | 480 | 500 | 460 | 410 | 370 | 310 | 290 | 260 | 280 |
| 5 | 270 | 260 | 190 | 140 | 80 | 40 | 0 | 60 | 120 | 200 | 260 | 320 | 360 | 440 | 490 | 500 | 450 | 400 | 350 | 330 | 300 | 320 |
| 6 | 340 | 330 | 260 | 200 | 140 | 100 | 60 | 0 | 60 | 140 | 200 | 250 | 300 | 380 | 430 | 460 | 510 | 470 | 410 | 390 | 360 | 390 |
| 7 | 400 | 380 | 320 | 260 | 200 | 160 | 120 | 60 | 0 | 80 | 140 | 190 | 240 | 320 | 370 | 400 | 460 | 500 | 470 | 450 | 420 | 440 |
| 8 | 480 | 460 | 400 | 340 | 280 | 240 | 200 | 140 | 80 | 0 | 60 | 110 | 160 | 240 | 290 | 330 | 380 | 420 | 480 | 500 | 500 | 520 |
| 9 | 500 | 510 | 450 | 400 | 340 | 300 | 260 | 200 | 140 | 60 | 0 | 50 | 100 | 180 | 230 | 270 | 320 | 370 | 420 | 440 | 470 | 510 |
| 10 | 440 | 450 | 510 | 450 | 390 | 350 | 320 | 250 | 190 | 110 | 50 | 0 | 50 | 130 | 180 | 210 | 270 | 310 | 370 | 390 | 420 | 460 |
| 11 | 400 | 410 | 470 | 500 | 440 | 400 | 360 | 300 | 240 | 160 | 100 | 50 | 0 | 80 | 130 | 170 | 220 | 260 | 320 | 340 | 370 | 410 |
| 12 | 310 | 320 | 390 | 450 | 510 | 480 | 440 | 380 | 320 | 240 | 180 | 130 | 80 | 0 | 50 | 80 | 140 | 180 | 240 | 260 | 290 | 330 |
| 13 | 270 | 280 | 350 | 400 | 460 | 500 | 490 | 430 | 370 | 290 | 230 | 180 | 130 | 50 | 0 | 40 | 90 | 130 | 190 | 210 | 240 | 280 |
| 14 | 230 | 240 | 310 | 370 | 420 | 460 | 500 | 460 | 400 | 330 | 270 | 210 | 170 | 80 | 40 | 0 | 60 | 100 | 150 | 180 | 200 | 250 |
| 15 | 170 | 180 | 250 | 310 | 370 | 410 | 450 | 510 | 460 | 380 | 320 | 270 | 220 | 140 | 90 | 60 | 0 | 40 | 100 | 120 | 150 | 190 |
| 16 | 130 | 140 | 210 | 270 | 330 | 370 | 400 | 470 | 500 | 420 | 370 | 310 | 260 | 180 | 130 | 100 | 40 | 0 | 60 | 80 | 110 | 150 |
| 17 | 80 | 90 | 160 | 210 | 270 | 310 | 350 | 410 | 470 | 480 | 420 | 370 | 320 | 240 | 190 | 150 | 100 | 60 | 0 | 20 | 50 | 90 |
| 18 | 50 | 60 | 130 | 190 | 250 | 290 | 330 | 390 | 450 | 500 | 440 | 390 | 340 | 260 | 210 | 180 | 120 | 80 | 20 | 0 | 30 | 70 |
| 18A | 20 | 40 | 100 | 160 | 220 | 260 | 300 | 360 | 420 | 500 | 470 | 420 | 370 | 290 | 240 | 200 | 150 | 110 | 50 | 30 | 0 | 40 |
| 19 | 50 | 60 | 130 | 190 | 240 | 280 | 320 | 390 | 440 | 520 | 510 | 460 | 410 | 330 | 280 | 250 | 190 | 150 | 90 | 70 | 40 | 0 |

Table 5-18: 3-axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 100 | 180 | 250 | 300 | 350 | 430 | 510 | 610 | 640 | 570 | 510 | 400 | 340 | 290 | 220 | 170 | 100 | 70 | 30 | 60 |
| 1A | 10 | 0 | 90 | 160 | 240 | 290 | 340 | 420 | 500 | 600 | 650 | 580 | 520 | 420 | 360 | 310 | 240 | 180 | 110 | 80 | 50 | 80 |
| 2 | 100 | 90 | 0 | 70 | 150 | 200 | 250 | 330 | 410 | 510 | 580 | 650 | 610 | 510 | 440 | 400 | 330 | 270 | 200 | 170 | 130 | 170 |
| 3 | 180 | 160 | 70 | 0 | 70 | 130 | 170 | 260 | 330 | 440 | 510 | 580 | 640 | 580 | 520 | 470 | 400 | 350 | 270 | 250 | 210 | 240 |
| 4 | 250 | 240 | 150 | 70 | 0 | 50 | 100 | 180 | 260 | 360 | 440 | 510 | 570 | 650 | 590 | 540 | 470 | 420 | 350 | 320 | 280 | 310 |
| 4A | 300 | 290 | 200 | 130 | 50 | 0 | 50 | 130 | 210 | 310 | 380 | 460 | 520 | 620 | 640 | 600 | 530 | 470 | 400 | 370 | 330 | 360 |
| 5 | 350 | 340 | 250 | 170 | 100 | 50 | 0 | 80 | 160 | 260 | 340 | 410 | 470 | 570 | 630 | 650 | 570 | 520 | 450 | 420 | 380 | 410 |
| 6 | 430 | 420 | 330 | 260 | 180 | 130 | 80 | 0 | 80 | 180 | 250 | 320 | 380 | 490 | 550 | 600 | 660 | 600 | 530 | 500 | 460 | 500 |
| 7 | 510 | 500 | 410 | 330 | 260 | 210 | 160 | 80 | 0 | 100 | 180 | 250 | 310 | 410 | 470 | 520 | 590 | 650 | 610 | 580 | 540 | 570 |
| 8 | 610 | 600 | 510 | 440 | 360 | 310 | 260 | 180 | 100 | 0 | 70 | 140 | 200 | 310 | 370 | 420 | 490 | 540 | 620 | 640 | 640 | 680 |
| 9 | 640 | 650 | 580 | 510 | 440 | 380 | 340 | 250 | 180 | 70 | 0 | 70 | 130 | 240 | 300 | 340 | 420 | 470 | 540 | 570 | 610 | 660 |
| 10 | 570 | 580 | 650 | 580 | 510 | 460 | 410 | 320 | 250 | 140 | 70 | 0 | 60 | 170 | 230 | 270 | 350 | 400 | 470 | 500 | 540 | 590 |
| 11 | 510 | 520 | 610 | 640 | 570 | 520 | 470 | 380 | 310 | 200 | 130 | 60 | 0 | 110 | 170 | 210 | 290 | 340 | 410 | 440 | 480 | 530 |
| 12 | 400 | 420 | 510 | 580 | 650 | 620 | 570 | 490 | 410 | 310 | 240 | 170 | 110 | 0 | 60 | 110 | 180 | 230 | 310 | 330 | 370 | 430 |
| 13 | 340 | 360 | 440 | 520 | 590 | 640 | 630 | 550 | 470 | 370 | 300 | 230 | 170 | 60 | 0 | 50 | 120 | 170 | 240 | 270 | 310 | 360 |
| 14 | 290 | 310 | 400 | 470 | 540 | 600 | 650 | 600 | 520 | 420 | 340 | 270 | 210 | 110 | 50 | 0 | 70 | 130 | 200 | 230 | 260 | 320 |
| 15 | 220 | 240 | 330 | 400 | 470 | 530 | 570 | 660 | 590 | 490 | 420 | 350 | 290 | 180 | 120 | 70 | 0 | 50 | 130 | 150 | 190 | 250 |
| 16 | 170 | 180 | 270 | 350 | 420 | 470 | 520 | 600 | 650 | 540 | 470 | 400 | 340 | 230 | 170 | 130 | 50 | 0 | 70 | 100 | 140 | 190 |
| 17 | 100 | 110 | 200 | 270 | 350 | 400 | 450 | 530 | 610 | 620 | 540 | 470 | 410 | 310 | 240 | 200 | 130 | 70 | 0 | 30 | 70 | 120 |
| 18 | 70 | 80 | 170 | 250 | 320 | 370 | 420 | 500 | 580 | 640 | 570 | 500 | 440 | 330 | 270 | 230 | 150 | 100 | 30 | 0 | 40 | 90 |
| 18A | 30 | 50 | 130 | 210 | 280 | 330 | 380 | 460 | 540 | 640 | 610 | 540 | 480 | 370 | 310 | 260 | 190 | 140 | 70 | 40 | 0 | 50 |
| 19 | 60 | 80 | 170 | 240 | 310 | 360 | 410 | 500 | 570 | 680 | 660 | 590 | 530 | 430 | 360 | 320 | 250 | 190 | 120 | 90 | 50 | 0 |

Table 5-19: 4 to 6 axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 20 | 150 | 250 | 360 | 430 | 510 | 620 | 730 | 880 | 920 | 820 | 730 | 580 | 490 | 420 | 320 | 240 | 140 | 100 | 40 | 90 |
| 1A | 20 | 0 | 130 | 230 | 340 | 410 | 480 | 600 | 710 | 860 | 940 | 840 | 750 | 600 | 510 | 440 | 340 | 260 | 160 | 120 | 70 | 110 |
| 2 | 150 | 130 | 0 | 110 | 210 | 290 | 360 | 480 | 590 | 730 | 840 | 940 | 880 | 730 | 640 | 570 | 470 | 390 | 290 | 250 | 190 | 240 |
| 3 | 250 | 230 | 110 | 0 | 110 | 180 | 250 | 370 | 480 | 630 | 730 | 830 | 920 | 830 | 750 | 680 | 580 | 500 | 390 | 350 | 300 | 340 |
| 4 | 360 | 340 | 210 | 110 | 0 | 70 | 150 | 260 | 370 | 520 | 630 | 730 | 810 | 940 | 850 | 780 | 680 | 600 | 500 | 460 | 400 | 450 |
| 4A | 430 | 410 | 290 | 180 | 70 | 0 | 70 | 190 | 300 | 450 | 550 | 650 | 740 | 890 | 930 | 860 | 760 | 680 | 570 | 530 | 480 | 520 |
| 5 | 510 | 480 | 360 | 250 | 150 | 70 | 0 | 120 | 230 | 380 | 480 | 580 | 670 | 820 | 910 | 930 | 830 | 750 | 650 | 600 | 550 | 600 |
| 6 | 620 | 600 | 480 | 370 | 260 | 190 | 120 | 0 | 110 | 260 | 360 | 470 | 550 | 700 | 790 | 860 | 940 | 870 | 760 | 720 | 670 | 710 |
| 7 | 730 | 710 | 590 | 480 | 370 | 300 | 230 | 110 | 0 | 150 | 250 | 360 | 440 | 590 | 680 | 750 | 850 | 930 | 870 | 830 | 780 | 820 |
| 8 | 880 | 860 | 730 | 630 | 520 | 450 | 380 | 260 | 150 | 0 | 110 | 210 | 290 | 450 | 530 | 600 | 700 | 780 | 890 | 930 | 930 | 970 |
| 9 | 920 | 940 | 840 | 730 | 630 | 550 | 480 | 360 | 250 | 110 | 0 | 100 | 190 | 340 | 430 | 500 | 600 | 680 | 780 | 820 | 870 | 950 |
| 10 | 820 | 840 | 940 | 830 | 730 | 650 | 580 | 470 | 360 | 210 | 100 | 0 | 90 | 240 | 330 | 390 | 500 | 580 | 680 | 720 | 770 | 850 |
| 11 | 730 | 750 | 880 | 920 | 810 | 740 | 670 | 550 | 440 | 290 | 190 | 90 | 0 | 150 | 240 | 310 | 410 | 490 | 590 | 630 | 690 | 760 |
| 12 | 580 | 600 | 730 | 830 | 940 | 890 | 820 | 700 | 590 | 450 | 340 | 240 | 150 | 0 | 90 | 160 | 260 | 340 | 440 | 480 | 540 | 610 |
| 13 | 490 | 510 | 640 | 750 | 850 | 930 | 910 | 790 | 680 | 530 | 430 | 330 | 240 | 90 | 0 | 70 | 170 | 250 | 350 | 390 | 450 | 520 |
| 14 | 420 | 440 | 570 | 680 | 780 | 860 | 930 | 860 | 750 | 600 | 500 | 390 | 310 | 160 | 70 | 0 | 100 | 180 | 280 | 320 | 380 | 460 |
| 15 | 320 | 340 | 470 | 580 | 680 | 760 | 830 | 940 | 850 | 700 | 600 | 500 | 410 | 260 | 170 | 100 | 0 | 80 | 180 | 220 | 280 | 350 |
| 16 | 240 | 260 | 390 | 500 | 600 | 680 | 750 | 870 | 930 | 780 | 680 | 580 | 490 | 340 | 250 | 180 | 80 | 0 | 100 | 140 | 200 | 270 |
| 17 | 140 | 160 | 290 | 390 | 500 | 570 | 650 | 760 | 870 | 890 | 780 | 680 | 590 | 440 | 350 | 280 | 180 | 100 | 0 | 40 | 90 | 170 |
| 18 | 100 | 120 | 250 | 350 | 460 | 530 | 600 | 720 | 830 | 930 | 820 | 720 | 630 | 480 | 390 | 320 | 220 | 140 | 40 | 0 | 50 | 130 |
| 18A | 40 | 70 | 190 | 300 | 400 | 480 | 550 | 670 | 780 | 930 | 870 | 770 | 690 | 540 | 450 | 380 | 280 | 200 | 90 | 50 | 0 | 80 |
| 19 | 90 | 110 | 240 | 340 | 450 | 520 | 600 | 710 | 820 | 970 | 950 | 850 | 760 | 610 | 520 | 460 | 350 | 270 | 170 | 130 | 80 | 0 |

Table 5-20: 7 & above axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 0 | 30 | 180 | 310 | 440 | 530 | 620 | 760 | 890 | 1070 | 1120 | 1000 | 890 | 710 | 600 | 520 | 390 | 290 | 170 | 120 | 50 | 110 |
| 1A | 30 | 0 | 150 | 280 | 410 | 500 | 590 | 730 | 870 | 1050 | 1140 | 1020 | 920 | 730 | 620 | 540 | 420 | 320 | 200 | 150 | 80 | 140 |
| 2 | 180 | 150 | 0 | 130 | 260 | 350 | 440 | 580 | 710 | 890 | 1020 | 1150 | 1070 | 890 | 780 | 700 | 570 | 470 | 350 | 300 | 230 | 290 |
| 3 | 310 | 280 | 130 | 0 | 130 | 220 | 310 | 450 | 580 | 760 | 890 | 1020 | 1120 | 1020 | 910 | 830 | 700 | 600 | 480 | 430 | 360 | 420 |
| 4 | 440 | 410 | 260 | 130 | 0 | 90 | 180 | 320 | 450 | 630 | 760 | 890 | 990 | 1140 | 1040 | 950 | 830 | 730 | 610 | 560 | 490 | 550 |
| 4A | 530 | 500 | 350 | 220 | 90 | 0 | 90 | 230 | 360 | 540 | 670 | 800 | 900 | 1090 | 1130 | 1040 | 920 | 820 | 700 | 650 | 580 | 640 |
| 5 | 620 | 590 | 440 | 310 | 180 | 90 | 0 | 140 | 280 | 460 | 590 | 710 | 820 | 1000 | 1110 | 1130 | 1010 | 910 | 790 | 740 | 670 | 720 |
| 6 | 760 | 730 | 580 | 450 | 320 | 230 | 140 | 0 | 130 | 310 | 440 | 570 | 670 | 860 | 960 | 1050 | 1150 | 1050 | 930 | 880 | 810 | 870 |
| 7 | 890 | 870 | 710 | 580 | 450 | 360 | 280 | 130 | 0 | 180 | 310 | 430 | 540 | 720 | 830 | 910 | 1040 | 1130 | 1060 | 1010 | 950 | 1000 |
| 8 | 1070 | 1050 | 890 | 760 | 630 | 540 | 460 | 310 | 180 | 0 | 130 | 250 | 360 | 540 | 650 | 730 | 860 | 950 | 1080 | 1130 | 1130 | 1180 |
| 9 | 1120 | 1140 | 1020 | 890 | 760 | 670 | 590 | 440 | 310 | 130 | 0 | 120 | 230 | 410 | 520 | 600 | 730 | 820 | 950 | 1000 | 1060 | 1160 |
| 10 | 1000 | 1020 | 1150 | 1020 | 890 | 800 | 710 | 570 | 430 | 250 | 120 | 0 | 100 | 290 | 400 | 480 | 600 | 700 | 830 | 870 | 940 | 1030 |
| 11 | 890 | 920 | 1070 | 1120 | 990 | 900 | 820 | 670 | 540 | 360 | 230 | 100 | 0 | 190 | 290 | 380 | 500 | 600 | 720 | 770 | 840 | 930 |
| 12 | 710 | 730 | 890 | 1020 | 1140 | 1090 | 1000 | 860 | 720 | 540 | 410 | 290 | 190 | 0 | 110 | 190 | 320 | 410 | 540 | 590 | 650 | 740 |
| 13 | 600 | 620 | 780 | 910 | 1040 | 1130 | 1110 | 960 | 830 | 650 | 520 | 400 | 290 | 110 | 0 | 80 | 210 | 300 | 430 | 480 | 540 | 640 |
| 14 | 520 | 540 | 700 | 830 | 950 | 1040 | 1130 | 1050 | 910 | 730 | 600 | 480 | 380 | 190 | 80 | 0 | 120 | 220 | 350 | 400 | 460 | 550 |
| 15 | 390 | 420 | 570 | 700 | 830 | 920 | 1010 | 1150 | 1040 | 860 | 730 | 600 | 500 | 320 | 210 | 120 | 0 | 100 | 220 | 270 | 340 | 430 |
| 16 | 290 | 320 | 470 | 600 | 730 | 820 | 910 | 1050 | 1130 | 950 | 820 | 700 | 600 | 410 | 300 | 220 | 100 | 0 | 120 | 170 | 240 | 330 |
| 17 | 170 | 200 | 350 | 480 | 610 | 700 | 790 | 930 | 1060 | 1080 | 950 | 830 | 720 | 540 | 430 | 350 | 220 | 120 | 0 | 50 | 120 | 210 |
| 18 | 120 | 150 | 300 | 430 | 560 | 650 | 740 | 880 | 1010 | 1130 | 1000 | 870 | 770 | 590 | 480 | 400 | 270 | 170 | 50 | 0 | 70 | 160 |
| 18A | 50 | 80 | 230 | 360 | 490 | 580 | 670 | 810 | 950 | 1130 | 1060 | 940 | 840 | 650 | 540 | 460 | 340 | 240 | 120 | 70 | 0 | 90 |
| 19 | 110 | 140 | 290 | 420 | 550 | 640 | 720 | 870 | 1000 | 1180 | 1160 | 1030 | 930 | 740 | 640 | 550 | 430 | 330 | 210 | 160 | 90 | 0 |

Return Journey

Table 5-21: Car/Jeep/Van Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|
| 1 | 0 | 5 | 15 | 25 | 35 | 40 | 50 | 60 | 70 | 85 | 85 | 75 | 70 | 55 | 45 | 40 | 30 | 25 | 15 | 10 | 5 | 10 |
| 1A | 5 | 0 | 10 | 20 | 30 | 40 | 45 | 55 | 65 | 80 | 90 | 80 | 70 | 55 | 50 | 40 | 30 | 25 | 15 | 10 | 5 | 10 |
| 2 | 15 | 10 | 0 | 10 | 20 | 25 | 35 | 45 | 55 | 70 | 80 | 90 | 85 | 70 | 60 | 55 | 45 | 35 | 25 | 25 | 20 | 20 |
| 3 | 25 | 20 | 10 | 0 | 10 | 15 | 25 | 35 | 45 | 60 | 70 | 80 | 85 | 80 | 70 | 65 | 55 | 45 | 35 | 35 | 30 | 30 |
| 4 | 35 | 30 | 20 | 10 | 0 | 5 | 15 | 25 | 35 | 50 | 60 | 70 | 75 | 90 | 80 | 75 | 65 | 55 | 45 | 45 | 40 | 40 |
| 4A | 40 | 40 | 25 | 15 | 5 | 0 | 5 | 20 | 30 | 40 | 50 | 60 | 70 | 85 | 85 | 80 | 70 | 65 | 55 | 50 | 45 | 50 |
| 5 | 50 | 45 | 35 | 25 | 15 | 5 | 0 | 10 | 20 | 35 | 45 | 55 | 65 | 75 | 85 | 85 | 80 | 70 | 60 | 55 | 50 | 55 |
| 6 | 60 | 55 | 45 | 35 | 25 | 20 | 10 | 0 | 10 | 25 | 35 | 45 | 50 | 65 | 75 | 80 | 90 | 80 | 70 | 70 | 65 | 65 |
| 7 | 70 | 65 | 55 | 45 | 35 | 30 | 20 | 10 | 0 | 15 | 25 | 35 | 40 | 55 | 65 | 70 | 80 | 90 | 80 | 80 | 75 | 80 |
| 8 | 85 | 80 | 70 | 60 | 50 | 40 | 35 | 25 | 15 | 0 | 10 | 20 | 30 | 40 | 50 | 55 | 65 | 75 | 85 | 85 | 85 | 90 |
| 9 | 85 | 90 | 80 | 70 | 60 | 50 | 45 | 35 | 25 | 10 | 0 | 10 | 20 | 30 | 40 | 45 | 55 | 65 | 75 | 75 | 80 | 90 |
| 10 | 75 | 80 | 90 | 80 | 70 | 60 | 55 | 45 | 35 | 20 | 10 | 0 | 10 | 20 | 30 | 35 | 45 | 55 | 65 | 70 | 75 | 80 |
| 11 | 70 | 70 | 85 | 85 | 75 | 70 | 65 | 50 | 40 | 30 | 20 | 10 | 0 | 15 | 25 | 30 | 40 | 45 | 55 | 60 | 65 | 70 |
| 12 | 55 | 55 | 70 | 80 | 90 | 85 | 75 | 65 | 55 | 40 | 30 | 20 | 15 | 0 | 10 | 15 | 25 | 30 | 40 | 45 | 50 | 60 |
| 13 | 45 | 50 | 60 | 70 | 80 | 85 | 85 | 75 | 65 | 50 | 40 | 30 | 25 | 10 | 0 | 5 | 15 | 25 | 35 | 35 | 40 | 50 |
| 14 | 40 | 40 | 55 | 65 | 75 | 80 | 85 | 80 | 70 | 55 | 45 | 35 | 30 | 15 | 5 | 0 | 10 | 15 | 25 | 30 | 35 | 45 |
| 15 | 30 | 30 | 45 | 55 | 65 | 70 | 80 | 90 | 80 | 65 | 55 | 45 | 40 | 25 | 15 | 10 | 0 | 5 | 15 | 20 | 25 | 35 |
| 16 | 25 | 25 | 35 | 45 | 55 | 65 | 70 | 80 | 90 | 75 | 65 | 55 | 45 | 30 | 25 | 15 | 5 | 0 | 10 | 15 | 20 | 25 |
| 17 | 15 | 15 | 25 | 35 | 45 | 55 | 60 | 70 | 80 | 85 | 75 | 65 | 55 | 40 | 35 | 25 | 15 | 10 | 0 | 5 | 10 | 15 |
| 18 | 10 | 10 | 25 | 35 | 45 | 50 | 55 | 70 | 80 | 85 | 75 | 70 | 60 | 45 | 35 | 30 | 20 | 15 | 5 | 0 | 5 | 10 |
| 18A | 5 | 5 | 20 | 30 | 40 | 45 | 50 | 65 | 75 | 85 | 80 | 75 | 65 | 50 | 40 | 35 | 25 | 20 | 10 | 5 | 0 | 5 |
| 19 | 10 | 10 | 20 | 30 | 40 | 50 | 55 | 65 | 80 | 90 | 90 | 80 | 70 | 60 | 50 | 45 | 35 | 25 | 15 | 10 | 5 | 0 |

Table 5-22: Minibus/LCV Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 5 | 20 | 40 | 55 | 65 | 75 | 95 | 110 | 135 | 140 | 125 | 110 | 90 | 75 | 65 | 50 | 35 | 20 | 15 | 5 | 15 |
| 1A | 5 | 0 | 20 | 35 | 50 | 65 | 75 | 90 | 110 | 130 | 145 | 130 | 115 | 90 | 80 | 70 | 50 | 40 | 25 | 20 | 10 | 15 |
| 2 | 20 | 20 | 0 | 15 | 30 | 45 | 55 | 70 | 90 | 110 | 130 | 145 | 135 | 110 | 95 | 85 | 70 | 60 | 45 | 40 | 30 | 35 |
| 3 | 40 | 35 | 15 | 0 | 15 | 25 | 40 | 55 | 75 | 95 | 110 | 125 | 140 | 125 | 115 | 105 | 90 | 75 | 60 | 55 | 45 | 50 |
| 4 | 55 | 50 | 30 | 15 | 0 | 10 | 20 | 40 | 55 | 80 | 95 | 110 | 125 | 145 | 130 | 120 | 105 | 90 | 75 | 70 | 60 | 70 |
| 4A | 65 | 65 | 45 | 25 | 10 | 0 | 10 | 30 | 45 | 70 | 85 | 100 | 115 | 135 | 140 | 130 | 115 | 105 | 85 | 80 | 75 | 80 |
| 5 | 75 | 75 | 55 | 40 | 20 | 10 | 0 | 20 | 35 | 55 | 75 | 90 | 100 | 125 | 140 | 140 | 125 | 115 | 100 | 90 | 85 | 90 |
| 6 | 95 | 90 | 70 | 55 | 40 | 30 | 20 | 0 | 15 | 40 | 55 | 70 | 85 | 105 | 120 | 130 | 145 | 130 | 115 | 110 | 100 | 110 |
| 7 | 110 | 110 | 90 | 75 | 55 | 45 | 35 | 15 | 0 | 20 | 40 | 55 | 65 | 90 | 105 | 115 | 130 | 140 | 135 | 125 | 120 | 125 |
| 8 | 135 | 130 | 110 | 95 | 80 | 70 | 55 | 40 | 20 | 0 | 15 | 30 | 45 | 70 | 80 | 90 | 105 | 120 | 135 | 140 | 140 | 150 |
| 9 | 140 | 145 | 130 | 110 | 95 | 85 | 75 | 55 | 40 | 15 | 0 | 15 | 30 | 50 | 65 | 75 | 90 | 105 | 120 | 125 | 135 | 145 |
| 10 | 125 | 130 | 145 | 125 | 110 | 100 | 90 | 70 | 55 | 30 | 15 | 0 | 15 | 35 | 50 | 60 | 75 | 90 | 105 | 110 | 120 | 130 |
| 11 | 110 | 115 | 135 | 140 | 125 | 115 | 100 | 85 | 65 | 45 | 30 | 15 | 0 | 25 | 35 | 45 | 65 | 75 | 90 | 95 | 105 | 115 |
| 12 | 90 | 90 | 110 | 125 | 145 | 135 | 125 | 105 | 90 | 70 | 50 | 35 | 25 | 0 | 15 | 25 | 40 | 50 | 65 | 75 | 80 | 95 |
| 13 | 75 | 80 | 95 | 115 | 130 | 140 | 140 | 120 | 105 | 80 | 65 | 50 | 35 | 15 | 0 | 10 | 25 | 40 | 55 | 60 | 70 | 80 |
| 14 | 65 | 70 | 85 | 105 | 120 | 130 | 140 | 130 | 115 | 90 | 75 | 60 | 45 | 25 | 10 | 0 | 15 | 30 | 45 | 50 | 60 | 70 |
| 15 | 50 | 50 | 70 | 90 | 105 | 115 | 125 | 145 | 130 | 105 | 90 | 75 | 65 | 40 | 25 | 15 | 0 | 10 | 30 | 35 | 40 | 55 |
| 16 | 35 | 40 | 60 | 75 | 90 | 105 | 115 | 130 | 140 | 120 | 105 | 90 | 75 | 50 | 40 | 30 | 10 | 0 | 15 | 20 | 30 | 40 |
| 17 | 20 | 25 | 45 | 60 | 75 | 85 | 100 | 115 | 135 | 135 | 120 | 105 | 90 | 65 | 55 | 45 | 30 | 15 | 0 | 5 | 15 | 25 |
| 18 | 15 | 20 | 40 | 55 | 70 | 80 | 90 | 110 | 125 | 140 | 125 | 110 | 95 | 75 | 60 | 50 | 35 | 20 | 5 | 0 | 10 | 20 |
| 18A | 5 | 10 | 30 | 45 | 60 | 75 | 85 | 100 | 120 | 140 | 135 | 120 | 105 | 80 | 70 | 60 | 40 | 30 | 15 | 10 | 0 | 10 |
| 19 | 15 | 15 | 35 | 50 | 70 | 80 | 90 | 110 | 125 | 150 | 145 | 130 | 115 | 95 | 80 | 70 | 55 | 40 | 25 | 20 | 10 | 0 |

Table 5-23: Bus/2-axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 5 | 40 | 70 | 95 | 115 | 135 | 170 | 200 | 240 | 250 | 220 | 200 | 155 | 135 | 115 | 85 | 65 | 40 | 25 | 10 | 25 |
| 1A | 5 | 0 | 35 | 65 | 90 | 110 | 130 | 165 | 190 | 230 | 255 | 225 | 205 | 160 | 140 | 120 | 90 | 70 | 45 | 30 | 20 | 30 |
| 2 | 40 | 35 | 0 | 30 | 55 | 75 | 95 | 130 | 160 | 200 | 225 | 255 | 235 | 195 | 175 | 155 | 125 | 105 | 80 | 65 | 50 | 65 |
| 3 | 70 | 65 | 30 | 0 | 30 | 50 | 70 | 100 | 130 | 170 | 200 | 225 | 250 | 225 | 200 | 185 | 155 | 135 | 105 | 95 | 80 | 95 |
| 4 | 95 | 90 | 55 | 30 | 0 | 20 | 40 | 70 | 100 | 140 | 170 | 195 | 220 | 255 | 230 | 210 | 185 | 165 | 135 | 125 | 110 | 120 |
| 4A | 115 | 110 | 75 | 50 | 20 | 0 | 20 | 50 | 80 | 120 | 150 | 175 | 200 | 240 | 250 | 230 | 205 | 185 | 155 | 145 | 130 | 140 |
| 5 | 135 | 130 | 95 | 70 | 40 | 20 | 0 | 30 | 60 | 100 | 130 | 160 | 180 | 220 | 245 | 250 | 225 | 200 | 175 | 165 | 150 | 160 |
| 6 | 170 | 165 | 130 | 100 | 70 | 50 | 30 | 0 | 30 | 70 | 100 | 125 | 150 | 190 | 215 | 230 | 255 | 235 | 205 | 195 | 180 | 195 |
| 7 | 200 | 190 | 160 | 130 | 100 | 80 | 60 | 30 | 0 | 40 | 70 | 95 | 120 | 160 | 185 | 200 | 230 | 250 | 235 | 225 | 210 | 220 |
| 8 | 240 | 230 | 200 | 170 | 140 | 120 | 100 | 70 | 40 | 0 | 30 | 55 | 80 | 120 | 145 | 165 | 190 | 210 | 240 | 250 | 250 | 260 |
| 9 | 250 | 255 | 225 | 200 | 170 | 150 | 130 | 100 | 70 | 30 | 0 | 25 | 50 | 90 | 115 | 135 | 160 | 185 | 210 | 220 | 235 | 255 |
| 10 | 220 | 225 | 255 | 225 | 195 | 175 | 160 | 125 | 95 | 55 | 25 | 0 | 25 | 65 | 90 | 105 | 135 | 155 | 185 | 195 | 210 | 230 |
| 11 | 200 | 205 | 235 | 250 | 220 | 200 | 180 | 150 | 120 | 80 | 50 | 25 | 0 | 40 | 65 | 85 | 110 | 130 | 160 | 170 | 185 | 205 |
| 12 | 155 | 160 | 195 | 225 | 255 | 240 | 220 | 190 | 160 | 120 | 90 | 65 | 40 | 0 | 25 | 40 | 70 | 90 | 120 | 130 | 145 | 165 |
| 13 | 135 | 140 | 175 | 200 | 230 | 250 | 245 | 215 | 185 | 145 | 115 | 90 | 65 | 25 | 0 | 20 | 45 | 65 | 95 | 105 | 120 | 140 |
| 14 | 115 | 120 | 155 | 185 | 210 | 230 | 250 | 230 | 200 | 165 | 135 | 105 | 85 | 40 | 20 | 0 | 30 | 50 | 75 | 90 | 100 | 125 |
| 15 | 85 | 90 | 125 | 155 | 185 | 205 | 225 | 255 | 230 | 190 | 160 | 135 | 110 | 70 | 45 | 30 | 0 | 20 | 50 | 60 | 75 | 95 |
| 16 | 65 | 70 | 105 | 135 | 165 | 185 | 200 | 235 | 250 | 210 | 185 | 155 | 130 | 90 | 65 | 50 | 20 | 0 | 30 | 40 | 55 | 75 |
| 17 | 40 | 45 | 80 | 105 | 135 | 155 | 175 | 205 | 235 | 240 | 210 | 185 | 160 | 120 | 95 | 75 | 50 | 30 | 0 | 10 | 25 | 45 |
| 18 | 25 | 30 | 65 | 95 | 125 | 145 | 165 | 195 | 225 | 250 | 220 | 195 | 170 | 130 | 105 | 90 | 60 | 40 | 10 | 0 | 15 | 35 |
| 18A | 10 | 20 | 50 | 80 | 110 | 130 | 150 | 180 | 210 | 250 | 235 | 210 | 185 | 145 | 120 | 100 | 75 | 55 | 25 | 15 | 0 | 20 |
| 19 | 25 | 30 | 65 | 95 | 120 | 140 | 160 | 195 | 220 | 260 | 255 | 230 | 205 | 165 | 140 | 125 | 95 | 75 | 45 | 35 | 20 | 0 |

Table 5-24: 3-axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 5 | 50 | 90 | 125 | 150 | 175 | 215 | 255 | 305 | 320 | 285 | 255 | 200 | 170 | 145 | 110 | 85 | 50 | 35 | 15 | 30 |
| 1A | 5 | 0 | 45 | 80 | 120 | 145 | 170 | 210 | 250 | 300 | 325 | 290 | 260 | 210 | 180 | 155 | 120 | 90 | 55 | 40 | 25 | 40 |
| 2 | 50 | 45 | 0 | 35 | 75 | 100 | 125 | 165 | 205 | 255 | 290 | 325 | 305 | 255 | 220 | 200 | 165 | 135 | 100 | 85 | 65 | 85 |
| 3 | 90 | 80 | 35 | 0 | 35 | 65 | 85 | 130 | 165 | 220 | 255 | 290 | 320 | 290 | 260 | 235 | 200 | 175 | 135 | 125 | 105 | 120 |
| 4 | 125 | 120 | 75 | 35 | 0 | 25 | 50 | 90 | 130 | 180 | 220 | 255 | 285 | 325 | 295 | 270 | 235 | 210 | 175 | 160 | 140 | 155 |
| 4A | 150 | 145 | 100 | 65 | 25 | 0 | 25 | 65 | 105 | 155 | 190 | 230 | 260 | 310 | 320 | 300 | 265 | 235 | 200 | 185 | 165 | 180 |
| 5 | 175 | 170 | 125 | 85 | 50 | 25 | 0 | 40 | 80 | 130 | 170 | 205 | 235 | 285 | 315 | 325 | 285 | 260 | 225 | 210 | 190 | 205 |
| 6 | 215 | 210 | 165 | 130 | 90 | 65 | 40 | 0 | 40 | 90 | 125 | 160 | 190 | 245 | 275 | 300 | 330 | 300 | 265 | 250 | 230 | 250 |
| 7 | 255 | 250 | 205 | 165 | 130 | 105 | 80 | 40 | 0 | 50 | 90 | 125 | 155 | 205 | 235 | 260 | 295 | 325 | 305 | 290 | 270 | 285 |
| 8 | 305 | 300 | 255 | 220 | 180 | 155 | 130 | 90 | 50 | 0 | 35 | 70 | 100 | 155 | 185 | 210 | 245 | 270 | 310 | 320 | 320 | 340 |
| 9 | 320 | 325 | 290 | 255 | 220 | 190 | 170 | 125 | 90 | 35 | 0 | 35 | 65 | 120 | 150 | 170 | 210 | 235 | 270 | 285 | 305 | 330 |
| 10 | 285 | 290 | 325 | 290 | 255 | 230 | 205 | 160 | 125 | 70 | 35 | 0 | 30 | 85 | 115 | 135 | 175 | 200 | 235 | 250 | 270 | 295 |
| 11 | 255 | 260 | 305 | 320 | 285 | 260 | 235 | 190 | 155 | 100 | 65 | 30 | 0 | 55 | 85 | 105 | 145 | 170 | 205 | 220 | 240 | 265 |
| 12 | 200 | 210 | 255 | 290 | 325 | 310 | 285 | 245 | 205 | 155 | 120 | 85 | 55 | 0 | 30 | 55 | 90 | 115 | 155 | 165 | 185 | 215 |
| 13 | 170 | 180 | 220 | 260 | 295 | 320 | 315 | 275 | 235 | 185 | 150 | 115 | 85 | 30 | 0 | 25 | 60 | 85 | 120 | 135 | 155 | 180 |
| 14 | 145 | 155 | 200 | 235 | 270 | 300 | 325 | 300 | 260 | 210 | 170 | 135 | 105 | 55 | 25 | 0 | 35 | 65 | 100 | 115 | 130 | 160 |
| 15 | 110 | 120 | 165 | 200 | 235 | 265 | 285 | 330 | 295 | 245 | 210 | 175 | 145 | 90 | 60 | 35 | 0 | 25 | 65 | 75 | 95 | 125 |
| 16 | 85 | 90 | 135 | 175 | 210 | 235 | 260 | 300 | 325 | 270 | 235 | 200 | 170 | 115 | 85 | 65 | 25 | 0 | 35 | 50 | 70 | 95 |
| 17 | 50 | 55 | 100 | 135 | 175 | 200 | 225 | 265 | 305 | 310 | 270 | 235 | 205 | 155 | 120 | 100 | 65 | 35 | 0 | 15 | 35 | 60 |
| 18 | 35 | 40 | 85 | 125 | 160 | 185 | 210 | 250 | 290 | 320 | 285 | 250 | 220 | 165 | 135 | 115 | 75 | 50 | 15 | 0 | 20 | 45 |
| 18A | 15 | 25 | 65 | 105 | 140 | 165 | 190 | 230 | 270 | 320 | 305 | 270 | 240 | 185 | 155 | 130 | 95 | 70 | 35 | 20 | 0 | 25 |
| 19 | 30 | 40 | 85 | 120 | 155 | 180 | 205 | 250 | 285 | 340 | 330 | 295 | 265 | 215 | 180 | 160 | 125 | 95 | 60 | 45 | 25 | 0 |

Table 5-25: 4 to 6 axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 10 | 75 | 125 | 180 | 215 | 255 | 310 | 365 | 440 | 460 | 410 | 365 | 290 | 245 | 210 | 160 | 120 | 70 | 50 | 20 | 45 |
| 1A | 10 | 0 | 65 | 115 | 170 | 205 | 240 | 300 | 355 | 430 | 470 | 420 | 375 | 300 | 255 | 220 | 170 | 130 | 80 | 60 | 35 | 55 |
| 2 | 75 | 65 | 0 | 55 | 105 | 145 | 180 | 240 | 295 | 365 | 420 | 470 | 440 | 365 | 320 | 285 | 235 | 195 | 145 | 125 | 95 | 120 |
| 3 | 125 | 115 | 55 | 0 | 55 | 90 | 125 | 185 | 240 | 315 | 365 | 415 | 460 | 415 | 375 | 340 | 290 | 250 | 195 | 175 | 150 | 170 |
| 4 | 180 | 170 | 105 | 55 | 0 | 35 | 75 | 130 | 185 | 260 | 315 | 365 | 405 | 470 | 425 | 390 | 340 | 300 | 250 | 230 | 200 | 225 |
| 4A | 215 | 205 | 145 | 90 | 35 | 0 | 35 | 95 | 150 | 225 | 275 | 325 | 370 | 445 | 465 | 430 | 380 | 340 | 285 | 265 | 240 | 260 |
| 5 | 255 | 240 | 180 | 125 | 75 | 35 | 0 | 60 | 115 | 190 | 240 | 290 | 335 | 410 | 455 | 465 | 415 | 375 | 325 | 300 | 275 | 300 |
| 6 | 310 | 300 | 240 | 185 | 130 | 95 | 60 | 0 | 55 | 130 | 180 | 235 | 275 | 350 | 395 | 430 | 470 | 435 | 380 | 360 | 335 | 355 |
| 7 | 365 | 355 | 295 | 240 | 185 | 150 | 115 | 55 | 0 | 75 | 125 | 180 | 220 | 295 | 340 | 375 | 425 | 465 | 435 | 415 | 390 | 410 |
| 8 | 440 | 430 | 365 | 315 | 260 | 225 | 190 | 130 | 75 | 0 | 55 | 105 | 145 | 225 | 265 | 300 | 350 | 390 | 445 | 465 | 465 | 485 |
| 9 | 460 | 470 | 420 | 365 | 315 | 275 | 240 | 180 | 125 | 55 | 0 | 50 | 95 | 170 | 215 | 250 | 300 | 340 | 390 | 410 | 435 | 475 |
| 10 | 410 | 420 | 470 | 415 | 365 | 325 | 290 | 235 | 180 | 105 | 50 | 0 | 45 | 120 | 165 | 195 | 250 | 290 | 340 | 360 | 385 | 425 |
| 11 | 365 | 375 | 440 | 460 | 405 | 370 | 335 | 275 | 220 | 145 | 95 | 45 | 0 | 75 | 120 | 155 | 205 | 245 | 295 | 315 | 345 | 380 |
| 12 | 290 | 300 | 365 | 415 | 470 | 445 | 410 | 350 | 295 | 225 | 170 | 120 | 75 | 0 | 45 | 80 | 130 | 170 | 220 | 240 | 270 | 305 |
| 13 | 245 | 255 | 320 | 375 | 425 | 465 | 455 | 395 | 340 | 265 | 215 | 165 | 120 | 45 | 0 | 35 | 85 | 125 | 175 | 195 | 225 | 260 |
| 14 | 210 | 220 | 285 | 340 | 390 | 430 | 465 | 430 | 375 | 300 | 250 | 195 | 155 | 80 | 35 | 0 | 50 | 90 | 140 | 160 | 190 | 230 |
| 15 | 160 | 170 | 235 | 290 | 340 | 380 | 415 | 470 | 425 | 350 | 300 | 250 | 205 | 130 | 85 | 50 | 0 | 40 | 90 | 110 | 140 | 175 |
| 16 | 120 | 130 | 195 | 250 | 300 | 340 | 375 | 435 | 465 | 390 | 340 | 290 | 245 | 170 | 125 | 90 | 40 | 0 | 50 | 70 | 100 | 135 |
| 17 | 70 | 80 | 145 | 195 | 250 | 285 | 325 | 380 | 435 | 445 | 390 | 340 | 295 | 220 | 175 | 140 | 90 | 50 | 0 | 20 | 45 | 85 |
| 18 | 50 | 60 | 125 | 175 | 230 | 265 | 300 | 360 | 415 | 465 | 410 | 360 | 315 | 240 | 195 | 160 | 110 | 70 | 20 | 0 | 25 | 65 |
| 18A | 20 | 35 | 95 | 150 | 200 | 240 | 275 | 335 | 390 | 465 | 435 | 385 | 345 | 270 | 225 | 190 | 140 | 100 | 45 | 25 | 0 | 40 |
| 19 | 45 | 55 | 120 | 170 | 225 | 260 | 300 | 355 | 410 | 485 | 475 | 425 | 380 | 305 | 260 | 230 | 175 | 135 | 85 | 65 | 40 | 0 |

Table 5-26: 7 & above axle Toll Rates for Year 2024-2025 (Rs. Rupees)

| F/T | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 15 | 90 | 155 | 220 | 265 | 310 | 380 | 445 | 535 | 560 | 500 | 445 | 355 | 300 | 260 | 195 | 145 | 85 | 60 | 25 | 55 |
| 1A | 15 | 0 | 75 | 140 | 205 | 250 | 295 | 365 | 435 | 525 | 570 | 510 | 460 | 365 | 310 | 270 | 210 | 160 | 100 | 75 | 40 | 70 |
| 2 | 90 | 75 | 0 | 65 | 130 | 175 | 220 | 290 | 355 | 445 | 510 | 575 | 535 | 445 | 390 | 350 | 285 | 235 | 175 | 150 | 115 | 145 |
| 3 | 155 | 140 | 65 | 0 | 65 | 110 | 155 | 225 | 290 | 380 | 445 | 510 | 560 | 510 | 455 | 415 | 350 | 300 | 240 | 215 | 180 | 210 |
| 4 | 220 | 205 | 130 | 65 | 0 | 45 | 90 | 160 | 225 | 315 | 380 | 445 | 495 | 570 | 520 | 475 | 415 | 365 | 305 | 280 | 245 | 275 |
| 4A | 265 | 250 | 175 | 110 | 45 | 0 | 45 | 115 | 180 | 270 | 335 | 400 | 450 | 545 | 565 | 520 | 460 | 410 | 350 | 325 | 290 | 320 |
| 5 | 310 | 295 | 220 | 155 | 90 | 45 | 0 | 70 | 140 | 230 | 295 | 355 | 410 | 500 | 555 | 565 | 505 | 455 | 395 | 370 | 335 | 360 |
| 6 | 380 | 365 | 290 | 225 | 160 | 115 | 70 | 0 | 65 | 155 | 220 | 285 | 335 | 430 | 480 | 525 | 575 | 525 | 465 | 440 | 405 | 435 |
| 7 | 445 | 435 | 355 | 290 | 225 | 180 | 140 | 65 | 0 | 90 | 155 | 215 | 270 | 360 | 415 | 455 | 520 | 565 | 530 | 505 | 475 | 500 |
| 8 | 535 | 525 | 445 | 380 | 315 | 270 | 230 | 155 | 90 | 0 | 65 | 125 | 180 | 270 | 325 | 365 | 430 | 475 | 540 | 565 | 565 | 590 |
| 9 | 560 | 570 | 510 | 445 | 380 | 335 | 295 | 220 | 155 | 65 | 0 | 60 | 115 | 205 | 260 | 300 | 365 | 410 | 475 | 500 | 530 | 580 |
| 10 | 500 | 510 | 575 | 510 | 445 | 400 | 355 | 285 | 215 | 125 | 60 | 0 | 50 | 145 | 200 | 240 | 300 | 350 | 415 | 435 | 470 | 515 |
| 11 | 445 | 460 | 535 | 560 | 495 | 450 | 410 | 335 | 270 | 180 | 115 | 50 | 0 | 95 | 145 | 190 | 250 | 300 | 360 | 385 | 420 | 465 |
| 12 | 355 | 365 | 445 | 510 | 570 | 545 | 500 | 430 | 360 | 270 | 205 | 145 | 95 | 0 | 55 | 95 | 160 | 205 | 270 | 295 | 325 | 370 |
| 13 | 300 | 310 | 390 | 455 | 520 | 565 | 555 | 480 | 415 | 325 | 260 | 200 | 145 | 55 | 0 | 40 | 105 | 150 | 215 | 240 | 270 | 320 |
| 14 | 260 | 270 | 350 | 415 | 475 | 520 | 565 | 525 | 455 | 365 | 300 | 240 | 190 | 95 | 40 | 0 | 60 | 110 | 175 | 200 | 230 | 275 |
| 15 | 195 | 210 | 285 | 350 | 415 | 460 | 505 | 575 | 520 | 430 | 365 | 300 | 250 | 160 | 105 | 60 | 0 | 50 | 110 | 135 | 170 | 215 |
| 16 | 145 | 160 | 235 | 300 | 365 | 410 | 455 | 525 | 565 | 475 | 410 | 350 | 300 | 205 | 150 | 110 | 50 | 0 | 60 | 85 | 120 | 165 |
| 17 | 85 | 100 | 175 | 240 | 305 | 350 | 395 | 465 | 530 | 540 | 475 | 415 | 360 | 270 | 215 | 175 | 110 | 60 | 0 | 25 | 60 | 105 |
| 18 | 60 | 75 | 150 | 215 | 280 | 325 | 370 | 440 | 505 | 565 | 500 | 435 | 385 | 295 | 240 | 200 | 135 | 85 | 25 | 0 | 35 | 80 |
| 18A | 25 | 40 | 115 | 180 | 245 | 290 | 335 | 405 | 475 | 565 | 530 | 470 | 420 | 325 | 270 | 230 | 170 | 120 | 60 | 35 | 0 | 45 |
| 19 | 55 | 70 | 145 | 210 | 275 | 320 | 360 | 435 | 500 | 590 | 580 | 515 | 465 | 370 | 320 | 275 | 215 | 165 | 105 | 80 | 45 | 0 |

Above rates are applicable for year 2024-25 (Updating WPI). Toll rates for future years have been worked out as per applicable rate revision policy. These rates have been used for calculating revenue of future years.

5.2 Traffic Forecast

Growth rates recommended in the previous section of the report are used to arrive at traffic projections for future years.

These projections have been done for the following three cases of growth up to concession period.

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

Traffic of horizon years has been worked out on the basis of growth as discussed previously. Traffic forecast of total volume (all category) is given in tables below.

Table 5-27: Total Tollable Traffic (Pessimistic Growth Scenario)

| Year/ Types of vehicles | Car/Jeep/Van | Minibus /LCV | Bus/ 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Tollable Traffic (No.) | PCU (Including Exempted) |
|-------------------------|--------------|--------------|--------------|----------|-------------|------------------|------------------------------|--------------------------|
| 2024-25 | 179718 | 9002 | 9639 | 6973 | 12537 | 5 | 217874 | 299496 |
| 2025-26 | 191946 | 9388 | 9904 | 7226 | 13019 | 5 | 231488 | 316026 |
| 2026-27 | 204996 | 9786 | 10177 | 7493 | 13520 | 5 | 245977 | 333548 |
| 2027-28 | 218956 | 10199 | 10461 | 7766 | 14041 | 5 | 261428 | 352143 |
| 2028-29 | 230834 | 10597 | 10652 | 7967 | 14429 | 5 | 274484 | 367540 |
| 2029-30 | 243336 | 11009 | 10846 | 8172 | 14823 | 5 | 288191 | 383630 |
| 2030-31 | 256520 | 11442 | 11043 | 8381 | 15224 | 5 | 302615 | 400486 |
| 2031-32 | 270453 | 11889 | 11241 | 8596 | 15637 | 5 | 317821 | 418187 |
| 2032-33 | 285111 | 12354 | 11442 | 8814 | 16060 | 5 | 333786 | 436703 |
| 2033-34 | 295461 | 12801 | 11549 | 8935 | 16298 | 5 | 345049 | 449478 |
| 2034-35 | 306193 | 13255 | 11656 | 9057 | 16539 | 5 | 356705 | 462663 |
| 2035-36 | 317307 | 13723 | 11763 | 9181 | 16782 | 5 | 368761 | 476265 |
| 2036-37 | 328815 | 14212 | 11870 | 9309 | 17028 | 5 | 381239 | 490319 |
| 2037-38 | 340746 | 14717 | 11978 | 9437 | 17281 | 5 | 394164 | 504854 |

| Year/ Types of vehicles | Car/Jeep/Van | Minibus /LCV | Bus/ 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Tollable Traffic (No.) | PCU (Including Exempted) |
|-------------------------|--------------|--------------|--------------|----------|-------------|------------------|------------------------------|--------------------------|
| 2038-39 | 350191 | 15193 | 12040 | 9513 | 17432 | 5 | 404374 | 516106 |
| 2039-40 | 359898 | 15682 | 12102 | 9589 | 17583 | 5 | 414859 | 527640 |
| 2040-41 | 369873 | 16189 | 12164 | 9665 | 17734 | 5 | 425630 | 539469 |
| 2041-42 | 380132 | 16705 | 12226 | 9741 | 17886 | 5 | 436695 | 551600 |
| 2042-43 | 390659 | 17245 | 12288 | 9817 | 18039 | 5 | 448053 | 564040 |
| 2043-44 | 398537 | 17750 | 12311 | 9855 | 18120 | 5 | 456578 | 573223 |
| 2044-45 | 406568 | 18262 | 12334 | 9893 | 18201 | 5 | 465263 | 582569 |
| 2045-46 | 414765 | 18784 | 12357 | 9931 | 18282 | 5 | 474124 | 592097 |
| 2046-47 | 423118 | 19325 | 12380 | 9969 | 18363 | 5 | 483160 | 601809 |
| 2047-48 | 431644 | 19887 | 12403 | 10007 | 18444 | 5 | 492390 | 611725 |
| 2048-49 | 437539 | 20402 | 12403 | 10011 | 18453 | 5 | 498813 | 618445 |
| 2049-50 | 443513 | 20923 | 12403 | 10015 | 18462 | 5 | 505321 | 625253 |
| 2050-51 | 449574 | 21462 | 12403 | 10019 | 18471 | 5 | 511934 | 632175 |
| 2051-52 | 455717 | 22014 | 12403 | 10023 | 18480 | 5 | 518642 | 639199 |
| 2052-53 | 461937 | 22578 | 12403 | 10027 | 18489 | 5 | 525439 | 646317 |
| 2053-54 | 467833 | 23149 | 12403 | 10031 | 18498 | 5 | 531919 | 653122 |

Table 5-28: Total Tollable Traffic (Most likely Growth Scenario)

| Year/ Types of vehicles | Car/Jeep/Van | Minibus /LCV | Bus/ 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Tollable Traffic (No.) | PCU (Including Exempted) |
|-------------------------|--------------|--------------|--------------|----------|-------------|------------------|------------------------------|--------------------------|
| 2024-25 | 180153 | 9017 | 9669 | 6993 | 12566 | 5 | 218403 | 300234 |
| 2025-26 | 192859 | 9422 | 9961 | 7272 | 13083 | 5 | 232602 | 317587 |
| 2026-27 | 206466 | 9846 | 10261 | 7556 | 13620 | 5 | 247754 | 335999 |
| 2027-28 | 221028 | 10291 | 10570 | 7847 | 14180 | 5 | 263921 | 355548 |
| 2028-29 | 233557 | 10719 | 10791 | 8070 | 14606 | 5 | 277748 | 371968 |

| Year/ Types of vehicles | Car/Jeep/Van | Minibus /LCV | Bus/ 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Tollable Traffic (No.) | PCU (Including Exempted) |
|--------------------------------|---------------------|---------------------|---------------------|-----------------|--------------------|-------------------------|-------------------------------------|---------------------------------|
| 2029-30 | 246808 | 11164 | 11018 | 8295 | 15040 | 5 | 292330 | 389196 |
| 2030-31 | 260806 | 11619 | 11249 | 8529 | 15481 | 5 | 307689 | 407256 |
| 2031-32 | 275601 | 12097 | 11481 | 8772 | 15932 | 5 | 323888 | 426222 |
| 2032-33 | 291231 | 12597 | 11719 | 9017 | 16393 | 5 | 340962 | 446126 |
| 2033-34 | 302529 | 13075 | 11859 | 9168 | 16685 | 5 | 353321 | 460328 |
| 2034-35 | 314282 | 13571 | 12004 | 9319 | 16979 | 5 | 366160 | 475036 |
| 2035-36 | 326474 | 14078 | 12150 | 9471 | 17278 | 5 | 379456 | 490228 |
| 2036-37 | 339135 | 14609 | 12297 | 9626 | 17585 | 5 | 393257 | 505973 |
| 2037-38 | 352296 | 15166 | 12445 | 9786 | 17896 | 5 | 407594 | 522293 |
| 2038-39 | 362941 | 15687 | 12539 | 9892 | 18106 | 5 | 419170 | 535264 |
| 2039-40 | 373903 | 16227 | 12633 | 9999 | 18320 | 5 | 431087 | 548602 |
| 2040-41 | 385192 | 16787 | 12728 | 10106 | 18536 | 5 | 443354 | 562309 |
| 2041-42 | 396825 | 17364 | 12823 | 10213 | 18754 | 5 | 455984 | 576395 |
| 2042-43 | 408805 | 17966 | 12920 | 10321 | 18975 | 5 | 468992 | 590887 |
| 2043-44 | 418069 | 18534 | 12974 | 10385 | 19102 | 5 | 479069 | 601929 |
| 2044-45 | 427534 | 19111 | 13028 | 10450 | 19230 | 5 | 489358 | 613192 |
| 2045-46 | 437211 | 19712 | 13083 | 10515 | 19359 | 5 | 499885 | 624711 |
| 2046-47 | 447122 | 20326 | 13138 | 10580 | 19488 | 5 | 510659 | 636484 |
| 2047-48 | 457252 | 20972 | 13193 | 10645 | 19617 | 5 | 521684 | 648523 |
| 2048-49 | 464635 | 21568 | 13210 | 10666 | 19672 | 5 | 529756 | 657162 |
| 2049-50 | 472136 | 22175 | 13227 | 10687 | 19727 | 5 | 537957 | 665935 |
| 2050-51 | 479764 | 22791 | 13244 | 10708 | 19783 | 5 | 546295 | 674853 |
| 2051-52 | 487501 | 23439 | 13261 | 10729 | 19839 | 5 | 554774 | 683928 |
| 2052-53 | 495370 | 24099 | 13278 | 10750 | 19895 | 5 | 563397 | 693153 |
| 2053-54 | 502843 | 24780 | 13295 | 10771 | 19951 | 5 | 571645 | 702013 |

Table 5-29: Total Tollable Traffic (Optimistic Growth Scenario)

| Year/ Types of vehicles | Car/Jeep/Van | Minibus /LCV | Bus/ 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Tollable Traffic (No.) | PCU (Including Exempted) |
|-------------------------|--------------|--------------|--------------|----------|-------------|------------------|------------------------------|--------------------------|
| 2024-25 | 180567 | 9041 | 9684 | 7008 | 12604 | 5 | 218909 | 300945 |
| 2025-26 | 193765 | 9476 | 9997 | 7300 | 13164 | 5 | 233707 | 319131 |
| 2026-27 | 207922 | 9931 | 10314 | 7602 | 13742 | 5 | 249516 | 338428 |
| 2027-28 | 223113 | 10402 | 10641 | 7919 | 14344 | 5 | 266424 | 358967 |
| 2028-29 | 236325 | 10861 | 10894 | 8171 | 14800 | 5 | 281056 | 376434 |
| 2029-30 | 250323 | 11336 | 11151 | 8428 | 15268 | 5 | 296511 | 394793 |
| 2030-31 | 265149 | 11836 | 11420 | 8690 | 15752 | 5 | 312852 | 414140 |
| 2031-32 | 280853 | 12352 | 11692 | 8959 | 16246 | 5 | 330107 | 434464 |
| 2032-33 | 297490 | 12894 | 11972 | 9237 | 16761 | 5 | 348359 | 455905 |
| 2033-34 | 309780 | 13413 | 12147 | 9423 | 17113 | 5 | 361881 | 471641 |
| 2034-35 | 322579 | 13955 | 12324 | 9610 | 17470 | 5 | 375943 | 487951 |
| 2035-36 | 335893 | 14518 | 12505 | 9801 | 17832 | 5 | 390554 | 504855 |
| 2036-37 | 349788 | 15107 | 12690 | 9994 | 18206 | 5 | 405790 | 522450 |
| 2037-38 | 364230 | 15721 | 12876 | 10189 | 18586 | 5 | 421607 | 540666 |
| 2038-39 | 376145 | 16308 | 13010 | 10333 | 18858 | 5 | 434659 | 555520 |
| 2039-40 | 388442 | 16921 | 13146 | 10480 | 19132 | 5 | 448126 | 570818 |
| 2040-41 | 401153 | 17548 | 13285 | 10628 | 19410 | 5 | 462029 | 586582 |
| 2041-42 | 414284 | 18207 | 13425 | 10779 | 19689 | 5 | 476389 | 602830 |
| 2042-43 | 427823 | 18902 | 13569 | 10930 | 19971 | 5 | 491200 | 619565 |
| 2043-44 | 438585 | 19553 | 13661 | 11016 | 20148 | 5 | 502968 | 632634 |
| 2044-45 | 449619 | 20218 | 13753 | 11105 | 20326 | 5 | 515026 | 646010 |
| 2045-46 | 460925 | 20917 | 13845 | 11195 | 20506 | 5 | 527393 | 659720 |
| 2046-47 | 472524 | 21637 | 13937 | 11286 | 20687 | 5 | 540076 | 673763 |
| 2047-48 | 484418 | 22381 | 14030 | 11377 | 20868 | 5 | 553079 | 688139 |
| 2048-49 | 493458 | 23081 | 14081 | 11425 | 20973 | 5 | 563023 | 698999 |
| 2049-50 | 502653 | 23801 | 14132 | 11474 | 21080 | 5 | 573145 | 710055 |
| 2050-51 | 512037 | 24542 | 14183 | 11524 | 21187 | 5 | 583478 | 721335 |

| Year/ Types of vehicles | Car/Jeep/Van | Minibus /LCV | Bus/ 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Tollable Traffic (No.) | PCU (Including Exempted) |
|-------------------------|--------------|--------------|--------------|----------|-------------|------------------|------------------------------|--------------------------|
| 2051-52 | 521584 | 25305 | 14235 | 11574 | 21294 | 5 | 593997 | 732814 |
| 2052-53 | 531303 | 26093 | 14287 | 11624 | 21401 | 5 | 604713 | 744503 |
| 2053-54 | 540550 | 26898 | 14339 | 11674 | 21509 | 5 | 614975 | 755749 |

5.2 Toll Revenue at all toll plazas

Toll revenue has been worked out for concession period as per projected traffic and worked out rates.

5.4 Revenue Forecast

Revenue forecast with traffic numbers as per above analysis and rates worked out is given in following table.

