

**Corporate Office:**3rd Floor, IRB Complex, Chandivali Farm, Chandivali Village,  
Andheri (E), Mumbai-400 072

Tel: 91-22-6640 4220 / 4880 4200 • Fax: 91-22-2857 3441

e-mail: info@irb.co.in • www.irb.co.in

CIN : U45200MH2002PTC135512

Date: March 08, 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/Ma'am,

**NSE Symbol: IRBIT / Series: IV****Sub.: Rights Issue of units of IRB Infrastructure Trust (“the Trust”)**

Further to our intimation dated March 5, 2024 and pursuant to applicable provisions of the SEBI (Infrastructure Investment Trusts) Regulations, 2014 read with circulars, clarifications, notifications and guidelines issued thereunder from time to time (“**SEBI InvIT Regulations**”) and other applicable regulations including Chapter 9 of the Master Circular for Infrastructure Investment Trusts (InvITs) dated July 6, 2023 issued by the SEBI (to the extent applicable), please note that the Board of Directors of the Investment Manager (“the **Board**”) of IRB Infrastructure Trust (“the Trust”) has considered and approved, *inter-alia*, the following matters in relation to the Right Issue of Units:

- i. Unaudited Condensed Consolidated and Standalone Interim Financial Statements of the Trust as of and for the nine-month period ended December 31, 2023 (enclosed as Annexure 1).
- ii. Valuation Report of the Trust Assets as on December 31, 2023, issued by M/s. KPMG Valuation Services LLP [IBBI Reg. No. IBBI/RV-E/06/2020/115], undertaken for the purpose of computation of enterprise value of the InvIT Assets under InvIT Regulations. (Enclosed as Annexure 2).

The Net Asset Value (“NAV”) of the Trust as on December 31, 2023, based on the Valuation Report issued by the Valuer is as follows:

<b>Particulars</b>	<b>Amount in Rs. Crore</b>
A. Assets	46,238.34
B. Liabilities (adjusted for present value of standalone expenses of Trust, net of cash and cash equivalents and surplus assets)	19,989.00
C. Net Assets	26,249.34
Outstanding Units (in Crore)	102.17
<b>NAV at Fair Value (Rs/per Unit)</b>	<b>256.92</b>

- iii. Valuation Report as on January 31, 2024 for following Project Assets: i) IRB Lalitpur Tollway Private Limited (IRBLTPL); ii) IRB Kota Tollway Private Limited (IRBKTPL); and iii) IRB Gwalior Tollway Private Limited (IRBGTPPL) issued by M/s. KPMG Valuation Services LLP [IBBI Reg. No. IBBI/RV-E/06/2020/115] (Enclosed as Annexure 3).

Kindly take the same on record.

Thanking you,

**For MMK Toll Road Private Limited**

**(in its capacity as Investment Manager to IRB Infrastructure Trust)**

**Kaustubh Shevade**  
**Company Secretary and Compliance Officer**

**Encl.: As above.**



**Annexure 1**

Unaudited Condensed Consolidated and Standalone Interim Financial Statements of the Trust as of and for the nine-month period ended December 31, 2023

*(Enclosed separately below)*

Gokhale & Sathe  
Chartered Accountants  
304/308/309, Udyog Mandir No.1,  
7-C, Bhagoji Keer Marg,  
Mahim, Mumbai 400 016.  
Telephone + 91 (22) 43484242  
Fax + 91 (22) 43484241

M S K A & Associates  
Chartered Accountants  
602, Floor 6, Raheja Titanium  
Western Express Highway,  
Geetanjali Railway Colony,  
Ram Nagar, Goregaon (E),  
Mumbai 400063, India  
Tel: +91 22 6238 0519

**Independent Auditors' Review Report on Unaudited Condensed Interim Consolidated Financial Statements for the nine months period ended December 31, 2023 of IRB Infrastructure Trust.**

To  
The Board of Directors,  
MMK Toll Roads Private Limited  
The Investment manager of the IRB Infrastructure Trust ("the Investment Manager")

1. We have jointly reviewed the accompanying Unaudited Condensed Interim Consolidated Financial Statements of IRB Infrastructure Trust ("the Trust") and its subsidiaries (the Trust and its subsidiaries together referred to as "the Group") which comprises Condensed Interim Consolidated Balance Sheet as on December 31, 2023, Unaudited Condensed Interim Consolidated Statement of Profit and Loss, including other comprehensive income, Unaudited Condensed Interim Consolidated Statement of Net Assets at Fair Value, Unaudited Condensed Interim Consolidated Statement of Total returns at Fair Value, Unaudited Condensed Interim Consolidated Cash Flow Statement and Unaudited Condensed Interim Consolidated Statement of Changes in Unitholders Equity for the nine months period then ended and a summary of select explanatory notes (together hereinafter referred to as the "Unaudited Condensed Interim Consolidated Financial Statements"). These Unaudited Condensed Interim Consolidated Financial Statements for the period from April 01, 2023 to December 31, 2023 have been prepared solely for inclusion in the Letter of Offer ("LOF") in connection with the proposed right issue of units of the Trust.
2. The Unaudited Condensed Interim Consolidated Financial Statements, which is the responsibility of the Investment Manager and approved by the Investment Manager's Board of Directors, has been prepared in accordance with the requirements of SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended from time to time read with the Paragraph 3.23 of Chapter 3 of the Securities and Exchange Board of India ("SEBI") Master Circular No. SEBI/HO/DDHS-PoD-2/P/CIR/2023/115 dated July 06, 2023, as amended ("SEBI Circular"), together known as ("InvIT Regulations"), and recognition and measurement principles laid down in Indian Accounting Standard 34, Interim Financial Reporting ('Ind AS 34') prescribed under rule 2(1)(a) of Companies (Indian Accounting Standards) Rules 2015, as amended and other recognised accounting principles generally accepted in India, to the extent not inconsistent with the InvIT Regulations.
3. We conducted our review in accordance with the Standard on Review Engagements (SRE) 2410 Review of Interim Financial Information Performed by the Independent Auditor of the Entity" issued by the Institute of Chartered Accountants of India. A review consists of making inquiries, primarily of Investment Manager's personnel responsible for financial and accounting matters and applying analytical and other review procedures. A review is substantially less in scope than an audit conducted in accordance with Standards on Auditing and consequently does not enable us to obtain assurance that we would become aware of all significant matters that might be identified in an audit. Accordingly, we do not express an audit opinion.



4. This Statement includes the unaudited condensed interim financial statements of the Trust and the following entities:

Sr No	Name of Entity	Relationship with the Trust
1	AE Tollway Limited	Subsidiary
2	Yedeshi Aurangabad Tollway Limited	Subsidiary
3	IRB Westcoast Tollway Limited	Subsidiary
4	Kaithal Tollway Limited	Subsidiary
5	Solapur Yedeshi Tollway Limited	Subsidiary
6	CG Tollway Limited	Subsidiary
7	Udaipur Tollway Limited	Subsidiary
8	Kishangarh Gulabpura Tollway Limited	Subsidiary
9	IRB Hapur Moradabad Tollway Limited	Subsidiary
10	Palsit Dankuni Tollway Private Limited (w.e.f. 2 April 2022)	Subsidiary
11	IRB Golconda Expressway Private Limited (w.e.f. 11 August 2023)	Subsidiary
12	IRB Lalitpur Tollway Private Limited (w.e.f. 10 November 2023)	Subsidiary
13	Samakhiyali Tollway Private Limited (w.e.f. 28 December 2023)	Subsidiary

5. Based on our review conducted and procedures performed as stated in paragraph 3 above and based on the consideration of review reports of other auditors as stated in paragraph 7 below, nothing has come to our attention that causes us to believe that the accompanying Unaudited Condensed Interim Consolidated Financial Statements, prepared in accordance with the recognition and measurement principles laid down in Ind AS 34 prescribed under prescribed under rule 2(1)(a) of Companies (Indian Accounting Standards) Rules 2015, as amended and other recognised accounting principles generally accepted in India, to the extent not inconsistent with the InvIT Regulations, has not disclosed the information required to be disclosed in terms of Regulation 23 of the SEBI (Infrastructure Investment Trusts) Regulation, 2014, as amended, read with SEBI circular, including the manner in which it is to be disclosed, or that it contains any material misstatement.
6. We draw attention to Note 14 of the accompanying unaudited condensed interim consolidated financial statements, which describes the presentation of 'Unit Capital' as 'Equity' to comply with the InvIT Regulations.

Our conclusion is not modified in respect of this matter.

7. We did not review the unaudited condensed interim financial statements of 6 subsidiaries included in the Unaudited Condensed Interim Consolidated Financial Statements, whose unaudited condensed interim financial statements reflects total assets of Rs. 1,20,900 million (before consolidation adjustments) as on December 31, 2023, total revenues of Rs. 15,609 million (before consolidation adjustment), total net loss after tax of Rs. 5,351 million (before consolidation adjustment), total comprehensive loss of Rs. 5,351 million (before consolidation adjustment) and cash flows (net) of Rs. 267 million for the period April 01, 2023 to December 31, 2023, as considered in the Unaudited Condensed Interim Consolidated Financial Statements. These condensed interim financial statements have been reviewed by other auditors whose reports have been furnished to us by the Management and our conclusion on the Unaudited Condensed Interim Consolidated Financial Statements, in so far as it relates to the amounts and disclosures included in respect of these subsidiaries is based solely on the report of the other auditors and the procedures performed by us as stated in paragraph 3 above.

Our conclusion is not modified in respect of the above matter.



Gokhale & Sathe  
Chartered Accountants  
304/308/309, Udyog Mandir No.1,  
7-C, Bhagoji Keer Marg,  
Mahim, Mumbai 400 016.  
Telephone + 91 (22) 43484242  
Fax + 91 (22) 43484241

M S K A & Associates  
Chartered Accountants  
602, Floor 6, Raheja Titanium  
Western Express Highway,  
Geetanjali Railway Colony,  
Ram Nagar, Goregaon (E),  
Mumbai 400063, India  
Tel: +91 22 6238 0519

8. The Unaudited Condensed Interim Consolidated Financial Statements of the Trust for the period April 01, 2022 to December 31, 2022 included in the Unaudited Condensed Interim Consolidated Financial Statements, were reviewed by Gokhale & Sathe, one of the Joint Auditor of the Trust, whose report dated March 08, 2024 expressed an unmodified conclusion of those Unaudited Condensed Interim Consolidated Financial Statements.

M S K A & Associates conclusion is not modified in respect of this matter.

9. The consolidated financial information for the year ended March 31, 2023, included in the Unaudited Condensed Interim Consolidated Financial Statements, are from the consolidated financial statements of the Trust, which were audited by Gokhale & Sathe, one of the Joint Statutory Auditor of the Trust, whose report dated May 12, 2023 expressed an unmodified opinion of those audited consolidated financial statements.

M S K A & Associates conclusion is not modified in respect of this matter.

10. The report is addressed to the Board of Directors of the Investment Manager and submitted solely for inclusion in the LOF in connection with the proposed rights issue of units of the Trust.

Accordingly, do not accept or assume any liability or any duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come without our prior consent in writing.

Our conclusion is not modified in respect of this matter.

**For Gokhale & Sathe**  
Chartered Accountants  
ICAI Firm Registration No.103264W

**CA Kaustubh Deshpande**  
Partner  
Membership No.: 121011  
UDIN: 24121011BKAALP2178



Place: Mumbai  
Date: March 08, 2024

**For M S K A & Associates**  
Chartered Accountants  
ICAI Firm Registration No.105047W

**Nitin Tiwari**  
Partner  
Membership No.: 118894  
UDIN: 24118894BKGQGP4850



Place: Mumbai  
Date: March 08, 2024

IRB Infrastructure Trust  
Condensed Interim Consolidated Balance sheet as at December 31, 2023

		(Rs. in million)	
	Notes	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
<b>ASSETS</b>			
<b>Non-current assets</b>			
Property, Plant and Equipment	4	6 87	7,59
Goodwill		604,54	604,54
Other Intangible assets	4	308,561.98	228,418.29
Intangible assets under development	4	6,218.25	2,421.67
<b>Financial assets</b>			
i) Others	7	32.06	0.33
Other non-current assets	9	8.00	174.07
Deferred tax assets	8	1,280.76	792.60
		<b>316,712.46</b>	<b>232,419.09</b>
<b>Current assets</b>			
<b>Financial assets</b>			
i) Investments	5	7,095.52	1,283.09
ii) Trade receivables	6	213.05	84.67
iii) Cash and cash equivalents	10	687.54	731.31
iv) Bank balance other than (iii) above	11	9,453.30	4,866.69
v) Others	7	2,219.42	1,448.56
Current tax assets (net)	12	176.67	24.81
Other current assets	13	2,250.32	2,657.07
		<b>22,095.82</b>	<b>11,096.20</b>
<b>Total assets</b>		<b>338,808.28</b>	<b>243,515.29</b>
<b>EQUITY AND LIABILITIES</b>			
<b>Equity</b>			
Unit Capital	14	115,445.40	87,929.33
Subordinate debt	15	16,916.65	-
Other equity			
Other reserves	16	(14,777.41)	(10,395.80)
<b>Total Equity</b>		<b>117,584.64</b>	<b>77,533.53</b>
Non-controlling interests		1.39	0.81
<b>Total unit holder's equity</b>		<b>117,586.03</b>	<b>77,534.34</b>
<b>Non-current liabilities</b>			
<b>Financial liabilities</b>			
i) Borrowings	17	169,150.24	98,943.95
ii) Other financial liabilities	19	37,493.58	35,780.80
iii) Trade payables			
a) total outstanding dues of micro enterprises and small enterprises		-	-
b) total outstanding dues of creditors other than micro enterprises and small enterprises	20	-	4,165.72
Provisions	21	3,418.74	2,965.03
Deferred tax liabilities	8	235.60	36.80
		<b>210,298.16</b>	<b>141,892.30</b>
<b>Current liabilities</b>			
<b>Financial liabilities</b>			
i) Borrowings	17	1,261.08	6,135.65
ii) Trade payables	18		
a) total outstanding dues of micro enterprises and small enterprises		1.50	1.61
b) total outstanding dues of creditors other than micro enterprises and small enterprises		7,945.74	15,303.87
iii) Other financial liabilities	19	1,623.92	2,549.37
Other current liabilities	22	91.85	98.15
		<b>10,924.09</b>	<b>24,088.65</b>
<b>Total liabilities</b>		<b>221,222.25</b>	<b>165,980.95</b>
<b>Total equity and liabilities</b>		<b>338,808.28</b>	<b>243,515.29</b>

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Consolidated Financial Statements

As per our report of even date

For Gokhale & Sathe  
Chartered Accountants  
ICAI registration number: 103264W

CA Krunal Deshpande  
Partner  
Membership No 121011

For M S K A & Associates  
Chartered Accountants  
ICAI registration number: 105047W

Nitin Tiwari  
Partner  
Membership No 118894

Place: Mumbai  
Date:

08 MAR 2024

For and on behalf of the Board of Directors of  
NIMK Toll Road Private Limited  
(As Investment Manager to IRB Infrastructure Trust)  
CIN : U45200MH2002PTC135512

Virendra D. Mhaikar  
Chairman  
DIN : 00183554

Shilpa Todankar  
Chief Financial Officer

Place: Mumbai  
Date:

08 MAR 2024

Dhananjay K. Joshi  
Chief Executive officer

Krunal Shevade  
Company Secretary  
Membership No A27833





IRB Infrastructure Trust

Unaudited Condensed Interim Consolidated Statement of Profit and Loss for the period April 01, 2023 to December 31, 2023

(Rs. in million)

Particulars	Notes	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
<b>Income</b>			
Revenue from operations	23	26,535.36	19,896.67
Other income	24	527.86	161.32
<b>Total income</b>		<b>27,063.22</b>	<b>20,057.99</b>
<b>Expenses</b>			
Valuation Expenses		2.29	0.97
Audit fees	28A	3.68	3.85
Operating Expenses	25	13,201.29	9,305.29
Project Management Fees		2,931.62	1,997.38
Insurance and Security Expenses		66.74	8.13
Trustee Fees		4.54	3.33
Depreciation on Property, Plant and Equipment	26	0.72	0.95
Amortisation of Intangible Assets	26	2,614.32	1,957.61
Finance costs (Interest)	27	9,531.37	6,698.66
Finance costs (Others)	27	814.76	990.24
Legal & Professional Fees		239.81	136.14
Investment Manager Fees		122.60	42.39
Custodian fees		1.10	0.24
Fair value loss on measurement of other payable		1,676.37	356.63
Other expenses	28	63.25	86.20
<b>Total expenses</b>		<b>31,274.46</b>	<b>21,588.00</b>
<b>Profit/(loss) before tax</b>		<b>(4,211.24)</b>	<b>(1,530.02)</b>
<b>Tax expenses</b>			
Current tax	36	(75.08)	351.25
Deferred tax	36	(289.36)	(445.56)
<b>Total tax expenses</b>		<b>(364.44)</b>	<b>(94.30)</b>
<b>Profit/(loss) after tax</b>		<b>(3,846.80)</b>	<b>(1,435.72)</b>
<b>Other comprehensive income</b>			
<b>Item that will not be reclassified to profit or loss:</b>			
(a) Re-measurement (loss)/gain on defined benefit plans (net of taxes)		-	-
<b>Other comprehensive income/ (loss) for the period, net of tax</b>		<b>-</b>	<b>-</b>
<b>Total comprehensive income/(loss) for the period</b>		<b>(3,846.80)</b>	<b>(1,435.72)</b>
<b>Profit/(loss) after tax</b>		<b>(3,846.80)</b>	<b>(1,435.72)</b>
Attributable to:			
Unit holders		(3,846.93)	(1,436.18)
Non-controlling interests		0.13	0.46
<b>Total comprehensive income for the period</b>			
Attributable to:			
Unit holders		(3,846.93)	(1,436.18)
Non-controlling interests		0.13	0.46
<b>Earnings per unit (Face value of Rs 100 each)</b>			
Basic	42	(4.03)	(1.64)
Diluted		(4.03)	(1.64)

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Consolidated Financial Statements.

As per our report of even date

For Gokhale & Sathe

Chartered Accountants

ICAI registration number: 103264W

CA Kaustubh Deshpande

Partner

Membership No. 121011

For M S K A & Associates

Chartered Accountants

ICAI registration number: 105047W

Nitin Tiwari

Partner

Membership No. 118894

For and on behalf of the Board of Directors of

MMK Toll Road Private Limited

(As Investment Manager to IRB Infrastructure Trust)

CIN : U45200MH2002PTC135512

Virendra D. Mhaikar

Chairman

DIN :00183554

Dhananjay K. Joshi

Chief Executive officer

Shilpa Todankar

Chief Financial Officer

Kaustubh Shevade

Company Secretary

Membership No.A27833

Place: Mumbai

Date: 08 MAR 2024

Place: Mumbai

Date: 08 MAR 2024

**IRB Infrastructure Trust**
**Unaudited Condensed Interim Consolidated Cash Flows Statement for the period April 01, 2023 to December 31, 2023**
**(Rs. in million)**

Particulars	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
<b>Cash flow from operating activities</b>		
Profit/(loss) before tax	(4,211.24)	(1,530.02)
<b>Adjustment to reconcile loss before tax to net cash flows:</b>		
Depreciation and amortisation	2,615.04	1,958.56
Resurfacing expenses	453.71	1,179.10
Fair value gain on mutual funds	(66.87)	(7.32)
Net (gain) on sale of current Investment	(77.82)	(42.12)
Finance costs	10,113.54	7,688.90
Interest income	(368.74)	(110.53)
Gain/(loss) on fair value measurement of other payable	1,676.37	356.63
<b>Operating profit before working capital changes</b>	<b>10,133.99</b>	<b>9,493.19</b>
<b>Movement in working capital:</b>		
Increase/ (Decrease) in trade payables	(11,873.19)	484.04
Decrease in other financial liabilities	(1,474.83)	(274.45)
Decrease in other liabilities	(58.75)	(438.94)
Increase in trade receivables	(128.38)	(0.10)
Decrease / (Increase) in other financial assets	(738.77)	496.71
Decrease in other assets	2,313.69	420.27
<b>Cash generated from operations</b>	<b>(1,826.24)</b>	<b>10,180.73</b>
Taxes paid (net of refunds)	(71.71)	(179.49)
<b>Net cash flows (used in)/generated from operating activities (A)</b>	<b>(1,897.95)</b>	<b>10,001.24</b>
<b>Cash flows from investing activities</b>		
Purchase of property, plant and equipment including CWIP, intangible assets including intangible assets under development	(86,554.59)	(7,745.84)
Proceeds from sale/ (purchase) of current investments (net)	(5,667.73)	(431.32)
Investments in bank deposits (having maturity of more than three months) (net)	(4,586.61)	(1987.42)
Interest received	305.66	129.08
<b>Net cash flows (used in) investing activities (B)</b>	<b>(96,503.27)</b>	<b>(10,035.50)</b>
<b>Cash flows from financing activities</b>		
Proceeds from non-current borrowings	119,742.76	31,668.76
Repayment of non-current borrowings	(48,312.74)	(25,772.63)
Proceed of current borrowings	97.66	(267.50)
Repayment of current borrowings	(5,350.72)	1,532.48
Issue of Unit capital	28,619.50	2,425.22
Return of Unit capital	(1,103.43)	-
Issue of Subordinate Debt	16,916.65	-
Unit issue expenses	(85.13)	(15.33)
Finance cost paid	(9,725.17)	(7,575.83)
Transaction cost paid	(1,994.36)	-
Interest distribution to unitholders	(449.55)	-
<b>Net cash flows generated from financing activities (C)</b>	<b>98,355.47</b>	<b>1,995.17</b>
<b>Net increase / (decrease) in cash and cash equivalents (A+B+C)</b>	<b>(45.75)</b>	<b>1,960.90</b>
<b>Cash and cash equivalents at the beginning of the year</b>	<b>731.31</b>	<b>287.23</b>
Add: Cash acquired on transfer of SPV's	1.98	-
<b>Cash and cash equivalents at the end of the period</b>	<b>687.54</b>	<b>2,248.13</b>
<b>Components of cash and cash equivalents</b>		
Balances with scheduled banks:		
- Trust, retention and other escrow accounts	375.57	1,833.69
- Others	214.72	279.80
- In deposit accounts with original maturity less than 3 months	80.00	124.50
Cash on hand	17.25	10.14
<b>Total cash and cash equivalents</b>	<b>687.54</b>	<b>2,248.13</b>



**IRB Infrastructure Trust****Unaudited Condensed Interim Consolidated Cash Flows Statement for the period April 01, 2023 to December 31, 2023****(Rs. in million)**

Particulars	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
<b>Debt reconciliation statement in accordance with Ind AS 7</b>		
<b>Opening balances</b>		
Long term borrowing	101,369.82	94,124.22
Short term borrowing	5,350.72	4,085.74
<b>Movements</b>		
<b>Cash Flows</b>		
Long term borrowing	72,418.93	5,896.12
Short term borrowing	(5,253.06)	1,264.98
<b>Non-cash changes</b>		
Long term borrowing	-	-
Short term borrowing	-	-
<b>Closing balances</b>		
Long term borrowing	173,788.75	100,020.34
Short term borrowing	97.66	5,350.72

**Notes :**

1. All figures in bracket are outflow.
2. Taxes paid are treated as arising from operating activities and are not bifurcated between investing and financing activities.
3. The Unaudited Condensed Interim Consolidated Cash Flow Statement has been prepared under Indirect Method as per Ind AS 7 "Statement of Cash Flows".
4. The Borrowings reflected in above Debt Reconciliation Statement are gross of Unamortised Transaction Cost.

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Consolidated Financial Statements.

As per our report of even date

**For Gokhale & Sathe**

Chartered Accountants

ICAI registration number: 103264W

CA Kaustubh Deshpande

Partner

Membership No. 121011



For and on behalf of the Board of Directors of

**MMK Toll Road Private Limited**

(As Investment Manager to IRB Infrastructure Trust)

CIN : U45200MH2002PTC135512

Virendra D. Mhaiskar

Chairman

DIN :00183554

Dhananjay K. Joshi

Chief Executive officer

**For M S K A & Associates**

Chartered Accountants

ICAI registration number: 105047W

Nitin Tiwari

Partner

Membership No. 118894



Shilpa Todankar

Chief Financial Officer

Kaustubh Shevade

Company Secretary

Membership No. A27833



Place: Mumbai

Date: **08 MAR 2024**

Place: Mumbai

Date: **08 MAR 2024**



**IRB Infrastructure Trust**

Unaudited Condensed Interim Consolidated Statement of changes in unitholder's equity for the period April 01, 2023 to December 31, 2023

**Statement of changes in Unitholders equity****A. Unit capital:**

	(Rs. in million)			
	As at December 31, 2023 (Unaudited)		As at March 31, 2023 (Audited)	
	No.	Rs.	No.	Rs.
<b>i) Units issued, subscribed and fully paid</b>				
Units having face value of Rs. 100/-				
Balance at the beginning of the year	87,92,93,265	87,929.33	85,50,43,265	85,504.33
Issue of Unit capital	14,24,00,000	28,619.50	2,42,50,000	2,425.00
Return of Unit capital (refer note 33)	-	(1,103.43)	-	-
<b>Balance at the end of the period / year</b>	<b>1,02,16,93,265</b>	<b>1,15,445.40</b>	<b>87,92,93,265</b>	<b>87,929.33</b>

**B. Other equity**

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
	<b>Retained earnings</b>	
Balance at the beginning of the year	(10,395.80)	(8,108.29)
Loss for the period / year	(3,846.93)	(2,272.18)
Interest Distribution (refer note 33)	(449.55)	-
Unit Issue expenses	(85.13)	(15.33)
<b>Balance at the end of the period / year</b>	<b>(14,777.41)</b>	<b>(10,395.80)</b>

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Consolidated Financial Statements.

As per our report of even date


For Gokhale & Sathe  
Chartered Accountants  
ICAI registration number: 103264W

  
CA Kaustubh Deshpande  
Partner  
Membership No. 121011



For and on behalf of the Board of Directors of  
**MMK Toll Road Private Limited**  
(As Investment Manager to IRB Infrastructure Trust)  
CIN : U45200MH2002PTC135512

  
Virendra D. Mhaiskar  
Chairman  
DIN :00183554

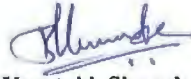
  
Dhananjay K. Joshi  
Chief Executive officer

For M S K A & Associates  
Chartered Accountants  
ICAI registration number: 105047W

  
Nitin Tiwari  
Partner  
Membership No. 118894



  
Shilpa Todankar  
Chief Financial Officer

  
Kaustubh Shevade  
Company Secretary  
Membership No. A.27833



Place: Mumbai  
Date: **08 MAR 2024**

Place: Mumbai  
Date: **08 MAR 2024**

**IRB Infrastructure Trust**  
**DISCLOSURES PURSUANT TO SEBI CIRCULARS**  
 (SEBI Circular No. CIR/IMD/DF/114/2016 dated 20-Oct-2016 and No. CIR/IMD/DF/127/2016 dated 29-Nov-2016)

**A. Unaudited Condensed Interim Consolidated Statement of Net Assets at Fair Value**

(Rs. in Million)

Particulars	December 31, 2023 (Unaudited)		March 31, 2023 (Audited)	
	Book value	Fair value	Book value	Fair value
A. Assets	338,808.28	462,383.41	243,478.49	299,372.54
B. Liabilities (at book value)	221,222.25	199,889.98	165,944.15	116,629.02
C. Net Assets (A-B)	117,586.03	262,493.43	77,534.34	182,743.52
D. Number of units (in millions)	1,021.69	1,021.69	879.29	879.29
E. NAV (C/D) (Amount in Rs.)	115.09	256.92	88.18	207.83

**Project wise break up of fair value of total assets:**

Name of the project	December 31, 2023 (Unaudited)
IRB Westcoast Tollway Limited (IRBWT)	34,541.22
Solapur Yedeshi Tollway Limited (SYTL)	26,931.18
Yedeshi Aurangabad Tollway Limited (YATL)	45,566.22
Kaithal Tollway Limited (KTL)	24,304.46
AE Tollway Limited (AETL)	35,334.14
Udaipur Tollway Limited (UTL)	27,289.43
CG Tollway Limited (CGTL)	29,021.07
Kishangarh Gulabpura Tollway Limited (KGTL)	21,013.68
IRB Hapur Moradabad Tollway Limited (IRBHMTL)	43,564.70
Palsit Dankuni Tollway Private Limited (PDTPL)	17,278.18
IRB Golconda Expressway Private Limited (IGEPL)	144,119.82
Samakhiali Tollway Private Limited (STPL)	3,779.36
<b>Subtotal</b>	<b>452,743.46</b>
<b>Add : IRB Infrastructure Trust Assets</b>	<b>9,639.96</b>
<b>Total assets</b>	<b>462,383.41</b>

**B. Unaudited Condensed Interim Consolidated Statement of total returns at Fair Value :**

(Rs. in Million)

Particulars	For the period ended December 31, 2023	For the year ended March 31, 2023
Total Comprehensive Income (As per the Statement of Profit and Loss)	(3,846.80)	(2,271.59)
Add/Less: other changes in fair value (e.g., in investment property, property, plant & equipment (if cost model is followed)) not recognized in total comprehensive income	144,907.40	105,209.18
<b>Total Return</b>	<b>141,060.60</b>	<b>102,937.59</b>

**Notes :**

Fair value of assets as at December 31, 2023 and March 31, 2023 and other changes in fair value for the year then ended as disclosed in the above tables are derived based on the fair valuation reports issued by the independent valuer appointed under the InvIT Regulations.

As per our report of even date

**For Gokhale & Sathe**  
 Chartered Accountants  
 ICAI Firm Registration Number: 103264W

**CA Kaustubh Deshpande**  
 Partner  
 Membership No. 121011

**Nitin Tiwari**  
 Partner  
 Membership No. 118894

Place: Mumbai

Date: **08 MAR 2024**

For and on behalf of the Board of Directors of  
**MMK Toll Road Private Limited**  
 (As Investment Manager to IRB Infrastructure Trust)  
 CIN : U45200MH2002PTC135512

**Virendra D. Mhaikar**  
 Chairman  
 DIN : 00183554

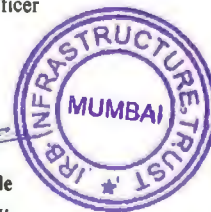
**Shilpa Todankar**  
 Chief Financial Officer

Place: Mumbai

Date: **08 MAR 2024**

**D. K. Joshi**  
 Chief Executive officer

**Kaustubh Shevade**  
 Company Secretary  
 Membership No. A27833





**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**1 Corporate Information**

The IRB Infrastructure Trust (the "Trust") is a trust settled pursuant to the indenture of trust dated August 27, 2019 which is registered under the Registration Act, 1908 and under the Securities Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended from time to time. The Trust is settled by the Sponsor, IRB Infrastructure Developers Limited ("IRB" or the "Sponsor"), an infrastructure development company in India. The Trustee to the Trust is IDBI Trusteeship Services Limited (the "Trustee"). Investment manager for the Trust is MMK Toll Road Private Limited (the "Investment Manager"). The Trust has received registration certificate from SEBI on November 25, 2019.

The Trust has been formed to invest in infrastructure assets primarily being in the road sector in India. The Trust's road projects are eligible infrastructure projects under the InvIT Regulations and held through special purpose vehicles ("Project SPVs" together as "Project SPV Group"). The Trust's portfolio comprises of thirteen road projects as listed below:-

Project SPV Name**	Residual Concession life*	Proposed shareholding	Nature of Investment	Status	Principal Activities	Country of incorporation
IRB Westcoast Tollway Limited (IRBWTL)	18 years 2 Months 2 days	100%	Subsidiary	Tolling and Construction	Construction and operation of road including toll collection.	India
Solapur Yedeshi Tollway Limited (SYTL)	20 years 0 Months 20 days	100%	Subsidiary	Operating		India
Yedeshi Aurangabad Tollway Limited (YATL)	17 years 5 Months 30 days	100%	Subsidiary	Operating		India
Kaithal Tollway Limited (KTL)	18 years 6 Months 14 days	100%	Subsidiary	Operating		India
AE Tollway Limited (AETL)	16 years 6 Months 31 days	100%	Subsidiary	Operating		India
Udaipur Tollway Limited (UTL)	14 years 8 Months 2 days	100%	Subsidiary	Operating		India
CG Tollway Limited (CGTL)	13 years 10 Months 3 days	100%	Subsidiary	Operating		India
Kishangarh Gulabpura Tollway Limited (KGTL)	14 years 1 Months 20 days	100%	Subsidiary	Operating		India
IRB Hapur Moradabad Tollway Limited (IRBHMTL)	17 years 4 Months 26 days	100%	Subsidiary	Operating		India
Palsit Dankuni Tollway Private Limited (PDTPL) w.e.f 02.04.2022	15 years 3 Months 1 day	100%	Subsidiary	Tolling and Construction		India
IRB Golconda Tollway Private Limited (IGEPL) w.e.f 11.08.2023	29 years 7 Months 11 days	100%	Subsidiary	Operating		India
Samakhiali Tollway Private Limited (STPL) w.e.f 28.12.2023	19 years 11 Months 27 days	100%	Subsidiary	Tolling and Construction		India
IRB Lalitpur Tollway Private Limited (ILTPL) w.e.f 10.11.2023	-	100%	Subsidiary	Appointed date pending		India

\* Represents residual concession life as at December 31, 2023 as per original concession period (without considering extension of concession period, if any).

\*\* Of the above Project SPVs, IRBWTL, SYTL, YATL, AETL, CGTL, UTL and IRBHMTL have been converted to public companies on November 13, 2019 and KTL and KGTL on November 14, 2019.

The registered office of the Investment Manager is Off No-11th Floor/1101 Hiranandani Knowledge Park, Technology Street, Hill Side Avenue, Powai Mumbai 400076. The Trust has been listed on NSE w.e.f. 03.04.2023.

**2 Basis of preparation of Consolidated Financial Statements**

The Unaudited Condensed Interim Consolidated Financial Statements which comprises Condensed Interim Consolidated Balance Sheet as on December 31, 2023, Unaudited Condensed Interim Consolidated Statement of Profit and Loss, including other comprehensive income, Unaudited Condensed Interim Consolidated Statement of Net Assets at Fair Value, Unaudited Condensed Interim Consolidated Statement of total returns at Fair Value, Unaudited Condensed Interim Consolidated Cash Flow Statement and Unaudited Condensed Interim Consolidated Statement of Changes in Unitholders Equity for the nine months period then ended and a summary of select explanatory notes (together herein after referred to as the "Unaudited Condensed Interim Consolidated Financial Statements"). These Unaudited Condensed Interim Consolidated Financial Statements for the period from April 1, 2023 to December 31, 2023 have been prepared solely for inclusion in the Letter of Offer ("LOF") in connection with the proposed right issue of units of the Trust.

The Unaudited Condensed Interim Consolidated Financial Statements has been prepared in accordance with the requirements of SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended from time to time read with the Paragraph 3.23 of Chapter 3 of the SEBI Circular No. SEBI/HO/DDHS-PoD-2/P/CIR/2023/115 dated July 06, 2023 ("SEBI Circular"), together known as ("InvIT Regulations"); recognition and measurement principles laid down in the Indian Accounting Standards 34 "Interim Financial Reporting" ("Ind AS 34") as prescribed under Rule 2(1) (a) of Companies (Indian Accounting Standards) Rules, 2015, as amended, and other recognised accounting principles generally accepted in India to the extent not inconsistent with the InvIT Regulations (refer note 14 below on presentation of "Unit Capital" as "Equity" instead of compound instruments under Ind AS 32 - Financial Instruments: Presentation).

These unaudited condensed interim consolidated financial statements for the period from April 01, 2023 to December 31, 2023 have been prepared solely for inclusion in the Letter of Offer in connection with the proposed rights issue of units of the Trust, and should not be relied upon for any other purpose.

These Unaudited Condensed Interim Consolidated Financial Statements are not the statutory accounts for the purpose of any statutory compliances or for regulatory requirements in any jurisdiction. The Unaudited Condensed Consolidated Financial Statements of the Trust for the period from April 01, 2023 to December 31, 2023 were approved by the Board of Directors of the Investment Manager and authorised for inclusion in the Letter of Offer of the Trust on **08.03.2024**

The Unaudited Condensed Interim Consolidated Financial Statements do not include all the information and disclosures required in the Annual Financial Statements, and should be read in conjunction with the Trust's Annual Consolidated Financial Statements as at March 31, 2023.

**3 Standard issued but not yet effective**

Ministry of Corporate affairs ("MCA") notifies new standard or amendment to the existing standards. There is no such notification which would have been applicable from January 01, 2024



**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note 4 : Property, Plant and Equipment**

(Rs. in million)

	Premises	Computer	Office Equipments	Furniture and Fixture	Total
<b>Cost</b>					
At 31 March 2022	16.09	0.30	1.40	0.39	18.18
Additions	-	-	-	-	-
Disposals/ Adjustments	-	-	0.09	-	0.09
At 31 March 2023	16.09	0.30	1.31	0.39	18.10
Additions	-	-	-	-	-
Disposals/ Adjustments	-	-	-	-	-
At 31 December 2023	16.09	0.30	1.31	0.39	18.10
<b>Depreciation</b>					
At 31 March 2022	7.40	0.29	1.28	0.38	9.34
Additions	1.20	0.00	0.03	0.01	1.25
Disposals/ Adjustments	-	-	0.08	-	0.08
At 31 March 2023	8.60	0.29	1.23	0.39	10.51
Additions	0.71	-	0.01	0.00	0.72
Disposals/ Adjustments	-	-	-	-	-
At 31 December 2023	9.30	0.29	1.24	0.39	11.23
<b>Net Book value</b>					
At 31 December 2023	6.79	0.01	0.07	0.00	6.87
At 31 March 2023	7.49	0.01	0.08	0.00	7.59
<b>Net Book value</b>					
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )			
Property, Plant and Equipment	6.87	7.59			



**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note 4 : Other Intangible Assets and Intangible Assets under development**

<b>Intangible Assets</b> (Rs. in million)		
<b>Particulars</b>	<b>Toll Collection Rights</b>	<b>Total</b>
<b>Cost</b>		
<b>At 31 March 2022</b>	<b>2,28,159.42</b>	<b>2,28,159.42</b>
Additions	9,663.30	9,663.30
Deletions / Adjustments	295.32	295.32
<b>At 31 March 2023</b>	<b>2,37,527.40</b>	<b>2,37,527.40</b>
Additions	82,758.00	82,758.00
Deletions / Adjustments	-	-
<b>At 31 December 2023</b>	<b>3,20,285.40</b>	<b>3,20,285.40</b>
<b>Amortisation</b>		
<b>At 31 March 2022</b>	<b>6,299.93</b>	<b>6,299.93</b>
Additions	2,809.17	2,809.17
Deletions / Adjustments	-	-
<b>At 31 March 2023</b>	<b>9,109.10</b>	<b>9,109.10</b>
Additions	2,614.32	2,614.32
Deletions / Adjustments	-	-
<b>At 31 December 2023</b>	<b>11,723.42</b>	<b>11,723.42</b>
<b>Net Book value</b>		
At 31 December 2023	3,08,561.98	3,08,561.98
At 31 March 2023	2,28,418.29	2,28,418.29
<b>Particulars</b>	<b>December 31, 2023 ( Unaudited )</b>	<b>March 31, 2023 ( Audited )</b>
Toll Collection Rights	3,08,561.98	2,28,418.29
<b>Total</b>	<b>3,08,561.98</b>	<b>2,28,418.29</b>
<b>Intangible assets under development</b> (Rs. in million)		
<b>Particulars</b>	<b>December 31, 2023 ( Unaudited )</b>	<b>March 31, 2023 ( Audited )</b>
<b>Toll Collection Rights</b>		
<b>At the beginning of the year</b>	2,421.67	1,290.89
Add : Development during the year	12,929.81	11,128.99
	<b>15,351.48</b>	<b>12,419.88</b>
Less : Transfer to Intangible Asset (Toll Collection Rights)	9,133.23	9,998.21
<b>Closing balance</b>	<b>6,218.25</b>	<b>2,421.67</b>
<b>Total</b>	<b>6,218.25</b>	<b>2,421.67</b>

Tangible and Intangible assets given as security

Tangible and Intangible assets are subject to first charge to secured long-term borrowings from the lenders.





## Financial Assets

## Note 5 : Investment

(Rs. in million)

Particulars	December 31, 2023 ( Unaudited )			March 31, 2023 ( Audited )		
	Face Value (Rs.)	No of Units	Amount	Face Value (Rs.)	No of Units	Amount
	<b>i) Investments in Mutual Funds</b>					
<b>Quoted ( Fair Value Through Profit or Loss (FVTPL) )</b>						
Canara Robeco Liquid Fund - Direct Plan - Growth	1,000	75,877.11	215.54	1,000	18,486.04	49.85
Canara Robeco Overnight Fund - Direct Plan - Growth	1,000	16,455.17	20.05	1,000	5,174.20	6.00
IDBI Liquid Fund - Direct Plan - Growth		-	-	1,000	64,718.69	156.76
LIC MF Liquid Fund - Direct Plan - Growth	1,000	27,018.56	116.30	-	-	-
ABSL Liquid Fund - Direct Plan - Growth	100	30,99,066.32	1,184.93	-	-	-
ABSL Overnight Fund - Direct Plan - Growth	1,000	17,97,535.98	2,289.82	-	-	-
OGRD - Union Overnight Fund Growth - Direct	1,000	4,45,706.77	552.60	-	-	-
HSBC Liquid Fund Direct Growth	1,000	29,113.33	68.76	-	-	-
SBI Liquid Fund - Direct Growth	1,000	2,65,020.02	983.21	1,000	2,91,778.24	1,028.03
SBI Overnight Fund - Direct Growth	1,000	4,34,250.03	1,664.31	1,000	11,632.96	42.44
<b>Total</b>			<b>7,095.52</b>			<b>1,283.09</b>



**IRB Infrastructure Trust****Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023****Note 6 : Trade receivable**

(Rs. in million)

	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
(Unsecured, considered good, unless otherwise stated)		
Related parties ( Refer Note 38 )	0.51	0.61
Others	212.54	84.05
<b>Total</b>	<b>213.05</b>	<b>84.67</b>

The Trust has not identified any credit impairment loss as at December 31, 2023 and March 31, 2023

**Note 7 : Other financial assets**

(Rs. in million)

	December 31, 2023 ( Unaudited )		March 31, 2023 ( Audited )	
	Current	Non-current	Current	Non-current
(Unsecured, considered good, unless otherwise stated)				
Interest accrued on fixed deposits	74.65	-	11.57	-
Interest receivable from others	10.63	-	3.73	-
Retention money receivable	568.71	-	530.54	-
Receivable from Related parties ( BG Margin receivable) ( Refer Note 38 )	-	30.95	-	-
Receivable from Government Authorities (NHAI)	1,363.22	-	816.07	-
Other receivable	191.22	-	75.65	-
Security and other deposits	10.99	1.11	10.99	0.33
<b>Total</b>	<b>2,219.42</b>	<b>32.06</b>	<b>1,448.56</b>	<b>0.33</b>



**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 8 : Deferred tax assets / Deferred tax liabilities**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
<b>Deferred tax liabilities (net):</b>		
Deferred tax liabilities:		
Difference in Depreciation and other differences in block of Property, Plant and equipment and Intangible assets as per tax books & financial books	265.61	36.80
<b>Deferred tax assets:</b>		
Business Losses	30.01	-
<b>Deferred tax liabilities (net)</b>	<b>235.60</b>	<b>36.80</b>
<b>Deferred tax assets:</b>		
Deferred Tax assets on Fair valuation	1,280.76	792.60
Deferred Tax Assets	1,280.76	792.60
<b>Deferred tax (assets) / liabilities (net)</b>	<b>(1,045.16)</b>	<b>(755.80)</b>

**Note 9 : Other non - current assets**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
Duties and taxes receivable	8.00	174.07
<b>Total</b>	<b>8.00</b>	<b>174.07</b>

**Note 10 : Cash and cash equivalents**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
<b>Cash and Bank balances</b>		
Balances with banks:		
-on current accounts	214.72	279.37
-on trust, retention and other escrow accounts*	375.57	394.06
Deposits with banks		
-Original maturity less than 3 months	80.00	49.50
Cash on hand	17.25	8.38
<b>Total</b>	<b>687.54</b>	<b>731.31</b>

\* First charge on above to the extent of amount payable as per the waterfall mechanism as defined in the Concession Agreement / Common Loan Agreement.





**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note 11 : Bank balance other than cash and cash equivalent**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
<b>Maturity less than 3 months</b>		
Major Maintenance Reserve Account	2,004.50	-
Debt service reserve account with banks /earmarked balance**	429.21	
<b>Maturity more than 3 months less than 12 months</b>		
Cash Reserve	1,000.00	-
Other deposits	-	15.09
Debt service reserve account with banks /earmarked balance**	1,549.89	3,459.60
Major Maintenance Reserve Account	685.50	1,390.00
<b>Maturity more than 12 months</b>		
Debt service reserve account with banks /earmarked balance**	3,782.20	-
Other deposits	2.00	2.00
<b>Total</b>	<b>9,453.30</b>	<b>4,866.69</b>

**Debt service reserve account/ major maintenance reserve account and trust, retention and other escrow accounts**

Bank deposits are marked lien / pledged against the non current secured loan as per term loan agreement with the lender, further the lenders have first charge on trust, retention and other escrow accounts.

\*\* The deposits to the extent of Rs. 5,761.30 million (March 31, 2023 : Rs. 3,459.60 million) maintained by the Project SPV Group with bank includes time deposits, which are held against Debt Service Reserve (DSR), are considered as current portion under the head "Other bank balances" since the same are encashable by the lenders in the event of default by the Project SPV Group, if any.

Current deposits are made for varying periods of between one day and three months, depending on the immediate cash requirements of the group and earn interest at the respective current deposit rates. Other time deposits earn interest at the rate of 5.50% to 7.50% p.a. (March 31, 2023: 4.70% to 7.95% p.a).

Refer note 17 for details of security against term loans.

For the purpose of statement of cash flows, cash and cash equivalents comprise the following:

	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
<b>Balance with banks:</b>		
-on current accounts	214.72	279.37
-on trust, retention and other escrow accounts	375.57	394.06
Fixed deposits less than 3 months	80.00	49.50
Cash on hand	17.25	8.38
<b>Total</b>	<b>687.54</b>	<b>731.31</b>

**Note 12 : Current tax assets (net)**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
Advance income-tax (net of provision for tax)	176.67	24.81
<b>Total</b>	<b>176.67</b>	<b>24.81</b>

**Note 13 : Other current assets**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
(Unsecured, considered good, unless otherwise stated)		
Advance with suppliers		
- Related parties (refer note 38)	318.85	1,347.33
- Others	49.67	45.29
Mobilisation advances (refer note 38)	301.37	33.68
Prepaid expenses	164.31	45.88
Duties and taxes receivable	1,365.10	1,184.89
Contract assets	51.02	-
<b>Total</b>	<b>2,250.32</b>	<b>2,657.07</b>



**IRB Infrastructure Trust**  
Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note : 14 : Unit capital**

(Rs. in million)

	December 31, 2023 ( Unaudited )		March 31, 2023 ( Audited )	
	No. of units	Amount (Rs. in million)	No. of units	Amount (Rs. in million)
<b>Unit capital*</b>				
<b>Authorised Unit capital</b>				
Units having face value of Rs. 100 each	1,02,16,93,265	1,15,445.40	87,92,93,265	87,929.33
	<b>1,02,16,93,265</b>	<b>1,15,445.40</b>	<b>87,92,93,265</b>	<b>87,929.33</b>
<b>Issued Unit capital</b>				
Units having face value of Rs. 100 each	1,02,16,93,265	1,15,445.40	87,92,93,265	87,929.33
<b>Total</b>	<b>1,02,16,93,265</b>	<b>1,15,445.40</b>	<b>87,92,93,265</b>	<b>87,929.33</b>

**Terms / rights attached to equity shares**

The Project SPVs have only one class of equity shares having par value of Rs. 100/- per share Each holder of equity shares is entitled to one vote per share. The Project SPVs declares and pays dividend in Indian rupees.

In the event of liquidation of the Project SPV, the holders of equity shares will be entitled to receive remaining assets of the Project SPV, after distribution of all preferential amounts. The distribution will be in proportion to the number of equity shares held by the shareholders.

\* Under the provisions of the InvIT Regulations, Trust is required to distribute to Unitholders not less than 90% of the net distributable cash flows of the Trust for each financial year. Accordingly, a portion of the Unit Capital contains a contractual obligation of the Trust to pay to its Unitholders cash distributions. Hence, the Unit Capital is a compound financial instrument which contains equity and liability components in accordance with Ind AS 32 - Financial Instruments: Presentation. However, in accordance with Chapter 3 and Chapter 4 of the SEBI circular, the Unit capital have been presented as "Equity" in order to comply with the requirements of Section H of Chapter 3 to the SEBI circular, dealing with the minimum presentation and disclosure requirements for key financial statements. Consistent with Unit Capital being classified as equity, the distributions to Unitholders is also presented in Statement of Changes in Unitholders' Equity when the distributions are approved by the Board of Directors of the Investment Manager.