Table 5-30: Total Toll Revenue – Rs. Cr (Pessimistic)

| Year /TP no. | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | Total |
|--------------|-------|------|-------|--------|-------|-------|-------|--------|-------|-------|--------|-------|--------|-------|-------|-------|-------|--------|-------|-------|-------|--------|-----------------|
| 2023-24 | 18.98 | 0.00 | 10.88 | 85.68 | 10.96 | 5.27 | 32.26 | 83.34 | 33.08 | 13.22 | 37.25 | 5.94 | 88.83 | 22.31 | 4.96 | 23.68 | 18.22 | 103.32 | 17.09 | 19.93 | 6.02 | 59.67 | 700.88 |
| 2024-25 | 21.14 | 0.00 | 11.74 | 92.23 | 11.83 | 5.87 | 34.80 | 89.28 | 35.72 | 14.40 | 40.63 | 6.47 | 96.13 | 24.12 | 5.30 | 25.72 | 19.71 | 111.34 | 18.15 | 21.60 | 6.54 | 64.46 | 757.19 |
| 2025-26 | 23.17 | 0.00 | 13.32 | 102.06 | 13.04 | 6.64 | 38.85 | 97.75 | 40.17 | 16.01 | 45.54 | 7.08 | 106.01 | 26.93 | 5.83 | 28.57 | 21.85 | 122.53 | 20.52 | 25.56 | 7.28 | 73.60 | 842.30 |
| 2026-27 | 25.51 | 0.00 | 14.64 | 112.27 | 14.77 | 7.34 | 42.82 | 108.44 | 44.32 | 17.55 | 50.05 | 7.85 | 117.30 | 29.66 | 6.45 | 31.98 | 24.28 | 138.84 | 22.93 | 27.90 | 7.98 | 85.94 | 938.80 |
| 2027-28 | 28.33 | 0.00 | 16.41 | 126.11 | 16.31 | 8.31 | 48.21 | 120.59 | 49.68 | 19.84 | 56.15 | 8.64 | 130.89 | 34.08 | 7.35 | 35.88 | 27.02 | 152.61 | 25.58 | 30.97 | 8.81 | 95.24 | 1,047.02 |
| 2028-29 | 31.85 | 0.00 | 18.64 | 137.72 | 18.07 | 9.20 | 53.10 | 132.45 | 54.82 | 21.99 | 62.48 | 9.43 | 143.84 | 37.41 | 7.92 | 39.46 | 29.42 | 171.90 | 27.58 | 33.52 | 10.13 | 107.98 | 1,158.91 |
| 2029-30 | 34.70 | 0.00 | 20.37 | 152.03 | 20.20 | 10.32 | 58.62 | 144.99 | 60.65 | 24.23 | 69.34 | 10.60 | 158.29 | 41.27 | 8.65 | 44.22 | 32.67 | 186.33 | 30.44 | 37.22 | 11.10 | 116.33 | 1,272.57 |
| 2030-31 | 38.96 | 0.00 | 22.80 | 167.56 | 22.24 | 11.31 | 64.72 | 159.30 | 67.17 | 26.73 | 76.82 | 11.70 | 175.36 | 45.28 | 9.66 | 47.74 | 35.90 | 202.68 | 34.63 | 43.33 | 12.41 | 130.69 | 1,407.00 |
| 2031-32 | 43.21 | 0.00 | 25.08 | 184.45 | 24.79 | 12.54 | 71.76 | 175.23 | 74.89 | 29.41 | 84.77 | 12.73 | 193.13 | 50.84 | 10.69 | 53.08 | 39.22 | 227.70 | 37.32 | 47.13 | 14.39 | 150.03 | 1,562.37 |
| 2032-33 | 47.71 | 0.00 | 27.97 | 203.21 | 27.10 | 13.96 | 79.23 | 192.02 | 82.25 | 32.76 | 94.40 | 14.06 | 212.08 | 56.58 | 11.82 | 59.53 | 43.33 | 246.53 | 41.10 | 51.41 | 15.66 | 163.34 | 1,716.02 |
| 2033-34 | 52.63 | 0.00 | 30.54 | 220.77 | 29.97 | 15.36 | 86.38 | 208.93 | 89.93 | 35.81 | 102.91 | 15.39 | 232.07 | 61.54 | 12.92 | 65.09 | 47.01 | 273.99 | 46.09 | 56.06 | 16.72 | 182.18 | 1,882.31 |
| 2034-35 | 56.95 | 0.00 | 33.25 | 242.32 | 32.86 | 16.77 | 94.94 | 227.84 | 98.84 | 39.25 | 113.13 | 16.76 | 251.86 | 67.15 | 14.09 | 71.21 | 51.64 | 294.51 | 50.04 | 63.20 | 18.85 | 198.54 | 2,053.99 |

| Year /TP no. | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | Total |
|----------------|--------|------|--------|---------|--------|-------|--------|---------|--------|--------|--------|-------|---------|--------|-------|--------|--------|---------|--------|--------|-------|---------|-----------------|
| 2035-36 | 62.87 | 0.00 | 36.89 | 264.65 | 36.00 | 18.54 | 103.71 | 247.74 | 107.75 | 43.13 | 123.95 | 18.38 | 276.02 | 74.51 | 15.38 | 78.75 | 56.31 | 325.21 | 55.45 | 69.35 | 20.60 | 220.75 | 2,255.94 |
| 2036-37 | 70.86 | 0.00 | 39.98 | 288.88 | 39.43 | 20.34 | 113.79 | 269.78 | 118.31 | 47.53 | 135.45 | 19.87 | 300.64 | 80.43 | 16.97 | 86.02 | 61.26 | 359.68 | 61.41 | 75.46 | 22.91 | 245.49 | 2,474.48 |
| 2037-38 | 76.51 | 0.00 | 43.92 | 313.79 | 42.87 | 22.42 | 124.86 | 293.31 | 130.98 | 51.63 | 148.63 | 21.87 | 329.56 | 88.81 | 18.53 | 94.65 | 66.69 | 385.96 | 66.50 | 80.93 | 24.73 | 263.65 | 2,690.80 |
| 2038-39 | 83.09 | 0.00 | 48.37 | 340.04 | 47.27 | 24.20 | 135.58 | 318.73 | 141.21 | 56.61 | 162.01 | 23.80 | 357.21 | 96.54 | 20.20 | 102.65 | 72.99 | 421.79 | 72.65 | 90.12 | 27.19 | 292.29 | 2,934.54 |
| 2039-40 | 91.46 | 0.00 | 52.46 | 370.80 | 51.52 | 26.62 | 148.25 | 346.67 | 154.43 | 61.49 | 177.21 | 25.85 | 389.78 | 104.67 | 22.14 | 112.63 | 79.12 | 463.07 | 78.90 | 98.26 | 29.73 | 321.04 | 3,206.09 |
| 2040-41 | 99.77 | 0.00 | 57.15 | 401.97 | 55.50 | 29.20 | 161.42 | 374.93 | 169.21 | 67.17 | 193.42 | 27.94 | 422.85 | 114.64 | 24.24 | 122.06 | 85.49 | 501.36 | 85.55 | 108.33 | 32.46 | 355.73 | 3,490.38 |
| 2041-42 | 108.87 | 0.00 | 62.69 | 437.73 | 60.85 | 31.80 | 175.58 | 406.43 | 182.60 | 73.22 | 210.75 | 30.55 | 459.98 | 125.16 | 26.49 | 134.53 | 93.05 | 547.98 | 93.50 | 116.65 | 35.80 | 387.98 | 3,802.19 |
| 2042-43 | 118.91 | 0.00 | 68.34 | 475.98 | 66.33 | 34.93 | 191.75 | 442.10 | 200.21 | 79.99 | 230.31 | 33.37 | 501.27 | 137.06 | 29.03 | 146.69 | 101.65 | 597.63 | 101.67 | 129.44 | 39.46 | 427.86 | 4,153.98 |
| 2043-44 | 130.48 | 0.00 | 74.56 | 517.08 | 72.58 | 38.30 | 208.60 | 479.85 | 218.49 | 87.30 | 250.61 | 36.11 | 544.90 | 148.96 | 31.71 | 158.64 | 110.02 | 647.56 | 112.56 | 140.03 | 42.33 | 465.68 | 4,516.36 |
| 2044-45 | 140.85 | 0.00 | 80.51 | 556.74 | 78.85 | 41.66 | 226.12 | 518.10 | 236.40 | 94.51 | 271.63 | 39.37 | 588.46 | 161.39 | 34.20 | 171.89 | 118.87 | 699.37 | 119.32 | 154.49 | 46.05 | 504.07 | 4,882.84 |
| 2045-46 | 152.47 | 0.00 | 88.25 | 603.80 | 85.69 | 45.35 | 245.55 | 560.46 | 257.20 | 102.79 | 295.23 | 42.46 | 636.67 | 175.65 | 36.94 | 188.33 | 129.39 | 765.49 | 130.63 | 163.73 | 50.35 | 553.65 | 5,310.10 |
| 2046-47 | 168.36 | 0.00 | 94.91 | 653.01 | 93.21 | 49.28 | 267.03 | 605.68 | 279.94 | 111.76 | 319.74 | 46.40 | 691.07 | 191.33 | 40.32 | 204.92 | 140.41 | 827.36 | 142.33 | 180.51 | 54.73 | 603.25 | 5,765.56 |
| 2047-48 | 181.88 | 0.00 | 104.43 | 710.77 | 102.23 | 54.32 | 292.17 | 659.57 | 305.78 | 122.05 | 349.55 | 50.33 | 750.48 | 208.97 | 44.14 | 223.35 | 152.30 | 906.60 | 154.47 | 197.86 | 59.91 | 664.43 | 6,295.60 |
| 2048-49 | 197.13 | 0.00 | 112.59 | 764.76 | 109.89 | 58.50 | 314.47 | 709.59 | 329.73 | 131.51 | 378.48 | 54.49 | 809.39 | 225.51 | 47.66 | 241.62 | 164.73 | 970.94 | 168.54 | 212.24 | 64.55 | 711.20 | 6,777.51 |
| 2049-50 | 214.69 | 0.00 | 121.59 | 827.83 | 119.19 | 63.39 | 341.56 | 765.39 | 357.79 | 142.78 | 409.72 | 59.24 | 873.95 | 244.34 | 51.49 | 262.11 | 177.63 | 1053.73 | 181.92 | 230.20 | 71.06 | 777.45 | 7,347.05 |
| 2050-51 | 232.44 | 0.00 | 132.19 | 894.08 | 129.98 | 68.72 | 368.41 | 826.82 | 387.38 | 154.75 | 443.08 | 63.83 | 944.37 | 264.72 | 56.02 | 283.50 | 192.43 | 1141.13 | 197.24 | 250.44 | 76.74 | 843.64 | 7,951.89 |
| 2051-52 | 253.24 | 0.00 | 144.10 | 969.01 | 140.77 | 75.44 | 400.82 | 897.59 | 422.69 | 168.40 | 481.33 | 69.64 | 1024.77 | 288.55 | 61.09 | 308.78 | 208.84 | 1237.07 | 215.16 | 272.26 | 82.97 | 921.51 | 8,644.04 |
| 2052-53 | 274.55 | 0.00 | 155.70 | 1044.59 | 152.40 | 81.27 | 432.98 | 966.03 | 457.22 | 181.52 | 521.48 | 75.13 | 1104.40 | 310.85 | 65.98 | 333.88 | 225.03 | 1333.36 | 232.94 | 295.76 | 90.16 | 997.48 | 9,332.71 |
| 2053-54 | 296.73 | 0.00 | 168.90 | 1129.63 | 165.22 | 88.33 | 469.74 | 1042.90 | 495.15 | 197.39 | 564.52 | 81.54 | 1195.44 | 338.68 | 71.83 | 363.83 | 243.64 | 1440.25 | 252.02 | 319.02 | 98.67 | 1079.67 | 10103.10 |

Table 5-31: Total Toll Revenue – Rs. Cr (Most Likely)

| Year /TP no. | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | Total |
|----------------|-------|------|-------|--------|-------|-------|-------|--------|-------|-------|-------|-------|--------|-------|------|-------|-------|--------|-------|-------|-------|--------|-----------------|
| 2023-24 | 18.98 | 0.00 | 10.88 | 85.68 | 10.96 | 5.27 | 32.26 | 83.34 | 33.08 | 13.22 | 37.25 | 5.94 | 88.83 | 22.31 | 4.96 | 23.68 | 18.22 | 103.32 | 17.09 | 19.93 | 6.02 | 59.67 | 700.88 |
| 2024-25 | 21.18 | 0.00 | 11.78 | 92.39 | 11.85 | 5.89 | 34.88 | 89.48 | 35.82 | 14.44 | 40.75 | 6.49 | 96.32 | 24.16 | 5.31 | 25.77 | 19.76 | 111.57 | 18.18 | 21.64 | 6.56 | 64.60 | 758.82 |
| 2025-26 | 23.25 | 0.00 | 13.40 | 102.57 | 13.07 | 6.69 | 39.05 | 98.16 | 40.37 | 16.08 | 45.77 | 7.11 | 106.44 | 27.06 | 5.85 | 28.71 | 21.96 | 123.00 | 20.60 | 25.66 | 7.32 | 73.91 | 846.02 |
| 2026-27 | 25.64 | 0.00 | 14.78 | 113.12 | 14.84 | 7.40 | 43.13 | 109.17 | 44.66 | 17.65 | 50.46 | 7.89 | 118.08 | 29.87 | 6.47 | 32.24 | 24.44 | 139.61 | 23.07 | 28.06 | 8.04 | 86.51 | 945.12 |
| 2027-28 | 28.55 | 0.00 | 16.63 | 127.35 | 16.41 | 8.39 | 48.67 | 121.67 | 50.19 | 20.00 | 56.72 | 8.69 | 132.09 | 34.38 | 7.39 | 36.30 | 27.25 | 153.85 | 25.81 | 31.23 | 8.89 | 96.08 | 1,056.53 |
| 2028-29 | 32.16 | 0.00 | 18.90 | 139.39 | 18.22 | 9.30 | 53.69 | 133.97 | 55.52 | 22.22 | 63.28 | 9.51 | 145.46 | 37.84 | 7.98 | 40.01 | 29.78 | 173.77 | 27.87 | 33.86 | 10.24 | 109.17 | 1,172.15 |
| 2029-30 | 35.17 | 0.00 | 20.70 | 154.28 | 20.39 | 10.47 | 59.40 | 146.96 | 61.59 | 24.56 | 70.39 | 10.72 | 160.44 | 41.85 | 8.75 | 44.94 | 33.15 | 188.85 | 30.83 | 37.69 | 11.25 | 117.89 | 1,290.28 |
| 2030-31 | 39.60 | 0.00 | 23.22 | 170.51 | 22.52 | 11.48 | 65.76 | 161.85 | 68.39 | 27.17 | 78.15 | 11.85 | 178.11 | 46.00 | 9.79 | 48.65 | 36.53 | 205.94 | 35.13 | 43.96 | 12.59 | 132.75 | 1,429.94 |

| Year /TP no. | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | Total |
|----------------|--------|------|--------|---------|--------|-------|--------|---------|--------|--------|--------|-------|---------|--------|-------|--------|--------|---------|--------|--------|--------|---------|-----------------|
| 2031-32 | 44.02 | 0.00 | 25.57 | 188.15 | 25.12 | 12.75 | 73.08 | 178.51 | 76.44 | 29.97 | 86.38 | 12.91 | 196.52 | 51.78 | 10.88 | 54.20 | 39.97 | 231.84 | 37.94 | 47.91 | 14.64 | 152.74 | 1,591.31 |
| 2032-33 | 48.72 | 0.00 | 28.55 | 207.77 | 27.53 | 14.23 | 80.91 | 196.08 | 84.15 | 33.41 | 96.41 | 14.27 | 216.29 | 57.77 | 12.07 | 60.94 | 44.25 | 251.72 | 41.89 | 52.37 | 15.95 | 166.68 | 1,751.96 |
| 2033-34 | 53.89 | 0.00 | 31.25 | 226.24 | 30.61 | 15.70 | 88.42 | 213.95 | 92.17 | 36.62 | 105.30 | 15.64 | 237.20 | 62.96 | 13.21 | 66.80 | 48.13 | 280.44 | 47.09 | 57.28 | 17.05 | 186.35 | 1,926.32 |
| 2034-35 | 58.41 | 0.00 | 34.14 | 248.80 | 33.71 | 17.19 | 97.35 | 233.94 | 101.49 | 40.24 | 116.00 | 17.07 | 258.10 | 68.87 | 14.42 | 73.25 | 53.03 | 302.25 | 51.24 | 64.81 | 19.26 | 203.59 | 2,107.14 |
| 2035-36 | 64.59 | 0.00 | 38.00 | 272.27 | 37.13 | 19.07 | 106.58 | 255.05 | 110.85 | 44.33 | 127.33 | 18.75 | 283.64 | 76.61 | 15.74 | 81.18 | 57.99 | 334.56 | 56.89 | 71.35 | 21.09 | 226.95 | 2,319.96 |
| 2036-37 | 72.94 | 0.00 | 41.27 | 297.82 | 40.87 | 21.02 | 117.20 | 278.52 | 121.92 | 48.99 | 139.40 | 20.31 | 309.71 | 82.97 | 17.39 | 88.84 | 63.29 | 370.88 | 63.16 | 77.86 | 23.53 | 253.01 | 2,550.89 |
| 2037-38 | 78.93 | 0.00 | 45.43 | 324.26 | 44.64 | 23.27 | 128.91 | 303.61 | 135.22 | 53.38 | 153.26 | 22.40 | 340.34 | 91.96 | 19.02 | 97.95 | 69.14 | 398.82 | 68.57 | 83.75 | 25.46 | 272.40 | 2,780.70 |
| 2038-39 | 85.98 | 0.00 | 50.16 | 352.29 | 49.34 | 25.17 | 140.32 | 330.68 | 146.20 | 58.62 | 167.43 | 24.43 | 369.95 | 100.13 | 20.77 | 106.55 | 75.84 | 436.75 | 75.15 | 93.45 | 28.06 | 302.78 | 3,040.07 |
| 2039-40 | 94.89 | 0.00 | 54.53 | 385.10 | 53.88 | 27.74 | 153.81 | 360.58 | 160.33 | 63.81 | 183.58 | 26.62 | 404.82 | 108.76 | 22.80 | 117.30 | 82.41 | 480.56 | 81.88 | 102.11 | 30.78 | 333.44 | 3,329.73 |
| 2040-41 | 103.80 | 0.00 | 59.55 | 418.53 | 58.16 | 30.46 | 167.86 | 390.90 | 176.16 | 69.83 | 200.90 | 28.84 | 440.29 | 119.36 | 24.99 | 127.48 | 89.22 | 521.40 | 89.07 | 112.80 | 33.70 | 370.45 | 3,633.75 |
| 2041-42 | 113.59 | 0.00 | 65.51 | 456.87 | 63.86 | 33.24 | 183.03 | 424.70 | 190.64 | 76.26 | 219.45 | 31.59 | 480.18 | 130.58 | 27.34 | 140.98 | 97.27 | 571.17 | 97.61 | 121.70 | 37.22 | 405.06 | 3,967.86 |
| 2042-43 | 124.37 | 0.00 | 71.62 | 498.02 | 69.71 | 36.57 | 200.33 | 463.07 | 209.62 | 83.48 | 240.43 | 34.55 | 524.68 | 143.29 | 30.01 | 154.18 | 106.38 | 624.27 | 106.46 | 135.34 | 41.10 | 447.84 | 4,345.32 |
| 2043-44 | 136.78 | 0.00 | 78.31 | 542.38 | 76.39 | 40.21 | 218.50 | 503.60 | 229.09 | 91.36 | 262.32 | 37.42 | 571.73 | 156.11 | 32.88 | 167.04 | 115.37 | 677.89 | 118.04 | 146.81 | 44.17 | 488.58 | 4,734.99 |
| 2044-45 | 147.97 | 0.00 | 84.72 | 585.41 | 83.11 | 43.80 | 237.47 | 544.88 | 248.31 | 99.17 | 285.08 | 40.87 | 618.88 | 169.51 | 35.55 | 181.35 | 124.90 | 733.72 | 125.35 | 162.39 | 48.15 | 530.10 | 5,130.70 |
| 2045-46 | 160.56 | 0.00 | 93.05 | 636.55 | 90.45 | 47.75 | 258.56 | 590.89 | 270.63 | 108.19 | 310.74 | 44.14 | 671.24 | 184.95 | 38.51 | 199.07 | 136.19 | 804.94 | 137.50 | 172.58 | 52.76 | 583.59 | 5,592.86 |
| 2046-47 | 177.72 | 0.00 | 100.28 | 690.24 | 98.59 | 52.01 | 281.95 | 640.11 | 295.20 | 117.96 | 337.50 | 48.32 | 730.29 | 201.98 | 42.15 | 217.02 | 148.04 | 871.95 | 150.11 | 190.78 | 57.45 | 637.33 | 6,086.96 |
| 2047-48 | 192.46 | 0.00 | 110.53 | 753.31 | 108.38 | 57.45 | 309.29 | 698.78 | 323.13 | 129.14 | 370.11 | 52.51 | 794.91 | 221.12 | 46.28 | 237.03 | 160.79 | 957.54 | 163.26 | 209.68 | 63.00 | 703.57 | 6,662.27 |
| 2048-49 | 209.10 | 0.00 | 119.51 | 812.61 | 116.71 | 62.04 | 333.75 | 753.55 | 349.23 | 139.44 | 401.52 | 56.97 | 859.56 | 239.10 | 50.09 | 256.98 | 174.27 | 1027.87 | 178.59 | 225.34 | 68.06 | 754.97 | 7,189.28 |
| 2049-50 | 228.20 | 0.00 | 129.43 | 881.85 | 126.82 | 67.41 | 363.38 | 814.72 | 379.86 | 151.75 | 435.56 | 62.12 | 930.53 | 259.67 | 54.24 | 279.33 | 188.32 | 1118.26 | 193.27 | 244.86 | 75.11 | 827.31 | 7,812.00 |
| 2050-51 | 247.54 | 0.00 | 141.11 | 954.80 | 138.59 | 73.26 | 392.80 | 882.16 | 412.30 | 164.84 | 472.03 | 67.09 | 1008.11 | 281.97 | 59.14 | 302.76 | 204.41 | 1213.87 | 210.14 | 266.95 | 81.30 | 899.93 | 8,475.11 |
| 2051-52 | 270.26 | 0.00 | 154.25 | 1037.51 | 150.41 | 80.64 | 428.45 | 959.91 | 451.03 | 179.76 | 513.90 | 73.41 | 1096.64 | 308.03 | 64.64 | 330.42 | 222.29 | 1318.95 | 229.77 | 290.75 | 88.11 | 985.38 | 9,234.48 |
| 2052-53 | 293.68 | 0.00 | 167.14 | 1121.24 | 163.12 | 87.09 | 464.07 | 1035.51 | 489.00 | 194.19 | 558.04 | 79.39 | 1184.80 | 332.56 | 69.96 | 358.06 | 239.94 | 1424.93 | 249.38 | 316.44 | 95.96 | 1069.16 | 9,993.66 |
| 2053-54 | 318.07 | 0.00 | 181.75 | 1215.62 | 177.21 | 94.94 | 504.82 | 1120.47 | 530.79 | 211.68 | 605.38 | 86.40 | 1285.61 | 363.20 | 76.32 | 390.95 | 260.24 | 1542.83 | 270.45 | 341.99 | 105.31 | 1160.04 | 10844.07 |

Table 5-32: Total Toll Revenue –Rs. Cr (Optimistic)

| Year /TP no. | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | Total |
|----------------|--------|------|--------|--------|--------|-------|--------|--------|--------|--------|--------|-------|--------|--------|-------|--------|--------|---------|--------|--------|-------|--------|-----------------|
| 2023-24 | 18.98 | 0.00 | 10.88 | 85.68 | 10.96 | 5.27 | 32.26 | 83.34 | 33.08 | 13.22 | 37.25 | 5.94 | 88.83 | 22.31 | 4.96 | 23.68 | 18.22 | 103.32 | 17.09 | 19.93 | 6.02 | 59.67 | 700.88 |
| 2024-25 | 21.22 | 0.00 | 11.83 | 92.68 | 11.89 | 5.90 | 35.00 | 89.73 | 35.92 | 14.48 | 40.88 | 6.50 | 96.60 | 24.22 | 5.32 | 25.90 | 19.86 | 111.85 | 18.22 | 21.70 | 6.57 | 64.76 | 761.01 |
| 2025-26 | 23.37 | 0.00 | 13.51 | 103.06 | 13.16 | 6.72 | 39.29 | 98.81 | 40.61 | 16.17 | 46.10 | 7.14 | 107.07 | 27.18 | 5.86 | 29.01 | 22.17 | 123.71 | 20.68 | 25.78 | 7.37 | 74.26 | 851.01 |
| 2026-27 | 25.86 | 0.00 | 14.96 | 113.87 | 14.97 | 7.45 | 43.54 | 110.20 | 45.08 | 17.81 | 50.96 | 7.94 | 119.07 | 30.06 | 6.50 | 32.70 | 24.80 | 140.85 | 23.22 | 28.29 | 8.11 | 87.13 | 953.37 |
| 2027-28 | 28.86 | 0.00 | 16.88 | 128.49 | 16.60 | 8.45 | 49.25 | 123.16 | 50.81 | 20.21 | 57.45 | 8.77 | 133.55 | 34.67 | 7.44 | 36.94 | 27.78 | 155.59 | 26.03 | 31.55 | 9.00 | 97.01 | 1,068.50 |
| 2028-29 | 32.60 | 0.00 | 19.24 | 140.92 | 18.45 | 9.41 | 54.50 | 135.89 | 56.32 | 22.53 | 64.20 | 9.61 | 147.36 | 38.22 | 8.05 | 40.81 | 30.38 | 176.19 | 28.19 | 34.29 | 10.39 | 110.51 | 1,188.07 |
| 2029-30 | 35.70 | 0.00 | 21.14 | 156.25 | 20.71 | 10.60 | 60.44 | 149.39 | 62.62 | 24.99 | 71.56 | 10.85 | 162.91 | 42.33 | 8.85 | 45.92 | 33.84 | 192.03 | 31.26 | 38.25 | 11.43 | 119.65 | 1,310.69 |
| 2030-31 | 40.26 | 0.00 | 23.77 | 173.09 | 22.89 | 11.64 | 67.01 | 164.90 | 69.67 | 27.72 | 79.60 | 12.01 | 181.33 | 46.62 | 9.94 | 49.79 | 37.34 | 209.96 | 35.71 | 44.73 | 12.82 | 135.08 | 1,455.88 |
| 2031-32 | 44.83 | 0.00 | 26.23 | 191.33 | 25.60 | 12.97 | 74.61 | 182.24 | 78.06 | 30.65 | 88.20 | 13.10 | 200.67 | 52.56 | 11.07 | 55.58 | 41.00 | 237.03 | 38.65 | 48.86 | 14.92 | 155.81 | 1,623.97 |
| 2032-33 | 49.72 | 0.00 | 29.37 | 211.81 | 28.08 | 14.50 | 82.79 | 200.65 | 86.14 | 34.27 | 98.67 | 14.50 | 221.37 | 58.82 | 12.31 | 62.64 | 45.53 | 257.96 | 42.75 | 53.52 | 16.29 | 170.43 | 1,792.13 |
| 2033-34 | 55.15 | 0.00 | 32.24 | 231.25 | 31.29 | 16.06 | 90.71 | 219.54 | 94.56 | 37.66 | 108.12 | 15.96 | 243.44 | 64.41 | 13.49 | 68.79 | 49.66 | 288.13 | 48.16 | 58.79 | 17.52 | 191.02 | 1,975.94 |
| 2034-35 | 59.95 | 0.00 | 35.27 | 255.04 | 34.54 | 17.64 | 100.18 | 240.69 | 104.42 | 41.51 | 119.45 | 17.52 | 265.56 | 70.81 | 14.74 | 75.54 | 54.85 | 311.24 | 52.53 | 66.77 | 19.88 | 209.19 | 2,167.32 |
| 2035-36 | 66.52 | 0.00 | 39.32 | 279.93 | 38.08 | 19.63 | 109.97 | 263.08 | 114.35 | 45.86 | 131.52 | 19.33 | 292.58 | 79.12 | 16.12 | 83.84 | 60.13 | 345.35 | 58.47 | 73.79 | 21.88 | 233.72 | 2,392.58 |
| 2036-37 | 75.35 | 0.00 | 42.81 | 307.01 | 42.02 | 21.67 | 121.24 | 288.05 | 126.12 | 50.82 | 144.44 | 21.03 | 320.33 | 86.04 | 17.83 | 91.91 | 65.77 | 383.85 | 65.05 | 80.83 | 24.52 | 261.17 | 2,637.85 |
| 2037-38 | 81.75 | 0.00 | 47.23 | 335.16 | 45.99 | 24.01 | 133.69 | 314.80 | 140.24 | 55.52 | 159.30 | 23.28 | 352.98 | 95.68 | 19.54 | 101.53 | 71.99 | 413.89 | 70.79 | 87.30 | 26.63 | 281.85 | 2,883.16 |
| 2038-39 | 89.25 | 0.00 | 52.28 | 365.18 | 51.01 | 26.04 | 145.93 | 343.70 | 151.98 | 61.24 | 174.43 | 25.41 | 384.48 | 104.48 | 21.35 | 110.70 | 79.17 | 454.50 | 77.81 | 97.60 | 29.41 | 314.09 | 3,160.04 |
| 2039-40 | 98.71 | 0.00 | 56.97 | 400.36 | 55.92 | 28.81 | 160.39 | 375.75 | 167.04 | 66.90 | 191.66 | 27.69 | 421.66 | 113.81 | 23.47 | 122.15 | 86.30 | 501.48 | 85.02 | 106.84 | 32.30 | 346.76 | 3,469.99 |
| 2040-41 | 108.22 | 0.00 | 62.34 | 436.28 | 60.57 | 31.77 | 175.55 | 408.36 | 183.93 | 73.51 | 210.15 | 30.04 | 459.69 | 125.26 | 25.76 | 133.09 | 93.73 | 545.69 | 92.77 | 118.27 | 35.44 | 386.22 | 3,796.65 |
| 2041-42 | 118.70 | 0.00 | 68.68 | 477.65 | 66.76 | 34.81 | 191.97 | 444.81 | 199.50 | 80.64 | 230.02 | 32.96 | 502.54 | 137.42 | 28.23 | 147.48 | 102.52 | 599.33 | 101.98 | 127.87 | 39.23 | 423.35 | 4,156.45 |
| 2042-43 | 130.28 | 0.00 | 75.21 | 522.07 | 73.18 | 38.42 | 210.74 | 486.41 | 219.86 | 88.61 | 252.51 | 36.10 | 550.38 | 151.16 | 31.02 | 161.64 | 112.47 | 656.75 | 111.52 | 142.50 | 43.43 | 469.23 | 4,563.50 |
| 2043-44 | 143.69 | 0.00 | 82.35 | 570.03 | 80.37 | 42.31 | 230.29 | 530.46 | 240.86 | 97.17 | 276.21 | 39.22 | 601.15 | 165.06 | 34.04 | 175.63 | 122.29 | 715.02 | 124.00 | 154.95 | 46.76 | 513.13 | 4,984.99 |
| 2044-45 | 155.84 | 0.00 | 89.26 | 616.83 | 87.65 | 46.17 | 250.78 | 575.49 | 261.66 | 105.72 | 300.88 | 42.93 | 652.33 | 179.62 | 36.86 | 191.20 | 132.70 | 775.89 | 132.06 | 171.79 | 51.07 | 558.14 | 5,414.86 |
| 2045-46 | 169.54 | 0.00 | 98.23 | 672.33 | 95.62 | 50.43 | 273.62 | 625.56 | 285.85 | 115.55 | 328.78 | 46.47 | 709.13 | 196.38 | 39.99 | 210.47 | 145.01 | 853.28 | 145.22 | 183.03 | 56.07 | 615.94 | 5,916.50 |
| 2046-47 | 188.14 | 0.00 | 106.10 | 730.76 | 104.42 | 55.03 | 298.98 | 679.32 | 312.58 | 126.23 | 357.95 | 50.97 | 773.26 | 214.94 | 43.84 | 230.11 | 157.95 | 926.63 | 158.92 | 202.79 | 61.23 | 674.39 | 6,454.54 |
| 2047-48 | 204.24 | 0.00 | 117.29 | 799.31 | 115.01 | 60.96 | 328.61 | 743.45 | 343.01 | 138.54 | 393.42 | 55.51 | 843.53 | 235.89 | 48.22 | 252.06 | 171.90 | 1020.14 | 173.22 | 223.39 | 67.31 | 746.35 | 7,081.34 |
| 2048-49 | 222.39 | 0.00 | 127.09 | 864.15 | 124.10 | 65.95 | 355.54 | 803.66 | 371.39 | 149.94 | 428.00 | 60.28 | 914.19 | 255.68 | 52.25 | 273.76 | 186.79 | 1097.62 | 189.84 | 240.76 | 72.85 | 802.83 | 7,659.05 |
| 2049-50 | 243.25 | 0.00 | 137.91 | 939.89 | 135.12 | 71.80 | 388.12 | 870.96 | 404.72 | 163.54 | 465.54 | 65.80 | 992.02 | 278.27 | 56.68 | 298.12 | 202.41 | 1196.76 | 205.80 | 262.34 | 80.56 | 881.89 | 8,341.50 |

| Year /TP no. | 1 | 1A | 2 | 3 | 4 | 4A | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18A | 19 | Total |
|----------------|--------|------|--------|---------|--------|--------|--------|---------|--------|--------|--------|-------|---------|--------|-------|--------|--------|---------|--------|--------|--------|---------|------------------|
| 2050-51 | 264.47 | 0.00 | 150.70 | 1020.09 | 147.93 | 78.21 | 420.69 | 945.53 | 440.12 | 178.08 | 505.89 | 71.15 | 1077.25 | 302.87 | 61.93 | 323.81 | 220.26 | 1301.97 | 224.13 | 286.76 | 87.42 | 961.59 | 9,070.83 |
| 2051-52 | 289.39 | 0.00 | 165.10 | 1110.97 | 160.83 | 86.26 | 459.95 | 1031.47 | 482.36 | 194.65 | 552.22 | 77.96 | 1174.60 | 331.60 | 67.83 | 354.14 | 240.15 | 1417.96 | 245.49 | 313.14 | 94.93 | 1055.51 | 9,906.51 |
| 2052-53 | 315.16 | 0.00 | 179.25 | 1203.51 | 174.76 | 93.35 | 499.35 | 1115.53 | 524.08 | 210.81 | 601.24 | 84.45 | 1272.14 | 358.85 | 73.57 | 384.55 | 259.96 | 1535.32 | 266.91 | 341.71 | 103.60 | 1148.12 | 10,746.23 |
| 2053-54 | 342.12 | 0.00 | 195.33 | 1308.00 | 190.18 | 101.96 | 544.50 | 1209.84 | 570.12 | 230.32 | 653.91 | 92.03 | 1383.82 | 392.74 | 80.44 | 420.82 | 282.72 | 1666.08 | 290.05 | 370.28 | 113.86 | 1248.67 | 11687.77 |

5.4 Modification in concession period.

Modification in concession period is analysed as per provisions of DCA and same is summarised in table below for all scenarios.

Pessimistic Case

| Target Point 1- April 2033 | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|----------------------------|
| Target Month - March 2029 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Modified Concession Period |
| NORR | 173.18 | 150.18 | -13.28% | No | - | 0.00% | 30.00 | 0.00 | |

| Target Point 2- April 2043 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------------|--|
| Target Month - March 2036 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Total Change in Concession period | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| NORR | 448.25 | 361.47 | -19.36% | No | - | 0.00% | 30.00 | 0.00 | 0.00 | 30.00 | |

Most Likely Case

| Target Point 1- April 2033 | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|----------------------------|
| Target Month - March 2029 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Modified Concession Period |
| NORR | 173.18 | 153.54 | -11.34% | No | - | 0.00% | 30.00 | 0.00 | |

| Target Point 2- April 2043 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------------|--|
| Target Month - March 2036 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Total Change in Concession period | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| NORR | 448.25 | 378.60 | -15.54% | No | - | 0.00% | 30.00 | 0.00 | 0.00 | 30.00 | |

Optimistic Case

| Target Point 1- April 2033 | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|----------------------------|
| Target Month - March 2029 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Modified Concession Period |
| NORR | 173.18 | 157.33 | -9.15% | No | - | 0.00% | 30.00 | 0.00 | |

| Target Point 2- April 2043 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------------|--|
| Target Month - March 2036 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Total Change in Concession period | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| NORR | 448.25 | 398.17 | -11.17% | No | - | 0.00% | 30.00 | 0.00 | 0.00 | 30.00 | |

| Hyderabad NORR-Modification in Concession Period | | | | | | |
|--|------------------|------------|------------------|------------|-----------------|------------|
| Types of Scenarios | Pessimistic Case | | Most likely Case | | Optimistic Case | |
| Target Month | April 2033 | April 2043 | April 2033 | April 2043 | April 2033 | April 2043 |
| Target Revenue (Rs. Crores) | 173.18 | 448.25 | 173.18 | 448.25 | 173.18 | 448.25 |
| Calculated Revenue (Rs. Crores) | 150.18 | 361.47 | 153.54 | 378.60 | 157.33 | 398.17 |
| Difference % | -13.28% | -19.36% | -11.34% | -15.54% | -9.15% | -11.17% |
| If qualifies for Modification in Concession Period | No | No | No | No | No | No |
| Qualifying Increment or shortfall | - | - | - | - | - | - |
| Change in Concession period % | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Original Concession Period | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Change in Concession period | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Change in Concession period | 0.00 | | 0.00 | | 0.00 | |
| Calculated Modified Concession Period | 30.00 | | 30.00 | | 30.00 | |
| Final Concession Period subject to Cap | 0.00 | | 0.00 | | 0.00 | |

Thus, there is no modification expected in concession period due to variation in revenue as per above estimates in all scenarios.

CHAPTER 6

CONCLUSION & RECOMMENDATIONS

6.1 Conclusion & Recommendations

The Outer Ring Road, officially as, Jawaharlal Nehru Outer Ring Road and abbreviated as, O.R.R., is a 158 kilometer, 8-lanes ring road expressway encircling Hyderabad, capital of the Indian state of Telangana. ORR is one of the most important infrastructural developments which has complimented growth of Hyderabad as major metro of India. On Eastern side it has provided express connectivity to major commercial and upscale residential centres of Gachibowli, Banjara Hills, Jublee Hills, Hitec- City, Manikonda, Nanakramguda. As a result, large number of residential and commercial projects have come up on this north-east part of ORR. Tellapur, Mokila, Kollur, Narsingi can be named as few of these. On north and western side ORR connects to Shamirpet and Genome Valley.

ORR also provides fast connectivity to various radial state and national highways connecting to Mumbai, Nagpur, Karimnagar, Warangal, Suryapet, Vijayawada, Bengaluru. Regional traffic now does not need to go into congested network of Hyderabad.

All above indicates that Hyderabad Ring Road or Nehru Outer Ring Road (NORR) has potential of good traffic growth on sustainable basis, and it can be considered as a stable healthy project from the traffic and revenue point of view.



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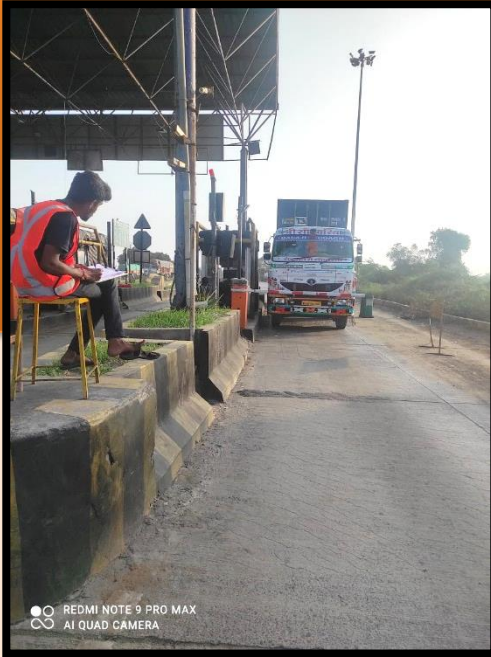
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Six Laning of Santalpur – Samakhiyali Section of NH-27 from Km 339.200 to km 430.100 in State of Gujarat



MARCH 2024

TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)



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**Six Laning of Santalpur – Samakhiyali Section of NH-27
from Km 339.200 to km 430.100 in
State of Gujarat**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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CHAPTER 1

INTRODUCTION

1.1 General

Project stretch from Santalpur to Samakhiali (Km 339.200 to km 430.100) is a 90.40 km long 4-lane National Highway Section on NH-27 in the state of Gujarat. NH-27 which is basically east west connector of country.

Project stretch is gateway link to both Kandla and Mundra ports and also to region of Saurashtra from northern part of India. Stretch is also part of Jamnagar – Amritsar Expressway which will boost the connectivity of Saurashtra and both ports from north Indian states of Punjab, Haryana, Rajasthan, and part of Uttar Pradesh.

The Government of India had entrusted National Highways Authority of India (NHAI) with developing of road infrastructure to match growing transportation demands of expanding economy. The Authority had resolved to undertake the six laning of existing four lane highway section from Santalpur to Samakhiali (Km 339.200 to km 430.100) on BOT basis. This report is part of traffic and revenue assessment of stretch including future growth projections. Project Highway alignment is depicted in following figure.

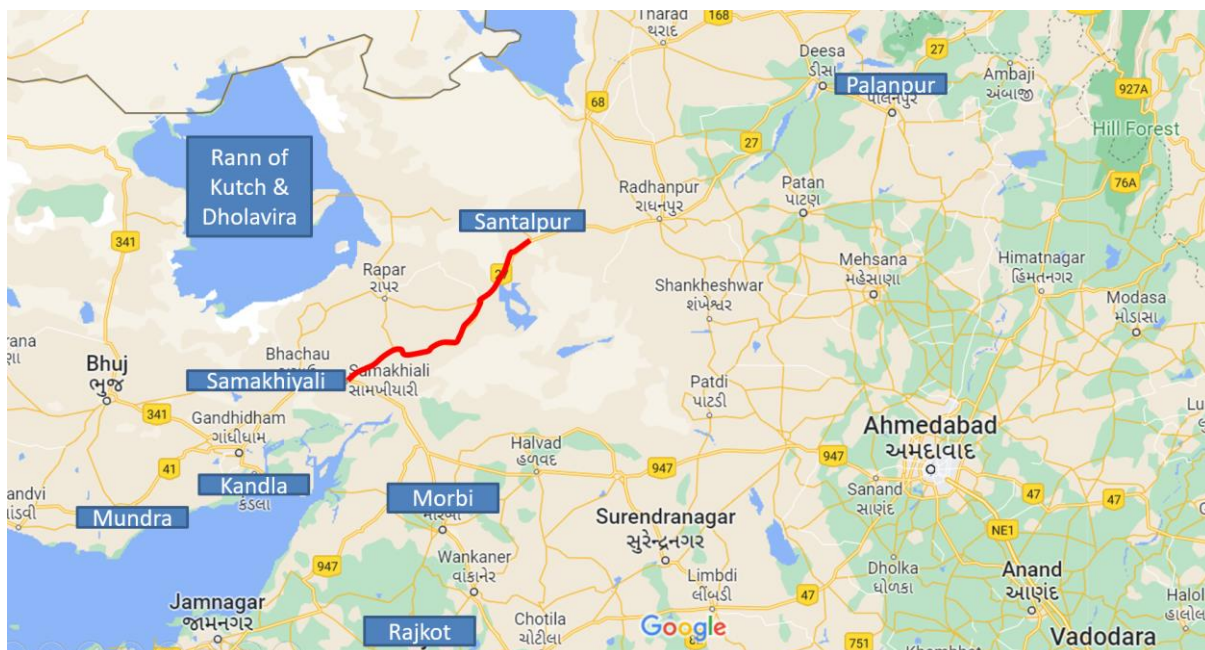


Figure 1-1: Project Location

M/s IRB Infrastructure Developers Limited (IRB) intends to participate in bidding for Six Laning of Santalpur- Samakhiali section of NH-27 on BOT basis. **GMD**

Consultants have been assigned the work of conducting traffic study and developing revenue model based on traffic projections and forecast.

For making the proper assessment of traffic volume on project stretch, base year traffic and its projection, GMD Consultants have carried out necessary traffic surveys and investigations. The base year traffic data is the primary input for determination of future traffic demand. With a view to estimate the base year traffic volume in different categories of goods and passenger carrying vehicles, the Classified Traffic Volume Count (CTVC) surveys, Turning Movement surveys (TMC), Registration Plate Survey (N.P.) & Origin-Destination (O-D) were conducted at Main Toll Plaza (MTP).

Year 2022-23 has been taken as the base year for projections and forecasting of traffic in horizon year.

This report fulfils part requirement of the assignment.

1.2 Project Scope

Following may be referred to as broad scope of Traffic Study of Six laning of Santalpur - Samakhiyali section of NH-27

- 14 days 24 hrs Classified Traffic Volume Count at main toll plaza location at Makhel. This was done with Videography of traffic for entire duration.
- Origin & Destination Survey (OD)- 1 Day at toll plaza (Additional One Day OD and CVC was done at Mehsana Bypass)
- Turning movement survey at important junctions / intersections- Optional
- Establishment of traffic pattern
- Working out traffic demand elasticity and growth
- Traffic forecast up to concession period.
- Preparation of revenue model up to concession period
- Any other analysis relevant to scope

1.3 Brief Description of the Project Influence Area (PIA)

Project stretch from Santalpur to Samakhiyali is gateway link for both the ports of Mundra and Kandla and also of Saurashtra region. The stretch is having combined traffic of NH-27 which is coming from Palanpur / Radhanpur Abu Road and northern link from north Indian states via NH-68 and small section of SH-127 from Suigaon to Sidhadha on project highway. Following figure show this the alignment of project highway in above context.

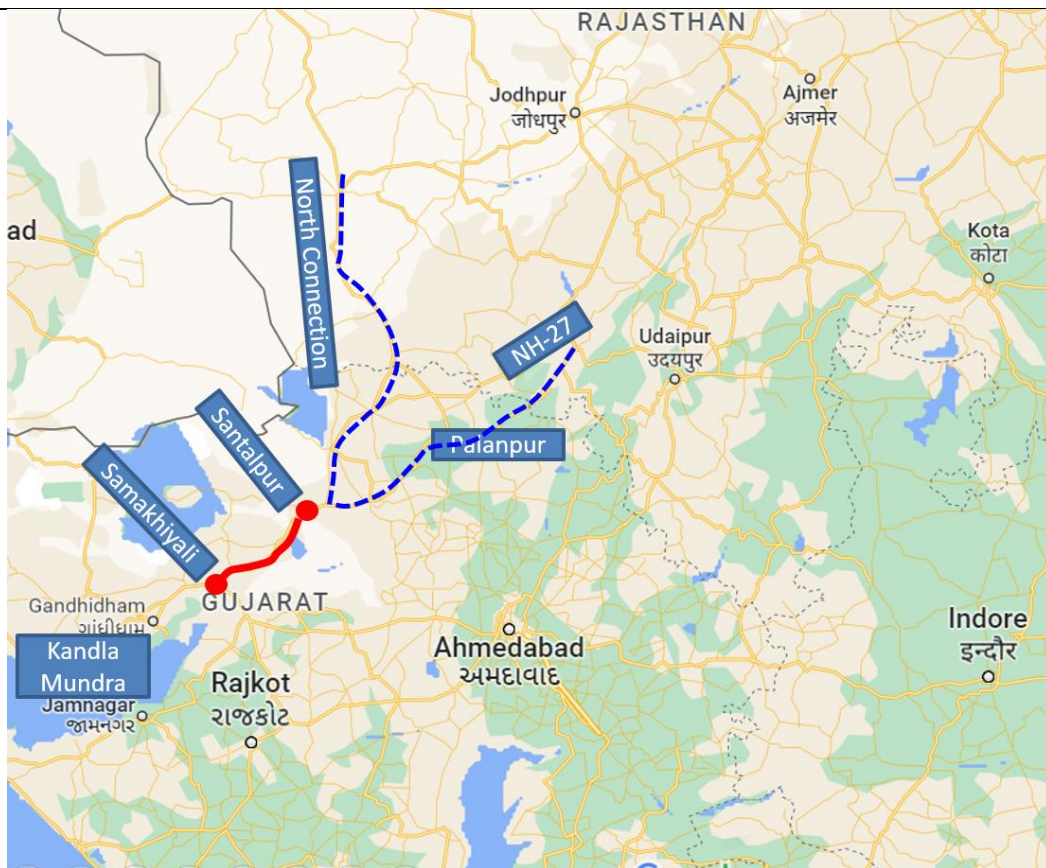


Figure 1-2 : Project Road in regional context.

As discussed previously project stretch is gateway link to both ports of Kandla and Mundra and also area of Saurashtra. On north of project stretch lies great Rann of Kutch which is also emerging as important tourist destination of area. Presence of historical Harrapan site of Dholavira in Rann of Kutch adds value to historical tourism.

1.4 Project Appreciation

Project stretch is currently four lanes. Condition of pavement is not that great at moment. Due to presence of heavy commercial traffic at many locations wearing coat has been damaged.



Figure 1-3 : Worn out wearing course of project road.

Project stretch is mostly dominated by heavy commercial traffic.

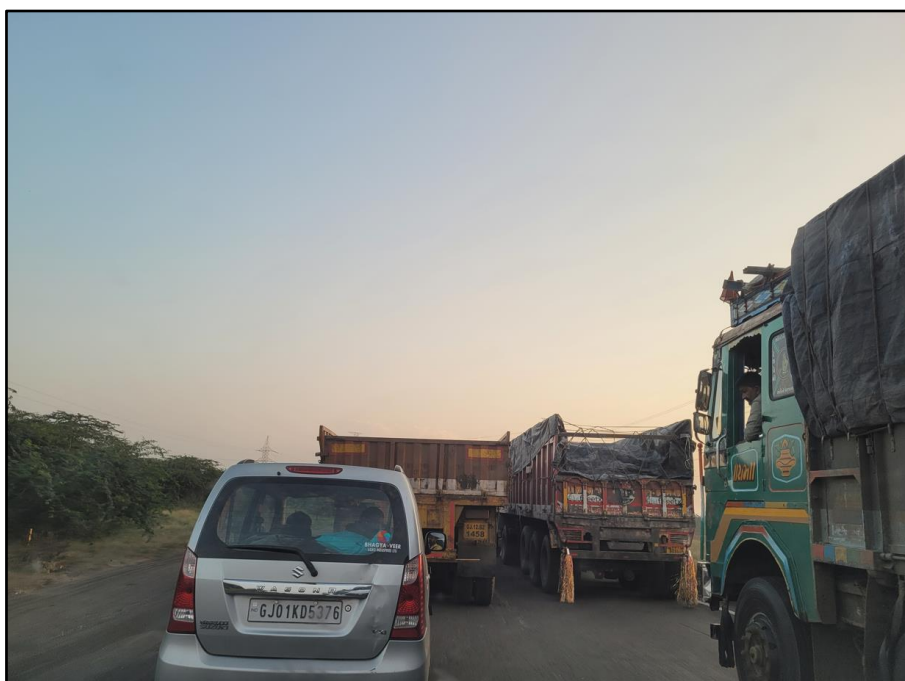


Figure 1-4 : Heavy Commercial Traffic on Project Stretch

There is Palanpur to Kandla Rail Line running along project highway. This is also an important transportation link from ports to mainland. This line is being doubled and electrified.



Figure 1-5 : Railway Line Palanpur- Kandla along Project Stretch

A new expressway from Jamnagar to Amritsar is under construction and is expected to complete by 2024. Project stretch is part of this new expressway. An interchange is planned at junction of Amritsar – Jamnagar Expressway with project stretch. This interchange is also under construction.



Figure 1-6 : Interchange at connection of Amritsar – Jamnagar Expressway near Santalpur

Project stretch has one Toll Plaza at Makhel. It has six lanes on either side including oversized lane. As observed and inquired Toll Operations are running smoothly and there no significant violation or forced exemption on toll plaza.



Figure 1-7 : Toll Plaza at Makhel

1.5 Organization of Report

The traffic study report covers the traffic study along the project corridor. The entire analysis, modelling and traffic and toll forecast have been covered in following sections:

- i. Traffic Surveys and Analysis
- ii. Traffic Forecasting
- iii. Toll Revenue Forecasting
- iv. SWOT Analysis

CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

The Consultants have carried out a reconnaissance survey of the project corridor to understand the general traffic and travel characteristics on the corridor.

Traffic data forecast is one of the important inputs required for a TOT/BOT/DBFO highway/roadway project. In order to arrive at a fair estimate of traffic forecast it is necessary to collect data, analyse, model, validate and then forecast. The Consultants have carried out a reconnaissance survey of the project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic studies have been carried out for the project.

- **Classified traffic volume counts.**
Project stretch has single toll plaza at Makhel. Classified Volume Survey with videography has been done at this location.
- **Origin - Destination** studies at toll plaza locations with aim to capture all traffic on Project is done. Since OD survey was done on toll plaza with permission hence a good sample was obtained at location.
- **Number Plate Registration-** Number plate registration survey was conducted at Toll Plaza location for 24 Hrs.
- **Turning Movement Survey** – Turning movement survey was done at Sidhada junction. All traffic from north joins project road stretch from this junction.

Following figure shows traffic survey locations.

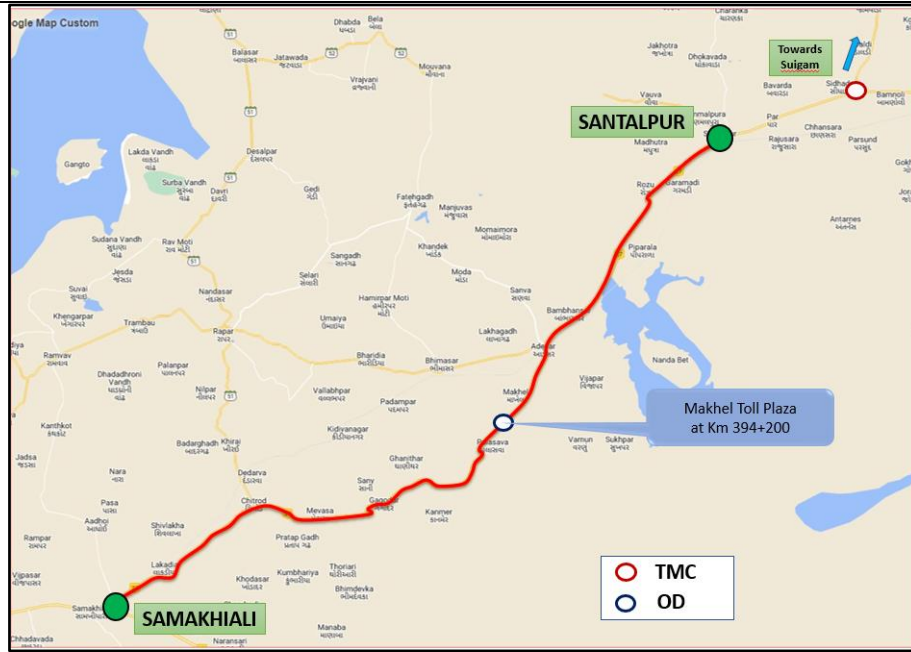


Figure 2-1 : Traffic Survey Locations

Later Additional survey was done at Mehsana Bypass to identify any Gandhidham or port bound traffic from north taking this alternate route via and which has potential to divert to project stretch after construction of Jamnagar Amritsar Expressway. Same is analysed in respective section.

The main objective of the surveys is to:

- Determine the existing traffic movement characteristics of project.
- Establish Base year traffic demand.
- Identification of travel patterns and influence area of project
- Deriving growth factor for traffic demand forecasting
- Estimation of corridor traffic including traffic diversion if any

Brief description of each of the survey undertaken for the project corridor is presented in subsequent sections.

Following photographs show traffic survey in progress at toll plaza and other locations.

Classified Volume Count in progress.



Figure 2-2 : Classified Traffic Survey with Videography

Original-Destination Survey: In progress



Figure 2-3: Origin Destination Survey in Progress

Number Plate Registration Survey: Number plate registration survey was done manually.



Figure 2-4: NPR Survey in Progress

TMC Survey: Turning movement traffic survey was done at Sidhada junction for north bound traffic.



Figure 2-5: TMC Survey@ Sidhada junction in Progress.

2.2 Classified Traffic Volume Count

The objective of conducting Classified Traffic Volume Count is to understand the traffic flow pattern on a roadway. The Classified Traffic Volume Count survey has been conducted at toll location for the entire 24 hours a day, 14-day period as recommended in IRC: SP: 19-2001 “Manual for Survey, Investigation and Preparation of Road Projects” at the proposed three toll plaza locations on NH-50.

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 were further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles were counted separately. The detailed vehicle classification system considered for this study is presented in **Table 2.1**. Traffic surveys were conducted for directional traffic using video graphic method. A day was divided into two shifts of 12 hours each and different groups of supervisors were assigned for each shift. The count data was recorded at hourly intervals for each vehicle group for each direction of travel separately. Trained enumerators were deployed for counting and recording by making tally marks in the five-dash system.

Table 2-1 : 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, Two-Wheeler, Three-Wheeler |

Source - IRC: 64 – 1990

2.3 Origin Destination Survey

In order to understand the travel pattern in the influence area of the project, Origin and Destination (O-D) Surveys was carried out for one day (24 hours) at Toll Plaza location. The O-D survey was carried out based on the roadside interview method as described in IRC: 102-1988. Both passenger and commercial vehicles plying on the project road were stopped on a random sampling basis and interviewed.

Trained enumerators under the supervision of transport planners collected the trip characteristics using the survey forms designed for this purpose. The O-D survey elicited characteristics like origin, destination, frequency, length of trip, etc., both for passenger and goods vehicles. The information collected during roadside interviews was analyzed to obtain the trip distribution based on a zoning system suitably designed in the study.

2.3.1 Sample Size

As per normal standards of sound engineering practices 10-15% sample in each category of vehicle is considered as good representative sample on which traffic analysis can be done to arrive at probable traffic on project highway. Following table provides sample size.

Table 2-2 : Sample size for O-D Surveys at the Toll Plaza Location

| Survey Location | Passenger OD Sample Size | Goods OD Sample Size | Total OD Sample | ADT (Passenger Plus Goods) | Sample Size as % of ADT |
|-----------------|--------------------------|----------------------|-----------------|----------------------------|-------------------------|
| Makhel TP | 423 | 3522 | 3945 | 9510 | 41.48% |

It can be observed from above that a good traffic sample was collected at toll location which can be taken as representative to traffic on project road.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Data collected from the site were punched into the computer and analyzed using spread sheet in MS Excel. The various vehicle types having different sizes and characteristics were 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 .** These factors were

used for converting vehicles of different classification into common Passenger Car Unit (PCU).

Table 2-3 : 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 |
| Two-Wheeler | 0.5 |
| Three-Wheeler | 1.0 |

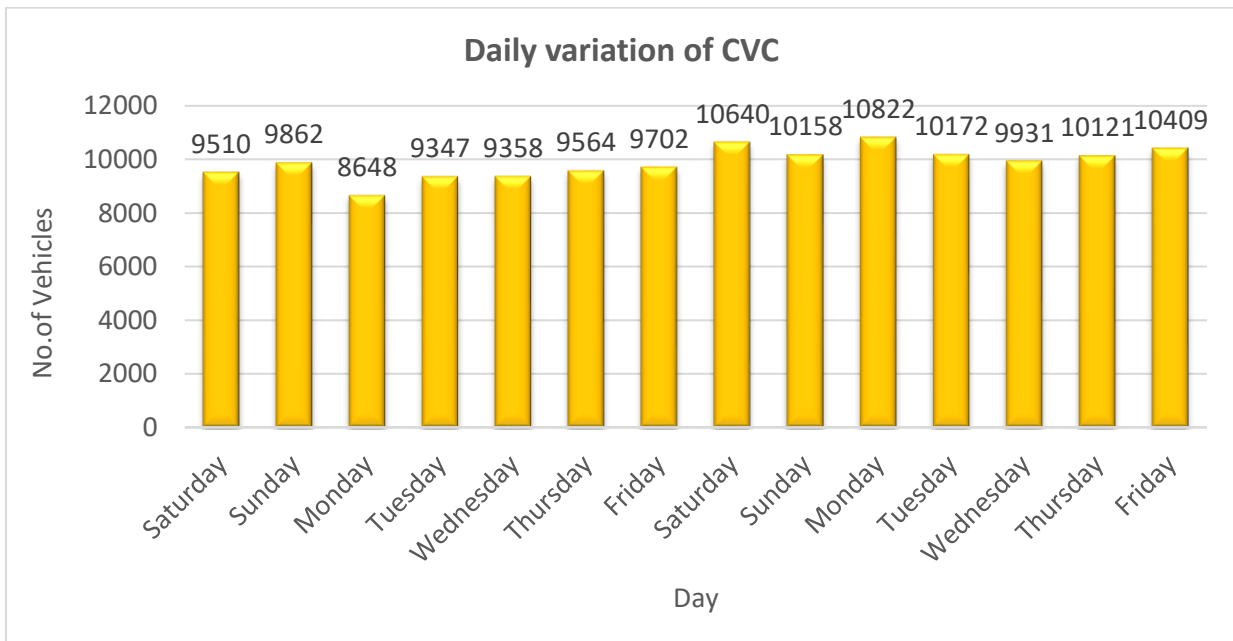
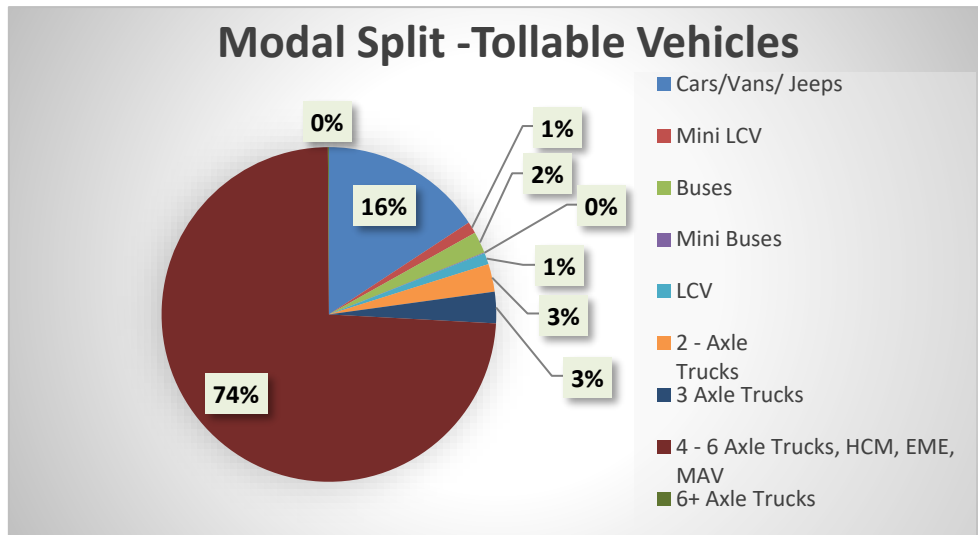
Source: IRC: 64-1990

2.4.2 Average Daily Traffic (ADT)

Video graphic traffic count for 14 days has been done at toll plaza location including. Average daily traffic entering and exiting at various toll plazas is given in following tables.

Table 2-4: ADT (14 Days) at Makhel Toll

| Date | Day | Passenger Vehicles | | | | Goods Vehicles | | | | | | Army/ Govt Vehicles/ Ambulance | Total |
|-----------|------------|---------------------|------------|------------|------------|----------------|--------------------|------------------|---|-------------------|----------|---|-------|
| | | Cars/Vans/ Jeeps | Mini LCV | Buses | Mini Buses | LCV | 2 - Axle Trucks | 3 Axle Trucks | 4 - 6 Axle Trucks, HCM, EME, MAV | 6+ Axle Trucks | | | |
| 01-Oct-22 | Saturday | 1247 | 108 | 225 | 9 | 99 | 223 | 298 | 7281 | 16 | 4 | 9510 | |
| 02-Oct-22 | Sunday | 1283 | 98 | 205 | 6 | 76 | 202 | 272 | 7702 | 13 | 5 | 9862 | |
| 03-Oct-22 | Monday | 1346 | 85 | 183 | 3 | 64 | 214 | 298 | 6443 | 10 | 2 | 8648 | |
| 04-Oct-22 | Tuesday | 1360 | 103 | 206 | 6 | 73 | 211 | 260 | 7113 | 10 | 5 | 9347 | |
| 05-Oct-22 | Wednesday | 1298 | 140 | 191 | 9 | 116 | 223 | 287 | 7085 | 6 | 3 | 9358 | |
| 06-Oct-22 | Thursday | 1364 | 116 | 209 | 4 | 99 | 239 | 303 | 7220 | 8 | 2 | 9564 | |
| 07-Oct-22 | Friday | 1332 | 120 | 176 | 1 | 128 | 232 | 329 | 7368 | 12 | 4 | 9702 | |
| 08-Oct-22 | Saturday | 1537 | 99 | 220 | 5 | 87 | 388 | 340 | 7947 | 8 | 9 | 10640 | |
| 09-Oct-22 | Sunday | 1554 | 107 | 214 | 11 | 83 | 343 | 307 | 7524 | 10 | 5 | 10158 | |
| 10-Oct-22 | Monday | 2273 | 133 | 210 | 9 | 217 | 260 | 291 | 7416 | 10 | 3 | 10822 | |
| 11-Oct-22 | Tuesday | 1894 | 127 | 222 | 9 | 151 | 271 | 315 | 7169 | 10 | 4 | 10172 | |
| 12-Oct-22 | Wednesday | 1739 | 105 | 197 | 7 | 101 | 277 | 283 | 7208 | 9 | 5 | 9931 | |
| 13-Oct-22 | Thursday | 1832 | 119 | 200 | 8 | 123 | 303 | 296 | 7228 | 9 | 3 | 10121 | |
| 14-Oct-22 | Friday | 1699 | 113 | 211 | 7 | 114 | 323 | 316 | 7616 | 7 | 3 | 10409 | |
| | ADT | 1554 | 112 | 205 | 7 | 109 | 265 | 300 | 7309 | 10 | 4 | 9875 | |



2.4.3 Classified Average Daily Traffic (ADT)

It was observed at the site during survey that there are some vehicles which do not pay toll at toll plaza or are exempted. In order to develop a realistic traffic model for revenue, such vehicles have been excluded in tollable ADT. Such normalized ADT is given in table below.

Table 2-5: Classified ADT (14 Days) at Makhel Toll

| Sr.no | Type of Vehicle | Total ADT | Exempt Vehicle | Tollable ADT |
|-------|-------------------------|-----------|----------------|--------------|
| 1 | Car / Taxi / Jeep / Van | 1554 | 431 | 1123 |
| 2 | Mini LCV | 113 | 17 | 96 |
| 3 | Bus | 205 | 0 | 205 |
| 4 | Minibus | 6 | 0 | 6 |
| 5 | LCV | 110 | 12 | 98 |
| 6 | Truck - 2 Axle | 265 | 12 | 253 |
| 7 | 3 - Axle | 300 | 12 | 288 |
| 8 | 4 - 6 Axle | 7309 | 12 | 7297 |
| 9 | 7 & above Axle | 9 | 0 | 9 |

2.4.4 Seasonal Correction Factor

Seasonal variation factors are required to account for variations in the pattern of traffic volume on the sections of project road over different months or seasons of the year. There are various methods of determining the seasonality factor. The most direct method is using the past traffic counts, if traffic surveys are carried out round the year. But in India, round the year counts are seldom carried out or available for any road. In other method seasonal factors are calculated based on traffic related secondary data like fuel sales or toll collections etc. Petrol and diesel sale data obtained from fuel stations is most closely represents traffic variation for the project road having sales variation from month-to-month basis. Data regarding fuel sales has been collected from fuel outlets for duration of one- three years on project corridor in Project Influence Area (PIA). Following table provides details of same.

Table 2-6: Fuel sale Seasonal correction factor

| From Fuel Data | | |
|----------------|------------|------------|
| Month | SCF Petrol | SCF Diesel |
| April | 0.95 | 1.08 |
| May | 0.74 | 1.02 |
| June | 0.92 | 1.14 |
| July | 0.95 | 1.09 |
| August | 0.89 | 1.19 |
| September | 1.14 | 1.14 |
| October | 1.00 | 1.02 |
| November | 0.98 | 0.92 |
| December | 1.13 | 0.85 |
| January | 1.31 | 0.87 |
| February | 1.10 | 0.94 |
| March | 1.12 | 0.90 |

Additionally, fast tag data for last year at toll plaza has been made available. Same has also been utilized for assessing the seasonality.

Following tables provide details of seasonal factors on the basis of Fast Tag.

Table 2-7: Fast Tag ETC collection Seasonal correction factor

| From Fast tag ETC Collection Data | |
|-----------------------------------|------|
| Month | SCF |
| October | 0.93 |
| November | 1.08 |
| December | 0.89 |
| January | 0.95 |
| February | 1.01 |
| March | 0.9 |
| April | 0.9 |
| May | 0.94 |
| June | 1 |
| July | 1.06 |
| August | 1.22 |
| September | 1.16 |

Average seasonality of fuel sale data and fast tag which comes to **0.96** for survey month i.e., October has been taken.

2.4.5 Annual Average Daily Traffic (AADT)

Video graphic traffic count for 14 days has been done at all toll plaza locations including entry and exit ramps. Annual Average daily traffic at toll plaza is given as under.

Table 2-8: AADT (14 Days) at Makhel Toll

| | Vehicle Type | Seasonal Correction Factor | ADT | AADT |
|---------------------------|----------------------------------|----------------------------|------|------|
| Passenger Vehicles | Cars/Vans/Jeeps | 0.96 | 1123 | 1079 |
| | Mini LCV | 0.96 | 96 | 93 |
| | Buses | 0.96 | 205 | 197 |
| | Minibuses | 0.96 | 6 | 6 |
| Goods Vehicles | LCV | 0.96 | 98 | 95 |
| | 2 Axle Trucks | 0.96 | 253 | 243 |
| | 3 Axle Trucks | 0.96 | 288 | 277 |
| | 4 - 6 Axle Trucks, HCM, EME, MAV | 0.96 | 7297 | 7006 |
| | 6+ Axle Trucks | 0.96 | 9 | 9 |

| ADT | AADT | PCU | PCU INDEX |
|------|------|-------|-----------|
| 9375 | 9005 | 35042 | 3.89 |

The PCU index in the range of 3.5 to 4.0 is an indicator of very high dominance of heavy commercial vehicles.

2.4.6 Origin - Destination Survey

In order to understand the travel pattern in the influence area of the project, Origin and Destination (O-D) Surveys is one of the most important tools. O-D survey was carried out at the survey locations.

2.4.7 Data Validation

The collected data from Origin - Destination Survey were entered into the computer and checked manually. Incorrect entries were corrected by cross-checking it with original field data sheets. The data was also checked for inconsistencies.

2.4.8 Zoning System

For understanding the spatial dimensions of the trip characteristics of the vehicles interviewed during the O-D survey, a scientifically derived zoning system was adopted.

While defining zone boundaries, the following were considered:

- Important towns and industrial centres along the project corridor.
- Administrative boundaries of district and state boundaries.
- Configuration of the project roads in the regional road network with respect to other National Highways.

The following table presents the Zoning System considered in this study.

Table 2-9: Zoning System considered for the study (Project Stretch)

| Below Makhel TP (21-99) | Codes |
|------------------------------------|--------------|
| Bhuj,bharapar | 21 |
| Somnaath,kadali | 22 |
| Kandla | 23 |
| Bhadra | 24 |
| Morbi | 25 |
| Jamnagar,sikara | 26 |
| Rajkot,gondal,amreli | 27 |
| Bhavnagar | 28 |
| Surat,Palsana | 29 |
| Mundra | 30 |
| Vapi | 31 |
| Khali | 32 |
| Dwarka | 33 |
| Porbandar | 34 |
| Diu | 35 |
| Jungadh,Plasva,Ajab | 36 |
| Amreli | 37 |
| Gandhidham | 38 |
| Samakhiali | 39 |
| Liliyana | 40 |
| Chitrod | 41 |
| Pratap gadh | 42 |
| Mevasa | 43 |
| Gagodar | 44 |
| Rampur | 45 |
| May | 46 |

| Below Makhel TP (21-99) | Codes |
|------------------------------------|--------------|
| Vijpasar | 47 |
| Manfara | 48 |
| Chobari | 49 |
| Chhadavada | 50 |
| Vondh | 51 |
| Sikara | 52 |
| Bhachau | 53 |
| kabrau | 54 |
| Chirai nani | 55 |
| Dudhai | 56 |
| Bhimasar | 57 |
| Padana | 58 |
| Mokhana | 59 |
| Anjar | 60 |
| Ratnal | 61 |
| Nadapa | 62 |
| Dhaneti | 63 |
| Bidada | 64 |
| Mandvi | 65 |
| Godhra | 66 |
| Kothara | 67 |
| Jakhau | 68 |
| Nakhatrana | 69 |
| Matano madh | 70 |
| Hajipir | 71 |
| Dhordo | 72 |
| Khavda | 73 |
| Dhrobana | 74 |
| Navsari | 75 |

| Above Makhe TP (100-200) | Codes |
|---------------------------------|--------------|
| Ahmedabad(mati) | 100 |
| Godhra | 101 |
| Dahod (Liladi) | 102 |
| Mehsana,Modasa | 103 |
| Patan | 104 |
| Palanpur,Deesa,Tharad | 105 |
| Bharuch | 106 |
| Vadodara | 107 |
| Adesar | 108 |
| Raadhanpur | 109 |
| Makhel | 110 |
| Santalpur | 111 |
| Bikaner | 112 |
| Bhiwadi | 113 |
| Jhodhpur,nagaur | 114 |
| Ladnun | 115 |
| Udaipur,chani | 116 |
| Kota | 117 |
| Bhilwara | 118 |
| Lakhagadh | 119 |
| Moda | 120 |
| Khandek | 121 |
| Fatehgadh | 122 |
| Manjuvas | 123 |
| Varnun | 124 |
| Sukhpar | 125 |

| Above Makhel TP (100-200) | Codes |
|----------------------------------|--------------|
| Momaimora | 126 |
| Fatehgadh | 127 |
| Vijapar | 128 |
| Bambhansar | 129 |
| Piparala | 130 |
| Roza | 131 |
| Garamadi | 132 |
| Madhutra | 133 |
| Vauva | 134 |
| Ranmalpura | 135 |
| Par | 136 |
| Rajusara | 137 |
| Dhokavada | 138 |
| Jakhotra | 139 |
| Bavarda | 140 |
| Chhansara | 141 |
| Sidhada | 142 |
| Parsund | 143 |
| Antarnes | 144 |
| Gokhantar | 145 |
| Bamnoli | 146 |
| Daldi | 147 |
| Charankha | 148 |
| Bojunda | 149 |
| Ajmer,Naner,Beawar | 150 |
| Jaipur,Alwar,Palsana | 151 |
| Balotra,Sarli,Barmer,Pali,jalore | 152 |

Table 2-10 : Zoning System considered for the study (State Codes)

| State in India above Gujrat (1-10) | Codes |
|---|--------------|
| Rajasthan | 1 |
| Haryana (Faridabad,Sirsa,Panipat) | 2 |
| Delhi | 2A |
| Punjab | 3 |
| Himachal pradesh/Kashmir & Ladak | 4 |
| Uttarakhand (Haridwar) | 5 |
| Uttar pradesh(Agra,Aligarh) | 6 |
| Madhyapradesh | 7 |
| Jharkhand | 8 |
| Meghalaya/Assam | 9 |
| Arunachal pradesh | 10 |

| State in India below Gujrat (11-20) | Codes |
|--|--------------|
| Maharashtra | 11 |
| Chattisgarh | 12 |
| West bangal/Bihar | 13 |
| Odisha | 14 |
| Goa | 15 |
| Telangana | 16 |
| Karnataka | 17 |
| Andra pradesh | 18 |
| Kerala | 19 |
| Tamilnadu | 20 |

Above zones are marked on map along with Samkhyali -sanatpur alignment for better understanding.