Units are classified as equity. Incremental costs attributable to the issue of units are directly recorded in equity, net of tax.

**Reconciliation of the number of unit outstanding and the amount of Unit capital:**

	December 31, 2023 ( Unaudited )		March 31, 2023 ( Audited )	
	No. of units	Amount (Rs. in million)	No. of units	Amount (Rs. in million)
<b>Units issued, subscribed and fully paid</b>				
<b>Units having face value of Rs. 100/-</b>				
At the beginning of the year	87,92,93,265	87,929.33	85,50,43,265	85,504.33
Issued during the year	14,24,00,000	28,619.50	2,42,50,000	2,425.00
Distributions (refer note 33)	-	(1,103.43)	-	-
<b>At the end of the period / year</b>	<b>1,02,16,93,265</b>	<b>1,15,445.40</b>	<b>87,92,93,265</b>	<b>87,929.33</b>

**Details of unit holders holding more than 5% units:**

	December 31, 2023 ( Unaudited )		March 31, 2023 ( Audited )	
	No. of units	% of total unit capital	No. of units	% of total unit capital
IRB Infrastructure Developers Limited	52,12,39,840	51%	44,84,39,840	51%
Anahera Investments Pte Ltd	25,56,23,181	25%	21,98,23,181	25%
Bricklayers Investments Pte Ltd	6,11,57,561	6%	5,27,57,561	6%
Chiswick Investments Pte Ltd	6,11,57,561	6%	5,27,57,561	6%
Stretford End Investments Pte Ltd	6,11,57,561	6%	5,27,57,561	6%
Dangenham Investments Pte Ltd	6,13,57,561	6%	5,27,57,561	6%

**Details of Sponsor units**

	December 31, 2023 ( Unaudited )		March 31, 2023 ( Audited )	
	No. of units	% of total unit capital	No. of units	% of total unit capital
IRB Infrastructure Developers Limited	52,12,39,840	51%	44,84,39,840	51%

**Note : 15 : Subordinate Debt**

(Rs. in million)

	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
	At the beginning of the year	-
Increase / (decrease) during the period/ year	16,916.65	-
<b>At the end of the period / year</b>	<b>16,916.65</b>	<b>-</b>



Note : 16 : Other equity

Attributable to the unit holders

(Rs. in million)

Other reserves

Retained earnings

At the beginning of the year

Profit for the period / year

Interest Distribution (refer note 33)

Unit Issue expenses

At the end of the period / year

Total

	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
	(10,395.80)	(8,108.29)
	(3,846.93)	(2,272.18)
	(449.55)	-
	(85.13)	(15.33)
	<u>(14,777.41)</u>	<u>(10,395.80)</u>
	<u>(14,777.41)</u>	<u>(10,395.80)</u>



**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note : 17 : Borrowings**

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
<b>Non-current Borrowings</b>		
<b>Term loans</b>		
Indian rupee loan from banks (secured)		
Project loans for SPVs	1,10,031.99	61,005.36
Less : current maturities expected to be settled within 12 month from balance sheet date	(737.46)	(639.16)
<b>Total (a)</b>	<b>1,09,294.53</b>	<b>60,366.20</b>
Indian rupee loan from financial institutions (secured)		
Project loans for SPVs	35,715.62	6,931.65
Less : current maturities expected to be settled within 12 month from balance sheet date	(362.50)	(9.75)
<b>Total (b)</b>	<b>35,353.12</b>	<b>6,921.90</b>
Non-convertible debentures (secured)	28,041.14	33,432.82
Less : current maturities expected to be settled within 12 month from balance sheet date	(53.38)	(130.59)
<b>Total (c)</b>	<b>27,987.76</b>	<b>33,302.22</b>
Less: Unamortised transaction cost (d)	(3,485.17)	(1,646.37)
<b>Total non current borrowings (e = a + b + c + d)</b>	<b>1,69,150.24</b>	<b>98,943.95</b>
<b>Current Borrowings</b>		
<b>Short-term borrowings</b>		
Current maturity of long term loans		
Indian rupee loan from banks (secured)	737.46	639.16
Indian rupee loan from financial institutions (secured)	362.50	9.75
Non convertible debentures (secured)	53.38	130.59
Interest accrued but not due on borrowings	10.08	5.43
<b>(Unsecured, repayable on demand and interest free)</b>		
Loan from related parties (refer note 38)	97.66	5,350.72
<b>Total current borrowings (f)</b>	<b>1,261.08</b>	<b>6,135.65</b>
<b>Total borrowings (e+f)</b>	<b>1,70,411.32</b>	<b>1,05,079.60</b>
Aggregate secured loans	1,70,303.58	99,723.46
Aggregate unsecured loans	97.66	5,350.72



**IRB Infrastructure Trust****Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023****Note : 17 : Borrowings (Continued)****(i) Project loans for SPVs**

December 31, 2023: Rs. 1,73,788.75 million; March 31, 2023: Rs.1,01,369.83 million; pertains to term loans taken by SPV's (Special Purpose Vehicles) & Trust for Project financing.

**Rate of interest**

Rate of interest on the Indian Rupee loan from banks and financial institutions varies from 7.75% to 10.65% p.a. (March 31, 2023: 7.75% to 10.75% p.a.) and are secured by pledge of shares of its subsidiaries and subservient charge on the current assets of the trust.

Secured redeemable Non-convertible debentures carries interest rates which varies from 8.65% - 8.95% p.a.

**Nature of security**

i) Secured by first charge on the movable/immovable asset by way of mortgage/hypothecation; first charge on all intangible assets, assignment of all receivables; book debts, loans and advances extended by the Borrower to SPVs and all rights and interest in project, both present and future, excluding the Project Assets of respective companies;

ii) Secured by first charge over all the equity shares, Preference shares, Debentures representing 100% of such securities.

iii) Secured by first charge on the Escrow Account, Debt Service Reserve Account and any other reserves and other bank accounts of the respective Companies.

iv) Unconditional and irrevocable corporate guarantee by each of the RG SPV's, in a form and manner satisfactory to the Finance parties (the "Corporate Guarantee").

v) An irrevocable and unconditional corporate guarantee from IRB Infrastructure Developers Limited to meet shortfall (if any) between debt due and

termination payments received from Concessioneing Authority in case of termination of Concession Agreement for any reason in case of Project SPV's.

vi) Pledge of securities of obligators created pursuant to the terms of loan Agreement held as common security for the benefit of Rupee lenders.

**Repayment terms**

The Non Convertible Debentures of YATL are redeemable at par on in August 2027 for Rs.12,150 million and in September 2029 for Rs.3,000 million.

The Non Convertible Debentures of SYTL are redeemable at par on in September 2027 for Rs.4,910 million and in October 2029 for Rs.1,000 million.

The Indian rupee loans from Banks, Financial Institutions, Non Convertible Debentures(other than above) are repayable in structured monthly/quarterly installments such that the total tenor does not exceed 19 years and repayable as per the repayment schedule specified in common loan agreement with the Lenders.

**Note : 18 : Trade payables (Current)**

Total outstanding dues of micro enterprises and small enterprises  
Total outstanding dues of creditors other than micro and small enterprises  
- Related parties (refer note 38)  
- Others  
Total

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
	1.50	1.61
	4,170.89	13,812.18
	3,774.85	1,491.69
	<b>7,947.24</b>	<b>15,305.48</b>





**IRB Infrastructure Trust**
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**
**Note 19 : Other financial liabilities**

	(Rs. in million)			
	December 31, 2023 ( Unaudited )		March 31, 2023 ( Audited )	
	Current	Non-current	Current	Non-current
Obligation for construction	184.86	-	1,102.31	-
Directors sitting fees payable	0.43	-	0.44	-
Deposit	1.19	-	1.18	-
Retention money payable				
- Related parties (refer note 38)	676.86	-	636.46	-
- Others	289.78	3.76	295.83	2.77
Revenue share payable	425.95	-	345.46	-
Other payable				
- Related parties (refer note 38)	41.93	37,489.82	167.70	35,778.03
- Others	2.93	-	-	-
<b>Total</b>	<b>1,623.92</b>	<b>37,493.58</b>	<b>2,549.37</b>	<b>35,780.80</b>

**Note : 20 : Trade payables (Non Current)**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
	Total outstanding dues of micro enterprises and small enterprises	-
Total outstanding dues of creditors other than micro and small enterprises		
- Related parties (refer note 38)	-	4,165.72
<b>Total</b>	<b>-</b>	<b>4,165.72</b>

**Note 21 : Provisions**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
	Major maintenance expenses	3,418.74
<b>Total</b>	<b>3,418.74</b>	<b>2,965.03</b>

The movement in provision for resurfacing expenses is as follows:

	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
	<b>Opening balance</b>	2,965.03
Obligation on new toll projects	1,289.57	1,614.45
Utilised / reversed during the period / year	(835.86)	-
<b>Closing balance</b>	<b>3,418.74</b>	<b>2,965.03</b>

The above provisions are based on current best estimation of expenses that may be required to fulfill the resurfacing obligation as per the service concession agreement with regulatory authorities. It is expected that significant portion of the costs will be incurred over the period. The actual expense incurred may vary from the above. No reimbursements are expected from any sources against the above obligation.

**Note 22 : Other current liabilities**

	(Rs. in million)	
	December 31, 2023 ( Unaudited )	March 31, 2023 ( Audited )
	Duties and taxes payable	30.33
Advance from customer- Others	61.51	34.03
<b>Total</b>	<b>91.85</b>	<b>98.15</b>



**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note 23 : Revenue from operations**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Contract revenue (road construction)	12,668.24	8,444.95
Income from toll collection (gross)	19,638.74	15,442.74
Less - Revenue Share to NHAI	(5,659.54)	(3,845.40)
Income arising out of toll collection (net)	13,979.20	11,597.34
Revenue share to NHAI- Fastag	(112.08)	(145.85)
Other operating revenue	-	0.23
<b>Total</b>	<b>26,535.36</b>	<b>19,896.67</b>

**Note 24 : Other income**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Interest income on		
- Bank deposits	367.14	104.16
- Others	1.60	6.37
Profit on sale of investments	77.82	42.12
Fair value gain on mutual funds	66.87	7.32
Other non operating income	14.42	1.35
<b>Total</b>	<b>527.86</b>	<b>161.32</b>

**Note 25 : Operating expenses**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Contract expenses	12,182.40	8,188.85
Operation and maintenance expenses	933.44	1,071.82
Site and other direct expenses	46.72	
Sub-contracting / Security expenses	4.81	0.35
Technical consultancy and supervision charges	33.92	44.26
<b>Total</b>	<b>13,201.29</b>	<b>9,305.29</b>

**Note 26 : Depreciation and amortisation expenses**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Depreciation on property, plant and equipment (refer note 4)	0.72	0.95
Amortisation on intangible assets (refer note 4)	2,614.32	1,957.61
<b>Total</b>	<b>2,615.04</b>	<b>1,958.56</b>

**Note 27 : Finance cost**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Interest expense		
- Banks and financial institutions	7,465.84	5,794.26
- Debentures	2,065.53	904.40
Other borrowing costs		
- Amortisation of Transaction cost	159.35	86.52
- Unwinding of discount on provision of MMR	232.58	107.28
- Interest unwinding on loan/retention money	36.70	36.70
- Interest unwinding of Trade Payable- Associates	187.67	610.50
- Others	198.46	149.25
<b>Total</b>	<b>10,346.13</b>	<b>7,688.90</b>



**IRB Infrastructure Trust****Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023****Note 28 : Other expenses**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Power and fuel		
Rent	0.05	0.01
Rates and taxes	23.64	80.80
Travelling and conveyance	2.46	-
Membership & Subscription	0.05	-
Advertisement expenses	0.00	-
Director sitting fees	1.59	1.24
Corporate social responsibilities expenditure	1.60	-
Bank charges	6.47	1.81
Miscellaneous expenses	27.37	2.34
<b>Total</b>	<b>63.25</b>	<b>86.20</b>

**Note 28A : Payment to auditor (including GST)**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
As auditors:		
- Statutory audit fees	1.23	1.05
- Limited review fees	2.20	2.03
In other capacity		
- Other services (certification fees)	0.11	0.63
Reimbursement of expenses	0.14	0.14
<b>Total</b>	<b>3.68</b>	<b>3.85</b>





**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 29 : Commitment and Contingencies**

**a. Leases**

Rental expense recorded for short-term leases/ low-value lease was Rs.0.05 million (December 31, 2022: Rs.0.03 million)

**b. Capital commitments**

(Rs. in million)	
December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
77,403.87	14,295.07

Estimated value of contracts in capital account remaining to be executed

IRB Kota Tollway Private Limited and IRB Gwalior Tollway Private Limited have been incorporated on January 01, 2024 and the commitment related to Project cost amounts to Rs.5,890 million and Rs.12,490 million respectively.

SPV's have entered into agreement for toll operations and management services with Sponsor and Subsidiary of Sponsor.

**c. Contingent liabilities**

(Rs. in million)	
December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
-	-
-	-

Contingent liabilities

**Total**

UTL, CGTL and KGTL have filed Writ petition with Hon'ble Rajasthan High Court with prayer to commence payment of Premium to National Highways Authority of India (NHAI) six months post actual completion of the project construction work. The Hon'ble High Court prima facie agreed with the contention of these companies and had provided interim relief from payment of premium. Vide judgement order dated 25th August, 2021, the Hon'ble High Court found merit in the contention of the companies and has directed the parties to resolve the dispute under Arbitration. The said matter is currently pending under Arbitration.



IRB Infrastructure Trust  
Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

Note 30 : Fair values

(Rs. in million)

	Carrying amount		Fair Value	
	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
<b>Financial assets</b>				
<u>Financial assets measured at amortised cost</u>				
Other Financial assets	2,251.48	1,448.89	2,251.48	1,448.89
Trade receivable	213.05	84.67	213.05	84.67
Cash and cash equivalents	687.54	731.31	687.54	731.31
Other Bank balances	9,453.30	4,866.69	9,453.30	4,866.69
<u>Financial assets measured at fair value through statement of Profit &amp; Loss</u>				
Investments (Quoted)	7,028.46	1,283.09	7,095.52	1,283.09
<b>Financial liabilities</b>				
<u>Financial liabilities measured at amortised cost</u>				
Trade payables	7,947.24	19,471.20	7,947.24	19,471.20
Borrowings (net of transaction cost)	1,70,411.32	1,05,079.60	1,70,411.32	1,05,079.60
Other financial liabilities	1,627.68	2,552.14	1,627.68	2,552.14
<u>Financial liabilities measured at fair value through statement of Profit &amp; Loss</u>				
Other financial liabilities	37,489.82	35,778.03	37,489.82	35,778.03

The management assessed that the fair value of other financials assets, trade receivables, cash and cash equivalents, other bank balance, trade payables, borrowings and other financial liabilities approximate their carrying amounts largely due to the short-term maturities of these instruments.

The fair value of the financial assets and liabilities is included at the amount at which the instrument could be exchanged in a current transaction between willing parties, other than in a forced or liquidation sale.

The discount for lack of marketability represents the amounts that the Group has determined that market participants would take into account when pricing the investments.

Note 31 : Fair value hierarchy

All financial instruments for which fair value is recognised or disclosed are categorised within the fair value hierarchy described as follows, based on the lowest level input that is significant to the fair value measurement as a whole.

Level 1: Quoted (unadjusted) price in active market for identical assets or liabilities

Level 2: Valuation technique for which the lowest level input that has a significant effect on the fair value measurement are observed, either directly or indirectly.

Level 3: Valuation technique for which the lowest level input has a significant effect on the fair value measurement is not based on observable market data.

Quantitative disclosures fair value measurement hierarchy for financial instruments as at December 31, 2023:

(Rs in million)

	As on December 31, 2023 (Unaudited)	Fair value measurement at end of the reporting period using		
		Level 1	Level 2	Level 3
<b>Assets</b>				
Investments (Quoted)	7,095.52	7,095.52	-	-
<b>Liabilities</b>				
Other financial liabilities	37,489.82	-	-	37,489.82

Quantitative disclosures fair value measurement hierarchy for financial instruments as at March 31, 2023:

(Rs in million)

	As on March 31, 2023 (Audited)	Fair value measurement at end of the reporting period using		
		Level 1	Level 2	Level 3
<b>Assets</b>				
Investments (Quoted)	1,283.09	1,283.09	-	-
<b>Liabilities</b>				
Other financial liabilities	35,778.03	-	-	35,778.03

There has been no transfer between Level 1, Level 2 & Level 3 during the period.

Sensitivity: Higher probability by 5% and lower discount rate by 0.5% will increase the fair value by Rs.4,446.51 million (31 March 2023 - Rs.4,166.87 million). Lower probability by 5% and higher discount rate by 0.5% will reduce fair value by Rs.4,197.70 million (31 March 2023 - Rs.3,946.06 million).

Fair value movement for Payable to IRB Infrastructure Developers Limited is as under:

(Rs in million)

	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
Opening balance as at 1st April 2023 (Previous period: 1st April 2022)	35,778.03	35,168.79
Add: Recognised during the period/ year	1,676.37	560.53
Less: Payment of deferred consideration	-	-
Add: Adjustment on account of interest unwinding	35.42	48.71
Closing balance of payable as on December 31, 2023 (Previous period: March 31, 2023)	37,489.82	35,778.03



**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 32 : Liquidity Risk**

Liquidity risk is the risk that the Trust may not be able to meet its present and future cash and collateral obligations without incurring unacceptable losses. The Trust's objective is to, at all times maintain optimum levels of liquidity to meet its cash and collateral requirements. The Trust closely monitors its liquidity position and deploys a robust cash management system. It maintains adequate sources of financing including debt from banks at an optimised cost.

The table below summarises the maturity profile of the Trust's financial liabilities based on contractual undiscounted payments:

	(Rs. in million)					
As at December 31, 2023 (Unaudited)	Carrying amount	Total	On Demand	Less than 1 year	1 to 5 years	> 5 years
Borrowings (Gross of unamortised transaction cost)	1,73,896.49	1,73,896.49	97.66	1,163.42	16,521.37	1,56,114.04
Other financial liabilities	39,117.50	39,117.50	-	1,623.92	37,493.58	-
Trade payables	7,947.24	7,947.24	-	7,947.24	-	-
<b>Total</b>	<b>2,20,961.23</b>	<b>2,20,961.23</b>	<b>97.66</b>	<b>10,734.58</b>	<b>54,014.95</b>	<b>1,56,114.04</b>

	(Rs. in million)					
As at March 31, 2023 (Audited)	Carrying amount	Total	On Demand	Less than 1 year	1 to 5 years	> 5 years
Borrowings (Gross of unamortised transaction cost)	1,06,725.97	1,06,725.97	5,350.72	784.93	17,853.83	82,736.49
Other financial liabilities	38,330.17	38,330.17	-	2,549.37	35,780.80	-
Trade payables	15,305.48	15,305.48	-	15,305.48	-	-
<b>Total</b>	<b>1,60,361.62</b>	<b>1,60,361.62</b>	<b>5,350.72</b>	<b>18,639.78</b>	<b>53,634.63</b>	<b>82,736.49</b>



**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 33 : Distribution made**

	(Rs in million)	
	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
Distributed during the period as :		
Interest	449.55	-
Return of Capital	1,103.43	-
	<b>1,552.98</b>	<b>-</b>

**Note:** The Board of Directors of the Investment Manager have declared 1st Distribution of Rs.1.52 per unit which comprises of Rs.0.44 per unit as interest and Rs. 1.08 per unit as return of capital in their meeting held on October 25, 2023.

**Note 34 : Revenue share / premium payment to NHAI**

(a) During the period ended December 31, 2023, the Group has paid/accrued Rs. 5,659.55 millions (December 31, 2022, Rs. 3845.40 millions) as Revenue Share (Additional Concession Fee) to National Highways Authority of India ("NHAI") out of its toll collection in accordance with the Concession Agreements entered with NHAI. Income from Operations in the financials for the above periods is net off the above Revenue Share to NHAI.

(b) During the year ended March 31, 2017, AE Tollway Limited (AETL) has entered into a Concession agreement (CA) with NHAI for a period of 24 years. As per the terms of the CA, AETL has agreed to pay a premium in the form of "Additional Concession Fee" equal to Rs. 810.00 millions for the first year and each subsequent year such premium shall be determined by increasing the amount of premium in the respective year by an additional 5% as compared to the immediately preceding year. Management based on the legal opinion obtained and their evaluations of the terms of the CA, believes that such premium payable is restricted to the toll collection during the year and is in the form of revenue sharing arrangement. Accordingly, the premium payable for the year is accounted for as revenue share. The said treatment has been followed in case of KGTL, UTL, CGTL and IRBHM where premium payment has commenced.

**Note 35 : Details of Project management fees and Investment management fees**

**i) Project Management Fees**

In accordance with the Project Implementation Agreements, the fees and remuneration payable by the Project SPVs to the Project Manager has been worked out and agreed upon for the duration of current financial year, between the Project Manager, Investment Manager and the respective Project SPV, on an arm's length basis, after taking into account the extent of work to be done in respect of maintenance and other services to be provided by the Project Manager to such Project SPV.

**ii) Investment Management Fees**

Pursuant to a resolution dated July 4, 2023 of the Board of Directors of the Investment Manager and a resolution dated July 27, 2023 of the Unitholders, the Management Fees have been revised to be equivalent to 110% of the cost incurred by the Investment Manager in connection with providing investment management services to the Trust including routine administrative and operational expenses (exclusive of any out of pocket expenses, reimbursements and taxes).

**Note 36 : Income Tax**

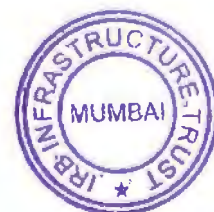
**Reconciliation of tax expenses and the accounting of profit multiplied by Indian Domestic tax rate for nine months ended December 31, 2023 and December 31, 2022 are:**

	(Rs in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Profit Before tax	(4,211.24)	(1,530.02)
Tax rate	29.12%	29.12%
Expected income tax at India's statutory rate	(1,226.31)	(445.54)
Effect of unused tax losses and tax offsets not recognised as deferred tax assets	882.97	768.01
Difference in tax rate as per new regime as compared to normal tax rates	(18.49)	(58.76)
Additional Prior Period Taxes booked in current year for current tax of prior years	5.96	-
Adjustments recognised in the current year in relation to the Deferred tax of prior years	-	(339.00)
Others	(8.57)	(19.01)
<b>Income tax expense reported in statement of Profit and loss</b>	<b>(364.44)</b>	<b>(94.30)</b>
<b>Effective Tax Rate</b>	<b>8.65%</b>	<b>6.16%</b>

No deferred tax assets have been recognised on losses incurred in SPV's due to uncertainty of future taxable business income.

**Note 37: Capitalisation Statement**

Particulars	(Rs in million)
	December 31, 2023 (Unaudited)
<b>Unitholders' Funds:</b>	
Unit Capital	1,15,445.40
Subordinate Debt	16,916.65
Other Equity	(14,777.41)
Non-Controlling Interest	1.39
<b>Total Shareholders' Funds</b>	<b>1,17,586.03</b>
<b>Borrowings</b>	
Borrowings from related parties	97.66
Long term borrowings	1,69,150.24
Current maturities of long term borrowings (including interest accrued but not due)	1,163.42
<b>Total Debt</b>	<b>1,70,411.32</b>
<b>Total Capitalisation</b>	<b>2,87,997.35</b>





**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 38 : Related party disclosures**

**I. List of Related parties of the Trust**

1	Parties to the InvIT	IRB Infrastructure Developers Limited (Sponsor Group and Project Manager ) MMK Toll Road Private Limited (Investment Manager) IDBI Trusteeship Services Limited (Trustee of the IRB Infrastructure Trust)
2	Associates, Promoters, Directors and Partners of the persons mentioned in clause 1	As per table below #

**# List of Associates, Promoters, Directors and Partners of the persons mentioned in clause 1**

Particulars	IRB Infrastructure Developers Limited (Sponsor and Project Manager)	MMK Toll Road Private Limited (Investment Manager)	IDBI Trusteeship Services Limited ( Trustee of IRB Infrastructure Trust)
<b>Promoters</b>	Mr. Virendra D. Mhaiskar Mrs. Deepali V. Mhaiskar Mr. Virendra D. Mhaiskar (HUF)	IRB Infrastructure Developers Limited (IRBIDL)	IDBI Bank Limited LIC Corporation Limited General Insurance Corporation
<b>Directors</b>	Mr. Virendra D. Mhaiskar, Chairman and Managing Director Mrs. Deepali V. Mhaiskar, Whole Time Director Mr. Jose Tamariz Martel Goncer Mr. Ravindra Dhariwal	Mr. Virendra D Mhaiskar Mr. Kunnasagaran Chinniah Mr. Boon Chin Hau (w.e.f. 31.05.2023) Mr. Aryan Mhaiskar (w.e.f.31.05.2023)	Mr. Jayakumar Subramonia Pillai Mr. Pradeep Kumar Jain Mrs. Jayashree Vijay Ranade Mr. Pradeep Kumar Malhotra Ms. Baljinder Kaur Mandal
	<b>Independent directors</b> Mr. Chandrashekhar S. Kaptan Mr. Sunil H. Talati Mr. Sandeep J. Shah Ms. Priti Savla, Independent Director	<b>Independent directors</b> Mr. K G Krishnamurthy Mrs. Ranjana Paranjape Mr. Nagendraa Parakh (w.e.f. 31.05.2023) Mr. Aryn Jassani (w.e.f. 31.05.2023)	



**Note 38 : Related party disclosures**

**I. List of Related parties of the Trust (Continued)**

**# List of Associates, Promoters, Directors and Partners of the persons mentioned in clause 1 (Continued)**

<p><b>Associates</b></p>	<p><b>A) Holding Company of Sponsor / Project Manager</b>                      IRB Holding Private Limited (Formerly Mhaiskar Ventures Private Limited)</p> <p><b>B) Subsidiaries/JV's of Sponsor / Project Manager</b>                      1. Ideal Road Builders Private Limited (IRBPL)                      2. Mhaiskar Infrastructure Private Limited (MIPL)                      3. Modern Road Makers Private Limited (MRMPL)                      4. Aryan Toll Road Private Limited (ATRPL)                      5. ATR Infrastructure Private Limited (ATRFL)                      6. IRB Infrastructure Private Limited (IRBFL)                      7. Thane Ghodbunder Toll Road Private Limited (TGTRPL)                      8. Aryan Infrastructure Investments Private Limited (AIPL)                      9. IRB MP Expressway Private Limited (formerly known as NKT Road and Toll Private Limited)                      10. MMK Toll Road Private Limited (MMK) (Entity with Joint Control)                      11. IRB Kolhapur Integrated Road Development Company Private Limited (IRBK)                      12. Aryan Hospitality Private Limited (AHPL)                      13. IRB Sindhudurg Airport Private Limited (IRBSA)                      14. IRB Goa Tollway Private Limited (IRB Goa)                      15. IRB PS Highway Private Limited (formerly known as MRM Highways Private Limited) (IRBPS)                      16. IRB Ahmedabad Vadodara Super Express Tollway Private Limited (IRBAV)                      17. MRM Mining Private Limited (Formerly "J J Patel Infrastructural and Engineering Private Limited") (Subsidiary of MRMPL)                      18. GE1 Expressway Private Limited (formerly known as IRB PP Project Private Limited)                      19. VK1 Expressway Limited (VK1) (upto October 12, 2022)                      20. Pathankot Mandi Highway Private Limited                      21. Chittoor Thachur Highway Private Limited                      22. Meerut Budaun Expressway Limited - Subsidiary upto October 14, 2022 and Entity with Joint Control w.e.f. October 15,2022                      23. VM7 Expressway Private Limited</p>
	<p><b>C) Other Associate Companies of Sponsor / Project Manager</b>                      1. Virendra D. Mhaiskar (HUF)                      2. VCR Toll Services Private Limited                      3. VDM Ventures Private Limited                      4. DEUX Farming Films Private Limited                      5. IRB Charitable Foundation</p> <p><b>Key Managerial personnel (Only with whom Trust had transactions during the period/ there was balance outstanding at the year end)</b></p> <p>1. Ms. Shilpa Todankar                      2. Mr. Abhay Phatak                      3. Mr. Darshan Sangurdekar                      4. Mr. Omprakash Singh                      5. Mr. Chandrashekhar Kaptan                      6. Mrs. Ranjana Paranjape                      7. Mrs. Arati Taskar                      8. Mr. Sudhir Rao Hoshing                      9. Mr. Rajpaul Sharma                      10. Mr. Amitabh Murarka                      11. Devendra Ranka (Appointed as CFO)                      12. Jayprakash Nandi (Appointed as CEO)                      13. Mr. Tushar Kawedia                      14. Swati Chandekar (Appointed as CS of Yedeshi Aurangabad Tollway Limited)</p>



IRB Infrastructure Trust

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

Note 38 : Related party disclosures

II. Related Party Transactions

(Rs. in million)

Sr. No.	Particulars	Sponsor and Project Manager		Investment Manager		Fellow subsidiaries of Sponsor and Project Manager		Key Managerial personnel		Trustee of IRB Infrastructure Trust	
		31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)
1	<b>Contract expenses</b>	<b>10,182.51</b>	<b>1,113.81</b>	-	-	<b>806.29</b>	<b>689.11</b>	-	-	-	-
	IRB Infrastructure Developers Limited	10,182.51	1,113.81	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	806.29	689.11	-	-	-	-
2	<b>Interest Distribution</b>	<b>229.35</b>	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	229.35	-	-	-	-	-	-	-	-	-
3	<b>Capital Reduction</b>	<b>562.94</b>	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	562.94	-	-	-	-	-	-	-	-	-
4	<b>Expenses incurred on our behalf</b>	<b>4.10</b>	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	4.10	-	-	-	-	-	-	-	-	-
5	<b>Reimbursement of expenses incurred on our behalf</b>	<b>1.28</b>	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	1.28	-	-	-	-	-	-	-	-	-
6	<b>Operation &amp; Main. Expenses</b>	<b>3,815.46</b>	<b>2,047.15</b>	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	3,815.46	2,047.15	-	-	-	-	-	-	-	-
7	<b>Finance Cost -Interest unwinding on Trade payable</b>	-	-	-	-	<b>187.67</b>	<b>541.65</b>	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	187.67	541.65	-	-	-	-
8	<b>Interest unwinding on Trade Payable - TCR</b>	-	-	-	-	<b>172.03</b>	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	172.03	-	-	-	-	-
9	<b>Sub-ordinate debts (Unsecured &amp; interest free)</b>	<b>16,916.65</b>	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	16,916.65	-	-	-	-	-	-	-	-	-
	IRB Goa Tollway Private Limited	-	-	-	-	-	-	-	-	-	-



**IRB Infrastructure Trust**
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**
**Note 38 : Related party disclosures**
**II. Related Party Transactions**

(Rs. in million)

Sr. No.	Particulars	Sponsor and Project Manager		Investment Manager		Fellow subsidiaries of Sponsor and Project Manager		Key Managerial personnel		Trustee of IRB Infrastructure Trust	
		31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)
10	<b>Expenses incurred on behalf of others</b>	-	-	0.45	-	0.01	-	-	-	-	-
	IRB Infrastructure Developers Limited	-	-	-	-	-	-	-	-	-	-
	MMK Toll Road Private Limited	-	-	0.45	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	0.01	-	-	-	-	-
11	<b>Reimbursement of Expenses incurred on behalf of others</b>	16.68	-	0.53	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	16.68	-	-	-	-	-	-	-	-	-
	MMK Toll Road Pvt Limited	-	-	0.53	-	-	-	-	-	-	-
12	<b>Mobilisation advances given</b>	802.50	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	802.50	-	-	-	-	-	-	-	-	-
13	<b>Trading Purchase</b>	-	-	-	-	-	588.05	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	-	588.05	-	-	-	-
14	<b>Advance received including BG margin payable</b>	55.27	-	-	-	0.03	-	-	-	-	-
	IRB Infrastructure Developers Limited	55.27	-	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	0.03	-	-	-	-	-
15	<b>Advance given including BG margin given</b>	713.11	-	-	-	21.41	-	-	-	-	-
	IRB Infrastructure Developers Limited	713.11	-	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	21.41	-	-	-	-	-
16	<b>Trustee Fees</b>	-	-	-	-	-	-	-	-	0.12	-
	IDBI Trusteeship Services Limited	-	-	-	-	-	-	-	-	0.12	-





**IRB Infrastructure Trust**
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**
**Note 38 : Related party disclosures**
**II. Related Party Transactions**

(Rs. in million)

Sr. No.	Particulars	Sponsor and Project Manager		Investment Manager		Fellow subsidiaries of Sponsor and Project Manager		Key Managerial personnel		Trustee of IRB Infrastructure Trust	
		31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)
17	<b>Fair value loss on measurement of other payable</b>	1,677.04	356.63	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	1,677.04	356.63	-	-	-	-	-	-	-	-
18	<b>Interest Unwinding on Loan Taken</b>	-	-	-	-	36.70	36.70	-	-	-	-
	Mhaiskar Infrastructure Private Limited	-	-	-	-	36.70	36.70	-	-	-	-
19	<b>Unsecured Loan taken</b>	400.00	1,264.98	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	400.00	1,264.98	-	-	-	-	-	-	-	-
20	<b>Unsecured Loan repaid</b>	5,750.72	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	5,750.72	-	-	-	-	-	-	-	-	-
21	<b>Units Issued</b>	14,631.32	1,236.75	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	14,631.32	1,236.75	-	-	-	-	-	-	-	-
22	<b>BG Margin paid on behalf of others</b>	30.95	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	30.95	-	-	-	-	-	-	-	-	-
23	<b>Additional Intangible Asset</b>	-	-	-	-	-	104.86	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	-	104.86	-	-	-	-
24	<b>Investment Management Fees</b>	-	-	122.60	-	-	-	-	-	-	-
	MMK Toll Road Pvt Limited	-	-	122.60	-	-	-	-	-	-	-



**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 38 : Related party disclosures**

**II. Related Party Transactions**

(Rs. in million)

Sr. No.	Particulars	Sponsor and Project Manager		Investment Manager		Fellow subsidiaries of Sponsor and Project Manager		Key Managerial personnel		Trustee of IRB Infrastructure Trust	
		31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)	31/12/2023 (Unaudited)	31/12/2022 (Unaudited)
25	<b>Director sitting fees paid</b>	-	-	-	-	-	-	1.88	1.25	-	-
	Mrs. Arati Taskar	-	-	-	-	-	-	0.16	0.05	-	-
	Mr. Darshan Sangurdekar	-	-	-	-	-	-	0.13	0.14	-	-
	Mr. Omprakash Singh	-	-	-	-	-	-	0.15	0.14	-	-
	Mr. Sudhir Hoshing	-	-	-	-	-	-	0.12	0.05	-	-
	Mr. C S Kaptan	-	-	-	-	-	-	0.32	0.23	-	-
	Ms. Shilpa Todankar	-	-	-	-	-	-	0.34	0.34	-	-
	Mr. Tushar Kawedia	-	-	-	-	-	-	0.07	-	-	-
	Mr. Rajpaul S. Sharma	-	-	-	-	-	-	0.12	-	-	-
	Mrs. Ranjana Paranjape	-	-	-	-	-	-	0.09	0.09	-	-
	Mr. Abhay Pathak	-	-	-	-	-	-	0.18	0.16	-	-
	Mr. Amitabh Murarka	-	-	-	-	-	-	0.20	0.05	-	-



Note 38 : Related party disclosures

III. Related party balances

(Rs. in million)

Sr. No.	Particulars	Sponsor and Project Manager		Investment Manager		Fellow subsidiaries of Sponsor and Project Manager		Key Managerial personnel		Trustee of IRB Infrastructure Trust	
		31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)
1	<b>Short-term borrowings</b>	-	477.81	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	-	477.81	-	-	-	-	-	-	-	-
2	<b>Subordinated debt (unsecured and interest free)</b>	16,916.65	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	16,916.65	-	-	-	-	-	-	-	-	-
3	<b>Trade payable</b>	5,900.05	5,423.13	101.45	78.54	272.83	12,475.69	-	-	-	-
	IRB Infrastructure Developers Limited	5,900.05	5,423.13	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	272.83	12,475.69	-	-	-	-
	MMK Toll Road Private Limited	-	-	101.45	78.54	-	-	-	-	-	-
4	<b>Mobilisation advances</b>	301.37	33.68	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	301.37	33.68	-	-	-	-	-	-	-	-
5	<b>Advance given</b>	1,123.96	451.18	-	-	21.41	0.03	-	-	-	-
	IRB Infrastructure Developers Limited	1,123.96	451.18	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	21.41	0.03	-	-	-	-
6	<b>Advance taken</b>	81.57	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	81.57	-	-	-	-	-	-	-	-	-
7	<b>BG Margin Money Receivable</b>	30.95	-	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	30.95	-	-	-	-	-	-	-	-	-
8	<b>Retention payable</b>	653.70	-	-	-	23.17	281.35	-	-	-	-
	IRB Infrastructure Developers Limited	653.70	-	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	23.17	281.35	-	-	-	-
9	<b>Deferred Consideration payable</b>	33,771.95	32,246.65	-	-	3,717.38	3,697.39	-	-	-	-
	IRB Infrastructure Developers Limited	33,771.95	32,246.65	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	1,784.13	1,800.84	-	-	-	-
	IRB Goa Tollway Private Limited	-	-	-	-	1,544.86	1,544.86	-	-	-	-
	Mhaiskar Infrastructure Private Limited	-	-	-	-	388.39	351.69	-	-	-	-
10	<b>Other payable (Exp incurred on behalf of others)</b>	25.72	1.77	-	-	16.70	-	-	-	-	-
	IRB Infrastructure Developers Limited	25.72	1.77	-	-	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	16.70	-	-	-	-	-
11	<b>Unsecured Loan</b>	-	4,872.91	-	-	-	-	-	-	-	-
	IRB Infrastructure Developers Limited	-	4,872.91	-	-	-	-	-	-	-	-
12	<b>Trade Receivable</b>	-	-	-	-	0.51	0.61	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	0.51	0.61	-	-	-	-
13	<b>Expense payable</b>	-	-	-	-	-	-	-	-	-	0.51
	IDBI Trusteeship Services Limited	-	-	-	-	-	-	-	-	-	0.51
14	<b>Other receivable</b>	-	-	-	0.08	0.01	-	-	-	-	-
	MMK Toll Road Private Limited	-	-	-	0.08	-	-	-	-	-	-
	Modern Road Makers Private Limited	-	-	-	-	0.01	-	-	-	-	-



Note 38 : Related party disclosures

III. Related party balances

(Rs. in million)

Sr. No.	Particulars	Sponsor and Project Manager		Investment Manager		Fellow subsidiaries of Sponsor and Project Manager		Key Managerial personnel		Trustee of IRB Infrastructure Trust	
		31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)	31/12/2023 (Unaudited)	31/03/2023 (Audited)
15	Director sitting fees Payable	-	-	-	-	-	-	0.43	0.44	-	-
	Mrs. Aarti Taskar	-	-	-	-	-	-	0.03	0.01	-	-
	Mr. Darshan Sangurdekar	-	-	-	-	-	-	0.02	0.05	-	-
	Mr. Omprakash Singh	-	-	-	-	-	-	0.04	0.04	-	-
	Mr. Sudhir Hoshing	-	-	-	-	-	-	0.04	0.01	-	-
	Mr. Jitendra Sharma	-	-	-	-	-	-	-	0.02	-	-
	Mr. Rajpaul S. Sharma	-	-	-	-	-	-	0.01	-	-	-
	Mr. C S Kaptan	-	-	-	-	-	-	0.09	0.08	-	-
	Miss Shilpa Todankar	-	-	-	-	-	-	0.09	0.13	-	-
	Mr. Abhay Pathak	-	-	-	-	-	-	0.05	0.07	-	-
	Mr. Amitabh Murarka	-	-	-	-	-	-	0.05	0.01	-	-
	Mr. Tushar Kawedia	-	-	-	-	-	-	0.02	-	-	-
	Mrs. Ranjana Paranjape	-	-	-	-	-	-	0.02	0.03	-	-





**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note 39 : Projectwise Operating Cash Flows**

Particulars	(Rs. in million)												
	UTPL	AETL	WCTL	KGTL	KTL	PDTPL	CGTL	HMTL	SYTL	YATL	IGEPL	ILTPL	STPL
<b>Cash flow from operating activities</b>													
Profit Before Tax	(1,159.69)	(2,623.08)	(2,575.41)	(1,534.79)	(1,389.00)	467.86	(865.09)	(1,353.72)	(621.41)	(1,136.53)	(640.75)	(0.03)	73.43
<b>Adjustments :</b>													
Depreciation and amortisation expenses	311.15	252.10	155.89	188.86	153.09	173.45	296.11	336.55	127.68	426.13	194.01	-	-
Resurfacing expenses	(93.07)	(74.60)	-	121.07	(134.01)	-	95.73	256.70	49.75	109.02	-	-	-
Finance costs	1,201.54	2,819.35	2,890.46	1,387.46	1,974.47	536.76	1,128.29	1,197.57	1,309.19	2,389.27	2,931.85	-	-
Fair Value gain on Mutual Funds	0.05	0.16	-	(0.07)	(0.01)	(0.26)	(0.03)	0.01	0.13	(0.16)	(5.83)	-	-
(Gain) / loss on sale of Investment	(3.28)	(2.56)	(1.46)	(7.75)	(2.16)	(2.00)	(5.05)	(17.37)	(3.86)	(5.21)	(11.48)	-	-
Dividend Income on other investments	-	-	-	-	-	-	(0.02)	(0.02)	-	-	-	-	-
Interest Income on													
- Bank deposits	(22.29)	(18.60)	(14.76)	(12.59)	(12.73)	(1.76)	(23.91)	(23.50)	(41.42)	(71.72)	(72.93)	-	-
- Others	-	-	(0.01)	(0.60)	(0.50)	-	-	-	(0.25)	(0.23)	(0.86)	-	-
<b>Operating profit/(loss) before working capital changes</b>	<b>234.40</b>	<b>352.76</b>	<b>454.71</b>	<b>141.60</b>	<b>589.15</b>	<b>1,174.06</b>	<b>626.04</b>	<b>396.22</b>	<b>819.81</b>	<b>1,710.56</b>	<b>2,394.01</b>	<b>(0.03)</b>	<b>73.43</b>
<b>Movement in working capital:</b>													
Decrease/(increase) in Trade receivables	-	-	-	-	-	(98.05)	-	-	26.78	(57.11)	-	-	-
Decrease/(increase) in others financial assets	(40.13)	(36.68)	(69.57)	(22.89)	(29.26)	(157.46)	(7.26)	(264.03)	(28.82)	(4.32)	(39.46)	-	(6.96)
Decrease/(increase) in other assets	(1.77)	(16.93)	(88.14)	(34.35)	(9.37)	722.96	23.73	229.97	(0.31)	(7.80)	(301.77)	(0.62)	(106.60)
Increase/(decrease) in trade payables	(2,770.49)	112.48	(1,525.73)	(3,111.26)	125.58	(1,808.52)	(2,462.78)	(3,400.81)	(220.04)	(482.75)	1,479.63	0.01	2,329.53
Increase/(decrease) in other financial liabilities	(22.13)	(2,094.34)	(12.63)	14.00	(997.55)	111.94	(44.66)	128.16	11.94	(746.68)	5.97	0.01	24.64
Increase/(decrease) in other liabilities	(0.01)	0.77	(204.19)	(0.06)	(3.15)	8.34	(23.63)	(0.44)	2.89	10.85	0.67	-	0.02
Decrease/(increase) in other non current assets	-	-	166.07	-	-	-	-	-	-	-	-	-	-
<b>Cash generated from/(used in) operations</b>	<b>(2,600.13)</b>	<b>(1,681.93)</b>	<b>(1,279.48)</b>	<b>(3,012.96)</b>	<b>(324.61)</b>	<b>(46.74)</b>	<b>(1,888.56)</b>	<b>(2,910.94)</b>	<b>612.25</b>	<b>422.76</b>	<b>3,539.06</b>	<b>(0.63)</b>	<b>2,314.07</b>
<b>Direct taxes paid (net of refunds)</b>	<b>(12.86)</b>	<b>(3.70)</b>	<b>(3.44)</b>	<b>(0.15)</b>	<b>11.39</b>	<b>(24.17)</b>	<b>(11.40)</b>	<b>(7.18)</b>	<b>(4.90)</b>	<b>(7.51)</b>	<b>(12.06)</b>	<b>-</b>	<b>-</b>
<b>Net cash flows from/(used in) operating activities</b>	<b>(2,612.99)</b>	<b>(1,685.63)</b>	<b>(1,282.91)</b>	<b>(3,013.11)</b>	<b>(313.21)</b>	<b>(70.91)</b>	<b>(1,899.95)</b>	<b>(2,918.12)</b>	<b>607.35</b>	<b>415.25</b>	<b>3,527.00</b>	<b>(0.63)</b>	<b>2,314.07</b>



**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023

**Note 40 : Disclosure pursuant to Appendix - A to Ind AS 11 - " Service Concession Arrangements" ('SCA')**
**(A) Disclosures with regard to Toll Collection Rights (Intangible Assets)**

Sr. No.	Name of Concessionaire	Type of Concession	Start of concession period under concession agreement (Appointed date)	End of concession period under concession agreement	Period of concession since the appointed date	Construction completion date or expected construction completion date, as applicable
1	IRB Westcoast Tollway Limited	BOT	March 3, 2014	March 2, 2042	28 years	June 30, 2022
2	Solapur Yedeshi Tollway Limited	BOT	January 21, 2015	January 20, 2044	29 years	October 15, 2019
3	Yedeshi Aurangabad Tollway Limited	BOT	July 1, 2015	June 30, 2041	26 years	September 24, 2020
4	Kaithal Tollway Limited	BOT	July 15, 2015	July 14, 2042	27 years	March 29, 2019
5	AE Tollway Limited	BOT	August 1, 2016	July 31, 2040	24 years	November 24, 2020
6	Udaipur Tollway Limited	BOT	September 3, 2017	September 2, 2038	21 years from Appointed Date	June 01, 2021
7	CG Tollway Limited	BOT	November 4, 2017	November 3, 2037	20 years from Appointed Date	August 14, 2021
8	Kishangarh Gulabpura Tollway Limited	BOT	February 21, 2018	February 20, 2038	20 years from Appointed Date	June 30, 2022
9	IRB Hapur Moradabad Tollway Limited	BOT	May 28, 2019	May 26, 2041	22 years from Appointed Date	June 30, 2022
10	Palsit Dankuni Tollway Private Limited	BOT	April 2, 2022	April 1, 2039	17 years from Appointed Date	Tolling & Construction
11	IRB Golconda Expressway Private Limited*	TOT	August 12, 2023	August 11, 2053	30 years from Appointed Date	NA
12	Samakhiali Tollway Private Limited	BOT	December 28, 2023	December 27, 2043	20 years from Appointed Date	Tolling & Construction
13	IRB Lalitpur Tollway Private Limited#	TOT	-	-	-	-

\* Upfront concession fee of Rs 73,800 million

# Upfront concession fee of Rs 44,280 million &amp; appointed date pending

**Note:**

The above BOT/ DBFOT projects shall have following rights/ obligations in accordance with the Concession Agreement entered into with the Respective Government Authorities:-

- Rights to use the Specified assets
- Obligations to provide or rights to expect provision of services
- Obligations to deliver or rights to receive at the end of the Concession.

**Note 41 :Disclosure as per Ind AS 115**
**a) Disaggregation of revenue from contracts with customers**

The Group believes that the information provided below for Revenue from Operations, is sufficient to meet the disclosure objectives with respect to disaggregation of revenue under Ind AS 115, Revenue from Contracts with Customers and also refer note (b).

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Contract Revenue (refer note b below)	12,668.24	8,444.95
Income from toll collection (net) (refer note b below)	13,867.12	11,451.49
<b>Total</b>	<b>26,535.36</b>	<b>19,896.44</b>

**b) Reconciliation of revenue as per Ind AS 115**

	(Rs. in million)	
	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
<b>Contract Revenue</b>		
Construction revenue (Utility shifting & Construction work)	12,668.24	8,444.95
<b>Total</b>	<b>12,668.24</b>	<b>8,444.95</b>
<b>Income from toll collection</b>		
Revenue total collected	19,638.74	15,442.74
Less: NHAI Premium	(5,659.54)	(3,845.40)
Less : NHAI Revenue share - Double user fee	(112.08)	(145.85)
<b>Total</b>	<b>13,867.12</b>	<b>11,451.49</b>



**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Consolidated Financial Statements as at December 31, 2023**

**Note 42: Earnings Per Unit (EPU)**

EPU amounts are calculated by dividing the profit for the period attributable to unit holders by the weighted average number of units outstanding during the period.