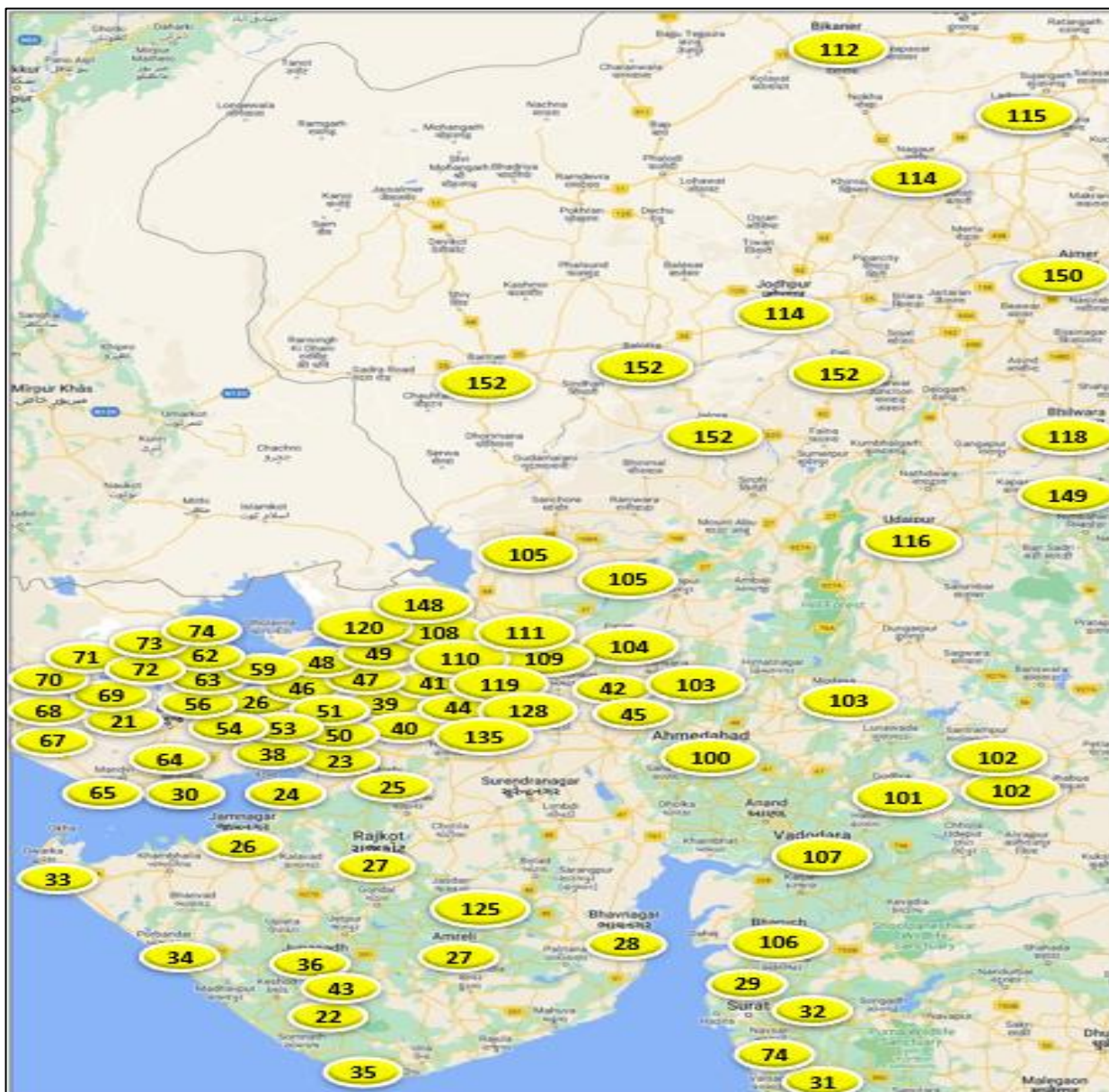


Figure 2-6: OD Coding Local Map

Following figure shows state level codes on country level map.

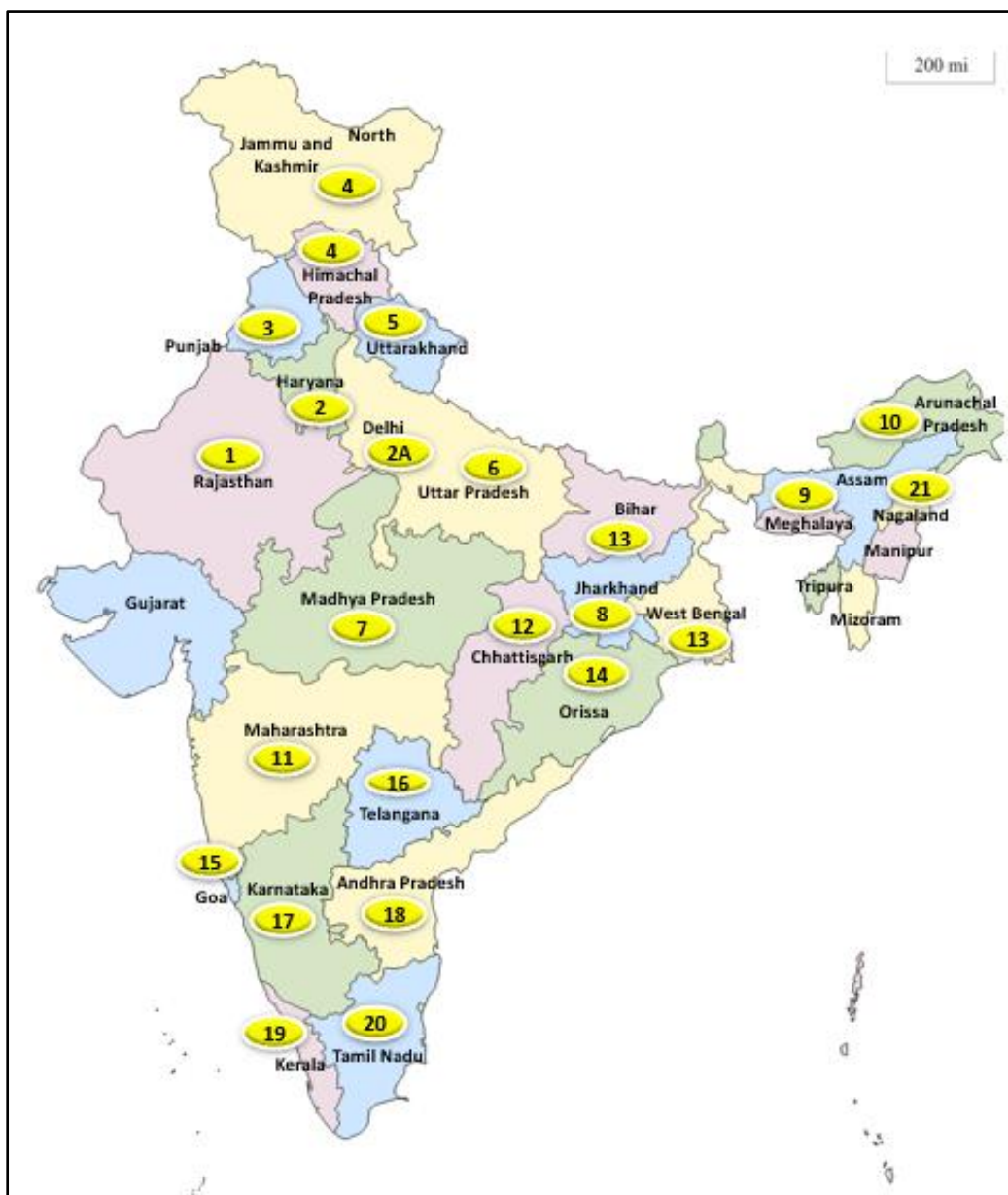


Figure 2-7: OD Coding Country Level

2.4.9 State Dominance

One of the most important parameters of OD analysis is state dominance among vehicles. This gives fair idea of local or regional character of traffic on project stretch. The state wise distribution of registered vehicles at each survey locations is given as under for passenger and commercial vehicles respectively.

Table 2-11 : State wise distribution of vehicles at Survey locations for passenger vehicles

| State Code | Type of Vehicle | | |
|--------------------|-----------------|----------------|----------------|
| | Car | Minibus | Bus |
| RJ | 5.90% | 0% | 29% |
| GJ | 89.75% | 100% | 54% |
| HR | 1.24% | 0% | 8% |
| PB | 0.31% | 0% | 4% |
| UP | 0.31% | 0% | 2% |
| NL | 0.00% | 0% | 1% |
| MH | 0.62% | 0% | 0% |
| DL | 0.31% | 0% | 0% |
| OR | 0.00% | 0% | 0% |
| MP | 0.62% | 0% | 0% |
| AR | 0.00% | 0% | 2% |
| AP | 0.31% | 0% | 0% |
| KA | 0.31% | 0% | 0% |
| KL | 0.31% | 0% | 0% |
| Grand Total | 100.00% | 100.00% | 100.00% |

It can be observed that in passenger vehicles Gujarat state has almost 90% share followed by Rajasthan.

Table 2-12: State wise distribution of vehicles at Survey locations for commercial vehicles

| State Code | Type of Vehicle | | | | |
|--------------------|-----------------|----------------|----------------|----------------|----------------|
| | LCV | 2-axle | 3-axle | MAV (4-6 axle) | MAV (>6 axle) |
| RJ | 14.29% | 10.00% | 22.50% | 51.25% | 48.00% |
| GJ | 48.57% | 65.00% | 57.50% | 32.81% | 35.00% |
| HR | 17.14% | 10.00% | 10.00% | 5.84% | 9.00% |
| PB | 0.00% | 0.00% | 2.50% | 3.60% | 3.00% |
| UP | 11.43% | 2.50% | 5.00% | 2.69% | 2.00% |
| NL | 0.00% | 5.00% | 2.50% | 1.87% | 1.00% |
| MH | 5.71% | 2.50% | 0.00% | 0.73% | 0.00% |
| DL | 2.86% | 2.50% | 0.00% | 0.24% | 0.00% |
| OR | 0.00% | 0.00% | 0.00% | 0.18% | 0.00% |
| MP | 0.00% | 0.00% | 0.00% | 0.12% | 1.00% |
| HP | 0.00% | 0.00% | 0.00% | 0.12% | 0.00% |
| JK | 0.00% | 0.00% | 0.00% | 0.12% | 0.00% |
| TN | 0.00% | 0.00% | 0.00% | 0.09% | 0.00% |
| WB | 0.00% | 2.50% | 0.00% | 0.06% | 0.00% |
| AR | 0.00% | 0.00% | 0.00% | 0.06% | 0.00% |
| AS | 0.00% | 0.00% | 0.00% | 0.06% | 0.00% |
| CH | 0.00% | 0.00% | 0.00% | 0.03% | 1.00% |
| UK | 0.00% | 0.00% | 0.00% | 0.06% | 0.00% |
| AP | 0.00% | 0.00% | 0.00% | 0.03% | 0.00% |
| JH | 0.00% | 0.00% | 0.00% | 0.03% | 0.00% |
| Grand Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Dominance of Gujarat state registered vehicles diminishes as configuration (axle) increases. In 4-6 category Gujarat share is only 32%.

This reflects long distance and presence of national traffic on project stretch.

2.4.10 Major OD Pairs

Following table provides details of major OD pairs on project highway.

Table 2-13: Major OD Pairs

| Sr.no | Origin | Destination | % | Remarks |
|-------|--------------------------------------|-------------------------------|-------|------------------|
| 1 | Balotra,Sarli,Barmer,Pali,jalore | Morbi | 4.86% | Non-Port Traffic |
| 2 | Bikaner | Morbi | 3.41% | Non-Port Traffic |
| 3 | Gandhidham | Ajmer,Naner,Beawar | 2.81% | Port Traffic |
| 4 | Gandhidham | Delhi | 2.04% | Port Traffic |
| 5 | Ajmer,Naner,Beawar | Gandhidham | 1.96% | Port Traffic |
| 6 | Morbi | Uttar pradesh(Agra,Aligarh) | 1.96% | Non-Port Traffic |
| 7 | Gandhidham | Raadhanpur | 1.90% | Port Traffic |
| 8 | Palanpur, Deesa, Tharad | Mundra | 1.62% | Port Traffic |
| 9 | Balotra,Sarli,Barmer,Pali,jalore | Jamnagar, sikara | 1.62% | Non-Port Traffic |
| 10 | Kandla | Ajmer, Naner, Beawar | 1.59% | Port Traffic |
| 11 | Palanpur,Deesa,Tharad | Gandhidham | 1.50% | Port Traffic |
| 12 | Ajmer,Naner,Beawar | Mundra | 1.50% | Port Traffic |
| 13 | Gandhidham | Uttar Pradesh (Agra, Aligarh) | 1.48% | Port Traffic |
| 14 | Gandhidham | Jaipur, Alwar, Palsana | 1.48% | Port Traffic |
| 15 | Kandla | Udaipur, chani | 1.42% | Port Traffic |
| 16 | Mundra | Delhi | 1.33% | Port Traffic |
| 17 | Mundra | Ajmer, Naner, Beawar | 1.25% | Port Traffic |
| 18 | Haryana (Faridabad,Sirsa,Panipat) | Morbi | 1.22% | Non-Port Traffic |
| 19 | Uttar pradesh(Agra,Aligarh) | Morbi | 1.22% | Non-Port Traffic |
| 20 | Gandhidham | Udaipur,chani | 1.22% | Port Traffic |
| 21 | Delhi | Mundra | 1.19% | Port Traffic |
| 22 | Kandla | Uttar pradesh(Agra,Aligarh) | 1.16% | Port Traffic |
| 23 | Haryana (Faridabad,Sirsa,Panipat) | Kandla | 1.14% | Port Traffic |
| 24 | Bojunda | Samakhiyali | 1.14% | Non-Port Traffic |
| 25 | Gandhidham | Punjab | 1.08% | Port Traffic |

It can be observed from above that majority of traffic on project highway is related to port. Second biggest impactor is Morbi tile industry.

Following table provides details of % share of various types of commodities on project highway.

Table 2-14: Commodity share

| Commodity Type | % of Share |
|------------------------------------|----------------|
| Empty | 28.51% |
| Sand/Cement/Aggregate/Steel/ Brick | 17.92% |
| Petrol/ Diesel/Gas/LPG/Sulphur | 13.91% |
| Chemicals & Fertilisers | 13.49% |
| Finished Consumer Goods | 5.00% |
| Food Grains (Rice/ Wheat/ etc.) | 4.43% |
| Others | 3.92% |
| Textile Materials/Cotton | 3.32% |
| Rubber/Wood/Tyre | 3.01% |
| Vegetables/Fruits/ Milk/ Fish | 2.47% |
| Drums/Tubes/Cables/Wire/Tiles | 1.96% |
| Container | 1.70% |
| Iron Coils | 0.23% |
| Machines | 0.09% |
| Industrial Goods (Alloy/Steel) | 0.06% |
| Leather | 0.00% |
| Paint/Dyes | 0.00% |
| Fibre | 0.00% |
| Pipe/Plastic | 0.00% |
| Grand Total | 100.00% |

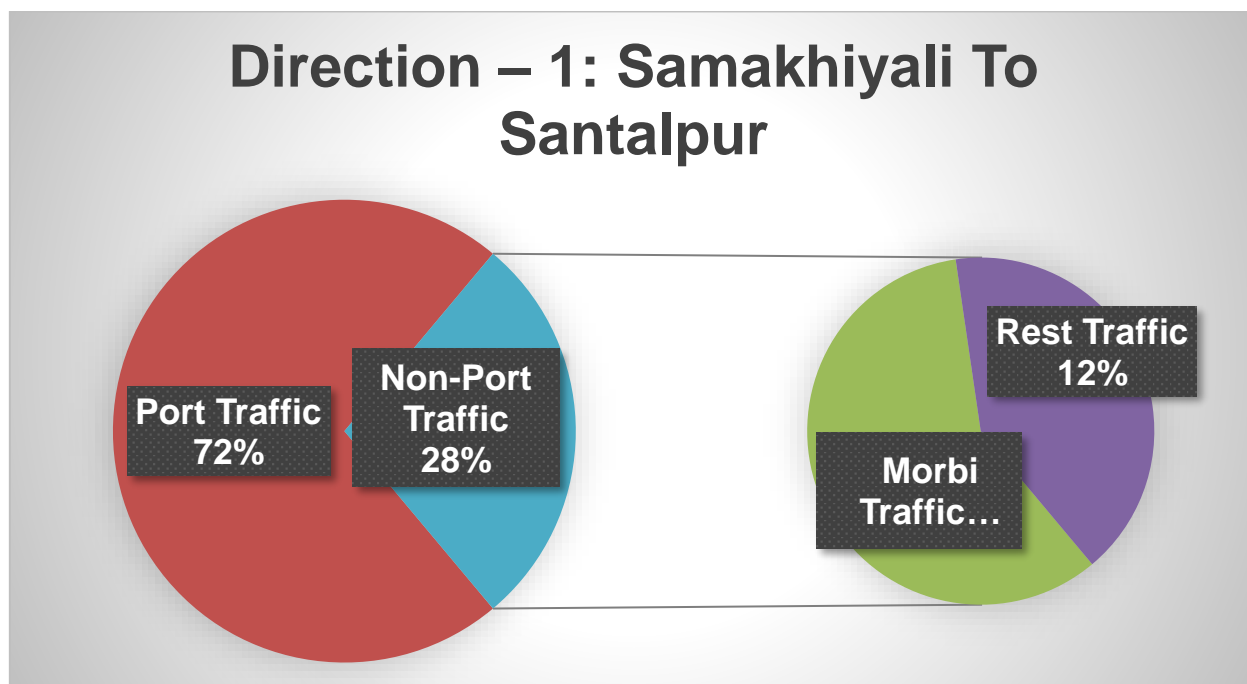
Following tables and graphs provide directional distribution of traffic on project highway in both directions respectively.

Table 2-15: Traffic Distribution- Commercial Vehicles

| Traffic in % | | Port Traffic | Non-Port Traffic | |
|-----------------------------------|--------------------------|---------------|------------------|---------------|
| | | | Morbi | Other |
| Direction - 1 | Samakhiyali to Santalpur | 72.20% | 16.34% | 11.46% |
| Direction - 2 | Santalpur to Samakhiyali | 46.14% | 31.38% | 22.48% |
| Average for both direction | | 59.17% | 23.86% | 16.97% |

It can be further observed that about 60% of the traffic on project road has port impact. Morbi tile has an impact of about 24% on project traffic and balance 16% is local and Palanpur, Radhanpur traffic.

Following graphs show this distribution for better appreciation.



Direction – 2: Santalpur To Samakhiyali

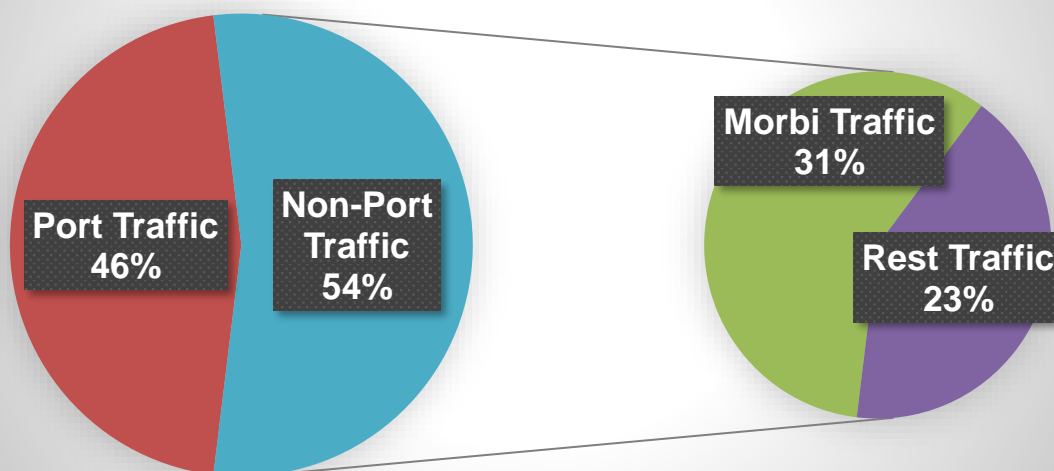


Figure 2-8: Distribution of project traffic.

Port traffic is further then analysed to understand the relationship of port traffic with the hinterland. Following table show distribution of port traffic in both directions.

Table 2-16 : Port Traffic Distribution (OD Sample)

| D-1 (Samakhiyali to Santalpur) Port Traffic (Origin) | | |
|---|-------------|--------|
| North Zone | 1016 | 84.88% |
| Local | 175 | 14.62% |
| East zone | 6 | 0.50% |
| Total Traffic Nos. | 1197 | |

| D-2 (Santalpur to Samakhiyali) Port Traffic (Destination) | | |
|--|------------|--------|
| North Zone | 616 | 71.63% |
| Local | 231 | 26.86% |
| East zone | 13 | 1.51% |
| Total Traffic Nos. | 860 | |

Thus, on an average about 80% of port traffic has relation in north India (Rajasthan, Punjab, Haryana, Part of UP and Delhi). Thus, any development or growth in this land would affect project road traffic.

2.4.11 Trip Segmentation Impact

Return journeys are tolled at discount fee. More volume of return trips has a reducing impact on revenue. Factor for converting all journeys into single journey for working out revenue has been worked out from the fast tag data which is available for four months from September 2022 to December 2022. Following table shows such conversion DP/MP factors.

Table 2-17 : DPMP Factors for four months

| Type of Vehicle/Month | Dec-22 | Nov-22 | Oct-22 | Sep-22 | Avg. |
|-----------------------|--------|--------|--------|--------|-------|
| Car/Jeep/Van | 0.913 | 0.913 | 0.918 | 0.900 | 0.911 |
| Mini LCV | 0.875 | 0.875 | 0.880 | 0.876 | 0.877 |
| Bus | 0.792 | 0.792 | 0.800 | 0.789 | 0.793 |
| Minibus | 0.926 | 0.926 | 0.904 | 0.881 | 0.909 |
| LCV | 0.878 | 0.878 | 0.882 | 0.905 | 0.886 |
| 2- Axle | 0.908 | 0.908 | 0.916 | 0.937 | 0.917 |
| 3 - Axle | 0.961 | 0.961 | 0.951 | 0.965 | 0.960 |
| 4 to 6 Axle | 0.977 | 0.977 | 0.977 | 0.981 | 0.978 |
| 7 and Above Axle | 0.944 | 0.944 | 0.958 | 0.989 | 0.959 |

DP/MP factor has been further moderated as cars have the greatest number of toll exemption and violation. Finally adopted DPMP factors are given in table below.

Table 2-18 : DP/MP Factor

| DP /MP FACTOR | |
|--|-------------|
| Type of Vehicle | Makhel Toll |
| Car/Jeep/Van/Light Motor Vehicle | 0.900 |
| Mini LCV | 0.800 |
| Bus | 0.790 |
| Minibus | 0.880 |
| Light Commercial Vehicle / Light Good Vehicle or Minibus | 0.890 |
| Two Axle Commercial Vehicles | 0.920 |
| Three Axle Commercial Vehicles | 0.950 |
| Multi Axle Vehicle (MAV) (Four to Six Axles) / Heavy Construction Machinery (HCM)/Earth Moving Equipment (EME) | 0.975 |
| Oversized Vehicle (Seven or More Axles) | 0.950 |

2.4.12 Additional OD Survey at Mehsana

Additional traffic survey of OD and CVC was done at Mehsana Bypass Junction. This was done to capture any traffic from north Rajasthan or Punjab going towards Jamnagar or Kandla / Mundra / Gandhi Dham. This traffic has potential to divert to project stretch after construction of Jamnagar- Amritsar Expressway. A diversion cost analysis has been done for the alternate route once Jamnagar Amritsar Expressway is commissioned scenario. Select pairs of origin and destination were examined for benefit cost ratio analysis. Such analysis is shown as below.

Project Route (Mahua-Amritsar) VS Competing Route (Amritsar-Jamnagar Expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|-------------|------------|----------------------------|-------------|----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane NH | 1560.00 | 72079.84 | 24469.66 | 12433 | 108982.69 | 0.67 | 99.55 |
| | Comp Route | 6 Lane / 6 lane Expressway | 1378.00 | 43732.64 | 16211.15 | 13242 | 73185.94 | | |

Project Route (NH 62: Morbi-Bikaner) VS Competing Route (Amritsar-Jamnagar Expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|-------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane NH | 835.00 | 38581.19 | 13097.54 | 6655 | 58333.68 | 0.63 | 99.58 |
| | Comp Route | 6 Lane / 6 lane Expressway | 685.80 | 21764.76 | 8067.93 | 6751 | 36583.68 | | |

Project Route (NH 62: Rajkot - Bikaner) VS Competing Route (Jamnagar Amritsar expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|-------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane NH | 866.00 | 40013.55 | 13583.80 | 6902 | 60499.37 | 0.66 | 99.56 |
| | Comp Route | 6 Lane / 6 lane Expressway | 747.30 | 23716.55 | 8791.43 | 7291 | 39798.93 | | |

Project Route (NH 48: Jamnagar to Haryana (Hisar)) VS Competing Route (Jamnagar Amritsar expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|--------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane NH | 1238.00 | 57201.82 | 19418.87 | 9866.86 | 86487.55 | 0.73 | 99.52 |
| | Comp Route | 6 Lane / 6 lane Expressway | 1180.00 | 37448.85 | 13881.82 | 11484.77 | 62815.44 | | |

Project Route (NH 48: Rajkot to Haryana (Hisar)) VS Competing Route (Jamnagar Amritsar expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|--------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane NH | 1141.00 | 52719.93 | 17897.36 | 9093.77 | 79711.06 | 0.76 | 93.25 |
| | Comp Route | 6 Lane / 6 lane Expressway | 1139.00 | 36147.66 | 13399.49 | 11010.56 | 60557.71 | | |

Project Route (NH 62: Rajkot to Jodhpur) VS Competing Route (Jamnagar Amritsar expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|--------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane NH | 618.00 | 28554.70 | 9693.75 | 4925.46 | 43173.91 | 0.74 | 99.51 |
| | Comp Route | 6 Lane / 6 lane Expressway | 599.00 | 19010.05 | 7046.79 | 5802.16 | 31859.00 | | |

Project Route (NH 62: Morbi to Jodhpur) VS Competing Route (Jamnagar Amritsar expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|--------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane Expressway | 586.00 | 27076.14 | 9191.81 | 4670.42 | 40938.37 | 0.83 | 79.99 |
| | Comp Route | 6 Lane / 6 lane Expressway | 640.00 | 20311.24 | 7529.13 | 6276.38 | 34116.74 | | |

Project Route (NH 62: Morbi to Rajasthan (Berasar)) VS Competing Route (Jamnagar Amritsar expressway)

| Description | Route | Configuration | Road Length | VOC (Rs.)- (A) | Travel Time Cost (B) | Toll (Rs) (C) | Total Cost of Trip (Rs.) (A+B+C) | Cost Ratio | % Diversion to Comp Route |
|-------------|------------|----------------------------|-------------|-----------------|----------------------|---------------|----------------------------------|------------|---------------------------|
| Goods | Ex. Route | 4 Lane / 4 lane Expressway | 716.00 | 33082.80 | 11230.95 | 5706.52 | 50020.26 | 0.88 | 72.04 |
| | Comp Route | 6 Lane / 6 lane Expressway | 830.00 | 26341.14 | 9764.33 | 7790.68 | 43896.15 | | |

Weighted Average Diversion (%) for all above project routes was calculated and same comes to 93%

Following table shows potential number of traffic diversion due to commissioning of Amritsar Jamnagar Expressway.

| | Direction | Type of Vehicles | 2-Axle Truck | 3-Axle Truck | Multi Axle Vehicles >=4 Axle |
|--|--------------------|----------------------|--------------|--------------|------------------------------|
| D-1 | RAJKOT To PALANPUR | Total Vehicles (ADT) | 331 | 401 | 1365 |
| D-2 | PALANPUR To RAJKOT | | 383 | 348 | 1299 |
| D-1 | RAJKOT To PALANPUR | Vehicles (OD) | 210 | 334 | 463 |
| D-2 | PALANPUR To RAJKOT | | 183 | 261 | 552 |
| D-1 | RAJKOT To PALANPUR | Expansion Factor | 1.58 | 1.20 | 2.95 |
| D-2 | PALANPUR To RAJKOT | | 2.09 | 1.33 | 2.35 |
| D-1 | RAJKOT To PALANPUR | Divertible Traffic | 13 | 30 | 31 |
| D-2 | PALANPUR To RAJKOT | | 19 | 23 | 44 |
| Potential Traffic for diversion | | | 60 | 67 | 195 |
| Total Potential Traffic for diversion | | | 322 | | |
| Diversion % (weighted avg.) | | | 93% | | |
| Total diverging Traffic | | | 299 | | |

Thus, commissioning of Amritsar Jamnagar Expressway would have a positive impact on project traffic. Same is considered in traffic projections. The total diverging traffic as per above analysis is about 4% of total commercial traffic. Hence a positive additional growth of 4% has been taken in year for the factor in year 2025-26.

CHAPTER 3

TRAFFIC FORECAST

3.1 Introduction

Traffic is generated and grows as a result 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. Further these factors have uncertainties associated with them. Forecasts of traffic have, therefore, to be 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 limited degree of accuracy and hence the forecasting of future traffic levels cannot be precise. The success of any road project with private sector participation hinges on the accuracy and robustness with which the future traffic and revenues are estimated.

Further, future traffic forms the basis of the design of the transportation infrastructure facility and also determines the viability of the project. The following section deals with different methods, techniques, and considerations used in traffic forecast for the project under study.

3.2 Secondary Data Collection

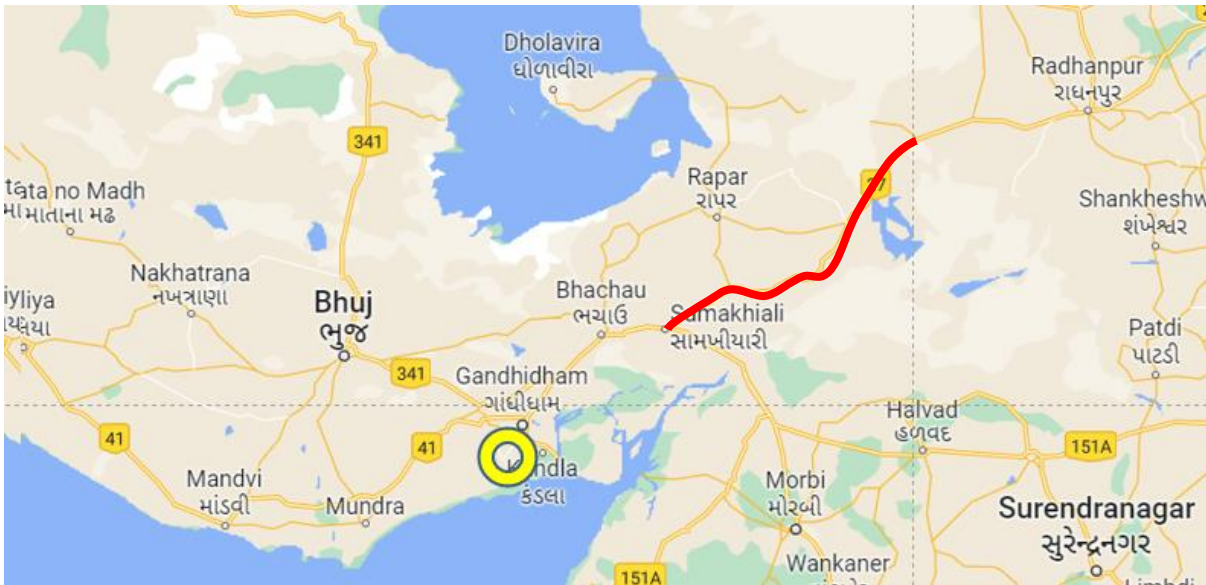
In addition to the above-mentioned traffic surveys, secondary data was also collected from the sources wherever the data available. This data is effectively used to determine and estimate past trends of growth and future pattern. Following secondary data was collected for study:

1. Fuel data collection from the fuel stations that are located along the project corridor to estimate the seasonal variations as well as traffic growth over the past years.
2. Vehicle registration data of Gujarat, Rajasthan, Haryana & UP.
3. Data of Indian national GDP (Gross Domestic Product), NSDP (Net State Domestic Product) of Gujarat, Rajasthan, Haryana & UP and PCI (Per Capita Income) of Gujarat, Rajasthan, Haryana & UP.
4. Estimated population data of Gujarat, Rajasthan, Haryana & UP states from Census.

This data is utilized in the study to estimate the growth factors along the project corridor. Relevant part of secondary data is placed at Annexure.

3.3 Development in the Project Influence Area

The Project Highway acts as gateway for the traffic of northern, western and part of central India leading to the major western ports of Kandla and Mundra in Gujarat. The Project Highway would majorly cater to the export and import traffic. The contribution of Kandla and Mundra port is about 60% of total traffic at project stretch. Hence, growth and expansion at port will have a major positive impact on project traffic.



Brief details of key influencing establishments around the project corridor are as summarised below:

a. Kandla Port

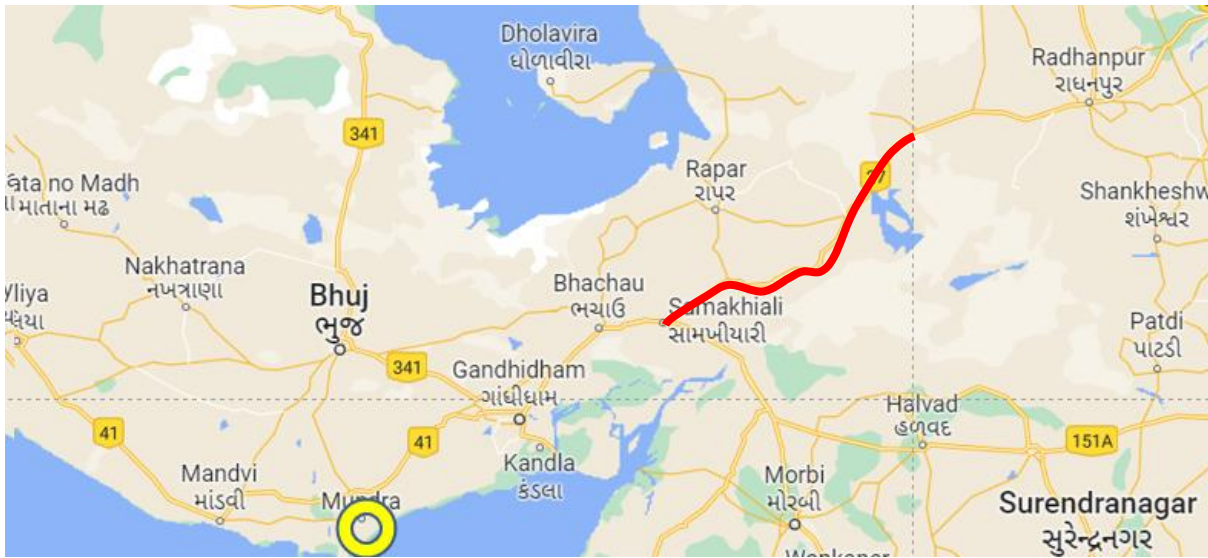
- Kandla is the largest Cargo handling major government port with a capacity of approximately 120 MMTA. It shares about 15% of all major port traffic. The port has shown good consistent growth over past years.
- Kandla Port handles a variety of cargo ranging from Bulk Cargo like Coal, Grain, Fertilizer, Minerals, Ores, Steel, Edible Oils, Chemicals, and Petroleum Products to Container Cargo, Automobiles and Crude Oil.
- Petroleum Oil Lubricants (“POL”) is about 64% of total cargo handled by the Port.
- At present Kandla is having a Container Terminal with a capacity of 0.75 MTEU.



- The Government of India has recently approved the development of two new mega container terminals at Tuna-Tekra in Kandla Port at an estimated cost of ~ Rs 6,000 crores. This would result in increase in capacity of dry cargo from 60MMTA to about 79 MMTA and increase in container cargo capacity from 6 lakh TEU to 26 lakh TEU.
- The Container Terminal and Multipurpose Cargo Terminal are expected to be completed in ~FY25 / FY26 at a total expenditure of ~Rs. 6000 Cr. The development of the two mega terminals of Container & Multipurpose Cargo is expected to induce migration of some of the traffic from JNPT, Mumbai to Kandla and Mundra port in Gujarat.
- The above development of two major terminal is expected to give high traffic growth on Project Highway.
- **DP World wins bid for development of a mega-container terminal at India's Deendayal Port**
 - DP World has won a major concession to develop, operate and maintain the mega-container terminal at Deendayal port in Gujarat, on the western coast of India.
 - The project involves the construction of a mega-container terminal at Tuna-Tekra through a Public-Private Partnership (PPP). Once complete, the terminal will include a 1,100-metre berth, and will be capable of handling vessels carrying more than 18,000 TEUs. Total capacity will be 2.19 million TEUs.
 - The contract was awarded by the Deendayal Port Authority under on a Build-Operate-Transfer (BOT) basis.
 - Once complete, the terminal will help unlock future container traffic growth in India, catering to exports and imports from Northern, Western and Central India, reducing logistics cost and enhancing efficiencies across supply chains. The project will complement initiatives of the Government of India, such as the PM Gati Shakti Master Plan and National Logistics Policy, which has been introduced to provide greater focus on developing multimodal logistics infrastructure promoting economic growth.
 - DP World's strategic investments in ports and terminals in the country is aligned with the Indian Government's Vision 2047, which aims to quadruple the country's port handling capacity. Development of mega container terminal would have positive impact on project traffic as it would enhance the hinterland logistic relations and volume of export / import with Kandla port.



b. Mundra Port



- Mundra port is located further to Kandla port and is the largest private port in India with about 330 MMTA capacity, 24 berths & 10 Terminals. The port is owned by Adani Group having 12 ports in total. The mega port at Mundra is a major economic gateway that caters to the northern hinterland of India with multimodal connectivity.
- Mundra port has handled 144 MMT in year 20-21 which is highest by any India port.
- The port handles multiple products – coal, POL, Liquid, Dry Bulk. The Mundra port has expansion plans for various products including Waterfront Development, Multi- Purpose cargo and Liquid/ Gas/ Cryogenic Cargo handling quay development.

- The container handling capacity at Mundra port has shown a very impressive growth of over 15% in past 12 years starting with 0.92 MTEU in FY10 to 6.94 MTEU expected in FY23. The total Container handling capacity at Mundra port is 7.5 MTEU and would be operating at over 90% Capacity Utilization by end of FY23.



- Mundra port is coming up with expansion of Container Terminal of 1.2 MTEU at estimated expense of R. 1239 Cr. The expansion work of Container Terminal is under progress and is expected to be operational by FY24.
- Other growth drivers in long term at ports of Kandla and Mundra Ports will be increasingly adoption of China+1 policy by Europe and US market. The diversification of manufacturing facilities to India

in addition to other emerging Asian economies is expected to boost exports consistently over next 10 years.

- China decision to cap its steel production and no export of steel from Russia would help India steel export.
- Coal import has also seen a surge due to domestic shortage of Coal.
- Defence Corridor at Jhansi and also Tata Aircraft manufacturing plant at Vadodara would have some add on to port traffic.
- As per an ICRA report, the port traffic is expected to grow by 6-8% per year.
- The above development of major terminal is expected to give high traffic growth on Project Highway.

c. Barmer Refinery

- A 9 MTA capacity refinery and a 2 MTPA Petrochemical Complex is under construction at Pachpadra near Barmer. The complex is a 74:26 Venture between HPCL & Govt. of Rajasthan being developed across 4400 acres at a cost of Rs. 5000 Cr.

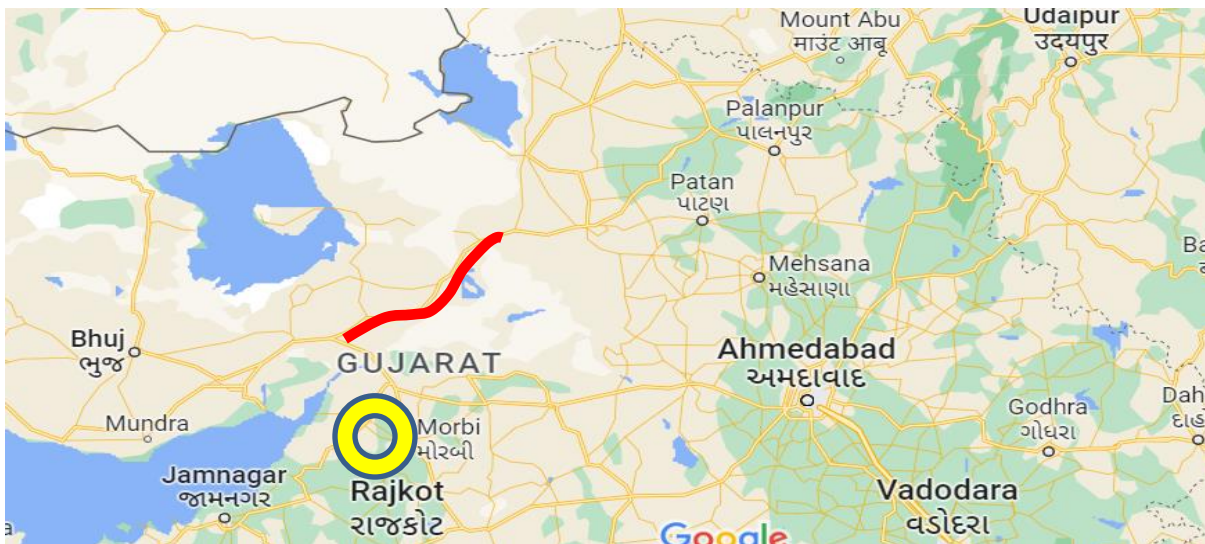


- This refinery will be connected with Jamnagar Refinery and Bathinda Refinery through Amritsar Jamnagar Expressway
- The refinery is likely to be commissioned by FY25.
- About 6.5 MTA crude will be transported from Gujarat for processing

- RIICO (Rajasthan State Industrial Development & Investment Corporation Limited) to develop PCPIR - Petroleum, Chemical and Petrochemical Investment Region in vicinity of Refinery cum Petrochemical Complex (area ~100km)
- Development of a third refinery enroute Jamnagar to Amritsar, viz; Bhatinda, Barmer and Jamnagar will lead to Petrochemical based traffic growth along Project Highway (via Amritsar Jamnagar Expressway).



d. Ceramic Cluster at Morbi



- Morbi accounts for 70% of total ceramic production in India and 2nd largest ceramic tile producing cluster in world.
- The cluster houses ~ 1,000 ceramic units, catering to 18 % of global demand and earns Rs 15,000 crore from exports.
- The ceramic cluster provides 10 Lakhs plus employment and produces over 14000 SQM tiles per day. The tiles are exported through Kandla and Mundra Port.
- The tiles are exported to more than 160 countries through Kandla and Mundra Port which are within 180 km from Morbi. This results in competitive pricing of the tiles in the international market due to savings in transportation costs. Domestic brands like Kajaria, HR Johnson, AGL, Somani outsource from Morbi. Global brands housed in Morbi include Daltile, Portobello, Emser, RAK, etc.
- Rajasthan has the highest proven reserves of China Clay followed by Gujarat. China clay mining is in Nagaur, Bikaner, Jaisalmer, Jodhpur, Bhilwara, and Chittorgarh.
- The Project highway is enroute to supply raw material to Morbi and finished products to domestic market in north India.
- The ceramic industry in India is expected to grow annually at a rate of ~9-10%.



Western DFCC -

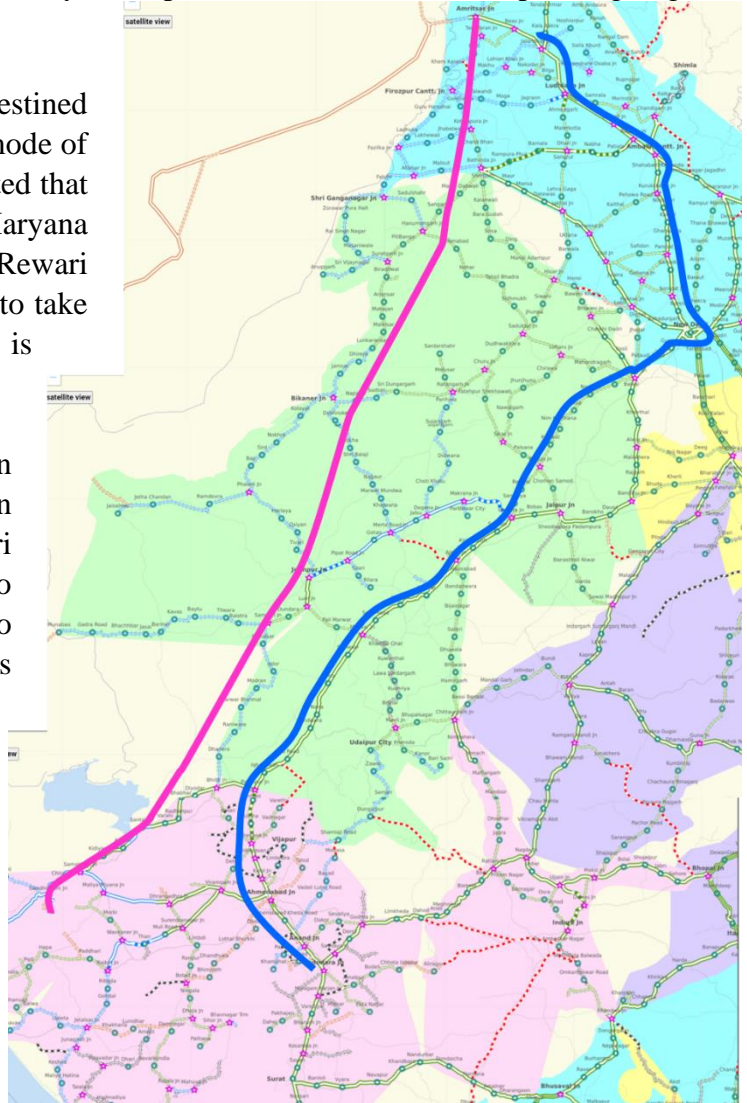
Western DFCC is 1500 km plus dedicated freight corridor of railway which connects Dadri in Uttar Pradesh to JNPT in Mumbai. It is designed to carry double stack, higher capacity trains at higher speed. The section from Rewari to Palanpur is already operational since March 2021. The balance section from Palanpur-Makarapura-Sachin-Vaitarna-JNPT is expected to be commissioned in stages by end of FY24.

The Kandla and Mundra ports are connected to Palanpur by an operational western railway line. Since rail movement from Rewari to Palanpur and Palanpur to Kandla / Mundra are operational since long, the modal shift of traffic from road to rail has already taken place and no diversion is expected going forward.

Further, only the traffic originating and destined within 50-75 kms of the DFCC will find rail mode of transport logistically viable. It is also to be noted that the cargo originating from Punjab, Himachal, Haryana will have to travel from Sahnewal to Dadri, Rewari along Eastern DFCC from where it will have to take Western DFCC to reach Palanpur which is connected to Ports via Western Railway.

The traffic originating from the northern hinterland has to take rail route via. Eastern DFCC by 450 kms from Sahnewal upto Dadri and then take Western DFCC from Dadri to Palanpur by 786 kms and further Palanpur to Gandhidham/Kandla by western rail which is 300 kms. Thus, the total rail route will be over 1500 kms which is ~25% longer as compared to alternative road network via. upcoming Jamnagar-Amritsar Expressway having a length of ~ 1200 kms.

Thus, we do not see the material impact of DFC on the Project and no further diversion of good traffic to DFCC is envisaged.

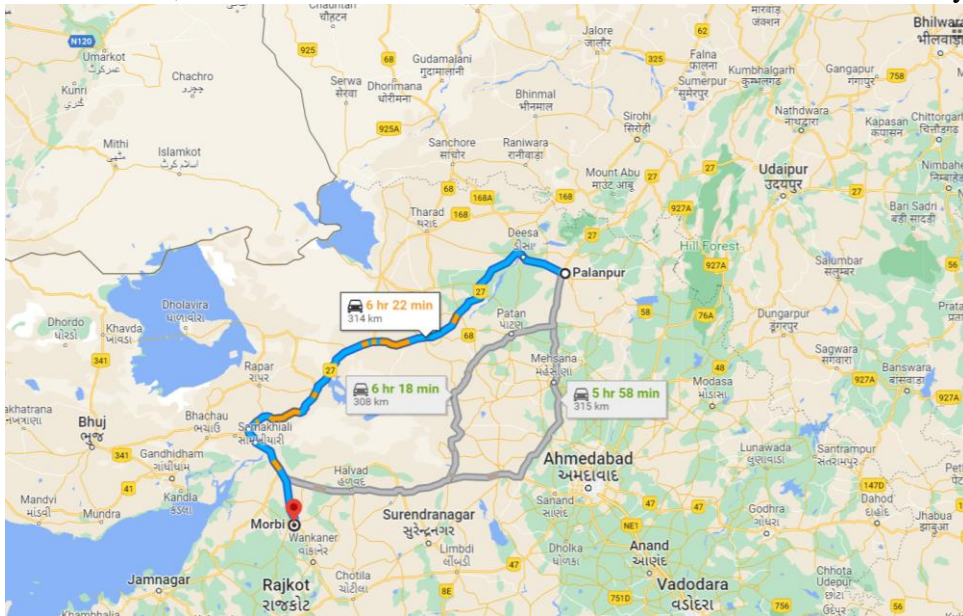


e. Amritsar – Jamnagar Expressway

The Amritsar – Jamnagar Expressway (AJE) is an access controlled 1300 km long partly greenfield / brownfield expressway. The AJE which is 4-lane up to PB/HR border and then 6-lane up to Jamnagar is under execution and is likely to be commissioned in FY25. The AJE will not only act as port connectivity expressway but will also have induced traffic due to connectivity of 3 refineries enroute, the Bhatinda refinery, Barmer refinery and Jamnagar refinery. Further all the major cities enroute the AJE are developing bypass / ring roads which will facilitate diversion of long-distance traffic. Thus, the long-distance traffic will have a better level of service and shorter turnaround time for port bound traffic which will be comparable to Freight movement by rail.

f. Morbi – Rajasthan via Mehsana: Divergence

There is some traffic originating from Morbi, Rajkot and travelling towards Punjab, Himachal, Haryana, Rajasthan and are taking alternate route via. Mehsana, Palanpur. Once the AJE is commissioned, the distance to the northern states via. AJE will be shorter by ~5-7%.



We have conducted OD survey along this alternate route near Mehsana and have worked out a total impact of divergence from alternate route and the development of AJE together will be nearly +2% for all categories of commercial vehicles.

Summary of impact as estimated is given in table below.

| Sr. No | Development Factor | Impact | Action |
|--------|------------------------------|---|--|
| 1 | Amritsar Jamnagar Expressway | Reduces travel time substantially. Connects Rajasthan, Haryana, UP & Punjab with a faster connectivity. New fast connectivity may add to growth in initial years of its commissioning. May also add new development area around its greenfield corridor | 4% additional traffic including divergence may be taken in year 2025-26, expected commissioning of full stretch |
| 2 | Barmer Refinery | New refinery. About 70% of crude is expected to come from Gujarat and also Amritsar – Jamnagar Expressway would provide fast access to ports for export / import, | It will add to traffic growth on project road once Expressway is commissioned. No additional impact separately |
| 3 | Kandla Mundra Ports | About 30% traffic on project stretch has Kandla Mundra connection. Both ports are doing good in terms of growth. These basically serve to northern hinterland of Rajasthan, Gujarat, Haryana, Punjab and UP | Capacity and facility expansion of both ports would support traffic growth on project stretch. No additional impact on traffic |
| 4 | Morbi Tile Industry | 90% of India's Ceramic is produced in Morbi. Over 1000 Ceramic factories. Domestic supplies to northern India through project stretch. | Would support traffic growth on project stretch. Would be part of growth |
| 5 | Road Network | No Competing Road Network | No Impact |
| 6 | DFCC | Kandla to Palanpur is existing rail line and Palanpur to Rewari is operational since last year. DFCC stretch from Rewari to Palanpur is already operational. Most of | No additional diversion is envisaged. |

| Sr. No | Development Factor | Impact | Action |
|--------|--------------------|---|--------|
| | | the traffic has already been shifted. Lack of last mile connectivity from DFCC hub to final destination of Goods will keep dependability of road network for goods transport. | |

3.4 Trend Analysis

Time series data of vehicle Registered in state of concerned states is taken from respective authorized websites and the same is used as the base data for analysis of growth.

Growth of vehicle traffic depends on type of vehicle. Traffic growth on any highway typically depends on number of economic parameters like

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

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. Same is recommended in IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways.

Following can be pair of vehicle type and independent variable for elasticity modelling of growth.

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

Same is used in analysis below.

3.5 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.

As per IRC: 108-1996 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)

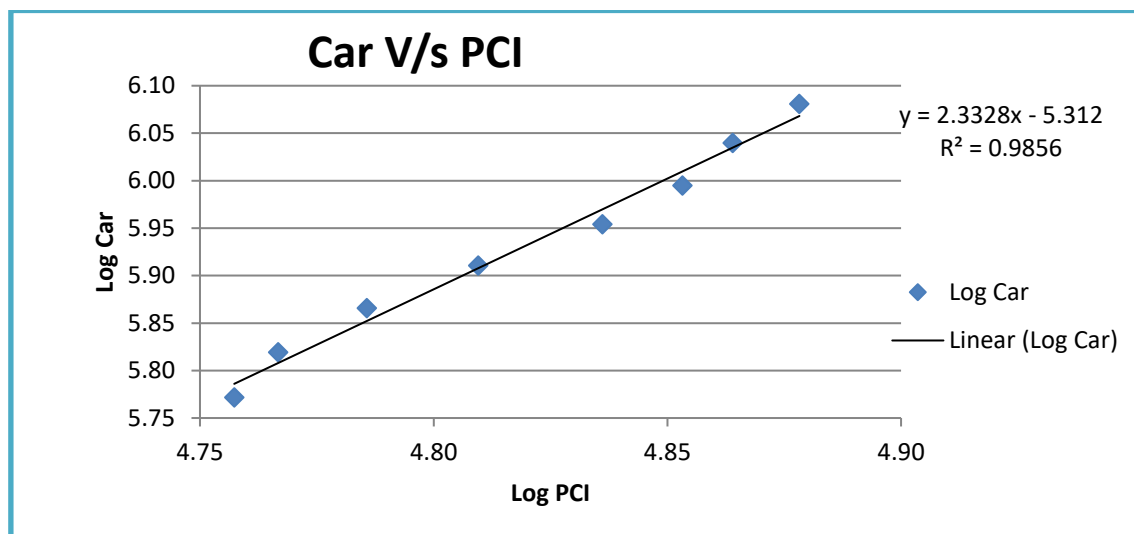
EI = Economic Indicator

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).

It is observed that most of the traffic at project stretch comes from Rajasthan, Haryana, Uttar Pradesh and Gujarat state. Hence economical model regression has been done for independent indicators for these states. The graphical presentation of the elasticity regression is presented in figures below:



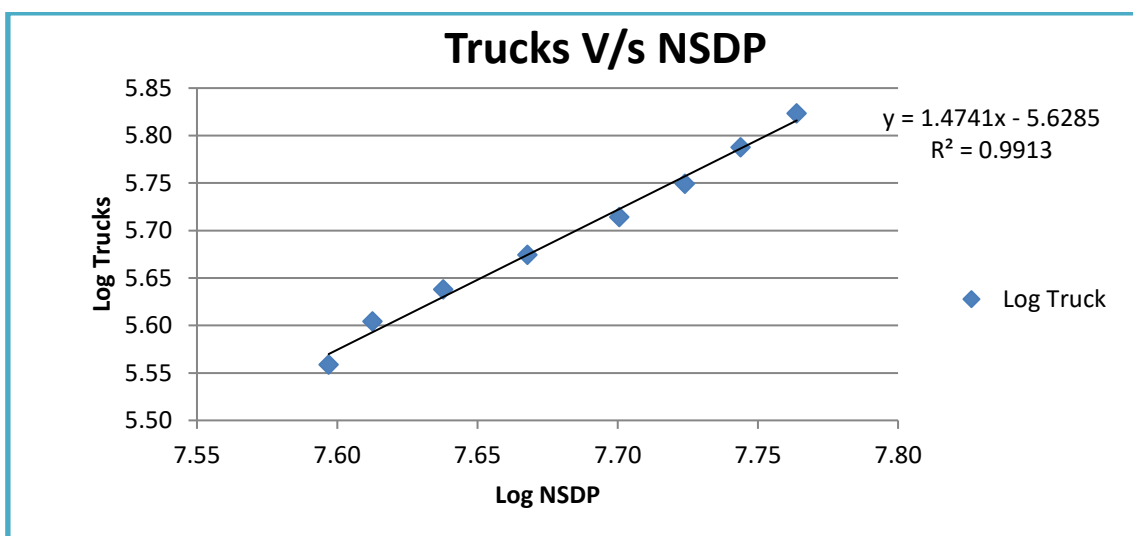
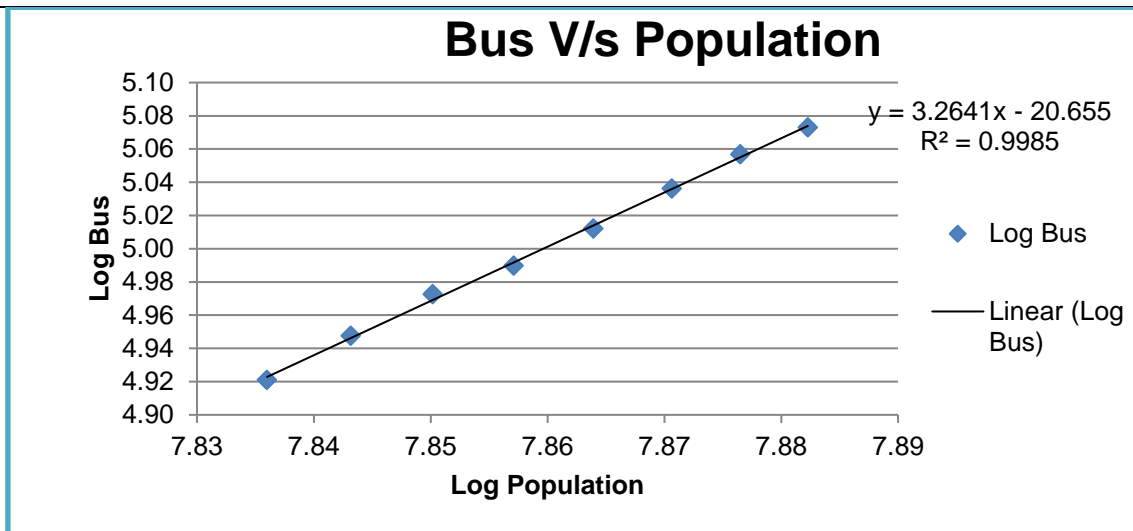
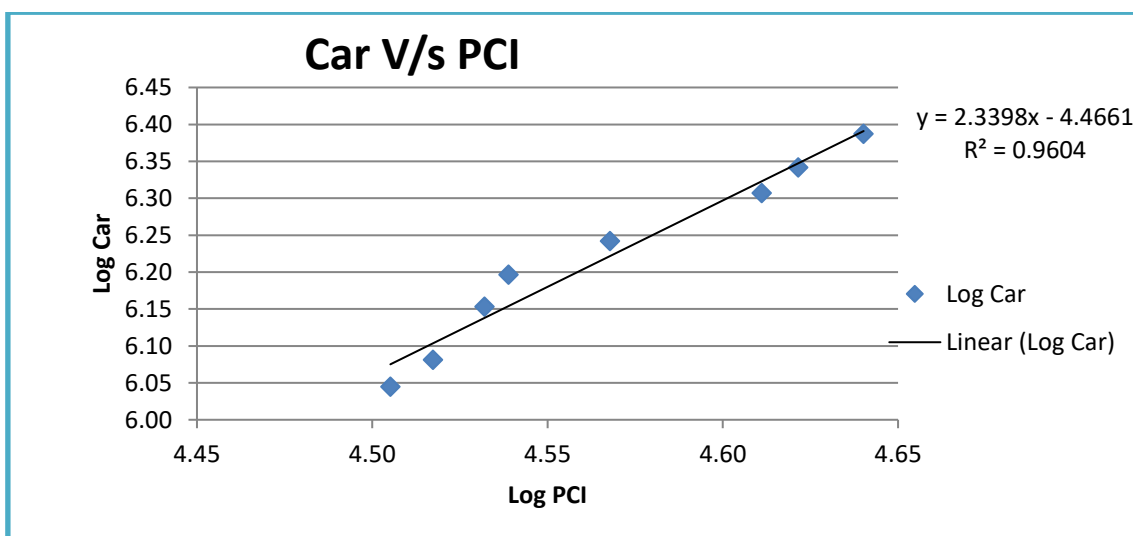


Figure 3-1: Elasticity Regression for Rajasthan



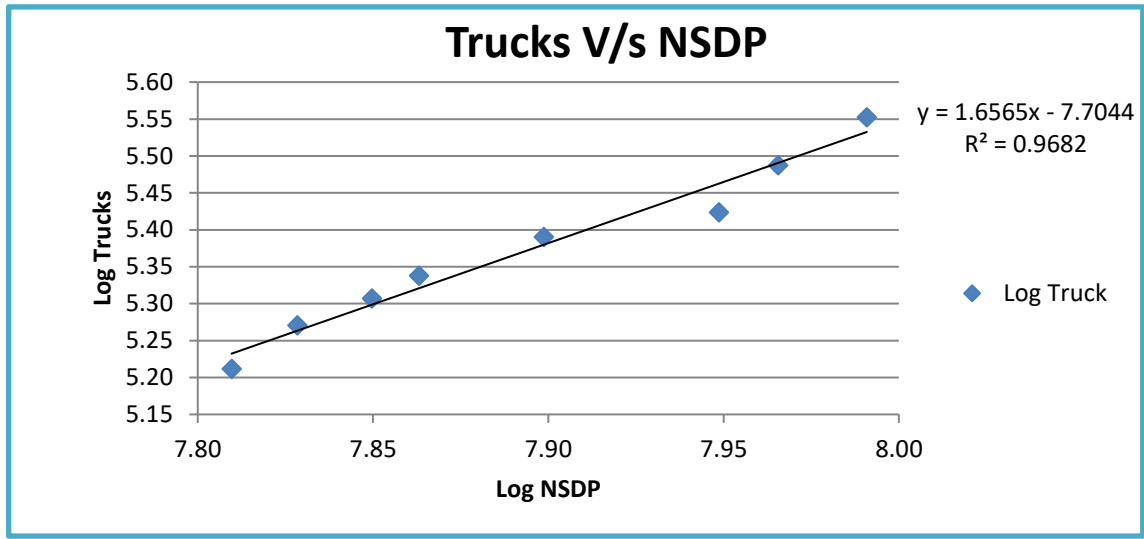
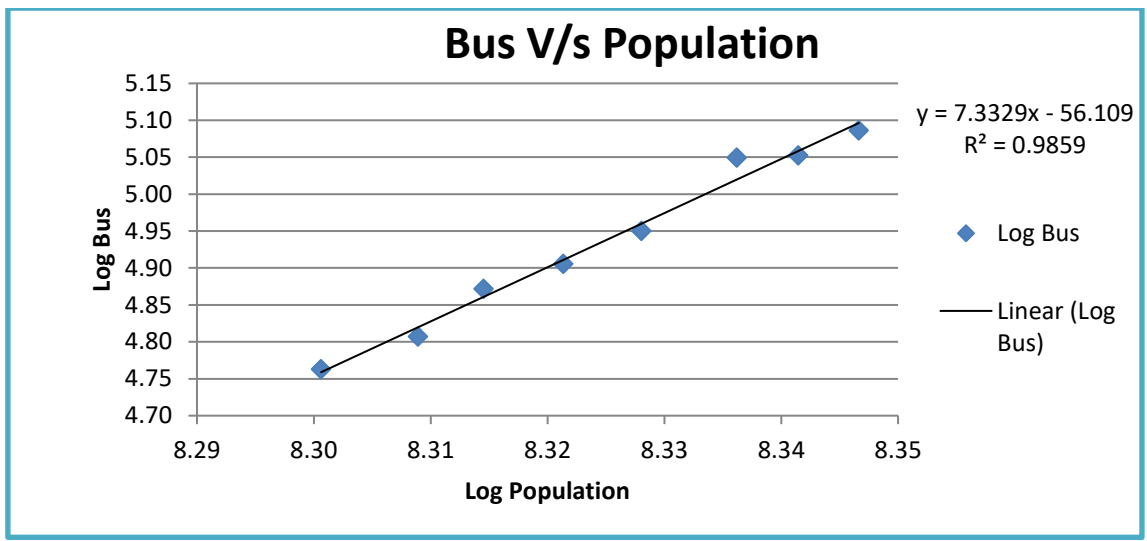


Figure 3-2: Elasticity Regression for Uttar Pradesh

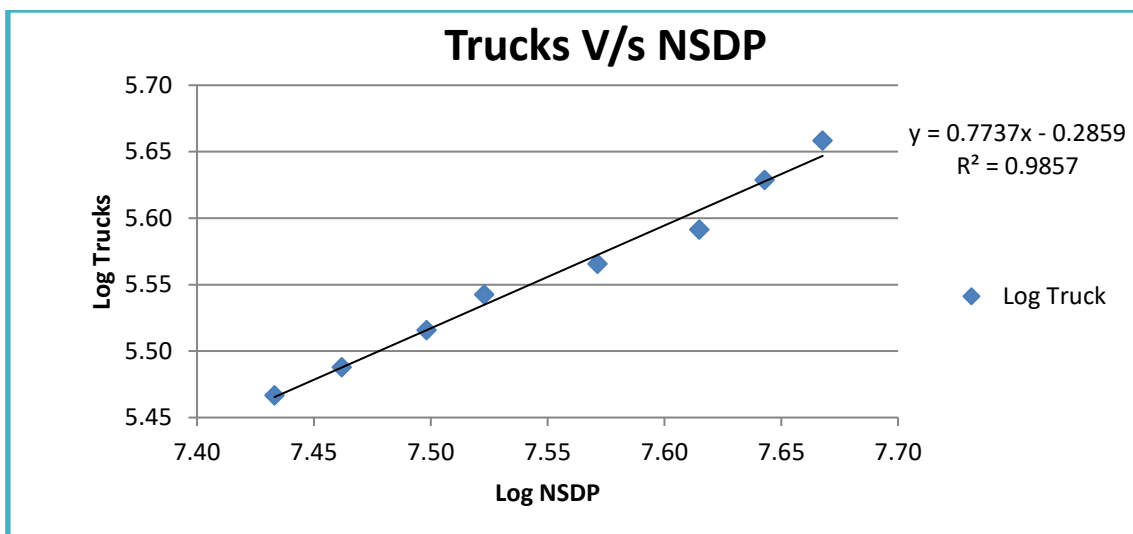
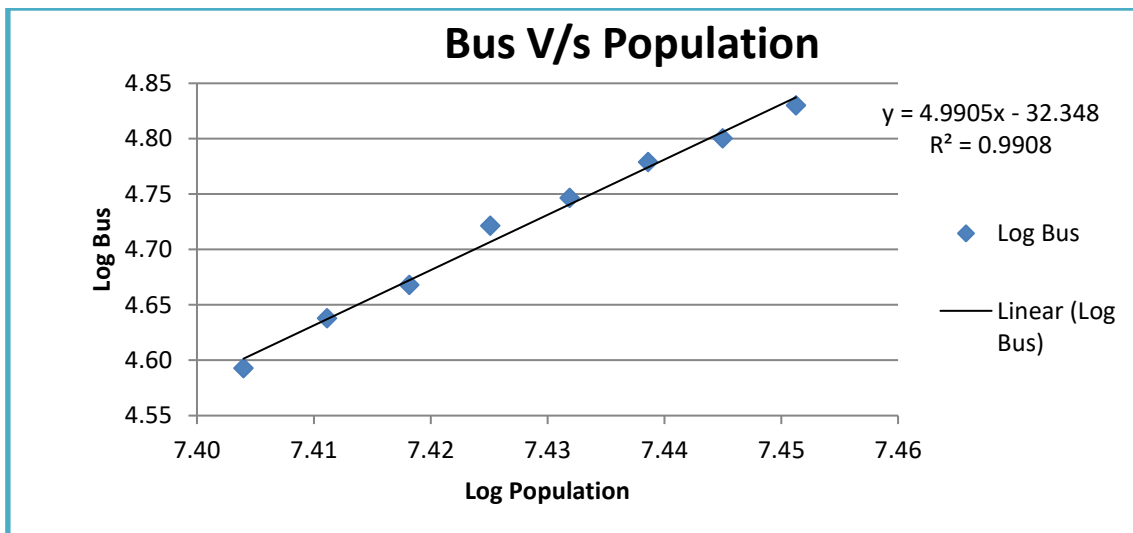
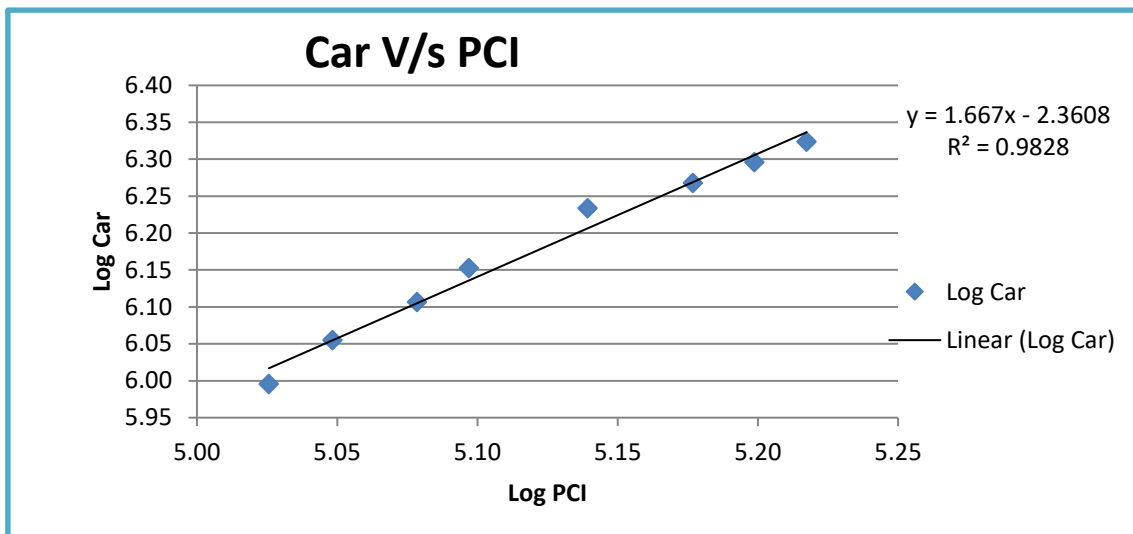


Figure 3-3: Elasticity Regression for Haryana

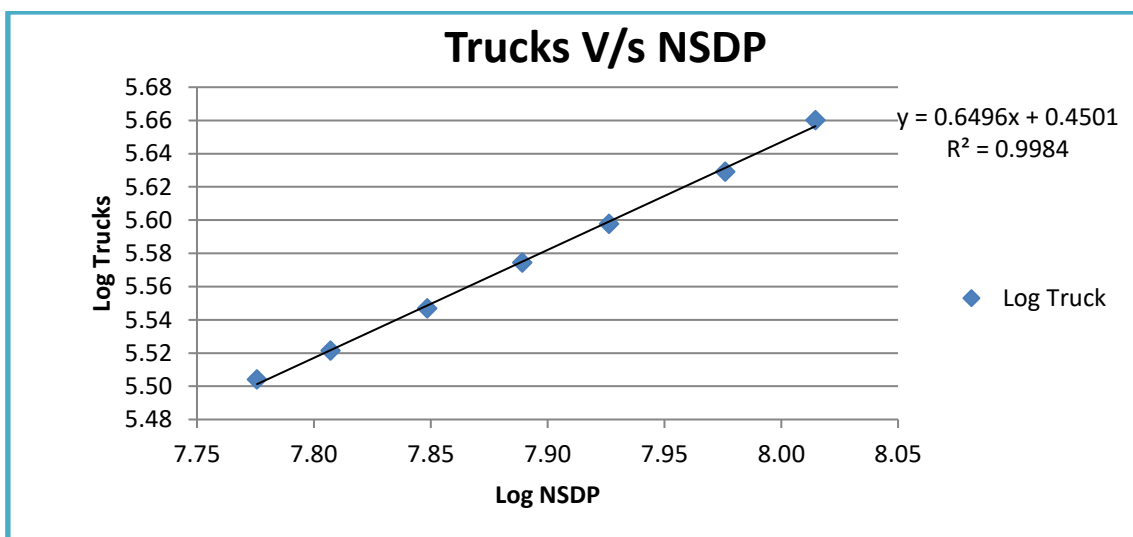
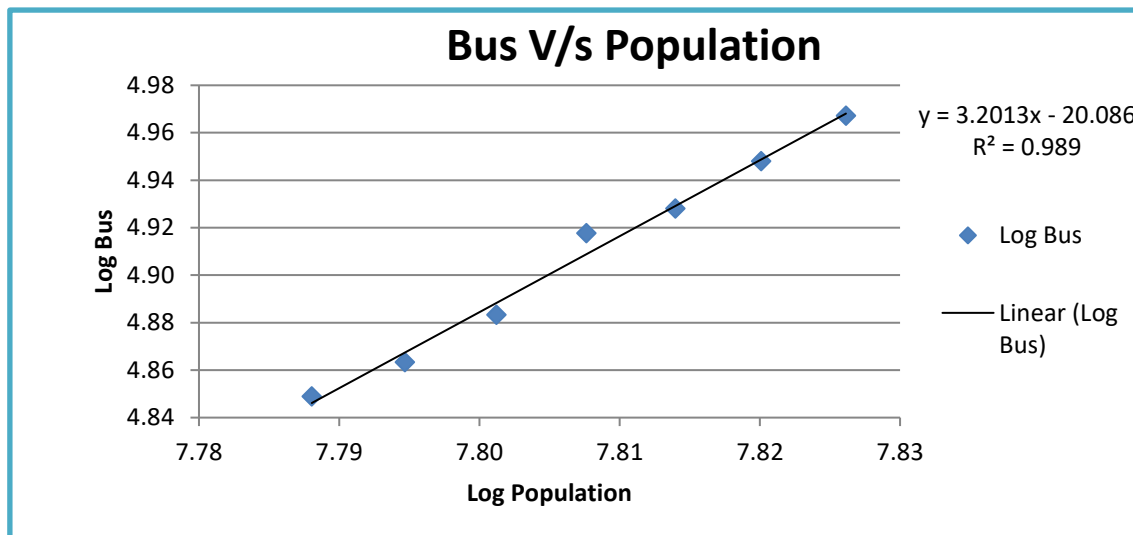
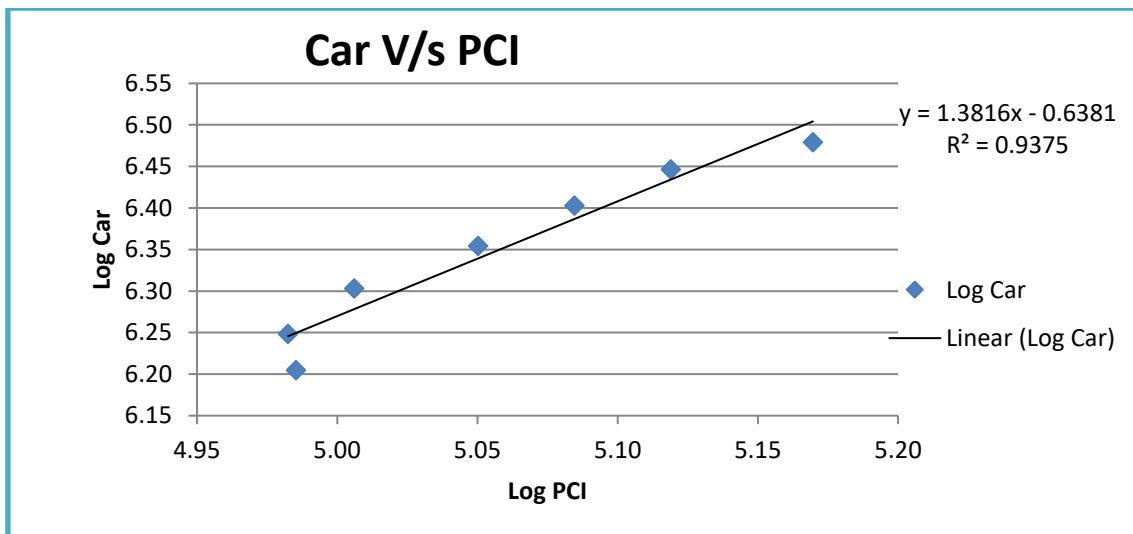


Figure 3-4: Elasticity Regression for Gujarat

It shall be noted that the growth rates for various modes are not same as they are influenced by different parameters. In other words, whilst the growth of the passenger vehicles (cars, Jeeps, two wheelers and even buses) could be attributed to the growth in the per capita income, population growth and vehicle registration growth, the growth of the LCV, Trucks, Multi Axle Trucks are found to be influenced with factors including the industrial production and growth of the National or state Domestic products.

For establishing the elasticity equations, details regarding NSDP/GDP, per capita income, population growth and registered vehicles in the state have been collected for the past few years and are presented in the Annexure. Based on this data, Log-Log regression curve fits have been developed for each type of vehicle with the most suitable parameters and the elasticity values obtained.

The results of these analyses for the good fit as reflected by R² values are presented in the table below.

Table 3-1 : Results of Regression Analysis

| Results of Regression Analysis | | | | | |
|--------------------------------|------------------|----------------------|-------------------------|-------------------------|------------------------|
| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient |
| GUJRAT | Car/Jeep | PCI | $y = 1.3816x - 0.6381$ | R ² = 0.9375 | 1.3816 |
| | Bus | Population | $y = 3.2013x - 20.0857$ | R ² = 0.989 | 3.2013 |
| | Truck | NSDP | $y = 0.6496x - 0.4501$ | R ² = 0.9984 | 0.6496 |
| UTTAR PRADESH | Car/Jeep | PCI | $y = 2.3398x - 4.4661$ | R ² = 0.9604 | 2.3398 |
| | Bus | Population | $y = 7.3329x - 56.1092$ | R ² = 0.9859 | 7.3329 |
| | Truck | NSDP | $y = 1.6565x - 7.7044$ | R ² = 0.9682 | 1.6565 |
| RAJASTHAN | Car/Jeep | PCI | $y = 2.3328x - 5.312$ | R ² = 0.9856 | 2.3328 |
| | Bus | Population | $y = 3.2641x - 20.6548$ | R ² = 0.9985 | 3.2641 |
| | Truck | NSDP | $y = 1.4741x - 5.6285$ | R ² = 0.9913 | 1.4741 |
| HARYANA & PUNJAB | Car/Jeep | PCI | $y = 1.667x - 2.3608$ | R ² = 0.9828 | 1.667 |
| | Bus | Population | $y = 4.9905x - 32.348$ | R ² = 0.9908 | 4.9905 |
| | Truck | NSDP | $y = 0.7737x - 0.2859$ | R ² = 0.9857 | 0.7737 |

However, considering factors such as proposed developments and other influencing economic factors, and logistic trends etc moderated growth factors as listed below are considered.

3.6 Basis for arriving at growth rates.

Arriving at growth rates for each mode on particular road stretch is always a complex issue. Transportation planners before arriving at such growth rates have to have a comprehensive understanding of the various disciplines such as land use, economy, automobile industry, anticipated changes in the region, traffic, and other related issues.

Giving due consideration to all the factors elaborated in the previous sections, three growth scenarios are suggested with a wide range of growth rates which are resilient and ready to respond to the changes in socio-economic conditions which are likely to influence the project corridor.

3.7 Growth of Economy and Projection of GDP in India and states

After witnessing a slowdown during previous years, the economy is expected to firm up further in coming years. The growth outlook for the Indian economy in the medium and long term remains upbeat and positive. Based on various projections and details available a NSDP growth is taken for various states having influence in traffic.

3.7.1 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 under different scenarios are as following.

Table 3-2 : Recommended Growth Rates Optimistic Scenario

| Category / Year | FY24 - FY28 | FY29 - FY33 | FY34 - FY38 | FY39- FY43 | FY44 - FY48 | FY49 - FY53 |
|------------------|-------------|-------------|-------------|------------|-------------|-------------|
| Car/Jeep/Van | 8.06% | 7.16% | 6.13% | 5.57% | 5.57% | 5.57% |
| Mini LCV | 3.30% | 3.22% | 2.85% | 2.25% | 2.25% | 2.25% |
| Bus | 3.29% | 2.84% | 2.41% | 2.21% | 2.21% | 2.21% |
| Minibus | 3.29% | 2.84% | 2.41% | 2.23% | 2.23% | 2.23% |
| LCV | 3.30% | 2.91% | 2.59% | 2.25% | 2.25% | 2.25% |
| 2- Axle | 2.83% | 2.45% | 2.19% | 2.06% | 2.06% | 2.06% |
| 3 - Axle | 7.06% | 6.28% | 5.45% | 4.81% | 4.81% | 4.81% |
| 4 to6 Axle | 7.86% | 6.93% | 6.00% | 5.43% | 5.43% | 5.43% |
| 7 and Above Axle | 7.06% | 6.28% | 5.45% | 4.81% | 4.81% | 4.81% |

Table 3-3 : Recommended Growth Rates Pessimistic Scenario

| Category / Year | FY24 - FY28 | FY29 - FY33 | FY34 - FY38 | FY39- FY43 | FY44 - FY48 | FY49 - FY53 |
|-------------------------|-------------|-------------|-------------|------------|-------------|-------------|
| Car/Jeep/Van | 7.56% | 6.66% | 5.63% | 5.07% | 5.07% | 5.07% |
| Mini LCV | 2.80% | 2.72% | 2.35% | 1.75% | 1.75% | 1.75% |
| Bus | 2.79% | 2.34% | 1.91% | 1.71% | 1.71% | 1.71% |
| Minibus | 2.79% | 2.34% | 1.91% | 1.73% | 1.73% | 1.73% |
| LCV | 2.80% | 2.41% | 2.09% | 1.75% | 1.75% | 1.75% |
| 2- Axle | 2.33% | 1.95% | 1.69% | 1.56% | 1.56% | 1.56% |
| 3 - Axle | 6.56% | 5.78% | 4.95% | 4.31% | 4.31% | 4.31% |
| 4 to6 Axle | 7.36% | 6.43% | 5.50% | 4.93% | 4.93% | 4.93% |
| 7 and Above Axle | 6.56% | 5.78% | 4.95% | 4.31% | 4.31% | 4.31% |

Table 3-4 : Recommended Growth Rates Most Likely Scenario

| Category / Year | FY24 - FY28 | FY29 - FY33 | FY34 - FY38 | FY39- FY43 | FY44 - FY48 | FY49 - FY53 |
|-------------------------|-------------|-------------|-------------|------------|-------------|-------------|
| Car/Jeep/Van | 7.81% | 6.91% | 5.88% | 5.32% | 5.32% | 5.32% |
| Mini LCV | 3.05% | 2.97% | 2.60% | 2.00% | 2.00% | 2.00% |
| Bus | 3.04% | 2.59% | 2.16% | 1.96% | 1.96% | 1.96% |
| Minibus | 3.04% | 2.59% | 2.16% | 1.98% | 1.98% | 1.98% |
| LCV | 3.05% | 2.66% | 2.34% | 2.00% | 2.00% | 2.00% |
| 2- Axle | 2.58% | 2.20% | 1.94% | 1.81% | 1.81% | 1.81% |
| 3 - Axle | 6.81% | 6.03% | 5.20% | 4.56% | 4.56% | 4.56% |
| 4 to6 Axle | 7.61% | 6.68% | 5.75% | 5.18% | 5.18% | 5.18% |
| 7 and Above Axle | 6.81% | 6.03% | 5.20% | 4.56% | 4.56% | 4.56% |

3.8 Traffic Forecast

3.8.1 AADT

In previous chapter base traffic matrix for all category of vehicles have been worked out and presented. This traffic is projected in future years of concession period. Same is given as under.

Table 3-5 : Traffic Forecast at Makhel Toll Plaza (Optimistic)

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to6 Axle | 7 and Above Axle | TOTAL |
|---------|--------------|----------|-----|---------|-----|--------|----------|------------|------------------|-------|
| 2023-24 | 1166 | 96 | 203 | 6 | 98 | 250 | 297 | 7557 | 10 | 9683 |
| 2024-25 | 1260 | 99 | 210 | 6 | 101 | 257 | 318 | 8151 | 11 | 10413 |
| 2025-26 | 1362 | 102 | 217 | 6 | 104 | 275 | 354 | 9143 | 12 | 11575 |
| 2026-27 | 1472 | 105 | 224 | 6 | 107 | 283 | 379 | 9861 | 13 | 12450 |
| 2027-28 | 1591 | 108 | 231 | 6 | 111 | 291 | 406 | 10636 | 14 | 13394 |
| 2028-29 | 1705 | 111 | 238 | 6 | 114 | 298 | 431 | 11374 | 15 | 14292 |
| 2029-30 | 1827 | 115 | 245 | 6 | 117 | 305 | 458 | 12163 | 16 | 15252 |
| 2030-31 | 1958 | 119 | 252 | 6 | 120 | 312 | 487 | 13006 | 17 | 16277 |
| 2031-32 | 2098 | 123 | 259 | 6 | 123 | 320 | 518 | 13908 | 18 | 17373 |
| 2032-33 | 2248 | 127 | 266 | 6 | 127 | 328 | 551 | 14872 | 19 | 18544 |
| 2033-34 | 2386 | 131 | 272 | 6 | 130 | 335 | 581 | 15764 | 20 | 19625 |
| 2034-35 | 2532 | 135 | 279 | 6 | 133 | 342 | 613 | 16710 | 21 | 20771 |
| 2035-36 | 2687 | 139 | 286 | 6 | 136 | 349 | 646 | 17712 | 22 | 21983 |
| 2036-37 | 2852 | 143 | 293 | 6 | 140 | 357 | 681 | 18775 | 23 | 23270 |
| 2037-38 | 3027 | 147 | 300 | 6 | 144 | 365 | 718 | 19901 | 24 | 24632 |
| 2038-39 | 3195 | 150 | 307 | 6 | 147 | 373 | 753 | 20981 | 25 | 25937 |
| 2039-40 | 3373 | 153 | 314 | 6 | 150 | 381 | 789 | 22120 | 26 | 27312 |
| 2040-41 | 3561 | 156 | 321 | 6 | 153 | 389 | 827 | 23320 | 27 | 28760 |
| 2041-42 | 3759 | 160 | 328 | 6 | 156 | 397 | 867 | 24585 | 28 | 30286 |
| 2042-43 | 3968 | 164 | 335 | 6 | 160 | 405 | 909 | 25919 | 29 | 31895 |
| 2043-44 | 4189 | 168 | 342 | 6 | 164 | 413 | 953 | 27325 | 30 | 33590 |
| 2044-45 | 4422 | 172 | 350 | 6 | 168 | 422 | 999 | 28808 | 31 | 35378 |

Table 3-6 : Traffic Forecast at Makhel Toll Plaza (Pessimistic)

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to6 Axle | 7 and Above Axle | TOTAL |
|---------|--------------|----------|-----|---------|-----|--------|----------|------------|------------------|-------|
| 2023-24 | 1161 | 96 | 202 | 6 | 98 | 249 | 295 | 7522 | 10 | 9639 |
| 2024-25 | 1249 | 99 | 208 | 6 | 101 | 255 | 314 | 8076 | 11 | 10319 |
| 2025-26 | 1343 | 102 | 214 | 6 | 104 | 271 | 348 | 9017 | 12 | 11417 |
| 2026-27 | 1445 | 105 | 220 | 6 | 107 | 277 | 371 | 9681 | 13 | 12225 |
| 2027-28 | 1554 | 108 | 226 | 6 | 110 | 283 | 395 | 10394 | 14 | 13090 |
| 2028-29 | 1657 | 111 | 231 | 6 | 113 | 289 | 418 | 11062 | 15 | 13902 |
| 2029-30 | 1767 | 114 | 236 | 6 | 116 | 295 | 442 | 11773 | 16 | 14765 |
| 2030-31 | 1885 | 117 | 242 | 6 | 119 | 301 | 468 | 12530 | 17 | 15685 |
| 2031-32 | 2011 | 120 | 248 | 6 | 122 | 307 | 495 | 13335 | 18 | 16662 |
| 2032-33 | 2145 | 123 | 254 | 6 | 125 | 313 | 524 | 14192 | 19 | 17701 |
| 2033-34 | 2266 | 126 | 259 | 6 | 128 | 318 | 550 | 14973 | 20 | 18646 |
| 2034-35 | 2393 | 129 | 264 | 6 | 131 | 323 | 577 | 15797 | 21 | 19641 |
| 2035-36 | 2528 | 132 | 269 | 6 | 134 | 328 | 606 | 16666 | 22 | 20691 |
| 2036-37 | 2670 | 135 | 274 | 6 | 137 | 334 | 636 | 17583 | 23 | 21798 |

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to6 Axle | 7 and Above Axle | TOTAL |
|---------|--------------|----------|-----|---------|-----|--------|----------|------------|------------------|-------|
| 2037-38 | 2820 | 138 | 279 | 6 | 140 | 340 | 667 | 18550 | 24 | 22964 |
| 2038-39 | 2963 | 140 | 284 | 6 | 142 | 345 | 696 | 19464 | 25 | 24065 |
| 2039-40 | 3113 | 142 | 289 | 6 | 144 | 350 | 726 | 20423 | 26 | 25219 |
| 2040-41 | 3271 | 144 | 294 | 6 | 147 | 355 | 757 | 21429 | 27 | 26430 |
| 2041-42 | 3437 | 147 | 299 | 6 | 150 | 361 | 790 | 22485 | 28 | 27703 |
| 2042-43 | 3611 | 150 | 304 | 6 | 153 | 367 | 824 | 23593 | 29 | 29037 |
| 2043-44 | 3794 | 153 | 309 | 6 | 156 | 373 | 859 | 24755 | 30 | 30435 |
| 2044-45 | 3986 | 156 | 314 | 6 | 159 | 379 | 896 | 25974 | 31 | 31901 |

Table 3-7 : Traffic Forecast at Makhel Toll Plaza (Most Likely)

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to6 Axle | 7 and Above Axle | TOTAL |
|---------|--------------|----------|-----|---------|-----|--------|----------|------------|------------------|-------|
| 2023-24 | 1163 | 96 | 203 | 6 | 98 | 249 | 296 | 7539 | 10 | 9660 |
| 2024-25 | 1254 | 99 | 209 | 6 | 101 | 255 | 316 | 8113 | 11 | 10364 |
| 2025-26 | 1352 | 102 | 215 | 6 | 104 | 272 | 351 | 9079 | 12 | 11493 |
| 2026-27 | 1458 | 105 | 222 | 6 | 107 | 279 | 375 | 9770 | 13 | 12335 |
| 2027-28 | 1572 | 108 | 229 | 6 | 110 | 286 | 401 | 10513 | 14 | 13239 |
| 2028-29 | 1681 | 111 | 235 | 6 | 113 | 292 | 425 | 11216 | 15 | 14094 |
| 2029-30 | 1797 | 114 | 241 | 6 | 116 | 298 | 451 | 11966 | 16 | 15005 |
| 2030-31 | 1921 | 117 | 247 | 6 | 119 | 305 | 478 | 12766 | 17 | 15976 |
| 2031-32 | 2054 | 120 | 253 | 6 | 122 | 312 | 507 | 13619 | 18 | 17011 |
| 2032-33 | 2196 | 124 | 260 | 6 | 125 | 319 | 538 | 14529 | 19 | 18116 |
| 2033-34 | 2325 | 127 | 266 | 6 | 128 | 325 | 566 | 15364 | 20 | 19127 |
| 2034-35 | 2462 | 130 | 272 | 6 | 131 | 331 | 595 | 16247 | 21 | 20195 |
| 2035-36 | 2607 | 133 | 278 | 6 | 134 | 337 | 626 | 17181 | 22 | 21324 |
| 2036-37 | 2760 | 136 | 284 | 6 | 137 | 344 | 659 | 18169 | 23 | 22518 |
| 2037-38 | 2922 | 140 | 290 | 6 | 140 | 351 | 693 | 19214 | 24 | 23780 |
| 2038-39 | 3077 | 143 | 296 | 6 | 143 | 357 | 725 | 20209 | 25 | 24981 |
| 2039-40 | 3241 | 146 | 302 | 6 | 146 | 363 | 758 | 21255 | 26 | 26243 |
| 2040-41 | 3413 | 149 | 308 | 6 | 149 | 370 | 793 | 22355 | 27 | 27570 |
| 2041-42 | 3594 | 152 | 314 | 6 | 152 | 377 | 829 | 23512 | 28 | 28964 |
| 2042-43 | 3785 | 155 | 320 | 6 | 155 | 384 | 867 | 24729 | 29 | 30430 |
| 2043-44 | 3986 | 158 | 326 | 6 | 158 | 391 | 907 | 26009 | 30 | 31971 |
| 2044-45 | 4198 | 161 | 332 | 6 | 161 | 398 | 948 | 27355 | 31 | 33590 |

CHAPTER 4

FORECAST OF TOLL REVENUE

4.1 General

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

4.2 Toll Rate Guidelines

As per the Toll Notification (Schedule R) the following acts and rules have been considered:

- National Highways Fee (Determination of Rates and Collection) Rules, 2008
- National Highways Fee (Determination of Rates and Collection) Amendment Rules, 2010
- National Highways Fee (Determination of Rates and Collection) Amendment Rules, 2011
- National Highways Fee (Determination of Rates and Collection) Amendment Rules, 2013 (Rate of fee for expressway shall be 1.25 times the normal rate)
- National Highways Fee (Determination of Rates and Collection) Amendment Rules, 2014 (Equivalent length of structure)

4.2.1 Discounts

As per the Fee Notification (Schedule-R) fee discounts shall be provided to project users as under

- Local discount for non-commercial vehicle owner within 20 km of toll plaza

4.2.2 Travel Passes

As per the Fee Notification (Schedule-R) fee discounts shall be provided to project users as under

1. Monthly Pass: For frequent user's monthly pass would have not more than 50 trips per month at 2/3rd 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 travellers or whose frequency does not yield any discount from the above categories.

4.3 Estimation of Toll Rates

As per the notification issued with RFP the following Base rate of fee for the categories mentioned are applicable as base rate.

Table 4-1 : 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 |

These rates are then modified for as per procedure provided in guidelines of notification considering factors listed below.

- Annual revision of fee rate - @3%
- Application of WPI

Base rates have been worked out to map the current rates. These shall be updated when more details come in. Base toll rates are given as under.

Table 4-2 : Car/Jeep/Van Toll Rates for Base Year 2022-23 (Rs. Rupees)

| Sr.no | Type of Vehicle | Rates |
|-------|------------------|-------|
| 1 | Car/Jeep/Van | 125 |
| 2 | Mini LCV | 125 |
| 3 | Bus | 425 |
| 4 | Minibus | 200 |
| 5 | LCV | 200 |
| 6 | 2- Axle | 425 |
| 7 | 3 - Axle | 460 |
| 8 | 4 to6 Axle | 665 |
| 9 | 7 and Above Axle | 805 |

Above rates are applicable for base year 2022-23. These rates have been escalated for future year as NHAI policy and MORTH guideline for future revenue working.

Table 4-3 : Car/Jeep/Van Toll Rates for Forecasting Year (Rs. Rupees)

| Year | Car/Jeep/ Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle |
|---------|------------------|----------|------|---------|-----|---------|-------------|----------------|------------------------|
| 2023-24 | 100 | 100 | 335 | 160 | 160 | 335 | 365 | 520 | 635 |
| 2024-25 | 100 | 100 | 335 | 160 | 160 | 335 | 365 | 520 | 635 |
| 2025-26 | 145 | 145 | 485 | 230 | 230 | 485 | 530 | 760 | 925 |
| 2026-27 | 150 | 150 | 510 | 245 | 245 | 510 | 555 | 795 | 970 |
| 2027-28 | 160 | 160 | 535 | 255 | 255 | 535 | 580 | 835 | 1020 |
| 2028-29 | 165 | 165 | 560 | 270 | 270 | 560 | 610 | 880 | 1070 |
| 2029-30 | 175 | 175 | 590 | 280 | 280 | 590 | 645 | 925 | 1125 |
| 2030-31 | 185 | 185 | 620 | 295 | 295 | 620 | 675 | 975 | 1185 |
| 2031-32 | 195 | 195 | 650 | 310 | 310 | 650 | 710 | 1025 | 1245 |
| 2032-33 | 205 | 205 | 685 | 325 | 325 | 685 | 750 | 1075 | 1310 |
| 2033-34 | 215 | 215 | 720 | 345 | 345 | 720 | 785 | 1130 | 1380 |
| 2034-35 | 225 | 225 | 760 | 365 | 365 | 760 | 830 | 1190 | 1450 |
| 2035-36 | 235 | 235 | 800 | 380 | 380 | 800 | 870 | 1255 | 1525 |
| 2036-37 | 250 | 250 | 840 | 400 | 400 | 840 | 920 | 1320 | 1605 |
| 2037-38 | 260 | 260 | 885 | 425 | 425 | 885 | 965 | 1390 | 1690 |
| 2038-39 | 275 | 275 | 935 | 445 | 445 | 935 | 1020 | 1465 | 1780 |
| 2039-40 | 290 | 290 | 985 | 470 | 470 | 985 | 1075 | 1540 | 1880 |
| 2040-41 | 305 | 305 | 1035 | 495 | 495 | 1035 | 1130 | 1625 | 1980 |
| 2041-42 | 325 | 325 | 1090 | 520 | 520 | 1090 | 1190 | 1715 | 2085 |
| 2042-43 | 340 | 340 | 1150 | 550 | 550 | 1150 | 1255 | 1805 | 2200 |

| Year | Car/Jeep/ Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle |
|---------|------------------|----------|------|---------|-----|---------|-------------|----------------|------------------------|
| 2043-44 | 360 | 360 | 1215 | 580 | 580 | 1215 | 1325 | 1905 | 2315 |
| 2044-45 | 380 | 380 | 1280 | 610 | 610 | 1280 | 1395 | 2005 | 2445 |

4.3.1 Revenue Forecast

Base case revenue forecast with traffic numbers as per above analysis and rates worked out is give in following table.

Table 4-4 : Total Toll Revenue – Base Case Rs. Cr (Optimistic)

| Location / Year | Makhel Toll | Total |
|-----------------|-------------|---------|
| 2023-24 | 153.67 | 153.67 |
| 2024-25 | 165.01 | 165.01 |
| 2025-26 | 206.59* | 206.59* |
| 2026-27 | 303.47 | 303.47 |
| 2027-28 | 344.28 | 344.28 |
| 2028-29 | 386.15 | 386.15 |
| 2029-30 | 433.67 | 433.67 |
| 2030-31 | 488.13 | 488.13 |
| 2031-32 | 549.63 | 549.63 |
| 2032-33 | 614.25 | 614.25 |
| 2033-34 | 683.65 | 683.65 |
| 2034-35 | 762.44 | 762.44 |
| 2035-36 | 853.46 | 853.46 |
| 2036-37 | 948.50 | 948.50 |
| 2037-38 | 1057.41 | 1057.41 |
| 2038-39 | 1174.30 | 1174.30 |
| 2039-40 | 1304.28 | 1304.28 |
| 2040-41 | 1445.57 | 1445.57 |
| 2041-42 | 1607.51 | 1607.51 |
| 2042-43 | 1782.35 | 1782.35 |
| 2043-44 | 1987.44 | 1987.44 |
| 2044-45 | 2198.10 | 2198.10 |

Note: * revenue is based on an assumption that construction is completed in H1FY26

Table 4-5 : Total Toll Revenue – Base Case Rs. Cr (Pessimistic)

| Location / Year | Makhel Toll | Total |
|-----------------|-------------|---------|
| 2023-24 | 152.96 | 152.96 |
| 2024-25 | 163.49 | 163.49 |
| 2025-26 | 203.74* | 203.74* |
| 2026-27 | 297.93 | 297.93 |
| 2027-28 | 336.43 | 336.43 |
| 2028-29 | 375.55 | 375.55 |
| 2029-30 | 419.77 | 419.77 |
| 2030-31 | 470.29 | 470.29 |
| 2031-32 | 527.03 | 527.03 |
| 2032-33 | 586.21 | 586.21 |
| 2033-34 | 649.41 | 649.41 |
| 2034-35 | 720.84 | 720.84 |
| 2035-36 | 803.15 | 803.15 |
| 2036-37 | 888.37 | 888.37 |
| 2037-38 | 985.70 | 985.70 |
| 2038-39 | 1089.45 | 1089.45 |
| 2039-40 | 1204.26 | 1204.26 |
| 2040-41 | 1328.37 | 1328.37 |
| 2041-42 | 1470.27 | 1470.27 |
| 2042-43 | 1622.49 | 1622.49 |
| 2043-44 | 1800.61 | 1800.61 |
| 2044-45 | 1981.93 | 1981.93 |

Note: *: revenue is based on an assumption that construction is completed in H1FY26

Table 4-6 : Total Toll Revenue – Base Case Rs. Cr (Most Likely)

| Location / Year | Makhel Toll | Total |
|-----------------|-------------|---------|
| 2023-24 | 153.30 | 153.30 |
| 2024-25 | 164.23 | 164.23 |
| 2025-26 | 205.12* | 205.12* |
| 2026-27 | 300.65 | 300.65 |
| 2027-28 | 340.29 | 340.29 |
| 2028-29 | 380.77 | 380.77 |
| 2029-30 | 426.64 | 426.64 |
| 2030-31 | 479.11 | 479.11 |
| 2031-32 | 538.19 | 538.19 |
| 2032-33 | 600.07 | 600.07 |
| 2033-34 | 666.31 | 666.31 |
| 2034-35 | 741.31 | 741.31 |

| Location / Year | Makhel Toll | Total |
|-----------------|-------------|---------|
| 2035-36 | 827.88 | 827.88 |
| 2036-37 | 917.90 | 917.90 |
| 2037-38 | 1020.91 | 1020.91 |
| 2038-39 | 1131.08 | 1131.08 |
| 2039-40 | 1253.26 | 1253.26 |
| 2040-41 | 1385.77 | 1385.77 |
| 2041-42 | 1537.38 | 1537.38 |
| 2042-43 | 1700.55 | 1700.55 |
| 2043-44 | 1891.77 | 1891.77 |
| 2044-45 | 2087.20 | 2087.20 |

Note: *: revenue is based on an assumption that construction is completed in H1FY26

4.3.2 Analysis of actual toll collection on the Project stretch

We have collated Fastag toll collection data for 9MFY23 on the project stretch through our sources, analysis of which is as summarized below:

| Particulars | Amount (in INR crores) |
|--|------------------------|
| Fastag Collection | |
| April 2022 | 11.99 |
| May 2022 | 14.73 |
| June 2022 | 13.69 |
| July 2022 | 12.95 |
| August 2022* | 11.44 |
| September 2022* | 11.92 |
| October 2022 | 13.73 |
| November 2022 | 15.18 |
| December 2022 | 15.85 |
| Total Fastag Collection (excluding August and September) | 98.12 |
| Fastag per day collection | INR 46 lakhs |
| Total per day collection (Fastag + cash) assuming Fastag penetration of 90-92% | INR 50 – 51 lakhs |
| Base year Toll Collection as per traffic study (FY23) | INR~ 50 lakhs |

*The months of August and September 2022 were impacted due to shut down of Morbi Tile Cluster which is one of the major traffic drivers on the project stretch. As this was one of a kind event, such shutdowns are not expected to occur in the future. Accordingly, for normalizing the assessment of actual toll collections, we have excluded the toll collections for the months of August and September 2022 from our analysis.

As can be seen from the above, actual toll collection on the project stretch in FY23 is in line with our base year traffic revenue for FY23 which further substantiates the accuracy of our traffic study.

4.3.3 Modifications in concession period

Modification in concession period due to variation in traffic is worked out as per procedure given in RFP. There are three milestones for traffic testing in year 2028, 2033 and 2038. Working of modification in concession period is given as under for all scenarios.

- Appointed date – 28th December 2023
- Concession Period (Days) – 7300 (For 20 Years)
- Hence, Original Concession end date is – 23rd December 2043

Pessimistic Case

| Sr. No | Target Date | Target Traffic | Actual Traffic | Variation in CP as per CA % | Change in CP (Days) | Total Variation in CP Years |
|--------|-------------|----------------|----------------|-----------------------------|---------------------|-----------------------------|
| 1 | 01-Oct-28 | 58741 | 54607 | 2.04% | 113 | 0.3 |
| 2 | 01-Oct-33 | 73443 | 73443 | 0.00% | 0 | |
| 3 | 01-Oct-38 | 93731 | 95001 | 0.00% | 0 | |

Optimistic Case

| Sr. No | Target Date | Target Traffic | Actual Traffic | Variation in CP as per CA % | Change in CP (Days) | Total Variation in CP Years |
|--------|-------------|----------------|----------------|-----------------------------|---------------------|-----------------------------|
| 1 | 01-Oct-28 | 58741 | 56148 | 0.00% | 0 | - 0.1 |
| 2 | 01-Oct-33 | 74971 | 77313 | 0.00% | 0 | |
| 3 | 01-Oct-38 | 95681 | 102401 | -2.02% | -39 | |

Most Likely Case

| Sr. No | Target Date | Target Traffic | Actual Traffic | Variation in CP as per CA % | Change in CP (Days) | Total Variation in CP Years |
|--------|-------------|----------------|----------------|-----------------------------|---------------------|-----------------------------|
| 1 | 01-Oct-28 | 58741 | 55366 | 0.75% | 41 | 0.1 |
| 2 | 01-Oct-33 | 74412 | 75352 | 0.00% | 0 | |
| 3 | 01-Oct-38 | 94968 | 98631 | 0.00% | 0 | |

Hence a positive variation of about **113 days** in concession period is expected as per traffic projections in *Pessimistic case*.

41 days in concession period is expected as per traffic projections in *most Likely case*.

CHAPTER 5

STRENGTH WEAKNESS OPPORTUNITY & THREAT (SWOT)

5.1 Introduction

SWOT analysis (alternately SLOT analysis) is a strategic planning method used to evaluate the Strengths, Weaknesses/Limitations, Opportunities, and Threats involved in a project or in a business venture. It involves specifying the objective of project and identifying the internal and external factors that are favourable and unfavourable to achieve that objective.

5.2 SWOT Analysis

Every project has its own strength and weaknesses. There are certain non-quantifiable parameters which can make project attractive or unattractive. An attempt has been made to capture these parameters for project highway to get complete review of project for making a management decision. For this purpose, a SWOT (Strength-Weakness-Opportunity-Threat) analysis has been done for project highway and is presented as below.

- **STRENGTH**

- Operational and has good tolling history.
- There no competing road network. Rail line along the alignment prohibits such developments of radial roads.
- Feeder to Major port of Kandla and biggest private port Mundra
- Stable long-distance traffic
- Morbi tile industry a very good feeder of commercial long-distance traffic in influence area.
- Peaceful tolling operations
- Toll plaza at confluence of central and north India Traffic connectors.

- **WEAKNESS**

- Local traffic almost absent and major dependence on port activities for traffic. Any disruption in port functioning impacts traffic volume at toll plaza.

- **OPPORTUNITY**

- Amritsar – Jamnagar Expressway may bring some additional traffic to project road.
- Development of Barmer refinery would positively impact traffic on Project stretch.

- **THREAT**

- Both Kandla and Mundra Ports handle large volumes of bulk. Commissioning of DFCC and conversion of Palanpur – Kandla rail line to double gauge may take away some traffic from project stretch. DFCC is operational though in stretch. Hence some part of traffic settlement has already taken place.



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**FOUR LANE LALITPUR- SAGAR- LAKHNADON SECTION (FROM KM
99+005 TO KM 415+089) OF NH-44 (OLD NH-26) IN THE STATES OF
UTTAR PRADESH & MADHYA PRADESH
(TOT BUNDLE-12)**



MARCH 2024

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**



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**FOUR LANE LALITPUR- SAGAR- LAKHNADON SECTION (FROM
KM 99+005 TO KM 415+089) OF NH-44 (OLD NH-26) IN THE
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PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 National Highways Authority of India (NHAI) introduced the Toll, Operate and Transfer (TOT) model for partnership with private developers in the road sector. Under this model, NHAI passes on the toll collection rights and operation and maintenance obligations for 20 years to the private developer against payment of upfront, one-time, lump sum concession fees quoted by the private developer as part of the comprehensive bidding process. Projects under this model are awarded as a bundle of operational national highways, which allows the investor to offset the risks of one project against another. Since existing and operational roads are auctioned under the TOT model.

Under the Toll Operate and Transfer (ToT) 12 bundle, NHAI had invited tenders for selection of concessionaire for maintenance of the National Highway stretch Lalitpur-Sagar-Lakhanadon from Km 99.00 to Km 415.089 section of NH-44 (old NH26).

M/s. IRB Infrastructure Developers Limited., has been declared as the selected bidder for the project. This report is for ToT bundle 12 “Lalitpur-Sagar- Lakhanadon from Km 99.00 to Km 415.089 section of NH-44 spanning in the states of Uttar Pradesh and Madhya Pradesh. Project Highway alignment is depicted in the following figure.

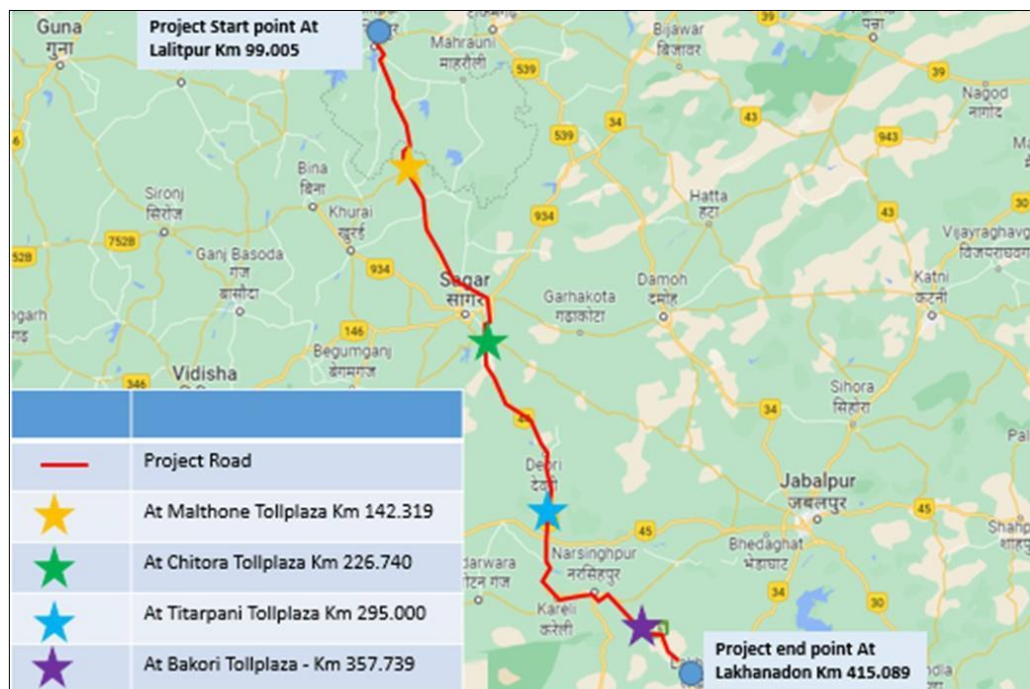


Figure 1-1: Project Stretch of TOT Bundle 12

1.2 Objective of the Study

M/s IRB Infrastructure Developers Limited (IRB) intends to develop a traffic study report for Four Laning of Lalitpur-Sagar- Lakhnadon from Km 99.00 to Km 415.089 section of NH-44 on BOT basis. GMD Consultants have been assigned the work of conducting traffic study and developing revenue model based on traffic projections and forecast.

For making the proper assessment of traffic volume on project stretch, base year traffic and its projection, GMD Consultants have been provided with the basic survey and investigation report available with client. The base year traffic data is the primary input for determination of future traffic demand. With a view to estimate the base year traffic volume in different categories of goods and passenger carrying vehicles, the Classified Traffic Volume Count (CTVC) surveys, Turning Movement surveys (TMC), Registration Plate Survey (N.P.) & Origin-Destination (O-D) were conducted at Main Toll Plaza (MTP) and data of same is provided for study.

The year 2022-23 has been taken as the base year for projections and forecasting of traffic in the horizon year. This report fulfils part of the requirement of the assignment.

1.3 Scope of Services

The following may be referred to as broad scope of Traffic Study of Four Laning of Lalitpur-Sagar- Lakhnadon from Km 99.00 to Km 415.089 section of NH-44.

- Classified Traffic Volume Count at main toll plaza location at Toll Plaza locations. This data was supplied by the Concessionaire.
- Establishment of traffic pattern
- Working our traffic demand elasticity and growth
- Traffic forecast up to concession period.
- Preparation of revenue model up to concession period
- Any other analysis relevant to scope

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

The project stretch is a section of NH-44, which is the longest National Highway in the country, running through North, Central and South India. It starts from Jammu & Kashmir and passes through the states of Punjab, Haryana, Delhi, Uttar Pradesh, Rajasthan, Madhya Pradesh, Maharashtra, Telangana, Andhra Pradesh, Karnataka and Tamil Nadu.

Project Stretch Description

The project stretch under this study starts from km 99.005 of NH-44 at Lalitpur in the state of Uttar Pradesh and ends at km 415.089 of NH-44 at Lakhnadon in the state of Madhya Pradesh. The length of project stretch is 316.084 km and has 4-lane configuration with four number of Toll Plazas (Malthone at ch.142+319, Chitora at Ch. 226+740, Titarpani at 295+000 and Bakori (Bachai) at ch.357+739).

The following figure shows this the alignment of the project highway in above context.



Figure 2-1 : Project Alignment with Toll Plaza

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Lalitpur – Sagar - Lakhnadon section of NH-44- Provided by Concessionaire for base year 2022-23.
- 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|---|--|--|--|--|--|
| 1 | Km 142.319 Toll Plaza at Malthone | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 |
| 2 | Km 226.740 Toll Plaza at Chitora | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 |
| 3 | Km 295.000 Toll Plaza at Titarpani | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 |
| 4 | Km 357.739 Toll Plaza at Bakori | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 | AADT from previous traffic study report for year 2022-23 |

All toll plazas are located in Madhya Pradesh.

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations-based traffic survey done at project stretch.

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 3-2 : 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Bus
- Truck /
- 3 Axle commercial vehicle
- Multi Axle

3.3 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.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data as per traffic survey conducted at toll plaza locations. It may not represent the whole year traffic as this pertains to specific period only. Hence a seasonality factor has been applied to average traffic of current period to arrive at

Annual Average Daily Traffic of base year 2022-23. Same corrected traffic is used for future projections and revenue calculations. Following table shows Annual Average Daily Traffic (AADT) for Base year 2022-23 as considered.

Table 3-3 : Traffic Data at Malthone Toll Plaza at Km 142.319

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|---------------------------|---|
| 1 | Car | 1672 |
| 2 | Minibus /LCV | 191 |
| 3 | Bus | 61 |
| 4 | Truck | 995 |
| 5 | 3-Axle Commercial vehicle | 1221 |
| 6 | Multi axle | 1448 |
| 7 | Oversize Vehicle | 1 |
| | Total | 5589 |

Table 3-4 : Traffic Data at Chitora Toll Plaza at Km 226.740

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|---------------------------|---|
| 1 | Car | 1776 |
| 2 | Minibus /LCV | 418 |
| 3 | Bus | 134 |
| 4 | Truck | 1062 |
| 5 | 3-Axle Commercial vehicle | 1314 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|------------------|---|
| 6 | Multi axle | 1662 |
| 7 | Oversize Vehicle | 1 |
| | Total | 6,367 |

Table 3-5 : Traffic Data at Titarpani Toll Plaza at Km 295.000

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|---------------------------|---|
| 1 | Car | 1387 |
| 2 | Minibus /LCV | 479 |
| 3 | Bus | 108 |
| 4 | Truck | 1102 |
| 5 | 3-Axle Commercial vehicle | 1369 |
| 6 | Multi axle | 1681 |
| 7 | Oversize Vehicle | 1 |
| | Total | 6,127 |

Table 3-6 : Traffic Data at Bakori Toll Plaza at Km 357.739

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) 2022-23 |
|--------|---------------------------|---|
| 1 | Car | 1086 |
| 2 | Minibus /LCV | 444 |
| 3 | Bus | 78 |
| 4 | Truck | 1015 |
| 5 | 3-Axle Commercial vehicle | 1207 |
| 6 | Multi axle | 1501 |
| 7 | Oversize Vehicle | 2 |
| | Total | 5,333 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-7.

Table 3-7 : PCU Factors Adopted for Study

| Vehicle Type | PCUs |
|--------------|------|
| Car | 1.0 |
| Minibus | 1.5 |
| Standard Bus | 3.0 |
| LCV/LGV | 1.5 |

| Vehicle Type | PCUs |
|-------------------------------------|------|
| 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 3-8 : Traffic in PCU at Project Stretch

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|------------------------------------|--|------------|-------|-----------|
| 2022 – 2023 (Base Year) | Km 142.319 Toll Plaza at Malthone | 5589 | 15310 | 2.74 |
| | Km 226.740 Toll Plaza at Chitora | 6367 | 17417 | 2.74 |
| | Km 295.000 Toll Plaza at Titarpani | 6127 | 17412 | 2.84 |
| | Km 357.739 Toll Plaza at Bakori | 5333 | 15416 | 2.89 |

It can be observed from above that project traffic has PCU index 2.5 to 3 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at four toll plaza locations.

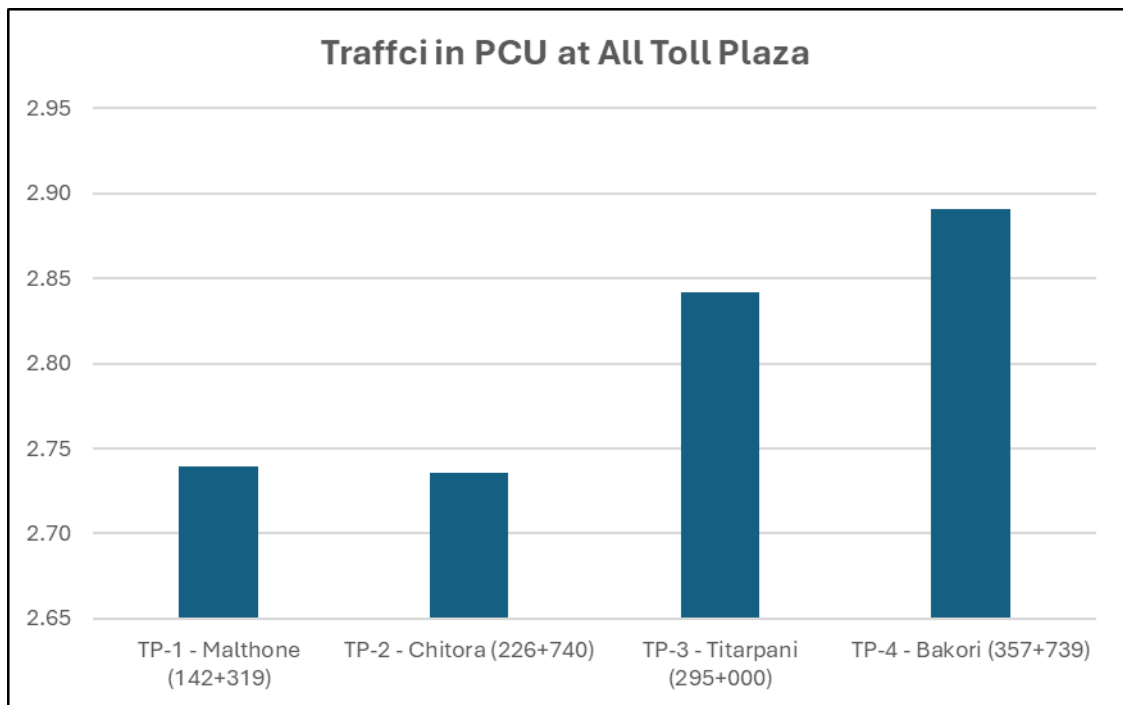


Figure 3-1 : Comparison of PCU Index

It can be observed that PCU index is consistent at all four toll plaza locations.

3.4.2 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.

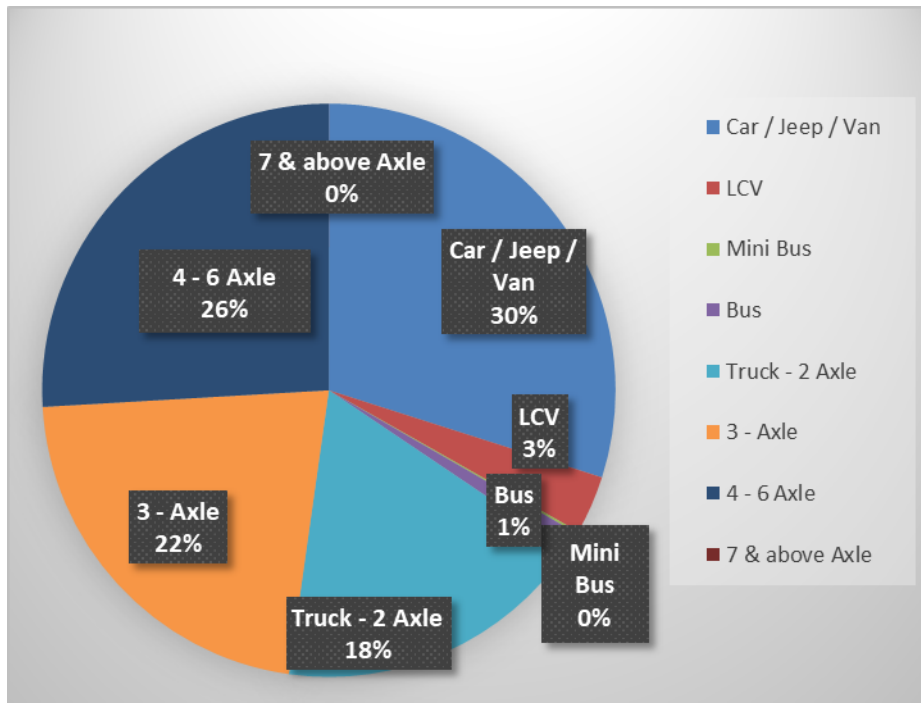


Figure 3-2: Model split of tollable vehicle @ Km 142.319

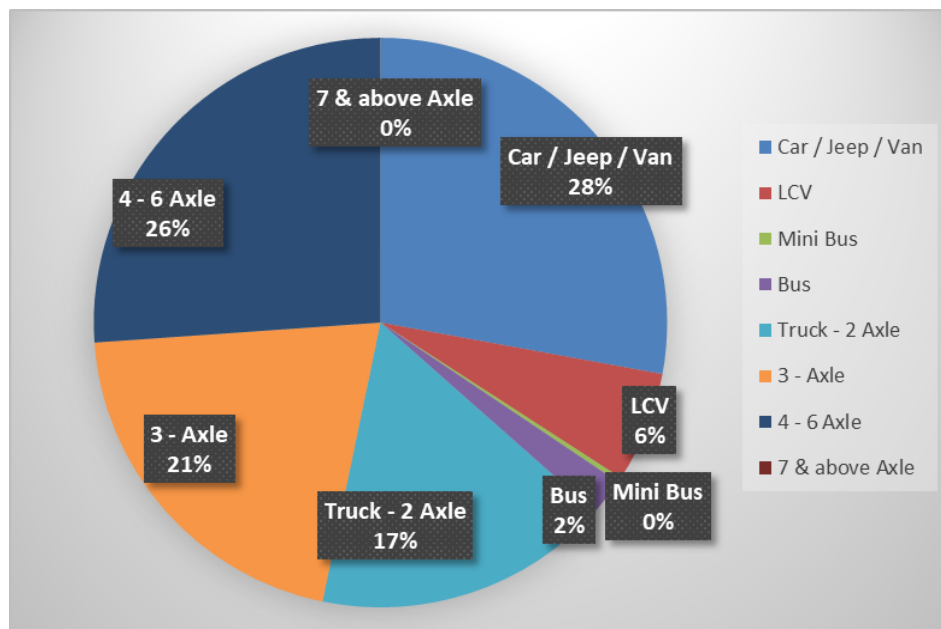


Figure 3-3: Model split of tollable vehicle @ Km 226.740

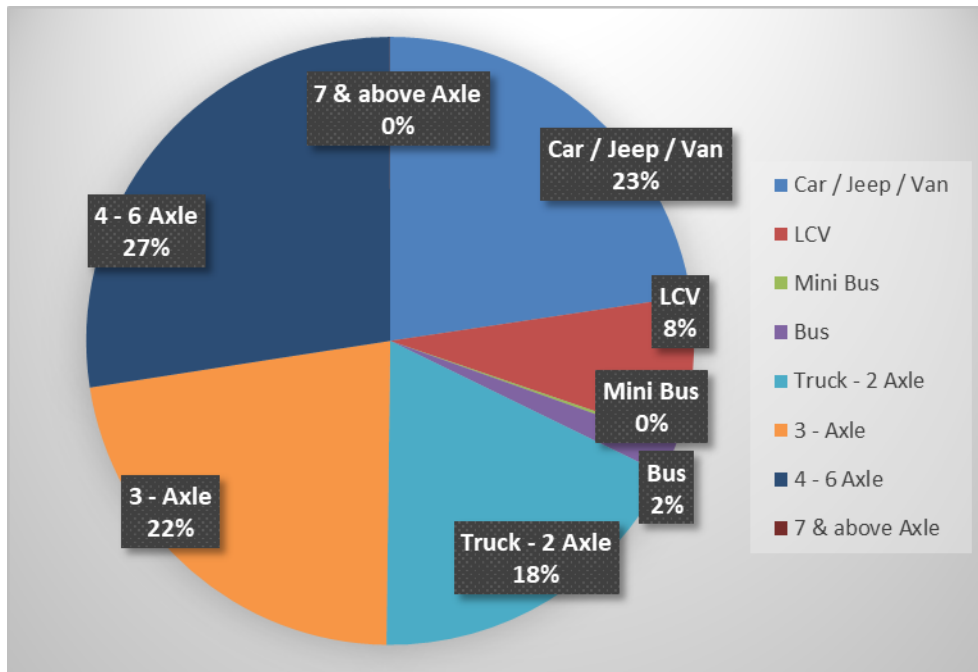


Figure 3-4: Model split of tollable vehicle @ Km 295.000

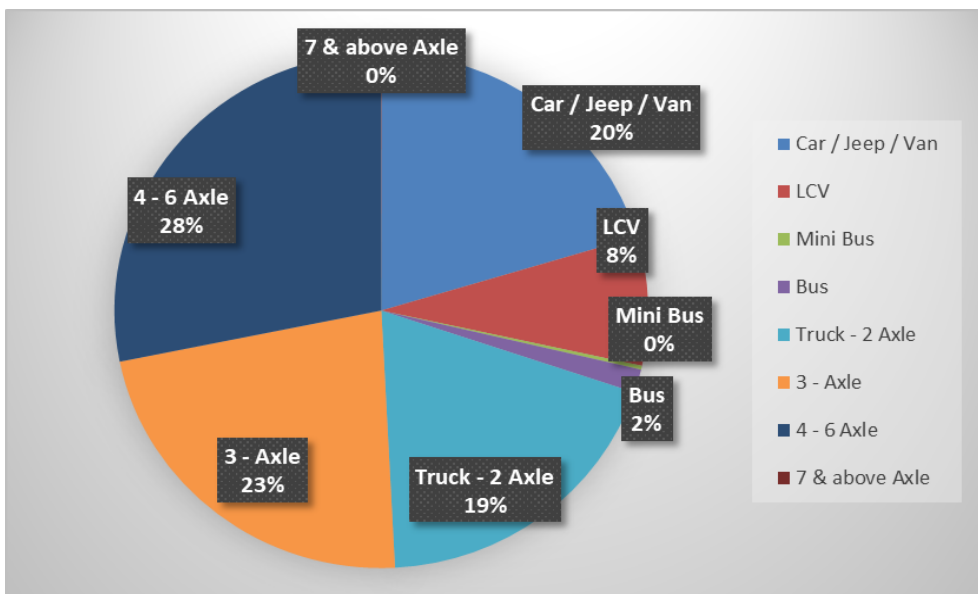


Figure 3-5: Model split of tollable vehicle @ Km 357+739

It is observed that car traffic forms about 30% of total traffic at toll plaza location KM 142.319 while multi axle commercial vehicles are about 48% of total traffic. Truck / Bus and LCV share about 19% and 3% of traffic volume respectively.

It is observed that car traffic forms about 28% of total traffic at toll plaza location KM 226.740 while multi axle commercial vehicles are about 47% of total traffic. Truck / Bus and LCV share about 19% and 6% of traffic volume respectively.

It is observed that car traffic forms about 23% of total traffic at toll plaza location KM 295.000 while multi axle commercial vehicles are about 49% of total traffic. Truck / Bus and LCV share about 20% and 8% of traffic volume respectively.

It is observed that car traffic forms about 20% of total traffic at toll plaza location KM 357.739 while multi axle commercial vehicles are about 51% of total traffic. Truck / Bus and LCV share about 21% and 8% of traffic volume respectively.

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

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

Since actual traffic data for bifurcation of journey is not available with Concessionaire, as the project has very recently been awarded, journey type bifurcation is adopted from traffic survey data provided by Concessionaire. For the purpose of calculating revenue all return journeys and monthly passes are converted to single journey type by suitable Daily Pass / Monthly Pass Factors (DPMP factor). The following table shows DP/MP factors adopted for each toll plaza on project stretch.

Table 3-9 : Journey Type factor at Malthone Toll Plaza KM 142.319

| Sr. No | Type of Vehicles | DP/MP Factors |
|--------|------------------|---------------|
| | | 2022-23 |
| 1 | Car / Jeep / Van | 0.90 |
| 2 | LCV | 0.98 |
| 3 | Minibus | 0.85 |
| 4 | Bus | 0.85 |
| 5 | Truck - 2 Axle | 0.99 |
| 6 | 3 - Axle | 1.00 |
| 7 | 4 - 6 Axle | 0.99 |
| 8 | 7 & above Axle | 0.99 |

Table 3-10 : Journey Type factor at Chitora Toll Plaza KM 226.740

| Sr. No | Type of Vehicles | DP/MP Factors |
|--------|------------------|---------------|
| | | 2022-23 |
| 1 | Car / Jeep / Van | 0.85 |
| 2 | LCV | 0.80 |
| 3 | Minibus | 0.85 |
| 4 | Bus | 0.85 |
| 5 | Truck - 2 Axle | 0.98 |
| 6 | 3 - Axle | 0.99 |
| 7 | 4 - 6 Axle | 0.99 |
| 8 | 7 & above Axle | 0.99 |

Table 3-11 : Journey Type factor at Titarpani Toll Plaza KM 295.000

| Sr. No | Type of Vehicles | DP/MP Factors |
|--------|------------------|---------------|
| | | 2022-23 |
| 1 | Car / Jeep / Van | 0.95 |
| 2 | LCV | 0.87 |
| 3 | Minibus | 0.87 |
| 4 | Bus | 0.85 |
| 5 | Truck - 2 Axle | 0.98 |
| 6 | 3 - Axle | 0.97 |
| 7 | 4 - 6 Axle | 0.99 |
| 8 | 7 & above Axle | 1.00 |

Table 3-12 : Journey Type factor at Bakori Toll Plaza KM 357.739

| Sr. No | Type of Vehicles | DP/MP Factors |
|--------|------------------|---------------|
| | | 2022-23 |
| 1 | Car / Jeep / Van | 0.95 |
| 2 | LCV | 0.87 |
| 3 | Minibus | 0.87 |
| 4 | Bus | 0.85 |
| 5 | Truck - 2 Axle | 0.98 |
| 6 | 3 - Axle | 0.97 |
| 7 | 4 - 6 Axle | 0.99 |
| 8 | 7 & above Axle | 0.99 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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. Same is discussed in subsequent chapter.

CHAPTER 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

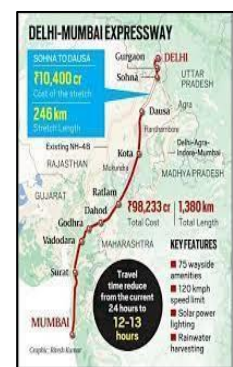
Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Regional Network

Project road is in existence for long and traffic is almost settled. However, there are a few upcoming corridors which may have interest in project road catchments. These are discussed below.

Delhi – Mumbai Expressway - The access controlled greenfield expressway connects Delhi and Mumbai (up to Jawaharlal Nehru Port Trust) and passes through states of Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. DME alignment will largely cater to traffic between North of India and Gujarat/Western Maharashtra and is not likely to affect traffic on the project road which caters to traffic on NH-44 which is north south highway. Hence it is not likely to impact project road traffic.



Surat – Chennai Expressway - The alignment will largely cater to traffic between states of Gujarat and Central Maharashtra /Andhra Pradesh/ Telangana/Karnataka/Tamilnadu and is not parallel to Project Road. Therefore, it is not likely to affect traffic on the project road.

Pune – Bangalore Expressway – Entire catchment of this proposed expressway falls south of project road. It is not likely to affect the project road traffic.

All other major highways in the region exist and traffic is settled in the region. On the local level also, there is no formidable competing route network. Hence it is not envisaged that there

will be any major impact on project road traffic in the near future due to regional or local network developments.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 of Lalitpur-Sagar- Lakhnadon from Km 99.00 to Km 415.089 section of NH-44 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-12015-Guidelines for Traffic Prediction on Rural Highways**.

In this method the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, In order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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).