The following reflects the income and share data used in the EPU computations:

	Nine months ended December 31, 2023 (Unaudited)	Nine months ended December 31, 2022 (Unaudited)
Profit attributable to unit holders for earnings (Rs in million)	(3,846.80)	(1,435.72)
Weighted average number of Units for EPU	953,859,083	877,529,629
Face value per unit (in Rs)	100.00	100.00
<b>Earnings per unit (in Rs.)*</b>		
Basic	(4.03)	(1.64)
Diluted	(4.03)	(1.64)

\* Not annualised

**Note 43 : Segment reporting**

The Group's activities comprise of Toll collection in various parts of India based on the guiding principles given in Ind AS - 108 "Operating Segments", this activity falls within a single operating segment and accordingly the disclosures of the standard have not separately been given.

**Note 44 : Debt payment history**

(Rs in million)

Particulars	Opening Balance as on April 1, 2023	Loan availed during the period	Loan repaid during the period	Closing Balance as at December 31, 2023 (Unaudited)
Secured loan from Bank and Financial Institution	67,937.01	120,731.67	(42,921.06)	145,747.62
Debenture	33,432.82	-	(5,391.68)	28,041.14
Loan from related party	5,350.72	97.66	(5,350.72)	97.66
<b>Total</b>	<b>106,720.55</b>	<b>120,829.33</b>	<b>(53,663.46)</b>	<b>173,886.42</b>

Particulars	Opening Balance as on April 1, 2022	Loan availed during the period	Loan repaid during the period	Closing Balance as at March 31, 2023 (Audited)
Secured loan from Bank and Financial Institution	88,627.04	5,109.36	(25,799.39)	67,937.01
Debenture	5,497.18	28,060.00	(124.36)	33,432.82
Loan from related party	4,085.74	1532.48	(267.50)	5,350.72
<b>Total</b>	<b>98,209.96</b>	<b>34,701.84</b>	<b>(26,191.25)</b>	<b>106,720.55</b>

**Note 45 : Subsequent Events**

The Board of Directors of the Investment Manager have declared 2nd Distribution of Rs.2.82 per unit towards return of capital in their meeting held on January 25, 2024, subsequently February 1, 2024 has been fixed as the record date for the purpose of payment of this distribution.

**Note 46 : Previous year comparatives**

Previous year's figures have been converted to make them comparable with the current period as per InvIT regulations.

As per our report of even date  
**For Gokhale & Sathe**  
 Chartered Accountants  
 ICAI registration number: 103264W



**CA Kaustubh Deshpande**  
 Partner  
 Membership No. 121011

For and on behalf of the Board of Directors of  
**MMK Toll Road Private Limited**  
 (As Investment Manager to IRB Infrastructure Trust)  
 CIN : U45200MH2002PTC135512

*Virendra D. Mhaiskar*

**Virendra D. Mhaiskar**  
 Chairman  
 DIN :00183554

*D. K. Joshi*

**Dhananjay K. Joshi**  
 Chief Executive officer

For **M S K A & Associates**  
 Chartered Accountants  
 ICAI registration number: 105047W



*Nitin Tiwari*  
**Nitin Tiwari**  
 Partner  
 Membership No. 118894

*Shilpa Todankar*

**Shilpa Todankar**  
 Chief Financial Officer

*Kaustubh Shevade*

**Kaustubh Shevade**  
 Company Secretary  
 Membership No A27833



Place: Mumbai  
 Date: **08 MAR 2024**

Place: Mumbai  
 Date: **08 MAR 2024**



Gokhale & Sathe  
Chartered Accountants  
304/308/309, Udyog Mandir No.1,  
7-C, Bhagoji Keer Marg,  
Mahim, Mumbai 400 016.  
Telephone + 91 (22) 43484242  
Fax + 91 (22) 43484241

M S K A & Associates  
Chartered Accountants  
602, Floor 6, Raheja Titanium  
Western Express Highway,  
Geetanjali Railway Colony,  
Ram Nagar, Goregaon (E),  
Mumbai 400063, India  
Tel: +91 22 6238 0519

**Independent Auditors' Review Report on Unaudited Condensed Interim Standalone Financial Statements for the nine months period ended December 31, 2023 of IRB Infrastructure Trust**

To  
The Board of Directors,  
MMK Toll Roads Private Limited  
The Investment manager of the IRB Infrastructure Trust ("the Investment Manager")

1. We have jointly reviewed the accompanying Unaudited Condensed Interim Standalone Financial Statements of IRB Infrastructure Trust ("the Trust") which comprises Condensed Interim Standalone Balance Sheet as on December 31, 2023, Unaudited Condensed Interim Standalone Statement of Profit and Loss, including other comprehensive income, Unaudited Condensed Interim Standalone Statement of Net Assets at Fair Value, Unaudited Condensed Interim Standalone Statement of Total returns at Fair Value, Unaudited Condensed Interim Standalone Cash Flow Statement and Unaudited Condensed Interim Standalone Statement of Changes in Unitholders Equity for the nine months period then ended and a summary of select explanatory notes (together hereinafter referred to as the "Unaudited Condensed Interim Standalone Financial Statements"). "These unaudited condensed interim standalone financial statements for the period from April 01, 2023 to December 31, 2023 have been prepared solely for inclusion in the Letter of Offer ("LOF") in connection with the proposed right issue of units of the Trust.
2. The Unaudited Condensed Interim Standalone Financial Statements, which is the responsibility of the Investment Manager and approved by the Investment Manager's Board of Directors, has been prepared in accordance with the requirements of SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended from time to time read with the Paragraph 3.23 of Chapter 3 of the Securities and Exchange Board of India ("SEBI") Master Circular No. SEBI/HO/DDHS-PoD-2/P/CIR/2023/115 dated July 06, 2023, as amended ("SEBI Circular"), together known as ("InvIT Regulations"), and recognition and measurement principles laid down in Indian Accounting Standard 34, Interim Financial Reporting ('Ind AS 34') prescribed under rule 2(1)(a) of Companies (Indian Accounting Standards) Rules 2015, as amended and other recognised accounting principles generally accepted in India, to the extent not inconsistent with the InvIT Regulations.
3. We conducted our review of the Unaudited Condensed Interim Standalone Financial Statements in accordance with the Standard on Review Engagements (SRE) 2410 "Review of Interim Financial Information Performed by the Independent Auditor of the Entity" issued by the Institute of Chartered Accountants of India. A review consists of making inquiries, primarily of Investment Manager's personnel responsible for financial and accounting matters and applying analytical and other review procedures. A review is substantially less in scope than an audit conducted in accordance with Standards on Auditing and consequently does not enable us to obtain assurance that we would become aware of all significant matters that might be identified in an audit. Accordingly, we do not express an audit opinion.
4. Based on our review conducted and procedures performed as stated in paragraph 3 above, nothing has come to our attention that causes us to believe that the accompanying Unaudited Condensed Interim Standalone Financial Statements, prepared in accordance with the recognition and measurement principles laid down in Ind AS 34 prescribed under prescribed under rule 2(1)(a) of Companies (Indian Accounting Standards) Rules 2015, as amended and other recognised accounting principles generally accepted in India, to the extent not inconsistent with the InvIT Regulations, has not disclosed the information required to be disclosed in terms of Regulation 23 of the SEBI (Infrastructure Investment Trusts) Regulation, 2014, as amended, read with SEBI circular, including the manner in which it is to be disclosed, or that it contains any material misstatement.





Gokhale & Sathe  
Chartered Accountants  
304/308/309, Udyog Mandir No.1,  
7-C, Bhagoji Keer Marg,  
Mahim, Mumbai 400 016.  
Telephone + 91 (22) 43484242  
Fax + 91 (22) 43484241

M S K A & Associates  
Chartered Accountants  
602, Floor 6, Raheja Titanium  
Western Express Highway,  
Geetanjali Railway Colony,  
Ram Nagar, Goregaon (E),  
Mumbai 400063, India  
Tel: +91 22 6238 0519

5. We draw attention to Note 8 of the accompanying Unaudited Condensed Interim Standalone Financial Statements, which describes the presentation of 'Unit Capital' as 'Equity' to comply with the InvIT Regulations.

Our conclusion is not modified in respect of this matter.

6. The Unaudited Condensed Interim Standalone Financial Statements of the Trust for the period April 01, 2022 to December 31, 2022 included in the Unaudited Condensed Interim Standalone Financial Statements, were reviewed by Gokhale & Sathe, one of the Joint Auditor of the Trust, whose report dated March 08, 2024 expressed an unmodified conclusion of those Unaudited Condensed Interim Standalone Financial Statements.

M S K A & Associates conclusion is not modified in respect of the above matter.

7. The standalone financial information for the year ended March 31, 2023, included in the Unaudited Condensed Interim Standalone Financial Statements, are from the standalone financial statements of the Trust, which were audited by Gokhale & Sathe, one of the Joint Statutory Auditors of the Trust, whose report dated May 12, 2023 expressed an unmodified opinion of those audited standalone financial statements.

M S K A & Associates conclusion is not modified in respect of this matter.

8. The report is addressed to the Board of Directors of the Investment Manager and submitted solely for inclusion in the LOF in connection with the proposed right issue of units of the Trust.

Accordingly, we do not accept or assume any liability or any duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come without our prior consent in writing.

Our conclusion is not modified in respect of this matter.

For Gokhale & Sathe  
Chartered Accountants  
ICAI Firm Registration No.103264W

  
CA Kaustubh Deshpande  
Partner  
Membership No.: 121011  
UDIN: 24121011BKAA106929



Place: Mumbai  
Date: March 08, 2024

For M S K A & Associates  
Chartered Accountants  
ICAI Firm Registration No.105047W

  
Nitin Tiwari  
Partner  
Membership No.: 118894  
UDIN: 24118894BKGG04011



Place: Mumbai  
Date: March 08, 2024

IRB Infrastructure Trust  
Condensed Interim Standalone Balance Sheet as at December 31, 2023

	Note No.	(Rs. in million)	
		As at December 31, 2023	As at March 31, 2023
		(Unaudited)	(Audited)
<b>I ASSETS</b>			
(1) Non-current assets			
Financial assets	4		
i) Investments	4.1	44,794.18	94,424.44
ii) Loans	4.2	1,55,666.85	30,351.69
iii) Other financial assets	4.3	30.95	-
<b>Total non-current assets</b>		<b>2,00,491.98</b>	<b>1,24,776.13</b>
(2) Current assets			
Financial assets	5		
i) Investments	5.1	5,737.32	20.08
ii) Cash and cash equivalents	5.2	28.55	6.56
iii) Bank balance other than (ii) above	5.3	2,532.30	-
iv) Loans	5.4	7,327.61	5,421.29
v) Other financial assets	5.5	17,175.64	7,965.17
Current tax assets (net)	6	0.80	-
Other current assets	7	0.29	4.48
<b>Total current assets</b>		<b>32,802.51</b>	<b>13,417.58</b>
<b>TOTAL ASSETS</b>		<b>2,33,294.49</b>	<b>1,38,193.71</b>
<b>II EQUITY AND LIABILITIES</b>			
Equity			
Unit capital	8	1,15,445.40	87,929.33
Other equity	9	17,674.36	9,526.42
<b>Total unit holder's equity</b>		<b>1,33,119.76</b>	<b>97,455.75</b>
(1) Non-current liabilities			
Financial liabilities	10		
i) Borrowings	10.1	61,777.70	-
ii) Other financial liabilities	10.2	37,489.82	35,778.03
<b>Total non-current liabilities</b>		<b>99,267.52</b>	<b>35,778.03</b>
(2) Current liabilities			
Financial liabilities	11		
i) Borrowings	11.1	802.00	4,872.91
ii) Trade payables	11.2		
a) total outstanding dues of micro enterprises and small enterprises		-	0.01
b) total outstanding dues of creditors other than micro enterprises and small enterprises		101.81	81.34
Other Current liabilities	12	3.40	5.67
<b>Total current liabilities</b>		<b>907.21</b>	<b>4,959.93</b>
<b>Total liabilities</b>		<b>1,00,174.73</b>	<b>40,737.96</b>
<b>TOTAL EQUITY AND LIABILITIES</b>		<b>2,33,294.49</b>	<b>1,38,193.71</b>

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Standalone Financial Statements.

As per our report of even date

For Gokhale & Sathe  
Chartered Accountants  
ICAI Finn Registration Number: 103264W

CA. Kausubh Deshpande  
Partner  
Membership No.: 121011

For M S K A & Associates  
Chartered Accountants  
ICAI registration number: 105047W

Nitin Tiwari  
Partner  
Membership No. 118894

Place: Mumbai

Date: 08 MAR 2024

For and on behalf of MMK Toll Road Private Limited  
(Investment Manager of IRB Infrastructure Trust)  
CIN : U45200MH2002PTC135512

Virendra D. Mhaskar  
Chairman  
DIN : 00183554

Shilpa Todankar  
Chief Financial officer

Place: Mumbai

Date: 08 MAR 2024

D. K. Joshi

Dhananjay K. Joshi  
Chief Executive officer

Kausubh Shevade  
Company secretary  
Membership No. A27833



**IRB Infrastructure Trust**

**Unaudited Condensed Interim Standalone Statement of Profit and Loss for the period April 1, 2023 to December 31, 2023**

(Rs. in million)

	Note No.	Nine month ended December 31, 2023 (Unaudited)	Nine month ended December 31, 2022 (Unaudited)
<b>Income</b>			
Other income	13	11,589.71	3,177.76
<b>Total Income</b>		<b>11,589.71</b>	<b>3,177.76</b>
<b>Expenses</b>			
Finance costs	14	1,108.60	-
Investment Manager Fees		122.60	42.39
Trustee fees		0.12	-
Valuation Fees		2.73	-
Other expenses	15	1,706.35	402.47
<b>TOTAL EXPENSES</b>		<b>2,940.40</b>	<b>444.86</b>
<b>Profit / (Loss) before tax</b>		<b>8,649.31</b>	<b>2,732.90</b>
<b>Tax expenses</b>		-	-
<b>Profit / (Loss) after tax (A)</b>		<b>8,649.31</b>	<b>2,732.90</b>
<b>Other comprehensive income / (loss) for the year (net of tax)</b>			
Re-measurement gains/ (losses) on defined benefit plans (net of taxes)		-	-
<b>Other comprehensive income/(loss) for the year (net of tax) (B)</b>		-	-
<b>Total comprehensive income for the year, net of tax : (A+B)</b>		<b>8,649.31</b>	<b>2,732.90</b>
<b>Earnings per unit ( Face value of Rs. 100 each)</b>	16		
Basic		9.07	3.11
Diluted		9.07	3.11

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Standalone Financial Statements.

As per our report of even date

**For Gokhale & Sathe**  
Chartered Accountants  
ICAI Firm Registration Number: 103264W

CA. Kaustubh Deshpande  
Partner  
Membership No.: 121011



For and on behalf of MMK Toll Road Private Limited  
(Investment Manager of IRB Infrastructure Trust)  
CIN : U45200MH2002PTC135512

Virendra D. Mhaiskar  
Chairman  
DIN : 00183554

Dhananjay K. Joshi  
Chief Executive officer

**For M S K A & Associates**  
Chartered Accountants  
ICAI registration number: 105047W

Nitin Tiwari  
Partner  
Membership No. 118894



Shilpa Todankar  
Chief Financial officer

Kaustubh Shevade  
Company secretary  
Membership No. A27833

Place: Mumbai  
Date : 08 MAR 2024

Place: Mumbai  
Date : 08 MAR 2024



IRB Infrastructure Trust

Unaudited Condensed Interim Standalone Statement of Cash Flow for the period from April 01, 2023 to December 31, 2023

(Rs. in million)

Particulars	For period ended December 31, 2023 (Unaudited)	For period ended December 31, 2022 (Unaudited)
<b>Cash flow from operating activities</b>		
Profit / (Loss) before tax	8,649.31	2,732.90
<b>Adjustments to reconcile profit before tax to net cash flows:</b>		
Finance costs	1,108.60	-
Fair value gain on investments	(60.88)	(0.17)
Profit on sale of investments	(15.66)	(0.31)
Fair value loss on measurement of other payable	1,676.37	-
Interest income on		
- Fixed deposits	(50.93)	-
- Others	(11,462.24)	(3,177.28)
<b>Operating profit/(loss) before working capital changes</b>	<b>(155.41)</b>	<b>(444.85)</b>
<b>Movement in working capital:</b>		
Increase/(decrease) in trade payables	20.46	(8.18)
Increase/(decrease) in other financial liabilities	35.42	393.32
Increase/(decrease) in other current liabilities	(2.28)	5.53
(Increase)/decrease in Other current assets	4.19	-
(Increase)/decrease in loans	(0.01)	(1,389.24)
(Increase)/decrease in Other Financial assets	(33.46)	(1,760.00)
<b>Cash generated from/(used in) operations</b>	<b>(131.09)</b>	<b>(3,203.42)</b>
Direct taxes paid (net of refunds)	(0.80)	-
<b>Net cash flows from/(used in) operating activities (A)</b>	<b>(131.89)</b>	<b>(3,203.42)</b>
<b>Cash flows from investing activities</b>		
Investment in subsidiaries	(7,155.00)	(1,212.00)
Investment in sub debt of subsidiaries	(25,915.31)	(2,282.64)
Repayment of sub debt from subsidiaries	4,511.07	-
Loan given to subsidiaries Long term	(48,907.48)	(36.70)
Loan repayment from subsidiaries Short term	816.74	-
Loan given to subsidiaries short term	(941.23)	-
Proceeds from sale/ (purchase) of current investments (net)	(5,640.70)	(89.64)
Investments in Bank deposits (having maturity of more than three months)	(2,532.30)	-
Interest received on fixed deposit	23.01	-
Interest received from related parties	2,282.20	3,177.28
<b>Net cash flows from/(used in) investing activities (B)</b>	<b>(83,459.01)</b>	<b>(443.70)</b>
<b>Cash flow from financing activities</b>		
Proceeds from issuance of unit capital	28,619.50	2,425.00
Return of unit capital	(1,103.43)	-
Proceeds from long term borrowings	63,677.20	-
Repayment of long term borrowings	(400.36)	-
Transaction cost on long term borrowings	(708.60)	-
Proceeds / Repayment of current borrowings	-	1,264.98
Loan received from Sponsor	400.00	-
Loan repayment to Sponsor	(5,272.91)	-
Unit Issue Expenses	(51.82)	(15.33)
Interest Distribution	(449.55)	-
Finance Cost paid	(1,097.14)	-
<b>Net cash flows from/(used in) financing activities (C)</b>	<b>83,612.89</b>	<b>3,674.65</b>
<b>Net increase/(decrease) in cash and cash equivalents (A+B+C)</b>	<b>21.99</b>	<b>27.52</b>
Cash and cash equivalents at the beginning of the period	6.56	0.25
<b>Cash and cash equivalents at the end of the period (refer 5.2)</b>	<b>28.55</b>	<b>27.77</b>
<b>Components of cash and cash equivalents</b>		
Balances with banks		
- On Current Account	28.55	27.77
<b>Total Cash and cash equivalents (refer note 5.2)</b>	<b>28.55</b>	<b>27.77</b>





IRB Infrastructure Trust

Unaudited Condensed Interim Standalone Statement of Cash Flow for the period from April 01, 2023 to December 31, 2023

Debt reconciliation statement in accordance with Ind AS 7		
Particulars	For period ended December 31, 2023 (Unaudited)	For period ended December 31, 2022 (Unaudited)
Opening balances as at beginning of the period		
Long term borrowings	-	-
Short term borrowings	4,872.91	3,607.93
<b>Movements</b>		
Long term borrowings	63,276.84	-
Short term borrowings	4,872.91	(1,264.98)
Closing balances as at end of the period		
Long term borrowings	63,276.84	-
Short term borrowings	-	4,872.91

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Standalone Financial Statements.

Notes:

1. All figures in bracket are outflow.
2. Taxes paid are treated as arising from operating activities and are not bifurcated between investing and financing activities.
3. The Unaudited Condensed Interim Standalone Cash Flow Statement has been prepared under Indirect Method as per Ind AS 7 "Statement of Cash Flows".
4. The Borrowings reflected in above Debt Reconciliation Statement are gross of Unamortised Transaction Cost.

As per our report of even date

For Gokhale & Sathe

Chartered Accountants

ICAI Firm Registration Number: 103264W



CA. Kaustubh Deshpande  
Partner  
Membership No.: 121011



For and on behalf of MMK Toll Road Private Limited

(Investment Manager of IRB Infrastructure Trust)

CIN : U45200MH2002PTC135512



Virendra D. Mhaikar  
Chairman  
DIN : 00183554



Dhananjay K. Joshi  
Chief Executive officer

For M S K A & Associates

Chartered Accountants

ICAI registration number: 105047W



Nitin Tiwari  
Partner  
Membership No. 118894





Shilpa Todankar  
Chief Financial officer



Kaustubh Shevade  
Company secretary  
Membership No. A27837

Place: Mumbai

Date: 08 MAR 2024

Place: Mumbai

Date: 08 MAR 2024



**IRB Infrastructure Trust**

**Unaudited Condensed Interim Standalone Statement of changes in Unitholders Equity for the period April 1, 2023 to December 31, 2023**

(Rs. in million)

	As at December 31, 2023 ( Unaudited )	As at March 31, 2023 ( Audited )
<b>I. Unit Capital</b>		
<b>a. Issued, subscribed and fully paid up Unit Capital</b>		
Unit Capital of Rs 100 each issued, subscribed and fully paid up		
At the beginning of the year	87,929.33	85,504.33
Issued during the period / year	28,619.50	2,425.00
Less: Capital reduction during the period / year	(1,103.43)	-
<b>At the end of the period / year</b>	<b>1,15,445.40</b>	<b>87,929.33</b>

**II. Reconciliation of the number of units outstanding and the amount of unit capital:**

	As at December 31, 2023( Unaudited )		As at March 31, 2023( Audited )	
	No. of units	Amount in Million	No. of units	Amount in Million
At the beginning of the year	87,92,93,265	87,929.33	85,50,43,265	85,504.33
Issued during the period/year	14,24,00,000	28,619.50	2,42,50,000	2,425.00
Less : Capital Reduction during the period/year	-	(1,103.43)	-	-
<b>At the end of the period/year</b>	<b>1,02,16,93,265</b>	<b>1,15,445.40</b>	<b>87,92,93,265</b>	<b>87,929.33</b>

**Other Equity**

(Rs. in million)

	As at December 31, 2023 ( Unaudited )	As at March 31, 2023 ( Audited )
<b>Retained earnings</b>		
At the beginning of the year	9,526.42	5,992.74
Profit / (Loss) for the period / year	8,649.31	3,549.01
Unit issue expenses	(51.82)	(15.33)
Interest Distribution	(449.55)	-
<b>At the end of the period / year</b>	<b>17,674.36</b>	<b>9,526.42</b>

The summary of selected explanatory notes forms an integral part of the Unaudited Condensed Interim Standalone Financial Statements.

As per our report of even date

**For Gokhale & Sathe**

Chartered Accountants

ICAI Firm Registration Number: 103264W

CA. Kaustubh Deshpande  
Partner  
Membership No.: 121011



For and on behalf of MMK Toll Road Private Limited  
(Investment Manager of IRB Infrastructure Trust)

CIN : U45200MH2002PTC135512

Virendra D. Mhaiskar  
Chairman  
DIN : 00183554

Dhananjay K. Joshi  
Chief Executive officer

**For M S K A & Associates**

Chartered Accountants

ICAI registration number: 105047W

Nitin Tiwari  
Partner  
Membership No. 118894  
Place: Mumbai  
Date: 08 MAR 2024



Shilpa Todankar  
Chief Financial officer

Place : Mumbai  
Date : 08 MAR 2024

Kaustubh Shevade  
Company secretary  
Membership No. A27833



**IRB Infrastructure Trust**  
**DISCLOSURES PURSUANT TO SEBI CIRCULARS**  
 (SEBI Circular No. CIR/IMD/DF/114/2016 dated 20-Oct-2016 and No. CIR/IMD/DF/127/2016 dated 29-Nov-2016)

**A. Unaudited Condensed Interim Standalone Statement of Net Asset at Fair Value**

Particulars	As at December 31, 2023 (Unaudited)		As at March 31, 2023 (Audited)	
	Book value	Fair value	Book value	Fair value
A. Assets	2,33,294.49	3,25,178.34	1,38,193.71	1,87,704.45
B. Liabilities (at book value)	1,00,174.73	62,684.91	40,737.96	4,959.93
C. Net Assets (A-B)	1,33,119.76	2,62,493.43	97,455.75	1,82,744.52
D. Number of units (in millions)	1,021.69	1021.69	879.29	879.29
E. NAV (C/D) (Amount in Rs.)	130.29	256.92	110.83	207.83

**B. Unaudited Condensed Interim Standalone Statement of total returns at Fair Value**


Particulars	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
Total Comprehensive Income (As per the Statement of Profit and Loss)	8,649.31	3,549.01
Add/(less): Other Changes in Fair Value	1,29,373.67	85,288.77
<b>Comprehensive Income</b>	<b>1,38,022.99</b>	<b>88,837.78</b>

**Notes :**

Fair value of assets as at December 31, 2023 and March 31, 2023 and other changes in fair value for the year then ended as disclosed in the above tables are derived based on the fair valuation reports issued by the independent valuer appointed under the InvIT Regulations.

As per our report of even date

**For Gokhale & Sathe**  
 Chartered Accountants  
 ICAI Firm Registration Number: 103264W

  
**CA. Kaustubh Deshpande**  
 Partner  
 Membership No.: 121011



**For and on behalf of MMK Toll Road Private Limited**  
 (Investment Manager of IRB Infrastructure Trust)  
 CIN : U45200MH2002PTC135512

  
**Virendra D. Mhaskar**  
 Chairman  
 DIN : 00183554


  
**Dhananjay K. Joshi**  
 Chief Executive officer

**For M S K A & Associates**  
 Chartered Accountants  
 ICAI registration number: 105047W

  
**Nitin Tiwari**  
 Partner  
 Membership No. 118894



  
**Shilpa Todankar**  
 Chief Financial officer

  
**Kaustubh Shevade**  
 Company secretary  
 Membership No. A27833

Place: Mumbai  
 Date: **08 MAR 2024**

Place: Mumbai  
 Date: **08 MAR 2024**



**1. Trust Information and Nature of Operations**

IRB Infrastructure Trust (the "Trust") is a trust settled pursuant to the indenture of trust dated August 27, 2019 which is registered under Indian Trust Act, 1882 and under the Securities Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended from time to time. The Trust is settled by the Sponsor, IRB Infrastructure Developers Limited ("IRB" or the "Sponsor"), an infrastructure development company in India. The Trustee to the Trust is IDBI Trusteeship Services Limited (the "Trustee"). Investment manager for the Trust is MMK Toll Road Private Limited (the "Investment Manager"). The Trust has received registration certificate from SEBI having registration number IN/InvIT/19-20/0012.

The Trust has been formed to invest in infrastructure assets primarily being in the road sector in India. The Trust's road projects are eligible infrastructure projects under the InvIT Regulations and held through special purpose vehicles ("Project SPVs" together as "Project SPV Group"). The Trust's portfolio comprises of thirteen road projects as listed below:-

The Trust had acquired the projects at Sr no 1 to 9 from the Sponsor which are road infrastructure projects developed on DBFOT basis. The SPV from Sr. no 10 has been added to portfolio from the respective dates as stated below:

Sr. No.	Project SPV Name
1	AE Tollway Limited (AETL)
2	CG Tollway Limited (CGTL)
3	IRB Hapur Moradabad Tollway Limited (IRBIIMTL)
4	IRB Westcoast Tollway Limited (IRBWTL)
5	Kishangarh Gulabpura Tollway Limited (KGTL)
6	Kaithal Tollway Limited (KTL)
7	Solapur Yedeshi Tollway Limited (SYTL)
8	Udaipur Tollway Limited (UTL)
9	Yedeshi Aurangabad Tollway Limited (YATL)
10	Palsit Dankuni Tollway Private Limited(PDTPL) ( w.e.f. 02.04.2022)
11	IRB Golconda Expressway Private Limited (IGEPL) ( w.e.f. 11.08.2023)
12	IRB Lalitpur Tollway Private Limited (ILTPL) ( w.e.f.10.11.2023)
13	Samakhiyali Tollway Limited (STL) ( w.e.f. 28.12.2023)

The registered office of the Investment Manager is Off No-11th Floor/1101 Hiranandani Knowledge Park, Technology Street, Hill Side Avenue, Powai Mumbai 400076.

The Trust has been listed on NSE w.e.f. 03.04.2023





**2. Basis of preparation**

The Unaudited Condensed Interim Standalone Financial Statements which comprises Condensed Interim Standalone Balance Sheet as on December 31, 2023, Unaudited Condensed Interim Standalone Statement of Profit and Loss, including other comprehensive income, Unaudited Condensed Interim Standalone Statement of Net Asset at Fair Value, Unaudited Condensed Interim Standalone Statement of total returns at Fair Value, Unaudited Condensed Interim Standalone Cash Flow Statement and Unaudited Condensed Interim Standalone Statement of Changes in Unitholders Equity for the nine months period then ended and a summary of select explanatory notes (together hereinafter referred to as the "Unaudited Condensed Interim Standalone Financial Statements"). These unaudited condensed interim standalone financial statements for the period from April 01, 2023 to December 31, 2023 have been prepared solely for inclusion in the Letter of Offer ( "LOF") in connection with the proposed right issue of units of the Trust.

The Unaudited Condensed Interim Standalone Financial Statements has been prepared in accordance with the requirements of SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended from time to time read with the Paragraph 3.23 of Chapter 3 of the SEBI Circular No. SEBI/HO/DDHS-PoD-2/P/CIR/2023/115 dated July 06, 2023 ("SEBI Circular"), together known as ("InvIT Regulations"); recognition and measurement principles laid down in Indian Accounting Standard 34, Interim Financial Reporting (Ind AS 34) prescribed under rule 2(1)(a) of Companies (Indian Accounting Standards) Rules 2015, as amended and other recognised accounting principles generally accepted in India, to the extent not inconsistent with the InvIT Regulations, (refer note 8 below on presentation of "Unit Capital" as "Equity" instead of compound instruments under Ind AS 32 - Financial Instruments : Presentation)

These Unaudited Condensed Interim Standalone Financial Statements for the period from April 01, 2023 to December 31, 2023 have been prepared solely for inclusion in the Letter of Offer in connection with the proposed right issue of units of the Trust, and should not be relied upon for any other purpose.

These Unaudited Condensed Interim Standalone Financial Statements are not the statutory accounts for the purpose of any statutory compliances or for regulatory requirements in any jurisdiction. The Condensed Standalone Financial Statements of the Trust for the period from April 01, 2023 to December 31, 2023 were approved by the Board of Directors of the Investment Manager and authorised for inclusion in the Letter of Offer of the Trust on March 08, 2024.

The Unaudited Condensed Interim Standalone Financial Statements do not include all the information and disclosures required in the Annual Financial Statements, and should be read in conjunction with the Trust's annual Standalone Financial Statements as at March 31, 2023.

**3. Standard issued but not yet effective**

Ministry of Corporate affairs ("MCA") notifies new standard or amendment to the existing standards. There is no such notification which would have been applicable from January 01, 2024.



**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

	( Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
<b>Note 4 : Financial assets (Non-current)</b>		
<b>4.1 Investments</b>		
<b>Investments at cost</b>		
<b>A. Investments in equity instruments of subsidiaries (unquoted)</b>		
436,500,000 equity shares of AE Tollway Limited	4,365.00	4,365.00
203,500,000 equity shares of CG Tollway Limited	2,035.00	2,035.00
371,500,000 equity shares of IRB Hapur Moradabad Tollway Limited	3,715.00	3,715.00
174,194,303 equity shares of IRB Westcoast Tollway Limited	1,741.94	1,741.94
155,500,000 equity shares of Kishangarh Gulabpura Tollway Limited	1,555.00	1,555.00
328,000,000 equity shares of Kaithal Tollway Limited	3,280.00	3,280.00
98,250,000 equity shares of Solapur Yedeshi Tollway Limited	982.50	982.50
116,800,000 equity shares of Udaipur Tollway Limited	1,168.00	1,168.00
215,757,001 equity shares of Yedeshi Aurangabad Tollway Limited	2,157.57	2,157.57
121,200,000 equity shares of Palshit Dankuni Tollway Private Limited	1,212.00	1,212.00
715,450,000 equity shares of IRB Golconda Expressway Private Limited	7,154.50	-
50,000 equity shares of IRB Lalitpur Tollway Private Limited	0.50	-
<b>Investments in Equity Instruments of subsidiaries (unquoted) (A)</b>	<b>29,367.01</b>	<b>22,212.01</b>
<b>B. Investments in sub debt of subsidiaries (Quoted) (Interest free)</b>		
AE Tollway Limited	-	10,265.88
CG Tollway Limited	2,896.26	2,727.80
IRB Hapur Moradabad Tollway Limited	-	9,798.52
IRB Westcoast Tollway Limited	-	12,203.92
Kishangarh Gulabpura Tollway Limited	-	2,495.38
Kaithal Tollway Private Limited	-	4,426.04
Solapur Yedeshi Tollway Limited	-	4,423.70
Udaipur Tollway Limited	8,893.41	8,338.40
Yedeshi Aurangabad Tollway Limited	-	16,319.79
Palshit Dankuni Tollway Private Limited	3,637.50	1,213.00
<b>Investments in sub debt of subsidiaries (Quoted) (Interest free) (B)</b>	<b>15,427.17</b>	<b>72,212.43</b>
<b>Total non-current investments ( A + B )</b>	<b>44,794.18</b>	<b>94,424.44</b>
<b>Aggregate amount of unquoted investments</b>	<b>44,794.18</b>	<b>94,424.44</b>
<b>4.2 Loans</b>		
Secured, considered good, unless otherwise stated		
Loans to Related Parties (interest bearing) (refer note 21)	45,997.16	-
Less: Current maturities of loan to related parties	(1,417.50)	-
Subordinate debt (interest bearing)	78,189.50	-
<b>Total (A)</b>	<b>1,22,769.16</b>	<b>-</b>



**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
<b>4.2 Loans (continued)</b>		
Unsecured, considered good, unless otherwise stated		
Loans to Related Parties (interest bearing) (refer note 21)	32,873.62	30,000.00
Less: Current maturities of loan to related parties	(364.32)	-
Loans to Related Parties (interest free) (refer note 21)	388.39	351.69
<b>Total (B)</b>	<b>32,897.69</b>	<b>30,351.69</b>
<b>Total (A+B)</b>	<b>1,55,666.85</b>	<b>30,351.69</b>
<b>4.3 Other Financial Assets</b>		
Unsecured, considered good, unless otherwise stated		
Receivable from Related Parties ( BG Margin receivable) (refer note 21)	30.95	-
	<b>30.95</b>	<b>-</b>
<b>Note 5 : Financial assets (current)</b>		
<b>5.1 Investments</b>		
<b>Investments in mutual fund (quoted)</b>		
Investments in Mutual Funds (quoted) (Fair Value through Profit & Loss)	5,737.32	20.08
	<b>5,737.32</b>	<b>20.08</b>
<b>5.2 Cash and cash equivalent</b>		
Balances with banks:		
- In current accounts	28.55	6.56
	<b>28.55</b>	<b>6.56</b>
<b>5.3 Other bank balances</b>		
<b><u>Debt service reserve account with banks /earmarked balance</u></b>		
- Maturity more than 12 months	582.20	-
- Maturity more than 3 but less than 12 months	950.10	-
<b><u>Cash Reserve</u></b>		
- Original maturity more than 3 but less than 12 months	1,000.00	-
	<b>2,532.30</b>	<b>-</b>
<b>5.4 Loans</b>		
Secured, considered good, unless otherwise stated		
Current maturities of long term loans (interest bearing)	1,417.50	-
<b>Total (A)</b>	<b>1,417.50</b>	<b>-</b>
Unsecured, considered good, unless otherwise stated		
Loans to Related Parties (interest bearing) (refer note 21)	2,770.74	-
Loans to Related Parties (interest free) (refer note 21)	2,775.04	5,421.29
Current maturities of loan to related parties	364.33	-
<b>Total (B)</b>	<b>5,910.11</b>	<b>5,421.29</b>
<b>Total (A+B)</b>	<b>7,327.61</b>	<b>5,421.29</b>



**IRB Infrastructure Trust****Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited )
<b>5.5 Other financial assets</b>		
Unsecured, considered good, unless otherwise stated		
Interest accrued on fixed deposits	27.92	-
Interest receivable from related parties ( Refer note 21 )	16,861.08	7,681.04
Other receivables		
- related parties ( Refer note 21 )	286.64	284.13
	<u>17,175.64</u>	<u>7,965.17</u>
 <b>Note 6 : Current tax assets (net)</b>		
Advance income tax	0.80	-
	<u>0.80</u>	<u>-</u>
 <b>Note 7 : Other current assets</b>		
Duties and taxes receivable	-	3.30
Prepaid expenses	0.29	1.18
<b>Total</b>	<u>0.29</u>	<u>4.48</u>





**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

**Note 8 : Unit Capital**

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
<b>I. Unit capital*</b>		
<b>a. Issued, subscribed and fully paid up Unit Capital</b>		
<b>Unit capital of Rs. 100 each issued, subscribed and fully paid up</b>		
At the beginning of the year	87,929.33	85,504.33
Issued during the period/year	28,619.50	2,425.00
Less : Capital Reduction during the period/year (refer note 27)	(1,103.43)	-
<b>At the end of the period/year</b>	<b>1,15,445.40</b>	<b>87,929.33</b>

\* Under the provisions of the InvIT Regulations, Trust is required to distribute to Unitholders not less than 90% of the net distributable cash flows of the Trust for each financial year. Accordingly, a portion of the Unit Capital contains a contractual obligation of the Trust to pay to its Unitholders cash distributions. Hence, the Unit Capital is a compound financial instrument which contains equity and liability components in accordance with Ind AS 32 - Financial Instruments. However, in accordance with Chapter 3 and Chapter 4 of the SEBI circular, the Unit capital have been presented as "Equity" in order to comply with the requirements of Section H of Chapter 3 to the SEBI circular, dealing with the minimum presentation and disclosure requirements for key financial statements. Consistent with Unit Capital being classified as equity, the distributions to Unitholders is also presented in Statement of Changes in Unitholders' Equity when the distributions are approved by the Board of Directors of Investment Manager.

Units are classified as equity. Incremental costs attributable to the issue of units are directly recorded in equity, net of tax

**II. Reconciliation of the number of units outstanding and the amount of unit capital:**

	As at December 31, 2023 (Unaudited)		As at March 31, 2023 (Audited)	
	No. of units	Amount in Million	No. of units	Amount in Million
At the beginning of the year	87,92,93,265	87,929.33	85,50,43,265	85,504.33
Issued during the period/year	14,24,00,000	28,619.50	2,42,50,000	2,425.00
Less : Capital Reduction during the period/year	-	(1,103.43)	-	-
<b>At the end of the period/year</b>	<b>1,02,16,93,265</b>	<b>1,15,445.40</b>	<b>87,92,93,265</b>	<b>87,929.33</b>

**III. Details of Promoter**

	As at December 31, 2023 (Unaudited)		As at March 31, 2023 (Audited)	
	No. of units	%	No. of units	%
IRB Infrastructure Developers Limited	52,12,39,840	51%	44,84,39,840	51%
Anahera Investments Pte Ltd	25,56,23,181	25%	21,98,23,181	25%
Bricklayers Investments Pte Ltd	6,11,57,561	6%	5,27,57,561	6%
Chiswick Investments Pte Ltd	6,11,57,561	6%	5,27,57,561	6%
Stretford End Investments Pte Ltd	6,11,57,561	6%	5,27,57,561	6%
Dungenham Investments Pte Ltd	6,13,57,561	6%	5,27,57,561	6%
<b>Total</b>	<b>1,02,16,93,265</b>	<b>100%</b>	<b>87,92,93,265</b>	<b>100%</b>

**Note 9 Other Equity**

	(Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited)
<b>Retained earnings</b>		
At the beginning of the year	9,526.42	5,992.74
Profit/(loss) for the period/year	8,649.31	3,549.01
Unit issue expenses	(51.82)	(15.33)
Interest Distribution (refer note 27)	(449.55)	-
<b>Total Other Equity</b>	<b>17,674.36</b>	<b>9,526.42</b>



**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

(Rs. in million)

	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited )
<b>Note 10 : Non-current financial liabilities</b>		
<b>Note 10.1 : Borrowings</b>		
<b>Non Current Borrowing</b>		
<b>Term loans</b>		
Indian rupee loan from banks (Secured)	34,522.70	-
Less: Current maturities	(436.25)	-
<b>Total (a)</b>	<b>34,086.45</b>	<b>-</b>
Indian rupee loan from financial institutions (Secured)	28,754.14	-
Less: Current maturities	(362.50)	-
<b>Total (b)</b>	<b>28,391.64</b>	<b>-</b>
<b>Unsecured</b>		
Less : Unamortised transaction cost (c)	(700.39)	-
<b>Total Non Current Borrowing (d=a+b+c)</b>	<b>61,777.70</b>	<b>-</b>
<b>10.2 Other financial liabilities</b>		
Other Payable		
- related party( Refer note 21 )	37,489.82	35,778.03
	<b>37,489.82</b>	<b>35,778.03</b>

**Note 11 : Current financial liabilities**

**Note 11.1 : Current Borrowing**

Current maturities of long-term borrowings		
- Indian rupee loan from banks	436.25	-
- Indian rupee loan from financial institutions	362.50	-
Loan from related parties		
- Interest free ( Refer note 21 )	-	4,872.91
Interest accrued but not due on borrowings	3.25	-
<b>Total Current Borrowings (e)</b>	<b>802.00</b>	<b>4,872.91</b>
<b>Total Borrowing (d+e)</b>	<b>62,579.70</b>	<b>4,872.91</b>

The unsecured loan taken from fellow subsidiary is repayable on demand

**Rate of Interest**

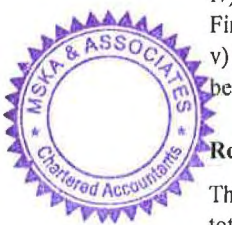
Rate of interest on the Indian Rupee loan from banks and financial institutions varies from 8.60% to 8.70% p.a. (March 31, 2023: Nil)

**Nature of security**

- i) Secured by first charge on the movable/immovable asset by way of mortgage/hypothecation; first charge on all intangible assets, assignment of all receivables; book debts, loans and advances extended by the Borrower to SPVs and all rights and interest in project, both present and future, excluding the Project Assets of respective companies;
- ii) Secured by first charge over all the equity shares, Preference shares, Debentures representing 100% of such securities.
- iii) Secured by first charge on the Escrow Account, Debt Service Reserve Account and any other reserves and other bank accounts of the respective Companies.
- iv) Unconditional and irrevocable corporate guarantee by each of the RG SPVs , in a form and manner satisfactory to the Finance Parties ( the " Corporate Guarantee" )
- v) Pledged of Securities of obligators created pursuant to the terms of loan Agreement held as common security for the benefit of Rupee Lenders

**Repayment terms**

The Indian rupee loans from Banks and Financial Institutions are repayable in structured monthly installments such that the total tenor does not exceed 16 years and repayable as per the repayment schedule specified in common loan agreement with the Lenders.



**IRB Infrastructure Trust****Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

	( Rs. in million)	
	As at December 31, 2023 (Unaudited)	As at March 31, 2023 (Audited )
<b>11.2 Trade Payables</b>		
a) total outstanding dues of micro enterprises and small enterprises	-	0.01
b) Total outstanding dues of creditors other than micro and small enterprises		
- related parties ( Refer note 21 )	101.45	78.54
- others	0.36	2.80
<b>Total</b>	<b>101.81</b>	<b>81.35</b>
<b>Note 12 : Other current liabilities</b>		
Statutory dues payable (including PF, TDS, GST & others)	3.40	5.67
<b>Total</b>	<b>3.40</b>	<b>5.67</b>



IRB Infrastructure Trust  
Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023

(Rs. in million)

	Nine month ended December 31, 2023 (Unaudited)	Nine month ended December 31, 2022 (Unaudited)
<b>Note 13 : Other Income</b>		
Interest income on		
- Bank deposits	50.93	-
- Interest income from Related parties	11,462.24	3,177.28
Profit on sale of investment	15.66	0.31
Fair value gain on Mutual Fund	60.88	0.17
	<b>11,589.71</b>	<b>3,177.76</b>
<b>Note 14 : Finance costs</b>		
Interest expense		
- Term loan from bank / financial Institutions	1,099.80	-
Other borrowing costs		
- Amorisation of transaction cost	8.21	-
- Other finance costs	0.59	-
	<b>1,108.60</b>	<b>-</b>
<b>Note 15 : Other expenses</b>		
Rates and taxes	1.32	0.11
Legal and professional fees	23.23	44.54
Payment to auditor (refer note below)	0.69	0.82
Bank charges	4.13	0.03
Miscellaneous expenses	0.61	0.34
Fair value loss on measurement of other payable	1,676.37	356.63
	<b>1,706.35</b>	<b>402.47</b>
<b>Payment to auditor</b>		
- Statutory audit fees	0.24	0.22
- Limited review fees	0.42	0.43
- Other services (certification fees)	-	0.10
Reimbursement of expenses	0.03	0.07
	<b>0.69</b>	<b>0.82</b>





**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023

**Note 16 : Earnings per unit (EPU)**

The following reflects the income and unit data used in the basic and diluted EPU computations:

(Rs. in million)

	Nine month ended December 31, 2023 (Unaudited )	Nine month ended December 31, 2022 (Unaudited)
Profit attributable to unit holders of the Trust for basic & diluted earnings	8,649.31	2,732.90
Weighted average number of unit for basic & diluted EPU*	95,38,59,083	87,75,29,629
Face Value per unit (Amount in Rs.)	100.00	100.00
<b>Earnings per unit (In Rs.)*</b>		
Basic earning per unit (Amount in Rs.)	9.07	3.11
Diluted earning per unit (Amount in Rs.)	9.07	3.11
* Not annualised		

**Note 17 : Capital and other commitments**

There are no capital and other commitments as at December 31, 2023. ( As at March 31, 2023. Nil )

**Note 18 :Contingent liabilities**

The Trust has provided Corporate guarantee for the subsidiary companies i.e. SYTL and YATL in respect of the NCDs issued during the FY 2022-23.

**Note 19 : Operating segment**

The Trust is engaged in to invest in infrastructure assets primarily being in the road sector in India which in the context of Ind AS 108 - Operating Segments is considered as the only segment. The Trust's activities are restricted within India and hence no separate geographical segment disclosure is considered necessary.