The project corridor spreads across state of Madhya Pradesh & Uttar Pradesh. Toll plazas at Malthone, Chitora, Titarpani and Bakori are in the state of Madhya Pradesh. Project traffic has share of majorly states like Madhya Pradesh, Uttar Pradesh and Rajasthan. For elasticity calculations, working data from these states also has been analysed.

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

Table 5-1 : Per Capita Income Vs Car Madhya Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 38497 | 424644 | 4.59 | 5.63 | | |
| 2012 | 41142 | 493412 | 4.61 | 5.69 | 7% | |
| 2013 | 42548 | 555461 | 4.63 | 5.74 | 3% | |
| 2014 | 44027 | 637626 | 4.64 | 5.80 | 3% | |
| 2015 | 47351 | 820391 | 4.68 | 5.91 | 8% | |
| 2016 | 52782 | 869777 | 4.72 | 5.94 | 11% | |
| 2017 | 54829 | 982124 | 4.74 | 5.99 | 4% | |
| 2018 | 57401 | 1087124 | 4.76 | 6.04 | 5% | 5.9% |

Regression analysis of same is given in figure below

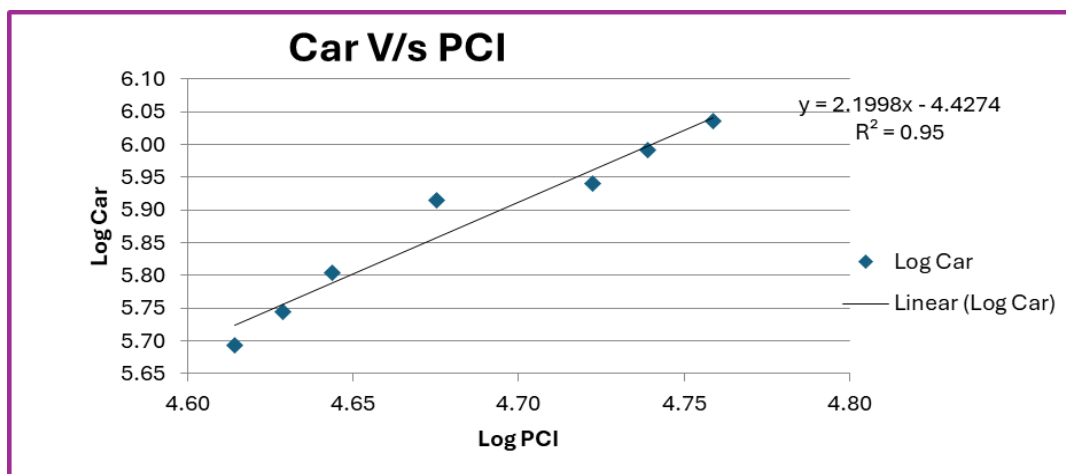


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh

Table 5-2 : Population Vs Bus Madhya Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 72627000 | 181770 | 7.86 | 5.26 | | |
| 2012 | 73863000 | 208530 | 7.87 | 5.32 | 2% | |
| 2013 | 75099000 | 233569 | 7.88 | 5.37 | 2% | |
| 2014 | 76334000 | 277898 | 7.88 | 5.44 | 2% | |
| 2015 | 77570000 | 322227 | 7.89 | 5.51 | 2% | |
| 2016 | 78806000 | 347227 | 7.90 | 5.54 | 2% | |
| 2017 | 79948000 | 382227 | 7.90 | 5.58 | 1% | |
| 2018 | 81090000 | 402227 | 7.91 | 5.60 | 1% | 1.6% |

Regression analysis of same is given in figure below

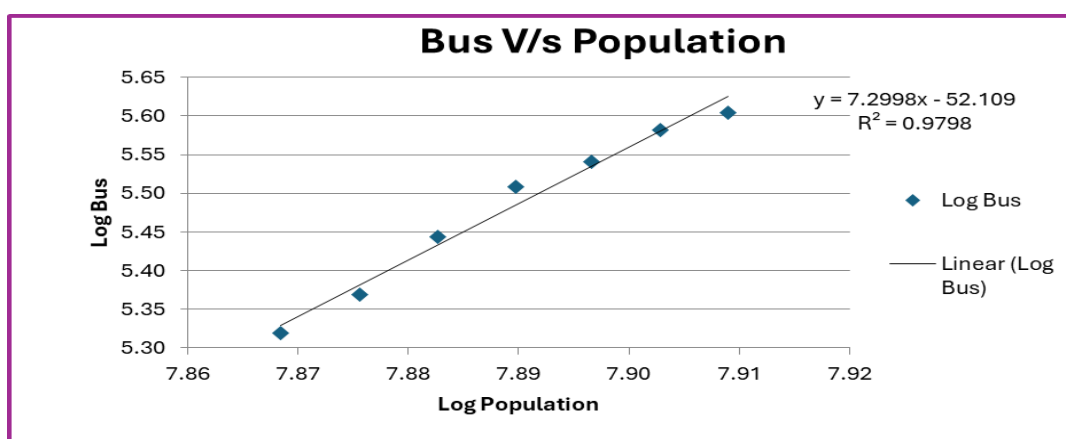


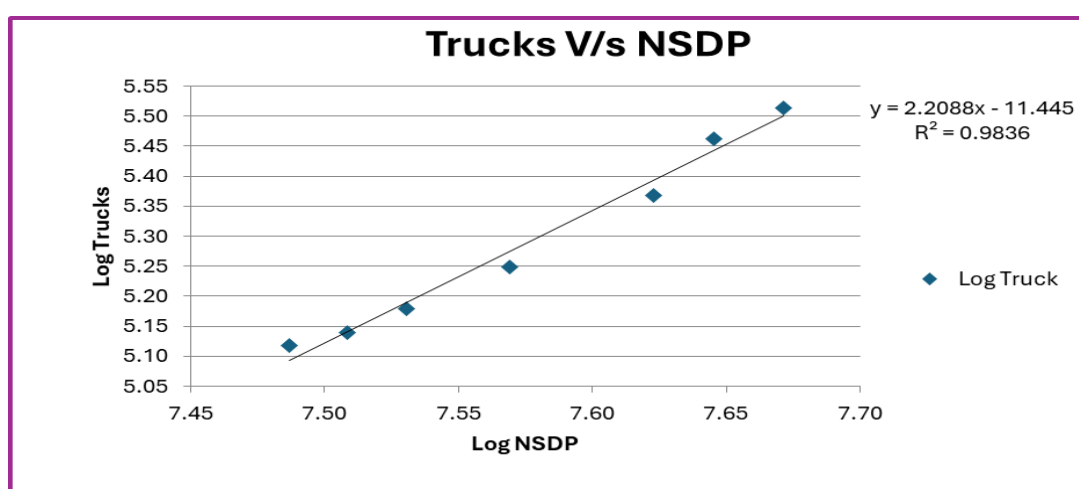
Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh

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

Table 5-3 : Trucks Traffic Vs NSDP Madhya Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 28237104 | 121916 | 7.45 | 5.09 | | |
| 2012 | 30685334 | 131098 | 7.49 | 5.12 | 9% | |
| 2013 | 32259760 | 137815 | 7.51 | 5.14 | 5% | |
| 2014 | 33924690 | 150921 | 7.53 | 5.18 | 5% | |
| 2015 | 37071567 | 177352 | 7.57 | 5.25 | 9% | |
| 2016 | 41946525 | 233553 | 7.62 | 5.37 | 13% | |
| 2017 | 44200243 | 289754 | 7.65 | 5.46 | 5% | |
| 2018 | 46928896 | 326291 | 7.67 | 5.51 | 6% | 7.6% |

Following figure depict regression analysis and extrapolation.

**Figure 5-3 : Regression and Elasticity Trucks vs. NSDP – Extrapolation Madhya Pradesh**

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-4 : Summary Regression Analysis Madhya Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-----------------------|------------------|----------------------|-------------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| MADHYA PRADESH | Car/Jeep | PCI | $y = 2.2965x - 4.8829$ | $R^2 = 0.9634$ | 2.3 | 6% | 13.57% | Good Regression |
| | Bus | Population | $y = 7.4978x - 53.6722$ | $R^2 = 0.9862$ | 7.5 | 2% | 11.90% | Good Regression |
| | Truck | NSDP | $y = 2.2088x - 11.4451$ | $R^2 = 0.9694$ | 2.2 | 8% | 16.70% | Good Regression |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Uttar Pradesh State.

Table 5-5 : Per Capita Income Vs Car Uttar Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 32002 | 1108100 | 4.51 | 6.04 | | |
| 2012 | 32908 | 1205374 | 4.52 | 6.08 | 3% | |
| 2013 | 34044 | 1423020 | 4.53 | 6.15 | 3% | |
| 2014 | 34583 | 1572217 | 4.54 | 6.20 | 2% | |
| 2015 | 36973 | 1746117 | 4.57 | 6.24 | 7% | |
| 2016 | 40847 | 2027972 | 4.61 | 6.31 | 10% | |
| 2017 | 41832 | 2195783 | 4.62 | 6.34 | 2% | |
| 2018 | 43670 | 2439845 | 4.64 | 6.39 | 4% | 4.6% |

Regression analysis of same is given in figure below

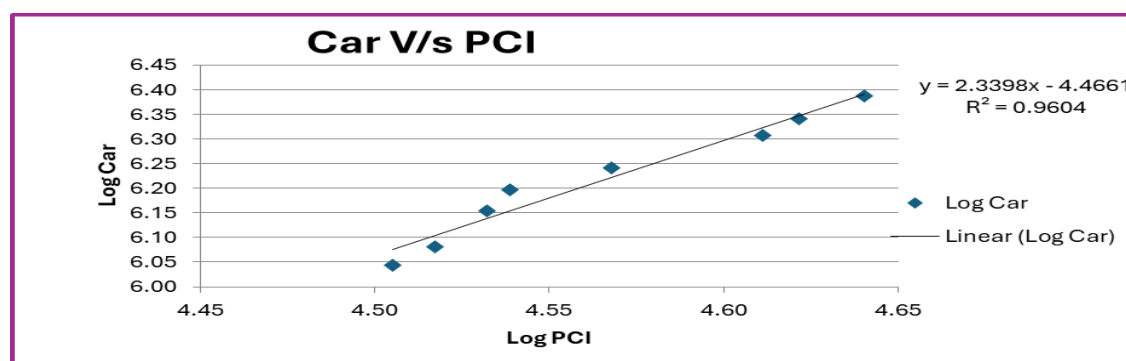
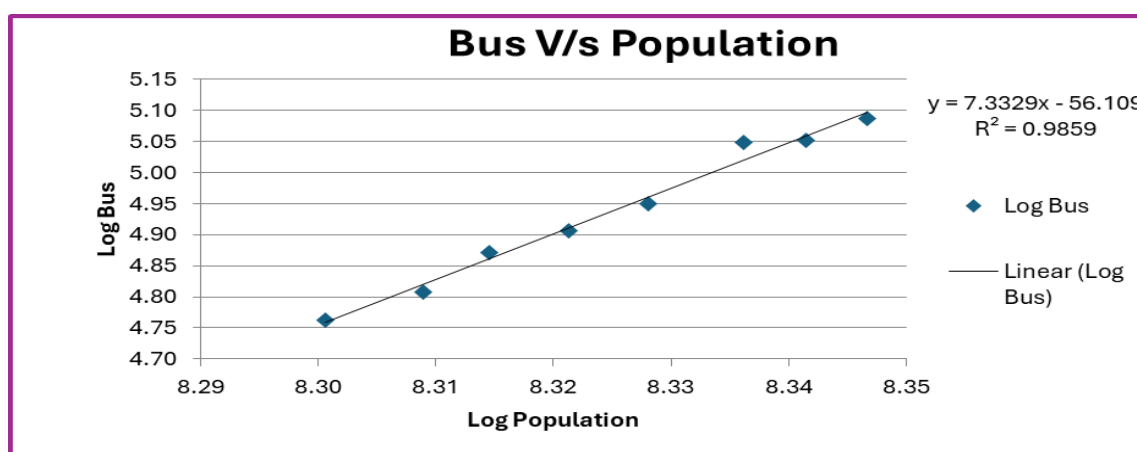


Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh**Table 5-6 : Population Vs Bus Uttar Pradesh**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 199812000 | 57901 | 8.30 | 4.76 | | |
| 2012 | 203670000 | 64147 | 8.31 | 4.81 | 2% | |
| 2013 | 206322000 | 74389 | 8.31 | 4.87 | 1% | |
| 2014 | 209577000 | 80460 | 8.32 | 4.91 | 2% | |
| 2015 | 212832000 | 89127 | 8.33 | 4.95 | 2% | |
| 2016 | 216870000 | 112020 | 8.34 | 5.05 | 2% | |
| 2017 | 219510000 | 112766 | 8.34 | 5.05 | 1% | |
| 2018 | 222150000 | 121975 | 8.35 | 5.09 | 1% | 1.5% |

Regression analysis of same is given in figure below

**Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh**

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

Table 5-7 : Trucks Traffic Vs NSDP Uttar Pradesh

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 64513155 | 162813 | 7.81 | 5.21 | | |
| 2012 | 67355218 | 186404 | 7.83 | 5.27 | 4% | |
| 2013 | 70746910 | 202761 | 7.85 | 5.31 | 5% | |
| 2014 | 72968630 | 217609 | 7.86 | 5.34 | 3% | |
| 2015 | 79204874 | 245688 | 7.90 | 5.39 | 9% | |
| 2016 | 88845325 | 265167 | 7.95 | 5.42 | 12% | |

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2017 | 92380571 | 307096 | 7.97 | 5.49 | 4% | |
| 2018 | 97915937 | 356828 | 7.99 | 5.55 | 6% | 6.2% |

Following figure depict regression analysis and extrapolation.

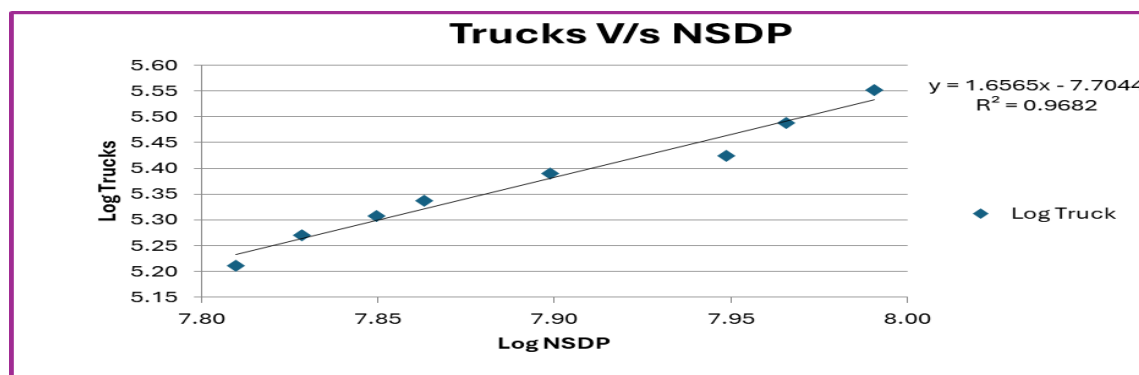


Figure 5-6 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Uttar Pradesh.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 5-8 : Summary Regression Analysis Uttar Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|---------------|------------------|----------------------|---------------------------|----------------------------|----------------------------|-----------------------|----------------------|-----------------|
| UTTAR PRADESH | Car/Jeep | PCI | y = 2.3398x - -4.4661 | R ² = 0.9604 | 2.3398 | 4.58% | 10.72% | Good Regression |
| | Bus | Population | y = 7.3329x - -56.1092 | R ² = 0.9859 | 7.3329 | 1.53% | 11.19% | Good Regression |
| | Truck | NSDP | y = 1.6565x - -7.7044 | R ² = 0.9682 | 1.6565 | 6.18% | 10.24% | Good Regression |

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-9 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2012 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2013 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2014 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2015 | 68565 | 899307 | 4.84 | 5.95 | 6% | |
| 2016 | 71324 | 988391 | 4.85 | 5.99 | 4% | |
| 2017 | 73109 | 1095526 | 4.86 | 6.04 | 3% | |
| 2018 | 75555 | 1204005 | 4.88 | 6.08 | 3% | 4.1% |

Regression analysis of same is given in figure below

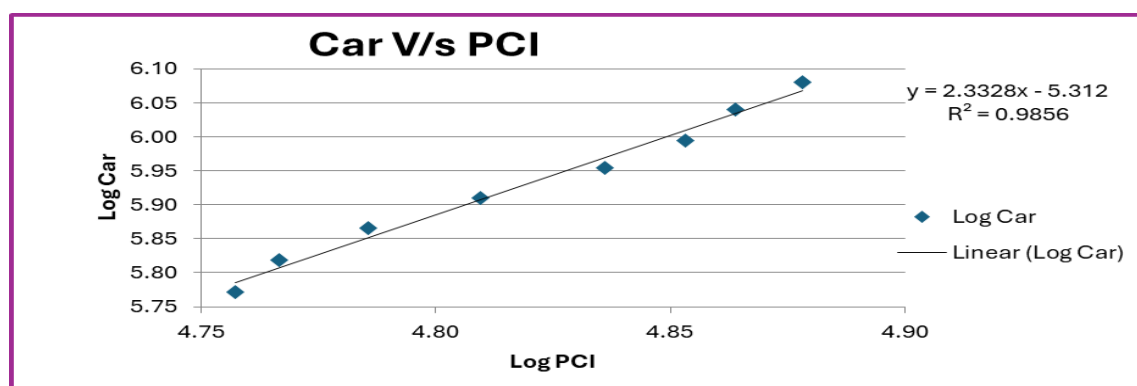


Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan

Table 5-10 : Population Vs Bus Rajasthan

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 68548000 | 83345 | 7.84 | 4.92 | | |
| 2012 | 69687000 | 88616 | 7.84 | 4.95 | 2% | |
| 2013 | 70825000 | 93892 | 7.85 | 4.97 | 2% | |
| 2014 | 71963000 | 97650 | 7.86 | 4.99 | 2% | |
| 2015 | 73102000 | 102818 | 7.86 | 5.01 | 2% | |
| 2016 | 74240000 | 108680 | 7.87 | 5.04 | 2% | |
| 2017 | 75248000 | 113964 | 7.88 | 5.06 | 1% | |
| 2018 | 76256000 | 118301 | 7.88 | 5.07 | 1% | 1.5% |

Regression analysis of same is given in figure below

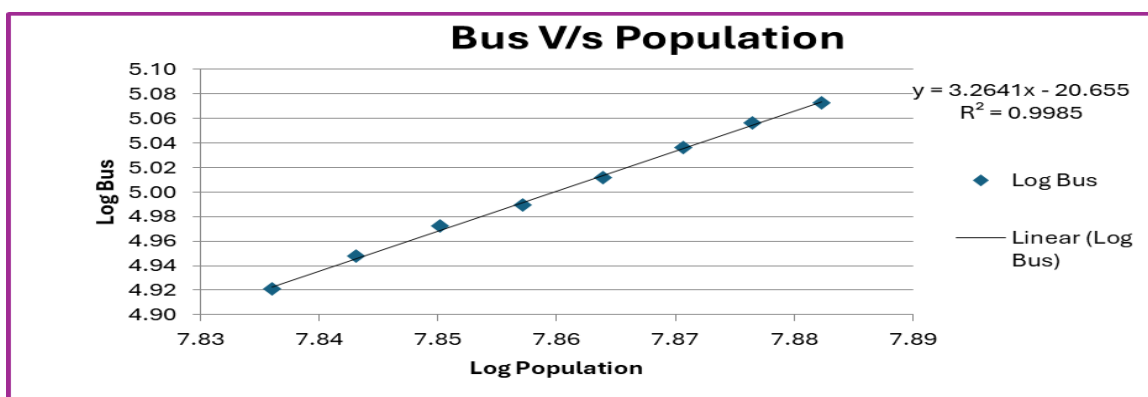


Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

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

Table 5-11 : Trucks Traffic Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 39533093 | 362028 | 7.60 | 5.56 | | |
| 2012 | 40980249 | 401983 | 7.61 | 5.60 | 4% | |
| 2013 | 43429222 | 434379 | 7.64 | 5.64 | 6% | |
| 2014 | 46540773 | 472365 | 7.67 | 5.67 | 7% | |
| 2015 | 50192151 | 517604 | 7.70 | 5.71 | 8% | |
| 2016 | 52965038 | 561158 | 7.72 | 5.75 | 6% | |
| 2017 | 55442912 | 613055 | 7.74 | 5.79 | 5% | |
| 2018 | 58059438 | 665926 | 7.76 | 5.82 | 5% | 5.7% |

Following figure depict regression analysis and extrapolation.

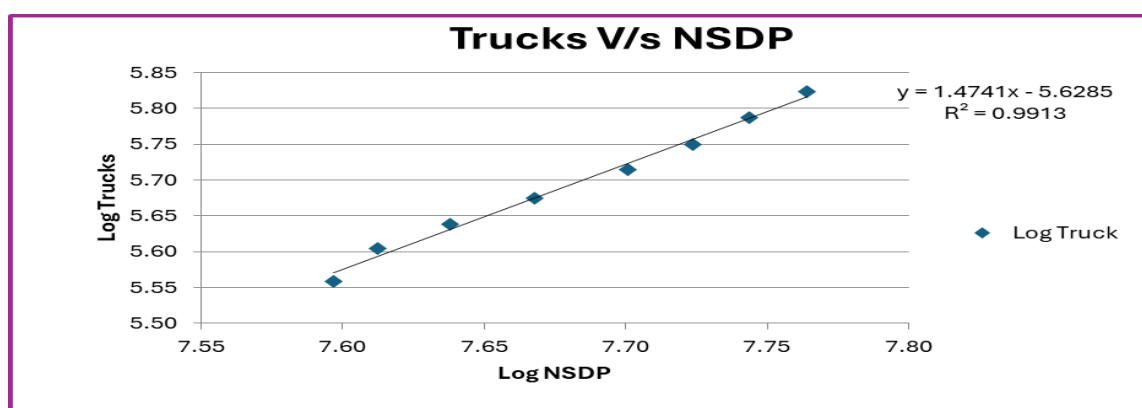


Figure 5-9 : Regression and Elasticity NSDP vs. Trucks – Extrapolation Rajasthan

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 5-12 : Summary Regression Analysis Rajasthan

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|-------------------------|----------------------------|-----------------------|----------------------|-----------------|
| RAJASTHAN | Car/Jeep | PCI | $y = 2.3328x - 5.312$ | R ² = 0.9856 | 2.3328 | 4.07% | 9.49% | Good Regression |
| | Bus | Population | $y = 3.2641x - 20.6548$ | R ² = 0.9985 | 3.2641 | 1.53% | 5.01% | Good Regression |
| | Truck | NSDP | $y = 1.4741x - 5.6285$ | R ² = 0.9913 | 1.4741 | 5.65% | 8.33% | 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 proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

5.4 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

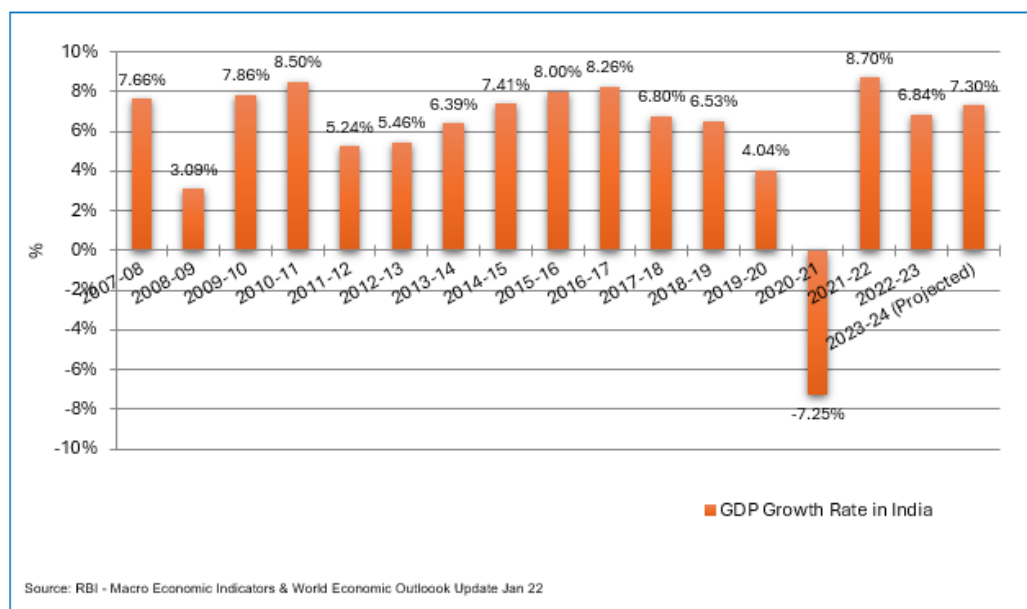


Figure 5-10 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. Leading banking and financial institutions have estimated that India would keep on registering good growth in coming years and the growth in year 2023-24 is expected to be around 7.3%.

5.5 Developments along and around the Project Corridor & State

MADHYA PRADESH: Madhya Pradesh state, which is located in central India is bound on the north by Uttar Pradesh, on the east by Chhattisgarh, on the south by Maharashtra, and on the west by Gujarat and Rajasthan. It is the second largest Indian state and one of the fastest growing states in the country. At current prices, the Gross State Domestic Product (GSDP) of Madhya Pradesh is estimated at Rs.1,151,049 crore trillion (US\$ 150.74 billion) in 2022-23, registering an annual growth of 10% over FY21. Between 2015-16 and 2021-22, The GSDP increased at a CAGR (in Rs.) of 13.09% from 2015-16 to 2021-22. Net State Domestic Product (NSDP) of Madhya Pradesh was about Rs. 8.27 trillion (US\$ 113.94 billion) in 2020-21. Between 2015-16 and 2020-21, state's NSDP grew at a CAGR of around 11.22%

UTTAR PRADESH: The state has an area of 240,928 sq kms and is the most populous state in India, with population of 199.8 million as per 2011 census with an average population density of 828 persons per sq. km. The economy of Uttar Pradesh is the third largest of all the states in India. Nominal GDP of the state for the year 2022-23 is Rs. 21.74 trillion.

It is reported that the economy of Uttar Pradesh is growing at a faster rate than the national economy at about 9%. In terms of traffic and transportation as well Uttar Pradesh is one of the leader states in India now.

- Air Connectivity: Major national & international airports connecting the rest of India, Middle East & Southeast Asian countries; Only state to have 05 International Airports (03 existing & 02 upcoming at Jewar (G. Noida & Ayodhya)
- Railway Network: Largest railway network in the country spanning over 8,949 km; 05 Railway Zones
- Inland Waterway: India's 1st Inland Waterway is operational in UP (1100 km Haldia - Varanasi tract)
- Expressways: Uttar Pradesh boasts state of art expressways ensuring seamless connectivity; 13 Expressways (existing & upcoming)
- Road Network: Largest Road Network in India; 4 Lakh Km Total Road Length 11,737 Km Total National Highway

Logistics hubs emerging across UP: MMLH Dadri, MMTH Boraki, MMT Varanasi etc.

From the above it can be expected that the project corridor would serve as one of the important transportation links in the area and would contribute to the growth of the region.

5.6 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. Traffic growth has been suitably stepped down for future years.

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 for corridor in both states.

5.6.1 Recommended Growth Rates of Traffic for Madhya Pradesh Part of Stretch

Table 5-13 : Recommended Growth Rates Optimistic

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 6.64% | 5.57% | 5.25% | 5.03% | 4.41% |
| LCV | 4.92% | 4.05% | 2.38% | 2.01% | 2.86% |
| Minibus | 4.18% | 3.53% | 2.95% | 2.68% | 2.43% |
| Bus | 4.18% | 3.53% | 2.95% | 2.68% | 2.43% |
| 2- Axle | 4.92% | 4.64% | 3.27% | 2.75% | 2.47% |
| 3 - Axle | 4.92% | 4.64% | 3.27% | 2.75% | 2.47% |
| 4 to 6 Axle | 4.53% | 4.34% | 3.09% | 2.60% | 2.34% |
| 7 and Above Axle | 4.53% | 4.34% | 3.09% | 2.60% | 2.34% |

Table 5-14 : Recommended Growth Rates Pessimistic

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 6.14% | 5.07% | 4.75% | 4.53% | 3.91% |
| LCV | 4.42% | 3.55% | 1.88% | 1.51% | 2.36% |
| Minibus | 3.68% | 3.03% | 2.45% | 2.18% | 1.93% |
| Bus | 3.68% | 3.03% | 2.45% | 2.18% | 1.93% |
| 2- Axle | 4.42% | 4.14% | 2.77% | 2.25% | 1.97% |
| 3 - Axle | 4.42% | 4.14% | 2.77% | 2.25% | 1.97% |
| 4 to 6 Axle | 4.03% | 3.84% | 2.59% | 2.10% | 1.84% |
| 7 and Above Axle | 4.03% | 3.84% | 2.59% | 2.10% | 1.84% |

Table 5-15 : Recommended Growth Rates Most Likely

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 6.39% | 5.32% | 5.00% | 4.78% | 4.16% |
| LCV | 4.67% | 3.80% | 2.13% | 1.76% | 2.61% |
| Minibus | 3.93% | 3.28% | 2.70% | 2.43% | 2.18% |
| Bus | 3.93% | 3.28% | 2.70% | 2.43% | 2.18% |
| 2- Axle | 4.67% | 4.39% | 3.02% | 2.50% | 2.22% |
| 3 - Axle | 4.67% | 4.39% | 3.02% | 2.50% | 2.22% |
| 4 to 6 Axle | 4.28% | 4.09% | 2.84% | 2.35% | 2.09% |
| 7 and Above Axle | 4.28% | 4.09% | 2.84% | 2.35% | 2.09% |

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.319 KM
(Optimistic Growth Scenario)

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1783 | 193 | 7 | 64 | 1044 | 1281 | 1514 | 0 | 5886 | 16063 |
| 2024-25 | 1901 | 202 | 7 | 67 | 1095 | 1344 | 1583 | 0 | 6199 | 16856 |
| 2025-26 | 2027 | 212 | 7 | 70 | 1149 | 1410 | 1655 | 0 | 6530 | 17690 |
| 2026-27 | 2162 | 222 | 7 | 73 | 1205 | 1479 | 1730 | 0 | 6878 | 18562 |
| 2027-28 | 2306 | 233 | 7 | 76 | 1264 | 1552 | 1808 | 0 | 7246 | 19478 |
| 2028-29 | 2459 | 244 | 7 | 79 | 1326 | 1628 | 1890 | 0 | 7633 | 20440 |
| 2029-30 | 2596 | 254 | 7 | 82 | 1387 | 1703 | 1972 | 0 | 8001 | 21378 |
| 2030-31 | 2741 | 264 | 7 | 85 | 1451 | 1782 | 2058 | 0 | 8388 | 22363 |
| 2031-32 | 2894 | 275 | 7 | 88 | 1518 | 1865 | 2147 | 0 | 8794 | 23392 |
| 2032-33 | 3055 | 286 | 7 | 91 | 1588 | 1951 | 2240 | 0 | 9218 | 24465 |
| 2033-34 | 3225 | 298 | 7 | 94 | 1662 | 2041 | 2337 | 0 | 9664 | 25590 |
| 2034-35 | 3394 | 305 | 7 | 97 | 1716 | 2108 | 2409 | 0 | 10036 | 26466 |
| 2035-36 | 3572 | 312 | 7 | 100 | 1772 | 2177 | 2483 | 0 | 10423 | 27371 |
| 2036-37 | 3760 | 319 | 7 | 103 | 1830 | 2248 | 2560 | 0 | 10827 | 28312 |
| 2037-38 | 3957 | 327 | 7 | 106 | 1890 | 2321 | 2639 | 0 | 11247 | 29285 |
| 2038-39 | 4165 | 335 | 7 | 109 | 1952 | 2397 | 2721 | 0 | 11686 | 30297 |
| 2039-40 | 4374 | 342 | 7 | 112 | 2006 | 2463 | 2792 | 0 | 12096 | 31205 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2040-41 | 4594 | 349 | 7 | 115 | 2061 | 2531 | 2865 | 0 | 12522 | 32142 |
| 2041-42 | 4825 | 356 | 7 | 118 | 2118 | 2601 | 2940 | 0 | 12965 | 33111 |
| 2042-43 | 5068 | 363 | 7 | 121 | 2176 | 2672 | 3016 | 0 | 13423 | 34102 |
| 2043-44 | 5323 | 370 | 7 | 124 | 2236 | 2745 | 3094 | 0 | 13899 | 35127 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 226.740 KM
(Optimistic Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1894 | 420 | 19 | 140 | 1114 | 1379 | 1737 | 0 | 6703 | 18268 |
| 2024-25 | 2020 | 441 | 20 | 146 | 1169 | 1447 | 1816 | 0 | 7059 | 19170 |
| 2025-26 | 2154 | 463 | 21 | 152 | 1226 | 1518 | 1898 | 0 | 7432 | 20109 |
| 2026-27 | 2297 | 486 | 22 | 158 | 1286 | 1593 | 1984 | 0 | 7826 | 21098 |
| 2027-28 | 2450 | 510 | 23 | 165 | 1349 | 1671 | 2074 | 0 | 8242 | 22138 |
| 2028-29 | 2613 | 535 | 24 | 172 | 1415 | 1753 | 2168 | 0 | 8680 | 23228 |
| 2029-30 | 2758 | 557 | 25 | 178 | 1481 | 1834 | 2262 | 0 | 9095 | 24289 |
| 2030-31 | 2912 | 580 | 26 | 184 | 1550 | 1919 | 2360 | 0 | 9531 | 25400 |
| 2031-32 | 3074 | 603 | 27 | 190 | 1622 | 2008 | 2462 | 0 | 9986 | 26558 |
| 2032-33 | 3245 | 627 | 28 | 197 | 1697 | 2101 | 2569 | 0 | 10464 | 27773 |
| 2033-34 | 3426 | 652 | 29 | 204 | 1776 | 2198 | 2681 | 0 | 10966 | 29046 |
| 2034-35 | 3606 | 668 | 30 | 210 | 1834 | 2270 | 2764 | 0 | 11382 | 30033 |
| 2035-36 | 3795 | 684 | 31 | 216 | 1894 | 2344 | 2849 | 0 | 11813 | 31050 |
| 2036-37 | 3994 | 700 | 32 | 222 | 1956 | 2421 | 2937 | 0 | 12262 | 32106 |
| 2037-38 | 4204 | 717 | 33 | 229 | 2020 | 2500 | 3028 | 0 | 12731 | 33202 |
| 2038-39 | 4425 | 734 | 34 | 236 | 2086 | 2582 | 3122 | 0 | 13219 | 34338 |
| 2039-40 | 4647 | 749 | 35 | 242 | 2143 | 2653 | 3203 | 0 | 13672 | 35351 |
| 2040-41 | 4881 | 764 | 36 | 248 | 2202 | 2726 | 3286 | 0 | 14143 | 36396 |
| 2041-42 | 5126 | 779 | 37 | 255 | 2263 | 2801 | 3371 | 0 | 14632 | 37477 |
| 2042-43 | 5384 | 795 | 38 | 262 | 2325 | 2878 | 3459 | 0 | 15141 | 38594 |
| 2043-44 | 5655 | 811 | 39 | 269 | 2389 | 2957 | 3549 | 0 | 15669 | 39746 |

Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 295.000 KM
(Optimistic Growth Scenario)

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1479 | 490 | 13 | 113 | 1156 | 1436 | 1757 | 0 | 6444 | 18255 |
| 2024-25 | 1577 | 514 | 14 | 118 | 1213 | 1507 | 1837 | 0 | 6780 | 19150 |
| 2025-26 | 1682 | 539 | 15 | 123 | 1273 | 1581 | 1920 | 0 | 7133 | 20084 |
| 2026-27 | 1794 | 565 | 16 | 128 | 1336 | 1659 | 2007 | 0 | 7505 | 21066 |
| 2027-28 | 1913 | 593 | 17 | 133 | 1402 | 1741 | 2098 | 0 | 7897 | 22097 |
| 2028-29 | 2040 | 622 | 18 | 139 | 1471 | 1827 | 2193 | 0 | 8310 | 23180 |
| 2029-30 | 2154 | 647 | 19 | 144 | 1539 | 1912 | 2288 | 0 | 8703 | 24234 |
| 2030-31 | 2274 | 673 | 20 | 149 | 1610 | 2001 | 2387 | 0 | 9114 | 25335 |
| 2031-32 | 2401 | 700 | 21 | 154 | 1685 | 2094 | 2491 | 0 | 9546 | 26491 |
| 2032-33 | 2535 | 728 | 22 | 159 | 1763 | 2191 | 2599 | 0 | 9997 | 27695 |
| 2033-34 | 2676 | 757 | 23 | 165 | 1845 | 2293 | 2712 | 0 | 10471 | 28959 |
| 2034-35 | 2816 | 775 | 24 | 170 | 1905 | 2368 | 2796 | 0 | 10854 | 29926 |
| 2035-36 | 2964 | 793 | 25 | 175 | 1967 | 2445 | 2882 | 0 | 11251 | 30921 |
| 2036-37 | 3120 | 812 | 26 | 180 | 2031 | 2525 | 2971 | 0 | 11665 | 31955 |
| 2037-38 | 3284 | 831 | 27 | 185 | 2097 | 2607 | 3063 | 0 | 12094 | 33022 |
| 2038-39 | 3456 | 851 | 28 | 190 | 2165 | 2692 | 3158 | 0 | 12540 | 34127 |
| 2039-40 | 3630 | 868 | 29 | 195 | 2224 | 2766 | 3240 | 0 | 12952 | 35111 |
| 2040-41 | 3812 | 885 | 30 | 200 | 2285 | 2842 | 3324 | 0 | 13378 | 36124 |
| 2041-42 | 4004 | 903 | 31 | 205 | 2348 | 2920 | 3410 | 0 | 13821 | 37169 |
| 2042-43 | 4205 | 921 | 32 | 210 | 2413 | 3000 | 3499 | 0 | 14280 | 38249 |
| 2043-44 | 4416 | 940 | 33 | 216 | 2479 | 3082 | 3590 | 0 | 14756 | 39362 |

Table 6-4 : Total Tollable Traffic @ Toll Plaza 4- Chainage 357.739 KM
(Optimistic Growth Scenario)

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1158 | 452 | 14 | 81 | 1065 | 1266 | 1569 | 0 | 5605 | 16154 |
| 2024-25 | 1235 | 474 | 15 | 84 | 1117 | 1328 | 1640 | 0 | 5893 | 16936 |
| 2025-26 | 1317 | 497 | 16 | 88 | 1172 | 1393 | 1714 | 0 | 6197 | 17759 |
| 2026-27 | 1404 | 521 | 17 | 92 | 1230 | 1461 | 1792 | 0 | 6517 | 18624 |
| 2027-28 | 1497 | 547 | 18 | 96 | 1290 | 1533 | 1873 | 0 | 6854 | 19530 |
| 2028-29 | 1596 | 574 | 19 | 100 | 1353 | 1608 | 1958 | 0 | 7208 | 20480 |
| 2029-30 | 1685 | 597 | 20 | 104 | 1416 | 1683 | 2043 | 0 | 7548 | 21413 |
| 2030-31 | 1779 | 621 | 21 | 108 | 1482 | 1761 | 2132 | 0 | 7904 | 22389 |
| 2031-32 | 1878 | 646 | 22 | 112 | 1551 | 1843 | 2225 | 0 | 8277 | 23411 |
| 2032-33 | 1983 | 672 | 23 | 116 | 1623 | 1928 | 2322 | 0 | 8667 | 24476 |
| 2033-34 | 2093 | 699 | 24 | 120 | 1698 | 2017 | 2423 | 0 | 9074 | 25586 |
| 2034-35 | 2203 | 716 | 25 | 124 | 1753 | 2083 | 2498 | 0 | 9402 | 26436 |
| 2035-36 | 2319 | 733 | 26 | 128 | 1810 | 2151 | 2575 | 0 | 9742 | 27312 |
| 2036-37 | 2441 | 750 | 27 | 132 | 1869 | 2221 | 2655 | 0 | 10095 | 28220 |
| 2037-38 | 2569 | 768 | 28 | 136 | 1930 | 2294 | 2737 | 0 | 10462 | 29160 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2038-39 | 2704 | 786 | 29 | 140 | 1993 | 2369 | 2822 | 0 | 10843 | 30132 |
| 2039-40 | 2840 | 802 | 30 | 144 | 2048 | 2434 | 2895 | 0 | 11193 | 30994 |
| 2040-41 | 2983 | 818 | 31 | 148 | 2104 | 2501 | 2970 | 0 | 11555 | 31881 |
| 2041-42 | 3133 | 834 | 32 | 152 | 2162 | 2570 | 3047 | 0 | 11930 | 32796 |
| 2042-43 | 3291 | 851 | 33 | 156 | 2221 | 2641 | 3126 | 0 | 12319 | 33738 |
| 2043-44 | 3456 | 868 | 34 | 160 | 2282 | 2714 | 3207 | 0 | 12721 | 34709 |

**Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.319 KM
(Pessimistic Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|---------------|--------------------------|
| 2023-24 | 1775 | 192 | 7 | 63 | 1039 | 1275 | 1506 | 0 | 5857 | 15982 |
| 2024-25 | 1884 | 200 | 7 | 65 | 1085 | 1331 | 1567 | 0 | 6139 | 16689 |
| 2025-26 | 2000 | 209 | 7 | 67 | 1133 | 1390 | 1630 | 0 | 6436 | 17429 |
| 2026-27 | 2123 | 218 | 7 | 69 | 1183 | 1451 | 1696 | 0 | 6747 | 18202 |
| 2027-28 | 2253 | 228 | 7 | 72 | 1235 | 1515 | 1764 | 0 | 7074 | 19010 |
| 2028-29 | 2391 | 238 | 7 | 75 | 1290 | 1582 | 1835 | 0 | 7418 | 19857 |
| 2029-30 | 2512 | 246 | 7 | 77 | 1343 | 1647 | 1906 | 0 | 7738 | 20670 |
| 2030-31 | 2639 | 255 | 7 | 79 | 1399 | 1715 | 1979 | 0 | 8073 | 21517 |
| 2031-32 | 2773 | 264 | 7 | 81 | 1457 | 1786 | 2055 | 0 | 8423 | 22399 |
| 2032-33 | 2914 | 273 | 7 | 83 | 1517 | 1860 | 2134 | 0 | 8788 | 23317 |
| 2033-34 | 3062 | 283 | 7 | 86 | 1580 | 1937 | 2216 | 0 | 9171 | 24278 |
| 2034-35 | 3207 | 288 | 7 | 88 | 1624 | 1991 | 2273 | 0 | 9478 | 24987 |
| 2035-36 | 3359 | 293 | 7 | 90 | 1669 | 2046 | 2332 | 0 | 9796 | 25718 |
| 2036-37 | 3519 | 299 | 7 | 92 | 1715 | 2103 | 2392 | 0 | 10127 | 26472 |
| 2037-38 | 3686 | 305 | 7 | 94 | 1762 | 2161 | 2454 | 0 | 10469 | 27248 |
| 2038-39 | 3861 | 311 | 7 | 96 | 1811 | 2221 | 2518 | 0 | 10825 | 28053 |
| 2039-40 | 4036 | 316 | 7 | 98 | 1852 | 2271 | 2571 | 0 | 11151 | 28753 |
| 2040-41 | 4219 | 321 | 7 | 100 | 1894 | 2322 | 2625 | 0 | 11488 | 29472 |
| 2041-42 | 4410 | 326 | 7 | 102 | 1937 | 2374 | 2680 | 0 | 11836 | 30209 |
| 2042-43 | 4610 | 331 | 7 | 104 | 1981 | 2427 | 2736 | 0 | 12196 | 30965 |
| 2043-44 | 4819 | 336 | 7 | 106 | 2026 | 2482 | 2793 | 0 | 12569 | 31744 |

**Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 226.740 KM
(Pessimistic Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1885 | 418 | 19 | 139 | 1109 | 1372 | 1729 | 0 | 6671 | 18181 |
| 2024-25 | 2001 | 436 | 20 | 144 | 1158 | 1433 | 1799 | 0 | 6991 | 18986 |
| 2025-26 | 2124 | 455 | 21 | 149 | 1209 | 1496 | 1871 | 0 | 7325 | 19820 |
| 2026-27 | 2254 | 475 | 22 | 154 | 1262 | 1562 | 1946 | 0 | 7675 | 20691 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2027-28 | 2392 | 496 | 23 | 160 | 1318 | 1631 | 2024 | 0 | 8044 | 21606 |
| 2028-29 | 2539 | 518 | 24 | 166 | 1376 | 1703 | 2105 | 0 | 8431 | 22560 |
| 2029-30 | 2668 | 536 | 25 | 171 | 1433 | 1773 | 2186 | 0 | 8792 | 23478 |
| 2030-31 | 2803 | 555 | 26 | 176 | 1492 | 1846 | 2270 | 0 | 9168 | 24432 |
| 2031-32 | 2945 | 575 | 27 | 181 | 1554 | 1922 | 2357 | 0 | 9561 | 25426 |
| 2032-33 | 3094 | 595 | 28 | 186 | 1618 | 2001 | 2448 | 0 | 9970 | 26460 |
| 2033-34 | 3251 | 616 | 29 | 192 | 1685 | 2084 | 2542 | 0 | 10399 | 27541 |
| 2034-35 | 3405 | 628 | 30 | 197 | 1732 | 2142 | 2608 | 0 | 10742 | 28341 |
| 2035-36 | 3567 | 640 | 31 | 202 | 1780 | 2201 | 2676 | 0 | 11097 | 29165 |
| 2036-37 | 3736 | 652 | 32 | 207 | 1829 | 2262 | 2745 | 0 | 11463 | 30009 |
| 2037-38 | 3913 | 664 | 33 | 212 | 1880 | 2325 | 2816 | 0 | 11843 | 30882 |
| 2038-39 | 4099 | 676 | 34 | 217 | 1932 | 2389 | 2889 | 0 | 12236 | 31779 |
| 2039-40 | 4285 | 686 | 35 | 222 | 1975 | 2443 | 2950 | 0 | 12596 | 32562 |
| 2040-41 | 4479 | 696 | 36 | 227 | 2019 | 2498 | 3012 | 0 | 12967 | 33363 |
| 2041-42 | 4682 | 707 | 37 | 232 | 2064 | 2554 | 3075 | 0 | 13351 | 34186 |
| 2042-43 | 4894 | 718 | 38 | 237 | 2110 | 2611 | 3140 | 0 | 13748 | 35032 |
| 2043-44 | 5116 | 729 | 39 | 242 | 2157 | 2670 | 3206 | 0 | 14159 | 35902 |

**Table 6-7 : Total Tollable Traffic @ Toll Plaza 3- Chainage 295.000 KM
(Pessimistic Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1472 | 488 | 12 | 112 | 1151 | 1429 | 1749 | 0 | 6413 | 18169 |
| 2024-25 | 1562 | 510 | 12 | 116 | 1202 | 1492 | 1819 | 0 | 6713 | 18961 |
| 2025-26 | 1658 | 533 | 12 | 120 | 1255 | 1558 | 1892 | 0 | 7028 | 19789 |
| 2026-27 | 1760 | 557 | 12 | 124 | 1310 | 1627 | 1968 | 0 | 7358 | 20653 |
| 2027-28 | 1868 | 582 | 12 | 129 | 1368 | 1699 | 2047 | 0 | 7705 | 21559 |
| 2028-29 | 1983 | 608 | 12 | 134 | 1428 | 1774 | 2129 | 0 | 8068 | 22502 |
| 2029-30 | 2083 | 630 | 12 | 138 | 1487 | 1847 | 2211 | 0 | 8408 | 23412 |
| 2030-31 | 2189 | 652 | 12 | 142 | 1548 | 1923 | 2296 | 0 | 8762 | 24356 |
| 2031-32 | 2300 | 675 | 12 | 146 | 1612 | 2003 | 2384 | 0 | 9132 | 25342 |
| 2032-33 | 2417 | 699 | 12 | 150 | 1679 | 2086 | 2476 | 0 | 9519 | 26371 |
| 2033-34 | 2539 | 724 | 12 | 155 | 1748 | 2172 | 2571 | 0 | 9921 | 27438 |
| 2034-35 | 2660 | 738 | 12 | 159 | 1796 | 2232 | 2638 | 0 | 10235 | 28217 |
| 2035-36 | 2786 | 752 | 12 | 163 | 1846 | 2294 | 2706 | 0 | 10559 | 29018 |
| 2036-37 | 2918 | 766 | 12 | 167 | 1897 | 2357 | 2776 | 0 | 10893 | 29840 |
| 2037-38 | 3057 | 780 | 12 | 171 | 1949 | 2422 | 2848 | 0 | 11239 | 30687 |
| 2038-39 | 3202 | 795 | 12 | 175 | 2003 | 2489 | 2922 | 0 | 11598 | 31563 |
| 2039-40 | 3347 | 807 | 12 | 179 | 2048 | 2545 | 2983 | 0 | 11921 | 32315 |
| 2040-41 | 3499 | 819 | 12 | 183 | 2094 | 2602 | 3046 | 0 | 12255 | 33090 |
| 2041-42 | 3657 | 831 | 12 | 187 | 2141 | 2660 | 3110 | 0 | 12598 | 33881 |
| 2042-43 | 3823 | 844 | 12 | 191 | 2189 | 2720 | 3175 | 0 | 12954 | 34695 |
| 2043-44 | 3996 | 857 | 12 | 195 | 2238 | 2781 | 3242 | 0 | 13321 | 35531 |

**Table 6-8 : Total Tollable Traffic @ Toll Plaza 4- Chainage 357.739 KM
(Pessimistic Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1153 | 450 | 13 | 81 | 1060 | 1260 | 1561 | 0 | 5578 | 16075 |
| 2024-25 | 1224 | 470 | 13 | 84 | 1107 | 1316 | 1624 | 0 | 5838 | 16778 |
| 2025-26 | 1299 | 491 | 13 | 87 | 1156 | 1374 | 1689 | 0 | 6109 | 17507 |
| 2026-27 | 1379 | 513 | 13 | 90 | 1207 | 1435 | 1757 | 0 | 6394 | 18271 |
| 2027-28 | 1464 | 536 | 13 | 93 | 1260 | 1498 | 1828 | 0 | 6692 | 19067 |
| 2028-29 | 1554 | 560 | 13 | 96 | 1316 | 1564 | 1902 | 0 | 7005 | 19901 |
| 2029-30 | 1633 | 580 | 13 | 99 | 1370 | 1629 | 1975 | 0 | 7299 | 20704 |
| 2030-31 | 1716 | 601 | 13 | 102 | 1427 | 1696 | 2051 | 0 | 7606 | 21542 |
| 2031-32 | 1803 | 622 | 13 | 105 | 1486 | 1766 | 2130 | 0 | 7925 | 22412 |
| 2032-33 | 1894 | 644 | 13 | 108 | 1547 | 1839 | 2212 | 0 | 8257 | 23316 |
| 2033-34 | 1990 | 667 | 13 | 111 | 1611 | 1915 | 2297 | 0 | 8604 | 24258 |
| 2034-35 | 2085 | 680 | 13 | 114 | 1656 | 1968 | 2356 | 0 | 8872 | 24941 |
| 2035-36 | 2184 | 693 | 13 | 117 | 1702 | 2022 | 2417 | 0 | 9148 | 25643 |
| 2036-37 | 2288 | 706 | 13 | 120 | 1749 | 2078 | 2480 | 0 | 9434 | 26368 |
| 2037-38 | 2397 | 719 | 13 | 123 | 1797 | 2135 | 2544 | 0 | 9728 | 27108 |
| 2038-39 | 2511 | 733 | 13 | 126 | 1847 | 2194 | 2610 | 0 | 10034 | 27876 |
| 2039-40 | 2625 | 744 | 13 | 129 | 1889 | 2243 | 2665 | 0 | 10308 | 28536 |
| 2040-41 | 2744 | 755 | 13 | 132 | 1931 | 2293 | 2721 | 0 | 10589 | 29209 |
| 2041-42 | 2868 | 766 | 13 | 135 | 1974 | 2345 | 2778 | 0 | 10879 | 29900 |
| 2042-43 | 2998 | 778 | 13 | 138 | 2018 | 2398 | 2836 | 0 | 11179 | 30609 |
| 2043-44 | 3134 | 790 | 13 | 141 | 2063 | 2452 | 2896 | 0 | 11489 | 31339 |

Traffic projections for Most Likely scenario is given as under

**Table 6-9 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.319 KM
(Most Likely Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|---------------|--------------------------|
| 2023-24 | 1779 | 193 | 7 | 63 | 1041 | 1278 | 1510 | 0 | 5871 | 16020 |
| 2024-25 | 1893 | 202 | 7 | 65 | 1090 | 1338 | 1575 | 0 | 6170 | 16773 |
| 2025-26 | 2014 | 211 | 7 | 68 | 1141 | 1400 | 1642 | 0 | 6483 | 17557 |
| 2026-27 | 2143 | 221 | 7 | 71 | 1194 | 1465 | 1712 | 0 | 6813 | 18379 |
| 2027-28 | 2280 | 231 | 7 | 74 | 1250 | 1533 | 1785 | 0 | 7160 | 19241 |
| 2028-29 | 2426 | 242 | 7 | 77 | 1308 | 1605 | 1861 | 0 | 7526 | 20144 |
| 2029-30 | 2555 | 251 | 7 | 80 | 1365 | 1675 | 1937 | 0 | 7870 | 21019 |
| 2030-31 | 2691 | 261 | 7 | 83 | 1425 | 1748 | 2016 | 0 | 8231 | 21933 |
| 2031-32 | 2834 | 271 | 7 | 86 | 1487 | 1825 | 2099 | 0 | 8609 | 22891 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|---------------|--------------------------|
| 2032-33 | 2985 | 281 | 7 | 89 | 1552 | 1905 | 2185 | 0 | 9004 | 23888 |
| 2033-34 | 3144 | 292 | 7 | 92 | 1620 | 1989 | 2274 | 0 | 9418 | 24929 |
| 2034-35 | 3301 | 298 | 7 | 94 | 1669 | 2049 | 2339 | 0 | 9757 | 25720 |
| 2035-36 | 3466 | 304 | 7 | 97 | 1719 | 2111 | 2405 | 0 | 10109 | 26536 |
| 2036-37 | 3639 | 310 | 7 | 100 | 1771 | 2175 | 2473 | 0 | 10475 | 27381 |
| 2037-38 | 3821 | 317 | 7 | 103 | 1824 | 2241 | 2543 | 0 | 10856 | 28255 |
| 2038-39 | 4012 | 324 | 7 | 106 | 1879 | 2309 | 2615 | 0 | 11252 | 29158 |
| 2039-40 | 4204 | 330 | 7 | 109 | 1926 | 2367 | 2676 | 0 | 11619 | 29958 |
| 2040-41 | 4405 | 336 | 7 | 112 | 1974 | 2426 | 2739 | 0 | 11999 | 30781 |
| 2041-42 | 4615 | 342 | 7 | 115 | 2023 | 2487 | 2803 | 0 | 12392 | 31627 |
| 2042-43 | 4835 | 348 | 7 | 118 | 2074 | 2549 | 2869 | 0 | 12800 | 32501 |
| 2043-44 | 5066 | 354 | 7 | 121 | 2126 | 2613 | 2936 | 0 | 13223 | 33400 |

**Table 6-10 : Total Tollable Traffic @ Toll Plaza 2- Chainage 226.740 KM
(Most Likely Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1890 | 419 | 19 | 139 | 1112 | 1375 | 1733 | 0 | 6687 | 18224 |
| 2024-25 | 2011 | 439 | 20 | 144 | 1164 | 1439 | 1807 | 0 | 7024 | 19072 |
| 2025-26 | 2140 | 459 | 21 | 150 | 1218 | 1506 | 1884 | 0 | 7378 | 19960 |
| 2026-27 | 2277 | 480 | 22 | 156 | 1275 | 1576 | 1965 | 0 | 7751 | 20894 |
| 2027-28 | 2423 | 502 | 23 | 162 | 1334 | 1650 | 2049 | 0 | 8143 | 21869 |
| 2028-29 | 2578 | 525 | 24 | 168 | 1396 | 1727 | 2137 | 0 | 8555 | 22891 |
| 2029-30 | 2715 | 545 | 25 | 174 | 1457 | 1803 | 2224 | 0 | 8943 | 23880 |
| 2030-31 | 2859 | 566 | 26 | 180 | 1521 | 1882 | 2315 | 0 | 9349 | 24914 |
| 2031-32 | 3011 | 588 | 27 | 186 | 1588 | 1965 | 2410 | 0 | 9775 | 25996 |
| 2032-33 | 3171 | 610 | 28 | 192 | 1658 | 2051 | 2509 | 0 | 10219 | 27122 |
| 2033-34 | 3340 | 633 | 29 | 198 | 1731 | 2141 | 2612 | 0 | 10684 | 28297 |
| 2034-35 | 3507 | 646 | 30 | 203 | 1783 | 2206 | 2686 | 0 | 11061 | 29184 |
| 2035-36 | 3682 | 660 | 31 | 208 | 1837 | 2273 | 2762 | 0 | 11453 | 30102 |
| 2036-37 | 3866 | 674 | 32 | 214 | 1892 | 2342 | 2840 | 0 | 11860 | 31049 |
| 2037-38 | 4059 | 688 | 33 | 220 | 1949 | 2413 | 2921 | 0 | 12283 | 32031 |
| 2038-39 | 4262 | 703 | 34 | 226 | 2008 | 2486 | 3004 | 0 | 12723 | 33046 |
| 2039-40 | 4466 | 715 | 35 | 231 | 2058 | 2548 | 3075 | 0 | 13128 | 33940 |
| 2040-41 | 4679 | 728 | 36 | 237 | 2109 | 2612 | 3147 | 0 | 13548 | 34861 |
| 2041-42 | 4903 | 741 | 37 | 243 | 2162 | 2677 | 3221 | 0 | 13984 | 35811 |
| 2042-43 | 5137 | 754 | 38 | 249 | 2216 | 2744 | 3297 | 0 | 14435 | 36789 |
| 2043-44 | 5382 | 767 | 39 | 255 | 2271 | 2813 | 3374 | 0 | 14901 | 37791 |

**Table 6-11 : Total Tollable Traffic @ Toll Plaza 3- Chainage 295.000 KM
(Most Likely Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibuses | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|-----------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1476 | 489 | 12 | 112 | 1153 | 1433 | 1753 | 0 | 6428 | 18210 |
| 2024-25 | 1570 | 512 | 12 | 116 | 1207 | 1500 | 1828 | 0 | 6745 | 19051 |
| 2025-26 | 1670 | 536 | 12 | 121 | 1263 | 1570 | 1906 | 0 | 7078 | 19931 |
| 2026-27 | 1777 | 561 | 12 | 126 | 1322 | 1643 | 1988 | 0 | 7429 | 20856 |
| 2027-28 | 1891 | 587 | 12 | 131 | 1384 | 1720 | 2073 | 0 | 7798 | 21823 |
| 2028-29 | 2012 | 614 | 12 | 136 | 1449 | 1800 | 2162 | 0 | 8185 | 22835 |
| 2029-30 | 2119 | 637 | 12 | 140 | 1513 | 1879 | 2250 | 0 | 8550 | 23814 |
| 2030-31 | 2232 | 661 | 12 | 145 | 1579 | 1961 | 2342 | 0 | 8932 | 24836 |
| 2031-32 | 2351 | 686 | 12 | 150 | 1648 | 2047 | 2438 | 0 | 9332 | 25904 |
| 2032-33 | 2476 | 712 | 12 | 155 | 1720 | 2137 | 2538 | 0 | 9750 | 27019 |
| 2033-34 | 2608 | 739 | 12 | 160 | 1795 | 2231 | 2642 | 0 | 10187 | 28182 |
| 2034-35 | 2738 | 755 | 12 | 164 | 1849 | 2298 | 2717 | 0 | 10533 | 29048 |
| 2035-36 | 2875 | 771 | 12 | 168 | 1905 | 2367 | 2794 | 0 | 10892 | 29943 |
| 2036-37 | 3019 | 787 | 12 | 173 | 1962 | 2438 | 2873 | 0 | 11264 | 30865 |
| 2037-38 | 3170 | 804 | 12 | 178 | 2021 | 2512 | 2955 | 0 | 11652 | 31825 |
| 2038-39 | 3328 | 821 | 12 | 183 | 2082 | 2588 | 3039 | 0 | 12053 | 32812 |
| 2039-40 | 3487 | 835 | 12 | 187 | 2134 | 2653 | 3110 | 0 | 12418 | 33675 |
| 2040-41 | 3654 | 850 | 12 | 192 | 2187 | 2719 | 3183 | 0 | 12797 | 34565 |
| 2041-42 | 3829 | 865 | 12 | 197 | 2242 | 2787 | 3258 | 0 | 13190 | 35484 |
| 2042-43 | 4012 | 880 | 12 | 202 | 2298 | 2857 | 3335 | 0 | 13596 | 36429 |
| 2043-44 | 4204 | 896 | 12 | 207 | 2355 | 2928 | 3413 | 0 | 14015 | 37395 |

**Table 6-12 : Total Tollable Traffic @ Toll Plaza 4- Chainage 357.739 KM
(Most Likely Growth Scenario)**

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2023-24 | 1155 | 451 | 14 | 81 | 1062 | 1263 | 1565 | 0 | 5591 | 16113 |
| 2024-25 | 1229 | 472 | 15 | 84 | 1112 | 1322 | 1632 | 0 | 5866 | 16858 |
| 2025-26 | 1308 | 494 | 16 | 87 | 1164 | 1384 | 1702 | 0 | 6155 | 17637 |
| 2026-27 | 1392 | 517 | 17 | 90 | 1218 | 1449 | 1775 | 0 | 6458 | 18452 |
| 2027-28 | 1481 | 541 | 18 | 94 | 1275 | 1517 | 1851 | 0 | 6777 | 19307 |
| 2028-29 | 1576 | 566 | 19 | 98 | 1334 | 1588 | 1930 | 0 | 7111 | 20199 |
| 2029-30 | 1660 | 588 | 20 | 101 | 1392 | 1658 | 2009 | 0 | 7428 | 21066 |
| 2030-31 | 1748 | 610 | 21 | 104 | 1453 | 1731 | 2091 | 0 | 7758 | 21968 |
| 2031-32 | 1841 | 633 | 22 | 107 | 1517 | 1807 | 2177 | 0 | 8104 | 22913 |
| 2032-33 | 1939 | 657 | 23 | 111 | 1584 | 1886 | 2266 | 0 | 8466 | 23899 |
| 2033-34 | 2042 | 682 | 24 | 115 | 1653 | 1969 | 2359 | 0 | 8844 | 24928 |
| 2034-35 | 2144 | 697 | 25 | 118 | 1703 | 2028 | 2426 | 0 | 9141 | 25691 |
| 2035-36 | 2251 | 712 | 26 | 121 | 1754 | 2089 | 2495 | 0 | 9448 | 26478 |
| 2036-37 | 2364 | 727 | 27 | 124 | 1807 | 2152 | 2566 | 0 | 9767 | 27291 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle | Total Tollable Traffic | PCU (Including Exempted) |
|----------------|------------------|-----|---------|-----|----------------|----------|------------|----------------|------------------------|--------------------------|
| 2037-38 | 2482 | 742 | 28 | 127 | 1861 | 2217 | 2639 | 0 | 10096 | 28128 |
| 2038-39 | 2606 | 758 | 29 | 130 | 1917 | 2284 | 2714 | 0 | 10438 | 28993 |
| 2039-40 | 2730 | 771 | 30 | 133 | 1965 | 2341 | 2778 | 0 | 10748 | 29750 |
| 2040-41 | 2860 | 785 | 31 | 136 | 2014 | 2399 | 2843 | 0 | 11068 | 30525 |
| 2041-42 | 2997 | 799 | 32 | 139 | 2064 | 2459 | 2910 | 0 | 11400 | 31325 |
| 2042-43 | 3140 | 813 | 33 | 142 | 2116 | 2520 | 2978 | 0 | 11742 | 32144 |
| 2043-44 | 3290 | 827 | 34 | 145 | 2169 | 2583 | 3048 | 0 | 12096 | 32989 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3rd rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers or whose frequency does not yield any discount from the above categories.
4. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van - Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2022-23. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

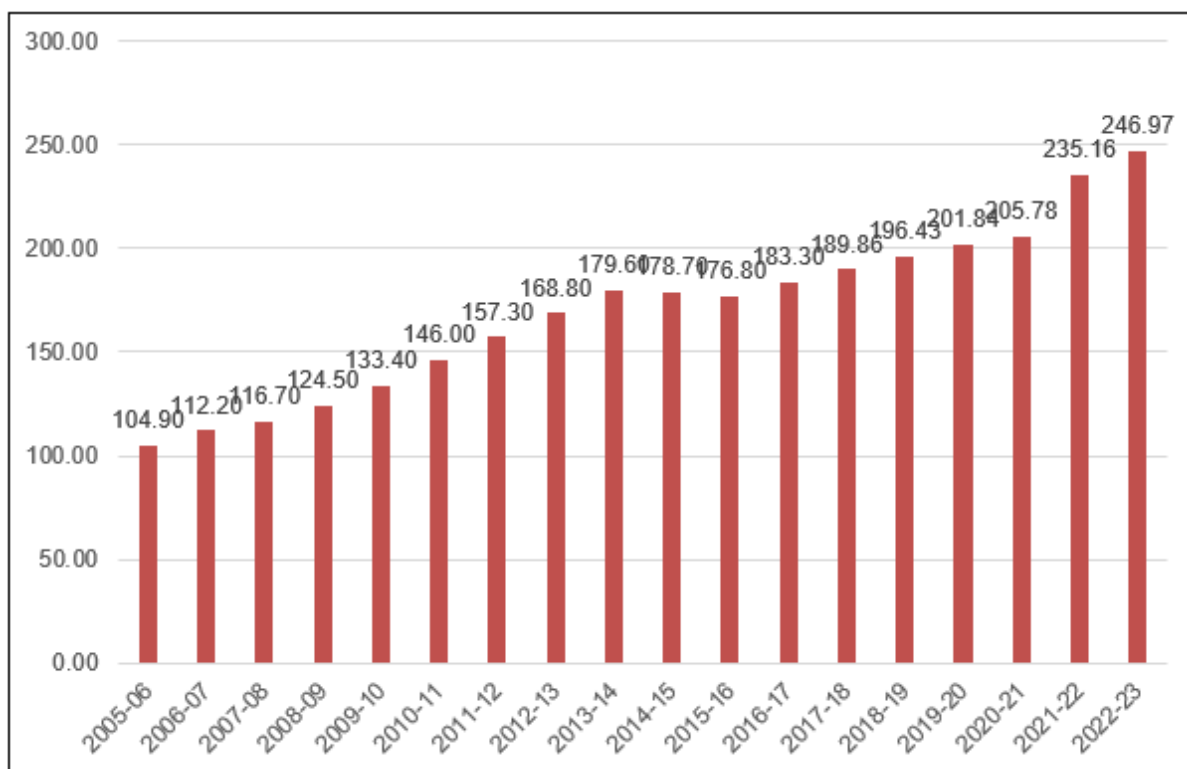


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--------------------------------------|-----------------------------------|
| Oversized Vehicles (7 or more Axles) | 4.20 |

These rates are then modified for as per procedure provided in guidelines of notification considering factors listed below.

- Annual revision of fee rate - @3%
- Application of WPI

Base rates have been worked out to map the current rates. These shall be updated when more details come in. Base toll rates are given below.

Table 7-2 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 142.319

| Sr.no | Type of Vehicle | Rates |
|-------|------------------|--------|
| 1 | Car / Jeep / Van | 115.00 |
| 2 | LCV | 185.00 |
| 3 | Minibus | 185.00 |
| 4 | Bus | 385.00 |
| 5 | Truck - 2 Axle | 385.00 |
| 6 | 3 - Axle | 420.00 |
| 7 | 4 - 6 Axle | 605.00 |
| 8 | 7 & above Axle | 735.00 |

Above rates are applicable for base year 2022-23. These rates have been escalated for future year as NHA policy and MORTH guideline for future revenue working.

Table 7-3 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 142.319

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------------|-----|---------|-----|-------------------|----------|---------------|----------------------|
| 2023-24 | 120 | 195 | 195 | 405 | 405 | 440 | 635 | 775 |
| 2024-25 | 125 | 200 | 200 | 415 | 415 | 455 | 650 | 795 |
| 2025-26 | 130 | 210 | 210 | 435 | 435 | 475 | 685 | 835 |
| 2026-27 | 135 | 220 | 220 | 460 | 460 | 500 | 720 | 875 |
| 2027-28 | 140 | 230 | 230 | 480 | 480 | 525 | 755 | 920 |
| 2028-29 | 150 | 240 | 240 | 505 | 505 | 550 | 795 | 965 |
| 2029-30 | 155 | 255 | 255 | 530 | 530 | 580 | 835 | 1015 |
| 2030-31 | 165 | 265 | 265 | 560 | 560 | 610 | 875 | 1070 |
| 2031-32 | 175 | 280 | 280 | 590 | 590 | 640 | 925 | 1125 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------|-----|---------|------|----------------|----------|------------|----------------|
| 2032-33 | 185 | 295 | 295 | 620 | 620 | 675 | 970 | 1180 |
| 2033-34 | 190 | 310 | 310 | 650 | 650 | 710 | 1020 | 1245 |
| 2034-35 | 200 | 325 | 325 | 685 | 685 | 745 | 1075 | 1310 |
| 2035-36 | 215 | 345 | 345 | 720 | 720 | 785 | 1130 | 1375 |
| 2036-37 | 225 | 360 | 360 | 760 | 760 | 830 | 1190 | 1450 |
| 2037-38 | 235 | 380 | 380 | 800 | 800 | 870 | 1255 | 1525 |
| 2038-39 | 250 | 400 | 400 | 840 | 840 | 920 | 1320 | 1605 |
| 2039-40 | 260 | 425 | 425 | 885 | 885 | 970 | 1390 | 1695 |
| 2040-41 | 275 | 445 | 445 | 935 | 935 | 1020 | 1465 | 1785 |
| 2041-42 | 290 | 470 | 470 | 985 | 985 | 1075 | 1545 | 1880 |
| 2042-43 | 305 | 495 | 495 | 1040 | 1040 | 1135 | 1630 | 1980 |
| 2043-44 | 325 | 520 | 520 | 1095 | 1095 | 1195 | 1715 | 2090 |

Table 7-4 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 226.740

| Sr.no | Type of Vehicle | Rates |
|-------|------------------|--------|
| 1 | Car / Jeep / Van | 145.00 |
| 2 | LCV | 230.00 |
| 3 | Minibus | 230.00 |
| 4 | Bus | 480.00 |
| 5 | Truck - 2 Axle | 480.00 |
| 6 | 3 - Axle | 525.00 |
| 7 | 4 - 6 Axle | 755.00 |
| 8 | 7 & above Axle | 920.00 |

Above rates are applicable for base year 2022-23. These rates have been escalated for future year as NHAI policy and MORTH guideline for future revenue working.

Table 7-5 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 226.740

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|
| 2023-24 | 150 | 240 | 240 | 505 | 505 | 555 | 795 | 965 |
| 2024-25 | 155 | 250 | 250 | 520 | 520 | 565 | 815 | 990 |
| 2025-26 | 170 | 270 | 270 | 570 | 570 | 620 | 890 | 1085 |
| 2026-27 | 175 | 285 | 285 | 600 | 600 | 650 | 935 | 1140 |
| 2027-28 | 185 | 300 | 300 | 630 | 630 | 685 | 985 | 1200 |
| 2028-29 | 195 | 315 | 315 | 660 | 660 | 720 | 1035 | 1260 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------|-----|---------|------|----------------|----------|------------|----------------|
| 2029-30 | 205 | 330 | 330 | 695 | 695 | 755 | 1090 | 1325 |
| 2030-31 | 215 | 350 | 350 | 730 | 730 | 795 | 1145 | 1395 |
| 2031-32 | 225 | 365 | 365 | 765 | 765 | 835 | 1205 | 1465 |
| 2032-33 | 240 | 385 | 385 | 805 | 805 | 880 | 1265 | 1540 |
| 2033-34 | 250 | 405 | 405 | 850 | 850 | 925 | 1330 | 1620 |
| 2034-35 | 265 | 425 | 425 | 895 | 895 | 975 | 1400 | 1705 |
| 2035-36 | 280 | 450 | 450 | 940 | 940 | 1025 | 1475 | 1795 |
| 2036-37 | 295 | 475 | 475 | 990 | 990 | 1080 | 1555 | 1890 |
| 2037-38 | 310 | 500 | 500 | 1045 | 1045 | 1135 | 1635 | 1990 |
| 2038-39 | 325 | 525 | 525 | 1100 | 1100 | 1200 | 1720 | 2095 |
| 2039-40 | 340 | 550 | 550 | 1155 | 1155 | 1260 | 1815 | 2210 |
| 2040-41 | 360 | 580 | 580 | 1220 | 1220 | 1330 | 1910 | 2325 |
| 2041-42 | 380 | 615 | 615 | 1285 | 1285 | 1400 | 2015 | 2450 |
| 2042-43 | 400 | 645 | 645 | 1355 | 1355 | 1475 | 2125 | 2585 |
| 2043-44 | 420 | 680 | 680 | 1430 | 1430 | 1555 | 2240 | 2725 |

Table 7-6 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 295.000

| Sr.no | Type of Vehicle | Rates |
|-------|------------------|--------|
| 1 | Car / Jeep / Van | 110.00 |
| 2 | LCV | 180.00 |
| 3 | Minibus | 180.00 |
| 4 | Bus | 380.00 |
| 5 | Truck - 2 Axle | 380.00 |
| 6 | 3 - Axle | 415.00 |
| 7 | 4 - 6 Axle | 595.00 |
| 8 | 7 & above Axle | 725.00 |

Above rates are applicable for base year 2022-23. These rates have been escalated for future year as NHA policy and MORTH guideline for future revenue working.

Table 7-7 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 295.000

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------|-----|---------|-----|----------------|----------|------------|----------------|
| 2023-24 | 120 | 190 | 190 | 400 | 400 | 435 | 625 | 760 |
| 2024-25 | 120 | 195 | 195 | 410 | 410 | 445 | 640 | 780 |
| 2025-26 | 125 | 205 | 205 | 430 | 430 | 470 | 675 | 820 |

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------|-----|---------|------|----------------|----------|------------|----------------|
| 2026-27 | 135 | 215 | 215 | 450 | 450 | 495 | 710 | 860 |
| 2027-28 | 140 | 225 | 225 | 475 | 475 | 520 | 745 | 905 |
| 2028-29 | 145 | 240 | 240 | 500 | 500 | 545 | 780 | 950 |
| 2029-30 | 155 | 250 | 250 | 525 | 525 | 570 | 820 | 1000 |
| 2030-31 | 165 | 265 | 265 | 550 | 550 | 600 | 865 | 1050 |
| 2031-32 | 170 | 275 | 275 | 580 | 580 | 630 | 910 | 1105 |
| 2032-33 | 180 | 290 | 290 | 610 | 610 | 665 | 955 | 1165 |
| 2033-34 | 190 | 305 | 305 | 640 | 640 | 700 | 1005 | 1225 |
| 2034-35 | 200 | 320 | 320 | 675 | 675 | 735 | 1060 | 1290 |
| 2035-36 | 210 | 340 | 340 | 710 | 710 | 775 | 1115 | 1355 |
| 2036-37 | 220 | 355 | 355 | 750 | 750 | 815 | 1175 | 1430 |
| 2037-38 | 235 | 375 | 375 | 790 | 790 | 860 | 1235 | 1505 |
| 2038-39 | 245 | 395 | 395 | 830 | 830 | 905 | 1300 | 1585 |
| 2039-40 | 260 | 415 | 415 | 875 | 875 | 955 | 1370 | 1670 |
| 2040-41 | 270 | 440 | 440 | 920 | 920 | 1005 | 1445 | 1760 |
| 2041-42 | 285 | 465 | 465 | 970 | 970 | 1060 | 1520 | 1855 |
| 2042-43 | 300 | 490 | 490 | 1025 | 1025 | 1115 | 1605 | 1955 |
| 2043-44 | 320 | 515 | 515 | 1080 | 1080 | 1175 | 1690 | 2060 |

Table 7-8 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 357.739

| Sr.no | Type of Vehicle | Rates |
|-------|------------------|--------|
| 1 | Car / Jeep / Van | 145.00 |
| 2 | LCV | 235.00 |
| 3 | Minibus | 235.00 |
| 4 | Bus | 495.00 |
| 5 | Truck - 2 Axle | 495.00 |
| 6 | 3 - Axle | 540.00 |
| 7 | 4 - 6 Axle | 775.00 |
| 8 | 7 & above Axle | 940.00 |

Above rates are applicable for base year 2022-23. These rates have been escalated for future year as NHAI policy and MORTH guideline for future revenue working.

Table 7-9 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 357.739

| Year | Car / Jeep / Van | LCV | Minibus | Bus | Truck - 2 Axle | 3 - Axle | 4 - 6 Axle | 7 & above Axle |
|---------|------------------------|-----|---------|------|-------------------|----------|---------------|----------------------|
| 2023-24 | 155 | 245 | 245 | 520 | 520 | 565 | 815 | 990 |
| 2024-25 | 155 | 255 | 255 | 530 | 530 | 580 | 835 | 1015 |
| 2025-26 | 165 | 265 | 265 | 560 | 560 | 610 | 875 | 1065 |
| 2026-27 | 175 | 280 | 280 | 585 | 585 | 640 | 920 | 1120 |
| 2027-28 | 180 | 295 | 295 | 615 | 615 | 670 | 965 | 1175 |
| 2028-29 | 190 | 310 | 310 | 650 | 650 | 705 | 1015 | 1235 |
| 2029-30 | 200 | 325 | 325 | 680 | 680 | 745 | 1070 | 1300 |
| 2030-31 | 210 | 340 | 340 | 715 | 715 | 780 | 1120 | 1365 |
| 2031-32 | 220 | 360 | 360 | 755 | 755 | 820 | 1180 | 1435 |
| 2032-33 | 235 | 380 | 380 | 790 | 790 | 865 | 1240 | 1510 |
| 2033-34 | 245 | 400 | 400 | 835 | 835 | 910 | 1305 | 1590 |
| 2034-35 | 260 | 420 | 420 | 875 | 875 | 955 | 1375 | 1675 |
| 2035-36 | 275 | 440 | 440 | 925 | 925 | 1005 | 1445 | 1760 |
| 2036-37 | 285 | 465 | 465 | 970 | 970 | 1060 | 1525 | 1855 |
| 2037-38 | 300 | 490 | 490 | 1025 | 1025 | 1115 | 1605 | 1955 |
| 2038-39 | 320 | 515 | 515 | 1075 | 1075 | 1175 | 1690 | 2055 |
| 2039-40 | 335 | 540 | 540 | 1135 | 1135 | 1240 | 1780 | 2165 |
| 2040-41 | 355 | 570 | 570 | 1195 | 1195 | 1305 | 1875 | 2285 |
| 2041-42 | 370 | 600 | 600 | 1260 | 1260 | 1375 | 1975 | 2405 |
| 2042-43 | 395 | 635 | 635 | 1330 | 1330 | 1450 | 2085 | 2535 |
| 2043-44 | 415 | 670 | 670 | 1400 | 1400 | 1530 | 2195 | 2675 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2043-44 years starting from the year 2022-23 are shown in tables below.

Table 7-10 : Toll Revenue Optimistic Scenario*(Rs. Crores)*

| Location / Year | TP-1 - Malthone (142+319) | TP-2 - Chitora (226+740) | TP-3 - Titarpani (295+000) | TP-4 - Bakori (357+739) | Total |
|-----------------|---------------------------------|--------------------------------|----------------------------------|-------------------------------|--------|
| 2023-24 | 79.97 | 110.71 | 88.91 | 102.21 | 381.80 |
| 2024-25 | 85.96 | 118.62 | 95.05 | 109.29 | 408.93 |

| Location / Year | TP-1 - Malthone (142+319) | TP-2 - Chitora (226+740) | TP-3 - Titarpani (295+000) | TP-4 - Bakori (357+739) | Total |
|-----------------|---------------------------|--------------------------|----------------------------|-------------------------|---------|
| 2025-26 | 94.54 | 136.05 | 104.91 | 120.44 | 455.95 |
| 2026-27 | 104.28 | 149.61 | 115.79 | 132.57 | 502.25 |
| 2027-28 | 114.81 | 165.60 | 127.81 | 146.01 | 554.21 |
| 2028-29 | 126.37 | 181.81 | 140.06 | 160.74 | 608.97 |
| 2029-30 | 138.74 | 199.82 | 153.84 | 176.88 | 669.29 |
| 2030-31 | 152.59 | 219.54 | 169.43 | 193.75 | 735.31 |
| 2031-32 | 168.72 | 241.70 | 186.50 | 213.90 | 810.83 |
| 2032-33 | 184.97 | 265.19 | 204.59 | 234.58 | 889.32 |
| 2033-34 | 202.90 | 291.50 | 225.01 | 258.12 | 977.53 |
| 2034-35 | 220.64 | 317.21 | 244.84 | 280.41 | 1063.10 |
| 2035-36 | 240.94 | 345.82 | 266.98 | 305.80 | 1159.54 |
| 2036-37 | 261.70 | 375.34 | 289.67 | 331.61 | 1258.32 |
| 2037-38 | 284.38 | 407.95 | 315.37 | 360.75 | 1368.44 |
| 2038-39 | 309.74 | 443.85 | 342.57 | 392.44 | 1488.60 |
| 2039-40 | 336.30 | 481.42 | 372.60 | 426.37 | 1616.69 |
| 2040-41 | 363.63 | 520.55 | 402.11 | 460.57 | 1746.87 |
| 2041-42 | 394.31 | 564.32 | 435.67 | 498.59 | 1892.90 |
| 2042-43 | 427.97 | 611.70 | 472.63 | 541.45 | 2053.74 |
| 2043-44 | 465.19 | 664.89 | 513.96 | 587.95 | 2231.99 |

*Table 7-11 : Toll Revenue Pessimistic Scenario
(Rs. Crores)*

| Location / Year | TP-1 - Malthone (142+319) | TP-2 - Chitora (226+740) | TP-3 - Titarpani (295+000) | TP-4 - Bakori (357+739) | Total |
|-----------------|---------------------------|--------------------------|----------------------------|-------------------------|---------|
| 2023-24 | 79.58 | 110.18 | 88.47 | 101.72 | 379.94 |
| 2024-25 | 85.12 | 117.48 | 94.11 | 108.22 | 404.93 |
| 2025-26 | 93.17 | 134.08 | 103.38 | 118.69 | 449.31 |
| 2026-27 | 102.26 | 146.78 | 113.56 | 129.99 | 492.59 |
| 2027-28 | 112.07 | 161.68 | 124.74 | 142.49 | 540.98 |
| 2028-29 | 122.78 | 176.71 | 136.03 | 156.09 | 591.61 |
| 2029-30 | 134.16 | 193.30 | 148.68 | 170.97 | 647.11 |
| 2030-31 | 146.82 | 211.37 | 162.94 | 186.38 | 707.51 |
| 2031-32 | 161.54 | 231.53 | 178.52 | 204.76 | 776.36 |
| 2032-33 | 176.29 | 252.84 | 194.89 | 223.47 | 847.48 |
| 2033-34 | 192.44 | 276.60 | 213.27 | 244.71 | 927.02 |
| 2034-35 | 208.25 | 299.48 | 230.93 | 264.53 | 1003.19 |
| 2035-36 | 226.31 | 324.91 | 250.56 | 287.10 | 1088.88 |
| 2036-37 | 244.60 | 350.97 | 270.53 | 309.74 | 1175.85 |
| 2037-38 | 264.53 | 379.58 | 293.15 | 335.35 | 1272.61 |
| 2038-39 | 286.69 | 410.95 | 316.90 | 363.04 | 1377.59 |
| 2039-40 | 309.72 | 443.59 | 343.00 | 392.52 | 1488.84 |
| 2040-41 | 333.26 | 477.38 | 368.37 | 421.94 | 1600.94 |
| 2041-42 | 359.67 | 515.02 | 397.19 | 454.60 | 1726.47 |
| 2042-43 | 388.54 | 555.52 | 428.73 | 491.33 | 1864.11 |
| 2043-44 | 420.33 | 600.91 | 463.93 | 530.95 | 2016.12 |

Table 7-12 : Toll Revenue Most Likely Scenario
(Rs. Crores)

| Location / Year | TP-1 - Malthone (142+319) | TP-2 - Chitora (226+740) | TP-3 - Titarpani (295+000) | TP-4 - Bakori (357+739) | Total |
|-----------------|---------------------------|--------------------------|----------------------------|-------------------------|---------|
| 2023-24 | 79.76 | 110.44 | 88.69 | 101.98 | 380.86 |
| 2024-25 | 85.52 | 118.07 | 94.57 | 108.79 | 406.94 |
| 2025-26 | 93.85 | 135.10 | 104.15 | 119.60 | 452.69 |
| 2026-27 | 103.27 | 148.24 | 114.67 | 131.32 | 497.50 |
| 2027-28 | 113.41 | 163.66 | 126.27 | 144.28 | 547.63 |
| 2028-29 | 124.53 | 179.29 | 138.02 | 158.45 | 600.29 |
| 2029-30 | 136.41 | 196.65 | 151.23 | 173.96 | 658.25 |
| 2030-31 | 149.63 | 215.55 | 166.13 | 190.08 | 721.39 |
| 2031-32 | 165.06 | 236.73 | 182.45 | 209.34 | 793.58 |
| 2032-33 | 180.54 | 259.06 | 199.64 | 229.00 | 868.24 |
| 2033-34 | 197.58 | 284.07 | 218.99 | 251.40 | 952.05 |
| 2034-35 | 214.32 | 308.33 | 237.67 | 272.43 | 1032.75 |
| 2035-36 | 233.48 | 335.32 | 258.51 | 296.40 | 1123.71 |
| 2036-37 | 252.98 | 363.12 | 279.79 | 320.57 | 1216.46 |
| 2037-38 | 274.26 | 393.71 | 303.93 | 347.90 | 1319.80 |
| 2038-39 | 297.97 | 427.29 | 329.33 | 377.51 | 1432.10 |
| 2039-40 | 322.71 | 462.33 | 357.32 | 409.08 | 1551.44 |
| 2040-41 | 348.16 | 498.72 | 384.72 | 440.79 | 1672.39 |
| 2041-42 | 376.68 | 539.33 | 415.87 | 476.05 | 1807.92 |
| 2042-43 | 407.91 | 583.14 | 449.98 | 515.75 | 1956.78 |
| 2043-44 | 442.33 | 632.26 | 488.13 | 558.73 | 2121.45 |

7.6 Modification in Concession Period

Modification of the concession period shall be done on the basis of Revenue targets given in the contract for milestones 1 & 2.

Modification in concession period as per provisions of DCA and same is summarized in table for all scenarios.

Pessimistic Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------------|--|
| Target Month - March 2029 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Modified Concession Period | | |
| TOT-12 | 70 | 67.81 | -3.13% | No | - | 0.00% | 20.00 | 0.00 | | | |
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2036 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Total Change in Concession period | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-12 | 123 | 110.63 | -10.06% | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

Most likely Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|----------------------------|--|--|
| Target Month - March 2029 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Modified Concession Period | | |
| TOT-12 | 70 | 69.40 | -0.85% | No | - | 0.00% | 20.00 | 0.00 | | | |

| Target Point 2- March 2038 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------------|--|
| Target Month - March 2036 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Total Change in Concession period | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-12 | 123 | 114.88 | -6.60% | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

Optimistic Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------------|--|
| Target Month - March 2029 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Modified Concession Period | | |
| TOT-12 | 70 | 71.02 | 1.45% | No | - | 0.00% | 20.00 | 0.00 | | | |
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2036 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period | Change in Concession period | Total Change in Concession period | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-12 | 123 | 119.29 | -3.01% | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

TOT-12 (Lalitpur to Lakhadon)-Modification in Concession Period

| Types of Scenarios | Pessimistic Case | | Most likely Case | | Optimistic Case | |
|--|------------------|---------|------------------|--------|-----------------|--------|
| | Mar-31 | Mar-38 | Mar-31 | Mar-38 | Mar-31 | Mar-38 |
| Target Month | | | | | | |
| Target Revenue (Rs. Crores) | 70 | 123.00 | 70 | 123 | 70.00 | 123.00 |
| Calculated Revenue (Rs. Crores) | 67.81 | 110.63 | 69.40 | 114.88 | 71.02 | 119.29 |
| Differences % | -3.13% | -10.06% | -0.85% | -6.60% | 1.45% | -3.01% |
| If qualifies for Modification in Concession Period | No | No | No | No | No | No |
| Qualifying Increment or shortfall | - | - | - | - | - | - |
| Change in Concession period % | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Original Concession Period | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Change in Concession period | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Change in Concession period | 0.00 | | 0.00 | | 0.00 | |
| Calculated Modified Concession Period | 20.00 | | 20.00 | | 20.00 | |
| Final Concession Period subject to Cap | 0.00 | | 0.00 | | 0.00 | |

Thus, there is no modification expected in concession period due to variation in revenue as per above estimates in all scenarios.

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Lalitpur-Sagar- Lakhnadon from Km 99.00 to Km 415.089 section of NH-44 in state of Madhya Pradesh and Uttar Pradesh is currently four lane road. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the important regional network connecting Uttar Pradesh, Madhya Pradesh to Southern States and vice-versa. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As discussed, dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the 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 due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road

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



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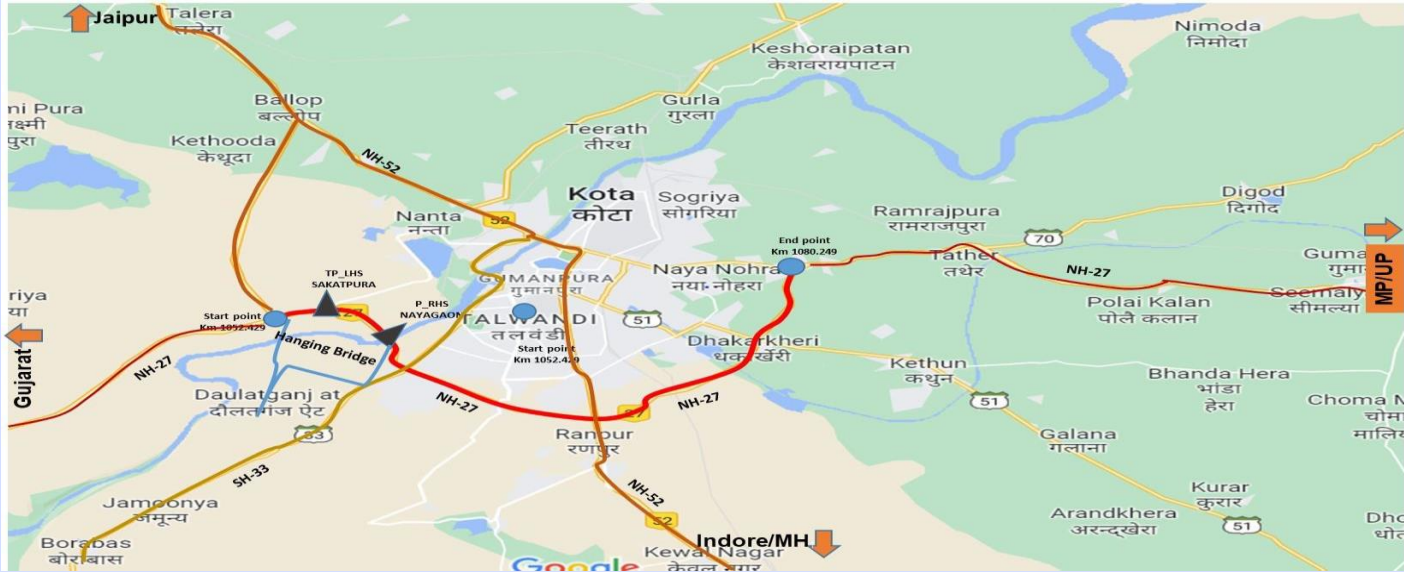
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KOTA BYPASS SECTION OF NH-27 IN THE STATE OF RAJASTHAN UNDER (TOT Bundle-13)



TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)

MARCH 2024



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**KOTA BYPASS SECTION OF NH-27 IN THE
STATE OF RAJASTHAN UNDER
(TOT Bundle-13)**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 National Highways Authority of India (NHA) introduced the Toll, Operate and Transfer (TOT) model for partnership with private developers in the road sector. Under this model, NHA passes on the toll collection rights and operation and maintenance obligations for 20 years to the private developer against payment of upfront, one-time, lump sum concession fees quoted by the private developer as part of the comprehensive bidding process. Projects under this model are awarded as a bundle of operational national highways, which allows the investor to offset the risks of one project against another. Since existing and operational roads are auctioned under the TOT model.

Under the Toll Operate and Transfer (ToT) 13 bundle, NHA had invited tenders for selection of concessionaire for maintenance of the National Highway stretch Kota Bypass section NH-27 in the state of Rajasthan.

M/s. IRB Infrastructure Developers Limited., has been declared as the selected bidder for the project. This report is for Part Section ToT bundle 13 “Kota Bypass section NH-27 spanning in the state of Rajasthan. Project Highway alignment is depicted in the following figure.

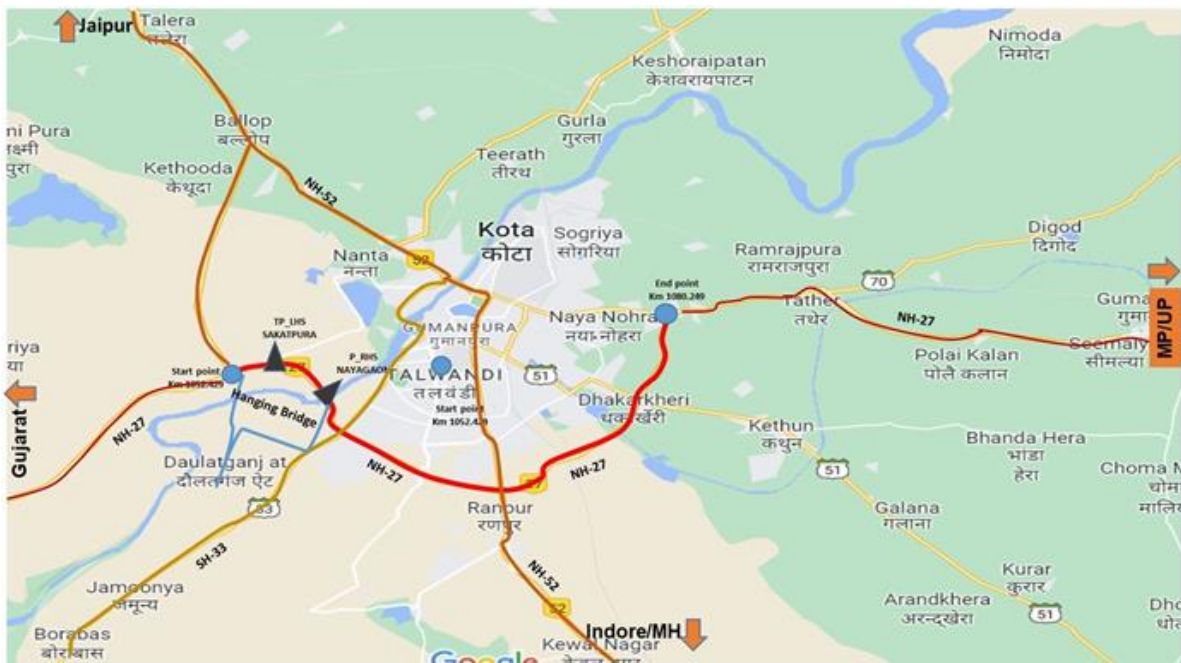


Figure 1-1: Project Stretch of ToT Bundle 13 (Part)

1.2 Objective of the Study

M/s IRB Infrastructure Developers Limited (IRB) intends to develop a traffic study report for Four Laning of Kota Bypass section NH-27 on BOT basis. GMD Consultants have been assigned the work of conducting traffic study and developing revenue model based on traffic projections and forecast.

For making the proper assessment of traffic volume on project stretch, base year traffic and its projection, GMD Consultants have been provided with the basic survey and investigation report available with client. The base year traffic data is the primary input for determination of future traffic demand. With a view to estimate the base year traffic volume in different categories of goods and passenger carrying vehicles, the Classified Traffic Volume Count (CTVC) surveys, Turning Movement surveys (TMC), Registration Plate Survey (N.P.) & Origin-Destination (O-D) were conducted at Main Toll Plaza (MTP) and data of same is provided for study.

The year 2023-24 has been taken as the base year for projections and forecasting of traffic in the horizon year. This report fulfils part of the requirement of the assignment.

1.3 Scope of Services

Following may be referred to as broad scope of Traffic Study of Four Laning of Kota Bypass section NH-27

Classified Traffic Volume Count at main toll plaza location at Toll Plaza locations. This data was supplied by the Concessionaire.

- Establishment of traffic pattern
- Working our traffic demand elasticity and growth
- Traffic forecast up to concession period.
- Preparation of revenue model up to concession period
- Any other analysis relevant to scope

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

The project stretch is a section of NH-44, which is the longest National Highway in the country, running through North, Central and South India. The Kota Bypass section is located along the Project Stretch starting from Km 1052+429 of NH-27 and ends at Km 1080+249 of NH-27 including a Cable-Stayed Bridge on the Chambal River in the State of Rajasthan.

Project Stretch Description

The project stretch under this study starts from Km 1052+429 of NH-27 and ends at Km 1080+249 of NH-27 at Jhansi in the state of Rajasthan. The length of project stretch is 27.820 km and has 4-lane configuration with single staggered of Toll Plaza (Sakatpura (LHS) at ch.1055+217 KM and Nayagaon (RHS) at ch.1058+837 KM).

The following figure shows this the alignment of project highway in above context.

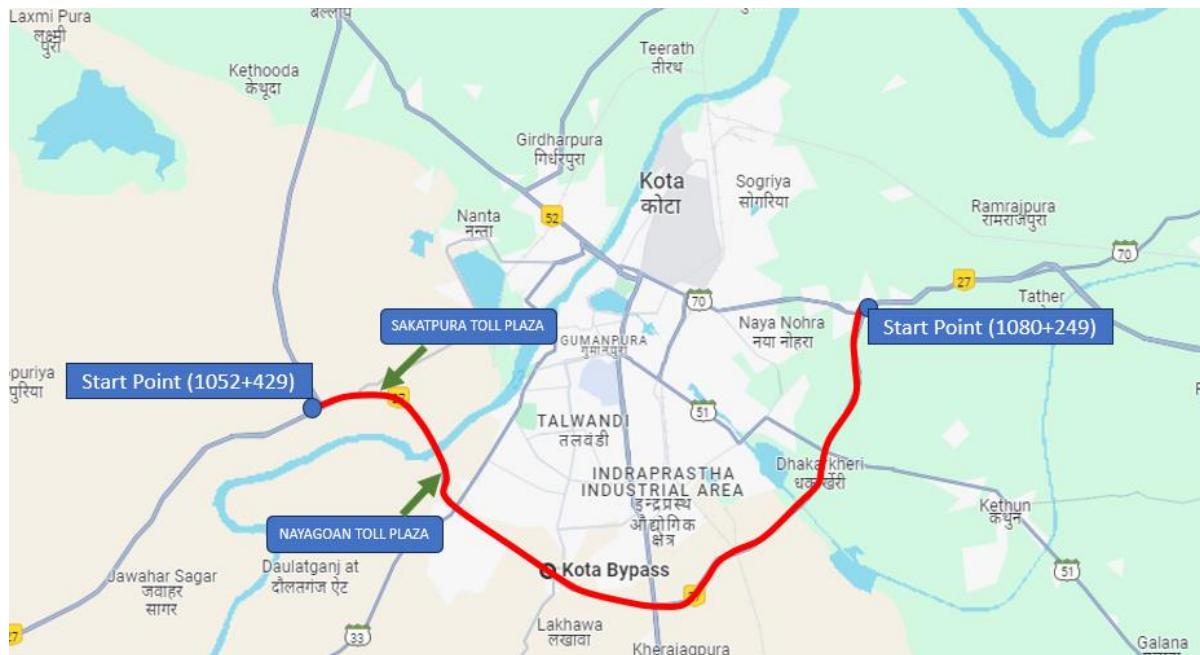


Figure 2-1 : Project Alignment with Toll Plaza

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Kota Bypass section of NH-27- Provided by Concessionaire for base year 2023-24
- 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--|---|--|--|--|--|
| 1 | Km 1055+217 Toll Plaza at Sakatpura (LHS Carriageway), Km 1058+837 Toll Plaza at Nayagaon (RHS Carriageway) | AADT from previous traffic study report for Year 2023-24 | AADT from previous traffic study report for Year 2023-24 | AADT from previous traffic study report for Year 2023-24 | AADT from previous traffic study report for Year 2023-24 | AADT from previous traffic study report for Year 2023-24 |

Toll plaza is located in Rajasthan.

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations-based traffic survey done at project stretch.

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 3-2 : 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 |

| Vehicle Type | |
|----------------|--|
| | 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Bus
- Truck /
- 3 Axle commercial vehicle
- Multi Axle

3.3 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.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data as per traffic survey conducted at toll plaza locations. It may not represent the whole year traffic as this pertains to specific period only. Hence a seasonality factor has been applied to average traffic of current period to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. Following table shows Annual Average Daily Traffic (AADT) for year 2023-24 as considered.

Table 3-3 : Traffic Data at Toll Plaza Sakatpura (Km 1055+217) / Nayagaon (Km 1058+837)

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) - 2023-24 |
|--------|-------------------------|---|
| 1 | Car / Taxi / Jeep / Van | 3399.00 |
| 2 | Mini LCV | 334.00 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.) - 2023-24 |
|--------|-----------------|---|
| 3 | Bus | 54.00 |
| 4 | Minibus | 14.00 |
| 5 | LCV | 513.00 |
| 6 | Truck - 2 Axle | 538.00 |
| 7 | 3 - Axle | 745.00 |
| 8 | 4 - 6 Axle | 2493.00 |
| 9 | 7 & above Axle | 0.00 |
| | Total | 8090 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-4 : 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 |

| Vehicle Type | PCUs |
|-------------------------------------|------|
| 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 3-5 : Traffic in PCU at Project Stretch

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|---|------------|-------|-----------|
| 2023-2024 | Km 1055+217 Toll Plaza at Sakatpura | 8090 | 19753 | 2.44 |
| | Km 1058+837 Toll Plaza at Nayagaon | | | |

It can be observed from above that project traffic has PCU index 2 to 2.6 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at four toll plaza locations.

3.4.2 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.

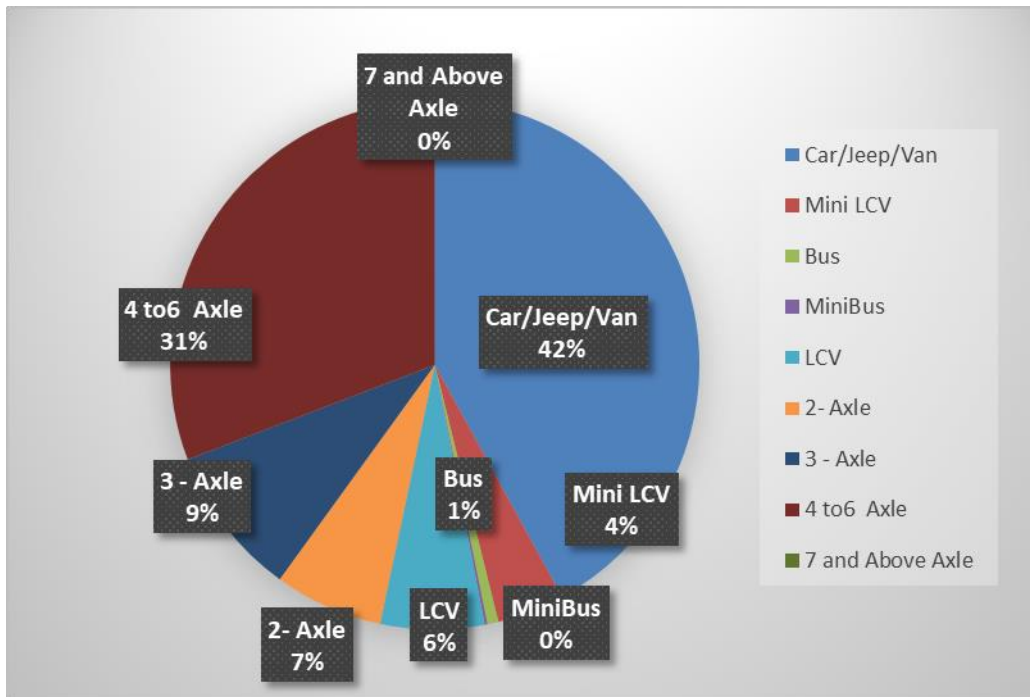


Figure 3-2: Model split of tollable vehicle @ Km 1055+217/ Km 1058+837

It is observed that car traffic forms about 42% of total traffic at toll plaza location KM 134.000 while multi axle commercial vehicles are about 40% of total traffic. Truck / Bus and LCV share about 12% and 6% of traffic volume respectively.

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

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

Since actual traffic data for bifurcation of journey is not available with Concessionaire, as the project has very recently been awarded, journey type bifurcation is adopted from traffic survey data provided by Concessionaire. For the purpose of calculating revenue all return journeys and monthly passes are converted to single journey type by suitable Daily Pass / Monthly Pass Factors (DPMP factor). The following table shows DPMP factors adopted for each toll plaza on project stretch.

Table 3-6 : Journey Type factor at Sakatpura/Nayagaon Toll Plaza KM 1055+217/ Km 1058+837

| Sr. No | Type | DP/MP Factors |
|--------|------------------|---------------|
| | | 2023-24 |
| 1 | Car / Jeep / Van | 0.850 |
| 2 | Mini LCV | 0.800 |
| 3 | LCV | 0.900 |
| 4 | Minibus | 0.850 |
| 5 | Bus | 0.900 |
| 6 | Truck - 2 Axle | 0.920 |
| 7 | 3 - Axle | 0.900 |
| 8 | 4 - 6 Axle | 0.900 |
| 9 | 7 & above Axle | 0.950 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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. Same is discussed in subsequent chapter.

CHAPTER 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

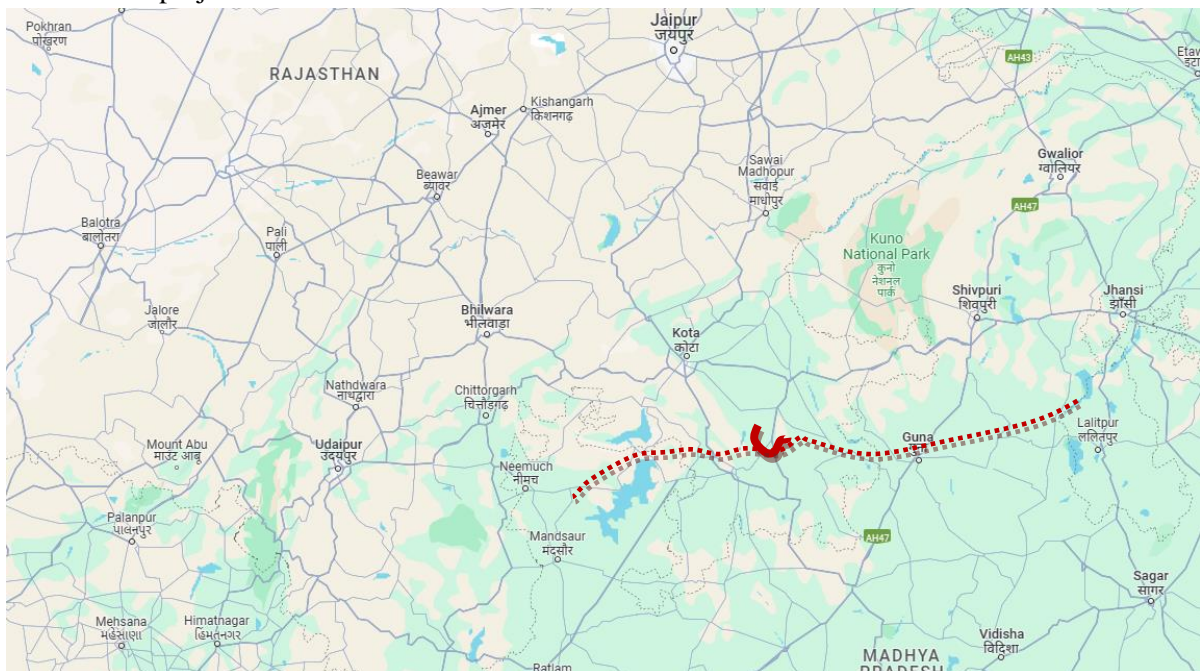
Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Regional Network

Kota Bypass is part of NH-27 which is major East – West connectivity in India. As can be seen from the data made available that most of the traffic on Kota Bypass is either local in nature or is part of East – West connectivity corridor. Gwalior, Chittorgarh, Jhalawar, Bhilwara areas have major influence on project traffic.



In such case upcoming corridors like Delhi Mumbai Expressway or Mumbai Vadodara Expressway or DFCC which basically cater for North -South connectivity, are not expected to have any substantial impact on project road traffic.

Delhi – Mumbai Expressway - The access controlled greenfield expressway connects Delhi and Mumbai (up to Jawaharlal Nehru Port Trust) and passes through states of Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. DME alignment will largely cater to traffic between North of India and Gujarat/Western Maharashtra and is not likely to affect traffic on the project road which caters to traffic on East – West connectivity and local traffic.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 of Kota Bypass from Km 1052+429 to Km 1080+249 section of NH-27 has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable to projects of short durations say 5-10 years, however for long term projections it would-be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-12015-Guidelines for Traffic Prediction on Rural Highways**.

In this method the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, In order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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).

The project corridor spreads across state of Rajasthan. Toll plazas at Sakatpura and Nayagaon in the state of Rajasthan. Project traffic has share of majorly states like Rajasthan, Madhya Pradesh, Uttar Pradesh, Gujrat and Delhi. For elasticity calculations, working data from these states also has been analysed.

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-1 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2012 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2013 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2014 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2015 | 68565 | 899307 | 4.84 | 5.95 | 6% | |
| 2016 | 71324 | 988391 | 4.85 | 5.99 | 4% | |
| 2017 | 73109 | 1095526 | 4.86 | 6.04 | 3% | |
| 2018 | 75555 | 1204005 | 4.88 | 6.08 | 3% | 4.1% |

Regression analysis of same is given in figure below.

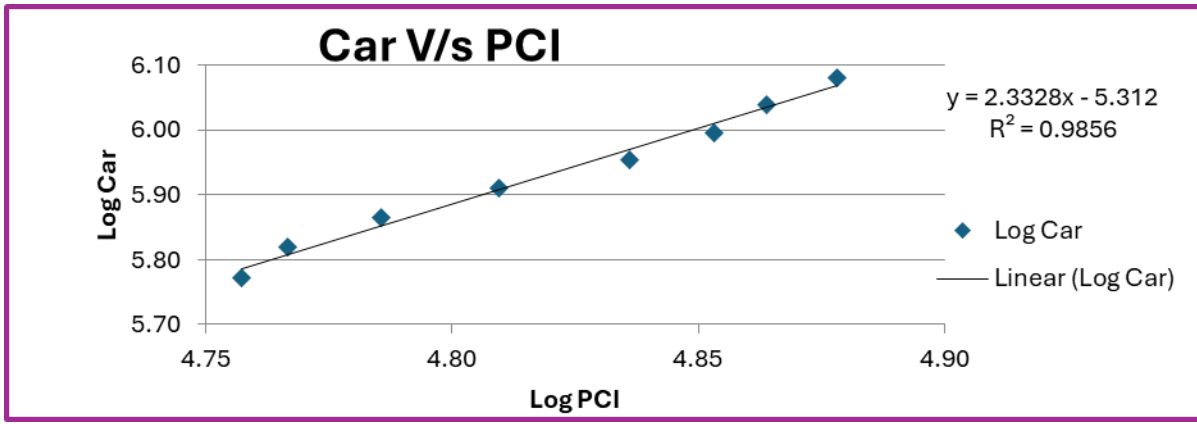


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan

Table 5-2 : Population Vs Bus Rajasthan

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 68548000 | 83345 | 7.84 | 4.92 | | |
| 2012 | 69687000 | 88616 | 7.84 | 4.95 | 2% | |
| 2013 | 70825000 | 93892 | 7.85 | 4.97 | 2% | |
| 2014 | 71963000 | 97650 | 7.86 | 4.99 | 2% | |
| 2015 | 73102000 | 102818 | 7.86 | 5.01 | 2% | |
| 2016 | 74240000 | 108680 | 7.87 | 5.04 | 2% | |
| 2017 | 75248000 | 113964 | 7.88 | 5.06 | 1% | |
| 2018 | 76256000 | 118301 | 7.88 | 5.07 | 1% | 1.5% |

Regression analysis of same is given in figure below.

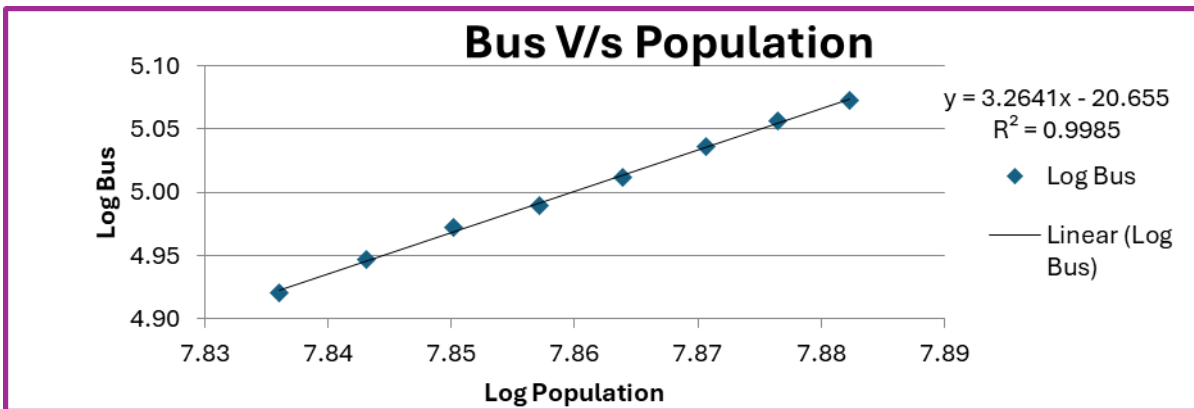


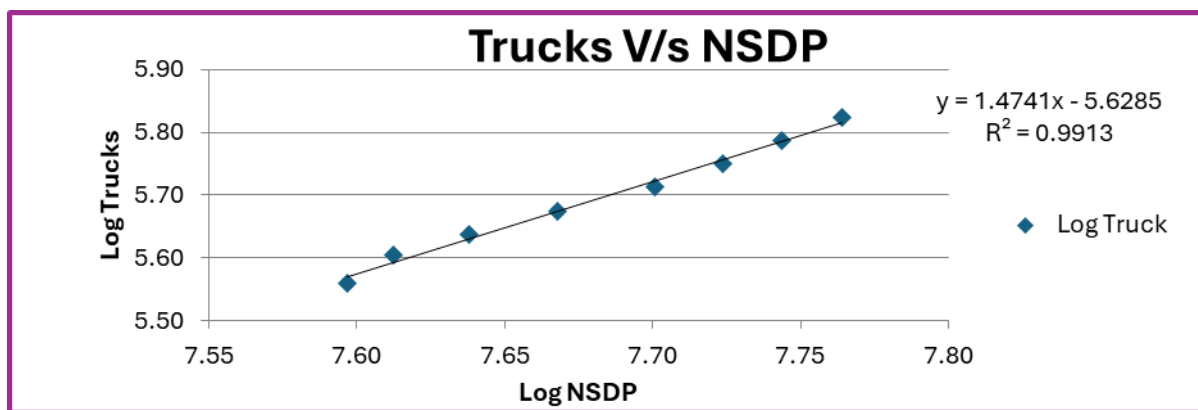
Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : Trucks Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 39533093 | 362028 | 7.60 | 5.56 | | |
| 2012 | 40980249 | 401983 | 7.61 | 5.60 | 4% | |
| 2013 | 43429222 | 434379 | 7.64 | 5.64 | 6% | |
| 2014 | 46540773 | 472365 | 7.67 | 5.67 | 7% | |
| 2015 | 50192151 | 517604 | 7.70 | 5.71 | 8% | |
| 2016 | 52965038 | 561158 | 7.72 | 5.75 | 6% | |
| 2017 | 55442912 | 613055 | 7.74 | 5.79 | 5% | |
| 2018 | 58059438 | 665926 | 7.76 | 5.82 | 5% | 5.7% |

The following figure depicts regression analysis and extrapolation.

**Figure 5-3 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Rajasthan.**

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-4 : Summary Regression Analysis Rajasthan

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-----------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| RAJASTHAN | Car/Jeep | PCI | $y = 2.3328x - 5.312$ | $R^2 = 0.9856$ | 2.3328 | 4.07% | 9.49% | Good Regression |

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|-------------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| | Bus | Population | $y = 3.2641x - 20.6548$ | $R^2 = 0.9985$ | 3.2641 | 1.53% | 5.01% | Good Regression |
| | Truck | NSDP | $y = 1.4741x - 5.6285$ | $R^2 = 0.9913$ | 1.4741 | 5.65% | 8.33% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Madhya Pradesh State.

Table 5-5 : Per Capita Income Vs Car Madhya Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 38497 | 424644 | 4.59 | 5.63 | | |
| 2012 | 41142 | 493412 | 4.61 | 5.69 | 7% | |
| 2013 | 42548 | 555461 | 4.63 | 5.74 | 3% | |
| 2014 | 44027 | 637626 | 4.64 | 5.80 | 3% | |
| 2015 | 47351 | 820391 | 4.68 | 5.91 | 8% | |
| 2016 | 52782 | 869777 | 4.72 | 5.94 | 11% | |
| 2017 | 54829 | 982124 | 4.74 | 5.99 | 4% | |
| 2018 | 57401 | 1087124 | 4.76 | 6.04 | 5% | 5.9% |

Regression analysis of same is given in figure below.

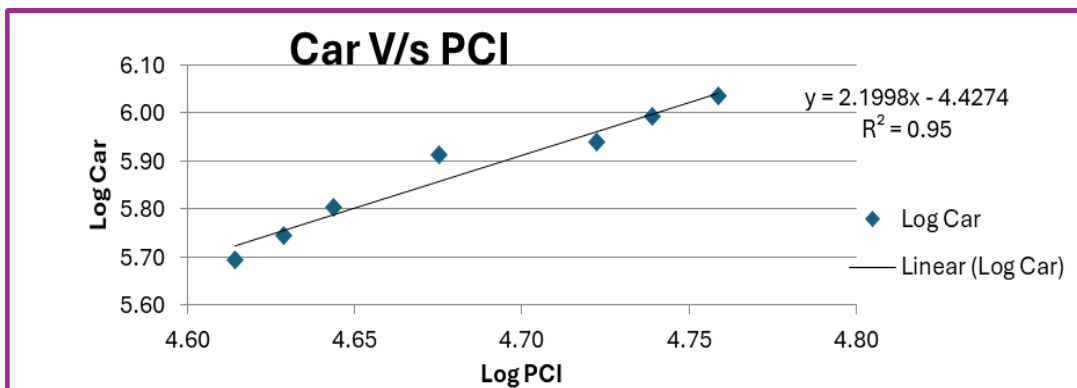
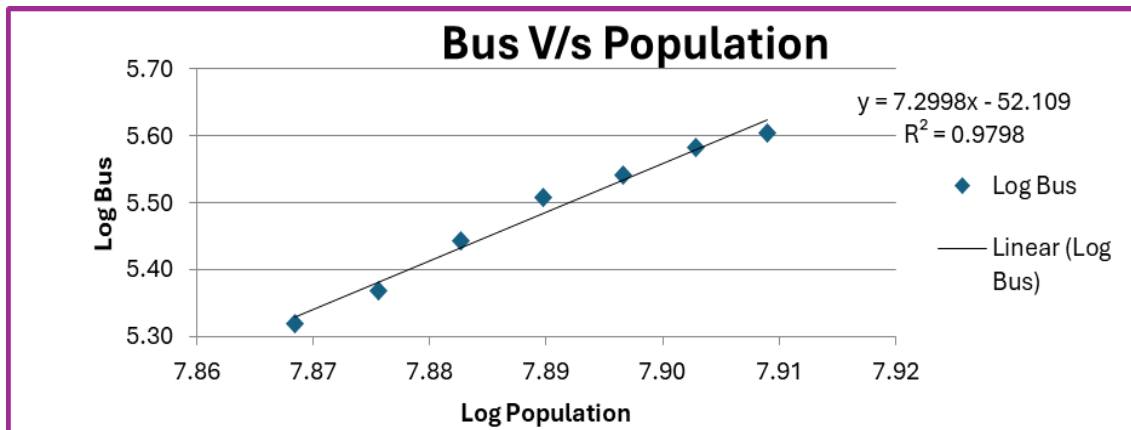


Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh

Table 5-6 : Population Vs Bus Madhya Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 72627000 | 181770 | 7.86 | 5.26 | | |
| 2012 | 73863000 | 208530 | 7.87 | 5.32 | 2% | |
| 2013 | 75099000 | 233569 | 7.88 | 5.37 | 2% | |
| 2014 | 76334000 | 277898 | 7.88 | 5.44 | 2% | |
| 2015 | 77570000 | 322227 | 7.89 | 5.51 | 2% | |
| 2016 | 78806000 | 347227 | 7.90 | 5.54 | 2% | |
| 2017 | 79948000 | 382227 | 7.90 | 5.58 | 1% | |
| 2018 | 81090000 | 402227 | 7.91 | 5.60 | 1% | 1.6% |

Regression analysis of same is given in figure below.

**Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh**

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-7 : Trucks Vs NSDP Madhya Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 28237104 | 121916 | 7.45 | 5.09 | | |
| 2012 | 30685334 | 131098 | 7.49 | 5.12 | 9% | |
| 2013 | 32259760 | 137815 | 7.51 | 5.14 | 5% | |
| 2014 | 33924690 | 150921 | 7.53 | 5.18 | 5% | |

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2015 | 37071567 | 177352 | 7.57 | 5.25 | 9% | |
| 2016 | 41946525 | 233553 | 7.62 | 5.37 | 13% | |
| 2017 | 44200243 | 289754 | 7.65 | 5.46 | 5% | |
| 2018 | 46928896 | 326291 | 7.67 | 5.51 | 6% | 7.6% |

The following figure depicts regression analysis and extrapolation.

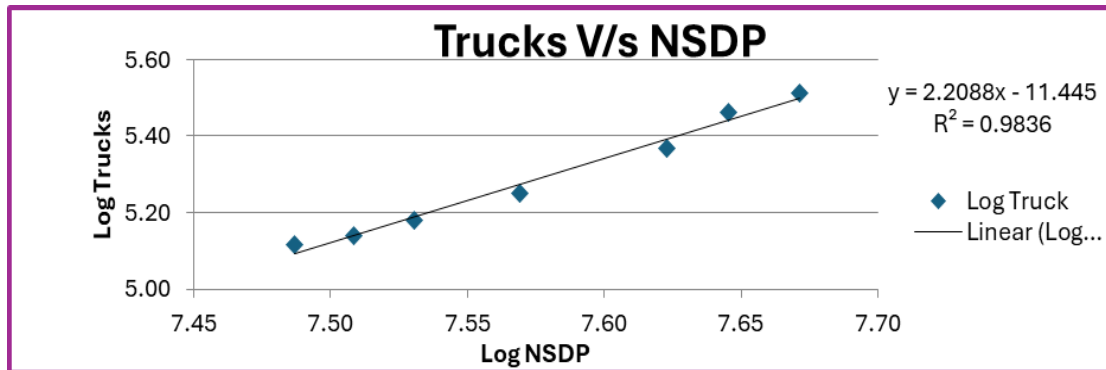


Figure 5-6 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Madhya Pradesh.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-8 : Summary Regression Analysis Madhya Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|----------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|-----------------------|----------------------|-----------------|
| MADHYA PRADESH | Car/Jeep | PCI | $y = 2.2965x - 4.8829$ | R ² = 0.9634 | 2.3 | 6% | 13.57% | Good Regression |
| | Bus | Population | $y = 7.4978x - 53.6722$ | R ² = 0.9862 | 7.5 | 2% | 11.90% | Good Regression |
| | Truck | NSDP | $y = 2.2088x - 11.4451$ | R ² = 0.9694 | 2.2 | 8% | 16.70% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Uttar Pradesh State.

Table 5-9 : Per Capita Income Vs Car Uttar Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 32002 | 1108100 | 4.51 | 6.04 | | |
| 2012 | 32908 | 1205374 | 4.52 | 6.08 | 3% | |
| 2013 | 34044 | 1423020 | 4.53 | 6.15 | 3% | |
| 2014 | 34583 | 1572217 | 4.54 | 6.20 | 2% | |
| 2015 | 36973 | 1746117 | 4.57 | 6.24 | 7% | |
| 2016 | 40847 | 2027972 | 4.61 | 6.31 | 10% | |
| 2017 | 41832 | 2195783 | 4.62 | 6.34 | 2% | |
| 2018 | 43670 | 2439845 | 4.64 | 6.39 | 4% | 4.6% |

Regression analysis of same is given in figure below.

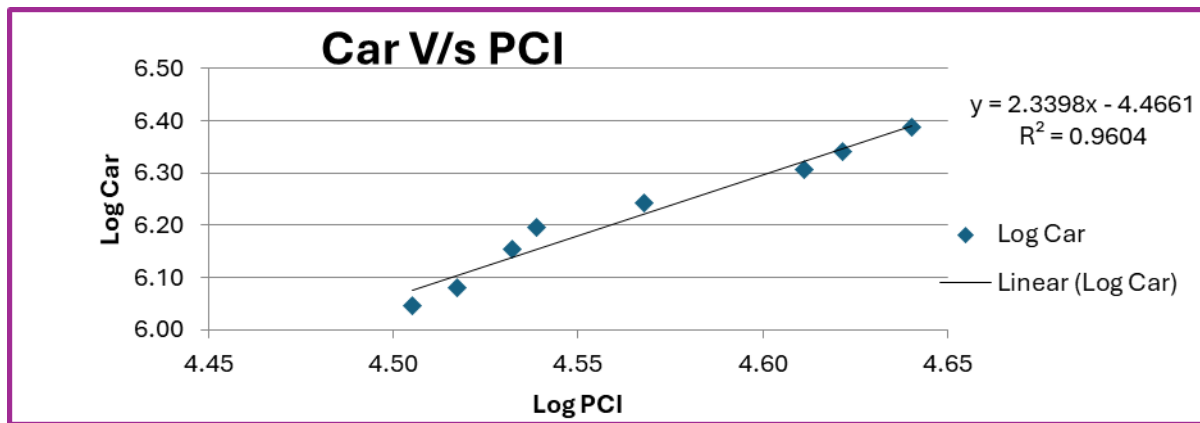


Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh

Table 5-10 : Population Vs Bus Uttar Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 199812000 | 57901 | 8.30 | 4.76 | | |
| 2012 | 203670000 | 64147 | 8.31 | 4.81 | 2% | |
| 2013 | 206322000 | 74389 | 8.31 | 4.87 | 1% | |
| 2014 | 209577000 | 80460 | 8.32 | 4.91 | 2% | |
| 2015 | 212832000 | 89127 | 8.33 | 4.95 | 2% | |
| 2016 | 216870000 | 112020 | 8.34 | 5.05 | 2% | |
| 2017 | 219510000 | 112766 | 8.34 | 5.05 | 1% | |
| 2018 | 222150000 | 121975 | 8.35 | 5.09 | 1% | 1.5% |

Regression analysis of same is given in figure below.

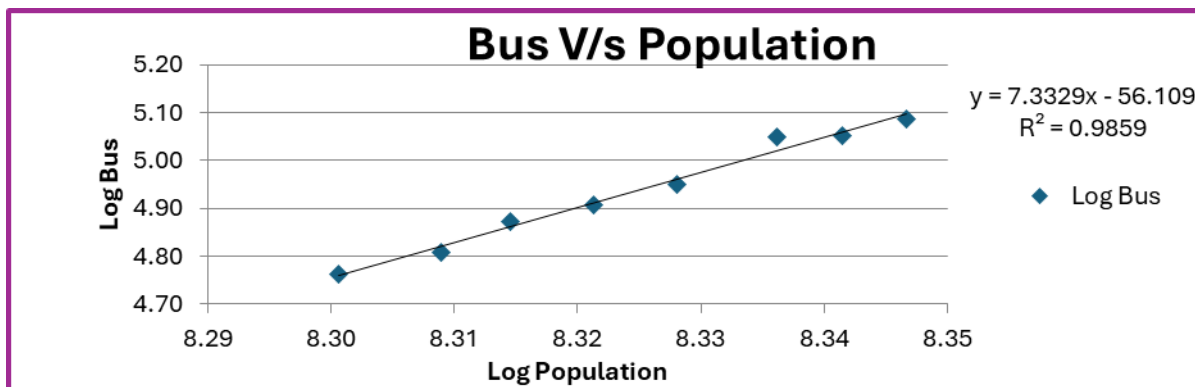


Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-11 : Trucks Vs NSDP Uutar Pradesh

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 64513155 | 162813 | 7.81 | 5.21 | | |
| 2012 | 67355218 | 186404 | 7.83 | 5.27 | 4% | |
| 2013 | 70746910 | 202761 | 7.85 | 5.31 | 5% | |
| 2014 | 72968630 | 217609 | 7.86 | 5.34 | 3% | |
| 2015 | 79204874 | 245688 | 7.90 | 5.39 | 9% | |
| 2016 | 88845325 | 265167 | 7.95 | 5.42 | 12% | |
| 2017 | 92380571 | 307096 | 7.97 | 5.49 | 4% | |
| 2018 | 97915937 | 356828 | 7.99 | 5.55 | 6% | 6.2% |

The following figure depicts regression analysis and extrapolation.

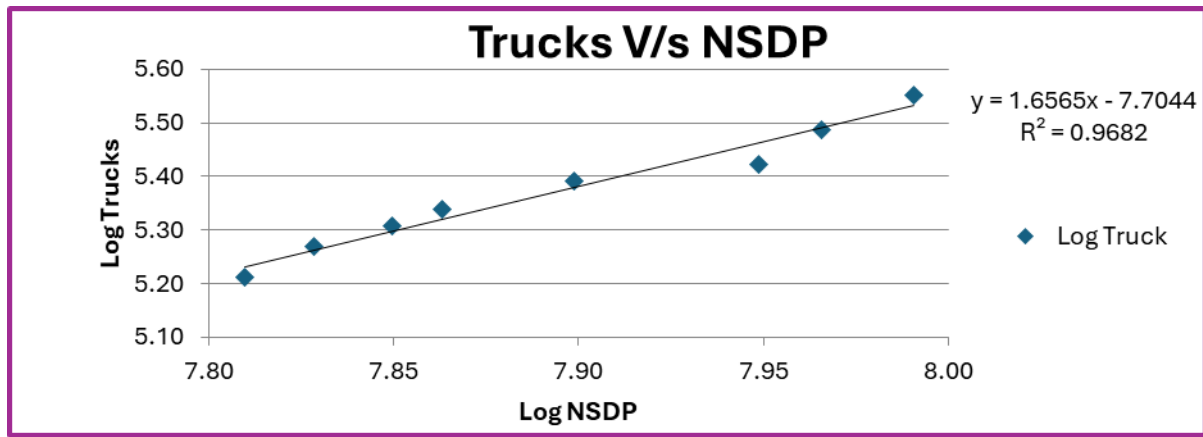


Figure 5-9 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Uttar Pradesh.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-12 : Summary Regression Analysis Uttar Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|---------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|-----------------------|----------------------|-----------------|
| UTTAR PRADESH | Car/Jeep | PCI | $y = 2.3398x - 4.4661$ | R ² = 0.9604 | 2.3398 | 4.58% | 10.72% | Good Regression |
| | Bus | Population | $y = 7.3329x - 56.1092$ | R ² = 0.9859 | 7.3329 | 1.53% | 11.19% | Good Regression |
| | Truck | NSDP | $y = 1.6565x - 7.7044$ | R ² = 0.9682 | 1.6565 | 6.18% | 10.24% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Gujrat State.

Table 5-13 : Per Capita Income Vs Car Gujrat

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 87481 | 1411898 | 4.94 | 6.15 | | |

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|--------|---------|---------|---------|------------|-------------------------|
| 2012 | 96683 | 1602129 | 4.99 | 6.20 | 11% | |
| 2013 | 102589 | 1771298 | 5.01 | 6.25 | 6% | |
| 2014 | 111370 | 2008748 | 5.05 | 6.30 | 9% | |
| 2015 | 120683 | 2260084 | 5.08 | 6.35 | 8% | |
| 2016 | 129738 | 2527537 | 5.11 | 6.40 | 8% | |
| 2017 | 143604 | 2794957 | 5.16 | 6.45 | 11% | |
| 2018 | 154887 | 3011656 | 5.19 | 6.48 | 8% | 8.5% |

Regression analysis of same is given in figure below.

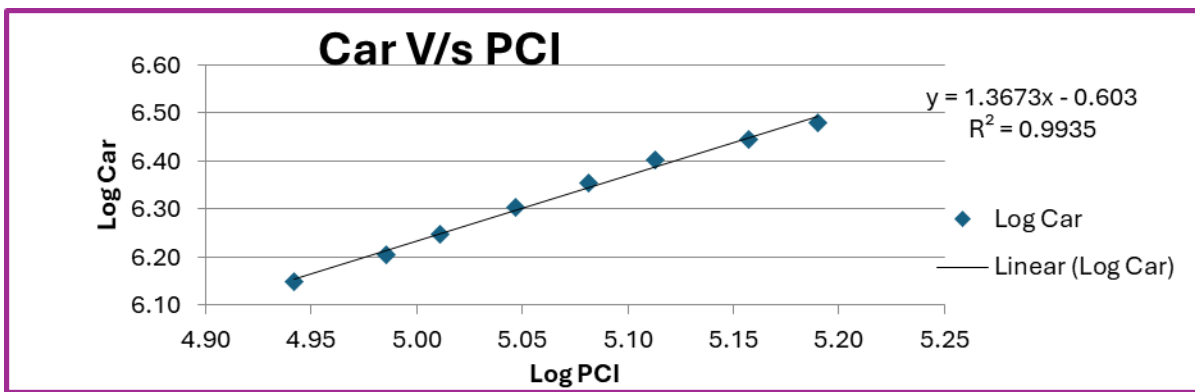


Figure 5-10 : Regression and Elasticity PCI vs. Car – Extrapolation Gujrat

Table 5-14 : Population Vs Bus Gujrat

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|-------|---------|---------|------------|-------------------------|
| 2011 | 60440000 | 67546 | 7.78 | 4.83 | | |
| 2012 | 61383000 | 70615 | 7.79 | 4.85 | 2% | |
| 2013 | 62327000 | 72998 | 7.79 | 4.86 | 2% | |
| 2014 | 63271000 | 76435 | 7.80 | 4.88 | 2% | |
| 2015 | 64214000 | 82734 | 7.81 | 4.92 | 1% | |
| 2016 | 65158000 | 81911 | 7.81 | 4.91 | 1% | |
| 2017 | 66084000 | 81087 | 7.82 | 4.91 | 1% | |
| 2018 | 67010000 | 86156 | 7.83 | 4.94 | 1% | 1.5% |

Regression analysis of same is given in figure below.