**Note 20: Capitalisation Statement**

(Rs. in million)

Particulars	As at December 31, 2023 ( Unaudited)
<b>Unitholder's Funds:</b>	
Unit Capital	1,15,445.40
Other Equity	17,674.36
<b>Total Unitholder's Funds</b>	<b>1,33,119.76</b>
<b>Borrowings</b>	
Long term borrowings	61,777.70
Current maturities of long term borrowings (including interest accrued but not due)	802.00
<b>Total Debt</b>	<b>62,579.70</b>
<b>Total Capitalisation</b>	<b>1,95,699.46</b>



**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

**Note 21 : Related party disclosures**

**List of Related parties of the Trust**

1	Parties to the InvIT	IRB Infrastructure Developers Limited (Sponsor Group and Project Manager ) MMK Toll Road Private Limited (Investment Manager) IDBI Trusteeship Services Limited (Trustee of the IRB Infrastructure Trust)
2	Associates, Promoters, Directors and Partners of the persons mentioned in clause 1	As per table below #

**# List of Associates, Promoters, Directors and Partners of the persons mentioned in clause 1**

Particulars	IRB Infrastructure Developers Limited (Sponsor and Project Manager)	MMK Toll Road Private Limited (Investment Manager)	IDBI Trusteeship Services Limited ( Trustee of IRB Infrastructure Trust)
<b>Promoters</b>	Mr. Virendra D. Mhaiskar Mrs. Deepali V. Mhaiskar Mr. Virendra D. Mhaiskar (HUF)	IRB Infrastructure Developers Limited (IRBIDL)	IDBI Bank Limited LIC Corporation Limited General Insurance Corporation
<b>Directors</b>	Mr. Virendra D. Mhaiskar, Chairman and Managing Director Mrs. Deepali V. Mhaiskar, Whole Time Director Mr. Jose Tamariz Martel Goncer Mr. Ravindra Dhariwal	Mr. Virendra D Mhaiskar Mr. Kunnasagan Chinniah Mr. Boon Chin Hau (w.e.f. 31.05.2023) Mr. Aryan Mhaiskar (w.e.f.31.05.2023)	Mr. Jayakumar Subramonia Pillai Mr. Pradeep Kumar Jain Mrs. Jayashree Vijay Ranade Mr. Pradeep Kumar Malhotra Ms. Baljinder Kaur Mandal
	<b>Independent directors</b> Mr. Chandrashekhar S. Kaptan Mr. Sunil H. Talati Mr. Sandeep J. Shah Ms. Priti Savla, Independent Director	<b>Independent directors</b> Mr. K G Krishnamurthy Mrs.Ranjana Paranjape Mr. Nagendraa Parakh (w.e.f. 31.05.2023) Mr. Aryn Jassani (w.e.f. 31.05.2023)	



<p><b>Associates</b></p>	<p><b>A) Holding Company of Sponsor / Project Manager</b>  IRB Holding Private Limited (Formerly Mhaiskar Ventures Private Limited)</p> <p><b>B) Project SPV's of Trust</b></p> <ol style="list-style-type: none"> <li>1. IRB Westcoast Tollway Limited (IRBWTL)</li> <li>2. Solapur Yedeshi Tollway Limited (SYTL)</li> <li>3. Yedeshi Aurangabad Tollway Limited (YATL)</li> <li>4. Kaithal Tollway Limited (KTL)</li> <li>5. AE Tollway Limited (AETL)</li> <li>6. Udaipur Tollway Limited (UTL)</li> <li>7. CG Tollway Limited (CGTL)</li> <li>8. Kishangarh Gulabpura Tollway Limited (KGTL)</li> <li>9. IRB Hapur Muradabad Tollway Limited (IRBHMTL)</li> <li>10. Palsit Dankuni Tollway Private Limited (PDTPPL)</li> <li>11. IRB Golconda Expressway Private Limited w.e.f. 11.08.2023</li> <li>12. IRB Lalitpur Tollway Private Limited w.e.f 10.11.2023</li> <li>13. Samakhiali Tollway Private Limited w.e.f. 28.12.2023</li> </ol> <p><b>C) Subsidiaries/JV's of Sponsor / Project Manager</b></p> <ol style="list-style-type: none"> <li>1. Ideal Road Builders Private Limited (IRBPL)</li> <li>2. Mhaiskar Infrastructure Private Limited (MIPL)</li> <li>3. Modern Road Makers Private Limited (MRMPL)</li> <li>4. Aryan Toll Road Private Limited (ATRPL)</li> <li>5. ATR Infrastructure Private Limited (ATRFL)</li> <li>6. IRB Infrastructure Private Limited (IRBFL)</li> <li>7. Thane Ghodbunder Toll Road Private Limited (TGTRPL)</li> <li>8. Aryan Infrastructure Investments Private Limited (AIPL)</li> <li>9. IRB MP Expressway Private Limited (formerly known as NKT Road and Toll Private Limited)</li> <li>10. MMK Toll Road Private Limited (MMK) (Entity with Joint Control)</li> <li>11. IRB Kolhapur Integrated Road Development Company Private Limited (IRBK)</li> <li>12. Aryan Hospitality Private Limited (AHPL)</li> <li>13. IRB Sindhudurg Airport Private Limited (IRBSA)</li> <li>14. IRB Goa Tollway Private Limited (IRB Goa)</li> <li>15. IRB PS Highway Private Limited (formerly known as MRM Highways Private Limited) (IRBPS)</li> <li>16. IRB Ahmedabad Vadodara Super Express Tollway Private Limited (IRBAV)</li> <li>17. MRM Mining Private Limited (Formerly "J J Patel Infrastructural and Engineering Private Limited") (Subsidiary of MRMPL)</li> <li>18. GE1 Expressway Private Limited (formerly known as IRB PP Project Private Limited)</li> <li>19. VK1 Expressway Limited (VK1) (formerly known as VK1 Expressway Private Limited ) (upto October 12, 2022)</li> <li>20. Pathankot Mandi Highway Private Limited</li> <li>21. Chittoor Thachur Highway Private Limited</li> <li>22. Meerut Budaun Expressway Limited - Subsidiary upto October 14, 2022 and Entity with Joint Control w.e.f. October 15,2022</li> <li>23. VM7 Expressway Private Limited</li> </ol>
	<p><b>D) Other Associate Companies of Sponsor / Project Manager</b></p> <ol style="list-style-type: none"> <li>1. Virendra D. Mhaiskar (HUF)</li> <li>2. VCR Toll Services Private Limited</li> <li>3. VDM Ventures Private Limited</li> <li>4. DEUX Farming Films Private Limited</li> <li>5. IRB Charitable Foundation</li> </ol> <p><b>Key Managerial personnel (Only with whom Trust had transactions during the period/ there was balance outstanding at the year end)</b></p> <ol style="list-style-type: none"> <li>1. Ms. Shilpa Todankar</li> <li>2. Mr. Abhay Phatak</li> <li>3. Mr. Darshan Sangurdekar</li> <li>4. Mr. Omprakash Singh</li> <li>5. Mr. Chandrashekhar Kaptan</li> <li>6. Mrs. Ranjana Paranjape</li> <li>7. Mrs. Arati Taskar</li> <li>8. Mr. Sudhir Rao Hoshing</li> <li>9. Mr. Rajpaul Sharma</li> <li>10. Mr. Amitabh Murarka</li> <li>11. Devendra Ranka (Appointed as CFO)</li> <li>12. Jayprakash Nandi (Appointed as CEO)</li> <li>13. Mr. Tushar Kawedia</li> <li>14. Svati Chandekar (Appointed as CS of Yedeshi Aurangabad Tollway Limited)</li> </ol>



IRB Infrastructure Trust  
Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023

II ) Related party transaction during the period

(Rs. in million)

Sr. No.	Particulars	Relation	Period ended December 31, 2023	Period ended December 31, 2022
1	<b>Equity Investment</b>		<b>7,155.00</b>	<b>1,212.00</b>
	IRB Hapur Muradabad Tollway Limited	Subsidiary	-	-
	IRB Golconda Expressway Private Limited	Subsidiary	7,154.50	-
	IRB Lalitpur Tollway Private Limited	Subsidiary	0.50	-
	Palshit Dankuni Tollway Private Limited	Subsidiary	-	1,212.00
2	<b>Subordinated Debt</b>		<b>25,915.31</b>	<b>2,282.64</b>
	AE Tollway Limited	Subsidiary	159.52	-
	CG Tollway Limited	Subsidiary	168.46	-
	IRB Hapur Muradabad Tollway Limited	Subsidiary	64.18	383.76
	Kaithal Tollway Limited	Subsidiary	46.82	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	-	685.88
	Udaipur Tollway Limited	Subsidiary	555.01	-
	Solapur Yedeshi Tollway Limited	Subsidiary	203.47	-
	Yedeshi Aurangabad Tollway Limited	Subsidiary	828.35	-
	IRB Golconda Expressway Private Limited	Subsidiary	21,465.00	-
	Palshit Dankuni Tollway Private Limited	Subsidiary	2,424.50	1,213.00
3	<b>Subordinated Debt- repaid</b>		<b>4,511.07</b>	<b>-</b>
	IRB Westcoast Tollway Limited	Subsidiary	4,415.12	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	95.95	-
4	<b>Long term loan</b>		<b>1,615.96</b>	<b>36.70</b>
	AE Tollway Limited	Subsidiary	414.30	-
	IRB Westcoast Tollway Limited	Subsidiary	464.05	-
	Kaithal Tollway Limited	Subsidiary	507.97	36.70
	Kishangarh Gulabpura Tollway Limited	Subsidiary	197.85	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	31.80	-
5	<b>Short Term Loan given</b>		<b>941.23</b>	<b>2,057.60</b>
	AE Tollway Limited	Subsidiary	-	-
	IRB Hapur Muradabad Tollway Limited	Subsidiary	-	-
	IRB Westcoast Tollway Limited	Subsidiary	-	1,088.60
	Kaithal Tollway Limited	Subsidiary	-	-
	Solapur Yedeshi Tollway Limited	Subsidiary	-	-
	Udaipur Tollway Limited	Subsidiary	560.04	886.50
	CG Tollway Limited	Subsidiary	320.59	80.00
	Kishangarh Gulabpura Tollway Limited	Subsidiary	60.00	-
	IRB Lalitpur Tollway Private Limited	Subsidiary	0.60	-
	Yedeshi Aurangabad Tollway Limited	Subsidiary	-	2.50
6	<b>Short Term Loan repaid</b>		<b>816.74</b>	<b>668.36</b>
	IRB Hapur Muradabad Tollway Limited		-	37.26
	AE Tollway Limited	Subsidiary	409.30	-
	IRB Westcoast Tollway Limited	Subsidiary	136.28	-
	Kaithal Tollway Limited	Subsidiary	82.16	525.10
	Solapur Yedeshi Tollway Limited	Subsidiary	24.00	-
	Yedeshi Aurangabad Tollway Limited	Subsidiary	165.00	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	-	106.00
7	<b>Unit Capital Issued</b>		<b>14,631.32</b>	<b>1,236.75</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	14,631.32	1,236.75
8	<b>Interest income</b>		<b>11,462.24</b>	<b>3,177.28</b>
	Solapur Yedeshi Tollway Limited	Subsidiary	894.35	421.92
	Yedeshi Aurangabad Tollway Limited	Subsidiary	1,339.03	434.81
	Kaithal Tollway Limited	Subsidiary	1,572.67	893.58
	IRB Westcoast Tollway Limited	Subsidiary	2,320.72	421.92
	AE Tollway Limited	Subsidiary	2,301.54	1,005.05
	Kishangarh Gulabpura Tollway Limited	Subsidiary	503.39	-
	IRB Hapur Muradabad Tollway Limited	Subsidiary	1,394.85	-
	IRB Golconda Expressway Private Limited	Subsidiary	1,135.69	-





IRB Infrastructure Trust

Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023

II ) Related party transaction during the period

(Rs. in million)

Sr. No.	Particulars	Relation	Period ended December 31, 2023	Period ended December 31, 2022
9	<b>Investment Manager Fees</b>		<b>122.60</b>	<b>38.80</b>
	MMK Toll Road Pvt Limited	Investment Manager	122.60	38.80
10	<b>Expenses incurred on behalf of others</b>		<b>57.43</b>	<b>224.66</b>
	AE Tollway Limited	Subsidiary	3.69	0.01
	CG Tollway Limited	Subsidiary	-	44.53
	Kishangarh Gulabpura Tollway Limited	Subsidiary	11.37	158.35
	IRB Hapur Muradabad Tollway Limited	Subsidiary	4.25	21.43
	IRB Westcoast Tollway Limited	Subsidiary	7.07	0.34
	Udaipur Tollway Limited	Subsidiary	0.00	-
	Solapur Yedeshi Tollway Limited	Subsidiary	0.00	-
	Yedeshi Aurangabad Tollway Limited	Subsidiary	0.00	-
	Kaithal Tollway Limited	Subsidiary	5.12	-
	Palsit Dankuni Tollway Private Limited	Subsidiary	25.47	-
	MMK Toll Road Pvt Limited	Investment Manager	0.45	-
	IRB Golconda Expressway Private Limited	Subsidiary	0.39	-
	IRB Lalipur Tollway Private Limited	Subsidiary	0.01	-
11	<b>Reimbursement received on expenses incurred on behalf of others</b>		<b>55.29</b>	<b>27.43</b>
	AE Tollway Limited	Subsidiary	3.55	-
	CG Tollway Limited	Subsidiary	-	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	-	-
	IRB Hapur Muradabad Tollway Limited	Subsidiary	0.00	-
	IRB Westcoast Tollway Limited	Subsidiary	20.84	-
	Udaipur Tollway Limited	Subsidiary	-	0.98
	Solapur Yedeshi Tollway Limited	Subsidiary	-	24.11
	Yedeshi Aurangabad Tollway Limited	Subsidiary	-	2.34
	Kaithal Tollway Limited	Subsidiary	4.52	-
	Palsit Dankuni Tollway Private Limited	Subsidiary	25.47	-
	MMK Toll Road Pvt Limited	Subsidiary	0.53	-
	IRB Golconda Expressway Private Limited	Subsidiary	0.39	-
12	<b>Unsecured Loan received</b>		<b>400.00</b>	<b>1,264.98</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	400.00	1,264.98
13	<b>Unsecured Loan paid</b>		<b>5,272.91</b>	<b>-</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	5,272.91	-
14	<b>Long Term loan received-MMR</b>		<b>1,294.36</b>	<b>-</b>
	IRB Westcoast Tollway Limited	Subsidiary	410.13	-
	Kaithal Tollway Limited	Subsidiary	449.90	-
	AE Tollway Limited	Subsidiary	390.81	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	43.52	-
15	<b>Secured Long Term Loan received</b>		<b>45,997.15</b>	<b>-</b>
	IRB Westcoast Tollway Limited	Subsidiary	9,538.54	-
	Kaithal Tollway Limited	Subsidiary	4,801.81	-
	AE Tollway Limited	Subsidiary	6,766.21	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	9,944.52	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	14,946.07	-



IRB Infrastructure Trust  
Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023

II ) Related party transaction during the period

( Rs. in million)

Sr. No.	Particulars	Relation	Period ended December 31, 2023	Period ended December 31, 2022
16	<b>Other Payable</b>		<b>1,713.07</b>	<b>393.32</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	1,676.37	356.62
	Mhaiskar Infrastructure Private Limited	Subsidiaries Company of Sponsor and Project Manager	36.70	36.70
17	<b>Interest Distribution</b>		<b>229.35</b>	-
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	229.35	-
18	<b>Capital Reduction</b>		<b>562.94</b>	-
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	562.94	-
19	<b>Expenses incurred on our behalf</b>		<b>4.10</b>	-
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	4.10	-
20	<b>BG Margin paid on behalf of others</b>		<b>30.95</b>	-
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	30.95	-
21	<b>Reimbursement of expenses incurred on our behalf</b>		<b>1.28</b>	-
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	1.28	-
22	<b>Trustee Fees</b>		<b>0.12</b>	-
	IDBI Trusteeship Services Limited	Trustee	0.12	-



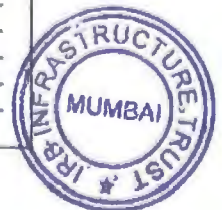
**IRB Infrastructure Trust**

**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

**III ) Related party outstanding balances**

(Rs. in million)

Sr. No.	Particulars	Relation	As on December 31,2023	As on March 31,2023
1	<b>Equity Investment</b>		<b>29,367.01</b>	<b>22,212.01</b>
	AE Tollway Limited	Subsidiary	4,365.00	4,365.00
	CG Tollway Limited	Subsidiary	2,035.00	2,035.00
	IRB Hapur Muradabad Tollway Limited	Subsidiary	3,715.00	3,715.00
	IRB Westcoast Tollway Limited	Subsidiary	1,741.94	1,741.94
	Kishangarh Gulabpura Tollway Limited	Subsidiary	1,555.00	1,555.00
	Kaithal Tollway Limited	Subsidiary	3,280.00	3,280.00
	Solapur Yedeshi Tollway Limited	Subsidiary	982.50	982.50
	Udaipur Tollway Limited	Subsidiary	1,168.00	1,168.00
	Yedeshi Aurangabad Tollway Limited	Subsidiary	2,157.57	2,157.57
	Palshit Dankuni Tollway Private Limited	Subsidiary	1,212.00	1,212.00
	IRB Golconda Expressway Private Limited	Subsidiary	7,154.50	-
	IRB Lalitpur Tollway Private Limited	Subsidiary	0.50	-
2	<b>Subordinated Debt</b>		<b>15,427.17</b>	<b>72,212.43</b>
	AE Tollway Limited	Subsidiary	-	10,265.88
	CG Tollway Limited	Subsidiary	2,896.26	2,727.80
	IRB Hapur Muradabad Tollway Limited	Subsidiary	-	9,798.52
	IRB Westcoast Tollway Limited	Subsidiary	-	12,203.92
	Kishangarh Gulabpura Tollway Limited	Subsidiary	-	2,495.38
	Kaithal Tollway Limited	Subsidiary	-	4,426.04
	Solapur Yedeshi Tollway Limited	Subsidiary	-	4,423.70
	Udaipur Tollway Limited	Subsidiary	8,893.41	8,338.40
	Yedeshi Aurangabad Tollway Limited	Subsidiary	-	16,319.79
	Palshit Dankuni Tollway Private Limited	Subsidiary	3,637.50	1,213.00
3	<b>Long term loan ( Interest bearing)</b>		<b>31,579.27</b>	<b>30,000.00</b>
	AE Tollway Limited	Subsidiary	9,942.71	9,528.41
	IRB Westcoast Tollway Limited	Subsidiary	4,464.05	4,000.00
	Kaithal Tollway Limited	Subsidiary	8,942.85	8,471.59
	Solapur Yedeshi Tollway Limited	Subsidiary	4,000.00	4,000.00
	Yedeshi Aurangabad Tollway Limited	Subsidiary	4,000.00	4,000.00
	Kishangarh Gulabpura Tollway Limited	Subsidiary	197.85	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	31.80	-
4	<b>Subordinated debt - (Interest bearing)</b>		<b>78,189.50</b>	<b>-</b>
	AE Tollway Limited	Subsidiary	10,425.40	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	9,862.69	-
	IRB Westcoast Tollway Limited	Subsidiary	7,788.81	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	2,399.43	-
	Kaithal Tollway Private Limited	Subsidiary	4,472.86	-
	Solapur Yedeshi Tollway Limited	Subsidiary	4,627.17	-
	Yedeshi Aurangabad Tollway Limited	Subsidiary	17,148.14	-
	IRB Golconda Expressway Private Limited	Subsidiary	21,465.00	-
5	<b>Long term loan ( Interest bearing) -MMR</b>		<b>1,294.36</b>	<b>-</b>
	IRB Westcoast Tollway Limited	Subsidiary	410.13	-
	Kaithal Tollway Limited	Subsidiary	449.90	-
	AE Tollway Limited	Subsidiary	390.81	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	43.52	-
6	<b>Long term loan ( Interest free)</b>		<b>388.39</b>	<b>351.69</b>
	Kaithal Tollway Limited	Subsidiary	388.39	351.69
7	<b>Secured Long Term Loan ( Interest bearing)</b>		<b>45,997.16</b>	<b>-</b>
	IRB Westcoast Tollway Limited	Subsidiary	9,538.54	-
	Kaithal Tollway Limited	Subsidiary	4,801.81	-
	AE Tollway Limited	Subsidiary	6,766.21	-
	Kishangarh Gulabpura Tollway Limited	Subsidiary	9,944.52	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	14,946.07	-



**IRB Infrastructure Trust**

Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023

## III ) Related party outstanding balances

(Rs. in million)

Sr. No.	Particulars	Relation	As on December 31,2023	As on March 31,2023
8	<b>Short Term Loan</b>		<b>5,545.78</b>	<b>5,421.29</b>
	AE Tollway Limited	Subsidiary	69.59	478.89
	IRB Hapur Muradabad Tollway Limited	Subsidiary	-	-
	IRB Westcoast Tollway Limited	Subsidiary	2,211.80	2,348.08
	Kaithal Tollway Limited	Subsidiary	74.55	156.71
	Solapur Yedeshi Tollway Limited	Subsidiary	-	24.00
	Udaipur Tollway Limited	Subsidiary	1,895.35	1,335.31
	Yedeshi Aurangabad Tollway Limited	Subsidiary	354.80	519.80
	IRB Lalitpur Tollway Private Limited	Subsidiary	0.60	-
	CG Tollway Limited	Subsidiary	879.09	558.50
	Kishangarh Gulabpura Tollway Limited	Subsidiary	60.00	-
9	<b>Other Payable</b>		<b>37,489.33</b>	<b>35,776.26</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	33,771.95	32,095.57
	Mhaskar Infrastructure Private Limited	Subsidiaries Company of Sponsor and Project Manager	388.39	351.69
	Modern Road Makers Private Limited	Subsidiaries Company of Sponsor and Project Manager	1,784.13	1,784.13
	IRB Goa Tollway private Limited	Subsidiaries Company of Sponsor and Project Manager	1,544.86	1,544.86
10	<b>Other payable ( Reimbursement of Expenses incurred on our behalf)</b>		<b>0.49</b>	<b>1.77</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	0.49	1.77





**IRB Infrastructure Trust**  
**Notes to Unaudited Condensed Interim Standalone Financial Statements as at December 31, 2023**

**III ) Related party outstanding balances**

( Rs. in million)

Sr. No.	Particulars	Relation	As on December 31,2023	As on March 31,2023
<b>11</b>	<b>Other Receivable</b>		<b>286.64</b>	<b>284.13</b>
	Solapur Yedeshi Tollway Limited	Subsidiary	4.89	4.89
	Yedeshi Aurangabad Tollway Limited	Subsidiary	8.17	8.17
	IRB Westcoast Tollway Limited	Subsidiary	-	13.76
	Udaipur Tollway Limited	Subsidiary	14.12	14.11
	AE Tollway Limited	Subsidiary	0.14	0.01
	CG Tollway Limited	Subsidiary	47.34	47.35
	Kishangarh Gulabpura Tollway Limited	Subsidiary	182.68	171.32
	IRB Hapur Moradabad Tollway Limited	Subsidiary	27.15	22.90
	Kaithal Tollway Limited	Subsidiary	0.61	0.00
	Palshit Dankuni Tollway Private Limited	Subsidiary	1.54	1.54
	IRB Golconda Expressway Private Limited	Subsidiary	-	-
	IRB Lalitpur Tollway Private Limited	Subsidiary	0.01	-
	MMK Toll Road Private Limited	Investment Manager	-	0.08
<b>12</b>	<b>Interest Receivable</b>		<b>16,861.08</b>	<b>7,681.04</b>
	Solapur Yedeshi Tollway Limited	Subsidiary	1,044.25	539.90
	Yedeshi Aurangabad Tollway Limited	Subsidiary	1,104.29	485.27
	Kaithal Tollway Limited	Subsidiary	3,248.81	2,112.74
	IRB Westcoast Tollway Limited	Subsidiary	3,662.12	1,552.00
	AE Tollway Limited	Subsidiary	5,102.68	2,991.13
	Kishangarh Gulabpura Tollway Limited	Subsidiary	503.39	-
	IRB Hapur Moradabad Tollway Limited	Subsidiary	1,059.85	-
	IRB Golconda Expressway Private Limited	Subsidiary	1,135.69	-
<b>13</b>	<b>BG Margin Receivable</b>		<b>30.95</b>	<b>-</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	30.95	-
<b>14</b>	<b>Trade payable</b>		<b>101.45</b>	<b>78.54</b>
	MMK Toll Road Pvt Limited	Investment Manager	101.45	78.54
<b>15</b>	<b>Unsecured Loan / other payable</b>		<b>-</b>	<b>4,872.91</b>
	IRB Infrastructure Developers Limited	Sponsor and Project Manager	-	4,872.91



**Note 22 : Fair Values****Financial assets and liabilities**

The carrying values of financial instruments of the trust are reasonable and approximations of fair values.

The accounting classification of each category of financial instruments, their carrying amounts and the categories of financial assets and liabilities measured at fair value, are set out below:

	(Rs. in million)			
	Carrying amount	Carrying amount	Fair Value	Fair Value
	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
<b>Financial assets</b>				
<u>Financial assets measured at amortised cost</u>				
Investment in subsidiaries	44,794.18	94,424.44	44,794.18	94,424.44
Loans	1,62,994.46	35,772.98	1,62,994.46	35,772.98
Other financial assets	17,206.59	7,965.17	17,206.59	7,965.17
Cash and cash equivalents	28.55	6.56	28.55	6.56
Other Bank balances	2,532.30	-	2,532.30	-
<u>Financial assets measured at fair value through statement of Profit &amp; Loss</u>				
Investments in Mutual funds	5,676.72	20.08	5,737.32	20.08
<b>Financial liabilities</b>				
<u>Financial liabilities measured at amortised cost</u>				
Trade payables	101.81	81.35	101.81	81.35
Borrowings (net of Transaction cost)	62,579.70	4,872.91	62,579.70	4,872.91
<u>Financial liabilities measured at fair value through statement of Profit &amp; Loss</u>				
Other financial liabilities	37,489.82	35,778.03	37,489.82	35,778.03

The management assessed that the fair value of other financial assets, trade receivables, cash and cash equivalents, other bank balance, trade payables, borrowings and other financial liabilities approximate their carrying amounts largely due to the short-term maturities of these instruments.

The fair value of the financial assets and liabilities is included at the amount at which the instrument could be exchanged in a current transaction between willing parties, other than in a forced or liquidation sale.

The discount for lack of marketability represents the amounts that the trust has determined that market participants would take into account when pricing the investments.

**Note 23 : Fair Value Hierarchy**

All financial instruments for which fair value is recognised or disclosed are categorised within the fair value hierarchy described as follows, based on the lowest level input that is significant to the fair value measurement as a whole.

Level 1: Quoted (unadjusted) price is active market for identical assets or liabilities

Level 2: Valuation technique for which the lowest level input that has a significant effect on the fair value measurement are observed, either directly or indirectly.

Level 3: Valuation technique for which the lowest level input has a significant effect on the fair value measurement is not based on observable market data.

There were no transfers between Level 1, Level 2 and Level 3 during the period.

The following table presents fair value hierarchy of assets and liabilities measured at fair value on a recurring basis as of December 31, 2023

	(Rs. in million)			
	As on December 31, 2023 (Unaudited)	Fair value measurement at end of the reporting period using		
		Level 1	Level 2	Level 3
<b>Assets</b>				
Investments in mutual fund (Quoted)	5,737.32	5,737.32		
<b>Liabilities</b>				
Other financial liabilities	37,489.82	-	-	37,489.82



The following table presents fair value hierarchy of assets and liabilities measured at fair value on a recurring basis as of March 31, 2023:

	As on March 31, 2023 (Audited)	Fair value measurement at end of the reporting year using		
		Level 1	Level 2	Level 3
(Rs. in million)				
<b>Assets</b>				
Investments in mutual fund (Quoted)	20.08	20.08	-	-
<b>Liabilities</b>				
Other financial liabilities	35,778.03	-	-	35,778.03

There has been no transfer between Level 1, Level 2 & Level 3 during the period.

Sensitivity: Higher probability by 5% and lower discount rate by 0.5% will increase the fair value by Rs.4,446.51 million (31 March 2023 - Rs.4,166.87 million). Lower probability by 5% and higher discount rate by 0.5% will reduce fair value by Rs.4,197.70 million (31 March 2023 - Rs.3,946.06 million).

Fair value movement for Payable to IRB Infrastructure Developers Limited is as under:

	December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
Opening balance as at 1st April 2023 (Previous period: 1st April 2022)	35,778.03	35,168.79
Add: Recognised during the period/ year	1,676.37	560.53
Less: Payment of deferred consideration	-	-
Add: Adjustment on account of interest unwinding	35.42	48.71
<b>Closing balance of payable as on December 31, 2023 (Previous period: March 31, 2023)</b>	<b>37,489.82</b>	<b>35,778.03</b>

**Note 24 : Taxes**

In accordance with section 10 (23FC) of the Income Tax Act, the income of business trust in the form of interest received or receivable from Project SPV is exempt from tax. Accordingly, the trust is not required to provide any current tax liability. Further, deferred tax assets on carry forward losses is not being created since there is no virtual certainty of reversal of the same in the near future.

**Note 25 : Investment Management Fees**

Pursuant to the terms of the Investment Management Agreement, the fees will be paid to the Investment Manager for the services provided by it ("Management Fees"). The Management Fees have been revised for the Financial Year with the approval of the Unitholders, where the votes cast by Unitholders so entitled and voting in favor of a resolution are not less than one-and-a-half times the votes cast against such resolution. Pursuant to a resolution of the Unitholders, the Management Fees for the period ended December 31, 2023 has been revised to Rs. 122.60 million

**Note 26 : Liquidity Risk**

**Liquidity risk**

Liquidity risk is the risk that the trust may not be able to meet its present and future cash and collateral obligations without incurring unacceptable losses. The trust's objective is to, at all times maintain optimum levels of liquidity to meet its cash and collateral requirements.

The trust closely monitors its liquidity position and deploys a robust cash management system. It maintains adequate sources of financing including debt and overdraft from banks at an optimised cost.

The liquidity risk is managed on the basis of expected maturity dates of the financial liabilities. The average credit period taken to settle trade payables is about 30 to 90 days. The other payables are with short-term durations. The carrying amounts are assumed to be a reasonable approximation of fair value. The following table analyses financial liabilities by remaining contractual maturities:

December 31, 2023	(Rs. in million)					Total
	On demand	Less than 3 months	Less than 1 year	1 to 5 years	> 5 years	
Borrowings (Gross of unamortised transaction cost)	-	-	802.00	5,990.62	56,487.47	63,280.09
Other financial liabilities	-	-	-	37,489.82	-	37,489.82
Trade payables	-	-	101.81	-	-	101.81
<b>Total</b>	<b>-</b>	<b>-</b>	<b>903.81</b>	<b>43,480.44</b>	<b>56,487.47</b>	<b>1,00,871.73</b>
March 31, 2023	On demand	Less than 3 months	Less than 1 year	1 to 5 years	> 5 years	Total
Borrowings (Gross of unamortised transaction cost)	-	-	4,872.91	-	-	4,872.91
Other financial liabilities	-	-	-	35,778.03	-	35,778.03
Trade payables	-	0.01	50.56	30.78	-	81.35
<b>Total</b>	<b>-</b>	<b>0.01</b>	<b>4,923.47</b>	<b>35,808.80</b>	<b>-</b>	<b>40,732.29</b>

At present, the trust does expects to repay all liabilities at their contractual maturity. In order to meet such cash commitments, the operating activity is expected to generate sufficient cash inflows





Note 27 : Distribution made

(Rs. in million)	
December 31, 2023 (Unaudited)	March 31, 2023 (Audited)
449.55	-
1,103.43	-
<u>1,552.97</u>	<u>-</u>

Distributed during the period as :

Interest  
Return of Capital

Note: The Board of Directors of the Investment Manager have declared 1st Distribution of Rs.1.52 per unit which comprises of Rs.0.44 per unit as interest and Rs. 1.08 per unit as return of capital in their meeting held on October 25, 2023.

Note 28 : Debt payment history

(Rs. in million)

Particulars	Opening Balance as on April 1, 2023	Loan availed during the period	Loan repaid during the period	Closing Balance as at December 31, 2023
Secured loan from Bank and Financial Institution (Gross of unamortised transaction cost)	-	63,677.20	(400.36)	63,276.84
Loan from related party	4,872.91	-	(4,872.91)	-
<b>Total</b>	<b>4,872.91</b>	<b>63,677.20</b>	<b>(5,273.27)</b>	<b>63,276.84</b>

Particulars	Opening Balance as on April 1, 2022	Loan availed during the period	Loan repaid during the period	Closing Balance as at March 31, 2023
Secured loan from Bank and Financial Institution (Gross of unamortised transaction cost)	-	-	-	-
Loan from related party	3,607.93	1,532.48	(267.50)	4,872.91
<b>Total</b>	<b>3,607.93</b>	<b>1,532.48</b>	<b>(267.50)</b>	<b>4,872.91</b>

Note 29 : Subsequent Events

The Board of Directors of the Investment Manager have declared 2nd Distribution of Rs.2.82 per unit towards return of capital in their meeting held on January 25, 2024, subsequently February 1, 2024 has been fixed as the record date for the purpose of payment of this distribution.

Note 30 : Previous year comparatives

Previous year figures have been converted to make them comparable with the current period as per InvIT regulations.

As per our report of even date  
For Gokhale & Sathe  
Chartered Accountants  
ICAI Firm Registration Number: 103264W

For and on behalf of MMK Toll Road Private Limited  
(Investment Manager of IRB Infrastructure Trust)  
CIN : U45200MH2002PTC135512

  
CA. Kaustubh Deshpande  
Partner  
Membership No.: 121011



  
Virendra D. Mhaiskar  
Chairman  
DIN : 00183554


  
Dhananjay K. Joshi  
Chief Executive officer

For M S K A & Associates  
Chartered Accountants  
ICAI registration number: 105047W

  
Nitin Tiwari  
Partner  
Membership No. 118894



  
Shilpa Todankar  
Chief Financial officer

  
Kaustubh Shevade  
Company secretary  
Membership No. A27833

Place: Mumbai  
Date: **08 MAR 2024**

Place: Mumbai  
Date: **08 MAR 2024**





**Annexure 2**

Valuation Report of Trust Assets as on December 31, 2023 (with Traffic Reports)

*(Enclosed separately below)*



# Security Cover

Valuation Report

—  
March 2024





# IRB Infrastructure Trust

Valuation of IRB Infrastructure Trust and its SPVs

Valuation Report

—  
March 2024







KPMG Valuation Services LLP  
2<sup>nd</sup> Floor, Block T2 (B Wing),  
Lodha Excelus  
Apollo Mills Compound  
N.M. Joshi Marg, Mahalakshmi  
Mumbai – 400 011, India  
Telephone: +91 22 3989 6000

**Strictly private and confidential**

08 March 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 along with Addendum to the letter of engagement dated 01 March 2024 (together referred as “LoE”), wherein KPMG Valuation Services LLP (hereinafter referred to as the “KPMG” or “Us” or “We” or “Valuer”) has been appointed by IRB Infrastructure Trust (“the Client”, or “IRB Trust”/ “the Trust”, or “the Company” or “You”) for carrying out Enterprise Valuation of 12 Special Purpose Vehicles (“SPVs” or “IRB Trust Assets”) of IRB Trust and Equity Valuation of IRB Trust (jointly referred as “Targets”), as on the agreed date of the valuation in relation to proposed right issue by IRB Trust. The valuation is to be conducted in accordance with Regulation 21(7) of the Securities Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 (“SEBI InvIT Regulations”) where it 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”).

KPMG is appointed as a registered valuer for the purpose of the Engagement. (Registered valuer entity under Companies (Registered Valuers and Valuation) Rules, 2017 having IBBI Registration No. IBBI/RV-E/06/2020/115)

The date for the valuation is 31 December 2023 (“Valuation Date”).

We hereby enclose our Valuation Report dated 08 March 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 IRB Trust is **INR 256.92 per unit** as on 31 December 2023.

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

<b>%</b>	Percentage	<b>IMF</b>	International Monetary Fund	<b>NWC</b>	Net Working Capital
<b>A</b>	Actual	<b>IMHTL</b>	IRB Hapur Moradabad Tollway Limited	<b>O&amp;M</b>	Operation and Maintenance
<b>Adj.</b>	Adjusted	<b>INR</b>	Indian Rupee	<b>PAT</b>	Profit After Tax
<b>AETL</b>	AE Tollway Limited	<b>InvIT</b>	Investment Trust	<b>PBT</b>	Profit Before Tax
<b>B</b>	Budgeted	<b>IRBI Trust</b>	IRB Infrastructure Trust	<b>PDTPL</b>	Palsit Dankuni Private Tollway Limited
<b>bn</b>	Billion	<b>IRBIDL</b>	IRB Infrastructure Developers Limited	<b>PIB</b>	Press Information Bureau
<b>CAGR</b>	Compounded Annual Growth Rate	<b>IWTL</b>	IRB Westcoast Tollway Limited	<b>PV</b>	Present Value
<b>Capex</b>	Capital Expenditure	<b>k</b>	Thousands	<b>R(f)</b>	Risk free rate of Return
<b>CGTL</b>	CG Tollway Limited	<b>Kd</b>	Cost of Debt	<b>R(m)</b>	Market rate of Return
<b>CoCo</b>	Comparable Companies	<b>Ke</b>	Cost of Equity	<b>Rf</b>	Risk-free Rate
<b>COD</b>	Commercial operation date	<b>KGTL</b>	Kishangarh Gulabpura Tollway Limited	<b>SEBI</b>	Securities and Exchange Board of India
<b>CoTrans</b>	Comparable Transactions	<b>Km</b>	Kilometer	<b>Sponsor</b>	IRB Infrastructure Developers Limited
<b>Cr</b>	Crore	<b>KPMG</b>	KPMG Valuation Services LLP	<b>SPV</b>	Special Purpose Vehicle
<b>CWIP</b>	Capital Work In Progress	<b>KTL</b>	Kaithal Tollway Limited	<b>STPL</b>	Samakhiali Tollway Private Limited
<b>DBFOT</b>	Design, Build, Finance, Operate and Transfer	<b>LoE</b>	Letter of Engagement	<b>SYTL</b>	Solapur Yedeshi Tollway Limited
<b>DCF</b>	Discounted Cash Flow	<b>Management</b>	Management of IRBI Trust and its 12 SPVs	<b>t</b>	Trillion
<b>EBIT</b>	Earnings Before Interest and Tax	<b>MAT</b>	Minimum Alternate Tax	<b>UTL</b>	Udaipur Tollway Limited
<b>EBITDA</b>	Earnings Before Interest, Tax, Depreciation and Amortization	<b>mn</b>	Million	<b>Valuation Date</b>	31 December 2023
<b>EV</b>	Enterprise Value	<b>MoRTH</b>	The Ministry of Road Transport and Highways	<b>WACC</b>	Weighted Average Cost Of Capital
<b>FCFF</b>	Free Cash Flows to Firm	<b>n.a.</b>	Not applicable	<b>WPI</b>	Wholesale Price Index
<b>FV</b>	Fair Value	<b>n.m.</b>	No Meaningful Figure	<b>YATL</b>	Yedeshi Aurangabad Tollway Limited
<b>FY</b>	Financial Year	<b>NA</b>	Not applicable	<b>y-o-y</b>	Year on year
<b>IBEF</b>	India Brand Equity Foundation	<b>NAV</b>	Net Asset Value	<b>YTD</b>	Year to date
<b>IGEPL</b>	IRB Golconda Expressway Private Limited	<b>NHAI</b>	National Highways Authority of India		
		<b>NHIDCL</b>	National Highway and Infrastructure Development Corporation Limited		

# Contents

<b>Executive Summary</b>	7
<b>IRBI Trust Overview</b>	10
<b>Industry Overview</b>	13
<b>Valuation Methodology and Approach</b>	18
• Valuation Methodology and Approach	19
• WACC Analysis	24
<b>Valuation of Individual SPVs</b>	27
• IRB Westcoast Tollway Limited	28
• Solapur Yedeshi Tollway Limited	34
• Yedeshi Aurangabad Tollway Limited	39
• Kaithal Tollway Limited	44
• AE Tollway Limited	50



# Contents

• Udaipur Tollway Limited	56
• Chittorgarh Gulabpura Tollway Limited	61
• Kishangarh Gulabpura Tollway Limited	66
• IRB Hapur Moradabad Tollway Limited	71
• Palsit Dankuni Tollway Private Limited	77
• IRB Golconda Expressway Private Limited	82
• Samakhiyali Tollway Private Limited	88
<b>Valuation Conclusion</b>	<b>94</b>
<b>Annexures</b>	<b>97</b>
<b>Scope &amp; Limitations</b>	<b>142</b>



**1.**

# **Executive Summary**



# Overview

## Terms of the Engagement

- We have been appointed by IRBI Trust to undertake Enterprise Valuation of 12 Special Purpose Vehicles of IRBI Trust and Equity Valuation of IRBI Trust in accordance with Regulation 21(7) of the SEBI InvIT Regulations for proposed right issue by IRBI Trust. The 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 December 2023. This report has been prepared by KPMG pursuant to terms of LoE.
- As at 31 December 2023 IRBI Trust assets comprised of the following 12 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”)
  - Samakhiyali Tollway Private Limited (“STPL”)

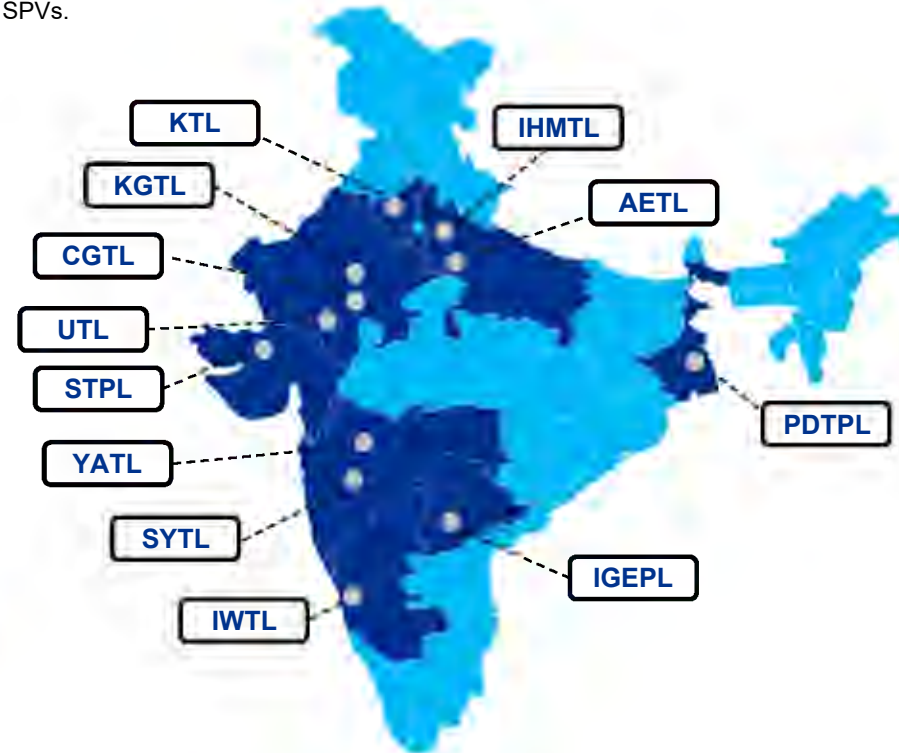
## Valuation Approach and Methodology

Approach	Method
Income Approach	Discounted Cash Flow Method (DCF)

Source(s): Management information, KPMG analysis

## SPV Overview

IRBI Trust has acquired 11 DBFOT assets and 1 TOT asset from the sponsors in the states of Maharashtra, Gujarat, Rajasthan, Goa, Karnataka, Haryana, 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

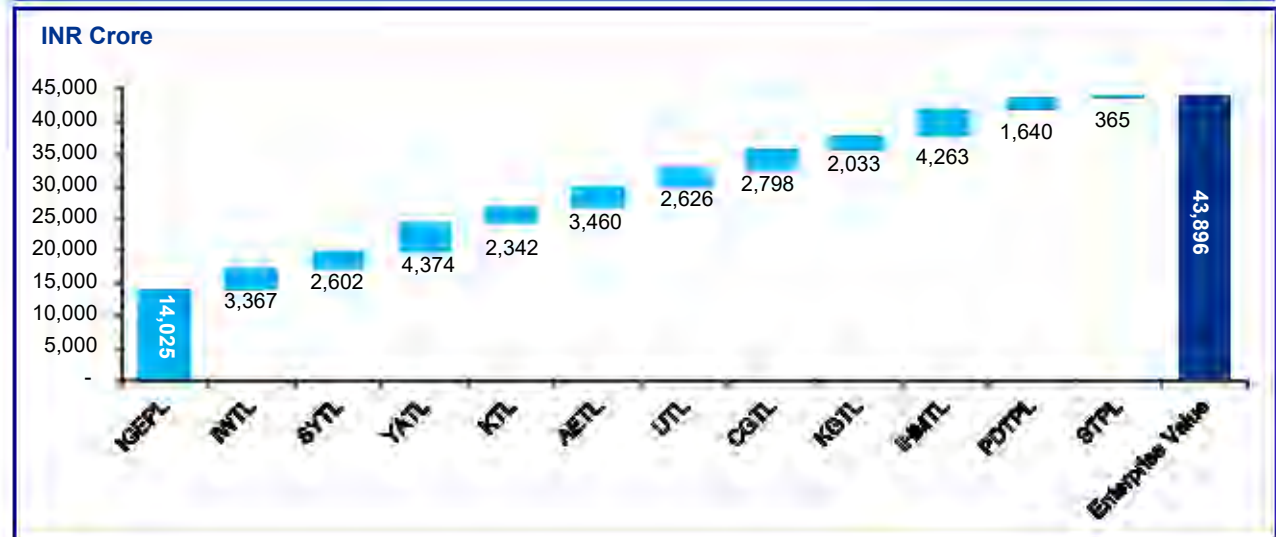
Valuation Conclusion (INR Crs)

Valuation Conclusion 31 December 2023		INR Crore
IRB Golconda Expressway Private Limited		14,025
IRB Westcoast Tollway Limited		3,367
Solapur Yedeshi Tollway Limited		2,602
Yedeshi Aurangabad Tollway Limited		4,374
Kaithal Tollway Limited		2,342
AE Tollway Limited		3,460
Udaipur Tollway Limited		2,626
CG Tollway Limited		2,798
Kishangarh Gulabpura Tollway Limited		2,033
IRB Hapur Moradabad Tollway Limited		4,263
Palsit Dankuni Tollway Private Limited		1,640
Samakhiyali Tollway Private Limited		365
<b>Enterprise Value of the SPVs</b>		<b>43,896</b>
Cash and cash Equivalents		69
Surplus assets		736
Proposed distribution		(288)
Debt and debt like items		(17,390)
PV of standalone expense pertaining to Trust		(224)
Capital Creditors		(549)
<b>Equity Value of IRBI Trust</b>		<b>26,250</b>
<b>NAV at fair value per unit as on 31 December 2023</b>		
Equity Value of IRBI Trust (INR Cr)		26,250
Units outstanding (No.)		1,021,693,265
<b>NAV at fair value per unit (INR)</b>		<b>256.92</b>

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

Source(s): Management information, KPMG analysis

## Enterprise Value of SPVs



The Enterprise Value of the SPVs is INR 43,896 crores and the 100% Equity Value of the IRBI Trust is INR 26,250 crores as on 31 December 2023.

The NAV at fair value per unit of IRBI Trust as on 31 December 2023 is INR 256.92 per unit.

2.

# IRBI Trust Overview

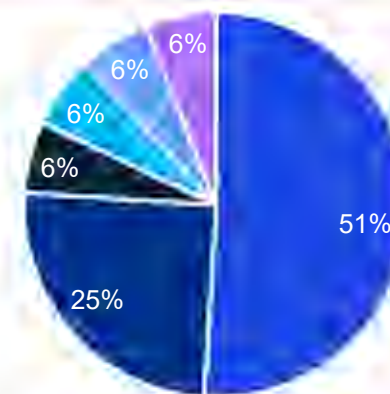
# IRBI Trust Overview

## 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 December 2023 IRBI Trust assets comprised of 12 SPVs. IRBI Trust has acquired 11 DBFOT road assets and 1 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 August 2023 by way of right issue issued 142.4 Mn units to the eligible unitholders of the IRBI Trust at an issue price of INR 200.98 per unit aggregating to INR 2,861.95 Cr. The purpose of the issue was to acquire and fund total project cost of IGEPL.
- We understand that IRBI Trust is contemplating another rights issue, to fund upfront fee payments of three new road projects.
- 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, Consolidated Trust Financials FY2023

## Shareholding Pattern of IRBI Trust as on 31 December 2023



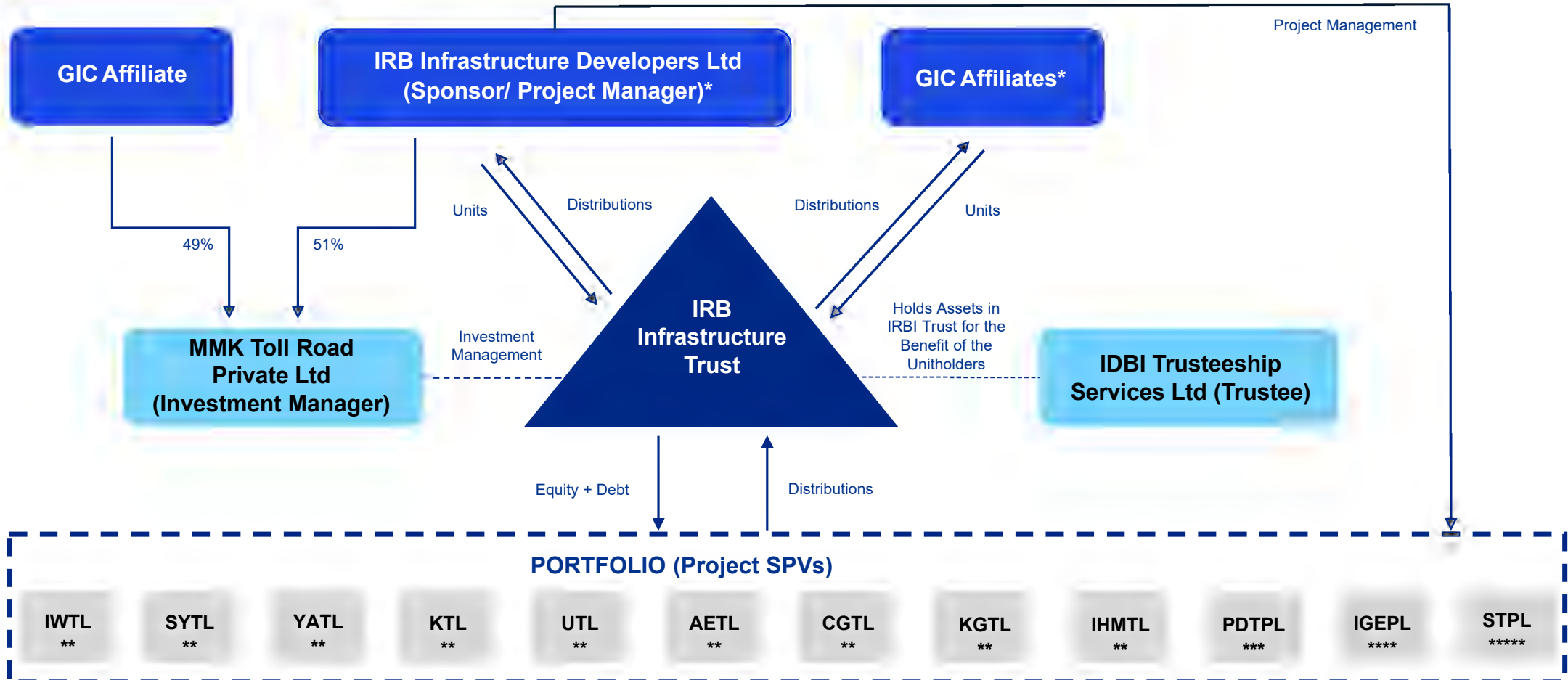
- IRB Infrastructure Developers Ltd
- Anahera Investments Pte Ltd
- Bricklayers Investment Pte Ltd
- Chiswick Investments Pte Ltd
- Stretford End Investments Pte Ltd
- Dangenham Investments Pte Ltd

## 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% as on 04 January 2024.  
 Source(s): IRBI Trust Corporate Presentation, Management



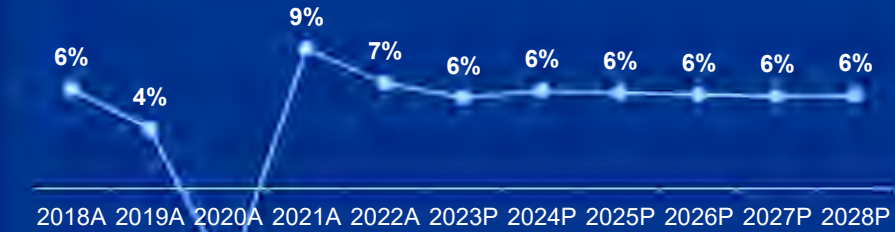
**3.**

# **Industry Overview**

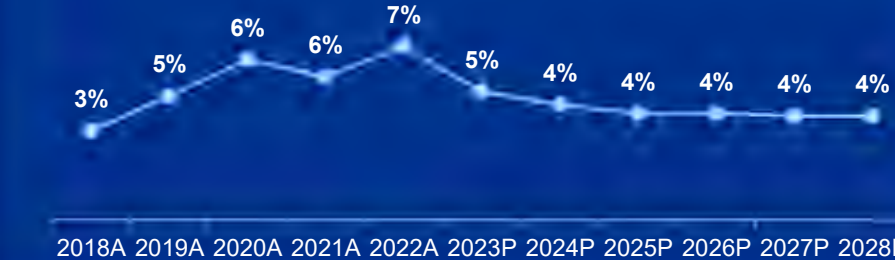
# Indian Economy Outlook

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.

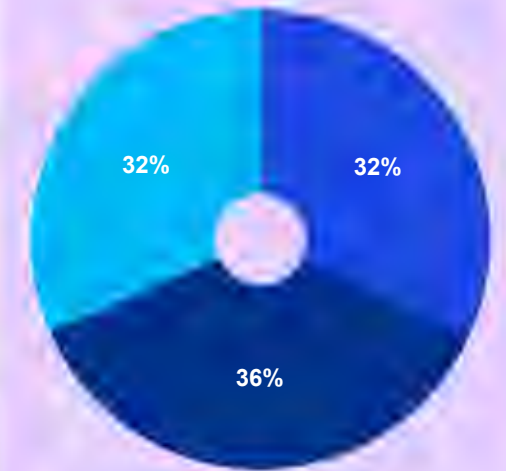
Capital investment outlay for infrastructure is being increased by 33 per cent, which would be 3.3 per cent of GDP and almost three times the outlay in 2019-20.

### India Infrastructure market (USD billion)



## Construction Industry

Market segmentation of India's Construction industry (2022)



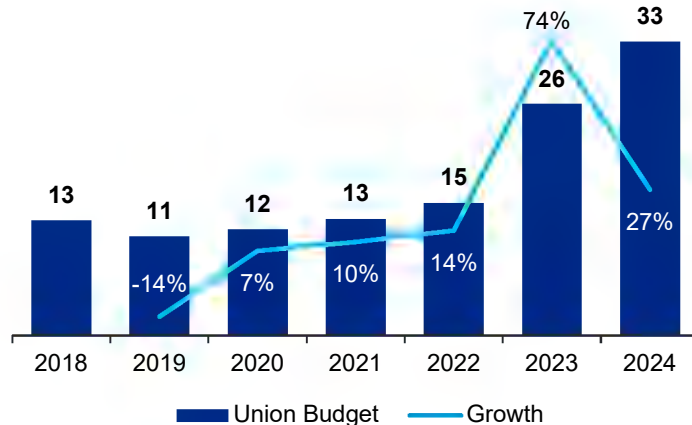
- Infrastructure construction
- Residential construction
- Commercial and special economic zones

# 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)



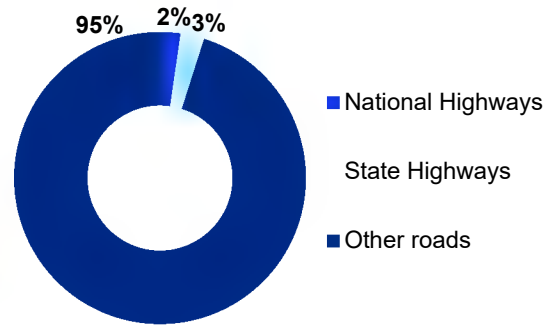
\*2023 data is as of 30 December 2022

Source(s): MoRTH, IBEF, Invest India

# 2<sup>nd</sup>

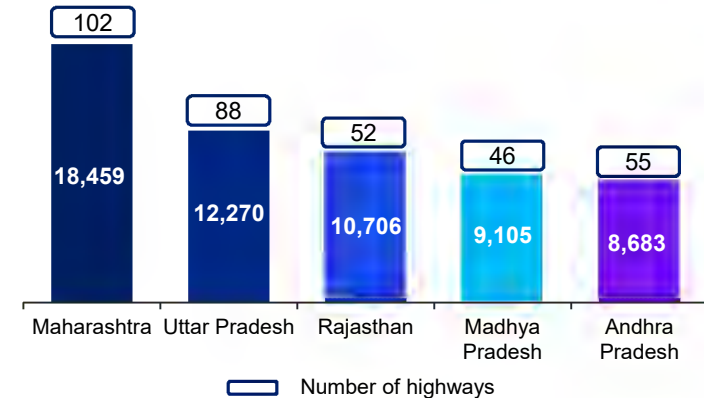
India has the second largest road network in the world of about 67 lakh km. This comprises National Highways, Expressways, State Highways, District Roads, Other District Roads and Village Roads.

### 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

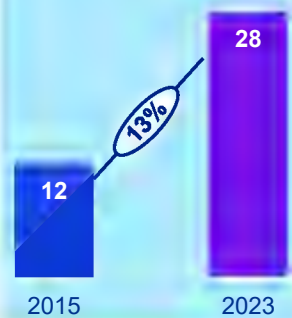
7.9 Cr

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

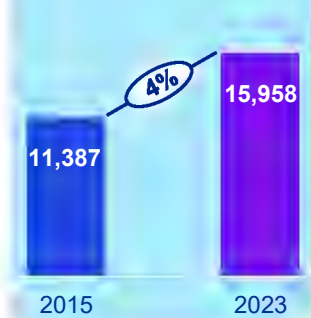
147 Cr

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

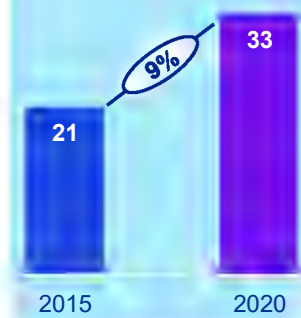
### Highway construction per day accelerates (in km)



### Toll collection over the period (INR crore)



### Total number of registered vehicles (in crore)



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

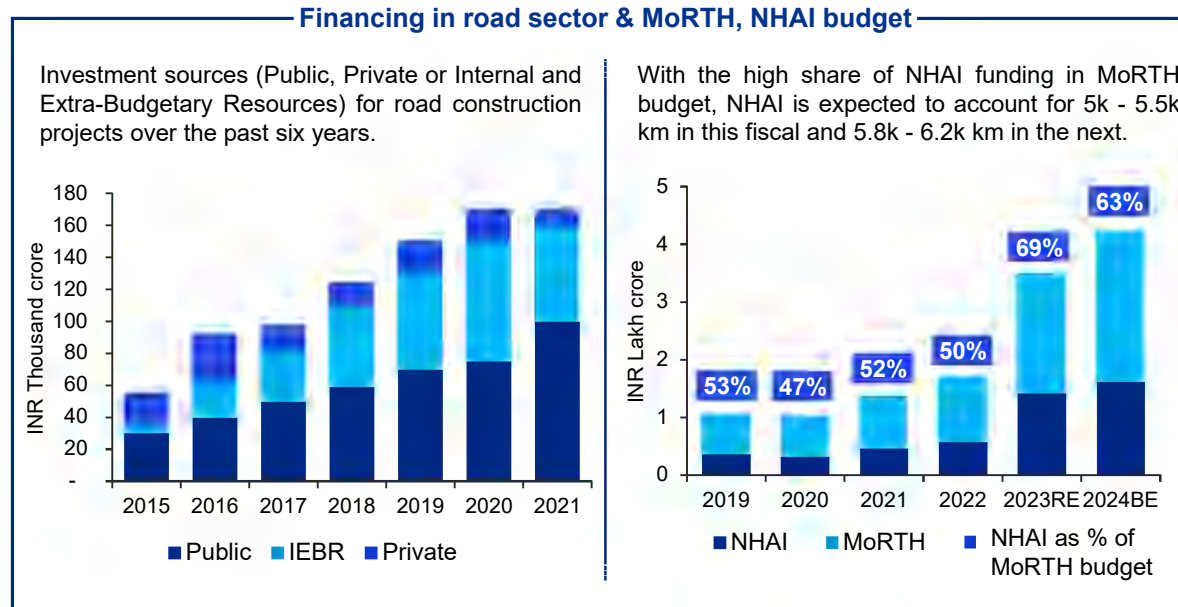
Investment in road infrastructure is long-term and returns are seen several years after construction. Roads and highways are financed through Government and private sources. Funding from Government sources includes budgetary allocations.

## 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 NHAI

### 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, NHAI 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.**

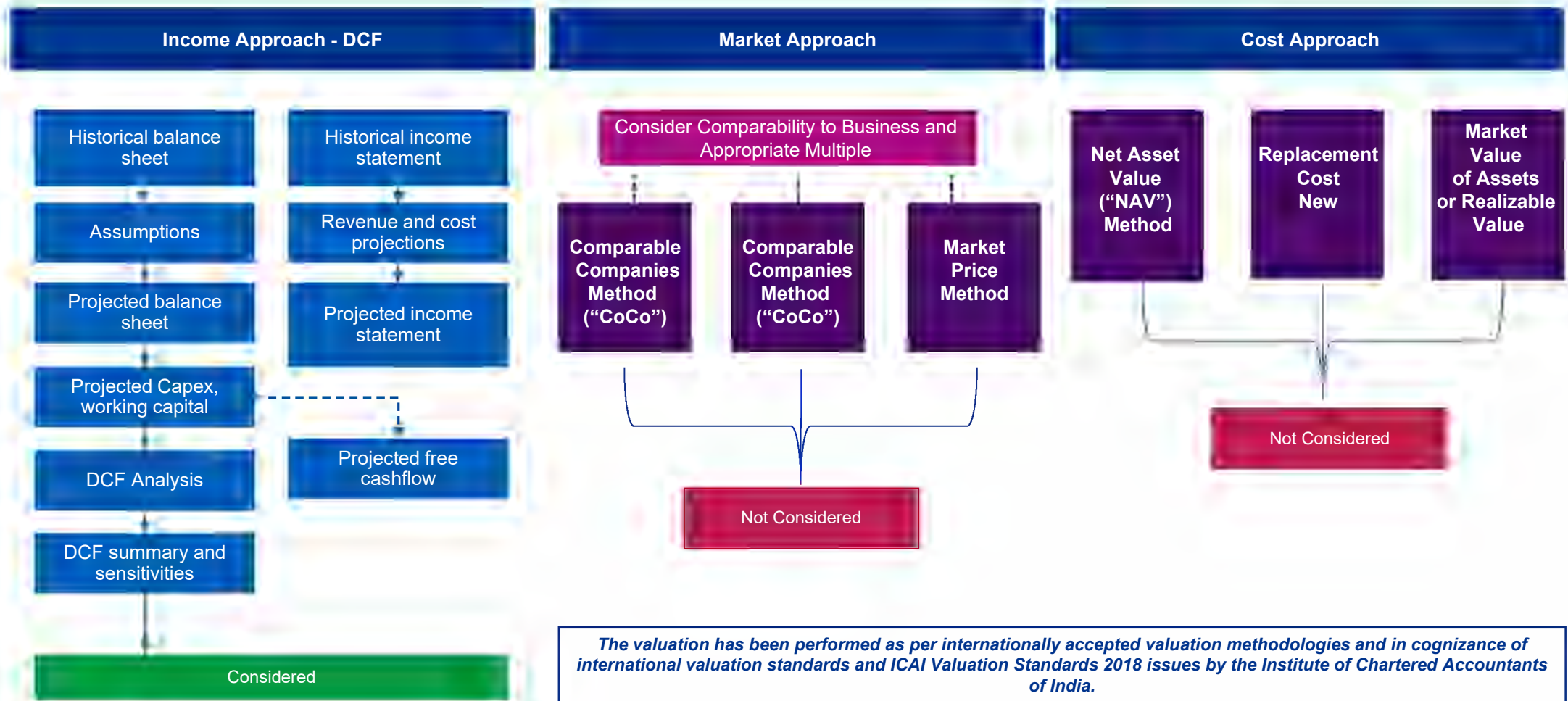
# **Valuation Methodology and Approach**



# 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

✘	<b>Net Asset Value (“NAV”) Method</b>	<ul style="list-style-type: none"><li>• Under the net asset value approach, total value is based on the sum of net asset value as recorded on the balance sheet.</li><li>• 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.</li><li>• 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.</li></ul>
✘	<b>Replacement Cost New</b>	<ul style="list-style-type: none"><li>• 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.</li><li>• The replacement cost method quantifies the cost and risk to reach the present stage of development.</li><li>• This approach is often used for start-up/non-mature technology or biotech businesses.</li><li>• Hence, the replacement cost method has not been considered.</li></ul>
✘	<b>Market Value of Assets or Realizable Value</b>	<ul style="list-style-type: none"><li>• 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.</li><li>• This methodology is most applicable for businesses where the value lies in the underlying assets and not the ongoing operations of the business.</li><li>• Hence, the market value method has not been considered.</li></ul>





# 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
$\beta$	=	the beta factor, being the measure of the systematic risk of a particular asset relative to the risk of a portfolio of all risky assets
$\alpha$	=	company specific risk factor (alpha)

# Summary - WACC

WACC calculation												
Name of SPV	IWTL	SYTL	YATL	KTL	AETL	UTL	CGTL	KGTL	IHMTL	PDTPPL	IGEPL	STPL
Risk free rate of return	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%
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%
Beta	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Alpha	-	-	-	-	-	-	-	-	-	1%	-	1%
<b>Cost of Equity</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>13.8%</b>	<b>14.8%</b>	<b>13.8%</b>	<b>14.8%</b>
Cost of Debt	8.6%	8.6%	8.6%	8.6%	8.6%	8.8%	8.8%	8.6%	8.6%	9.0%	8.8%	9.0%
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%
<b>After Tax Cost of Debt</b>	<b>6.4%</b>	<b>6.4%</b>	<b>6.4%</b>	<b>6.4%</b>	<b>6.4%</b>	<b>6.5%</b>	<b>6.5%</b>	<b>6.4%</b>	<b>6.4%</b>	<b>6.7%</b>	<b>6.5%</b>	<b>6.7%</b>
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%
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%
<b>Weighted Average Cost of Capital</b>	<b>9.37%</b>	<b>9.37%</b>	<b>9.37%</b>	<b>9.37%</b>	<b>9.37%</b>	<b>9.44%</b>	<b>9.44%</b>	<b>9.37%</b>	<b>9.37%</b>	<b>9.95%</b>	<b>9.44%</b>	<b>9.95%</b>

Source: KPMG analysis

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 December 2023	
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 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
<b>New scheduled end date</b>	<b>06-Feb-48</b>

- 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 January 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 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 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											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		39	168	188	210	236	262	294	326	365	403
EBITDA	[A]	22	99	160	180	206	121	222	293	331	367
EBITDA margin		57%	59%	85%	86%	87%	46%	75%	90%	91%	91%
Depreciation		(6)	(27)	(30)	(33)	(37)	(41)	(43)	(45)	(50)	(55)
EBIT		16	72	131	146	168	79	178	248	281	312
EBIT margin		40%	43%	69%	70%	71%	30%	61%	76%	77%	77%
Less: Tax on EBIT	[B]	(3)	(13)	(23)	(26)	(29)	(14)	(31)	(43)	(49)	(54)
Change in working capital	[C]	14	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>33</b>	<b>86</b>	<b>138</b>	<b>154</b>	<b>176</b>	<b>107</b>	<b>190</b>	<b>250</b>	<b>282</b>	<b>312</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>33</b>	<b>80</b>	<b>118</b>	<b>120</b>	<b>126</b>	<b>70</b>	<b>114</b>	<b>136</b>	<b>141</b>	<b>143</b>

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]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>342</b>	<b>258</b>	<b>441</b>	<b>494</b>	<b>552</b>	<b>466</b>	<b>602</b>	<b>711</b>	<b>789</b>	<b>877</b>
Discounting period		9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.750
Discount factor	[F]	0.418	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.186
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>143</b>	<b>99</b>	<b>154</b>	<b>158</b>	<b>161</b>	<b>124</b>	<b>147</b>	<b>159</b>	<b>161</b>	<b>163</b>

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]	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>949</b>	<b>1,054</b>	<b>1,175</b>	<b>1,307</b>	<b>1,242</b>
Discounting period		19.750	20.750	21.750	22.750	23.600
Discount factor	[F]	0.170	0.156	0.143	0.130	0.121
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>162</b>	<b>164</b>	<b>167</b>	<b>170</b>	<b>150</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	3,363
Present value of release of working capital	5
<b>Enterprise Valuation</b>	<b>3,367</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of INR 41 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of IWTL, as on 31 December 2023 is INR 3,367 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
<b>Project location</b>	Solapur Yedeshi
<b>Concessionaire</b>	SYTL
<b>State</b>	Maharashtra
<b>Tollable length (kms)</b>	98.7
<b>No. of toll plazas</b>	2
<b>Concession agreement date</b>	3-Mar-14
<b>Appointed date</b>	21-Jan-15
<b>Four laning completion certificate date</b>	15-Oct-19
<b>Scheduled end date</b>	21-Jan-44
<b>New scheduled end date</b>	20-Apr-44

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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 January 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											
	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034
INR crores	3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue	34	152	175	193	215	237	266	295	331	367	409
EBITDA [A]	30	115	136	152	194	215	242	270	305	279	316
EBITDA margin	87%	76%	78%	79%	90%	90%	91%	92%	92%	76%	77%
Depreciation	(4)	(18)	(21)	(24)	(27)	(29)	(33)	(37)	(41)	(46)	(51)
EBIT	25	97	115	129	167	185	209	234	264	233	265
EBIT margin	75%	64%	66%	67%	78%	78%	79%	79%	80%	63%	65%
Less: Tax on EBIT [B]	(4)	(17)	(20)	(22)	(29)	(32)	(37)	(41)	(46)	(41)	(46)
Change in working capital [C]	0	18	19	15	26	-	-	-	-	-	-
Less : Capex [D]	-	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>25</b>	<b>117</b>	<b>135</b>	<b>144</b>	<b>190</b>	<b>182</b>	<b>205</b>	<b>230</b>	<b>259</b>	<b>238</b>	<b>270</b>
Discounting period	0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750	9.750
Discount factor [F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457	0.418
<b>Present value of cash flows [E*F]</b>	<b>25</b>	<b>109</b>	<b>116</b>	<b>113</b>	<b>136</b>	<b>119</b>	<b>123</b>	<b>125</b>	<b>129</b>	<b>109</b>	<b>113</b>

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]	-	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>308</b>	<b>406</b>	<b>451</b>	<b>505</b>	<b>508</b>	<b>571</b>	<b>629</b>	<b>668</b>	<b>746</b>	<b>833</b>	<b>44</b>
Discounting period	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.750	19.750	19.806
Discount factor [F]	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.186	0.170	0.170
<b>Present value of cash flows [E*F]</b>	<b>118</b>	<b>142</b>	<b>144</b>	<b>147</b>	<b>136</b>	<b>139</b>	<b>140</b>	<b>136</b>	<b>139</b>	<b>142</b>	<b>7</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	2,607
Present value of release of working capital	(5)
<b>Enterprise Valuation</b>	<b>2,602</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of negative INR 28 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of SYTL, as on 31 December 2023 is INR 2,602 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
<b>Project location</b>	Yedeshi Aurangabad
<b>Concessionaire</b>	YATL
<b>State</b>	Maharashtra
<b>Tollable length (kms)</b>	189.1
<b>No. of toll plazas</b>	3
<b>Concession agreement date</b>	30-May-14
<b>Appointed date</b>	1-Jul-15
<b>Four laning completion certificate date</b>	24-Sep-20
<b>Scheduled end date</b>	1- July-41
<b>New scheduled end date</b>	20-Jan-43

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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
<b>New scheduled end date</b>	<b>20-Jan-43</b>

- 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 January 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										
	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores	3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue	68	306	346	378	416	452	497	546	599	653
EBITDA [A]	62	251	288	317	386	420	464	511	562	505
EBITDA margin	91%	82%	83%	84%	93%	93%	93%	94%	94%	77%
Depreciation	(9)	(43)	(49)	(54)	(59)	(65)	(72)	(79)	(86)	(94)
EBIT	52	208	239	264	327	355	393	432	476	411
EBIT margin	77%	68%	69%	70%	79%	79%	79%	79%	80%	63%
Less: Tax on EBIT [B]	(9)	(36)	(42)	(46)	(57)	(62)	(69)	(76)	(83)	(72)
Change in working capital [C]	-	29	31	27	65	-	-	-	-	-
Less : Capex [D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>53</b>	<b>244</b>	<b>277</b>	<b>299</b>	<b>394</b>	<b>358</b>	<b>396</b>	<b>435</b>	<b>479</b>	<b>433</b>
Discounting period	0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor [F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457
<b>Present value of cash flows [E*F]</b>	<b>53</b>	<b>228</b>	<b>237</b>	<b>234</b>	<b>282</b>	<b>234</b>	<b>236</b>	<b>238</b>	<b>239</b>	<b>198</b>

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	(103)	(113)	(124)	(135)	(148)	(161)	(177)	(193)	(212)	(188)
EBIT	458	508	691	755	829	909	939	1,031	1,133	1,054
EBIT margin	64%	65%	80%	81%	81%	81%	76%	77%	77%	81%
Less: Tax on EBIT [B]	(80)	(89)	(121)	(132)	(145)	(159)	(164)	(266)	(328)	(312)
Change in working capital [C]	-	-	-	-	-	-	-	-	-	-
Less : Capex [D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>481</b>	<b>532</b>	<b>694</b>	<b>758</b>	<b>832</b>	<b>912</b>	<b>952</b>	<b>958</b>	<b>1,018</b>	<b>929</b>
Discounting period	9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.556
Discount factor [F]	0.418	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.190
<b>Present value of cash flows [E*F]</b>	<b>201</b>	<b>203</b>	<b>242</b>	<b>242</b>	<b>243</b>	<b>243</b>	<b>232</b>	<b>214</b>	<b>208</b>	<b>176</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	4,381
Present value of release of working capital	(7)
<b>Enterprise Valuation</b>	<b>4,374</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of negative INR 41 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of YATL, as on 31 December 2023 is INR 4,374 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
<b>Project location</b>	Kaithal – Rajasthan border
<b>Concessionaire</b>	KTL
<b>State</b>	Haryana
<b>Tollable length (kms)</b>	166.3
<b>No. of toll plazas</b>	3
<b>Concession agreement date</b>	23-Jun-14
<b>Appointed date</b>	15-Jul-15
<b>Four laning completion certificate date</b>	29-Mar-19
<b>Scheduled end date</b>	14-Jul-42
<b>New scheduled end date</b>	6-Feb-49

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	100%

# Key Assumptions

**a. Modification in concession period**

- As per Clause 29.2 of the concession agreement between NHA1 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
<b>New scheduled end date</b>	<b>06-Feb-49</b>

- 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 January 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 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. 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											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		37	158	173	188	205	223	243	264	287	311
EBITDA	[A]	22	92	103	165	181	197	215	235	129	146
EBITDA margin		58%	58%	60%	88%	88%	88%	89%	89%	45%	47%
Depreciation		(6)	(24)	(27)	(29)	(32)	(34)	(37)	(41)	(44)	(48)
EBIT		16	67	76	136	149	163	178	195	85	98
EBIT margin		42%	43%	44%	72%	73%	73%	73%	74%	30%	32%
Less: Tax on EBIT	[B]	(3)	(12)	(13)	(24)	(26)	(28)	(31)	(34)	(15)	(17)
Change in working capital	[C]	45	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>64</b>	<b>80</b>	<b>90</b>	<b>141</b>	<b>155</b>	<b>168</b>	<b>184</b>	<b>201</b>	<b>114</b>	<b>129</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>63</b>	<b>75</b>	<b>77</b>	<b>110</b>	<b>110</b>	<b>110</b>	<b>110</b>	<b>110</b>	<b>57</b>	<b>59</b>

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)	(83)	(85)	(95)	(106)	(161)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>145</b>	<b>286</b>	<b>312</b>	<b>339</b>	<b>370</b>	<b>389</b>	<b>336</b>	<b>366</b>	<b>399</b>	<b>503</b>
Discounting period		9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.750
Discount factor	[F]	0.418	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.186
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>61</b>	<b>109</b>	<b>109</b>	<b>108</b>	<b>108</b>	<b>104</b>	<b>82</b>	<b>82</b>	<b>81</b>	<b>94</b>

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]	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>542</b>	<b>589</b>	<b>640</b>	<b>696</b>	<b>725</b>	<b>675</b>
Discounting period		19.750	20.750	21.750	22.750	23.750	24.600
Discount factor	[F]	0.170	0.156	0.143	0.130	0.119	0.110
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>92</b>	<b>92</b>	<b>91</b>	<b>91</b>	<b>86</b>	<b>75</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	2,345
Present value of release of working capital	(3)
<b>Enterprise Valuation</b>	<b>2,342</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of negative INR 28 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of KTL, as on 31 December 2023 is INR 2,342 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
<b>Project location</b>	Agra Etawah
<b>Concessionaire</b>	AETL
<b>State</b>	Uttar Pradesh
<b>Tollable length (kms)</b>	124.52
<b>No. of toll plazas</b>	2
<b>Concession agreement date</b>	01-Sep-15
<b>Appointed date</b>	01-Aug-16
<b>Six laning completion certificate date</b>	24-Nov-20
<b>Scheduled end date</b>	31-Jul-40
<b>New scheduled end date</b>	19-Oct-45

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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
<b>New scheduled end date</b>	<b>19-Oct-45</b>

- 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 January 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											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		35	155	182	212	244	282	324	372	428	489
EBITDA	[A]	16	77	100	168	198	234	273	196	243	296
EBITDA margin		46%	50%	55%	79%	81%	83%	85%	53%	57%	60%
Depreciation		(9)	(38)	(42)	(47)	(52)	(58)	(65)	(73)	(81)	(91)
EBIT		8	40	58	121	146	176	209	124	161	205
EBIT margin		22%	25%	32%	57%	60%	62%	64%	33%	38%	42%
Less: Tax on EBIT	[B]	(1)	(7)	(10)	(21)	(26)	(31)	(36)	(22)	(28)	(36)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>15</b>	<b>70</b>	<b>89</b>	<b>147</b>	<b>173</b>	<b>203</b>	<b>237</b>	<b>175</b>	<b>215</b>	<b>260</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>15</b>	<b>66</b>	<b>76</b>	<b>115</b>	<b>124</b>	<b>133</b>	<b>142</b>	<b>95</b>	<b>107</b>	<b>119</b>

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		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)	(168)	(283)	(329)	(367)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>428</b>	<b>493</b>	<b>559</b>	<b>630</b>	<b>646</b>	<b>731</b>	<b>810</b>	<b>890</b>	<b>979</b>	<b>1,090</b>
Discounting period		9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.750
Discount factor	[F]	0.418	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.186
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>179</b>	<b>188</b>	<b>195</b>	<b>201</b>	<b>189</b>	<b>195</b>	<b>198</b>	<b>198</b>	<b>200</b>	<b>203</b>

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]	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>1,217</b>	<b>1,347</b>	<b>821</b>
Discounting period		19.750	20.750	21.303
Discount factor	[F]	0.170	0.156	0.148
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>207</b>	<b>210</b>	<b>122</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	3,476
Present value of release of working capital	(16)
<b>Enterprise Valuation</b>	<b>3,460</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of negative INR 112 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of AETL, as on 31 December 2023 is INR 3,460 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 3<sup>rd</sup> 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
<b>Project location</b>	Udaipur Gujarat border
<b>Concessionaire</b>	UTL
<b>State</b>	Rajasthan/ Gujarat
<b>Tollable length (kms)</b>	113.8
<b>No. of toll plazas</b>	1
<b>Concession agreement date</b>	09-Dec-16
<b>Appointed date</b>	03-Sep-17
<b>Six laning completion certificate date</b>	01-Jun-21
<b>Scheduled end date</b>	02-Sep-38
<b>New scheduled end date</b>	13-Feb-43

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	100%



# Key Assumptions

## a. Modification in concession period

- As per Clause 29.2 of the concession agreement between NHA 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
<b>New scheduled end date</b>	<b>13-Feb-43</b>

- 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 January 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.

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 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.

# Discounted Cash Flows [1/2]

Discounted Cash Flow											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		35	160	189	223	261	291	326	365	407	453
EBITDA	[A]	15	69	90	195	237	146	174	210	374	425
EBITDA margin		44%	43%	48%	88%	91%	50%	53%	58%	92%	94%
Depreciation		(11)	(44)	(48)	(53)	(59)	(65)	(72)	(79)	(88)	(96)
EBIT		4	24	42	142	178	81	102	131	287	329
EBIT margin		11%	15%	22%	64%	68%	28%	31%	36%	70%	72%
Less: Tax on EBIT	[B]	(1)	(4)	(7)	(25)	(31)	(14)	(18)	(23)	(50)	(57)
Change in working capital	[C]	-	-	-	-	39	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>14</b>	<b>65</b>	<b>83</b>	<b>170</b>	<b>245</b>	<b>132</b>	<b>156</b>	<b>188</b>	<b>324</b>	<b>367</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.854	0.780	0.713	0.652	0.595	0.544	0.497	0.454
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>14</b>	<b>60</b>	<b>71</b>	<b>133</b>	<b>174</b>	<b>86</b>	<b>93</b>	<b>102</b>	<b>161</b>	<b>167</b>

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)	(133)	(204)	(227)	(249)	(274)	(263)
Change in working capital [C]	-	-	-	-	-	-	-	-	-	-
Less : Capex [D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>339</b>	<b>384</b>	<b>413</b>	<b>564</b>	<b>594</b>	<b>607</b>	<b>675</b>	<b>739</b>	<b>814</b>	<b>782</b>
Discounting period	9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.619
Discount factor [F]	0.415	0.379	0.347	0.317	0.289	0.264	0.242	0.221	0.202	0.186
<b>Present value of cash flows [E*F]</b>	<b>141</b>	<b>146</b>	<b>143</b>	<b>179</b>	<b>172</b>	<b>161</b>	<b>163</b>	<b>163</b>	<b>164</b>	<b>146</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	2,639
Present value of release of working capital	(13)
<b>Enterprise Valuation</b>	<b>2,626</b>
<b>WACC</b>	<b>9.44%</b>

Present value of release in working capital represent working capital of negative INR 71 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.44%, the Enterprise Value of UTL, as on 31 December 2023 is INR 2,626 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 3<sup>rd</sup> 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
<b>Project location</b>	Gulabpura Chittorgarh
<b>Concessionaire</b>	CGTL
<b>State</b>	Rajasthan
<b>Tollable length (kms)</b>	124.87
<b>No. of toll plazas</b>	2
<b>Concession agreement date</b>	9-Dec-16
<b>Appointed date</b>	4-Nov-17
<b>Six laning completion certificate date</b>	14-Aug-21
<b>Scheduled end date</b>	3-Nov-37
<b>New scheduled end date</b>	3-Feb-42

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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
<b>New scheduled end date</b>	<b>03-Feb-42</b>

- 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 January 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											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		35	167	205	248	296	332	378	421	467	517
EBITDA	[A]	27	104	139	178	254	289	333	287	326	370
EBITDA margin		76%	62%	68%	72%	86%	87%	88%	68%	70%	71%
Depreciation		(10)	(45)	(45)	(50)	(55)	(61)	(68)	(74)	(82)	(89)
EBIT		16	59	94	129	199	228	265	212	244	280
EBIT margin		46%	36%	46%	52%	67%	69%	70%	50%	52%	54%
Less: Tax on EBIT	[B]	(3)	(10)	(16)	(22)	(35)	(40)	(46)	(37)	(43)	(49)
Change in working capital	[C]	-	-	-	-	50	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>24</b>	<b>94</b>	<b>122</b>	<b>156</b>	<b>269</b>	<b>249</b>	<b>286</b>	<b>249</b>	<b>283</b>	<b>321</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.854	0.780	0.713	0.652	0.595	0.544	0.497	0.454
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>23</b>	<b>87</b>	<b>105</b>	<b>122</b>	<b>192</b>	<b>162</b>	<b>170</b>	<b>136</b>	<b>141</b>	<b>146</b>

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)	(81)	(150)	(167)	(186)	(220)	(244)	(268)	(250)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>447</b>	<b>492</b>	<b>447</b>	<b>496</b>	<b>552</b>	<b>654</b>	<b>725</b>	<b>798</b>	<b>744</b>
Discounting period		9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.592
Discount factor	[F]	0.415	0.379	0.347	0.317	0.289	0.264	0.242	0.221	0.205
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>185</b>	<b>186</b>	<b>155</b>	<b>157</b>	<b>160</b>	<b>173</b>	<b>175</b>	<b>176</b>	<b>152</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	2,804
Present value of release of working capital	(5)
<b>Enterprise Valuation</b>	<b>2,798</b>
<b>WACC</b>	<b>9.44%</b>

Present value of release in working capital represent working capital of negative INR 28 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.44%, the Enterprise Value of CGTL, as on 31 December 2023 is INR 2,798 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 3<sup>rd</sup> 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
<b>Project location</b>	Kishangarh Gulabpura
<b>Concessionaire</b>	KGTL
<b>State</b>	Rajasthan
<b>Tollable length (kms)</b>	90
<b>No. of toll plazas</b>	1
<b>Concession agreement date</b>	22-Feb-17
<b>Appointed date</b>	21-Feb-18
<b>Six laning completion certificate date</b>	20-Jul-22
<b>Scheduled end date</b>	20-Feb-38
<b>New scheduled end date</b>	20-Jun-42

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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
<b>New scheduled end date</b>	<b>20-Jun-42</b>

- 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 January 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											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		23	110	136	166	199	235	266	297	334	372
EBITDA	[A]	17	85	110	38	170	205	234	264	299	230
EBITDA margin		75%	77%	81%	23%	86%	87%	88%	89%	89%	62%
Depreciation		(8)	(33)	(37)	(37)	(39)	(43)	(47)	(52)	(57)	(63)
EBIT		10	52	73	0	132	162	187	212	241	168
EBIT margin		42%	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]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>17</b>	<b>76</b>	<b>97</b>	<b>38</b>	<b>147</b>	<b>177</b>	<b>201</b>	<b>227</b>	<b>256</b>	<b>201</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>17</b>	<b>71</b>	<b>83</b>	<b>29</b>	<b>105</b>	<b>115</b>	<b>120</b>	<b>124</b>	<b>128</b>	<b>92</b>

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)	(76)	(132)	(146)	(162)	(181)	(201)	(220)	(52)
Change in working capital [C]	-	-	-	-	-	-	-	-	-	-
Less : Capex [D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>238</b>	<b>270</b>	<b>398</b>	<b>392</b>	<b>434</b>	<b>483</b>	<b>539</b>	<b>599</b>	<b>656</b>	<b>154</b>
Discounting period	9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	17.972
Discount factor [F]	0.418	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.200
<b>Present value of cash flows [E*F]</b>	<b>99</b>	<b>103</b>	<b>139</b>	<b>125</b>	<b>127</b>	<b>129</b>	<b>131</b>	<b>134</b>	<b>134</b>	<b>31</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	2,037
Present value of release of working capital	(3)
<b>Enterprise Valuation</b>	<b>2,033</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of negative INR 17 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of KGTL, as on 31 December 2023 is INR 2,033 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 3<sup>rd</sup> 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
<b>Project location</b>	Hapur Moradabad
<b>Concessionaire</b>	IHMTL
<b>State</b>	Uttar Pradesh
<b>Tollable length (kms)</b>	99.87
<b>No. of toll plazas</b>	2
<b>Concession agreement date</b>	29-May-18
<b>Appointed date</b>	28-May-19
<b>Six laning completion certificate date</b>	7-Apr-23
<b>Scheduled end date</b>	31-May-41
<b>New scheduled end date</b>	1-Sept-44

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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
<b>New scheduled end date</b>	<b>1-Sept-44</b>

- 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 January 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**

- Capex of INR 21 Cr has been forecasted in FY2024 and FY2025.



# Discounted Cash Flows [1/3]

Discounted Cash Flow											
	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	
INR crores	3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue	65	300	337	375	413	453	501	545	599	656	
EBITDA	[A]	61	291	239	275	318	443	485	459	511	587
EBITDA margin		95%	97%	71%	73%	77%	98%	97%	84%	85%	90%
Depreciation		(13)	(56)	(62)	(65)	(71)	(78)	(86)	(93)	(102)	(112)
EBIT		48	235	176	210	247	365	399	366	409	475
EBIT margin		75%	78%	52%	56%	60%	81%	80%	67%	68%	72%
Less: Tax on EBIT	[B]	(8)	(41)	(31)	(37)	(43)	(64)	(70)	(64)	(71)	(83)
Change in working capital	[C]	4	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	(15)	(6)	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>42</b>	<b>244</b>	<b>208</b>	<b>238</b>	<b>275</b>	<b>379</b>	<b>415</b>	<b>395</b>	<b>440</b>	<b>504</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>42</b>	<b>228</b>	<b>178</b>	<b>186</b>	<b>196</b>	<b>248</b>	<b>248</b>	<b>216</b>	<b>220</b>	<b>230</b>

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		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)	(145)	(156)	(169)	(186)	(264)	(289)	(309)	(335)	(362)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>600</b>	<b>624</b>	<b>464</b>	<b>503</b>	<b>553</b>	<b>785</b>	<b>859</b>	<b>919</b>	<b>997</b>	<b>1,076</b>
Discounting period		9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.750
Discount factor	[F]	0.418	0.382	0.349	0.319	0.292	0.267	0.244	0.223	0.204	0.186
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>251</b>	<b>238</b>	<b>162</b>	<b>160</b>	<b>161</b>	<b>210</b>	<b>210</b>	<b>205</b>	<b>203</b>	<b>201</b>

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	650
EBITDA	[A]	1,561	615
EBITDA margin		98%	95%
Depreciation		(271)	(123)
EBIT		1,291	492
EBIT margin		81%	76%
Less: Tax on EBIT	[B]	(393)	(155)
Change in working capital	[C]	-	-
Less : Capex	[D]	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>1,168</b>	<b>461</b>
Discounting period		19.750	20.169
Discount factor	[F]	0.170	0.164
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>199</b>	<b>76</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	4,267
Present value of release of working capital	(3)
<b>Enterprise Valuation</b>	<b>4,263</b>
<b>WACC</b>	<b>9.37%</b>

Present value of release in working capital represent working capital of negative INR 21 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.37%, the Enterprise Value of IHMTL, as on 31 December 2023 is INR 4,263 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 1<sup>st</sup> anniversary of project completion date for every year of the remaining concession period, calculated on total realizable fee. For the 2<sup>nd</sup> 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
<b>Project</b>	Dankuni to Palsit
<b>Concessionaire</b>	PDTPL
<b>State</b>	West Bengal
<b>Tollable length (kms)</b>	63.83
<b>No. of toll plazas</b>	1
<b>Concession agreement date</b>	14-Jun-21
<b>Appointed date</b>	1-Apr-22
<b>Completion certificate date</b>	Under construction
<b>Scheduled end date</b>	1-Apr-39
<b>New scheduled end date</b>	5-Feb-37

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Developers Ltd</b>	0.04%
<b>IRB Infrastructure Trust</b>	99.96%

# Key Assumptions

**a. Modification in concession period**

- As per Clause 29.2.2 of the concession agreement between NHA 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
<b>New scheduled end date</b>	<b>5-Feb-37</b>

- 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 January 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 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.

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 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 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 642 Cr between FY2024 and FY2025 based on Management estimates.



# Discounted Cash Flows [1/2]

Discounted Cash Flow											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue		46	250	316	328	360	388	424	459	497	536
EBITDA	[A]	36	207	271	280	310	303	331	366	435	470
EBITDA margin		78%	83%	86%	86%	86%	78%	78%	80%	88%	88%
Depreciation		(12)	(80)	(105)	(116)	(129)	(142)	(157)	(172)	(189)	(206)
EBIT		24	127	166	164	181	161	173	194	246	264
EBIT margin		52%	51%	53%	50%	50%	41%	41%	42%	50%	49%
Less: Tax on EBIT	[B]	(2)	(15)	(27)	(29)	(36)	(35)	(42)	(51)	(68)	(77)
Change in working capital	[C]	-	(85)	-	-	85	-	-	-	-	-
Less : Capex	[D]	(224)	(418)	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>(190)</b>	<b>(311)</b>	<b>245</b>	<b>251</b>	<b>358</b>	<b>268</b>	<b>289</b>	<b>315</b>	<b>367</b>	<b>393</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.988	0.931	0.847	0.770	0.701	0.637	0.580	0.527	0.479	0.436
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>(188)</b>	<b>(290)</b>	<b>207</b>	<b>194</b>	<b>251</b>	<b>171</b>	<b>168</b>	<b>166</b>	<b>176</b>	<b>172</b>

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]	(87)	(98)	(97)	(95)
Change in working capital	[C]	-	-	-	-
Less : Capex	[D]	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>423</b>	<b>456</b>	<b>453</b>	<b>424</b>
Discounting period		9.750	10.750	11.750	12.597
Discount factor	[F]	0.397	0.361	0.328	0.303
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>168</b>	<b>164</b>	<b>149</b>	<b>128</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crore</b>	
Present value of cash flows	1,636
Present value of release of working capital	4
<b>Enterprise Valuation</b>	<b>1,640</b>
<b>WACC</b>	<b>9.95%</b>

Present value of release in working capital represent working capital of INR 15 Cr released at the end of the concession period.

Basis the above and using a WACC of 9.95%, the Enterprise Value of PDTPL, as on 31 December 2023 is INR 1,640 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 2023 (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
<b>Project</b>	Nehru Outer Ring Road, Hyderabad
<b>Concessionaire</b>	IGEPL
<b>State</b>	Telangana
<b>Tollable length (kms)</b>	158
<b>No. of toll plazas</b>	22
<b>Concession agreement date</b>	26-Mar-23
<b>Appointed date</b>	12-Aug-23
<b>Completion certificate date</b>	NA
<b>Scheduled end date</b>	11-Aug-53
<b>New scheduled end date</b>	NA

## Shareholding as at 31 December 2023

Particulars	Stake %
<b>IRB Infrastructure Developers Ltd</b>	99.99%
<b>Nominees of IRB Infrastructure Developers Ltd</b>	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 January 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

- Capex is forecasted to be INR 203 Cr in FY2024. Management represented that the cost primarily pertains to EPC cost.

Source(s): Management information



# Discounted Cash Flows [1/3]

Discounted Cash Flow										
	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores	3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue	175	771	856	953	1,061	1,161	1,275	1,410	1,566	1,720
<b>EBITDA</b>	<b>[A]</b>	<b>156</b>	<b>644</b>	<b>671</b>	<b>710</b>	<b>807</b>	<b>736</b>	<b>838</b>	<b>962</b>	<b>1,104</b>
EBITDA margin		90%	84%	78%	75%	76%	63%	66%	68%	71%
Depreciation		(13)	(56)	(62)	(69)	(77)	(85)	(93)	(103)	(115)
<b>EBIT</b>		<b>144</b>	<b>588</b>	<b>610</b>	<b>641</b>	<b>730</b>	<b>651</b>	<b>745</b>	<b>858</b>	<b>989</b>
EBIT margin		82%	76%	71%	67%	69%	56%	58%	61%	63%
Less: Tax on EBIT	<b>[B]</b>	(23)	(95)	(102)	(111)	(135)	(118)	(144)	(175)	(210)
Change in working capital	<b>[C]</b>	17	-	-	-	243	-	-	-	-
Less : Capex	<b>[D]</b>	(203)	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>(52)</b>	<b>549</b>	<b>570</b>	<b>599</b>	<b>915</b>	<b>618</b>	<b>695</b>	<b>787</b>	<b>894</b>
Discounting period		0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750
Discount factor	<b>[F]</b>	0.989	0.935	0.854	0.780	0.713	0.652	0.595	0.544	0.497
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>(52)</b>	<b>513</b>	<b>487</b>	<b>467</b>	<b>652</b>	<b>403</b>	<b>414</b>	<b>428</b>	<b>444</b>

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	1,886	2,058	2,261	2,480	2,696	2,941	3,213	3,498	3,810	4,163
<b>EBITDA</b>	<b>1,563</b>	<b>1,337</b>	<b>1,524</b>	<b>1,732</b>	<b>1,935</b>	<b>2,552</b>	<b>2,809</b>	<b>2,845</b>	<b>3,142</b>	<b>3,479</b>
EBITDA margin	83%	65%	67%	70%	72%	87%	87%	81%	82%	84%
Depreciation	(138)	(151)	(166)	(182)	(198)	(215)	(235)	(256)	(279)	(305)
<b>EBIT</b>	<b>1,425</b>	<b>1,186</b>	<b>1,359</b>	<b>1,550</b>	<b>1,738</b>	<b>2,336</b>	<b>2,573</b>	<b>2,588</b>	<b>2,863</b>	<b>3,174</b>
EBIT margin	76%	58%	60%	63%	64%	79%	80%	74%	75%	76%
Less: Tax on EBIT	(326)	(269)	(316)	(368)	(420)	(575)	(639)	(648)	(723)	(808)
Change in working capital	-	-	-	-	-	-	-	-	-	-
Less : Capex	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>1,237</b>	<b>1,068</b>	<b>1,208</b>	<b>1,363</b>	<b>1,516</b>	<b>1,977</b>	<b>2,169</b>	<b>2,196</b>	<b>2,419</b>	<b>2,671</b>
Discounting period	9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	17.750	18.750
Discount factor	0.415	0.379	0.347	0.317	0.289	0.264	0.242	0.221	0.202	0.184
<b>Present value of cash flows [E*F]</b>	<b>513</b>	<b>405</b>	<b>419</b>	<b>432</b>	<b>439</b>	<b>523</b>	<b>524</b>	<b>485</b>	<b>488</b>	<b>492</b>

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
<b>EBITDA</b>	<b>[A]</b>	<b>3,824</b>	<b>4,412</b>	<b>4,823</b>	<b>4,730</b>	<b>5,239</b>	<b>5,706</b>	<b>6,257</b>	<b>7,372</b>	<b>8,042</b>	<b>3,296</b>
EBITDA margin	84%	90%	91%	82%	83%	84%	85%	93%	93%	89%	89%
Depreciation	(332)	(358)	(390)	(423)	(462)	(498)	(539)	(584)	(635)	(685)	(270)
<b>EBIT</b>	<b>3,492</b>	<b>4,053</b>	<b>4,433</b>	<b>4,307</b>	<b>4,777</b>	<b>5,209</b>	<b>5,717</b>	<b>6,789</b>	<b>7,407</b>	<b>7,621</b>	<b>3,026</b>
EBIT margin	77%	83%	83%	75%	76%	77%	78%	85%	86%	81%	82%
Less: Tax on EBIT	[B]	(895)	(1,043)	(1,146)	(1,123)	(1,251)	(1,369)	(1,507)	(1,788)	(2,023)	(805)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>2,929</b>	<b>3,369</b>	<b>3,676</b>	<b>3,607</b>	<b>3,988</b>	<b>4,338</b>	<b>4,750</b>	<b>5,584</b>	<b>6,086</b>	<b>2,491</b>
Discounting period		19.750	20.750	21.750	22.750	23.750	24.750	25.750	26.750	27.750	29.114
Discount factor	[F]	0.168	0.154	0.141	0.128	0.117	0.107	0.098	0.090	0.082	0.072
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>493</b>	<b>518</b>	<b>517</b>	<b>463</b>	<b>468</b>	<b>465</b>	<b>466</b>	<b>500</b>	<b>498</b>	<b>180</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	14,025
<b>Enterprise Valuation</b>	<b>14,025</b>

**WACC** 9.44%

Basis the above and using a WACC of 9.44%, the Enterprise Value of IGEPL, as on 31 December 2023 is INR 14,025 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 1<sup>st</sup> 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 2<sup>nd</sup> 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
<b>Project location</b>	Samakhiyali to Santalpur
<b>Concessionaire</b>	STPL
<b>State</b>	Gujarat
<b>Tollable length (kms)</b>	90.90
<b>No. of toll plazas</b>	1
<b>Concession agreement date</b>	12-May-23
<b>Appointed date</b>	28-Dec-23
<b>Six laning completion certificate date</b>	Under construction
<b>Scheduled end date</b>	27-Dec-43
<b>New scheduled end date</b>	18-Apr-44

## Shareholding as at 04 January 2024

Particulars	Stake %
<b>IRB Infrastructure Developers Ltd</b>	0.04%
<b>IRB Infrastructure Trust</b>	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
<b>New scheduled end date</b>	<b>18-Apr-44</b>

- 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 January 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 1,848 Cr between FY2024 to FY2026 based on Management estimates. The Management has provided a project cost and completion certificate from an independent accountant which indicates the same.