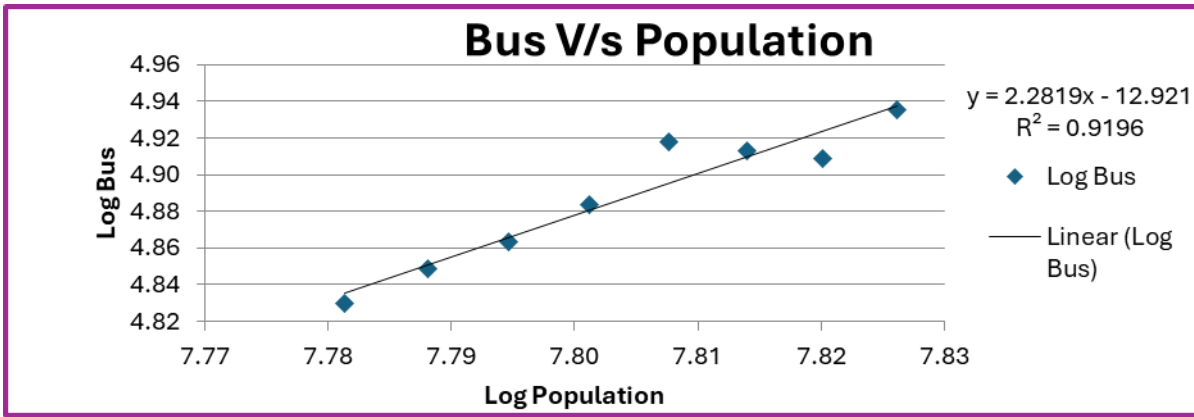


Figure 5-11 : Regression and Elasticity Population vs. Bus – Extrapolation Gujrat

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-15 : Trucks Vs NSDP Gujrat

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|-----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 53280946 | 301533 | 7.73 | 5.48 | | |
| 2012 | 59665883 | 319207 | 7.78 | 5.50 | 12% | |
| 2013 | 64148881 | 332185 | 7.81 | 5.52 | 8% | |
| 2014 | 70562884 | 352225 | 7.85 | 5.55 | 10% | |
| 2015 | 77477522 | 375265 | 7.89 | 5.57 | 10% | |
| 2016 | 84393034 | 396061 | 7.93 | 5.60 | 9% | |
| 2017 | 94651119 | 425799 | 7.98 | 5.63 | 12% | |
| 2018 | 103439901 | 457299 | 8.01 | 5.66 | 9% | 10.0% |

The following figure depicts regression analysis and extrapolation.

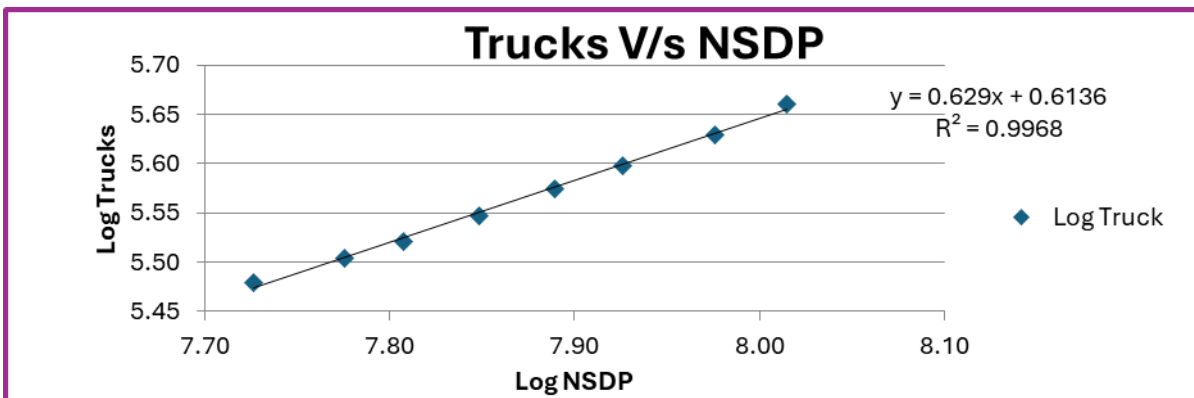


Figure 5-12 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Gujrat.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-16 : Summary Regression Analysis Gujrat

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|---------------|------------------|----------------------|-------------------------|-------------------------|----------------------------|-----------------------|----------------------|-----------------|
| GURJAT | Car/Jeep | PCI | $y = 1.3673x - 0.603$ | R ² = 0.9935 | 1.3673 | 8.51% | 11.64% | Good Regression |
| | Bus | Population | $y = 2.2819x - 12.9206$ | R ² = 0.9196 | 2.2819 | 1.49% | 3.39% | Good Regression |
| | Truck | NSDP | $y = 0.629x - 0.6136$ | R ² = 0.9968 | 0.6290 | 9.95% | 6.26% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Delhi State.

Table 5-17 : Per Capita Income Vs Car Delhi

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|--------|---------|---------|---------|------------|-------------------------|
| 2011 | 185001 | 2172069 | 5.27 | 6.34 | | |
| 2012 | 192220 | 2416974 | 5.28 | 6.38 | 4% | |
| 2013 | 200702 | 2568380 | 5.30 | 6.41 | 4% | |
| 2014 | 213669 | 2730071 | 5.33 | 6.44 | 6% | |
| 2015 | 233115 | 2986579 | 5.37 | 6.48 | 9% | |
| 2016 | 244255 | 3061817 | 5.39 | 6.49 | 5% | |
| 2017 | 252960 | 3087309 | 5.40 | 6.49 | 4% | |
| 2018 | 260967 | 3249670 | 5.42 | 6.51 | 3% | 5.1% |

Regression analysis of same is given in figure below.

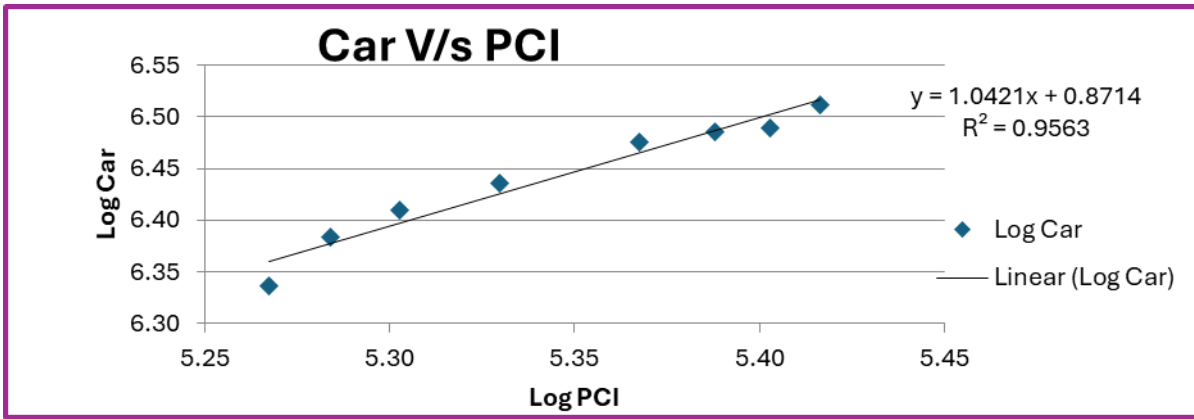


Figure 5-13 : Regression and Elasticity PCI vs. Car – Extrapolation Delhi

Table 5-18 : Population Vs Bus Delhi

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|-------|---------|---------|------------|-------------------------|
| 2011 | 16788000 | 20142 | 7.22 | 4.30 | | |
| 2012 | 17166000 | 24642 | 7.23 | 4.39 | 2% | |
| 2013 | 17544000 | 28142 | 7.24 | 4.45 | 2% | |
| 2014 | 17921000 | 33342 | 7.25 | 4.52 | 2% | |
| 2015 | 18299000 | 43723 | 7.26 | 4.64 | 2% | |
| 2016 | 18677000 | 51823 | 7.27 | 4.71 | 2% | |
| 2017 | 19056000 | 61023 | 7.28 | 4.79 | 2% | |
| 2018 | 19435000 | 71043 | 7.29 | 4.85 | 2% | 2.1% |

Regression analysis of same is given in figure below.

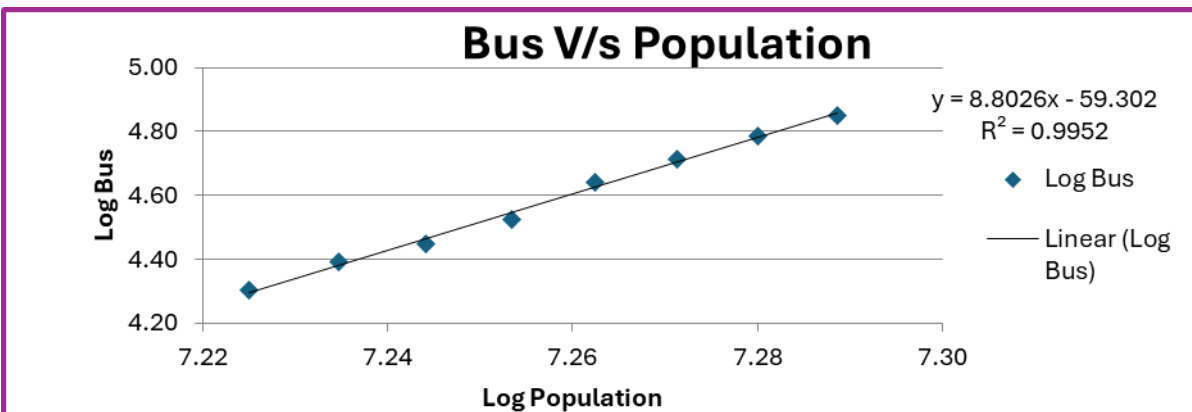


Figure 5-14 : Regression and Elasticity Population vs. Bus – Extrapolation Delhi

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-19 : Trucks Vs NSDP Delhi

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 31465002 | 149277 | 7.50 | 5.17 | | |
| 2012 | 33419330 | 157277 | 7.52 | 5.20 | 6% | |
| 2013 | 35652751 | 165477 | 7.55 | 5.22 | 7% | |
| 2014 | 38763874 | 174577 | 7.59 | 5.24 | 9% | |
| 2015 | 43172959 | 185027 | 7.64 | 5.27 | 11% | |
| 2016 | 46159238 | 196527 | 7.66 | 5.29 | 7% | |
| 2017 | 48763115 | 208417 | 7.69 | 5.32 | 6% | |
| 2018 | 51295715 | 220417 | 7.71 | 5.34 | 5% | 7.2% |

The following figure depicts regression analysis and extrapolation.

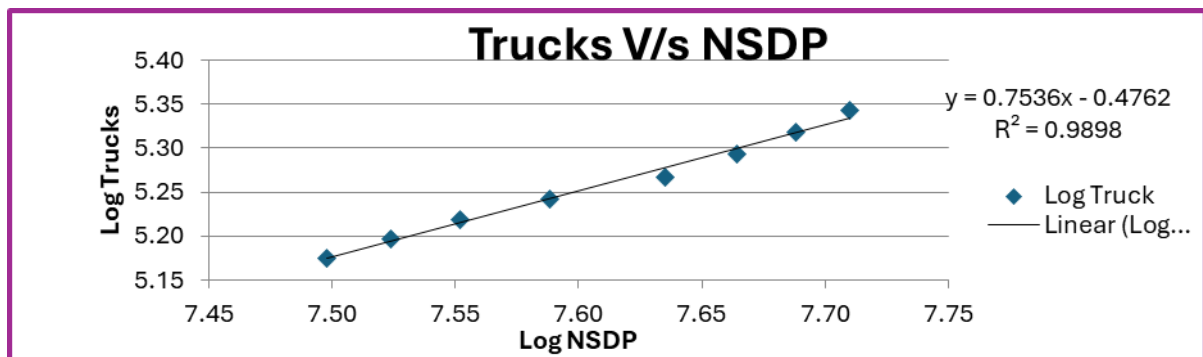


Figure 5-15 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Delhi.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

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

Table 5-20 : Summary Regression Analysis Delhi

Economical model for predicting growth is good tool, however other local, regional, national factors

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|-------------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| DELHI | Car/Jeep | PCI | $y = 1.0421x - 0.8714$ | $R^2 = 0.9563$ | 1.0421 | 5.05% | 5.27% | Good Regression |
| | Bus | Population | $y = 8.8026x - 59.3021$ | $R^2 = 0.9952$ | 8.8026 | 2.11% | 18.61% | Good Regression |
| | Truck | NSDP | $y = 0.7536x - 0.4762$ | $R^2 = 0.9898$ | 0.7536 | 7.25% | 5.46% | Good Regression |

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.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Kota Bypass has recently been awarded to Concessionaire. Hence credible historical traffic data is currently not available.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

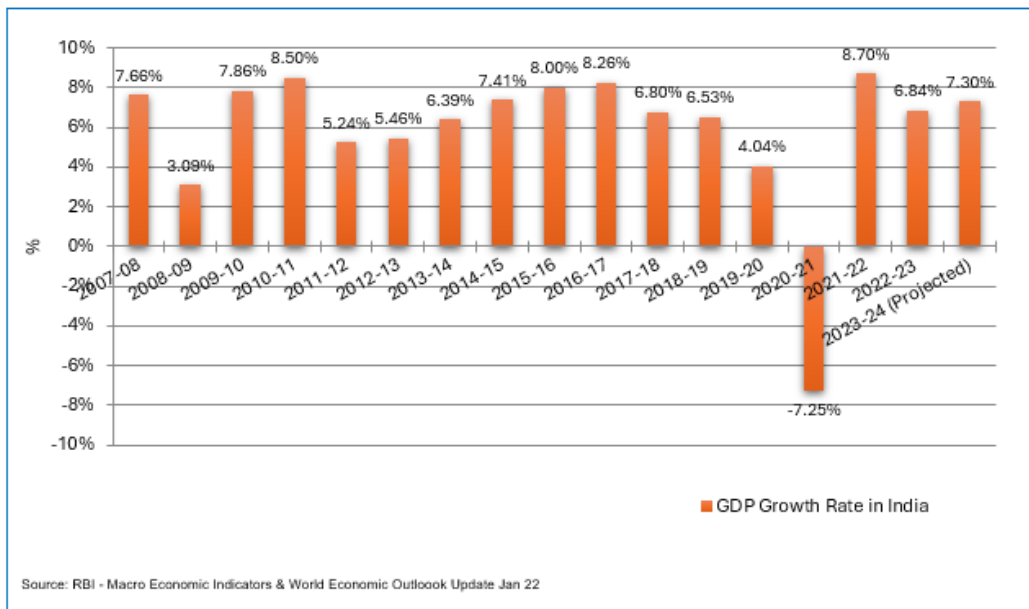


Figure 5-16 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. Leading banking and financial institutions have estimated that India would keep on registering good growth in coming years and the growth in year 2023-24 is expected to be around 7.3%.

5.6 Developments along and around the Project Corridor & State

RAJASTHAN: Rajasthan is a state where tradition and glory meet in the midst of colours. It is endowed with magnificent forts, palaces, havellies, natural resources, heritage, beauty and culture. With the lofty hills of Aravali—one of the oldest mountain ranges of the world and the golden sand dunes of the Great Indian Desert, Rajasthan is the only desert of the sub-continent. Rajasthan is located in the north-western region of India. It is the largest State in the Republic of India. It forms a corridor between the northern and the western states in the country.

KOTA DISTRICT: Kota district is one of the fifty districts of Rajasthan state. Kota is also the educational headquarters of this state. The town is considered as the Coaching Centre Hub of India.

Overall Rajasthan has 11th rank in India in terms of GDP. The state economy has shown promising growth in the past year in the range of 8-9% and it is expected that this would continue to grow in the same pattern and would contribute to growth of economy of country and region.

From the above it can be expected that the project corridor would serve as one of the important transportation links in the area and would contribute to the growth of the region.

5.7 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. Traffic growth has been suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Stretch

Table 5-21 : Recommended Growth Rates Optimistic

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 8.48% | 7.48% | 6.62% | 6.39% | 5.51% |
| Mini LCV | 4.78% | 3.29% | 2.38% | 2.01% | 2.79% |
| Bus | 4.09% | 2.58% | 2.36% | 2.14% | 1.94% |
| Mini - Bus | 4.09% | 2.58% | 2.36% | 2.14% | 1.94% |
| LCV | 4.78% | 3.29% | 2.38% | 2.01% | 1.82% |
| 2- Axle | 4.43% | 3.29% | 2.38% | 2.01% | 1.82% |
| 3 - Axle | 4.43% | 3.29% | 2.38% | 2.01% | 1.82% |
| 4 to6 Axle | 5.82% | 4.31% | 3.09% | 2.60% | 2.34% |
| 7 and Above Axle | 4.43% | 3.29% | 2.38% | 2.01% | 1.82% |

Table 5-22 : Recommended Growth Rates Pessimistic

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 7.98% | 6.98% | 6.12% | 5.89% | 5.01% |
| Mini LCV | 4.28% | 2.79% | 1.88% | 1.51% | 2.29% |
| Bus | 3.59% | 2.08% | 1.86% | 1.64% | 1.44% |
| Mini - Bus | 3.59% | 2.08% | 1.86% | 1.64% | 1.44% |
| LCV | 4.28% | 2.79% | 1.88% | 1.51% | 1.32% |
| 2- Axle | 3.93% | 2.79% | 1.88% | 1.51% | 1.32% |
| 3 - Axle | 3.93% | 2.79% | 1.88% | 1.51% | 1.32% |
| 4 to6 Axle | 5.32% | 3.81% | 2.59% | 2.10% | 1.84% |
| 7 and Above Axle | 3.93% | 2.79% | 1.88% | 1.51% | 1.32% |

Table 5-23 : Recommended Growth Rates Most Likely

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|-------------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 8.23% | 7.23% | 6.37% | 6.14% | 5.26% |
| Mini LCV | 4.53% | 3.04% | 2.13% | 1.76% | 2.54% |
| Bus | 3.84% | 2.33% | 2.11% | 1.89% | 1.69% |
| Mini - Bus | 3.84% | 2.33% | 2.11% | 1.89% | 1.69% |
| LCV | 4.53% | 3.04% | 2.13% | 1.76% | 1.57% |
| 2- Axle | 4.18% | 3.04% | 2.13% | 1.76% | 1.57% |
| 3 - Axle | 4.18% | 3.04% | 2.13% | 1.76% | 1.57% |
| 4 to6 Axle | 5.57% | 4.06% | 2.84% | 2.35% | 2.09% |
| 7 and Above Axle | 4.18% | 3.04% | 2.13% | 1.76% | 1.57% |

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza - Chainage 1055+217 KM/1058+837 KM
(Optimistic Growth Scenario)

| Year | Car/Jeep / Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|---------|----------------|----------|-----|---------|-----|--------|----------|-------------|------------------|---------------|--------------------------|
| 2024-25 | 3687 | 350 | 56 | 15 | 538 | 562 | 778 | 2638 | 0 | 8624 | 20926 |
| 2025-26 | 4000 | 367 | 58 | 16 | 564 | 587 | 812 | 2792 | 0 | 9196 | 22172 |
| 2026-27 | 4339 | 385 | 60 | 17 | 591 | 613 | 848 | 2955 | 0 | 9808 | 23497 |
| 2027-28 | 4707 | 403 | 62 | 18 | 619 | 640 | 886 | 3127 | 0 | 10462 | 24901 |
| 2028-29 | 5106 | 422 | 65 | 19 | 649 | 668 | 925 | 3309 | 0 | 11163 | 26395 |
| 2029-30 | 5488 | 436 | 67 | 19 | 670 | 690 | 955 | 3452 | 0 | 11777 | 27628 |
| 2030-31 | 5899 | 450 | 69 | 19 | 692 | 713 | 986 | 3601 | 0 | 12429 | 28924 |
| 2031-32 | 6340 | 465 | 71 | 19 | 715 | 736 | 1018 | 3756 | 0 | 13120 | 30283 |
| 2032-33 | 6814 | 480 | 73 | 19 | 739 | 760 | 1052 | 3918 | 0 | 13855 | 31717 |
| 2033-34 | 7324 | 496 | 75 | 19 | 763 | 785 | 1087 | 4087 | 0 | 14636 | 33226 |
| 2034-35 | 7809 | 508 | 77 | 19 | 781 | 804 | 1113 | 4213 | 0 | 15324 | 34458 |
| 2035-36 | 8326 | 520 | 79 | 19 | 800 | 823 | 1139 | 4343 | 0 | 16049 | 35741 |
| 2036-37 | 8877 | 532 | 81 | 19 | 819 | 843 | 1166 | 4477 | 0 | 16814 | 37083 |
| 2037-38 | 9465 | 545 | 83 | 19 | 838 | 863 | 1194 | 4615 | 0 | 17622 | 38483 |
| 2038-39 | 10092 | 558 | 85 | 19 | 858 | 884 | 1222 | 4758 | 0 | 18476 | 39950 |
| 2039-40 | 10736 | 569 | 87 | 19 | 875 | 902 | 1247 | 4882 | 0 | 19317 | 41323 |
| 2040-41 | 11422 | 580 | 89 | 19 | 893 | 920 | 1272 | 5009 | 0 | 20204 | 42754 |
| 2041-42 | 12151 | 592 | 91 | 19 | 911 | 939 | 1298 | 5139 | 0 | 21140 | 44248 |
| 2042-43 | 12927 | 604 | 93 | 19 | 929 | 958 | 1324 | 5273 | 0 | 22127 | 45807 |
| 2043-44 | 13753 | 616 | 95 | 19 | 948 | 977 | 1351 | 5410 | 0 | 23169 | 47434 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza 1 - Chainage 1055+217 KM/1058+837 KM
(Pessimistic Growth Scenario)**

| Year | Car/Jeep / Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|---------|----------------|----------|-----|---------|-----|---------|----------|-------------|------------------|---------------|--------------------------|
| 2024-25 | 3670 | 348 | 56 | 15 | 535 | 559 | 774 | 2626 | 0 | 8583 | 20827 |
| 2025-26 | 3963 | 363 | 58 | 16 | 558 | 581 | 804 | 2766 | 0 | 9109 | 21963 |
| 2026-27 | 4279 | 379 | 60 | 17 | 582 | 604 | 836 | 2913 | 0 | 9670 | 23165 |
| 2027-28 | 4620 | 395 | 62 | 18 | 607 | 628 | 869 | 3068 | 0 | 10267 | 24436 |
| 2028-29 | 4989 | 412 | 64 | 19 | 633 | 653 | 903 | 3231 | 0 | 10904 | 25779 |
| 2029-30 | 5337 | 424 | 65 | 19 | 651 | 671 | 928 | 3354 | 0 | 11449 | 26851 |
| 2030-31 | 5710 | 436 | 66 | 19 | 669 | 690 | 954 | 3482 | 0 | 12026 | 27977 |
| 2031-32 | 6109 | 448 | 67 | 19 | 688 | 709 | 981 | 3615 | 0 | 12636 | 29156 |
| 2032-33 | 6536 | 461 | 68 | 19 | 707 | 729 | 1008 | 3753 | 0 | 13281 | 30390 |
| 2033-34 | 6992 | 474 | 69 | 19 | 727 | 749 | 1036 | 3896 | 0 | 13962 | 31679 |
| 2034-35 | 7420 | 483 | 70 | 19 | 741 | 763 | 1055 | 3997 | 0 | 14548 | 32694 |
| 2035-36 | 7874 | 492 | 71 | 19 | 755 | 777 | 1075 | 4100 | 0 | 15163 | 33746 |
| 2036-37 | 8356 | 501 | 72 | 19 | 769 | 792 | 1095 | 4206 | 0 | 15810 | 34843 |
| 2037-38 | 8867 | 510 | 73 | 19 | 783 | 807 | 1116 | 4315 | 0 | 16490 | 35986 |
| 2038-39 | 9410 | 520 | 74 | 19 | 798 | 822 | 1137 | 4427 | 0 | 17207 | 37176 |
| 2039-40 | 9964 | 528 | 75 | 19 | 810 | 834 | 1154 | 4520 | 0 | 17904 | 38265 |
| 2040-41 | 10550 | 536 | 76 | 19 | 822 | 847 | 1171 | 4615 | 0 | 18636 | 39397 |
| 2041-42 | 11171 | 544 | 77 | 19 | 834 | 860 | 1189 | 4712 | 0 | 19406 | 40577 |
| 2042-43 | 11829 | 552 | 78 | 19 | 847 | 873 | 1207 | 4811 | 0 | 20216 | 41804 |
| 2043-44 | 12525 | 560 | 79 | 19 | 860 | 886 | 1225 | 4912 | 0 | 21066 | 43078 |

Traffic projections for Most Likely scenario is given as under

**Table 6-3 : Total Tollable Traffic @ Toll Plaza 1 - Chainage 1055+217 KM/1055+217 KM/1058+837 KM
(Most Likely Growth Scenario)**

| Year | Car/Jeep / Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|---------|----------------|----------|-----|---------|-----|---------|----------|-------------|------------------|---------------|--------------------------|
| 2024-25 | 3679 | 349 | 56 | 15 | 536 | 560 | 776 | 2632 | 0 | 8603 | 20875 |
| 2025-26 | 3982 | 365 | 58 | 16 | 560 | 583 | 808 | 2779 | 0 | 9151 | 22064 |
| 2026-27 | 4310 | 382 | 60 | 17 | 585 | 607 | 842 | 2934 | 0 | 9737 | 23325 |
| 2027-28 | 4665 | 399 | 62 | 18 | 611 | 632 | 877 | 3097 | 0 | 10361 | 24657 |
| 2028-29 | 5049 | 417 | 64 | 19 | 639 | 658 | 914 | 3270 | 0 | 11030 | 26076 |
| 2029-30 | 5414 | 430 | 65 | 19 | 658 | 678 | 942 | 3403 | 0 | 11609 | 27228 |
| 2030-31 | 5806 | 443 | 67 | 19 | 678 | 699 | 971 | 3541 | 0 | 12224 | 28440 |
| 2031-32 | 6226 | 456 | 69 | 19 | 699 | 720 | 1001 | 3685 | 0 | 12875 | 29712 |
| 2032-33 | 6676 | 470 | 71 | 19 | 720 | 742 | 1031 | 3835 | 0 | 13564 | 31044 |

| Year | Car/Jeep / Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|----------------|----------------|----------|-----|---------|-----|---------|----------|------------|------------------|---------------|--------------------------|
| 2033-34 | 7159 | 484 | 73 | 19 | 742 | 765 | 1062 | 3991 | 0 | 14295 | 32444 |
| 2034-35 | 7615 | 494 | 75 | 19 | 758 | 781 | 1085 | 4104 | 0 | 14931 | 33566 |
| 2035-36 | 8100 | 505 | 77 | 19 | 774 | 798 | 1108 | 4220 | 0 | 15601 | 34734 |
| 2036-37 | 8616 | 516 | 79 | 19 | 790 | 815 | 1132 | 4340 | 0 | 16307 | 35954 |
| 2037-38 | 9165 | 527 | 81 | 19 | 807 | 832 | 1156 | 4463 | 0 | 17050 | 37222 |
| 2038-39 | 9749 | 538 | 83 | 19 | 824 | 850 | 1181 | 4590 | 0 | 17834 | 38549 |
| 2039-40 | 10347 | 547 | 85 | 19 | 839 | 865 | 1202 | 4698 | 0 | 18602 | 39778 |
| 2040-41 | 10982 | 557 | 87 | 19 | 854 | 880 | 1223 | 4808 | 0 | 19410 | 41055 |
| 2041-42 | 11656 | 567 | 89 | 19 | 869 | 896 | 1245 | 4921 | 0 | 20262 | 42390 |
| 2042-43 | 12371 | 577 | 91 | 19 | 884 | 912 | 1267 | 5037 | 0 | 21158 | 43779 |
| 2043-44 | 13130 | 587 | 93 | 19 | 900 | 928 | 1289 | 5155 | 0 | 22101 | 45223 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3rd rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers or whose frequency does not yield any discount from the above categories.
4. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van - Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2022-23. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

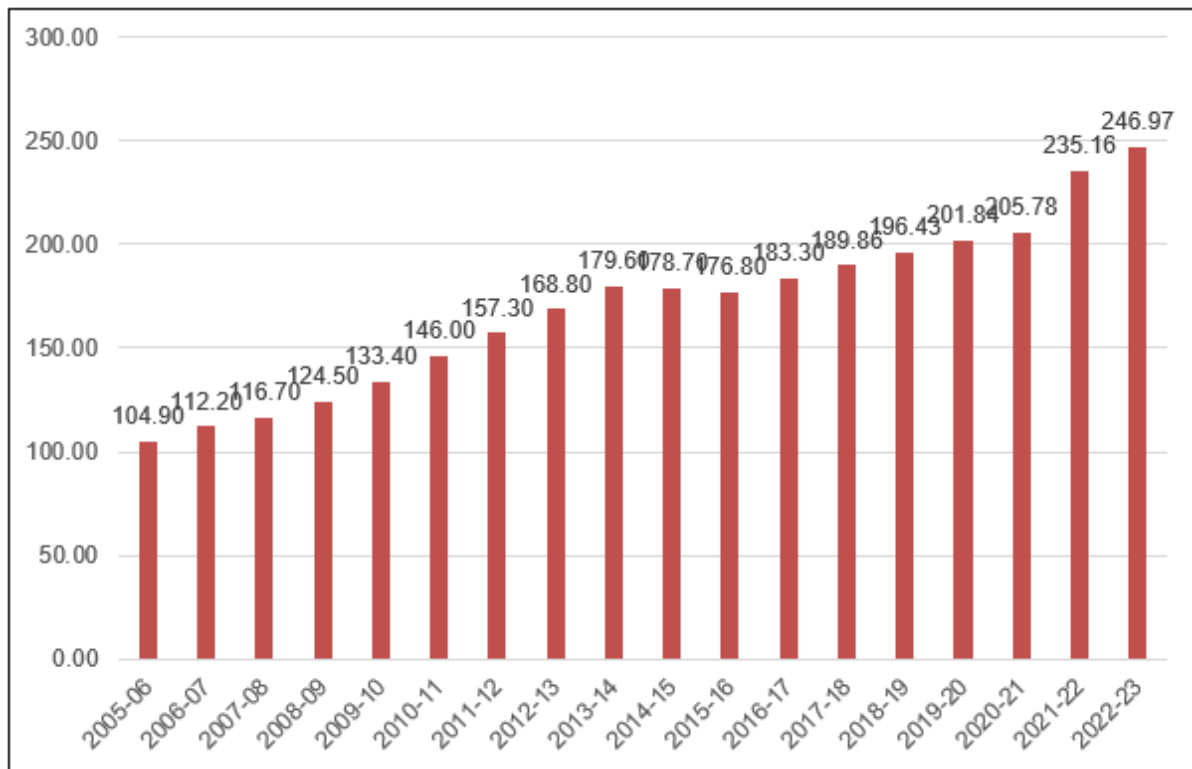


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--------------------------------------|-----------------------------------|
| Oversized Vehicles (7 or more Axles) | 4.20 |

These rates are then modified for as per procedure provided in guidelines of notification considering factors listed below.

- Annual revision of fee rate - @3%
- Application of WPI

Base rates have been worked out to map the current rates. These shall be updated when more details come in. Base toll rates are given below.

**Table 7-2 : Toll Rates for Year 2023-24 (Rs. Rupees) @ Toll Plaza 1 - Chainage 1055+217
KM/1055+217 KM/1058+837 KM**

| Sr.no | Type of Vehicle | Rates (2023-24) |
|-------|------------------|--------------------|
| 1 | Car / Jeep / Van | 80.00 |
| 2 | Mini LCV | 80.00 |
| 3 | Bus | 260.00 |
| 4 | Minibus | 125.00 |
| 5 | LCV | 125.00 |
| 6 | Truck - 2 Axle | 260.00 |
| 7 | 3 - Axle | 285.00 |
| 8 | 4 - 6 Axle | 410.00 |
| 9 | 7 & above Axle | 500.00 |

Above rates are applicable for base year 2023-24. These rates have been escalated for future year as NHAI policy and MORTH guideline for future revenue working

**Table 7-3 : Toll Rates for Forecasting Year (Rs. Rupees) @ Toll Plaza 1 - Chainage 1055+217
KM/1055+217 KM/1058+837 KM**

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle |
|---------|--------------|----------|-----|---------|-----|------------|-------------|----------------|------------------------|
| 2024-25 | 80 | 80 | 270 | 130 | 130 | 270 | 295 | 420 | 515 |
| 2025-26 | 85 | 85 | 285 | 135 | 135 | 285 | 310 | 445 | 540 |
| 2026-27 | 90 | 90 | 295 | 140 | 140 | 295 | 325 | 465 | 565 |
| 2027-28 | 90 | 90 | 310 | 150 | 150 | 310 | 340 | 490 | 595 |
| 2028-29 | 95 | 95 | 330 | 155 | 155 | 330 | 360 | 515 | 625 |

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle |
|---------|--------------|----------|-----|---------|-----|--------|----------|-------------|------------------|
| 2029-30 | 100 | 100 | 345 | 165 | 165 | 345 | 375 | 540 | 660 |
| 2030-31 | 105 | 105 | 360 | 175 | 175 | 360 | 395 | 570 | 690 |
| 2031-32 | 115 | 115 | 380 | 180 | 180 | 380 | 415 | 595 | 725 |
| 2032-33 | 120 | 120 | 400 | 190 | 190 | 400 | 435 | 630 | 765 |
| 2033-34 | 125 | 125 | 420 | 200 | 200 | 420 | 460 | 660 | 805 |
| 2034-35 | 130 | 130 | 445 | 210 | 210 | 445 | 485 | 695 | 845 |
| 2035-36 | 140 | 140 | 465 | 225 | 225 | 465 | 510 | 730 | 890 |
| 2036-37 | 145 | 145 | 490 | 235 | 235 | 490 | 535 | 770 | 940 |
| 2037-38 | 155 | 155 | 520 | 245 | 245 | 520 | 565 | 810 | 990 |
| 2038-39 | 160 | 160 | 545 | 260 | 260 | 545 | 595 | 855 | 1040 |
| 2039-40 | 170 | 170 | 575 | 275 | 275 | 575 | 625 | 900 | 1095 |
| 2040-41 | 180 | 180 | 605 | 290 | 290 | 605 | 660 | 950 | 1155 |
| 2041-42 | 190 | 190 | 640 | 305 | 305 | 640 | 695 | 1000 | 1220 |
| 2042-43 | 200 | 200 | 670 | 320 | 320 | 670 | 735 | 1055 | 1285 |
| 2043-44 | 210 | 210 | 710 | 340 | 340 | 710 | 775 | 1110 | 1355 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2043-44 years starting from the year 2023-24 are shown in tables below.

Table 7-4 : Toll Revenue Optimistic Scenario
(Rs. Crores)

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2024-25 | 61.85 | 61.85 |
| 2025-26 | 69.27 | 69.27 |
| 2026-27 | 76.76 | 76.76 |
| 2027-28 | 85.09 | 85.09 |
| 2028-29 | 94.64 | 94.64 |
| 2029-30 | 103.78 | 103.78 |
| 2030-31 | 114.33 | 114.33 |
| 2031-32 | 126.43 | 126.43 |

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2032-33 | 139.06 | 139.06 |
| 2033-34 | 152.49 | 152.49 |
| 2034-35 | 165.99 | 165.99 |
| 2035-36 | 182.12 | 182.12 |
| 2036-37 | 197.56 | 197.56 |
| 2037-38 | 216.32 | 216.32 |
| 2038-39 | 235.41 | 235.41 |
| 2039-40 | 257.22 | 257.22 |
| 2040-41 | 279.87 | 279.87 |
| 2041-42 | 304.76 | 304.76 |
| 2042-43 | 332.01 | 332.01 |
| 2043-44 | 362.33 | 362.33 |

Table 7-5 : Toll Revenue Pessimistic Scenario

(Rs. Crores)

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2024-25 | 61.56 | 61.56 |
| 2025-26 | 68.62 | 68.62 |
| 2026-27 | 75.68 | 75.68 |
| 2027-28 | 83.50 | 83.50 |
| 2028-29 | 92.43 | 92.43 |
| 2029-30 | 100.86 | 100.86 |
| 2030-31 | 110.59 | 110.59 |
| 2031-32 | 121.72 | 121.72 |
| 2032-33 | 133.23 | 133.23 |
| 2033-34 | 145.38 | 145.38 |
| 2034-35 | 157.48 | 157.48 |
| 2035-36 | 171.94 | 171.94 |
| 2036-37 | 185.61 | 185.61 |
| 2037-38 | 202.26 | 202.26 |
| 2038-39 | 219.04 | 219.04 |
| 2039-40 | 238.15 | 238.15 |
| 2040-41 | 257.86 | 257.86 |
| 2041-42 | 279.44 | 279.44 |
| 2042-43 | 302.95 | 302.95 |
| 2043-44 | 329.00 | 329.00 |

**Table 7-6 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

| Location / Year | TP-01 | Total |
|------------------------|--------------|--------------|
| 2024-25 | 61.70 | 61.70 |
| 2025-26 | 68.93 | 68.93 |
| 2026-27 | 76.20 | 76.20 |
| 2027-28 | 84.26 | 84.26 |
| 2028-29 | 93.50 | 93.50 |
| 2029-30 | 102.28 | 102.28 |
| 2030-31 | 112.42 | 112.42 |
| 2031-32 | 124.04 | 124.04 |
| 2032-33 | 136.11 | 136.11 |
| 2033-34 | 148.90 | 148.90 |
| 2034-35 | 161.69 | 161.69 |
| 2035-36 | 176.98 | 176.98 |
| 2036-37 | 191.54 | 191.54 |
| 2037-38 | 209.22 | 209.22 |
| 2038-39 | 227.14 | 227.14 |
| 2039-40 | 247.59 | 247.59 |
| 2040-41 | 268.73 | 268.73 |
| 2041-42 | 291.95 | 291.95 |
| 2042-43 | 317.29 | 317.29 |
| 2043-44 | 345.42 | 345.42 |

7.6 Modification in Concession Period

Modification of the concession period shall be done on the basis of Revenue targets given in the contract for milestones 1 & 2.

Modification in concession period as per provisions of DCA and same is summarized in table for all scenarios.

Pessimistic Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|------------------------------------|--|---------------------------------------|--|
| Target Month - March 2031 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period (Year) | Modified Concession Period | | |
| TOT-13 - Kota | 9.11 | 10.64 | 16.76 % | No | - | 0.00% | 20.00 | 0.00 | | | |
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2038 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period | Total Change in Concession period (Year) | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-13 - Kota | 16.81 | 17.59 | 4.63 % | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

Most likely Case

| Target Point 1- March 2033 | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|------------------------------------|----------------------------|--|
| Target Month - March 2031 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period (Year) | Modified Concession Period | |
| TOT-13 - Kota | 9.11 | 10.86 | 19.16 % | No | - | 0.00% | 20.00 | 0.00 | | |

| Target Point 2- March 2038 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|-----------------------------|--|---------------------------------------|--|
| Target Month - March 2038 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period | Total Change in Concession period (Year) | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-13 - Kota | 16.81 | 18.22 | 8.39 % | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

Optimistic Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|------------------------------------|--|---------------------------------------|--|
| Target Month - March 2031 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period (Year) | Modified Concession Period | | |
| TOT-13 - Kota | 9.11 | 11.08 | 21.63 % | Yes | 1.63% | - 1.22% | 20.00 | -0.24 | | | |
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2038 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period | Total Change in Concession period (Year) | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-13 - Kota | 16.81 | 18.86 | 12.22 % | No | - | 0.00% | 20.00 | 0.00 | -0.24 | 19.76 | |

TOT-13 (Kota bypass)-Modification in Concession Period

| Types of Scenarios | Pessimistic Case | | Most likely Case | | Optimistic Case | |
|--|------------------|--------|------------------|--------|-----------------|--------|
| | Mar-31 | Mar-38 | Mar-31 | Mar-38 | Mar-31 | Mar-38 |
| Target Month | | | | | | |
| Target Revenue (Rs. Crores) | 9.11 | 16.81 | 9.11 | 16.81 | 9.11 | 16.81 |
| Calculated Revenue (Rs. Crores) | 10.64 | 17.59 | 10.86 | 18.22 | 11.08 | 18.86 |
| Differences % | 16.76% | 4.63% | 19.16% | 8.39% | 21.63% | 12.22% |
| If qualifies for Modification in Concession Period | No | No | No | No | Yes | No |
| Qualifying Increment or shortfall | - | - | - | - | 1.63% | - |
| Change in Concession period % | 0.00% | 0.00% | 0.00% | 0.00% | -1.22% | 0.00% |
| Original Concession Period | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Change in Concession period | 0.00 | 0.00 | 0.00 | 0.00 | -0.24 | 0.00 |
| Total Change in Concession period | 0.00 | | 0.00 | | -0.24 | |
| Calculated Modified Concession Period | 20.00 | | 20.00 | | 19.76 | |
| Final Concession Period subject to Cap | 0.00 | | 0.00 | | 0.00 | |

Thus, there is no modification expected in concession period due to variation in revenue as per above estimates in *Pessimistic & Most likely scenarios*.

Only negative variation of about 89 days in concession period is expected as per revenue in *Optimistic scenarios*.

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Kota Bypass from Km 1052+429 to Km 1080+249 section of NH-27 in state of Rajasthan is currently four lane road. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the important regional network East-West connectivity. Kota Bypass is part of Silchar – Porbandar East – West Corridor. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As discussed, dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the 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 due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road

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



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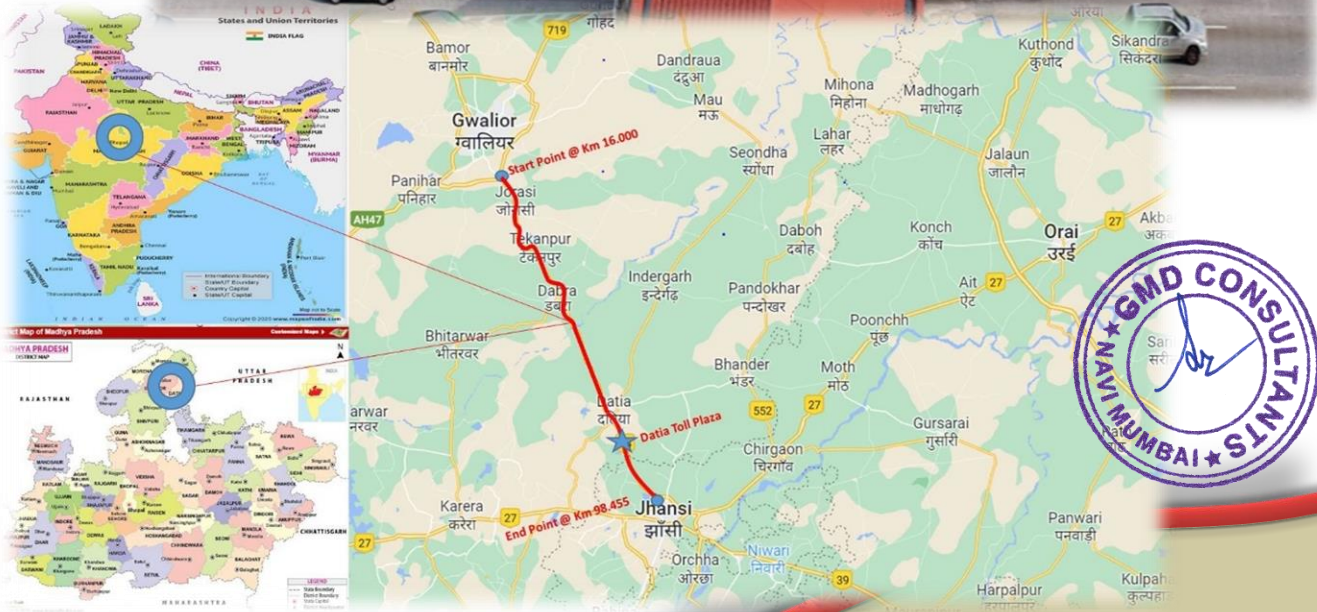
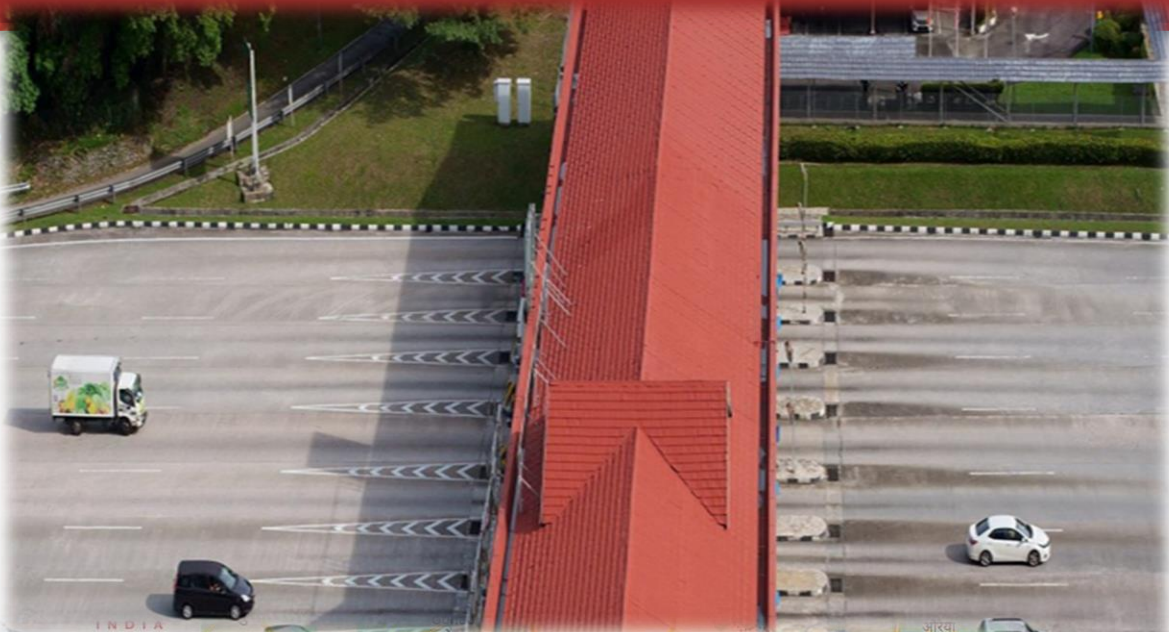
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Gwalior -Jhansi section from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh (TOT Bundle -13)



**TRAFFIC STUDY &
REVENUE
PROJECTION REPORT
(FINAL)
MARCH 2024**

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(New NH-44) in the state of Madhya Pradesh and
Uttar Pradesh
(TOT Bundle -13)**

**TRAFFIC STUDY & REVENUE
PROJECTION REPORT
(FINAL)**

MARCH 2024



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ABBREVIATIONS

| | | | |
|--------------|--|----------------|---|
| AADT | - Annual Average Daily Traffic | NHAI | - National Highway 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 National Highways Authority of India (NHAI) introduced the Toll, Operate and Transfer (TOT) model for partnership with private developers in the road sector. Under this model, NHAI passes on the toll collection rights and operation and maintenance obligations for 20 years to the private developer against payment of upfront, one-time, lump sum concession fees quoted by the private developer as part of the comprehensive bidding process. Projects under this model are awarded as a bundle of operational national highways, which allows the investor to offset the risks of one project against another. Existing and operational roads are auctioned under the TOT model.

Under the Toll Operate and Transfer (ToT) 13 bundle, NHAI had invited tenders for selection of concessionaire for maintenance of the National Highway stretch from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh.

M/s. IRB Infrastructure Developers Limited., has been declared as the selected bidder for the project. This report is for part section of ToT bundle 13 “Gwalior to Jhansi from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh. Project Highway alignment is depicted in the following figure.

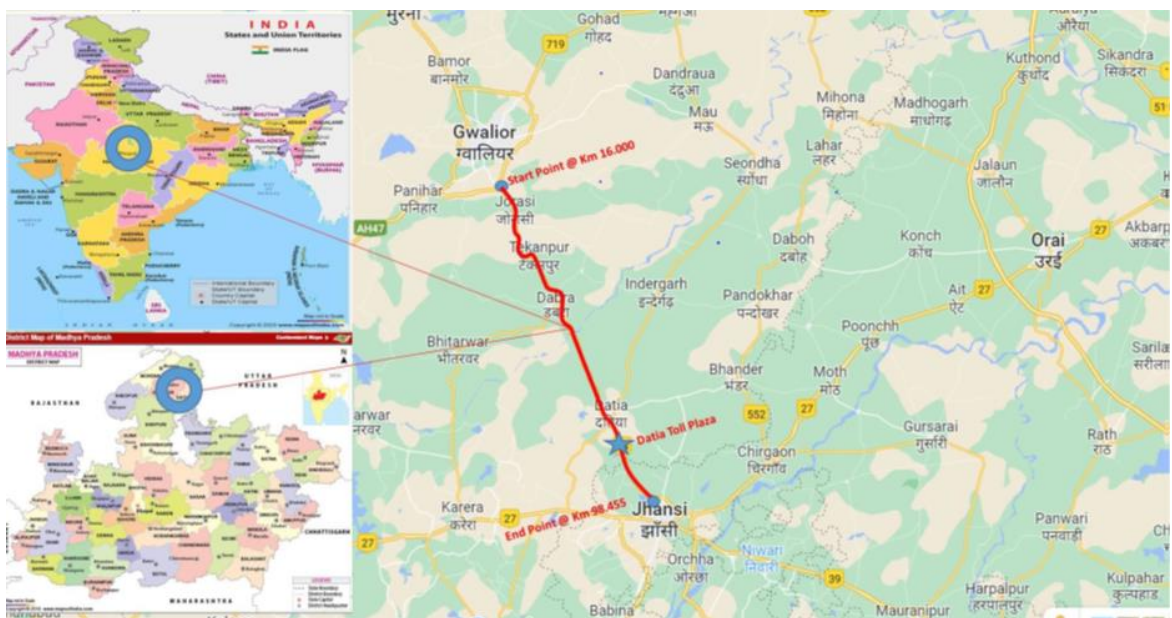


Figure 1-1: Project Stretch of ToT Bundle 13 (Part)

1.2 Objective of the Study

M/s IRB Infrastructure Developers Limited (IRB) intends to develop a traffic study report for Four Laning of Gwalior to Jhansi from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh on BOT basis. GMD Consultants have been assigned the work of conducting traffic study and developing revenue model based on traffic projections and forecast.

For making the proper assessment of traffic volume on project stretch, base year traffic and its projection, GMD Consultants have been provided with the basic survey and investigation report available with client. The base year traffic data is the primary input for determination of future traffic demand. With a view to estimate the base year traffic volume in different categories of goods and passenger carrying vehicles, the Classified Traffic Volume Count (CTVC) surveys, Turning Movement surveys (TMC), Registration Plate Survey (N.P.) & Origin-Destination (O-D) were conducted at Main Toll Plaza (MTP) and data of same is provided for study.

The year 2023-24 has been taken as the base year for projections and forecasting of traffic in the horizon year. This report fulfils part of the requirement of the assignment.

1.3 Scope of Services

The following may be referred to as broad scope of Traffic Study of Four Laning of Gwalior to Jhansi from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh.

Classified Traffic Volume Count at main toll plaza location at Toll Plaza locations. This data was supplied by the Concessionaire.

- Establishment of traffic pattern
- Working our traffic demand elasticity and growth
- Traffic forecast up to concession period.
- Preparation of revenue model up to concession period
- Any other analysis relevant to scope

CHAPTER 2

PROJECT DETAILS

2.1 Project Corridor

The project stretch is a section of NH-44, which is the longest National Highway in the country, running through North, Central and South India. A major part of the project section from Gwalior to Jhansi Road lies in Gwalior and Datia district of Madhya Pradesh followed by Jhansi district. The major towns along the project corridor are Gwalior, Tekampur, Dabra, Datia and Jhansi.

Project Stretch Description

The project stretch under this study starts from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh. The length of project stretch is 80.127 km and has 4-lane configuration with single Toll Plaza (Dagrai village at ch.97.900 KM).

The following figure shows this the alignment of the project highway in the above context.

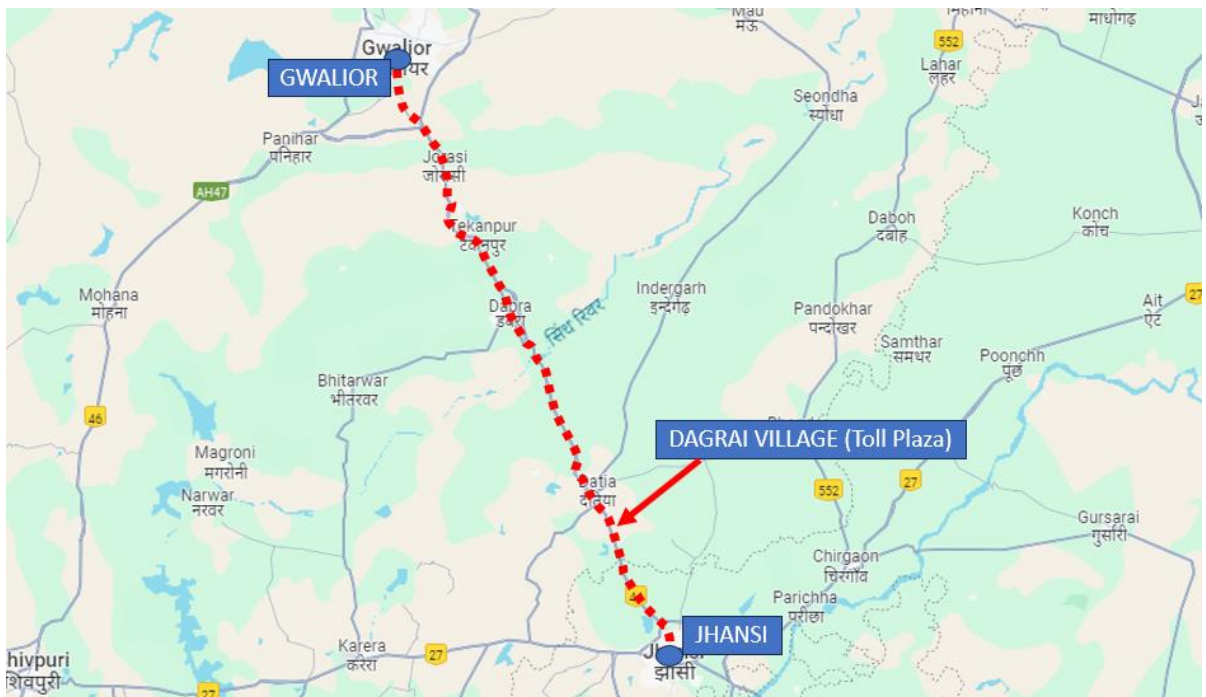


Figure 2-1 : Project Alignment with Toll Plaza

CHAPTER 3

TRAFFIC SURVEYS AND ANALYSIS

3.1 Traffic Surveys

The Consultants 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 from a client for a project.

- Classified traffic volume counts at toll plaza locations on Gwalior- Jhansi section km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44), provided by Concessionaire for base year 2023-24.
- 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 the 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 3-1 below lists provides details of locations from where traffic details have been collected.

Table 3-1 : Traffic Data Details

| SR. NO | LOCATION | CTV | Single Journey Traffic | Daily Return Journey | Monthly Pass | Local Pass |
|--------|--|---|--|--|--|--|
| 1 | Km 97.900 Toll Plaza at Dagrai Village | AADT from previous traffic study report for year 2023-24 | AADT from previous traffic study report for year 2023-24 | AADT from previous traffic study report for year 2023-24 | AADT from previous traffic study report for year 2023-24 | AADT from previous traffic study report for year 2023-24 |

Toll plaza is located in Uttar Pradesh.

3.2 Classified Traffic Volume

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 the concessionaire of project highway from actual traffic data gathered at toll plaza locations-based traffic survey done at project stretch.

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 3-2 : 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 |

| Vehicle Type | |
|----------------|--|
| | 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 corresponds to the category of tollable vehicles. The following are the types of vehicles as per concession agreement.

- Car / Jeep / van
- Minibus /LCV
- Bus
- Truck /
- 3 Axle commercial vehicle
- Multi Axle

3.3 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.

3.3.1 Traffic Data

Project concessionaire has provided Traffic data as per traffic survey conducted at toll plaza locations. It may not represent the whole year traffic as this pertains to specific period only. Hence a seasonality factor has been applied to average traffic of current period to arrive at Annual Average Daily Traffic of base year 2023-24. Same corrected traffic is used for future projections and revenue calculations. Following table shows Annual Average Daily Traffic (AADT) for year 2023-24 as considered.

Table 3-3 : Traffic Data at Dagrai Village Toll Plaza at Km 97.900

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|-----------------|--|
| 1 | Car/Jeep/Van | 4502 |
| 2 | Mini LCV | 363 |

| Sr. No | Type of Vehicle | Annual Average Daily Traffic (Nos.)- 2023-24 |
|--------|------------------|--|
| 3 | Bus | 210 |
| 4 | Minibus | 19 |
| 5 | LCV | 539 |
| 6 | 2- Axle | 1026 |
| 7 | 3 - Axle | 1253 |
| 8 | 4 to 6 Axle | 1393 |
| 9 | 7 and Above Axle | 0 |
| | Total | 9,305 |

3.4 Data Analysis

3.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the 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 3-4 : 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 |

| Vehicle Type | PCUs |
|-------------------------------------|------|
| 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 3-5 : Traffic in PCU at Project Stretch

| Year | Toll Plaza Location (Km) | Traffic No | PCU | PCU Index |
|-----------|--|------------|-------|-----------|
| 2023-2024 | Km 97.900 Toll Plaza at Dagrai Village | 9305 | 19438 | 2.09 |

It can be observed from above that project traffic has PCU index 2 to 2.5 which is an indicator of high proportion of commercial traffic in traffic mix in project corridor. The following figure illustrates variation of PCU index at four toll plaza locations.

3.4.2 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.

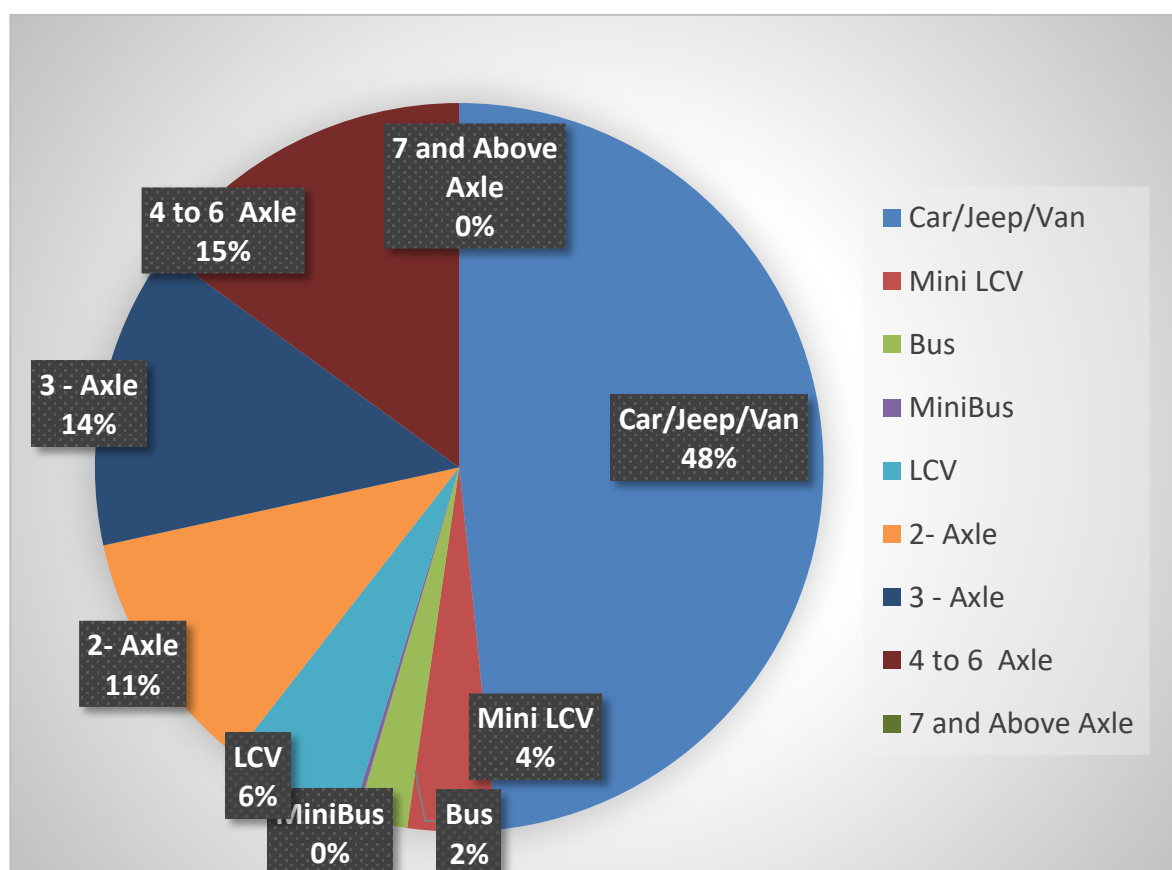


Figure 3-2: Model split of tollable vehicle @ Km 97.900

It is observed that car traffic forms about 48% of total traffic at toll plaza location KM 134.000 while multi axle commercial vehicles are about 38% of total traffic. Truck / Bus and LCV share about 17% and 6% of traffic volume respectively.

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

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

Since actual traffic data for bifurcation of journey is not available with Concessionaire, as the project has very recently been awarded, journey type bifurcation is adopted from traffic survey data provided by Concessionaire. For the purpose of calculating revenue all return journeys and monthly passes are converted to single journey type by suitable Daily Pass / Monthly Pass Factors (DPMP factor). The following table shows DPMP factors adopted for each toll plaza on project stretch.

Table 3-6 : Vehicle Type factor at Dagrai Village Toll Plaza KM 97.900

| Sr. No | Vehicle Type | DP/MP Factors |
|--------|------------------|---------------|
| | | 2023-24 |
| 1 | Car / Jeep / Van | 0.750 |
| 2 | Mini LCV | 0.800 |
| 3 | LCV | 0.930 |
| 4 | Minibus | 0.950 |
| 5 | Bus | 0.860 |
| 6 | Truck - 2 Axle | 0.980 |
| 7 | 3 - Axle | 0.990 |
| 8 | 4 - 6 Axle | 0.980 |
| 9 | 7 & above Axle | 0.980 |

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

3.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic patterns 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 the project site, secondary data was also collected from various other 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. Same is discussed in subsequent chapter.

CHAPTER 4

INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS

4.1 Introduction

Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

Following Factors can be considered as major contributors to friction on transportation network.

- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc.
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

4.2 Regional Network

Project road has been in existence for a long time and traffic is almost settled. However, there are few upcoming corridors which may have interest in project road catchments. These are discussed below.

Delhi – Mumbai Expressway - The access controlled greenfield expressway connects Delhi and Mumbai (up to Jawaharlal Nehru Port Trust) and passes through states of Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. DME alignment will largely cater to traffic between North of India and Gujarat/Western Maharashtra and is not likely to affect traffic on the project road which caters to traffic on NH-44 which is north south highway. Hence it is not likely to impact project road traffic.



Surat – Chennai Expressway - The alignment will largely cater to traffic between states of Gujarat and Central Maharashtra /Andhra Pradesh/ Telangana/Karnataka/Tamilnadu and is not parallel to Project Road. Therefore, it is not likely to affect traffic on the project road.

Pune – Bangalore Expressway – Entire catchment of this proposed expressway falls south of project road. It is not likely to affect the project road traffic.

All other major highways in the region exist and traffic is settled in the region. On the local level also, there is no formidable competing route network. Hence it is not envisaged that

there will be any major impact on project road traffic in the near future due to regional or local network developments.

CHAPTER 5

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

5.1 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 patterns 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 the project corridor of Gwalior-Jhansi from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) has been done 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.

5.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable for projects of short durations say 5-10 years, however for long term projections it would be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-12015-Guidelines for Traffic Prediction on Rural Highways**.

In this method the past trend of vehicular data is 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 types of vehicles. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on a number of economic parameters. Most important and direct parameters are given as under

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

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

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population

- Goods Vehicle – NSDP

5.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, In order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable 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: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is given as 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).

The project corridor spreads across state of Madhya Pradesh & Uttar Pradesh. Toll plaza at Dagrai Village in the state of Uttar Pradesh. Project traffic has share of majorly states like Madhya Pradesh, Uttar Pradesh, Delhi, Haryana and Rajasthan. For elasticity calculations, working data from these states also has been analysed.

Following tables and graphs depict regression and elasticity of growth model for stretch falling in Madhya Pradesh State.

Table 5-1 : Per Capita Income Vs Car Madhya Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 38497 | 424644 | 4.59 | 5.63 | | |
| 2012 | 41142 | 493412 | 4.61 | 5.69 | 7% | |
| 2013 | 42548 | 555461 | 4.63 | 5.74 | 3% | |
| 2014 | 44027 | 637626 | 4.64 | 5.80 | 3% | |
| 2015 | 47351 | 820391 | 4.68 | 5.91 | 8% | |
| 2016 | 52782 | 869777 | 4.72 | 5.94 | 11% | |
| 2017 | 54829 | 982124 | 4.74 | 5.99 | 4% | |
| 2018 | 57401 | 1087124 | 4.76 | 6.04 | 5% | 5.9% |

Regression analysis of same is given in figure below.

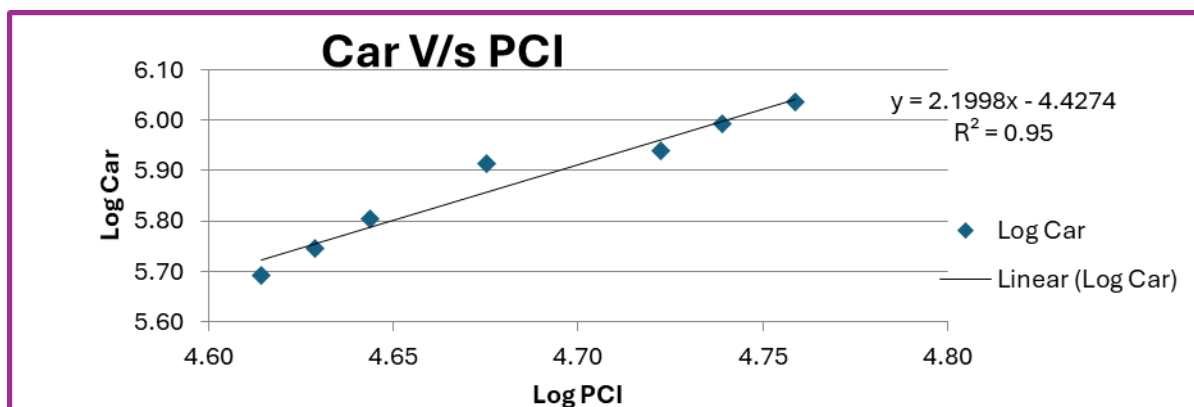


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh

Table 5-2 : Population Vs Bus Madhya Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 72627000 | 181770 | 7.86 | 5.26 | | |
| 2012 | 73863000 | 208530 | 7.87 | 5.32 | 2% | |
| 2013 | 75099000 | 233569 | 7.88 | 5.37 | 2% | |
| 2014 | 76334000 | 277898 | 7.88 | 5.44 | 2% | |
| 2015 | 77570000 | 322227 | 7.89 | 5.51 | 2% | |
| 2016 | 78806000 | 347227 | 7.90 | 5.54 | 2% | |
| 2017 | 79948000 | 382227 | 7.90 | 5.58 | 1% | |
| 2018 | 81090000 | 402227 | 7.91 | 5.60 | 1% | 1.6% |

Regression analysis of same is given in figure below.