Source(s): Management information



# Discounted Cash Flows [1/3]

Discounted Cash Flow										
	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores	3 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months	12 months
Revenue	38	164	204	271	197	211	231	254	280	305
<b>EBITDA</b>	<b>[A]</b>	<b>37</b>	<b>160</b>	<b>193</b>	<b>247</b>	<b>172</b>	<b>185</b>	<b>205</b>	<b>228</b>	<b>241</b>
EBITDA margin	98%	98%	94%	91%	87%	88%	89%	90%	77%	79%
Depreciation	(1)	(16)	(27)	(39)	(44)	(49)	(55)	(61)	(69)	(77)
<b>EBIT</b>	<b>36</b>	<b>144</b>	<b>166</b>	<b>208</b>	<b>128</b>	<b>136</b>	<b>151</b>	<b>166</b>	<b>147</b>	<b>164</b>
EBIT margin	95%	88%	81%	77%	65%	65%	65%	65%	53%	54%
Less: Tax on EBIT	[B]	(8)	(28)	(25)	(35)	(16)	(20)	(25)	(30)	(34)
Change in working capital	[C]	9	-	(100)	-	100	-	-	-	-
Less : Capex	[D]	(129)	(1,255)	(464)	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>(92)</b>	<b>(1,123)</b>	<b>(396)</b>	<b>211</b>	<b>256</b>	<b>166</b>	<b>181</b>	<b>198</b>	<b>189</b>	<b>207</b>
Discounting period	0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750
Discount factor	[F]	0.988	0.931	0.847	0.770	0.701	0.637	0.580	0.527	0.436
<b>Present value of cash flows [E*F]</b>	<b>(91)</b>	<b>(1,045)</b>	<b>(336)</b>	<b>163</b>	<b>179</b>	<b>106</b>	<b>105</b>	<b>104</b>	<b>91</b>	<b>90</b>

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	332	361	394	427	464	502	543	586	634	683
<b>EBITDA</b>	<b>[A]</b>	<b>266</b>	<b>332</b>	<b>365</b>	<b>397</b>	<b>433</b>	<b>471</b>	<b>467</b>	<b>509</b>	<b>649</b>
EBITDA margin		80%	92%	92%	93%	93%	94%	86%	87%	95%
Depreciation		(85)	(94)	(105)	(116)	(129)	(157)	(174)	(192)	(212)
<b>EBIT</b>		<b>181</b>	<b>238</b>	<b>260</b>	<b>281</b>	<b>304</b>	<b>328</b>	<b>310</b>	<b>335</b>	<b>437</b>
EBIT margin		54%	66%	66%	66%	66%	65%	57%	57%	64%
Less: Tax on EBIT	[B]	(40)	(57)	(65)	(73)	(82)	(91)	(91)	(101)	(136)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>226</b>	<b>275</b>	<b>300</b>	<b>324</b>	<b>351</b>	<b>379</b>	<b>377</b>	<b>408</b>	<b>513</b>
Discounting period		9.750	10.750	11.750	12.750	13.750	14.750	15.750	16.750	18.750
Discount factor	[F]	0.397	0.361	0.328	0.298	0.271	0.247	0.224	0.204	0.169
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>90</b>	<b>99</b>	<b>98</b>	<b>97</b>	<b>95</b>	<b>94</b>	<b>85</b>	<b>83</b>	<b>87</b>

Source(s): Management information, KPMG analysis

# Discounted Cash Flows [3/3]

Discounted Cash Flow			
		FY2044	FY2045
INR crores		12 months	1 months
Revenue		740	38
<b>EBITDA</b>	[A]	705	37
EBITDA margin		95%	95%
Depreciation		(235)	(13)
<b>EBIT</b>		470	24
EBIT margin		63%	62%
Less: Tax on EBIT	[B]	(150)	(8)
Change in working capital	[C]	-	-
Less : Capex	[D]	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>555</b>	<b>29</b>
Discounting period		19.750	19.800
Discount factor	[F]	0.154	0.153
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>85</b>	<b>4</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	365
<b>Enterprise Valuation</b>	<b>365</b>

<b>WACC</b>	<b>9.95%</b>
-------------	--------------

Basis the above and using a WACC of 9.95%, the Enterprise Value of STPL, as on 31 December 2023 is INR 365 crore.

Please refer annexure 2c for WACC breakup.



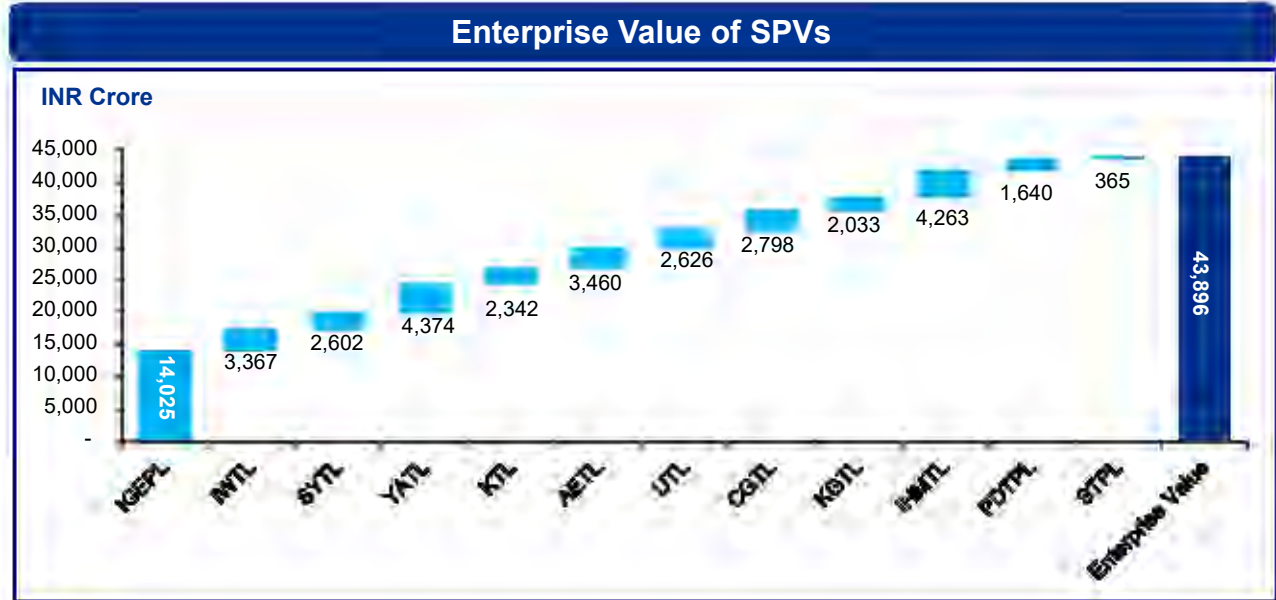
**6.**

# **Valuation Conclusion**

# Valuation Conclusion (1/2)

Valuation Conclusion (INR Crs)

Valuation Conclusion 31 December 2023		INR Crore
IRB Golconda Expressway Private Limited		14,025
IRB Westcoast Tollway Limited		3,367
Solapur Yedeshi Tollway Limited		2,602
Yedeshi Aurangabad Tollway Limited		4,374
Kaithal Tollway Limited		2,342
AE Tollway Limited		3,460
Udaipur Tollway Limited		2,626
CG Tollway Limited		2,798
Kishangarh Gulabpura Tollway Limited		2,033
IRB Hapur Moradabad Tollway Limited		4,263
Palsit Dankuni Tollway Private Limited		1,640
Samakhiyali Tollway Private Limited		365
<b>Enterprise Value of the SPVs</b>		<b>43,896</b>
Cash and cash Equivalents		69
Surplus assets		736
Proposed distribution		(288)
Debt and debt like items		(17,390)
PV of standalone expense pertaining to Trust		(224)
Capital Creditors		(549)
<b>Equity Value of IRBI Trust</b>		<b>26,250</b>
<b>NAV at fair value per unit as on 31 December 2023</b>		
Equity Value of IRBI Trust (INR Cr)		26,250
Units outstanding (No.)		1,021,693,265
<b>NAV at fair value per unit (INR)</b>		<b>256.92</b>



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 43,896 crores and the 100% Equity Value of the IRBI Trust is INR 26,250 crores as on 31 December 2023.**

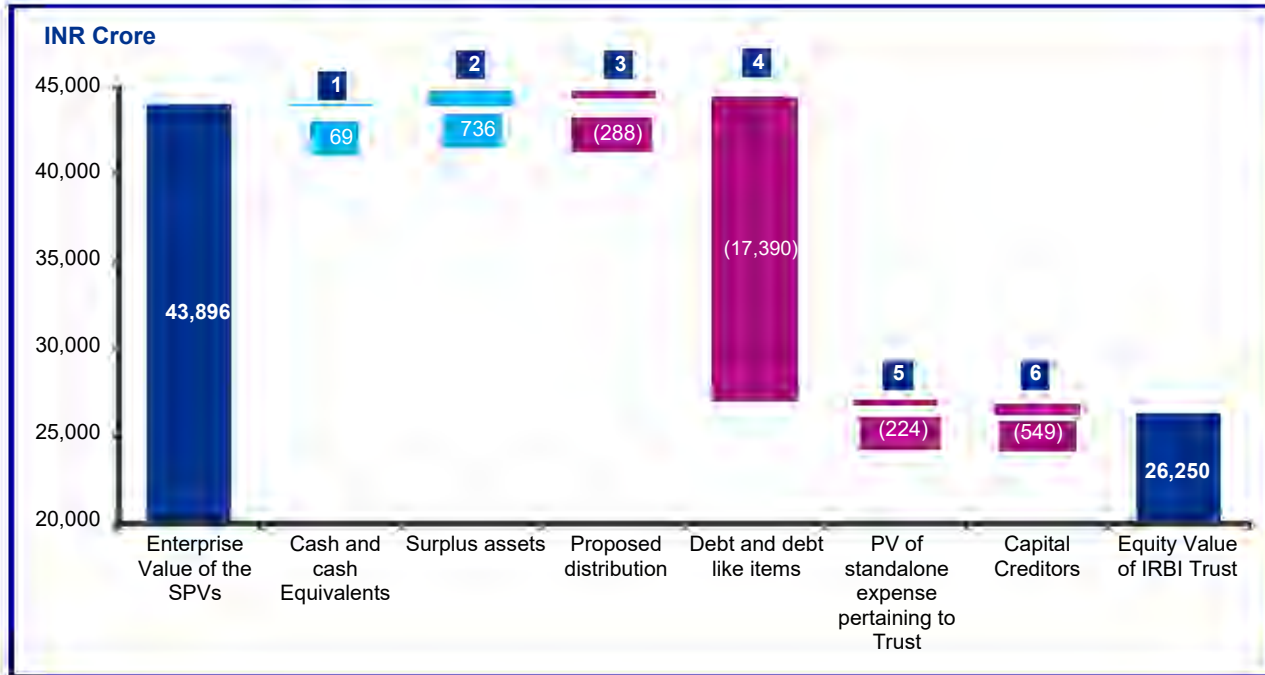
**The NAV at fair value per unit of IRBI Trust as on 31 December 2023 is INR 256.92 per unit.**

Source(s): Management information, KPMG analysis



# 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 December 2023.
- 2** Surplus assets primarily comprise investment in mutual funds of INR 710 Cr and advance tax net of provisions of INR 18 Cr as at 31 December 2023.
- 3** IRBI Trust has declared distribution of INR 288 Cr in the month of January 2024 to its unit holders. Although the distribution liability is not part of the financials statements of the Trust as at Valuation Date, We have adjusted the proposed distribution of INR 288 Cr from the enterprise value of the SPVs, to arrive at equity value of IRBI Trust net of proposed distribution.
- 4** Debt and debt like items primarily represents loan from bank, financial institutions, related parties and non-convertible debentures as at 31 December 2023.
- 5** 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).
- 6** Capital creditors of INR 549 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 43,896 crores and the 100% Equity Value of the IRBI Trust is INR 26,250 crores as on 31 December 2023.**

**The NAV at fair value per unit of IRBI Trust as on 31 December 2023 is INR 256.92 per unit.**

Source(s): Management information, KPMG analysis



**7.**

# **Annexures**

# Annexure 1: Sources of Information (1/3)

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 and STPL.
- Consolidated audited financial statements for FY2020, FY2021, FY2022 and FY2023 of IRBI Trust.
- Provisional financial statements for the period ended 31 December 2023 for all the SPVs and IRBI Trust (standalone and consolidated).
- Financial projections of SPV's from 1 January 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 is still under construction, the Management has provided a progress report from an independent consultant dated January 2024.
- Since STPL is still under construction, the Management has provided project cost completion certificate from an independent accountant dated 03 January 2024.
- List of approvals, permits, licenses and litigations for the SPVs as at 31 December 2023.
- 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 and FY2033 for IGEPL and STPL, till FY 2030 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 (2/3)

- 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 and STPL) increased by 90-139 days pursuant to notification no F.184/2020-PPD dated 13<sup>th</sup> May 2020 and Notification no. Covid-19/Roadmap/JS(H)/2020 dated 26<sup>th</sup> 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 3,749 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 December 2023. 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 549 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.
- Management informed us that IRBI Trust has declared distribution of INR 288 Cr in the month of January 2024 to its unit holders. Although the distribution liability is not part of the financials statements of the Trust as at Valuation Date, We have adjusted the proposed distribution of INR 288 Cr from the enterprise value of the SPVs, to arrive at equity value of IRBI Trust net of proposed distribution.
- On October 12, 2023, definitive agreements in relation to the implementation of Samakhiyali to Santalpur project were entered through IRBI Trust. Vide the said agreement, the Investment Manager and Trustee (acting on behalf of IRBI Trust) have executed the definitive agreements with the Sponsor, affiliates of GIC Private Limited as financial investors and STPL subject to fulfilment of the condition precedent set out therein. Management informed us that although the equity infusion in STPL by IRBI Trust took place on 04 January 2024, for financials reporting purposes STPL was considered to be a subsidiary of IRBI Trust from its appointed date i.e. 28 December 2023. We have relied on Management representation for the above matter and considered STPL as part of the Trust as on 31 December 2023 for our valuation analysis.



# Annexure 1: Sources of Information (3/3)

- 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; Ms. Shilpa Todankar; and Mr. Rushabh Gandhi.
- 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) 7.2%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Equity risk premium 7%</p>	<ul style="list-style-type: none"> <li>Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India.</li> </ul>
<p>Relevered beta 0.94</p>	<ul style="list-style-type: none"> <li>Beta is a measure of the risk of the shares of a company. <math>\beta</math> 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.</li> <li>We have considered companies involved in the road operating industry and infrastructure investment trusts.</li> <li>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.</li> </ul>
<p>Cost of equity 13.8%</p>	<ul style="list-style-type: none"> <li>Based on above parameters cost of equity is 13.8%.</li> </ul>

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"><li>As per the Management, the average cost of debt for the SPVs is 8.6%.</li></ul>
<p>Tax rate 25.17%</p>	<ul style="list-style-type: none"><li>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.</li></ul>
<p>Post-tax cost of debt 6.4%</p>	<ul style="list-style-type: none"><li>The average post tax cost of debt is 6.4% for all SPVs</li></ul>
<p>Debt Equity Ratio 150%</p>	<ul style="list-style-type: none"><li>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 81.6%. 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%.</li></ul>
<p>WACC 9.37%</p>	<ul style="list-style-type: none"><li>Based on the optimal capital structure, the weighted average cost of capital is 9.37%.</li></ul>

Source: KPMG analysis

# Annexure 2b: WACC – UTL, CGTL and IGEPL (1/2)

<p>Risk free rate (Rf) 7.2%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Equity risk premium 7%</p>	<ul style="list-style-type: none"> <li>Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India.</li> </ul>
<p>Relevered beta 0.94</p>	<ul style="list-style-type: none"> <li>Beta is a measure of the risk of the shares of a company. <math>\beta</math> 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.</li> <li>We have considered companies involved in the road operating industry and infrastructure investment trusts.</li> <li>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.</li> </ul>
<p>Cost of equity 13.8%</p>	<ul style="list-style-type: none"> <li>Based on above parameters cost of equity is 13.8%.</li> </ul>

Source: KPMG analysis

# Annexure 2b: WACC – UTL, CGTL and IGEPL(2/2)

<p>Cost of debt 8.8%</p>	<ul style="list-style-type: none"> <li>As per the Management, the average cost of debt for the SPVs is 8.75%.</li> </ul>
<p>Tax rate 25.17%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Post-tax cost of debt 6.5%</p>	<ul style="list-style-type: none"> <li>The average post tax cost of debt is 6.5% for all SPVs</li> </ul>
<p>Debt Equity Ratio 150%</p>	<ul style="list-style-type: none"> <li>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 81.6%. 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%.</li> </ul>
<p>WACC 9.44%</p>	<ul style="list-style-type: none"> <li>Based on the optimal capital structure, the weighted average cost of capital is 9.44%.</li> </ul>

Source: KPMG analysis

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

<p>Risk free rate (Rf) 7.2%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Equity risk premium 7%</p>	<ul style="list-style-type: none"> <li>Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India.</li> </ul>
<p>Relevered beta 0.94</p>	<ul style="list-style-type: none"> <li>Beta is a measure of the risk of the shares of a company. <math>\beta</math> 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.</li> <li>We have considered companies involved in the road operating industry and infrastructure investment trusts.</li> <li>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.</li> </ul>
<p>Alpha 1%</p>	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>
<p>Cost of equity 14.8%</p>	<ul style="list-style-type: none"> <li>Based on above parameters cost of equity is 14.8%.</li> </ul>

Source: KPMG analysis



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

<p>Cost of debt 9%</p>	<ul style="list-style-type: none"> <li>As per the Management, the average cost of debt for PDTPL and STPL is 9%.</li> </ul>
<p>Tax rate 25.17%</p>	<ul style="list-style-type: none"> <li>We have considered tax rate of 25.17% for the WACC analysis which is the tax rate applicable to PDTPL and STPL.</li> </ul>
<p>Post-tax cost of debt 6.7%</p>	<ul style="list-style-type: none"> <li>The post tax cost of debt is 6.7% for PDTPL and STPL.</li> </ul>
<p>Debt Equity Ratio 150%</p>	<ul style="list-style-type: none"> <li>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 81.6%. 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%.</li> </ul>
<p>WACC 9.95%</p>	<ul style="list-style-type: none"> <li>Based on the optimal capital structure, the weighted average cost of capital is 9.95%.</li> </ul>

Source: KPMG analysis

# Annexure 3: Beta Computation

Beta computation 31 December 2023										
	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	219,549	180,906	82.4%	45.2%	1.05	25.17%	0.65	150.0%	25.17%	1.38
PNC Infratech Limited	87,529	70,738	80.8%	44.7%	0.86	25.17%	0.54	150.0%	25.17%	1.14
Dilip Buildcon Limited	53,571	67,629	126.2%	55.8%	0.97	25.17%	0.50	150.0%	25.17%	1.06
Bharat Road Network Limited	3,985	13,693	343.6%	77.5%	1.22	25.17%	0.34	150.0%	25.17%	0.73
National Highways Infra Trust	na	na	na	na	na	na	na	na	na	na
India Infrastructure Trust	na	na	na	na	na	na	na	na	na	na
India Grid Trust	98,581	186,972	189.7%	65.5%	0.43	25.17%	0.18	150.0%	25.17%	0.38
Powergrid Infrastructure Investment Trust	88,858	5,721	6.4%	6.0%	0.41	25.17%	0.39	150.0%	25.17%	0.82
IRB InvIT Fund	40,385	30,380	75.2%	42.9%	0.46	25.17%	0.30	150.0%	25.17%	0.63
G R Infraprojects Limited	107,697	63,080	58.6%	36.9%	0.87	25.17%	0.61	150.0%	25.17%	1.29
<b>Median</b>			<b>81.6%</b>				<b>0.44</b>			<b>0.94</b>

Note:

(a) Market capitalization of comparable companies has been considered based on 3-month volume weighted average share prices till 31 December 2023.

(b) Beta has been computed based on 1-year daily average adjusted beta.

(c) Although, National Highway Infra Trust and India Infrastructure Trust are part of our comparable companies set, they has 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													
	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036
INR crores	3 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	1.7	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	0.125	0.750	1.750	2.750	3.750	4.750	5.750	6.750	7.750	8.750	9.750	10.750	11.750
Discount factor	0.989	0.935	0.855	0.782	0.715	0.653	0.597	0.546	0.499	0.457	0.418	0.382	0.349
<b>Present value of cash flows</b>	<b>1.7</b>	<b>7.0</b>	<b>7.0</b>	<b>7.1</b>	<b>7.1</b>	<b>7.1</b>	<b>7.2</b>	<b>7.2</b>	<b>7.3</b>	<b>7.3</b>	<b>7.3</b>	<b>7.4</b>	<b>7.4</b>

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	12.750	13.750	14.750	15.750	16.750	17.750	18.750	19.750	20.750	21.750	22.750	23.750	24.750
Discount factor	0.319	0.292	0.267	0.244	0.223	0.204	0.186	0.170	0.156	0.143	0.130	0.119	0.109
<b>Present value of cash flows</b>	<b>7.5</b>	<b>7.5</b>	<b>7.6</b>	<b>7.6</b>	<b>7.6</b>	<b>7.7</b>	<b>7.7</b>	<b>7.8</b>	<b>7.8</b>	<b>7.9</b>	<b>7.9</b>	<b>8.0</b>	<b>8.0</b>

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	25.750	26.750	27.750	28.750	29.114
Discount factor	0.100	0.091	0.083	0.076	0.074
<b>Present value of cash flows</b>	<b>8.0</b>	<b>8.1</b>	<b>8.1</b>	<b>8.2</b>	<b>3.2</b>

Valuation conclusion	
INR Crore	
<b>Present value of cash flows</b>	<b>224</b>

<b>WACC</b>	<b>9.37%</b>
-------------	--------------

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 December 2023 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 and STPL. 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 12 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 12 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	Mar-22	Mar-23	Sep-23
IRB Westcoast Tollway Limited	2,844	3,640	3,741
Solapur Yedeshi Tollway Limited	1,935	2,373	2,403
Yedeshi Aurangabad Tollway Limited	3,510	4,177	4,216
Kaithal Tollway Kimited	2,691	2,471	2,506
AE Tollway Limited	2,919	3,183	3,259
Udaipur Tollway Limited	2,685	2,607	2,673
CG Tollway Limited	2,444	2,744	2,803
Kishangarh Gulabpura Tollway Limited	1,930	2,136	2,206
IRB Hapur Moradabad Tollway Limited	3,490	4,112	4,176
Palsit Dankuni Private Tollway Limited	NA	1,095	1,576
IRB Golconda Expressway Private Limited	NA	NA	12,682
Samakhiyali Tollway Private Limited	NA	NA	NA

Source(s): Company website and Management Information

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

Sr. No.	Description	Remarks
<b>IRB Westcoast Tollway Limited</b>		
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-1	License for use of explosives.	Received
C-2	Permission of state government for drawing water from Rivers & reservoir	Not Applicable
D-1	License from Inspector of factories or competent authorities for setting up Batching Plant.	Received
D-2	Clearance from Pollution control board for Setting up Batching Plant	Received
E-1	Permission of Village Panchayat & Pollution control board for Asphalt Plant	Received
E-2	Permission of Village Panchayat & State government for Borrow earth	Received
F-1	Permission of State Government for Cutting of trees	Received
F-2	Any other permits or clearance required under applicable Laws	Labour License taken

Sr. No.	Description	Remarks
<b>Palsit Dankuni Private Tollway Limited</b>		
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
<b>Samakhiyali Tollway Private Limited</b>		
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-1	License for use of explosives.	Received
C-2	Permission of state government for drawing water from Rivers & reservoir.	Not Applicable
D-1	License from Inspector of factories or competent authorities for setting up Batching Plant.	Not Received
D-2	Clearance from Pollution control board for Setting up Batching Plant	Application done
E-1	Permission of Village Panchayat & Pollution control board for Asphalt Plant	Application done
E-2	Permission of Village Panchayat & State government for Borrow earth	Received
F-1	Permission of State Government for Cutting of trees	Received
F-2	Any other permits or clearance required under applicable Laws	Labour License taken.

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 (1/2)

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

### INR Crore

Name of the SPV	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
IRB Westcoast Tollway Limited	40	41	42	-	1	-	111	41
Solapur Yedeshi Tollway Limited	-	-	18	19	20	-	-	-
Yedeshi Aurangabad Tollway Limited	-	-	29	31	32	-	-	-
Kaithal Tollway Kimited	-	43	45	48	-	-	-	-
AE Tollway Limited	-	37	39	41	-	-	-	-
Udaipur Tollway Limited	-	57	69	76	4	-	120	125
CG Tollway Limited	-	-	27	28	30	-	-	-
Kishangarh Gulabpura Tollway Limited	-	-	-	-	100	-	-	-
IRB Hapur Moradabad Tollway Limited	-	4	-	89	90	85	-	5
Palsit Dankuni Private Tollway Limited	-	-	-	-	-	-	55	61
IRB Golconda Expressway Private Limited	-	-	-	-	-	-	161	161
Samakhiyali Tollway Private Limited	-	-	-	-	0	-	-	-

## 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	-	-	-	-

Source(s): Management information



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

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	-	-	-	-

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	-	-	-	-	-	-	-	-

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.

Source(s): Management information



# Annexure 5e: Pending litigations - IWTL

Sl. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	Financial implications
1	Mr. Sachhidanand a Shetty.	The Chief General Manager, Modern Road Makers Pvt. Ltd.	Judicial Magistrate First Class Court, Kundapura.	The plaintiff has filed this suit praying that There are no Adverse orders stay should be given for the stoppage work against the company. The of NH-66 to set right certain anomalies in matter is pending the tree cutting tender awarded to him by the NHA1 in Kundapur forest division in respect of cutting of reserved categories of trees like teak, Bethonne, Matti, Sandalwood & seasom.		Land acquisition and related cost, cutting the necessary trees for road widening work, and related cost, etc are the sole responsibilities of NHA1. 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 NHA1. 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 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 (1/2)

Sl. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	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.

Source(s): Management information





# Annexure 5e: Pending litigations - SYTL (2/2)

SI. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	Financial implications
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 December 2023	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)

Sl. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	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 NHAI for compensation as per Clause 35.2 and the Award is reserved. Proceedings have concluded and Clause 35.3 of the Concession Agreement on account of delays attributable to NHAI. The claim for cost 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.		Rs. 1720.80 Cr +interest & extension of 869.41 days

Source(s): Management information



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

Sl. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	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 the petition is dismissed by the collection of toll on the project, and has court for non joinder of prayed that the notification by which the toll necessary party. is collected should be quashed 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.		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 December 2023	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 December 2023	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

SI. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	Financial implications
1	1. Pushkarlal Choudhary	1. Udaipur Tollway Pvt. Ltd.	Udaipur District Consumer Forum, Udaipur, State – Rajasthan	The complainant had filed compliant in the consumer forum claiming for Rs. 1625/- and interest at the rate of 18% p.a. on it alleging that the toll plaza employees had taken excess toll on the overloaded vehicle and misbehaving of Tolling Staff.	The matter is pending in the district consumer forum.	The concessionaire is entitled to collect the overloading charges from the overloaded vehicles as per the toll notification. Hence, the toll collected from the complainant is legitimate as the vehicle of the complainant was overloaded. The concessionaire has denied all the allegations against misbehaviour of toll plaza staff. Hence, Considering the merits of the matter, there are no financial implications in this matter.
2	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 & by the police. created violence in smooth tolling operations at Khandiobri Toll.	The matter is being investigated	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.
3	(Shift Incharge Khandiobri Toll)	Dist - Bhilwada.	Tah – Kherwara,  Dist – Udaipur State – Rajasthan Arbitration			
4	Udaipur Tollway Ltd	NHAI		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

SI. No.	Complainant/ Applicant/ Plaintiff	Respondents	Name & Address of the Court and case number	Brief Description of Case	Status as on 31 December 2023	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 the court has disposed this collection of toll without completion of six case. 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 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 December 2023	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 December 2023	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 the 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 annual 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 December 2023	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 Crores to the State of Telangana.</p>	The matter is pending	Nil

Source(s): Management information



# Annexure 5f: Statement of assets as at 31 December 2023

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	-	3,010	0	3,010	87
Solapur Yedeshi Tollway Limited	-	1,303	-	1,303	91
Yedeshi Aurangabad Tollway Limited	-	3,426	0	3,426	183
Kaithal Tollway Kimited	-	1,949	-	1,949	88
AE Tollway Limited	0	2,996	0	2,997	73
Udaipur Tollway Limited	-	2,538	-	2,538	103
CG Tollway Limited	0	2,047	-	2,048	103
Kishangarh Gulabpura Tollway Limited	0	1,593	-	1,594	68
IRB Hapur Moradabad Tollway Limited	0	3,105	1	3,106	92
Palsit Dankuni Private Tollway Limited	-	1,641	-	1,641	88
IRB Golconda Expressway Private Limited	-	7,742	-	7,742	387
Samakhiyali Tollway Private Limited	-	240	-	240	13

Source(s): Management information





# Annexure 5g: Site pictures - IWTL



श्रेणी का वाहन	एक घण्टा का दर (₹)	24 घण्टा का दर (₹)	मासिक दर के दर(₹)	पंजीकृत वाहन के लिए एक मासिक दर (₹)
ट्रक	110	165	3690	55
ट्रैक्टर	175	260	5785	85
ऑटो रिक्शा	360	535	11930	180
ऑटो रिक्शा	390	590	13055	195
ऑटो रिक्शा	550	825	18375	275
ऑटो रिक्शा	695	1045	23180	350



Source(s): Site visits

# Annexure 5g: Site pictures - SYTL



IRB SOLAPUR YEDESHI TOLLWAY, LTD. NH-52				
Tamalwadi Toll Plaza (KM 19.300) USER FEE (₹) W.E.F. From 1/4/2023				
TYPE OF VEHICLE	SINGLE JOURNEY (₹)	ROUND JOURNEY (₹)	MONTHLY PASS	ONLY ELECTRIC COMMERCIAL
CAR / VAN / JEEP	75	110	2420	35
LCV (LIGHT COMMERCIAL VEHICLE)	115	175	3905	60
BUS / TRUCK	245	370	8185	125
3 AXLE	270	400	8925	135
HAV / HCM / EME (4 TO 6 AXLES)	385	575	12835	190
OVERSIZED VEHICLES (7 OR MORE AXLES)	470	705	15620	235

NOTE: MONTHLY PASS @ Rs. 330 FOR LOCAL NON COMMERCIAL VEHICLE (CAR)



Source(s): Site visits

# Annexure 5g: Site pictures - YATL



Source(s): Site visits



# Annexure 5g: Site pictures - KTL



Source(s): Site visits

# Annexure 5g: Site pictures - AETL



Source(s): Site visits

# Annexure 5g: Site pictures - UTL



National Highways Authority of India			
USER FEE			
Type of Vehicle	Single Journey Rate (Rs.)*	Return Journey Rate Valid for 24 Hrs. (Rs.)*	Month Pass more than 24 Hrs. (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



National Highways Authority of India	
EXEMPTED VEHICLES	
1.	The President of India
2.	The Vice-President of India
3.	The Prime Minister of India
4.	The Ministers of India
5.	The Speaker of India
6.	The Cabinet Minister of India
7.	The Chief Minister of India
8.	The Chief Minister of Union Territory
9.	The Judge of the Supreme Court
10.	The Minister of the Union
11.	The Minister of the State
12.	The Member of the Parliament
13.	The Chairman of the Legislative Council of India
14.	The Speaker of the Legislative Council of a State
15.	The Chief Justice of High Court of a State
16.	The Judge of a High Court
17.	The Member of Parliament
18.	The Army Commander or Vice-Chief of Army Staff and other Services
19.	The Chief Secretary to a State Government Within Concerned
20.	The Secretary to The Government of India
21.	The Secretary, Council of States
22.	The Secretary, House of People
23.	The Foreign Dignitary on State Visit
24.	The Member of Legislative Assembly of a State and The Member Legislative Council of a State Within Their Respective State if they Produce His or Her Identity Card Issued by The Concerned Legislature of The State
25.	The Awardee of Param Vir Chakra, Ashok Chakra, Maha Vir Chakra, Vir Chakra and Shurya 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



# Annexure 5g: Site pictures - CGTL



वाहन का वर्ग (VEHICLE CATEGORY)	एन एच एन सी (NH/SH/SH/SH)	एन एच एन सी (NH/SH/SH/SH)	एन एच एन सी (NH/SH/SH/SH)	एन एच एन सी (NH/SH/SH/SH)
ट्रक (TRUCK)	95	145	3200	50
ट्रैक्टर (TRACTOR)	155	235	5170	80
ऑटो रिक्शा (AUTO RIKSHA)	325	490	10835	165
टैक्सी (TAXI)	355	530	11820	175
एन एच एन सी (NH/SH/SH/SH)	510	765	16995	255
एन एच एन सी (NH/SH/SH/SH)	620	930	20690	310

Source(s): Site visits

# Annexure 5g: Site pictures - KGTL



**Kishangarh Gulabpura Tollway Limited**

**USER FEE**  
(Kishangarh Gulabpura 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 Monthly Journeys (in Rupees)	Fee for Monthly pass for 10 single journeys in a month (in Rupees)	Fee for Commercial Vehicles registered with the District (in Rupees)
Two (2) Wheelers / LMV	140	210	4670	70
LCV (L3V) / Mini Buses	225	340	7540	115
Four (4) Wheelers (2 Axles)	475	710	15800	235
Commercial Vehicles (3 Axles)	515	775	17235	260
HCM / EMU / MAN (4 to 6 Axles)	745	1115	24775	370
Overweight Vehicles (7 or more Axles)	905	1355	30160	450

All Rates are applicable only on Payment through FASTag



Source(s): Site visits

# Annexure 5g: Site pictures - IHMTL



Source(s): Site visits



# Annexure 5g: Site pictures - PDTPL



Source(s): Site visits

# Annexure 5g: Site pictures - IGEPL



Sl. No.	Segment Name	Vehicle Category	Rate	Vehicle Category	Rate	Vehicle Category	Rate	Vehicle Category	Rate
17	Hejencira Chavara	0.85	20	80	70	100	120		
18	TALPA	13.88	30	40	75	100	140	170	
19A	Aravali	10.00	40	80	100	120	150	200	
19	Manjeri Junction	22.08	80	80	140	180	200	220	
2	Chirappuzha	10.01	40	70	120	180	220	280	
1A	Manjeri	21.01	80	80	140	180	200	210	
3	Changanassery	33.43	70	110	200	280	330	450	
4	Manjeri	40.01	80	100	180	280	330	450	
4	Manjeri	48.81	110	180	310	400	500	710	
8A	Malappuram	25.91	120	200	320	450	650	780	
8	Manjeri	20.91	100	200	300	400	520	650	
8	Manjeri	29.71	160	280	480	680	840	1050	
9	Manjeri	70.00	170	270	480	630	800	1050	
9	Manjeri	83.10	180	300	510	630	780	930	
10	Chudassery	24.88	120	200	380	480	650	800	
10	Chudassery	46.35	160	270	500	650	850	1050	
11	Trivandrum	30.45	80	140	250	320	470	600	
12	Bongalur	27.20	60	100	180	230	330	420	
13	Manjeri	20.10	80	70	130	170	240	280	
14	Tripunithura	14.00	30	50	90	120	180	210	
15	Manjeri Chudassery	0.35	10	20	40	60	80	90	

Source(s): Site visits

# Annexure 5g: Site pictures - STPL

Category of vehicle	Entry fee (₹)	Exit fee (₹)	Maximum weight (kg)	Maximum height (m)
1. Car / Auto / Van / Light Motor Vehicle	100	150	3200	50
2. Light Commercial vehicles / Light Buses / Minivan / Van / Bus	160	240	5300	80
3. Mid / Tractor / Tractor Trailer	335	500	11105	185
4. Heavy Commercial Vehicles	365	545	12115	180
5. Heavy Construction Machinery (HCM) / Earth Moving Equipment (EME) / Multi Axle Vehicle (MAV) / Four to Six Axles	520	785	17415	260
6. Dimensional vehicles / Special or Heavy Axles	635	955	21200	320



Category of vehicle	Entry fee (₹)	Exit fee (₹)	Maximum weight (kg)	Maximum height (m)
1. Car / Auto / Van / Light Motor Vehicle	100	150	3200	50
2. Light Commercial vehicles / Light Buses / Minivan / Van / Bus	160	240	5300	80
3. Mid / Tractor / Tractor Trailer	335	500	11105	185
4. Heavy Commercial Vehicles	365	545	12115	180
5. Heavy Construction Machinery (HCM) / Earth Moving Equipment (EME) / Multi Axle Vehicle (MAV) / Four to Six Axles	520	785	17415	260
6. Dimensional vehicles / Special or Heavy Axles	635	955	21200	320

Source(s): Site visits



**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”) for carrying out Enterprise Valuation of 12 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 relation to proposed right issue by IRBI Trust. The valuation is to be conducted in accordance with Regulation 21(7) of the Securities Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 (“SEBI InvIT Regulations”) where it 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 along with Addendum to the letter of engagement dated 01 March 2024 (together referred as “LoE”).
- The date of Valuation is 31 December 2023 (“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. We also understand from you that the Report may be included in the offer document for the rights issue and therefore, we understand that the Report may enter 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 and STPL), 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 December 2023. Additionally, our analysis is based on the business plan of the SPVs for the period from 1 January 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.





[kpmg.com/socialmedia](https://kpmg.com/socialmedia)

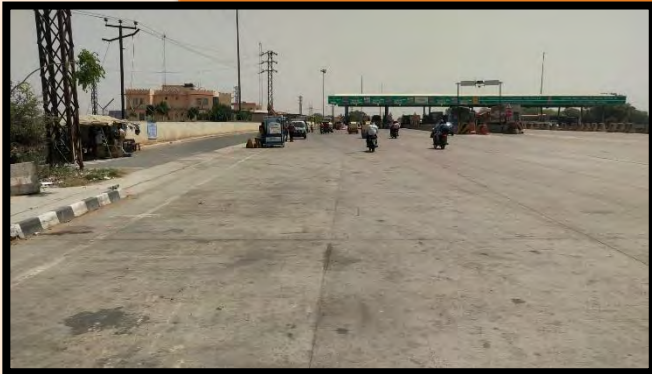
The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or 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.

© 2024 KPMG Valuation Services LLP, an Indian limited liability partnership and a member firm of KPMG global organization of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

**Document Classification: KPMG Confidential**

**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)**



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614. Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





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

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

**MARCH 2024**



# CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
INTRODUCTION .....	7
1.1 Background.....	7
1.2 Objective of the Study.....	7
1.2.1 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
PROJECT DETAILS.....	9
2.1 Project Corridor.....	9
2.2 Project Stretch Description .....	9
2.3 Project Corridor Illustration.....	10
<b>Chapter 3 .....</b>	<b>11</b>
TRAFFIC SURVEYS AND ANALYSIS.....	11
3.1 Traffic Surveys .....	11
3.2 Classified Traffic Volume.....	12
3.3 Traffic Characteristic .....	13
3.3.1 Traffic Data .....	13
3.4 Data Analysis.....	15
3.4.1 Analysis of Traffic Volume Count .....	15
3.4.2 Components of Traffic.....	16
3.5 Secondary Data Collection .....	19
<b>Chapter 4 .....</b>	<b>20</b>
INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....	20
4.1 Introduction.....	20
4.2 Competing / Alternate route.....	20
<b>Chapter 5 .....</b>	<b>23</b>
GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....	23
5.1 Introduction.....	23
5.2 Trend Analysis.....	23
5.3 Estimation of Traffic Demand Elasticity.....	24
5.4 Analysis of Historic Traffic Data .....	33
5.5 Other Factors Influencing Growth.....	33
5.6 Developments along and around the Project Corridor & State.....	34
5.7 Industrial Units along Project Corridor .....	35
5.8 Recommended Growth Rates of Traffic .....	36
5.8.1 Recommended Growth Rates of Traffic for Project Stretch.....	37

<b>Chapter 6 .....</b>	<b>38</b>
<b>TRAFFIC FORECAST.....</b>	<b>38</b>
6.1 <b>Traffic Projections .....</b>	<b>38</b>
6.2 <b>Modification in Concession Period .....</b>	<b>42</b>
<b>Chapter 7 .....</b>	<b>43</b>
<b>FORECAST OF TOLL REVENUE .....</b>	<b>43</b>
7.1 <b>General.....</b>	<b>43</b>
7.2 <b>Discount Categories .....</b>	<b>43</b>
7.3 <b>Estimation of Toll Rates .....</b>	<b>44</b>
7.4 <b>Toll Revenue .....</b>	<b>49</b>
7.5 <b>Toll Revenue at all toll plazas under Scenarios .....</b>	<b>49</b>
<b>Chapter 8 .....</b>	<b>52</b>
<b>CONCLUSION &amp; RECOMMENDATIONS .....</b>	<b>52</b>
8.1 <b>Conclusion &amp; Recommendations .....</b>	<b>52</b>

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	12
Table 3-3 : Traffic Data at Gurau Toll Plaza at Km 285.200.....	13
Table 3-4 : Traffic Data at Tundla Toll Plaza at Km 224.950.....	14
Table 3-5 : PCU Factors Adopted for Study .....	15
Table 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24.....	15
Table 3-7 : Journey Type Bifurcation of Traffic at Gurau Toll Plaza KM 285.200 .....	18
Table 3-8 : Journey Type Bifurcation of Traffic at Tundla Toll Plaza KM 224.950 .....	18
Table 4-1 : Competing Roads Details .....	22
Table 5-1 : Per Capita Income Vs Car Uttar Pradesh .....	24
Table 5-2 : Population Vs Bus Uttar Pradesh.....	25
Table 5-3 : LCV Traffic Vs NSDP Uttar Pradesh .....	26
Table 5-4 : Truck Traffic Vs NSDP Uttar Pradesh.....	26
Table 5-5 : Summary Regression Analysis Uttar Pradesh.....	27
Table 5-6 : Per Capita Income Vs Car Delhi .....	27
Table 5-7 : Population Vs Bus Delhi.....	28
Table 5-8 : LCV Traffic Vs NSDP Delhi.....	29
Table 5-9 : Truck Traffic Vs NSDP Delhi.....	29
Table 5-10 : Summary Regression Analysis Delhi.....	30
Table 5-11 : Per Capita Income Vs Car Haryana.....	30
Table 5-12 : Population Vs Bus Haryana.....	31
Table 5-13 : LCV Traffic Vs NSDP Haryana .....	32
Table 5-14 : Truck Traffic Vs NSDP Haryana .....	32
Table 5-15 : Summary Regression Analysis Haryana .....	33
Table 5-16 : GDP of India, UP and other important states.....	35
Table 5-17 : Recommended Growth Rates Optimistic .....	37
Table 5-18 : Recommended Growth Rates Pessimistic.....	37
Table 5-19 : Recommended Growth Rates Most Likely.....	37
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 224.95 KM .....	38
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 285.20 KM .....	39
Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 224.95 KM .....	39
Table 6-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 285.20KM .....	40
Table 6-5 : Total Tollable Traffic @ Toll Plaza 1-Tundla- Chainage 224.95 KM .....	41
Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Gurau - Chainage 285.20 KM .....	41
Table 7-1 : Base Toll Rates June 2007-08.....	44

<i>Table 7-2 : Toll Rates for Single Journey@ Km 224.95</i> .....	45
<i>Table 7-3 : Toll Rates for Single Journey @ Km 285.20</i> .....	45
<i>Table 7-4 : Toll Rates for Return Journey @ Km 224.95</i> .....	46
<i>Table 7-5 : Toll Rates for Return Journey @ Km 285.20</i> .....	47
<i>Table 7-6 : Toll Rates for Monthly pass Local @ 224.95</i> .....	47
<i>Table 7-7 : Toll Rates for Monthly pass Local @ 285.20</i> .....	48
<i>Table 7-8 : Toll Rates for Monthly Pass @ Km 224.95</i> .....	48
<i>Table 7-9 : Toll Rates for Monthly Pass @ Km 285.20</i> .....	49
<i>Table 7-10 : Toll Revenue Optimistic Scenario</i> .....	50
<i>Table 7-11 : Toll Revenue Pessimistic Scenario</i> .....	50
<i>Table 7-12 : Toll Revenue Most Likely Scenario</i> .....	51

## LIST OF FIGURES

<i>Figure 1-1: Alignment of Project Stretch.....</i>	<i>7</i>
<i>Figure 2-1: Project Alignment with Toll Plaza.....</i>	<i>9</i>
<i>Figure 2-2: Photographs showing Project Corridor .....</i>	<i>10</i>
<i>Figure 3-1: Comparison of PCU Index.....</i>	<i>16</i>
<i>Figure 3-2 :Model Split of Tollable Vehicle-Km 285.200.....</i>	<i>17</i>
<i>Figure 3-3 :Model Split of Tollable Vehicle-Km 224.950.....</i>	<i>17</i>
<i>Figure 4-1: Alternate route at regional level .....</i>	<i>21</i>
<i>Figure 4-2: Alternate route at local level.....</i>	<i>21</i>
<i>Figure 5-1: Regression and Elasticity PCI vs. Car-Extrapolation Uttar Pradesh .....</i>	<i>25</i>
<i>Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh.....</i>	<i>25</i>
<i>Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Uttar Pradesh .....</i>	<i>26</i>
<i>Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Uttar Pradesh.....</i>	<i>27</i>
<i>Figure 5-5: Regression and Elasticity PCI vs. Car-Extrapolation Delhi .....</i>	<i>28</i>
<i>Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Delhi .....</i>	<i>28</i>
<i>Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Delhi .....</i>	<i>29</i>
<i>Figure 5-8: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Delhi.....</i>	<i>30</i>
<i>Figure 5-9: Regression and Elasticity PCI vs. Car-Extrapolation Haryana .....</i>	<i>31</i>
<i>Figure 5-10: Regression and Elasticity Population vs. Bus – Extrapolation Haryana.....</i>	<i>31</i>
<i>Figure 5-11: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Haryana .....</i>	<i>32</i>
<i>Figure 5-12: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Haryana .....</i>	<i>33</i>
<i>Figure 5-13 : Growth of GDP in India.....</i>	<i>34</i>
<i>Figure 5-14 : Industrial Units along project corridor .....</i>	<i>36</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>44</i>



## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

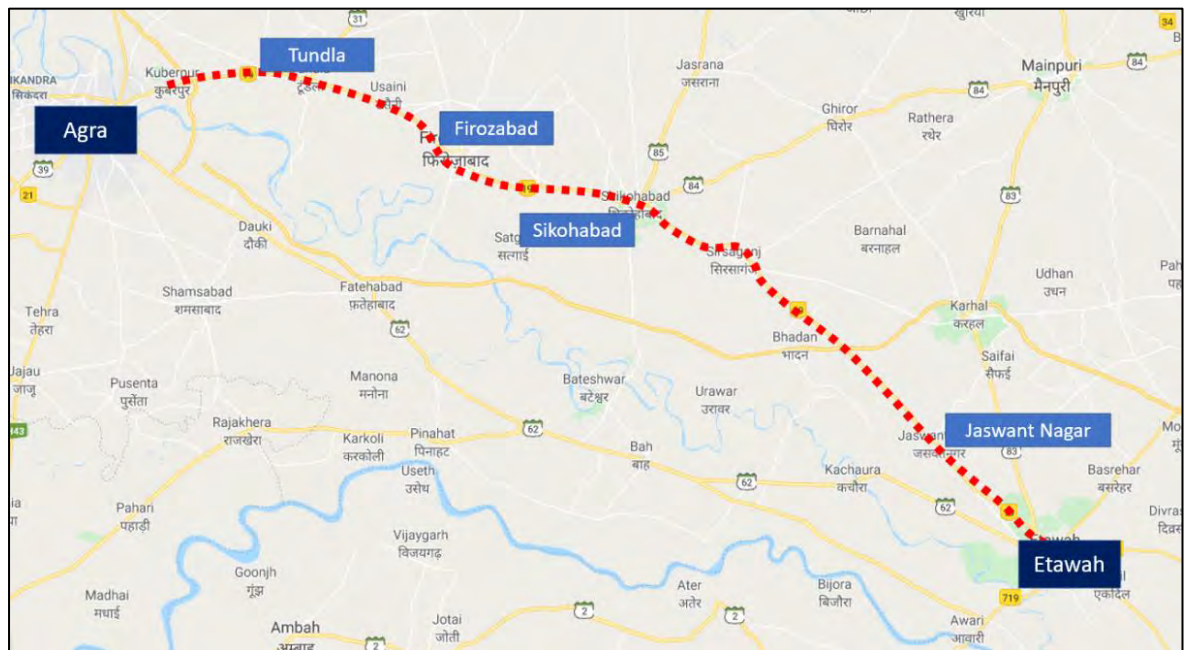
### 1.1 Background

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 1<sup>st</sup> 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.

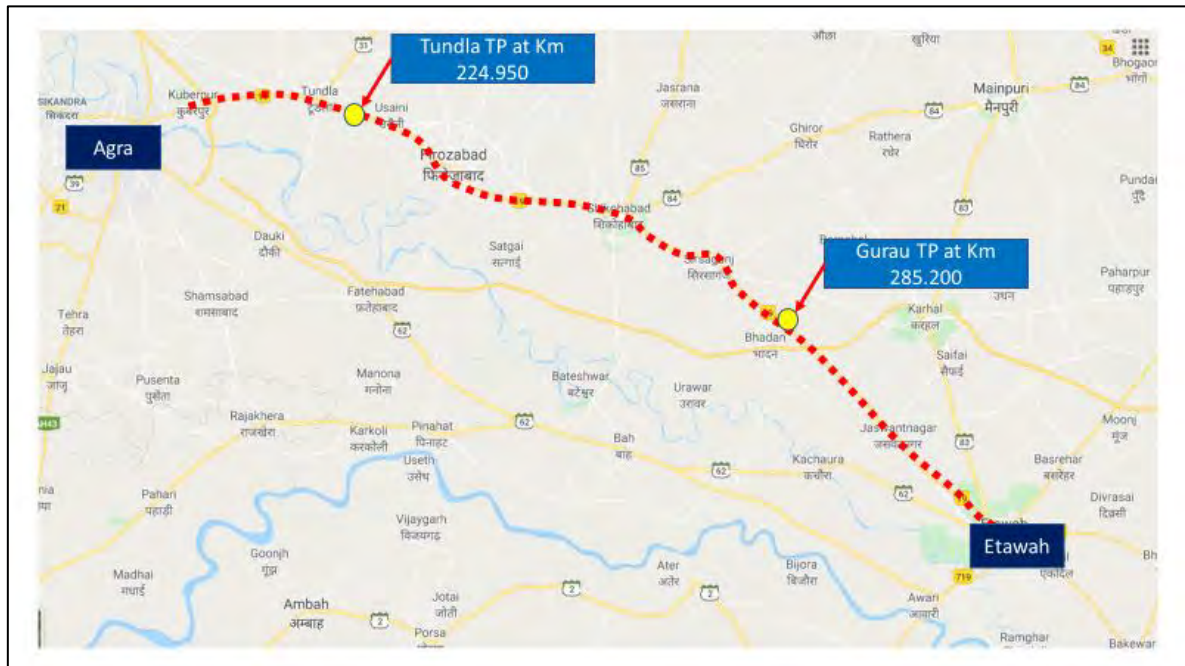
It connects the national capital Delhi to Kolkata, as well as important cities Mathura, Agra, Kanpur, Allahabad, Varanasi, Dhanbad, Asansol, Durgapur and Bardhaman. The highway is part of the Golden Quadrilateral project undertaken by National Highways Authority of India (NHAI).

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
	<b>Total</b>	<b>6892</b>	<b>9090</b>	<b>11197</b>	<b>9292</b>	<b>9880</b>

*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
	<b>Total</b>	<b>14918</b>	<b>12096</b>	<b>13832</b>	<b>16260</b>	<b>17580</b>

### 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

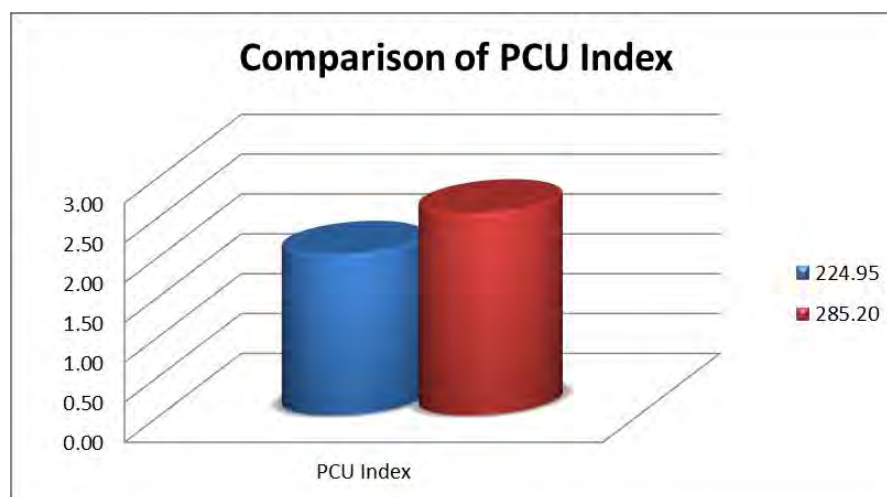
Traffic volume at each toll plaza was converted to PCU and same is presented as under

**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

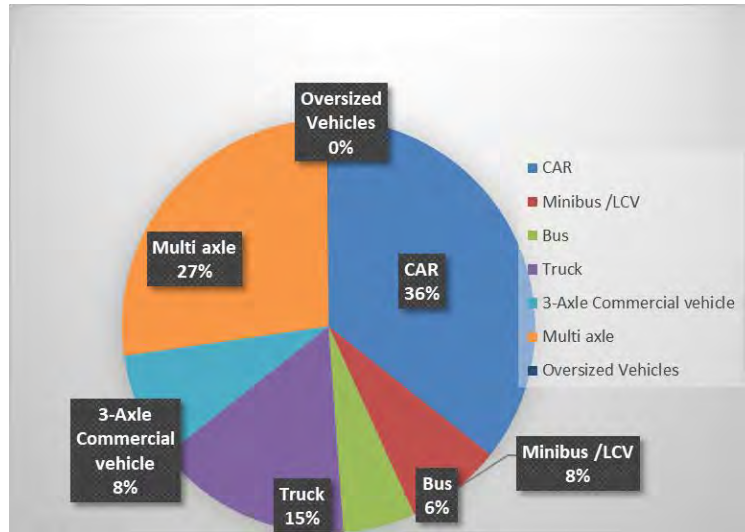
It can be observed from above that project traffic has PCU index close to 2.5 at Guarau which is an indicator of high proportion of commercial traffic in traffic mix. At Tundla the index is more toward passenger traffic due to urban impact. The following figure illustrates variation of PCU index at two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



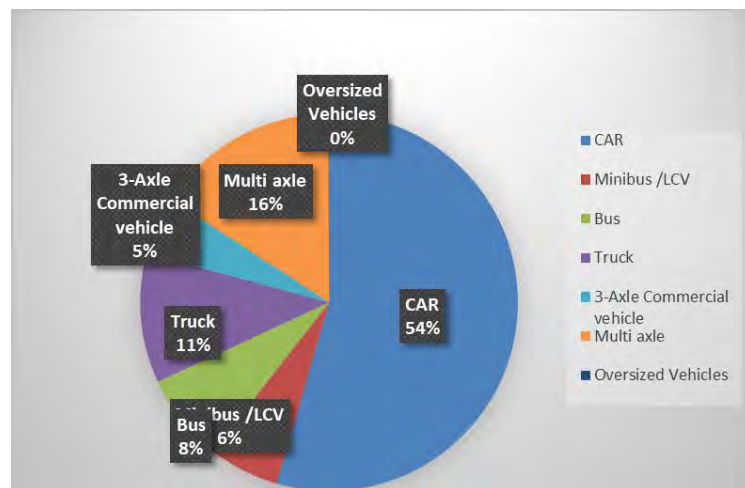
*Figure 3-1: Comparison of PCU Index*

### 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.

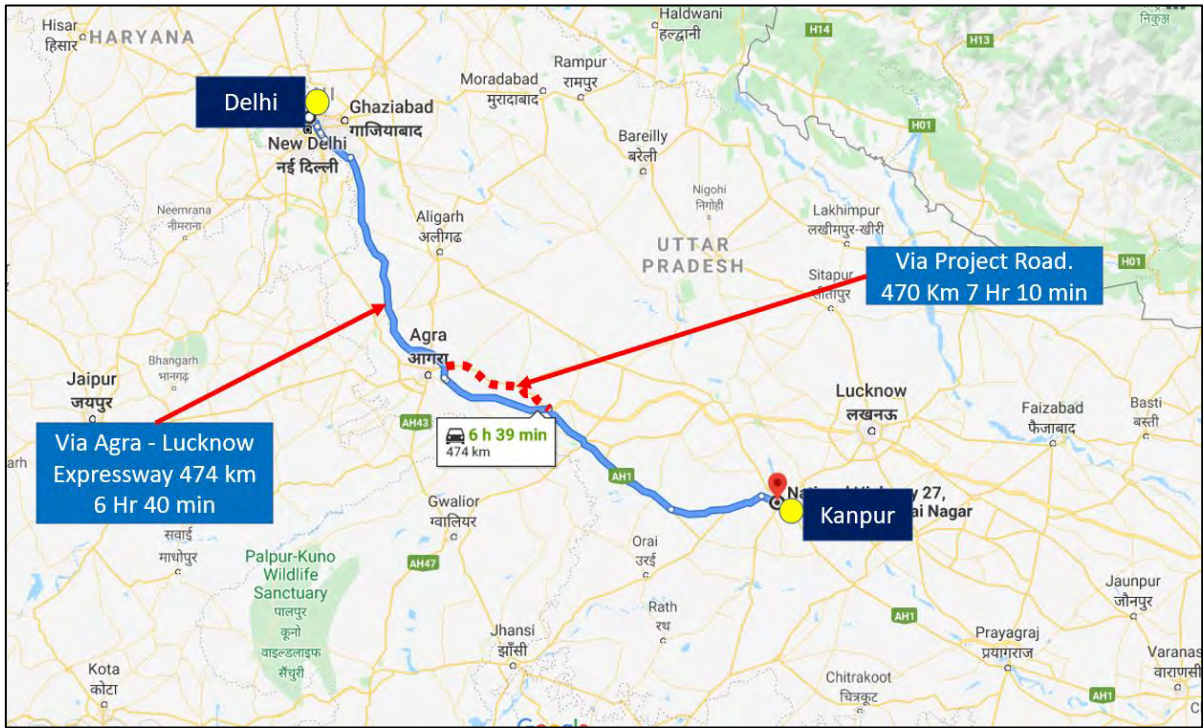


Figure 4-1: Alternate route at regional level.



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
<b>Regional Level</b>						
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	
<b>Local Level</b>						
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.

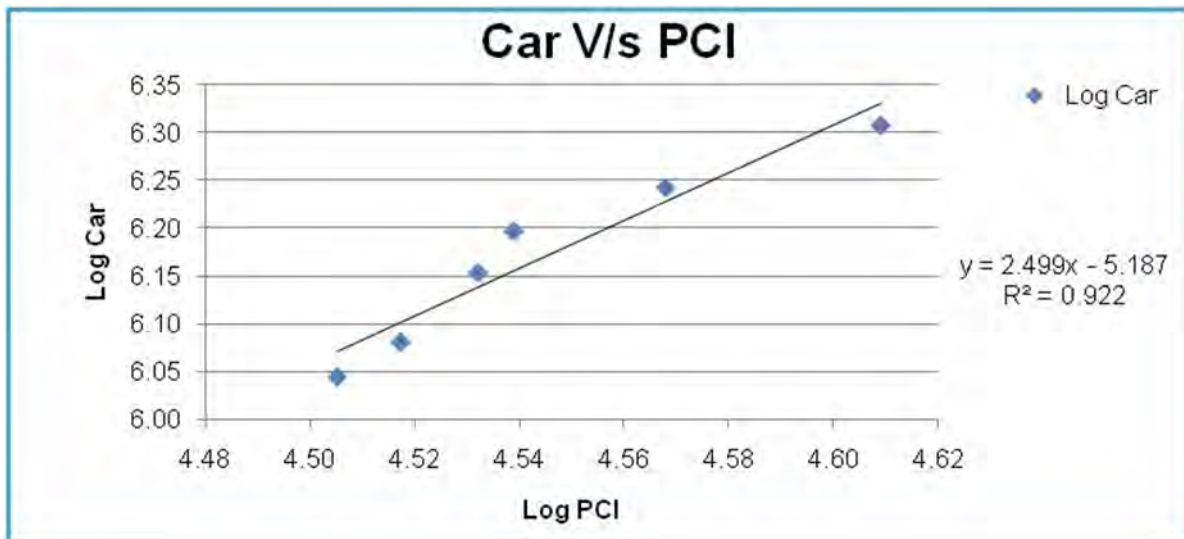


Figure 5-1: Regression and Elasticity PCI vs. Car–Extrapolation Uttar Pradesh

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.

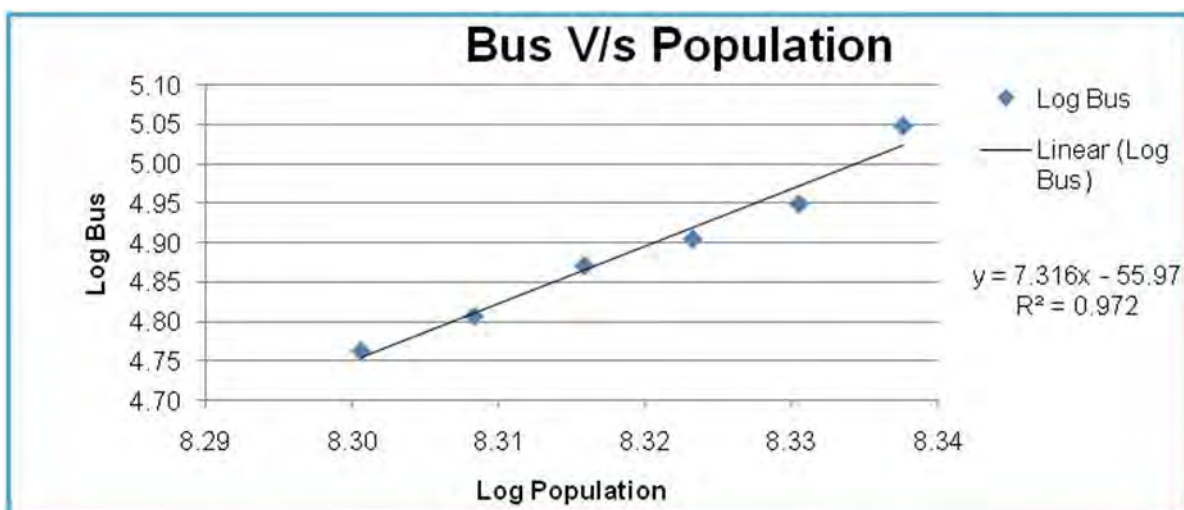


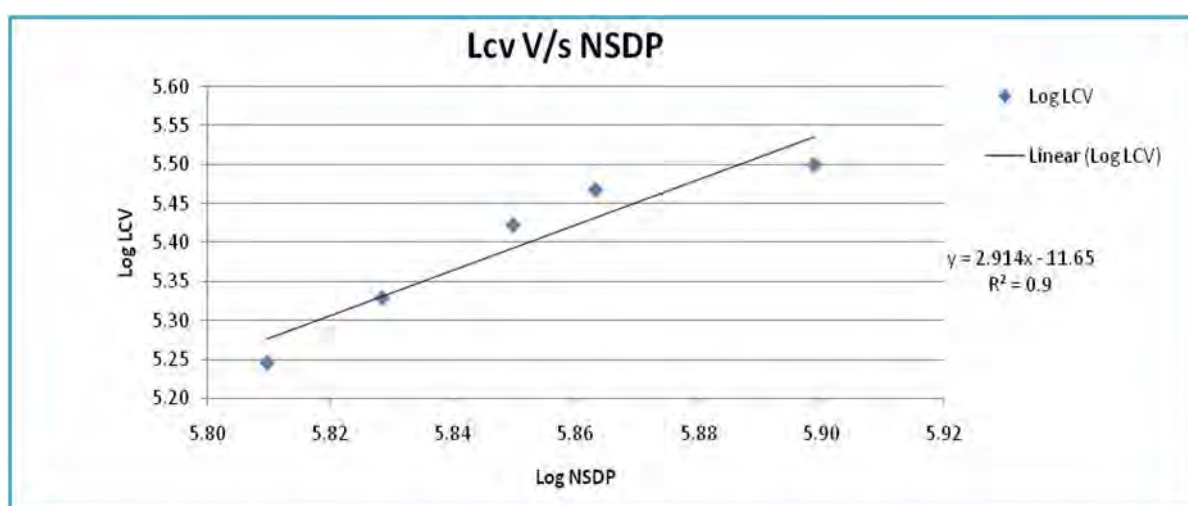
Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh

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 NDSP	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.

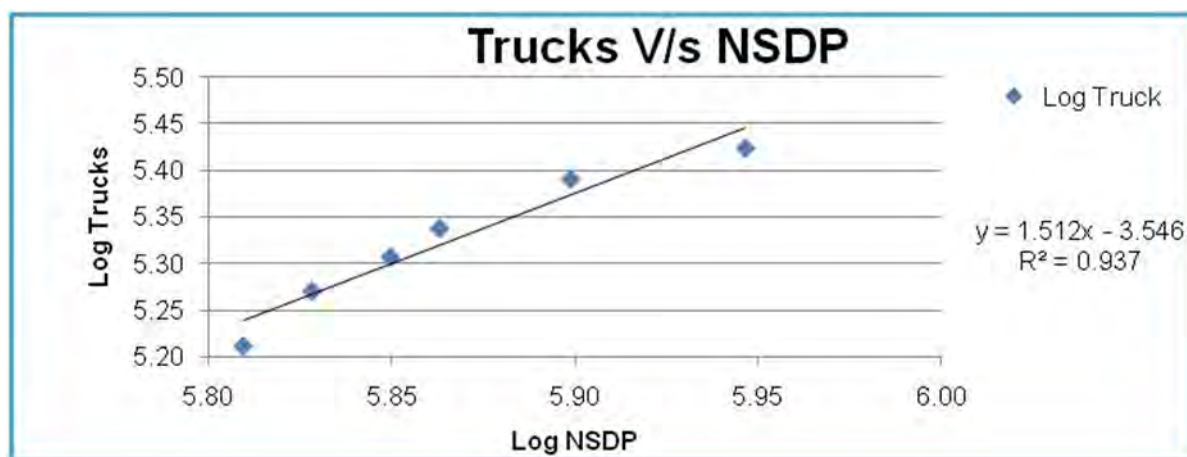


**Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Uttar Pradesh.**

**Table 5-4 : Truck Traffic Vs NSDP Uttar Pradesh**

Year	NSDP	Trucks	Log NDSP	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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R<sup>2</sup> 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 <sup>2</sup> = 0.922	2.4990	4.94%	12.34%	Good Regression
	Bus	Population	$y = 7.3167x - 55.9791$	R <sup>2</sup> = 0.9726	7.3167	1.72%	12.56%	Good Regression
	LCV	NSDP	$y = 2.9149x - 11.6585$	R <sup>2</sup> = 0.9	2.9149	5.28%	15.40%	Good Regression
	Truck	NSDP	$y = 1.5121x - 3.5463$	R <sup>2</sup> = 0.9373	1.5121	6.55%	9.90%	Good Regression

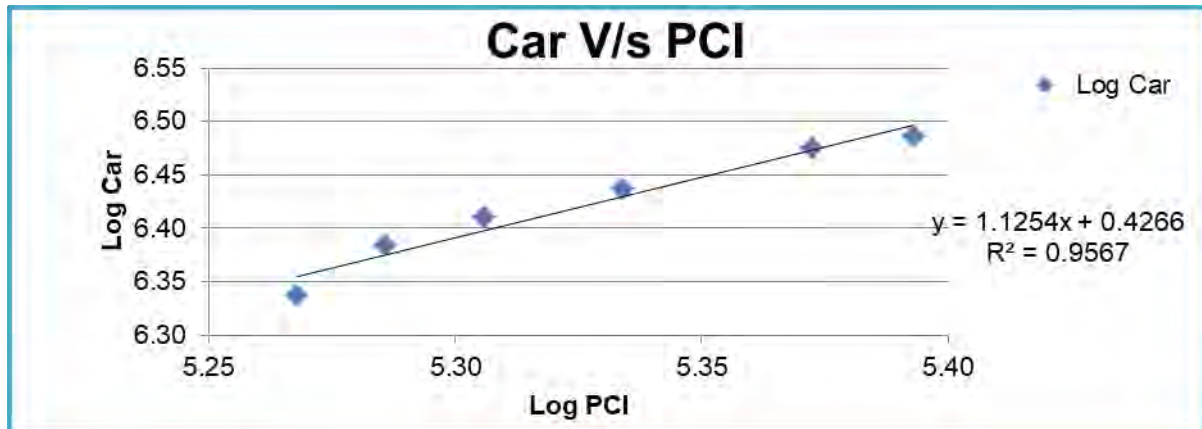
The following tables and graphs depict regression and elasticity of growth model for stretch falling in Delhi State.

**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.

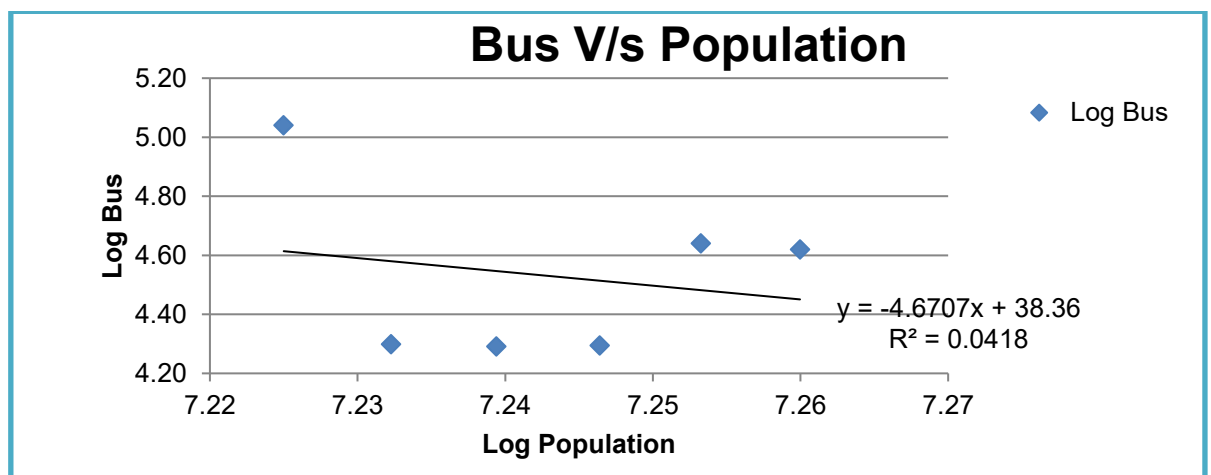


*Figure 5-5: Regression and Elasticity PCI vs. Car–Extrapolation Delhi*

*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.



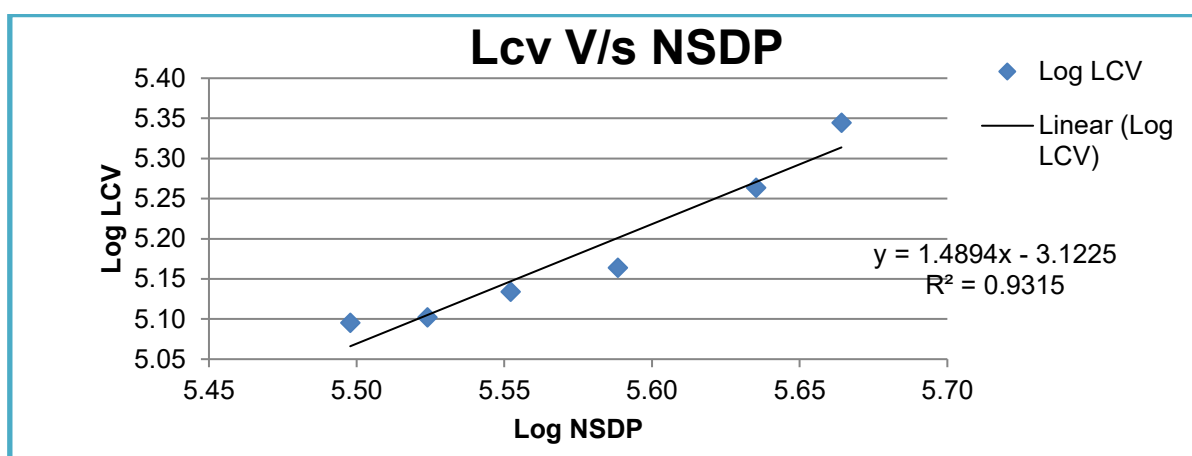
*Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Delhi*

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.



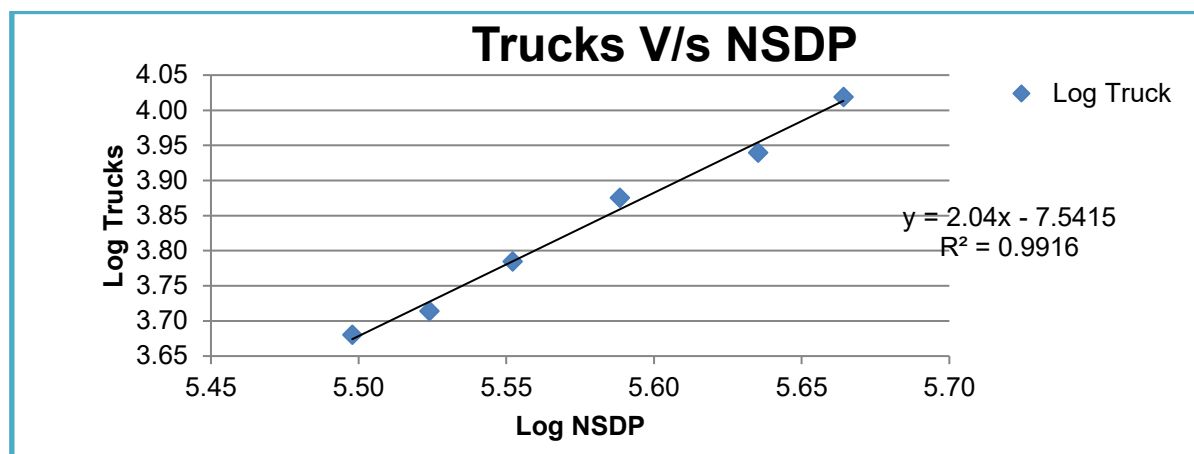
**Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Delhi.**

**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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R<sup>2</sup> 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 <sup>2</sup> = 0.9567	1.1254	5.95%	6.69%	Good Regression
	Bus	Population	$y = -4.6707x - 38.36$	R <sup>2</sup> = 0.0418	-4.6707	1.62%	-7.58%	Poor Regression
	LCV	NSDP	$y = 1.4894x - 3.1225$	R <sup>2</sup> = 0.9315	1.4894	7.98%	11.88%	Good Regression
	Truck	NSDP	$y = 2.04x - 7.5415$	R <sup>2</sup> = 0.9916	2.0400	7.98%	16.27%	Good Regression

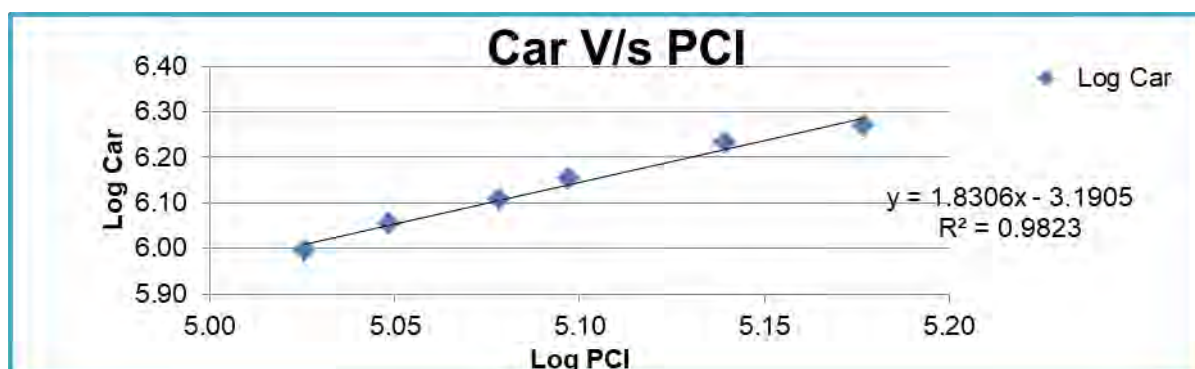
The following tables and graphs depict regression and elasticity of growth model for stretch falling in Haryana State.

**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.

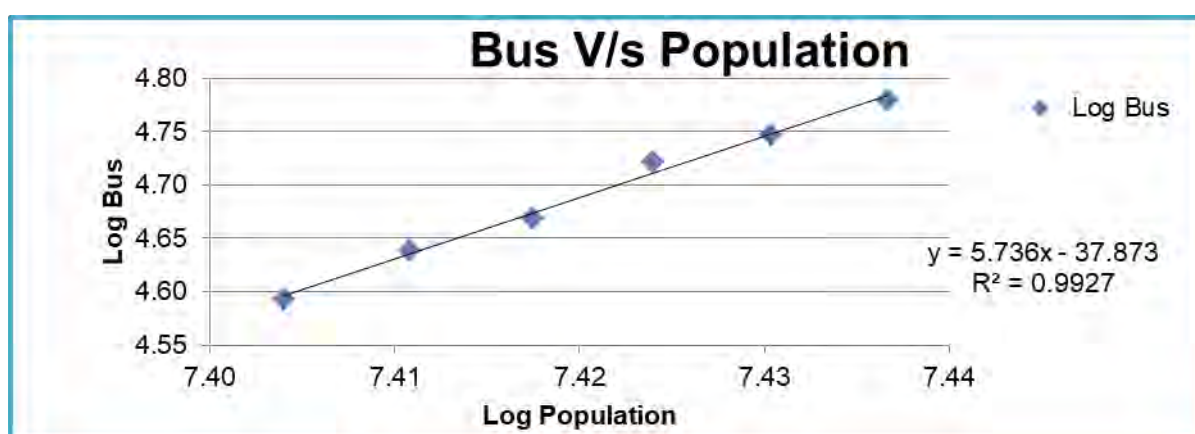


**Figure 5-9: Regression and Elasticity PCI vs. Car–Extrapolation Haryana**

**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.



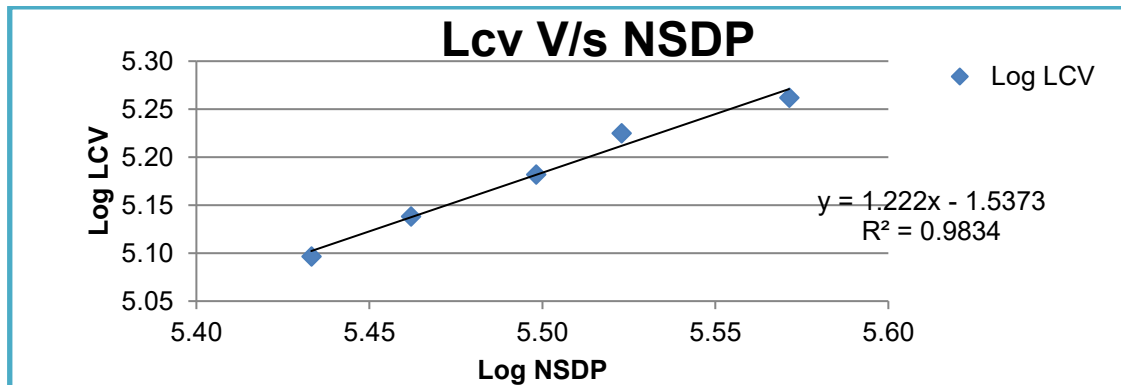
**Figure 5-10: Regression and Elasticity Population vs. Bus – Extrapolation Haryana**

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**

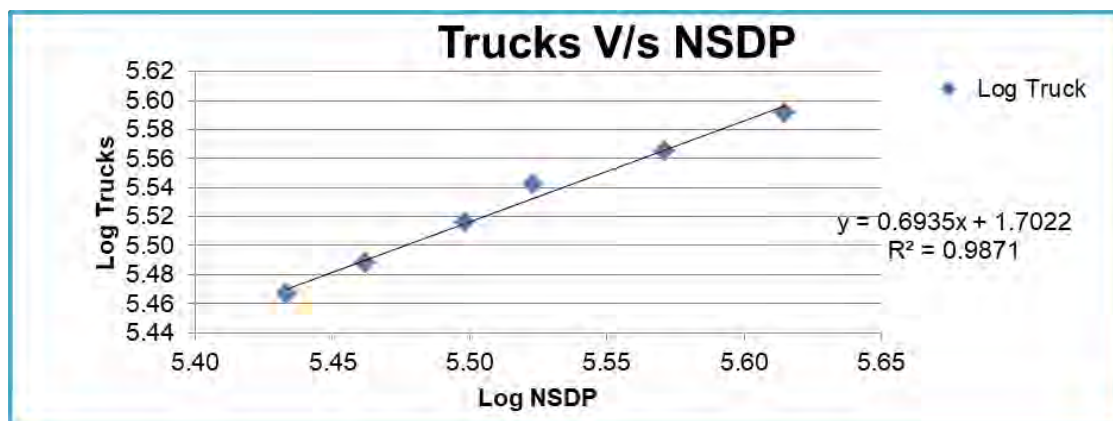
Year	NSDP	LCV	Log NDSP	Log LCV	NSDP Growth	Average Growth (5 Year)
2012	271152	124897	5.43	5.10		
2013	289756	137511	5.46	5.14	7%	
2014	314931	152069	5.50	5.18	9%	
2015	333359	167901	5.52	5.23	6%	
2016	372659	182776	5.57	5.26	12%	

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 NDSP	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 R<sup>2</sup> 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 <sup>2</sup> = 0.9823	1.8306	7.23%	13.24%	Good Regression
	Bus	Population	$y = 5.736x - 37.8732$	R <sup>2</sup> = 0.9927	5.7360	1.52%	8.69%	Good Regression
	LCV	NSDP	$y = 1.222x - 1.5373$	R <sup>2</sup> = 0.9834	1.2220	8.30%	10.14%	Good Regression
	Truck	NSDP	$y = 0.6935x - 1.7022$	R <sup>2</sup> = 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.

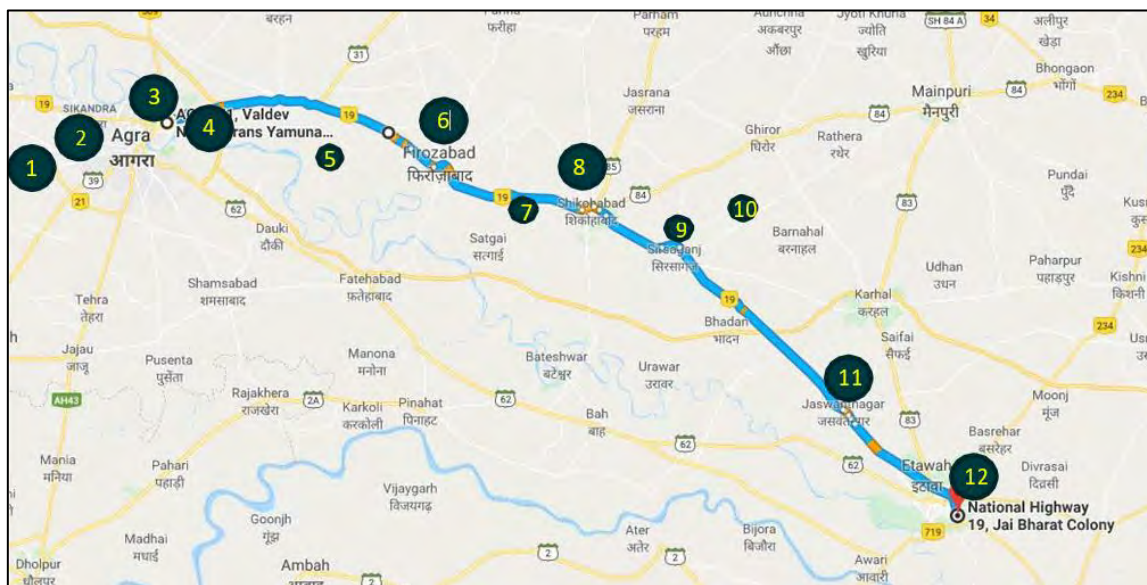
**Table 5-16 : GDP of India, UP and other important states**

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

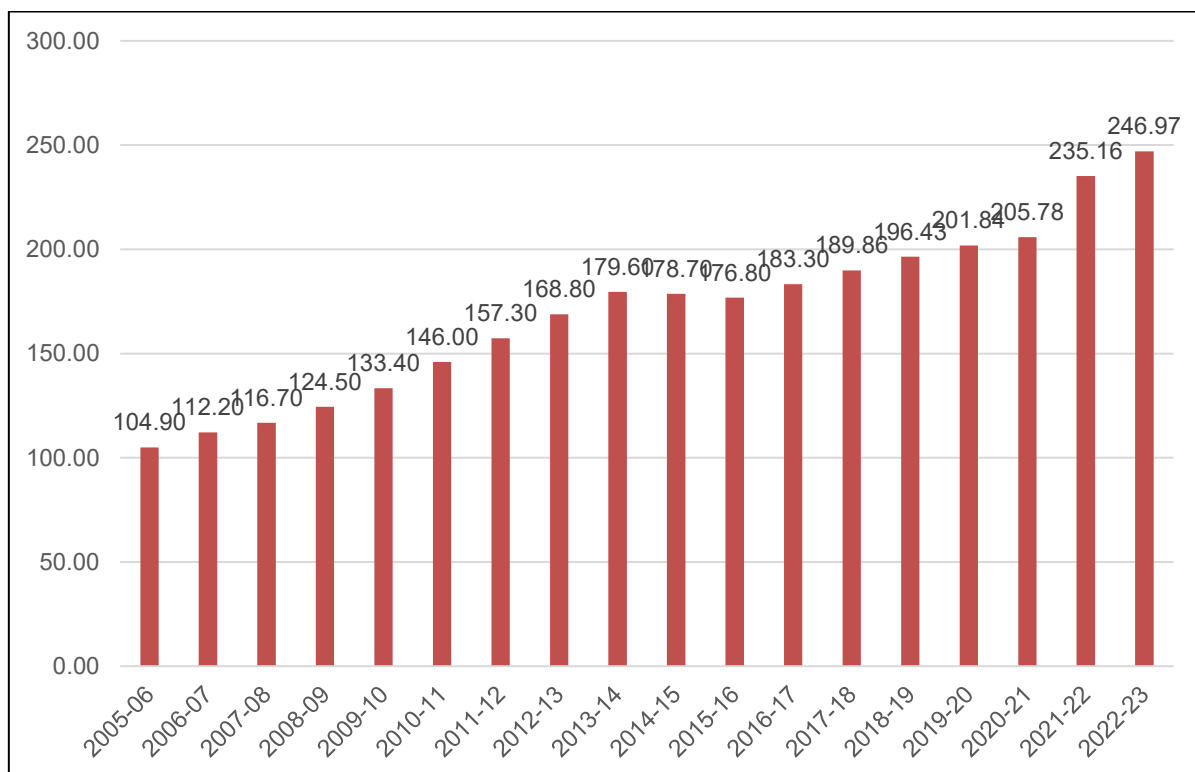
1. Monthly Pass: For frequent user's monthly pass would be issued at fee 50 time the single journey fee at 2/3<sup>rd</sup> Rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles 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](http://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.

### 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)**

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

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

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

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

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

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

## 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





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**



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614.

Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



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



# CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
INTRODUCTION .....	7
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.2.1 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
PROJECT DETAILS.....	9
2.1 Project Corridor.....	9
2.2 Project Stretch Description .....	9
2.3 Project Corridor Illustration.....	10
<b>Chapter 3 .....</b>	<b>11</b>
TRAFFIC SURVEYS AND ANALYSIS.....	11
3.1 Traffic Surveys .....	11
3.2 Classified Traffic Volume.....	12
3.3 Traffic Characteristic .....	13
3.3.1 Traffic Data .....	13
3.4 Data Analysis.....	15
3.4.1 Analysis of Traffic Volume Count .....	15
3.4.2 Components of Traffic.....	17
3.5 Secondary Data Collection .....	19
<b>Chapter 4 .....</b>	<b>20</b>
INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....	20
4.1 Introduction.....	20
4.2 Competing / Alternate route.....	20
<b>Chapter 5 .....</b>	<b>23</b>
GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....	23
5.1 Introduction.....	23
5.2 Trend Analysis.....	23
5.3 Estimation of Traffic Demand Elasticity.....	24
5.4 Analysis of Historic Traffic Data .....	30
5.5 Other Factors Influencing Growth.....	31
5.6 Developments along and around the Project Corridor & State.....	32
5.6.1 Industrial Units along Project Corridor .....	32
5.7 Recommended Growth Rates of Traffic .....	32
5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....	33
5.8 COVID Impact .....	Error! Bookmark not defined.

<b>Chapter 6 .....</b>	<b>34</b>
<b>TRAFFIC FORECAST.....</b>	<b>34</b>
6.1 Traffic Projections .....	34
6.2 Modification in Concession Period .....	37
<b>Chapter 7 .....</b>	<b>39</b>
<b>FORECAST OF TOLL REVENUE .....</b>	<b>39</b>
7.1 General.....	39
7.2 Discount Categories .....	39
7.3 Estimation of Toll Rates .....	40
7.4 Toll Revenue .....	45
7.5 Toll Revenue at all toll plazas under Scenarios .....	45
<b>Chapter 8 .....</b>	<b>47</b>
<b>CONCLUSION &amp; RECOMMENDATIONS .....</b>	<b>47</b>
8.1 Conclusion & Recommendations .....	47

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	12
Table 3-3 : Traffic Data at Lambial Kalan Toll Plaza at Km 121.020 .....	14
Table 3-4 : Traffic Data at Jojro ka Khera Toll Plaza at Km 184.0200 .....	14
Table 3-5 : PCU Factors Adopted for Study .....	15
Table 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24 .....	16
Table 3-7 : Journey Type Bifurcation of Traffic at Lambial Kalan TP KM121.020 .....	18
Table 3-8 : Journey Type Bifurcation of Traffic at Jojro ka KheraTPKm 184.020 .....	18
Table 4-1 : Competing Roads Details .....	22
Table 5-1 : Per Capita Income Vs Car Rajasthan .....	24
Table 5-2 : Population Vs Bus Rajasthan .....	25
Table 5-3 : LCV Traffic Vs NSDP Rajasthan .....	26
Table 5-4 : Truck Traffic Vs NSDP Rajasthan .....	26
Table 5-5 : Summary Regression Analysis Rajasthan .....	27
Table 5-6 : Per Capita Income Vs Car Gujarat .....	27
Table 5-7 : Population Vs Bus Gujarat .....	28
Table 5-8 : LCV Traffic Vs NSDP Gujarat .....	29
Table 5-9 : Truck Traffic Vs NSDP Gujarat .....	29
Table 5-10 : Summary Regression Analysis Gujarat .....	30
Table 5-11 : Recommended Growth Rates Optimistic .....	33
Table 5-12 : Recommended Growth Rates Pessimistic .....	33
Table 5-13 : Recommended Growth Rates Most Likely .....	33
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Lambial Kalan121.020 KM .....	34
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Jojro ka Khera184.020 KM .....	34
Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Lambial Kalan121.020 KM .....	35
Table 6-4 : Total Tollable Traffic @Toll Plaza 2- Jojro ka Khera184.020 KM .....	36
Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Lambial Kalan121.020 KM .....	36
Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Jojro ka Khera184.020 KM .....	37
Table 7-1 : Base Toll Rates June 2007-08 .....	40
Table 7-2 : Toll Rates for Single Journey@ Km 121.020 .....	41
Table 7-3 : Toll Rates for Single Journey @ Km 184.020 .....	41
Table 7-4 : Toll Rates for Return Journey @ Km 121.02 .....	42
Table 7-5 : Toll Rates for Return Journey @ Km 184.020 .....	42
Table 7-6 : Toll Rates for Monthly Pass Local @ Km 121.020 .....	43
Table 7-7 : Toll Rates for Monthly Pass Local @ Km 184.020 .....	43

---

<i>Table 7-8 : Toll Rates for Monthly Pass @ Km 121.020 .....</i>	<i>44</i>
<i>Table 7-9 : Toll Rates for Monthly Pass @ Km 184.020 .....</i>	<i>44</i>
<i>Table 7-10 : Toll Revenue Optimistic Scenario .....</i>	<i>45</i>
<i>Table 7-11 : Toll Revenue Pessimistic Scenario .....</i>	<i>45</i>
<i>Table 7-12 : Toll Revenue Most Likely Scenario .....</i>	<i>46</i>



## LIST OF FIGURES

<i>Figure 1-1: Alignment of Project Stretch.....</i>	<i>7</i>
<i>Figure 2-1: Project Alignment with Toll Plaza.....</i>	<i>9</i>
<i>Figure 2-2: Photographs showing Project Corridor .....</i>	<i>10</i>
<i>Figure 3-1 :Model Split of Tollable Vehicle-Km 121.020.....</i>	<i>17</i>
<i>Figure 3-2 :Model Split of Tollable Vehicle- Km 184.020.....</i>	<i>17</i>
<i>Figure 4-1: Alternate route at regional level .....</i>	<i>21</i>
<i>Figure 4-2: Alternate route at local level.....</i>	<i>21</i>
<i>Figure 5-1: Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	<i>25</i>
<i>Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	<i>25</i>
<i>Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan .....</i>	<i>26</i>
<i>Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Rajasthan .....</i>	<i>27</i>
<i>Figure 5-5: Regression and Elasticity PCI vs. Car – Extrapolation Gujarat.....</i>	<i>28</i>
<i>Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Gujarat .....</i>	<i>28</i>
<i>Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat .....</i>	<i>29</i>
<i>Figure 5-8: Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Gujarat.....</i>	<i>30</i>
<i>Figure 5-9 : Growth of GDP in India.....</i>	<i>31</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>40</i>

## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

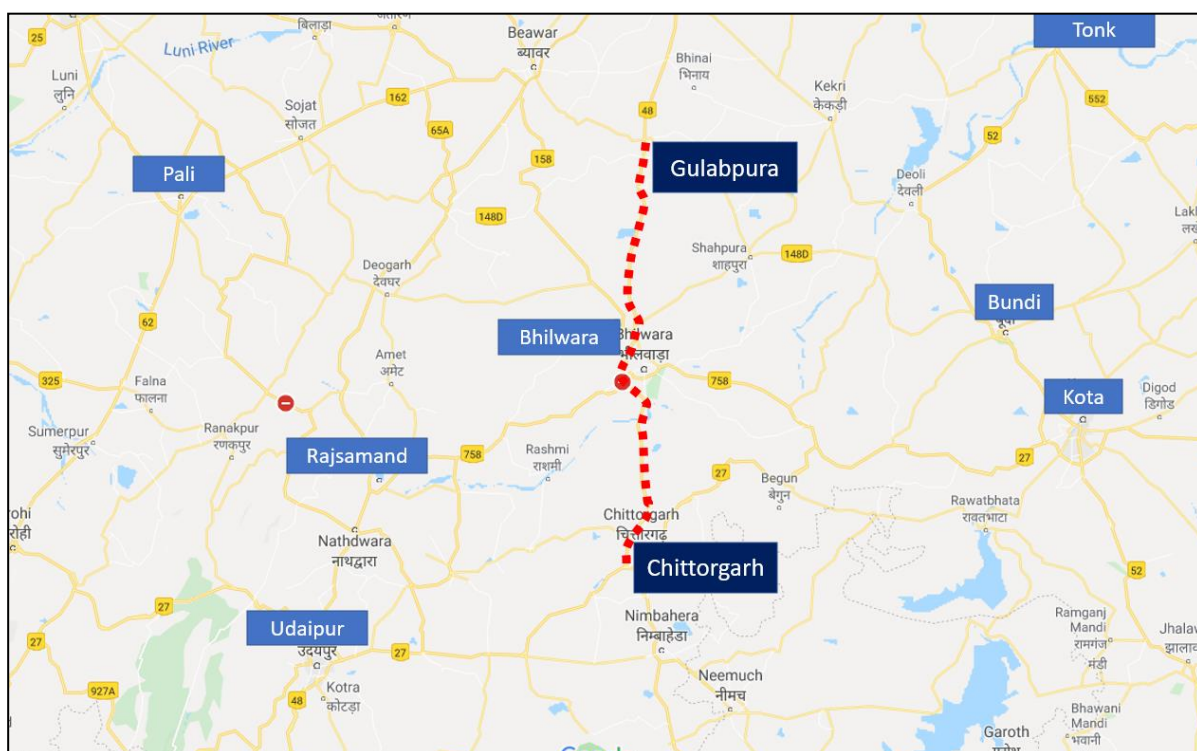
### 1.1 Background

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 Bhilwara 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.