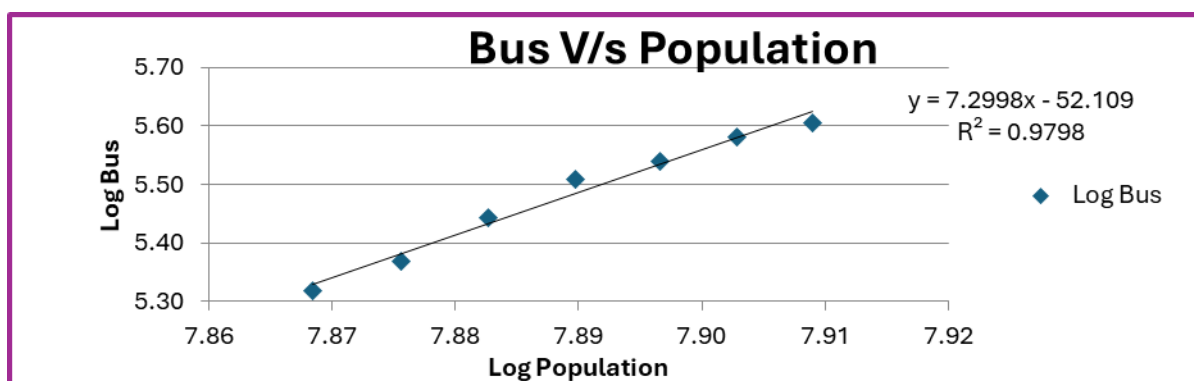


Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-3 : LCV Vs NSDP Madhya Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 28237104 | 121916 | 7.45 | 5.09 | | |
| 2012 | 30685334 | 131098 | 7.49 | 5.12 | 9% | |
| 2013 | 32259760 | 137815 | 7.51 | 5.14 | 5% | |
| 2014 | 33924690 | 150921 | 7.53 | 5.18 | 5% | |
| 2015 | 37071567 | 177352 | 7.57 | 5.25 | 9% | |
| 2016 | 41946525 | 233553 | 7.62 | 5.37 | 13% | |
| 2017 | 44200243 | 289754 | 7.65 | 5.46 | 5% | |
| 2018 | 46928896 | 326291 | 7.67 | 5.51 | 6% | 7.6% |

The following figure depicts regression analysis and extrapolation.

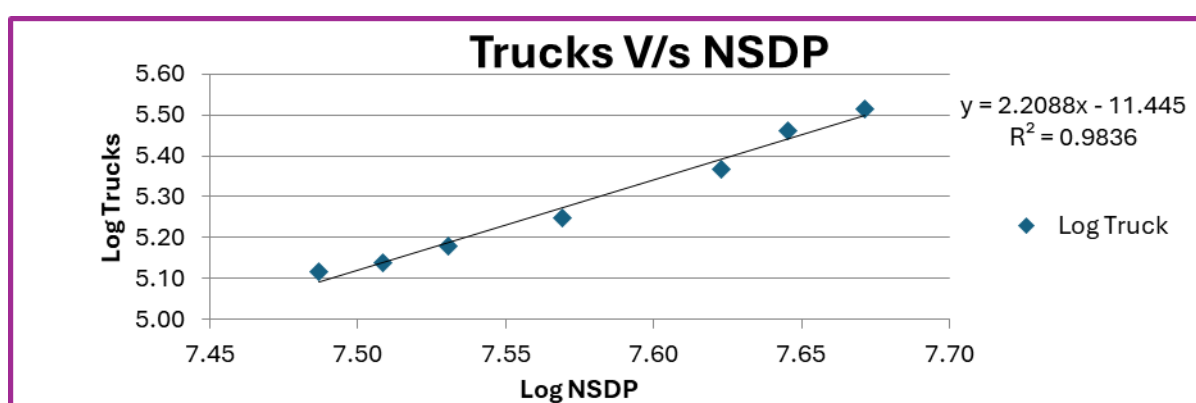


Figure 5-3 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Madhya Pradesh.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-4 : Summary Regression Analysis Madhya Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-----------------------|------------------|----------------------|-------------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| MADHYA PRADESH | Car/Jeep | PCI | $y = 2.2965x - 4.8829$ | $R^2 = 0.9634$ | 2.3 | 6% | 13.57% | Good Regression |
| | Bus | Population | $y = 7.4978x - 53.6722$ | $R^2 = 0.9862$ | 7.5 | 2% | 11.90% | Good Regression |
| | Truck | NSDP | $y = 2.2088x - 11.4451$ | $R^2 = 0.9694$ | 2.2 | 8% | 16.70% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Uttar Pradesh State.

Table 5-5 : Per Capita Income Vs Car Uttar Pradesh

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 32002 | 1108100 | 4.51 | 6.04 | | |
| 2012 | 32908 | 1205374 | 4.52 | 6.08 | 3% | |
| 2013 | 34044 | 1423020 | 4.53 | 6.15 | 3% | |
| 2014 | 34583 | 1572217 | 4.54 | 6.20 | 2% | |
| 2015 | 36973 | 1746117 | 4.57 | 6.24 | 7% | |
| 2016 | 40847 | 2027972 | 4.61 | 6.31 | 10% | |
| 2017 | 41832 | 2195783 | 4.62 | 6.34 | 2% | |
| 2018 | 43670 | 2439845 | 4.64 | 6.39 | 4% | 4.6% |

Regression analysis of same is given in figure below.

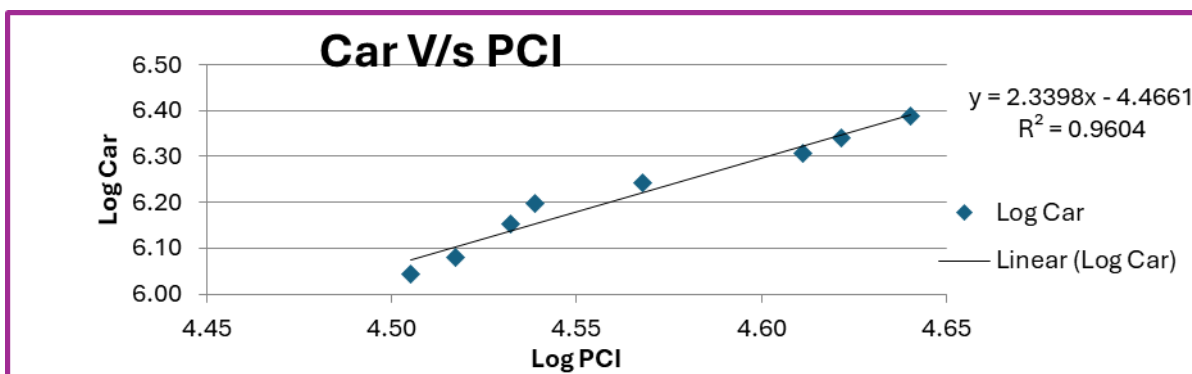


Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh

Table 5-6 : Population Vs Bus Uttar Pradesh

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 199812000 | 57901 | 8.30 | 4.76 | | |
| 2012 | 203670000 | 64147 | 8.31 | 4.81 | 2% | |
| 2013 | 206322000 | 74389 | 8.31 | 4.87 | 1% | |
| 2014 | 209577000 | 80460 | 8.32 | 4.91 | 2% | |
| 2015 | 212832000 | 89127 | 8.33 | 4.95 | 2% | |
| 2016 | 216870000 | 112020 | 8.34 | 5.05 | 2% | |
| 2017 | 219510000 | 112766 | 8.34 | 5.05 | 1% | |
| 2018 | 222150000 | 121975 | 8.35 | 5.09 | 1% | 1.5% |

Regression analysis of same is given in figure below.

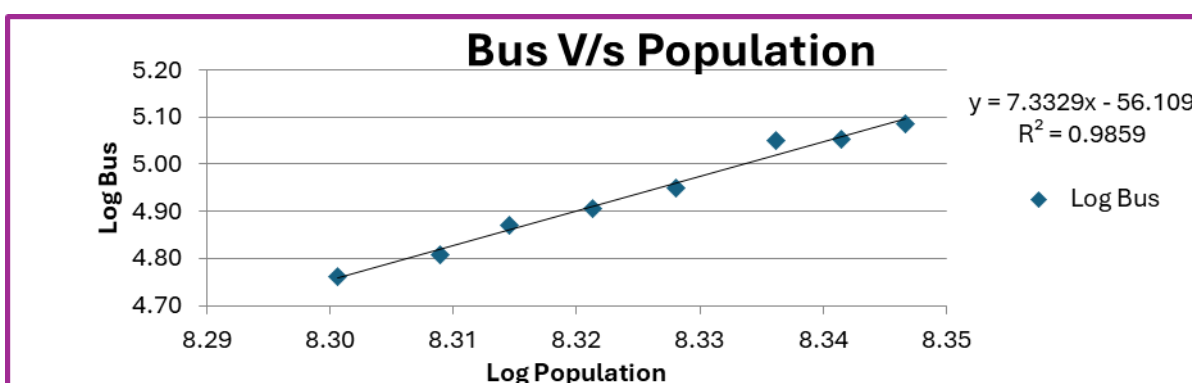


Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-7 Trucks Vs NSDP Uttar Pradesh

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 64513155 | 162813 | 7.81 | 5.21 | | |
| 2012 | 67355218 | 186404 | 7.83 | 5.27 | 4% | |
| 2013 | 70746910 | 202761 | 7.85 | 5.31 | 5% | |
| 2014 | 72968630 | 217609 | 7.86 | 5.34 | 3% | |
| 2015 | 79204874 | 245688 | 7.90 | 5.39 | 9% | |
| 2016 | 88845325 | 265167 | 7.95 | 5.42 | 12% | |
| 2017 | 92380571 | 307096 | 7.97 | 5.49 | 4% | |
| 2018 | 97915937 | 356828 | 7.99 | 5.55 | 6% | 6.2% |

The following figure depicts regression analysis and extrapolation.

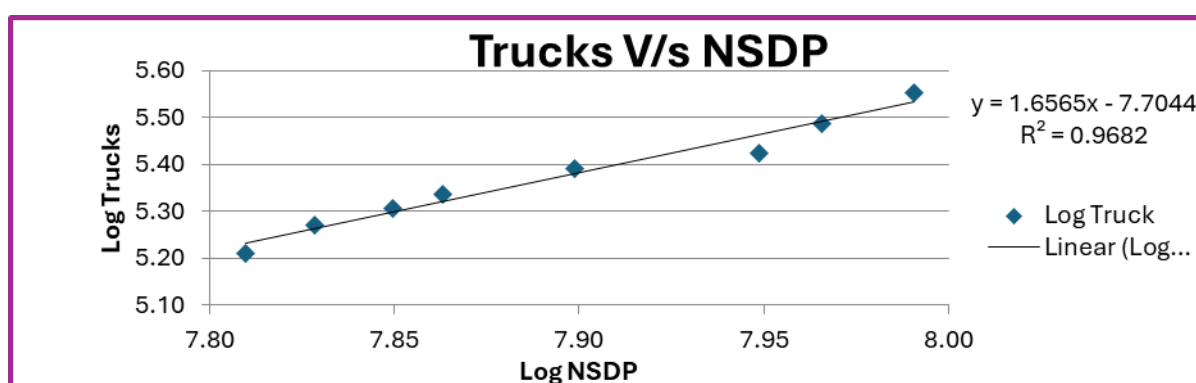


Figure 5-6 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Uttar Pradesh.

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. R² statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R² more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-8 : Summary Regression Analysis Uttar Pradesh

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|---------------|------------------|----------------------|-------------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| UTTAR PRADESH | Car/Jeep | PCI | $y = 2.3398x - 4.4661$ | $R^2 = 0.9604$ | 2.3398 | 4.58% | 10.72% | Good Regression |
| | Bus | Population | $y = 7.3329x - 56.1092$ | $R^2 = 0.9859$ | 7.3329 | 1.53% | 11.19% | Good Regression |
| | Truck | NSDP | $y = 1.6565x - 7.7044$ | $R^2 = 0.9682$ | 1.6565 | 6.18% | 10.24% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Delhi State.

Table 5-9 : Per Capita Income Vs Car Delhi

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|--------|---------|---------|---------|------------|-------------------------|
| 2011 | 185001 | 2172069 | 5.27 | 6.34 | | |
| 2012 | 192220 | 2416974 | 5.28 | 6.38 | 4% | |
| 2013 | 200702 | 2568380 | 5.30 | 6.41 | 4% | |
| 2014 | 213669 | 2730071 | 5.33 | 6.44 | 6% | |
| 2015 | 233115 | 2986579 | 5.37 | 6.48 | 9% | |
| 2016 | 244255 | 3061817 | 5.39 | 6.49 | 5% | |
| 2017 | 252960 | 3087309 | 5.40 | 6.49 | 4% | |
| 2018 | 260967 | 3249670 | 5.42 | 6.51 | 3% | 5.1% |

Regression analysis of same is given in figure below.

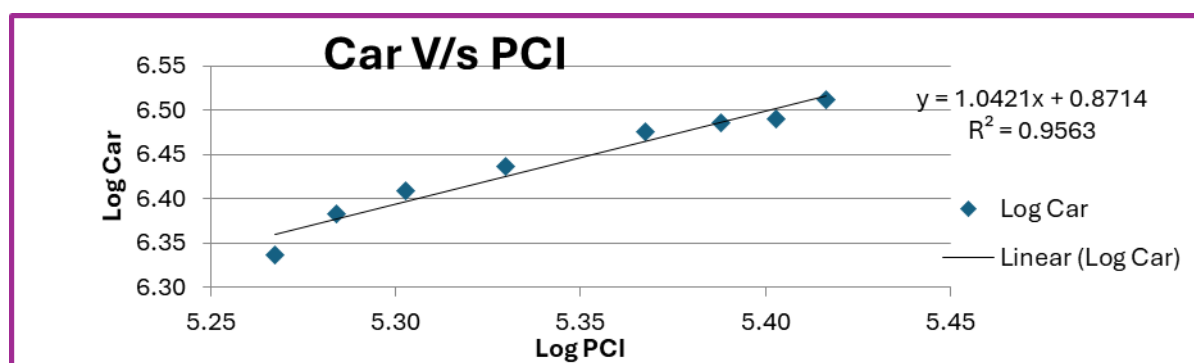
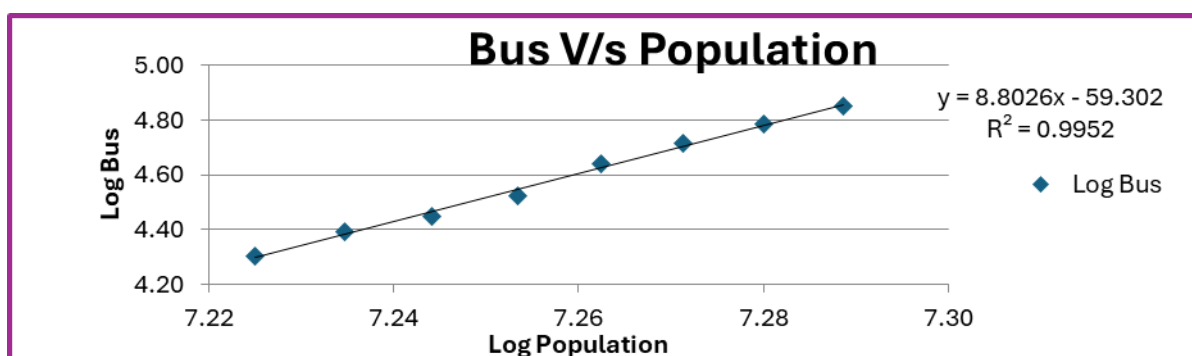


Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Delhi**Table 5-10 : Population Vs Bus Delhi**

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|-------|---------|---------|------------|-------------------------|
| 2011 | 16788000 | 20142 | 7.22 | 4.30 | | |
| 2012 | 17166000 | 24642 | 7.23 | 4.39 | 2% | |
| 2013 | 17544000 | 28142 | 7.24 | 4.45 | 2% | |
| 2014 | 17921000 | 33342 | 7.25 | 4.52 | 2% | |
| 2015 | 18299000 | 43723 | 7.26 | 4.64 | 2% | |
| 2016 | 18677000 | 51823 | 7.27 | 4.71 | 2% | |
| 2017 | 19056000 | 61023 | 7.28 | 4.79 | 2% | |
| 2018 | 19435000 | 71043 | 7.29 | 4.85 | 2% | 2.1% |

Regression analysis of same is given in figure below.

**Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Delhi**

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-11 Trucks Vs NSDP Delhi

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 31465002 | 149277 | 7.50 | 5.17 | | |
| 2012 | 33419330 | 157277 | 7.52 | 5.20 | 6% | |
| 2013 | 35652751 | 165477 | 7.55 | 5.22 | 7% | |
| 2014 | 38763874 | 174577 | 7.59 | 5.24 | 9% | |
| 2015 | 43172959 | 185027 | 7.64 | 5.27 | 11% | |
| 2016 | 46159238 | 196527 | 7.66 | 5.29 | 7% | |
| 2017 | 48763115 | 208417 | 7.69 | 5.32 | 6% | |

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2018 | 51295715 | 220417 | 7.71 | 5.34 | 5% | 7.2% |

The following figure depicts regression analysis and extrapolation.

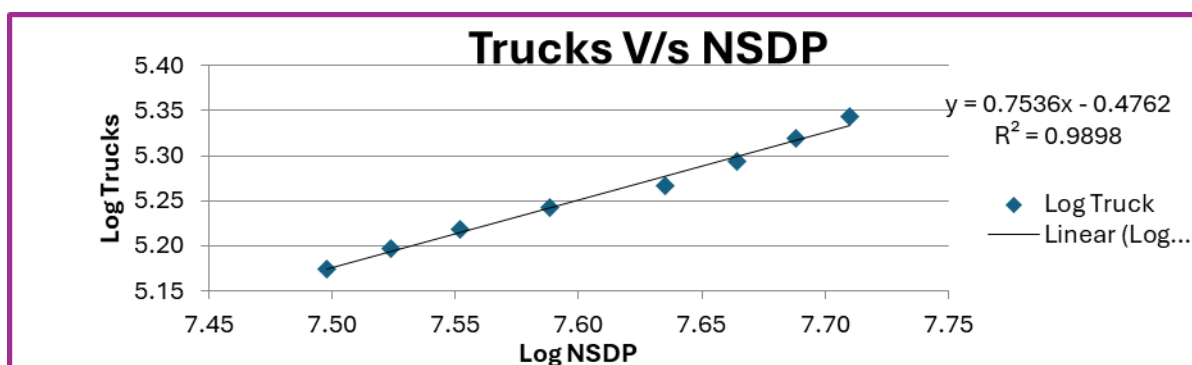


Figure 5-9 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Delhi.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-12 : Summary Regression Analysis Delhi

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-------|------------------|----------------------|-------------------------|-------------------------|----------------------------|-----------------------|----------------------|-----------------|
| DELHI | Car/Jeep | PCI | $y = 1.0421x - 0.8714$ | R ² = 0.9563 | 1.0421 | 5.05% | 5.27% | Good Regression |
| | Bus | Population | $y = 8.8026x - 59.3021$ | R ² = 0.9952 | 8.8026 | 2.11% | 18.61% | Good Regression |
| | Truck | NSDP | $y = 0.7536x - 0.4762$ | R ² = 0.9898 | 0.7536 | 7.25% | 5.46% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Haryana State.

Table 5-13 : Per Capita Income Vs Car Haryana

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|--------|---------|---------|---------|------------|-------------------------|
| 2011 | 106085 | 989519 | 5.03 | 6.00 | | |
| 2012 | 111780 | 1602129 | 5.05 | 6.20 | 5% | |
| 2013 | 119791 | 1771298 | 5.08 | 6.25 | 7% | |
| 2014 | 125032 | 2008748 | 5.10 | 6.30 | 4% | |
| 2015 | 137833 | 2260084 | 5.14 | 6.35 | 10% | |
| 2016 | 150259 | 2527537 | 5.18 | 6.40 | 9% | |
| 2017 | 158039 | 2794957 | 5.20 | 6.45 | 5% | |
| 2018 | 164976 | 3011656 | 5.22 | 6.48 | 4% | 6.5% |

Regression analysis of same is given in figure below.

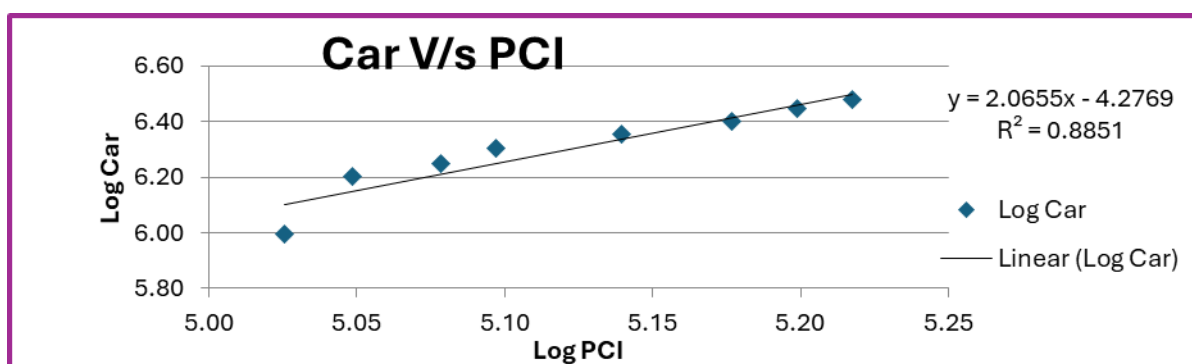


Figure 5-10 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana

Table 5-14 : Population Vs Bus Haryana

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|-------|---------|---------|------------|-------------------------|
| 2011 | 25351000 | 39153 | 7.40 | 4.59 | | |
| 2012 | 25772000 | 43456 | 7.41 | 4.64 | 2% | |
| 2013 | 26193000 | 46558 | 7.42 | 4.67 | 2% | |
| 2014 | 26614000 | 52640 | 7.43 | 4.72 | 2% | |
| 2015 | 27034000 | 55781 | 7.43 | 4.75 | 2% | |
| 2016 | 27455000 | 60129 | 7.44 | 4.78 | 2% | |
| 2017 | 27861000 | 64629 | 7.44 | 4.81 | 1% | |
| 2018 | 28266000 | 70229 | 7.45 | 4.85 | 1% | 1.6% |

Regression analysis of same is given in figure below.

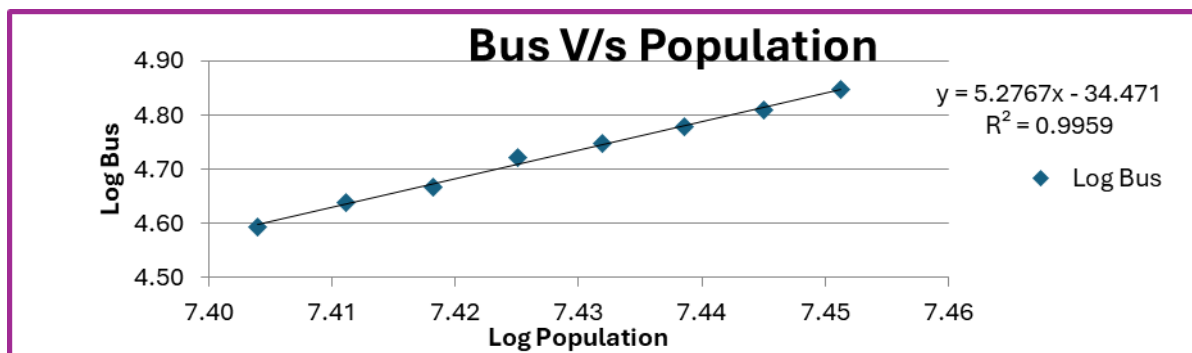


Figure 5-11 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-15 Trucks Vs NSDP Haryana

| Year | NSDP | Trucks | Log NDSP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 27115248 | 292735 | 7.43 | 5.47 | | |
| 2012 | 28975622 | 307509 | 7.46 | 5.49 | 7% | |
| 2013 | 31493120 | 327882 | 7.50 | 5.52 | 9% | |
| 2014 | 33335925 | 348732 | 7.52 | 5.54 | 6% | |
| 2015 | 37270025 | 367730 | 7.57 | 5.57 | 12% | |
| 2016 | 41205461 | 390321 | 7.61 | 5.59 | 11% | |
| 2017 | 43952345 | 455321 | 7.64 | 5.66 | 7% | |
| 2018 | 46533095 | 550321 | 7.67 | 5.74 | 6% | 8.0% |

The following figure depicts regression analysis and extrapolation.

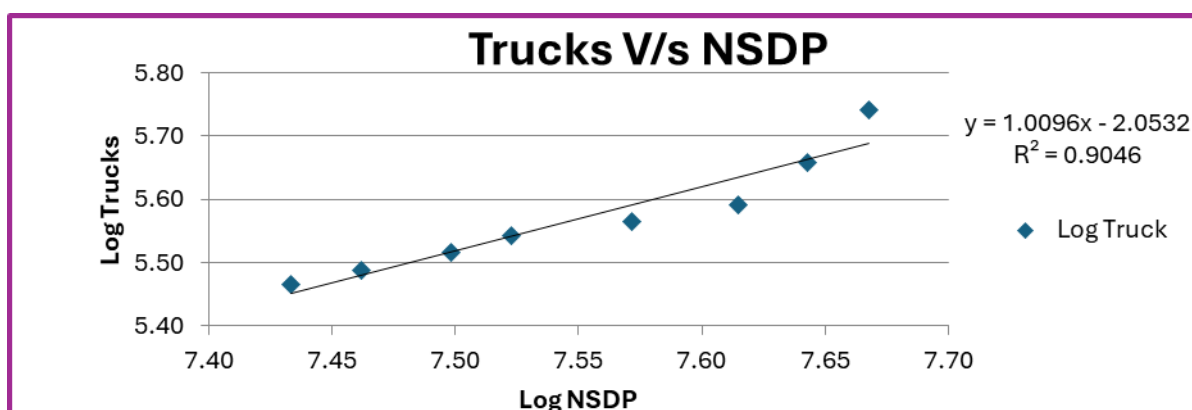


Figure 5-12 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Haryana.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-16 : Summary Regression Analysis Haryana

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|---------|------------------|----------------------|-------------------------|-------------------------|----------------------------|-----------------------|----------------------|-----------------|
| HARYANA | Car/Jeep | PCI | $y = 2.0655x - 4.2769$ | R ² = 0.8851 | 2.0655 | 6.53% | 13.49% | Good Regression |
| | Bus | Population | $y = 5.2767x - 34.4708$ | R ² = 0.9959 | 5.2767 | 1.57% | 8.27% | Good Regression |
| | Truck | NSDP | $y = 1.0096x - 2.0532$ | R ² = 0.9046 | 1.0096 | 8.04% | 8.12% | Good Regression |

The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

Table 5-17 : Per Capita Income Vs Car Rajasthan

| Year | PCI | Car | Log PCI | Log Car | PCI Growth | Average Growth (8 Year) |
|------|-------|---------|---------|---------|------------|-------------------------|
| 2011 | 57192 | 591069 | 4.76 | 5.77 | | |
| 2012 | 58441 | 659542 | 4.77 | 5.82 | 2% | |
| 2013 | 61053 | 733916 | 4.79 | 5.87 | 4% | |
| 2014 | 64496 | 814079 | 4.81 | 5.91 | 6% | |
| 2015 | 68565 | 899307 | 4.84 | 5.95 | 6% | |
| 2016 | 71324 | 988391 | 4.85 | 5.99 | 4% | |
| 2017 | 73109 | 1095526 | 4.86 | 6.04 | 3% | |
| 2018 | 75555 | 1204005 | 4.88 | 6.08 | 3% | 4.1% |

Regression analysis of same is given in figure below.

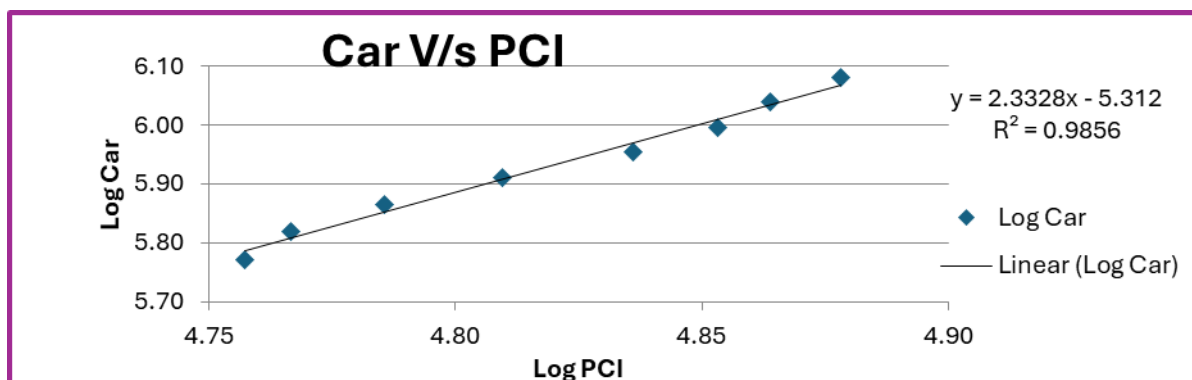


Figure 5-13 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan

Table 5-18 : Population Vs Bus Rajasthan

| Year | Population | Buses | Log Pop | Log Bus | Pop Growth | Average Growth (8 Year) |
|------|------------|--------|---------|---------|------------|-------------------------|
| 2011 | 68548000 | 83345 | 7.84 | 4.92 | | |
| 2012 | 69687000 | 88616 | 7.84 | 4.95 | 2% | |
| 2013 | 70825000 | 93892 | 7.85 | 4.97 | 2% | |
| 2014 | 71963000 | 97650 | 7.86 | 4.99 | 2% | |
| 2015 | 73102000 | 102818 | 7.86 | 5.01 | 2% | |
| 2016 | 74240000 | 108680 | 7.87 | 5.04 | 2% | |
| 2017 | 75248000 | 113964 | 7.88 | 5.06 | 1% | |
| 2018 | 76256000 | 118301 | 7.88 | 5.07 | 1% | 1.5% |

Regression analysis of same is given in figure below.

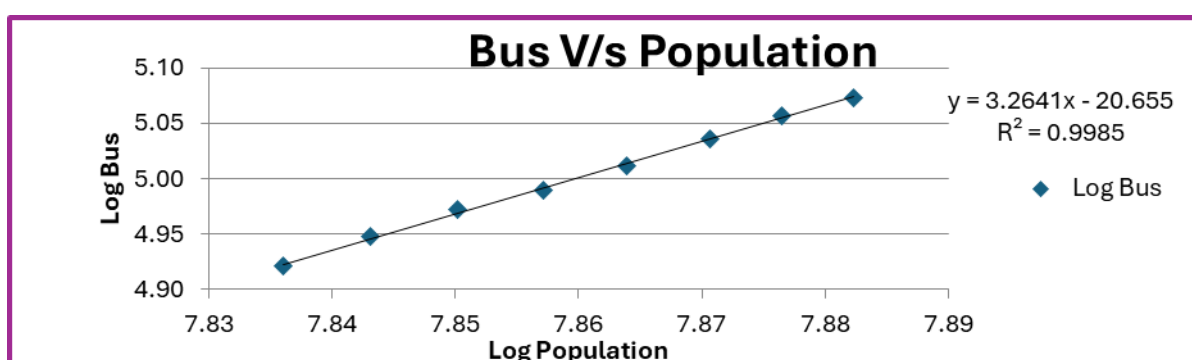


Figure 5-14 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

Table 5-19 Trucks Vs NSDP Rajasthan

| Year | NSDP | Trucks | Log NSDP | Log Truck | NSDP Growth | Average Growth (8 Year) |
|------|----------|--------|----------|-----------|-------------|-------------------------|
| 2011 | 39533093 | 362028 | 7.60 | 5.56 | | |
| 2012 | 40980249 | 401983 | 7.61 | 5.60 | 4% | |
| 2013 | 43429222 | 434379 | 7.64 | 5.64 | 6% | |
| 2014 | 46540773 | 472365 | 7.67 | 5.67 | 7% | |
| 2015 | 50192151 | 517604 | 7.70 | 5.71 | 8% | |
| 2016 | 52965038 | 561158 | 7.72 | 5.75 | 6% | |
| 2017 | 55442912 | 613055 | 7.74 | 5.79 | 5% | |
| 2018 | 58059438 | 665926 | 7.76 | 5.82 | 5% | 5.7% |

The following figure depicts regression analysis and extrapolation.

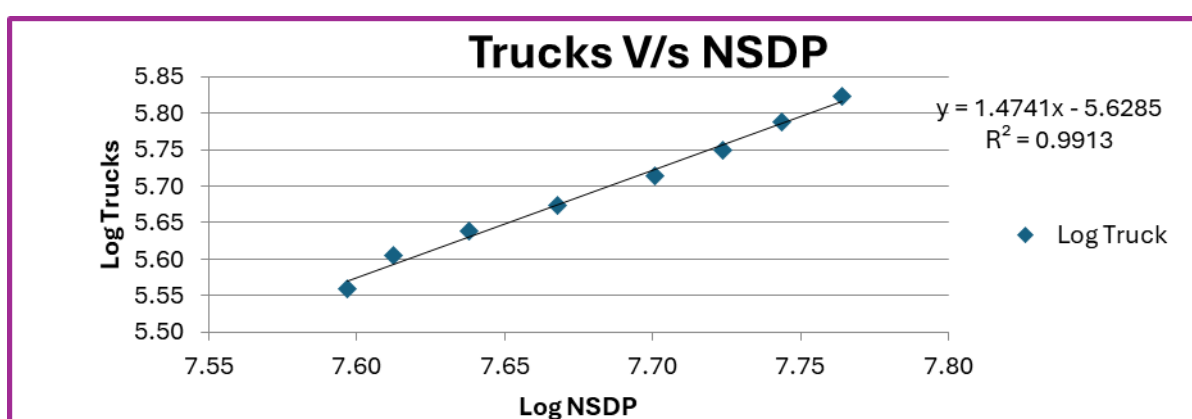


Figure 5-15 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Rajasthan.

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. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R2 more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below.

Table 5-20 : Summary Regression Analysis Rajasthan

| State | Vehicle Category | Independent Variable | Regression Equation | R Square | Elasticity Coefficient (y) | Average Growth (8yrs) | Growth Elastic Model | Remarks |
|-----------|------------------|----------------------|-------------------------|----------------|----------------------------|-----------------------|----------------------|-----------------|
| RAJASTHAN | Car/Jeep | PCI | $y = 2.3328x - 5.312$ | $R^2 = 0.9856$ | 2.3328 | 4.07% | 9.49% | Good Regression |
| | Bus | Population | $y = 3.2641x - 20.6548$ | $R^2 = 0.9985$ | 3.2641 | 1.53% | 5.01% | Good Regression |
| | Truck | NSDP | $y = 1.4741x - 5.6285$ | $R^2 = 0.9913$ | 1.4741 | 5.65% | 8.33% | 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 proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

5.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Gwalior_ Jhansi has recently been awarded to Concessionaire. Hence credible historical data on project traffic is not available.

5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economical, 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.

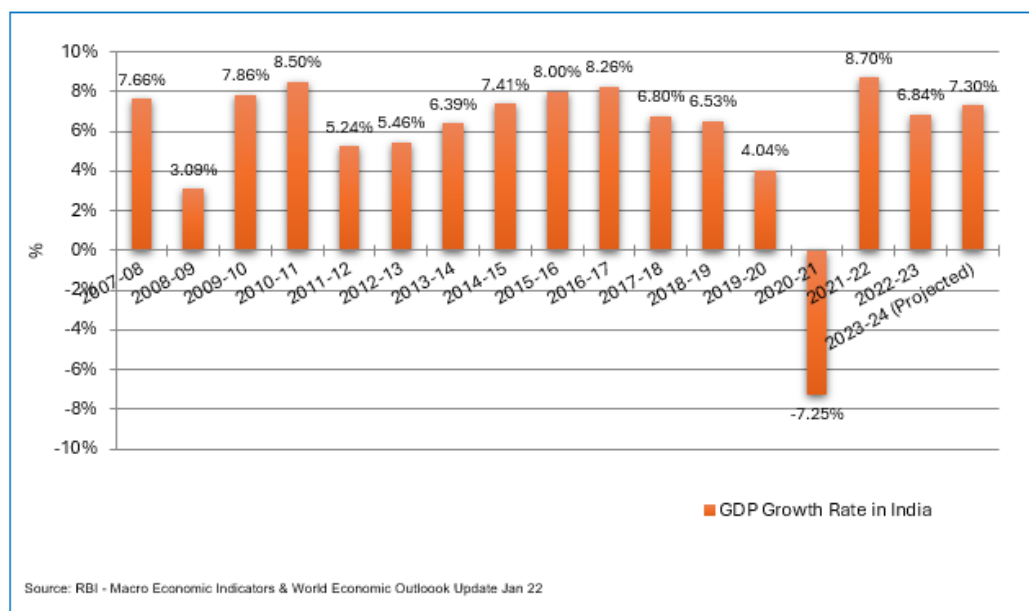


Figure 5-16 : Growth of GDP in India

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. The government took major policy decisions 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 an 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. Leading banking and financial institutions have estimated that India would keep on registering good growth in coming years and the growth in year 2023-24 is expected to be around 7.3%.

5.6 Developments along and around the Project Corridor & State

MADHYA PRADESH: Madhya Pradesh state, which is located in central India is bound on the north by Uttar Pradesh, on the east by Chhattisgarh, on the south by Maharashtra, and on the west by Gujarat and Rajasthan. It is the second largest Indian state and one of the fastest growing states in the country. At current prices, the Gross State Domestic Product (GSDP) of Madhya Pradesh is estimated at Rs.1,151,049 crore trillion (US\$ 150.74 billion) in 2022-23, registering an annual growth of 10% over FY21. Between 2015-16 and 2021-22, The GSDP increased at a CAGR (in Rs.) of 13.09% from 2015-16 to 2021-22. Net State Domestic Product (NSDP) of Madhya Pradesh was about Rs. 8.27 trillion (US\$ 113.94 billion) in 2020-21. Between 2015-16 and 2020-21, state's NSDP grew at a CAGR of around 11.22%

GWALIOR DISTRICT: Gwalior district is one of the fifty-two districts of Madhya Pradesh state. Gwalior is also the administrative headquarters of this district. The population density in the district is 446 people per sq. Km. In the year 2020 the number of live births in the district was 61265 out of which 34162 were male and 27102 were females.

INDUSTRIAL PROFILE OF GWALIOR DISTRICT: The economy of the district is basically based on various Industrial sectors. It comprises 3 prominent industrial areas namely Sitholi, Banmore and Malanpur. Earlier the place had two main big manufacturing industries, such as Gwalior Grasim and J.C. Mills of Birlanagar.

DATIA DISTRICT: Datia district is one of the fifty-two districts in the state of Madhya Pradesh with its administrative headquarter located at Datia city. According to the census of the district has population of 7,86,754 out of which 420,157, are males and 3,66,597 are females.

The chief agriculture products in the district are all food grains and cotton.

UTTAR PRADESH: The state has an area of 240,928 sq kms and is the most populous state in India, with population of 199.8 million as per 2011 census with an average population density of 828 persons per sq. km. The economy of Uttar Pradesh is the third largest of all the states in India. Nominal GDP of the state for the year 2022-23 is Rs. 21.74 trillion.

It is reported that the economy of Uttar Pradesh is growing at a faster rate than the national economy at about 9%. In terms of traffic and transportation as well Uttar Pradesh is one of the leader states in India now.

- **Air Connectivity:** Major national & international airports connecting the rest of India, Middle East & Southeast Asian countries; Only state to have 05 International Airports (03 existing & 02 upcoming at Jewar (G. Noida & Ayodhya)
- **Railway Network:** Largest railway network in the country spanning over 8,949 km; 05 Railway Zones
- **Inland Waterway:** India's 1st Inland Waterway is operational in UP (1100 km Haldia - Varanasi tract)
- **Expressways:** Uttar Pradesh boasts state of art expressways ensuring seamless connectivity; 13 Expressways (existing & upcoming)
- **Road Network:** Largest Road Network in India; 4 Lakh Km Total Road Length 11,737 Km Total National Highway

Logistics hubs emerging across UP: MMLH Dadri, MMTH Boraki, MMT Varanasi etc.

From the above it can be expected that the project corridor would serve as one of the important transportation links in the area and would contribute to the growth of the region.

JHANSI DISTRICT: Jhansi district is a district of Uttar Pradesh state with its headquarters located at Jhansi city. The district is named Jhansi after the headquarter city Jhansi. According to 2011 census the district has a population of 1998603 out of which 1057436 are males and 941167 are females. To some extent the economy of the district is based on agriculture some of its chief agriculture products are wheat, barley, pea, gram, paddy, groundnut, and different types of pulses. The foremost industries of the district are BHEL Jhansi, Heidelberg cement factory, Baidyanth factory, government cotton mill, Paricha

thermal power plant, Indian Hume Pipe Co.Ltd. its silk material and industries are not only famous in the country but also in the world.

5.7 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. Traffic growth has been suitably stepped down for future years.

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 for corridor in both states.

5.7.1 Recommended Growth Rates of Stretch

Table 5-21 : Recommended Growth Rates Optimistic

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 7.90% | 6.76% | 5.15% | 4.96% | 4.29% |
| Mini LCV | 4.87% | 3.09% | 2.38% | 2.01% | 3.22% |
| Bus | 4.97% | 3.91% | 2.67% | 2.45% | 2.23% |
| Mini - Bus | 4.97% | 3.91% | 2.67% | 2.45% | 2.23% |
| LCV | 4.54% | 3.09% | 2.38% | 2.01% | 1.82% |
| 2- Axle | 4.87% | 3.56% | 2.38% | 2.01% | 1.82% |
| 3 - Axle | 4.87% | 3.56% | 2.38% | 2.01% | 1.82% |
| 4 to6 Axle | 5.53% | 4.03% | 3.09% | 2.60% | 2.34% |
| 7 and Above Axle | 5.53% | 4.03% | 3.09% | 2.60% | 2.34% |

Table 5-22 : Recommended Growth Rates Pessimistic

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|------------------|----------|----------|----------|----------|----------|
| Car/Jeep/Van | 7.40% | 6.26% | 4.65% | 4.46% | 3.79% |
| Mini LCV | 4.37% | 2.59% | 1.88% | 1.51% | 2.72% |
| Bus | 4.47% | 3.41% | 2.17% | 1.95% | 1.73% |
| Mini - Bus | 4.47% | 3.41% | 2.17% | 1.95% | 1.73% |
| LCV | 4.04% | 2.59% | 1.88% | 1.51% | 1.32% |
| 2- Axle | 4.37% | 3.06% | 1.88% | 1.51% | 1.32% |
| 3 - Axle | 4.37% | 3.06% | 1.88% | 1.51% | 1.32% |
| 4 to6 Axle | 5.03% | 3.53% | 2.59% | 2.10% | 1.84% |
| 7 and Above Axle | 5.03% | 3.53% | 2.59% | 2.10% | 1.84% |

Table 5-23 : Recommended Growth Rates Most Likely

| Category / Year | FY 25-29 | FY 30-34 | FY 35-39 | FY 40-44 | FY 45-49 |
|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Car/Jeep/Van | 7.65% | 6.51% | 4.90% | 4.71% | 4.04% |
| Mini LCV | 4.62% | 2.84% | 2.13% | 1.76% | 2.97% |
| Bus | 4.72% | 3.66% | 2.42% | 2.20% | 1.98% |
| Mini - Bus | 4.72% | 3.66% | 2.42% | 2.20% | 1.98% |
| LCV | 4.29% | 2.84% | 2.13% | 1.76% | 1.57% |
| 2- Axle | 4.62% | 3.31% | 2.13% | 1.76% | 1.57% |
| 3 - Axle | 4.62% | 3.31% | 2.13% | 1.76% | 1.57% |
| 4 to 6 Axle | 5.28% | 3.78% | 2.84% | 2.35% | 2.09% |
| 7 and Above Axle | 5.28% | 3.78% | 2.84% | 2.35% | 2.09% |

CHAPTER 6

TRAFFIC FORECAST

6.1 Traffic Projections

Growth rates recommended in the previous section of the 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 up to concession period.

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

Table 6-1 : Total Tollable Traffic @ Toll Plaza - Chainage 97.900 KM
(Optimistic Growth Scenario)

| Year | Car/Jeep/ Van | Mini LCV | Bus | Minibus | LC V | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|---------|------------------|-------------|-----|---------|---------|---------|----------|----------------|------------------------|------------------|--------------------------------|
| 2024-25 | 4858 | 381 | 220 | 20 | 563 | 1076 | 1314 | 1470 | 0 | 9902 | 20559 |
| 2025-26 | 5242 | 400 | 231 | 21 | 589 | 1128 | 1378 | 1551 | 0 | 10540 | 21748 |
| 2026-27 | 5656 | 419 | 242 | 22 | 616 | 1183 | 1445 | 1637 | 0 | 11220 | 23009 |
| 2027-28 | 6103 | 439 | 254 | 23 | 644 | 1241 | 1515 | 1728 | 0 | 11947 | 24349 |
| 2028-29 | 6585 | 460 | 267 | 24 | 673 | 1301 | 1589 | 1824 | 0 | 12723 | 25770 |
| 2029-30 | 7030 | 474 | 277 | 25 | 694 | 1347 | 1646 | 1898 | 0 | 13391 | 26934 |
| 2030-31 | 7505 | 489 | 288 | 26 | 715 | 1395 | 1705 | 1974 | 0 | 14097 | 28153 |
| 2031-32 | 8012 | 504 | 299 | 27 | 737 | 1445 | 1766 | 2054 | 0 | 14844 | 29435 |
| 2032-33 | 8553 | 520 | 311 | 28 | 760 | 1496 | 1829 | 2137 | 0 | 15634 | 30780 |
| 2033-34 | 9131 | 536 | 323 | 29 | 783 | 1549 | 1894 | 2223 | 0 | 16468 | 32187 |
| 2034-35 | 9601 | 549 | 332 | 30 | 802 | 1586 | 1939 | 2292 | 0 | 17131 | 33283 |
| 2035-36 | 10096 | 562 | 341 | 31 | 821 | 1624 | 1985 | 2363 | 0 | 17823 | 34420 |
| 2036-37 | 10616 | 575 | 350 | 32 | 841 | 1663 | 2032 | 2436 | 0 | 18545 | 35598 |
| 2037-38 | 11163 | 589 | 359 | 33 | 861 | 1703 | 2080 | 2511 | 0 | 19299 | 36819 |
| 2038-39 | 11738 | 603 | 369 | 34 | 881 | 1744 | 2129 | 2589 | 0 | 20087 | 38090 |
| 2039-40 | 12320 | 615 | 378 | 35 | 899 | 1779 | 2172 | 2656 | 0 | 20854 | 39275 |
| 2040-41 | 12931 | 627 | 387 | 36 | 917 | 1815 | 2216 | 2725 | 0 | 21654 | 40504 |
| 2041-42 | 13572 | 640 | 396 | 37 | 935 | 1852 | 2261 | 2796 | 0 | 22489 | 41779 |
| 2042-43 | 14245 | 653 | 406 | 38 | 954 | 1889 | 2307 | 2869 | 0 | 23361 | 43103 |
| 2043-44 | 14951 | 666 | 416 | 39 | 973 | 1927 | 2353 | 2944 | 0 | 24269 | 44471 |

**Table 6-2 : Total Tollable Traffic @ Toll Plaza - Chainage 97.900 KM
(Pessimistic Growth Scenario)**

| Year | Car/Jeep/ Van | Mini LCV | Bus | Minibu s | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|---------|------------------|-------------|-----|-------------|-----|---------|----------|----------------|------------------------|------------------|--------------------------------|
| 2024-25 | 4835 | 379 | 219 | 20 | 561 | 1071 | 1308 | 1463 | 0 | 9856 | 20463 |
| 2025-26 | 5193 | 396 | 229 | 21 | 584 | 1118 | 1365 | 1537 | 0 | 10443 | 21549 |
| 2026-27 | 5577 | 413 | 239 | 22 | 608 | 1167 | 1425 | 1614 | 0 | 11065 | 22691 |
| 2027-28 | 5990 | 431 | 250 | 23 | 633 | 1218 | 1487 | 1695 | 0 | 11727 | 23898 |
| 2028-29 | 6433 | 450 | 261 | 24 | 659 | 1271 | 1552 | 1780 | 0 | 12430 | 25170 |
| 2029-30 | 6836 | 462 | 270 | 25 | 676 | 1310 | 1599 | 1843 | 0 | 13021 | 26180 |
| 2030-31 | 7264 | 474 | 279 | 26 | 693 | 1350 | 1648 | 1908 | 0 | 13642 | 27234 |
| 2031-32 | 7719 | 486 | 289 | 27 | 711 | 1391 | 1698 | 1975 | 0 | 14296 | 28334 |
| 2032-33 | 8202 | 499 | 299 | 28 | 729 | 1434 | 1750 | 2045 | 0 | 14986 | 29488 |
| 2033-34 | 8715 | 512 | 309 | 29 | 748 | 1478 | 1804 | 2117 | 0 | 15712 | 30692 |
| 2034-35 | 9120 | 522 | 316 | 30 | 762 | 1506 | 1838 | 2172 | 0 | 16266 | 31584 |
| 2035-36 | 9544 | 532 | 323 | 31 | 776 | 1534 | 1873 | 2228 | 0 | 16841 | 32503 |
| 2036-37 | 9988 | 542 | 330 | 32 | 791 | 1563 | 1908 | 2286 | 0 | 17440 | 33455 |
| 2037-38 | 10453 | 552 | 337 | 33 | 806 | 1592 | 1944 | 2345 | 0 | 18062 | 34435 |
| 2038-39 | 10939 | 562 | 344 | 34 | 821 | 1622 | 1981 | 2406 | 0 | 18709 | 35452 |
| 2039-40 | 11427 | 571 | 351 | 35 | 833 | 1647 | 2011 | 2457 | 0 | 19332 | 36384 |
| 2040-41 | 11936 | 580 | 358 | 36 | 846 | 1672 | 2041 | 2509 | 0 | 19978 | 37343 |
| 2041-42 | 12468 | 589 | 365 | 37 | 859 | 1697 | 2072 | 2562 | 0 | 20649 | 38332 |
| 2042-43 | 13024 | 598 | 372 | 38 | 872 | 1723 | 2103 | 2616 | 0 | 21346 | 39353 |
| 2043-44 | 13605 | 607 | 379 | 39 | 885 | 1749 | 2135 | 2671 | 0 | 22070 | 40407 |

Traffic projections for Most Likely scenario is given as under

**Table 6-3 : Total Tollable Traffic @ Toll Plaza - Chainage 97.900 KM
(Most Likely Growth Scenario)**

| Year | Car/Jeep/ Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|---------|------------------|-------------|-----|---------|-----|------------|----------|----------------|------------------------|------------------|--------------------------------|
| 2024-25 | 4846 | 380 | 220 | 20 | 562 | 1073 | 1311 | 1467 | 0 | 9879 | 20513 |
| 2025-26 | 5217 | 398 | 230 | 21 | 586 | 1123 | 1372 | 1544 | 0 | 10491 | 21649 |
| 2026-27 | 5616 | 416 | 241 | 22 | 611 | 1175 | 1435 | 1626 | 0 | 11142 | 22852 |
| 2027-28 | 6046 | 435 | 252 | 23 | 637 | 1229 | 1501 | 1712 | 0 | 11835 | 24121 |
| 2028-29 | 6509 | 455 | 264 | 24 | 664 | 1286 | 1570 | 1802 | 0 | 12574 | 25465 |
| 2029-30 | 6933 | 468 | 274 | 25 | 683 | 1329 | 1622 | 1870 | 0 | 13204 | 26553 |
| 2030-31 | 7384 | 481 | 284 | 26 | 702 | 1373 | 1676 | 1941 | 0 | 13867 | 27691 |
| 2031-32 | 7865 | 495 | 294 | 27 | 722 | 1418 | 1731 | 2014 | 0 | 14566 | 28876 |
| 2032-33 | 8377 | 509 | 305 | 28 | 742 | 1465 | 1788 | 2090 | 0 | 15304 | 30120 |
| 2033-34 | 8922 | 523 | 316 | 29 | 763 | 1513 | 1847 | 2169 | 0 | 16082 | 31422 |
| 2034-35 | 9359 | 534 | 324 | 30 | 779 | 1545 | 1886 | 2231 | 0 | 16688 | 32411 |
| 2035-36 | 9818 | 545 | 332 | 31 | 796 | 1578 | 1926 | 2294 | 0 | 17320 | 33435 |

| Year | Car/Jeep/ Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle | Total Traffic | PCU (Including Exempted) |
|----------------|------------------|-------------|-----|---------|-----|------------|----------|----------------|------------------------|------------------|--------------------------------|
| 2036-37 | 10299 | 557 | 340 | 32 | 813 | 1612 | 1967 | 2359 | 0 | 17979 | 34496 |
| 2037-38 | 10804 | 569 | 348 | 33 | 830 | 1646 | 2009 | 2426 | 0 | 18665 | 35594 |
| 2038-39 | 11334 | 581 | 356 | 34 | 848 | 1681 | 2052 | 2495 | 0 | 19381 | 36733 |
| 2039-40 | 11868 | 591 | 364 | 35 | 863 | 1711 | 2088 | 2554 | 0 | 20074 | 37788 |
| 2040-41 | 12427 | 601 | 372 | 36 | 878 | 1741 | 2125 | 2614 | 0 | 20794 | 38876 |
| 2041-42 | 13012 | 612 | 380 | 37 | 893 | 1772 | 2162 | 2675 | 0 | 21543 | 39999 |
| 2042-43 | 13625 | 623 | 388 | 38 | 909 | 1803 | 2200 | 2738 | 0 | 22324 | 41163 |
| 2043-44 | 14266 | 634 | 397 | 39 | 925 | 1835 | 2239 | 2802 | 0 | 23137 | 42368 |

CHAPTER 7

FORECAST OF TOLL REVENUE

7.1 General

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

7.2 Discount Categories

As per the Toll Notification (Schedule - G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3rd rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers or whose frequency does not yield any discount from the above categories.
4. Local Discounts: There are several categories of local discounts.
 - a) Local Car Jeep Van - Rs. 275 per month (for locals residing within a radius of 20 kms from toll plaza)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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 numbers (2011-12 series) are available up to 2022-23. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. The following graph provides historical rate of inflation (WPI) in India. Data has been sourced from the 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.

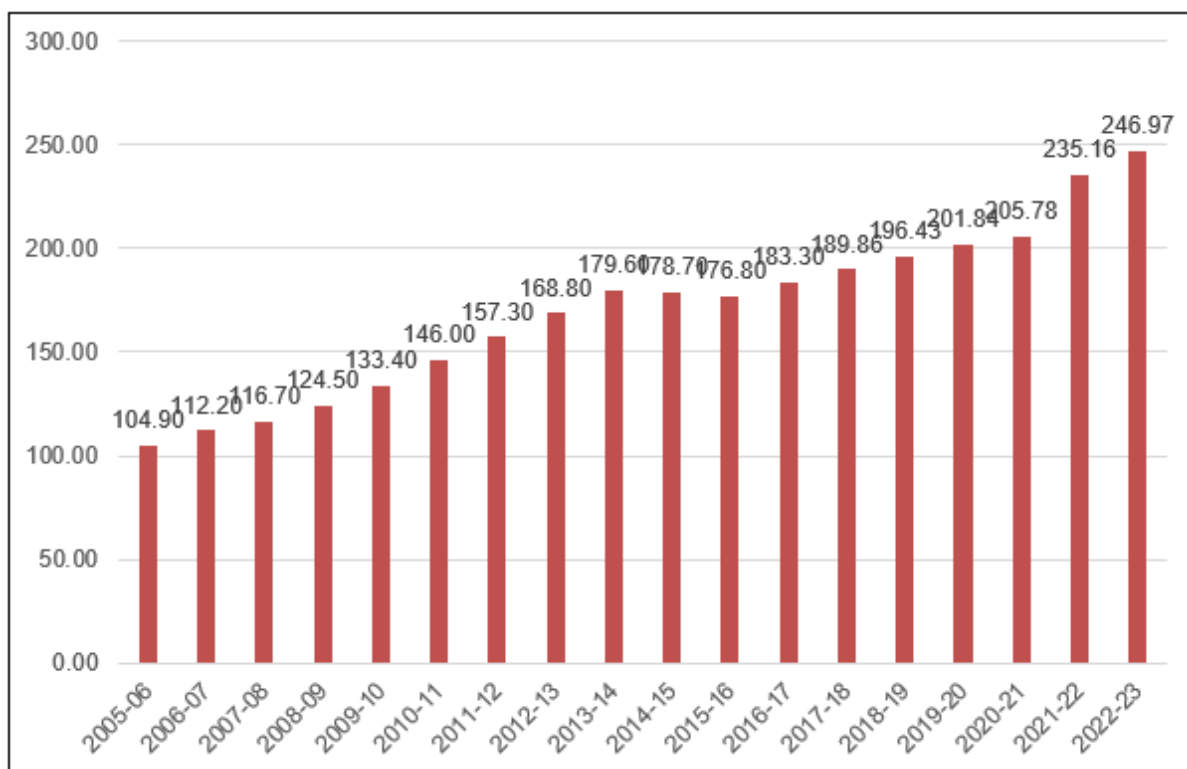


Figure 7-1 : Historical Rate of WPI Inflation in India

Average inflation in WPI in the last few years is steadily growing. It grew by the range of 4% - 5% in previous years. For future years initially it is takes 5% and Suitably Stepped down for future years.

7.3 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 7-1 : Base Toll Rates June 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 (Two Axles) | 2.20 |
| Three Axle Commercial Vehicles | 2.40 |
| Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4 to 6 axles) | 3.45 |

| Type of Vehicle | Base Rate of Fee / Km (in Rs.) |
|--------------------------------------|-----------------------------------|
| Oversized Vehicles (7 or more Axles) | 4.20 |

These rates are then modified for as per procedure provided in guidelines of notification considering factors listed below.

- Annual revision of fee rate - @3%
- Application of WPI

Base rates have been worked out to map the current rates. These shall be updated when more details come in. Base toll rates are given below.

Table 7-2 : Toll Rates for Year 2023-24 (Rs. Rupees) @ Toll Plaza 1 – KM 97.900

| Sr.no | Type of Vehicle | Rates (2023-24) |
|-------|------------------|--------------------|
| 1 | Car / Jeep / Van | 140.00 |
| 2 | Mini LCV | 140.00 |
| 3 | Bus | 475.00 |
| 4 | Minibus | 225.00 |
| 5 | LCV | 225.00 |
| 6 | Truck - 2 Axle | 475.00 |
| 7 | 3 - Axle | 515.00 |
| 8 | 4 - 6 Axle | 745.00 |
| 9 | 7 & above Axle | 905.00 |

Above rates are applicable for base year 2023-24. These rates have been escalated for future year as NHA policy and MORTH guideline for future revenue working.

Table 7-3 : Toll Rates for Forecasting Year (Rs. Rupees) @ Toll Plaza 1 – KM 97.900

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2- Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle |
|---------|--------------|----------|-----|---------|-----|------------|-------------|----------------|------------------------|
| 2024-25 | 145 | 145 | 485 | 230 | 230 | 485 | 530 | 760 | 925 |
| 2025-26 | 150 | 150 | 510 | 245 | 245 | 510 | 555 | 800 | 975 |
| 2026-27 | 160 | 160 | 535 | 255 | 255 | 535 | 585 | 840 | 1025 |
| 2027-28 | 165 | 165 | 565 | 270 | 270 | 565 | 615 | 885 | 1075 |
| 2028-29 | 175 | 175 | 590 | 280 | 280 | 590 | 645 | 930 | 1130 |
| 2029-30 | 185 | 185 | 620 | 295 | 295 | 620 | 680 | 975 | 1190 |
| 2030-31 | 195 | 195 | 655 | 310 | 310 | 655 | 715 | 1025 | 1250 |

| Year | Car/Jeep/Van | Mini LCV | Bus | Minibus | LCV | 2-Axle | 3 - Axle | 4 to 6 Axle | 7 and Above Axle |
|---------|--------------|----------|------|---------|-----|--------|----------|-------------|------------------|
| 2031-32 | 205 | 205 | 690 | 330 | 330 | 690 | 750 | 1080 | 1315 |
| 2032-33 | 215 | 215 | 725 | 345 | 345 | 725 | 790 | 1135 | 1380 |
| 2033-34 | 225 | 225 | 760 | 365 | 365 | 760 | 830 | 1195 | 1455 |
| 2034-35 | 235 | 235 | 800 | 380 | 380 | 800 | 875 | 1255 | 1530 |
| 2035-36 | 250 | 250 | 845 | 400 | 400 | 845 | 920 | 1320 | 1610 |
| 2036-37 | 260 | 260 | 890 | 425 | 425 | 890 | 970 | 1390 | 1695 |
| 2037-38 | 275 | 275 | 935 | 445 | 445 | 935 | 1020 | 1465 | 1785 |
| 2038-39 | 290 | 290 | 985 | 470 | 470 | 985 | 1075 | 1545 | 1880 |
| 2039-40 | 305 | 305 | 1035 | 495 | 495 | 1035 | 1130 | 1625 | 1980 |
| 2040-41 | 325 | 325 | 1095 | 520 | 520 | 1095 | 1190 | 1715 | 2085 |
| 2041-42 | 340 | 340 | 1150 | 550 | 550 | 1150 | 1255 | 1805 | 2200 |
| 2042-43 | 360 | 360 | 1215 | 580 | 580 | 1215 | 1325 | 1905 | 2315 |
| 2043-44 | 380 | 380 | 1280 | 610 | 610 | 1280 | 1395 | 2005 | 2445 |

7.4 Toll Revenue

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

7.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under all scenarios at each of the toll plaza up to 2043-44 years starting from the year 2023-24 are shown in tables below.

Table 7-4 : Toll Revenue Optimistic Scenario

(Rs. Crores)

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2024-25 | 112.54 | 112.54 |
| 2025-26 | 124.58 | 124.58 |
| 2026-27 | 138.62 | 138.62 |
| 2027-28 | 154.10 | 154.10 |
| 2028-29 | 170.56 | 170.56 |
| 2029-30 | 187.19 | 187.19 |
| 2030-31 | 205.60 | 205.60 |
| 2031-32 | 226.42 | 226.42 |
| 2032-33 | 247.59 | 247.59 |
| 2033-34 | 271.37 | 271.37 |
| 2034-35 | 294.09 | 294.09 |
| 2035-36 | 321.24 | 321.24 |

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2036-37 | 347.47 | 347.47 |
| 2037-38 | 377.90 | 377.90 |
| 2038-39 | 411.41 | 411.41 |
| 2039-40 | 446.34 | 446.34 |
| 2040-41 | 484.54 | 484.54 |
| 2041-42 | 524.22 | 524.22 |
| 2042-43 | 570.18 | 570.18 |
| 2043-44 | 620.12 | 620.12 |

Table 7-5 : Toll Revenue Pessimistic Scenario

(Rs. Crores)

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2024-25 | 112.01 | 112.01 |
| 2025-26 | 123.45 | 123.45 |
| 2026-27 | 136.71 | 136.71 |
| 2027-28 | 151.24 | 151.24 |
| 2028-29 | 166.58 | 166.58 |
| 2029-30 | 181.93 | 181.93 |
| 2030-31 | 198.86 | 198.86 |
| 2031-32 | 217.91 | 217.91 |
| 2032-33 | 237.16 | 237.16 |
| 2033-34 | 258.73 | 258.73 |
| 2034-35 | 279.03 | 279.03 |
| 2035-36 | 303.30 | 303.30 |
| 2036-37 | 326.49 | 326.49 |
| 2037-38 | 353.37 | 353.37 |
| 2038-39 | 382.84 | 382.84 |
| 2039-40 | 413.40 | 413.40 |
| 2040-41 | 446.63 | 446.63 |
| 2041-42 | 480.86 | 480.86 |
| 2042-43 | 520.45 | 520.45 |
| 2043-44 | 563.30 | 563.30 |

Table 7-6 : Toll Revenue Most Likely Scenario

(Rs. Crores)

| Location / Year | TP-01 | Total |
|-----------------|--------|--------|
| 2024-25 | 112.29 | 112.29 |
| 2025-26 | 124.02 | 124.02 |
| 2026-27 | 137.68 | 137.68 |

| Location / Year | TP-01 | Total |
|------------------------|--------------|--------------|
| 2027-28 | 152.66 | 152.66 |
| 2028-29 | 168.54 | 168.54 |
| 2029-30 | 184.53 | 184.53 |
| 2030-31 | 202.22 | 202.22 |
| 2031-32 | 222.10 | 222.10 |
| 2032-33 | 242.26 | 242.26 |
| 2033-34 | 264.89 | 264.89 |
| 2034-35 | 286.35 | 286.35 |
| 2035-36 | 312.01 | 312.01 |
| 2036-37 | 336.68 | 336.68 |
| 2037-38 | 365.28 | 365.28 |
| 2038-39 | 396.69 | 396.69 |
| 2039-40 | 429.38 | 429.38 |
| 2040-41 | 465.00 | 465.00 |
| 2041-42 | 501.79 | 501.79 |
| 2042-43 | 544.40 | 544.40 |
| 2043-44 | 590.67 | 590.67 |

7.6 Modification in Concession Period

Modification of the concession period shall be done on the basis of Revenue targets given in the contract for milestones 1 & 2.

Modification in concession period as per provisions of DCA and same is summarized in table for all scenarios.

Pessimistic Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|------------------------------------|--|---------------------------------------|--|
| Target Month - March 2031 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period (Year) | Modified Concession Period | | |
| TOT-13 - Gwalior to Jhansi | 17 | 19.00 | 11.74 % | No | - | 0.00% | 20.00 | 0.00 | | | |
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2038 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period | Total Change in Concession period (Year) | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-13 - Gwalior to Jhansi | 31 | 30.73 | - 0.88 % | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

Most likely Case

| Target Point 1- March 2033 | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|------------------------------------|----------------------------|--|
| Target Month - March 2031 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period (Year) | Modified Concession Period | |
| TOT-13 - Gwalior to | 17 | 19.39 | 14.04 % | No | - | 0.00% | 20.00 | 0.00 | | |

| Jhansi | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|-----------------------------|--|---------------------------------------|--|
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2038 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period | Total Change in Concession period (Year) | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-13 - Gwalior to Jhansi | 31 | 31.81 | 2.60 % | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

Optimistic Case

| Target Point 1- March 2033 | | | | | | | | | | | |
|----------------------------|-----------------------------|---------------------------------|--------------|--|-----------------------------------|-------------------------------|-----------------------------------|------------------------------------|--|---------------------------------------|--|
| Target Month - March 2031 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period (Year) | Modified Concession Period | | |
| TOT-13 - Gwalior to Jhansi | 17 | 19.79 | 16.42 % | No | - | 0.00% | 20.00 | 0.00 | | | |
| Target Point 2- March 2038 | | | | | | | | | | | |
| Target Month - March 2038 | Target Revenue (Rs. Crores) | Calculated Revenue (Rs. Crores) | Difference % | If qualifies for Modification in Concession Period | Qualifying increment or shortfall | Change in Concession period % | Original Concession Period (Year) | Change in Concession period | Total Change in Concession period (Year) | Calculated Modified Concession Period | Final Concession Period subject to Cap |
| TOT-13 - Gwalior to Jhansi | 31 | 32.95 | 6.29 % | No | - | 0.00% | 20.00 | 0.00 | 0.00 | 20.00 | |

TOT-13 (Gwalior to Jhansi)-Modification in Concession Period

| Types of Scenarios | Pessimistic Case | | Most likely Case | | Optimistic Case | |
|--|------------------|--------|------------------|--------|-----------------|--------|
| | Mar-31 | Mar-38 | Mar-31 | Mar-38 | Mar-31 | Mar-38 |
| Target Month | | | | | | |
| Target Revenue (Rs. Crores) | 17 | 31 | 17 | 31 | 17 | 31 |
| Calculated Revenue (Rs. Crores) | 19.00 | 30.73 | 19.39 | 31.81 | 19.79 | 32.95 |
| Differences % | 11.74% | -0.88% | 14.04% | 2.60% | 16.42% | 6.29% |
| If qualifies for Modification in Concession Period | No | No | No | No | No | No |
| Qualifying Increment or shortfall | - | - | - | - | - | - |
| Change in Concession period % | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Original Concession Period | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Change in Concession period | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Change in Concession period | 0.00 | | 0.00 | | 0.00 | |
| Calculated Modified Concession Period | 20.00 | | 20.00 | | 20.00 | |
| Final Concession Period subject to Cap | 0.00 | | 0.00 | | 0.00 | |

Thus, there is no modification expected in concession period due to variation in revenue as per above estimates in all scenarios.

CHAPTER 8

CONCLUSION & RECOMMENDATIONS

8.1 Conclusion & Recommendations

Project stretch of Gwalior-Jhansi from km 0.000 to km 103.000 (revised section km 16.000 to km 98.455) of NH-75 (New NH-44) in the state of Madhya Pradesh and Uttar Pradesh is currently four lane road. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the important regional network connecting Uttar Pradesh, Madhya Pradesh to Southern States and vice-versa. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As discussed, dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 7%+ post COVID-19, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the 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 due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road

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



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