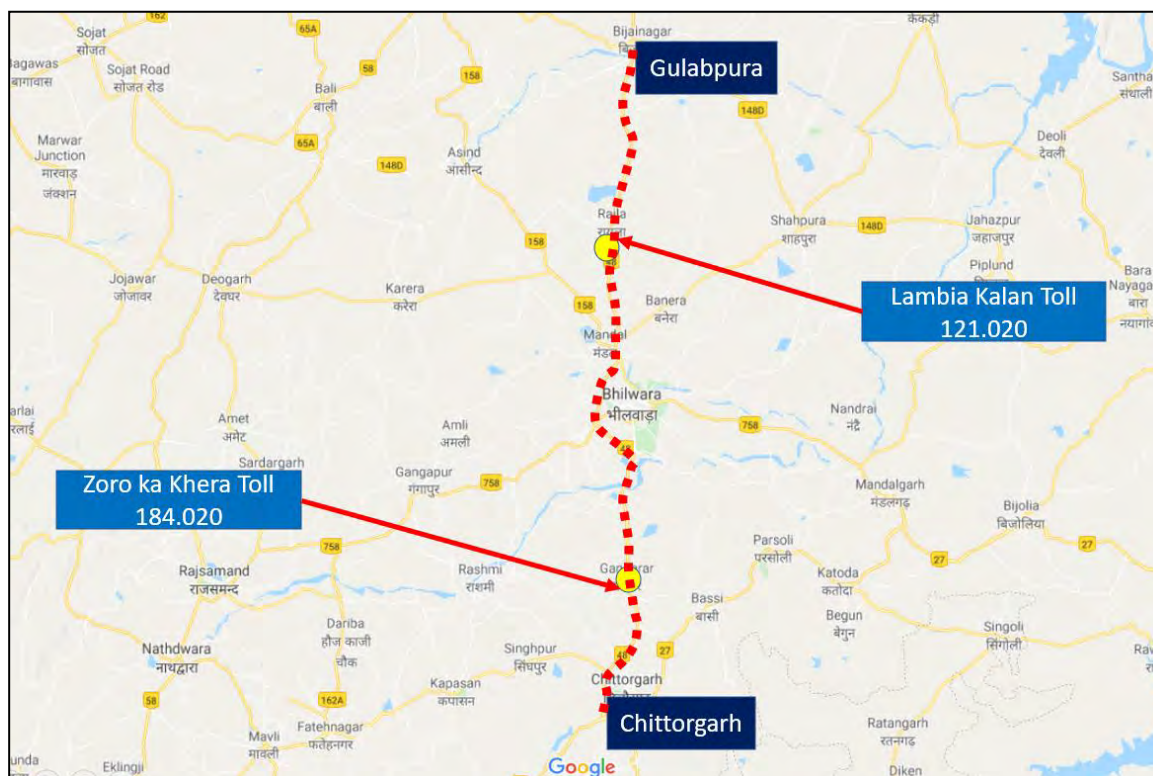
It is one of the major north-south road connectivity for the traffic from northern states of Haryana, Punjab and Delhi to Industrial and tourist areas of Rajasthan like Jaipur, Chittorgarh, Udaipur and then to Dahod, Ratlam and other parts of Madhya Pradesh.

#### 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	<b>Km 121.020 Toll Plaza at Lambia Kalan</b>	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	<b>Km 184.020 Toll Plaza at Jojro ka Khera</b>	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 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 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
<b>Total</b>		<b>13612</b>	<b>11511</b>	<b>13949</b>	<b>17072</b>	<b>17590</b>

**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
<b>Total</b>		<b>11781</b>	<b>10896</b>	<b>13592</b>	<b>16532</b>	<b>17926</b>

### 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.



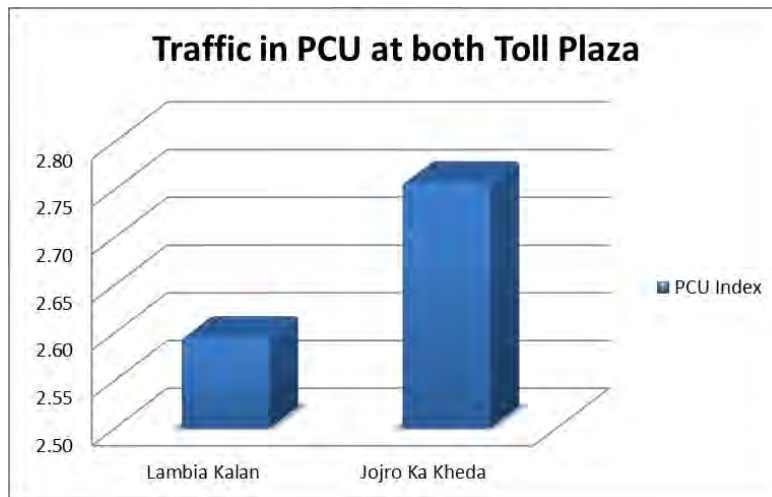


Figure 3-1: Comparison of PCU Index

### 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.

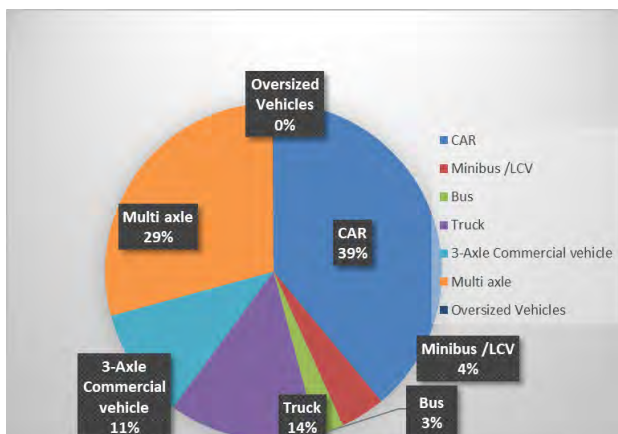


Figure 3-2 :Model Split of Tollable Vehicle-Km 121.020

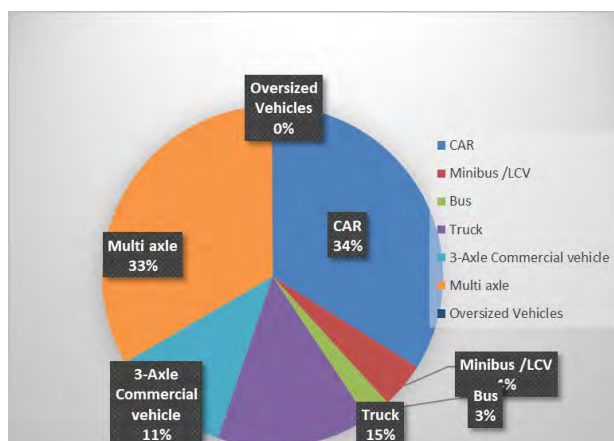


Figure 3-3 :Model Split of Tollable Vehicle- Km 184.020

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.

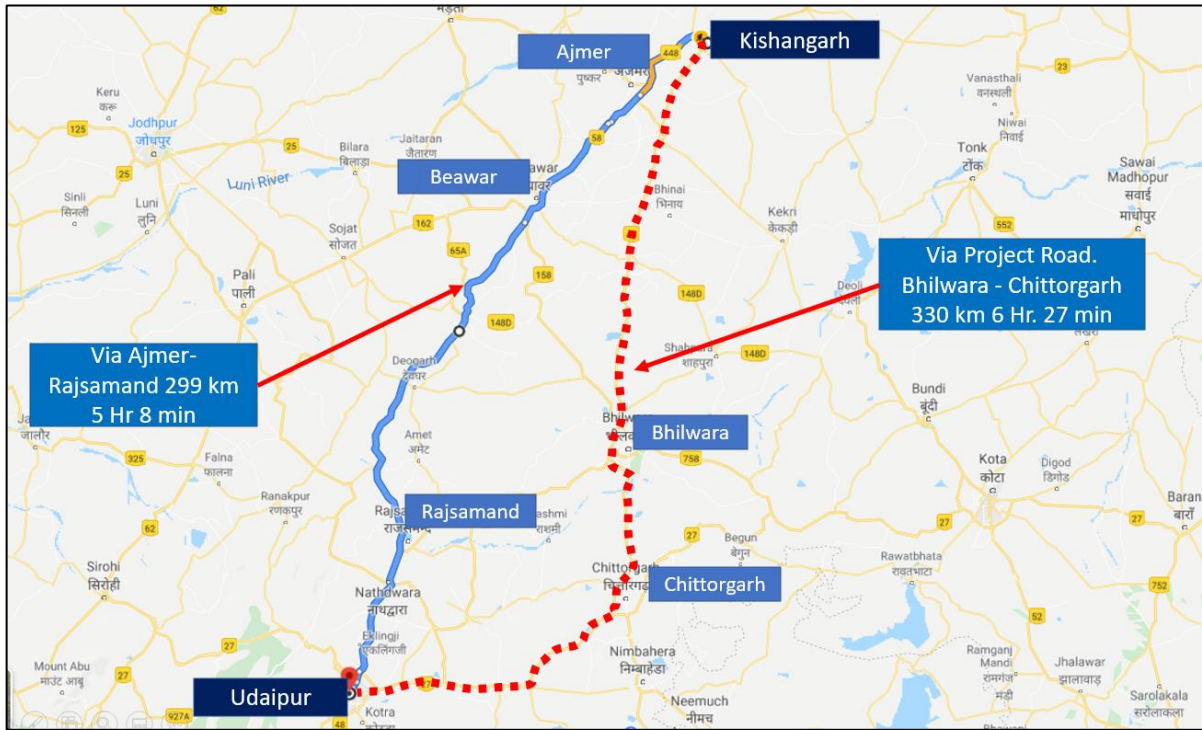


Figure 4-1: Alternate route at regional level.

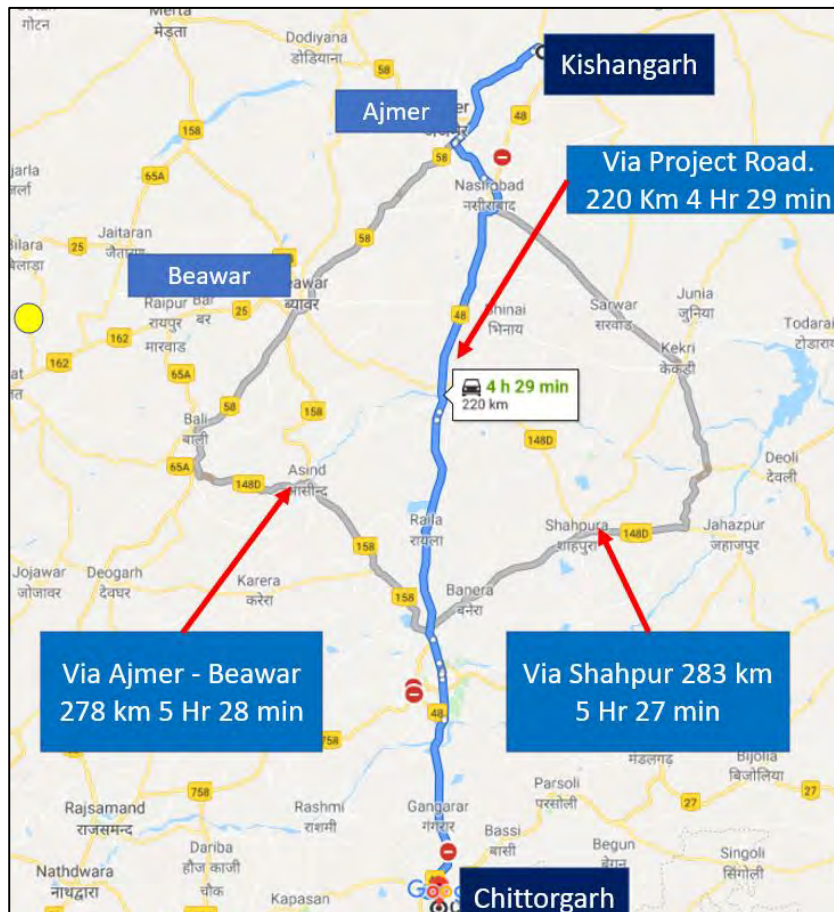


Figure 4-2: Alternate route at local level.



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
<b>Regional Level</b>						
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	
<b>Local Level</b>						
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 – 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 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.

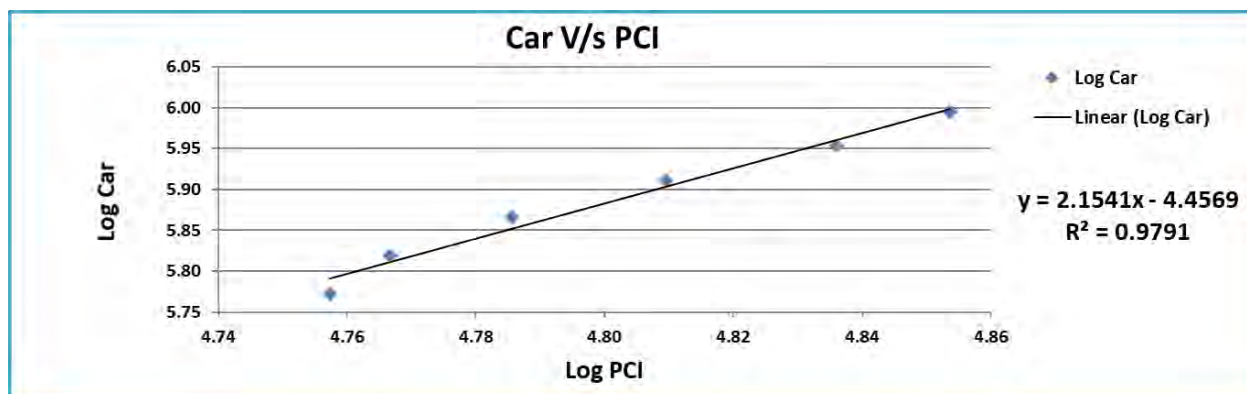
The following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

**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.

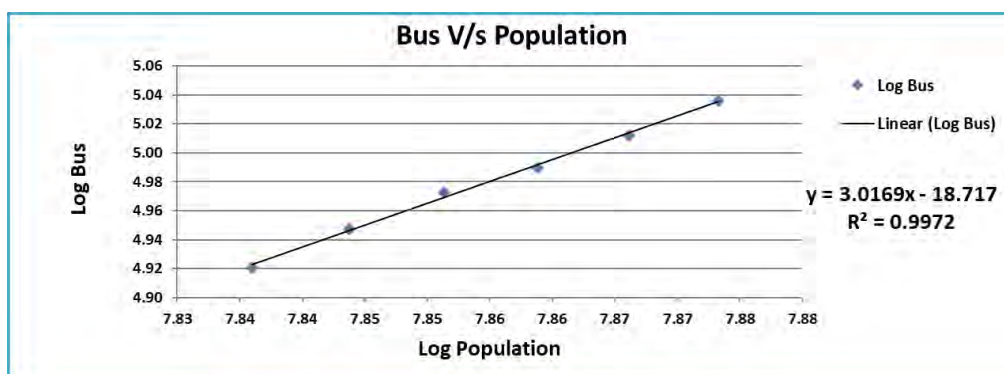


**Figure 5-1: Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan**

**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.



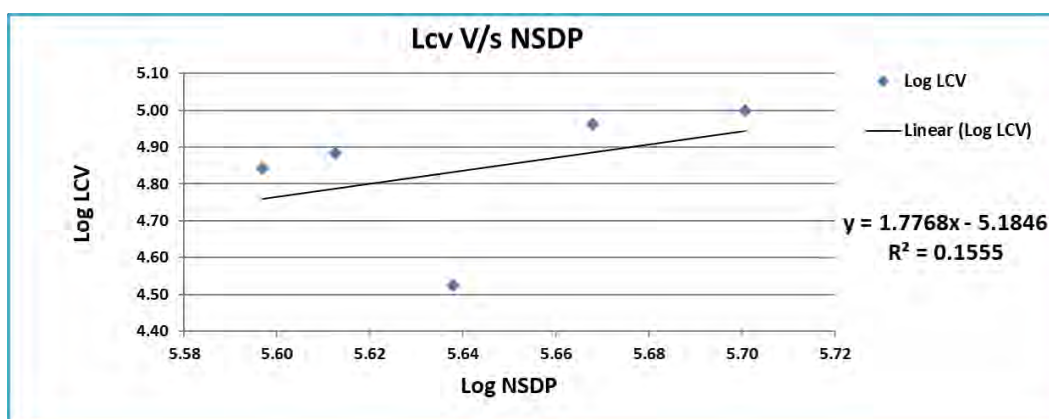
**Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan**

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%

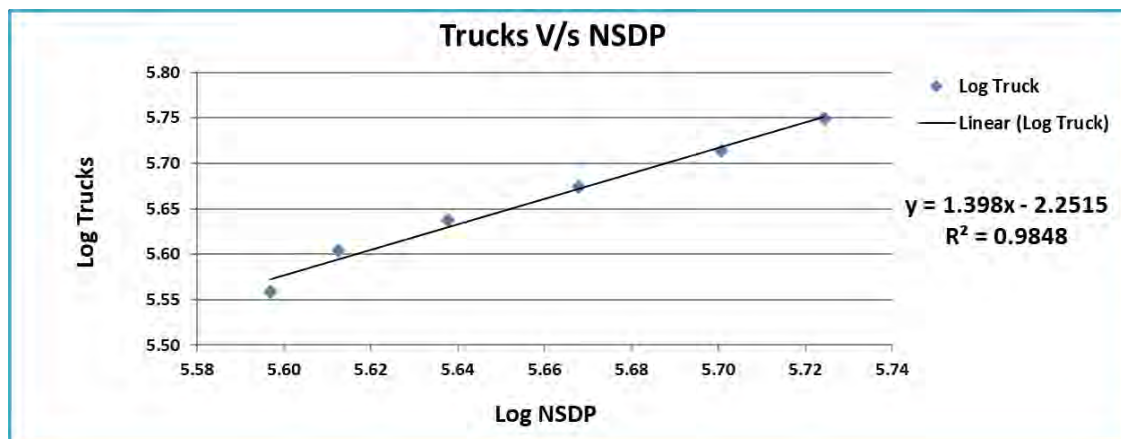
The following figure depicts regression analysis and extrapolation.

**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**

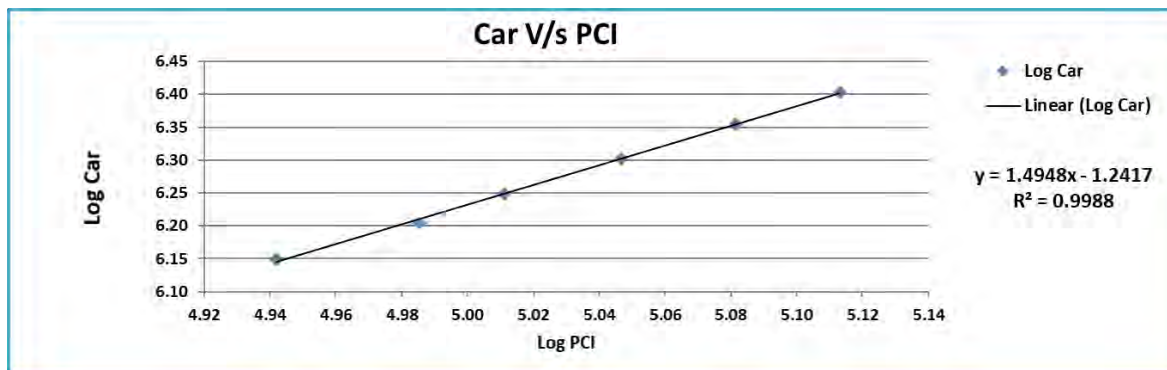
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average IV Growth (5yrs)	Growth Elastic Model	Remarks
Rajasthan	Car/Jeep	PCI	$y = 2.1541x - 4.4569$	$R^2 = 0.9791$	2.1541	4.55%	9.79%	Good Regression
	Bus	Population	$y = 3.0169x - 18.7174$	$R^2 = 0.9972$	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.

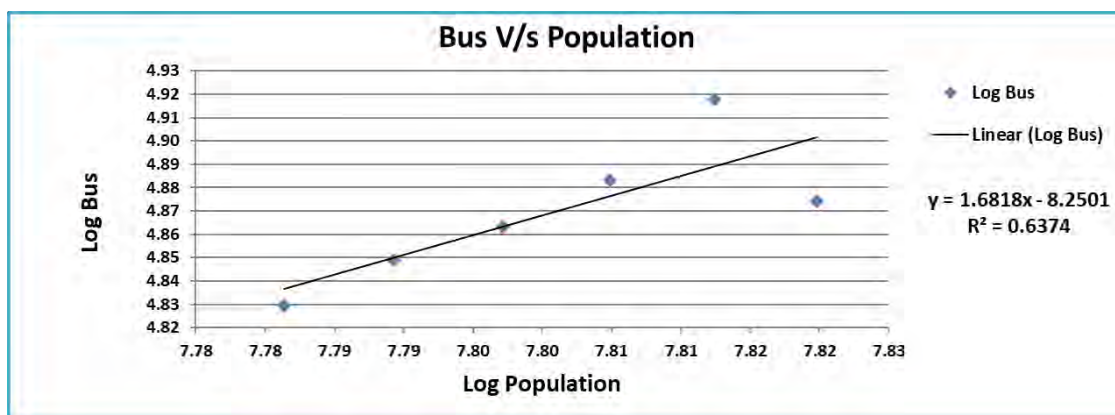


**Figure 5-5: Regression and Elasticity PCI vs. Car – Extrapolation Gujarat**

**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**

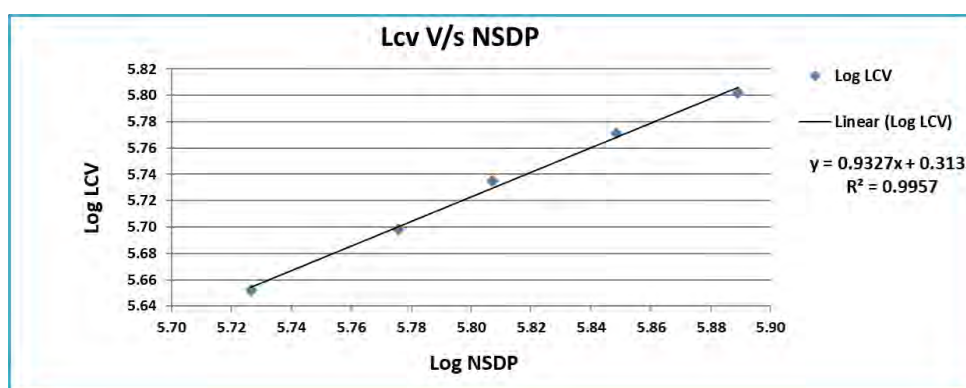


The elasticity of goods traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

**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.

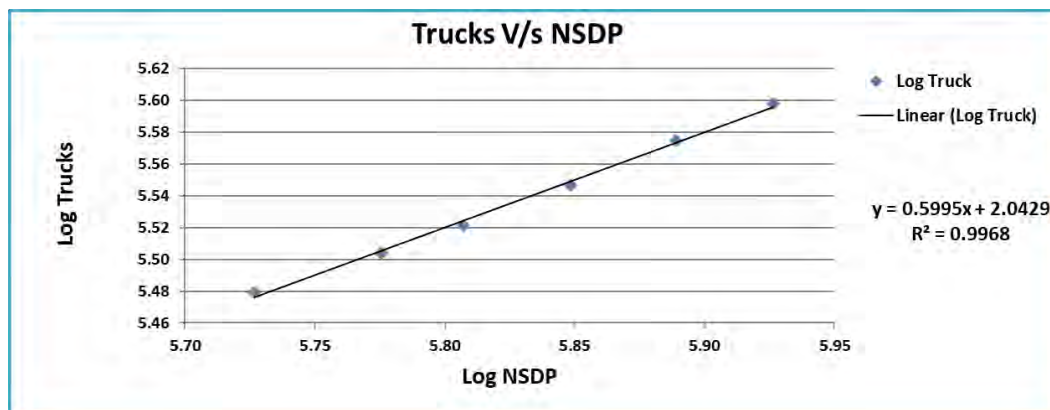


**Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat.**

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 R<sup>2</sup> 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
<b>Car/Jeep/Van</b>	8.61%	8.31%	7.01%	6.58%	6.33%	6.09%
<b>Bus</b>	4.93%	4.73%	3.77%	3.56%	3.41%	3.26%
<b>LCV</b>	5.19%	4.89%	3.83%	3.34%	3.08%	2.83%
<b>2- Axle</b>	5.68%	5.38%	4.55%	4.05%	3.78%	3.53%
<b>3 – Axle</b>	6.02%	5.71%	4.55%	4.05%	3.78%	3.53%
<b>4 to 6 Axle</b>	6.37%	6.03%	4.55%	4.05%	3.78%	3.53%
<b>7 and Above Axle</b>	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
<b>Car/Jeep/Van</b>	8.11%	7.81%	6.51%	6.08%	5.83%	5.59%
<b>Bus</b>	4.43%	4.23%	3.27%	3.06%	2.91%	2.76%
<b>LCV</b>	4.69%	4.39%	3.33%	2.84%	2.58%	2.33%
<b>2- Axle</b>	5.18%	4.88%	4.05%	3.55%	3.28%	3.03%
<b>3 – Axle</b>	5.52%	5.21%	4.05%	3.55%	3.28%	3.03%
<b>4 to 6 Axle</b>	5.87%	5.53%	4.05%	3.55%	3.28%	3.03%
<b>7 and Above Axle</b>	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
<b>Car/Jeep/Van</b>	8.36%	8.06%	6.76%	6.33%	6.08%	5.84%
<b>Bus</b>	4.68%	4.48%	3.52%	3.31%	3.16%	3.01%
<b>LCV</b>	4.94%	4.64%	3.58%	3.09%	2.83%	2.58%
<b>2- Axle</b>	5.43%	5.13%	4.30%	3.80%	3.53%	3.28%
<b>3 - Axle</b>	5.77%	5.46%	4.30%	3.80%	3.53%	3.28%
<b>4 to 6 Axle</b>	6.12%	5.78%	4.30%	3.80%	3.53%	3.28%
<b>7 and Above Axle</b>	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 - 1<sup>st</sup> 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

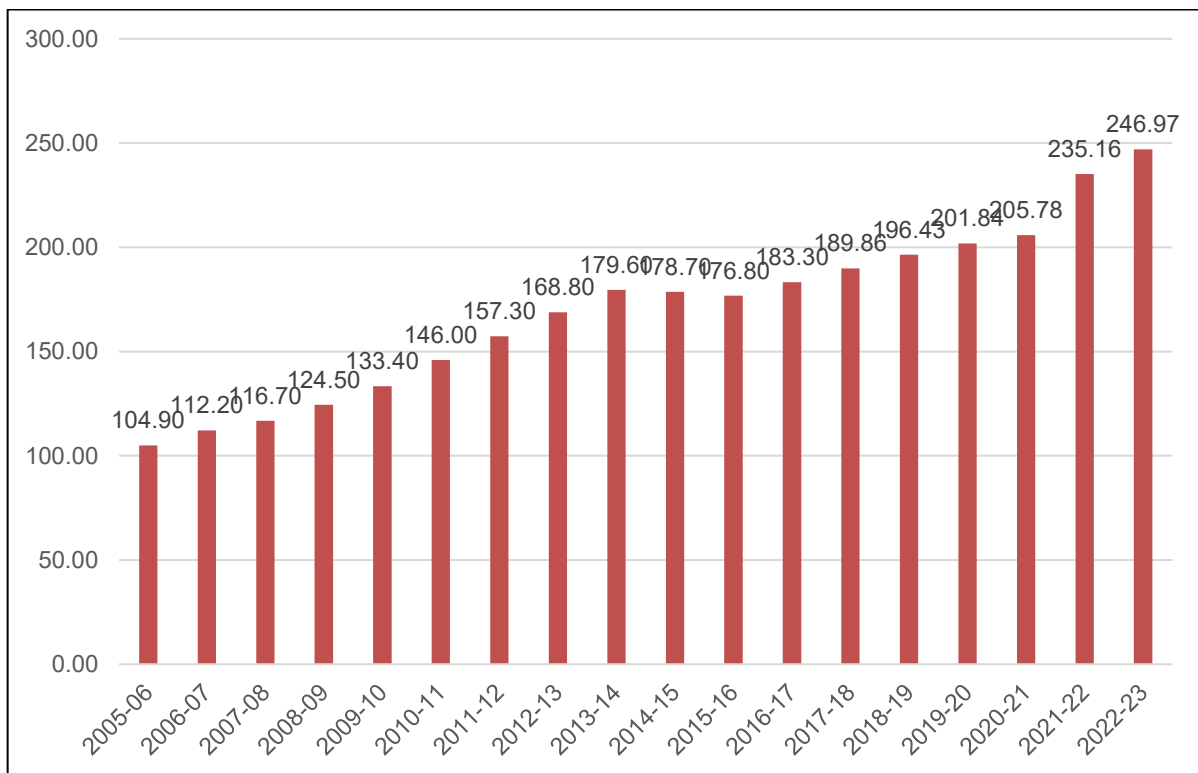
1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips in month at 2/3d rate. Additionally, concessionaire has announced special monthly passes for local commercial cars at Rs. 670.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single 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](http://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
<b>2034-35</b>	520.93	584.71	<b>1105.64</b>
<b>2035-36</b>	571.17	639.21	<b>1210.38</b>
<b>2036-37</b>	624.33	697.13	<b>1321.45</b>
<b>2037-38</b>	682.92	763.21	<b>1446.13</b>
<b>2038-39</b>	747.88	834.49	<b>1582.37</b>
<b>2039-40</b>	820.07	915.45	<b>1735.52</b>
<b>2040-41</b>	893.78	997.22	<b>1891.01</b>
<b>2041-42</b>	978.01	1088.73	<b>2066.74</b>

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

Year	TP-1	TP2	Total
<b>2023-24</b>	179.77	202.66	<b>382.43</b>
<b>2024-25</b>	195.20	218.93	<b>414.13</b>
<b>2025-26</b>	217.04	243.98	<b>461.01</b>
<b>2026-27</b>	241.26	271.52	<b>512.78</b>
<b>2027-28</b>	268.66	302.62	<b>571.28</b>
<b>2028-29</b>	298.19	334.99	<b>633.18</b>
<b>2029-30</b>	331.89	373.25	<b>705.14</b>
<b>2030-31</b>	366.30	409.42	<b>775.71</b>
<b>2031-32</b>	402.88	451.18	<b>854.06</b>
<b>2032-33</b>	441.84	494.34	<b>936.18</b>
<b>2033-34</b>	486.76	544.88	<b>1031.64</b>
<b>2034-35</b>	534.91	600.25	<b>1135.16</b>
<b>2035-36</b>	588.04	657.83	<b>1245.87</b>
<b>2036-37</b>	644.35	719.23	<b>1363.58</b>
<b>2037-38</b>	706.50	789.35	<b>1495.85</b>
<b>2038-39</b>	775.59	865.06	<b>1640.65</b>
<b>2039-40</b>	852.48	951.20	<b>1803.68</b>
<b>2040-41</b>	931.39	1038.63	<b>1970.02</b>
<b>2041-42</b>	1021.63	1136.51	<b>2158.13</b>



# 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

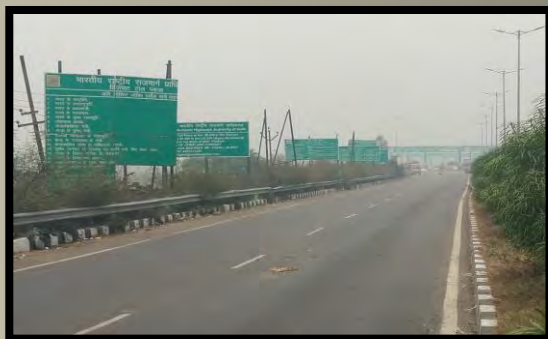
Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



# 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**



### **GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991  
Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)  
Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**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**



## CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.2.1 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS.....</b>	<b>9</b>
2.1 Project Corridor.....	9
2.2 Project Stretch Description .....	9
2.3 Project Corridor Illustration.....	10
<b>Chapter 3 .....</b>	<b>11</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>11</b>
3.1 Traffic Surveys .....	11
3.5 Classified Traffic Volume.....	12
3.6 Traffic Characteristic .....	13
3.6.1 Traffic Data .....	13
3.7 Data Analysis.....	15
3.7.1 Analysis of Traffic Volume Count .....	15
3.7.2 Components of Traffic .....	17
3.8 Secondary Data Collection .....	19
<b>Chapter 4 .....</b>	<b>20</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>20</b>
4.1 Introduction.....	20
4.2 Competing / Alternate route.....	20
<b>Chapter 5 .....</b>	<b>23</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>23</b>
5.1 Introduction.....	23
5.2 Trend Analysis.....	23
5.3 Estimation of Traffic Demand Elasticity.....	24
5.4 Analysis of Historic Traffic Data .....	35
5.5 Other Factors Influencing Growth.....	35
5.6 Developments along and around the Project Corridor & State.....	36
5.6.1 Industrial Units along Project Corridor .....	37
5.7 Recommended Growth Rates of Traffic .....	38
5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....	38
5.8 COVID-19 Impact.....	Error! Bookmark not defined.

<b>Chapter 6 .....</b>	<b>40</b>
<b>TRAFFIC FORECAST.....</b>	<b>40</b>
<b>6.1 Traffic Projections .....</b>	<b>40</b>
<b>6.2 Modification in Concession Period .....</b>	<b>44</b>
<b>Chapter 7 .....</b>	<b>45</b>
<b>FORECAST OF TOLL REVENUE .....</b>	<b>45</b>
<b>7.1 General.....</b>	<b>45</b>
<b>7.2 Discount Categories .....</b>	<b>45</b>
<b>7.3 Estimation of Toll Rates .....</b>	<b>46</b>
<b>7.4 Toll Revenue .....</b>	<b>51</b>
<b>7.5 Toll Revenue at all toll plazas under Scenarios .....</b>	<b>51</b>
<b>Chapter 8 .....</b>	<b>54</b>
<b>CONCLUSION AND RECOMMENDATIONS.....</b>	<b>54</b>
<b>8.1 Conclusion &amp; Recommendations .....</b>	<b>54</b>



## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	12
Table 3-3 : Traffic Data at Garh Toll Plaza at Km 90.661 .....	14
Table 3-4 : Traffic Data at Zoya Toll Plaza at Km 123.875 .....	14
Table 3-5 : PCU Factors Adopted for Study .....	15
Table 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24.....	16
Table 3-7 : Journey Type Bifurcation of Traffic at GarhTP-1KM 90.661 .....	18
Table 3-8 : Journey Type Bifurcation of Traffic at Zoro ka Khera TPKM 121.020.....	19
Table 4-1 : Competing Roads Details .....	22
Table 5-1 : Per Capita Income Vs Car Uttar Pradesh .....	24
Table 5-2 : Population Vs Bus Uttar Pradesh.....	25
Table 5-3 : LCV Traffic Vs NSDP Uttar Pradesh .....	26
Table 5-4 : Summary Regression Analysis Uttar Pradesh.....	28
Table 5-5 : Per Capita Income Vs Car Delhi .....	28
Table 5-6 : Population Vs Bus Delhi .....	29
Table 5-7 : LCV Traffic Vs NSDP Delhi.....	30
Table 5-8 : Summary Regression Analysis Delhi.....	32
Table 5-9 : Per Capita Income Vs Car Haryana .....	32
Table 5-10 : Population Vs Bus Haryana.....	33
Table 5-11 : LCV Traffic Vs NSDP Haryana .....	33
Table 5-12 : Summary Regression Analysis Haryana .....	35
Table 5-13 : Recommended Growth Rates Optimistic .....	38
Table 5-14 : Recommended Growth Rates Pessimistic.....	38
Table 5-15 : Recommended Growth Rates Most Likely.....	39
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Garh @90.661 KM .....	40
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Joya @123.875 KM.....	41
Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Garh @ 90.661 KM .....	41
Table 6-4 : Total Tollable Traffic @ Toll Plaza 2- Joya @123.875 KM.....	42
Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Garh @ 90.661 KM .....	42
Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Joya @123.875 KM.....	43
Table 7-1 : Base Toll Rates June 2007-08.....	46
Table 7-2 : Toll Rates for Single Journey@ Km 90.661 .....	47
Table 7-3 : Toll Rates for Return Journey @ Km 90.661.....	48
Table 7-4 : Toll Rates for Return Journey @ Km 123.875.....	49
Table 7-5 : Toll Rates for Monthly Pass Local @ Km 90.661.....	49

---

<i>Table 7-6 : Toll Rates for Monthly Pass Local @ Km 123.87</i> .....	50
<i>Table 7-7 : Toll Rates for Monthly Pass @ Km 90.661</i> .....	50
<i>Table 7-8 : Toll Rates for Monthly Pass @ Km 123.875</i> .....	51
<i>Table 7-9 : Toll Revenue Optimistic Scenario</i> .....	52
<i>Table 7-10 : Toll Revenue Pessimistic Scenario</i> .....	52
<i>Table 7-11 : Toll Revenue Most Likely Scenario</i> .....	53

## LIST OF FIGURES

<i>Figure 1-1: Alignment of Project Stretch</i> .....	7
<i>Figure 2-2: Project Alignment with Toll Plaza</i> .....	10
<i>Figure 2-3: Photographs showing Project Corridor</i> .....	10
<i>Figure 3-1: Comparison of PCU Index</i> .....	17
<i>Figure 4-1: Alternate route at regional level</i> .....	21
<i>Figure 4-2: Alternate route at local level</i> .....	21
<i>Figure 5-1: Regression and Elasticity PCI vs. Car–Extrapolation Uttar Pradesh</i> .....	25
<i>Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh</i> .....	26
<i>Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Uttar Pradesh</i> .....	27
<i>Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Uttar Pradesh</i> .....	27
<i>Figure 5-5: Regression and Elasticity PCI vs. Car–Extrapolation Delhi</i> .....	29
<i>Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Delhi</i> .....	29
<i>Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Delhi</i> .....	30
<i>Figure 5-8: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Delhi</i> .....	31
<i>Figure 5-9: Regression and Elasticity PCI vs. Car–Extrapolation Haryana</i> .....	32
<i>Figure 5-10: Regression and Elasticity Population vs. Bus – Extrapolation Haryana</i> .....	33
<i>Figure 5-11: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Haryana</i> .....	34
<i>Figure 5-12: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Haryana</i> .....	34
<i>Table 5-13: Summary Regression Analysis Haryana</i> .....	35
<i>Figure 5-14: Growth of GDP in India</i> .....	36
<i>Figure 5-15: Industrial Units along project corridor</i> .....	37
<i>Figure 7-1 : Historical Rate of WPI Inflation in India</i> .....	46

## ABBREVIATIONS

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

# CHAPTER 1

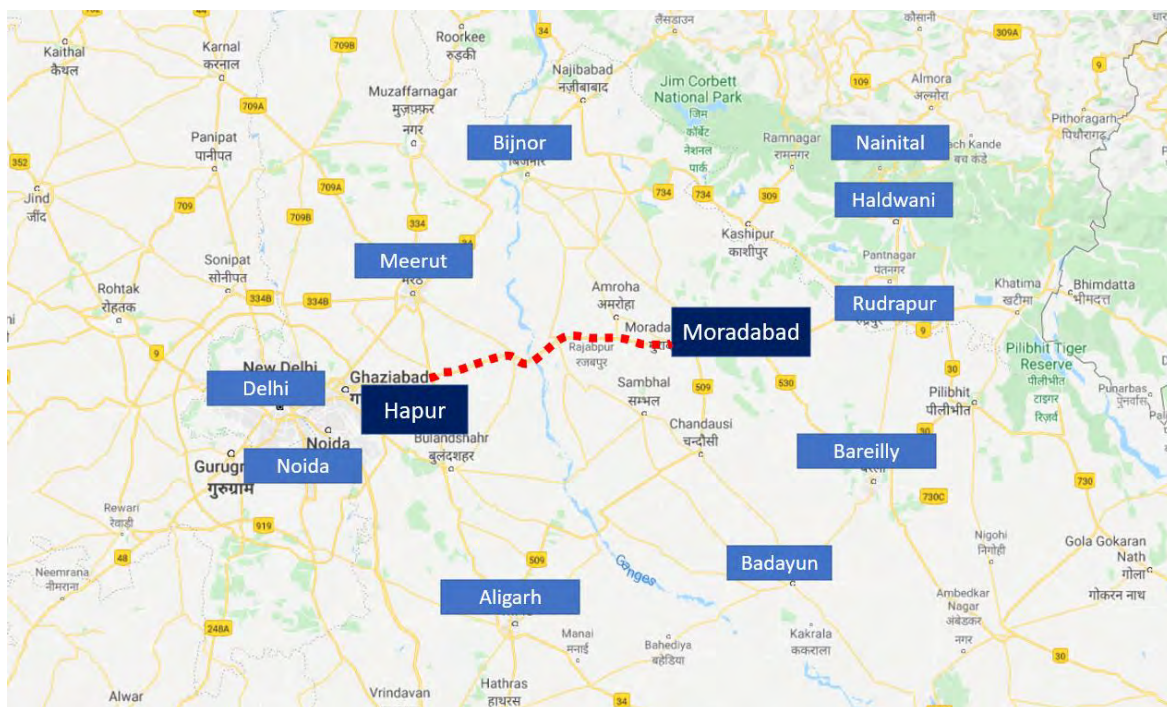
## INTRODUCTION

### 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)

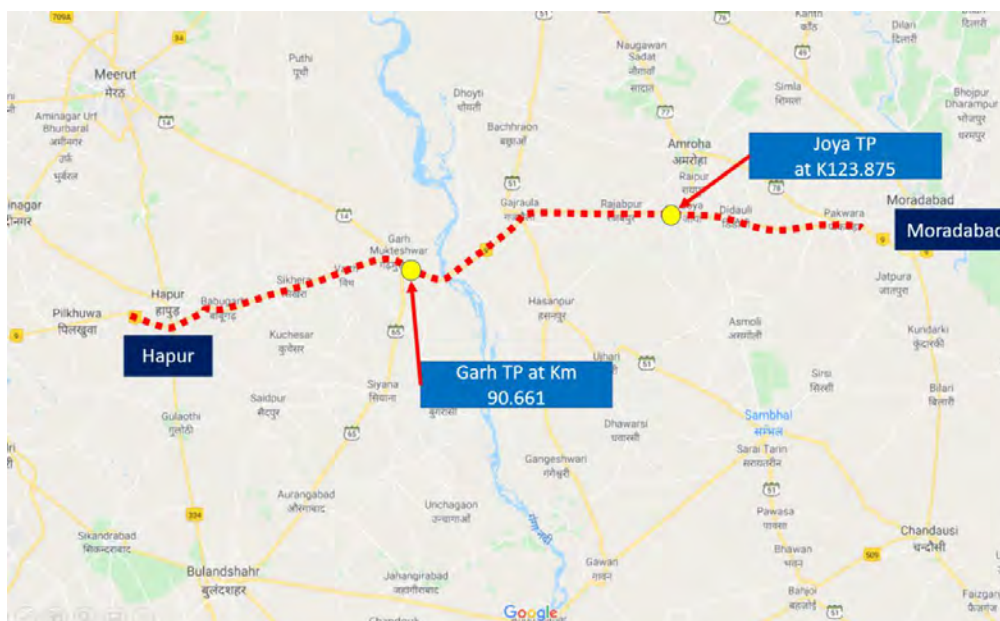
#### 2.2 Project Stretch Description

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
	<b>Total</b>	<b>24977</b>	<b>24657</b>	<b>30283</b>	<b>32899</b>	<b>36686</b>

**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
	<b>Total</b>	<b>17982</b>	<b>17570</b>	<b>20246</b>	<b>23203</b>	<b>26481</b>

### 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
<b>Garh Km 90.661</b>	<b>2019-2020</b>	24977	42251	1.69
	<b>2020-2021</b>	24657	40024	1.62
	<b>2021-2022</b>	30283	46705	1.54
	<b>2022-2023</b>	32899	50882	1.55
	<b>2023-2024</b>	36686	56079	1.53
<b>Joya Km 123.875</b>	<b>2019-2020</b>	17982	31508	1.75
	<b>2020-2021</b>	17570	30337	1.73
	<b>2021-2022</b>	20246	33545	1.66
	<b>2022-2023</b>	23203	38427	1.66
	<b>2023-2024</b>	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.

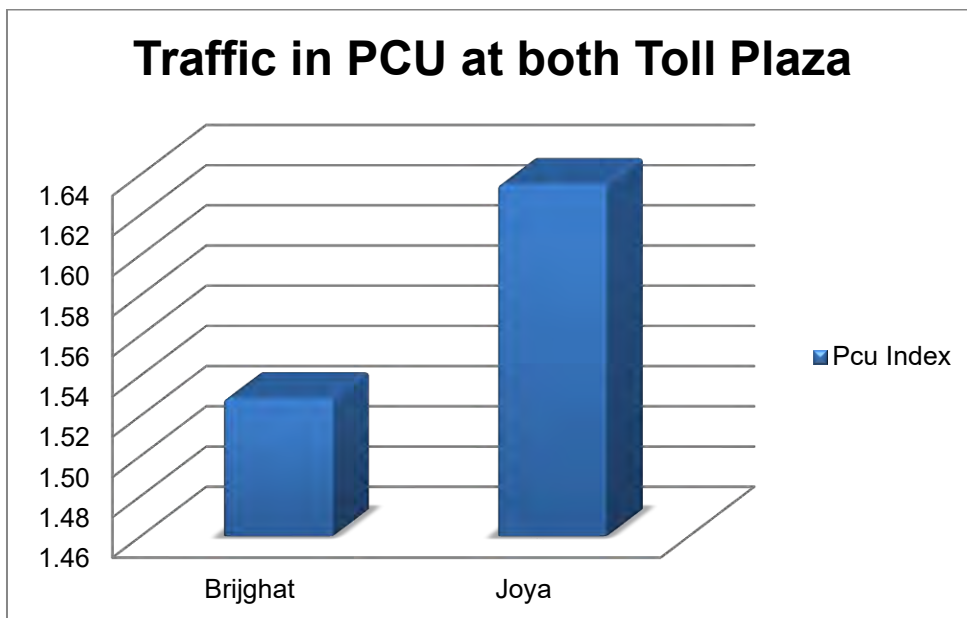


Figure 3-1: Comparison of PCU Index

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.

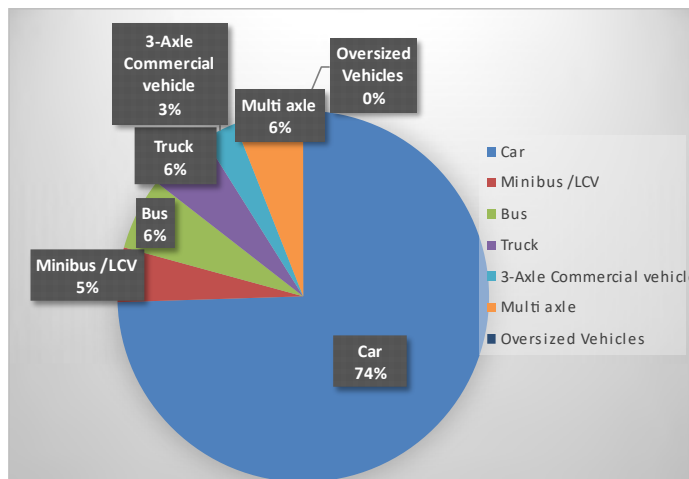
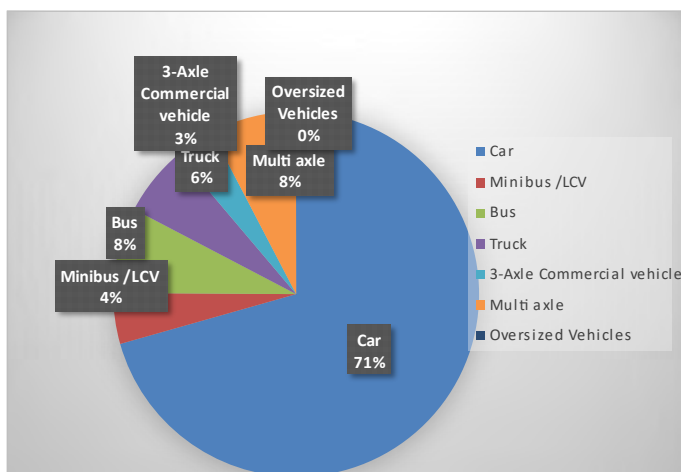


Figure 3-2: Model Split of Tollable Vehicle @TP-1



**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
<b>Regional Level</b>						
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	
<b>Local Level</b>						
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 – 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 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.

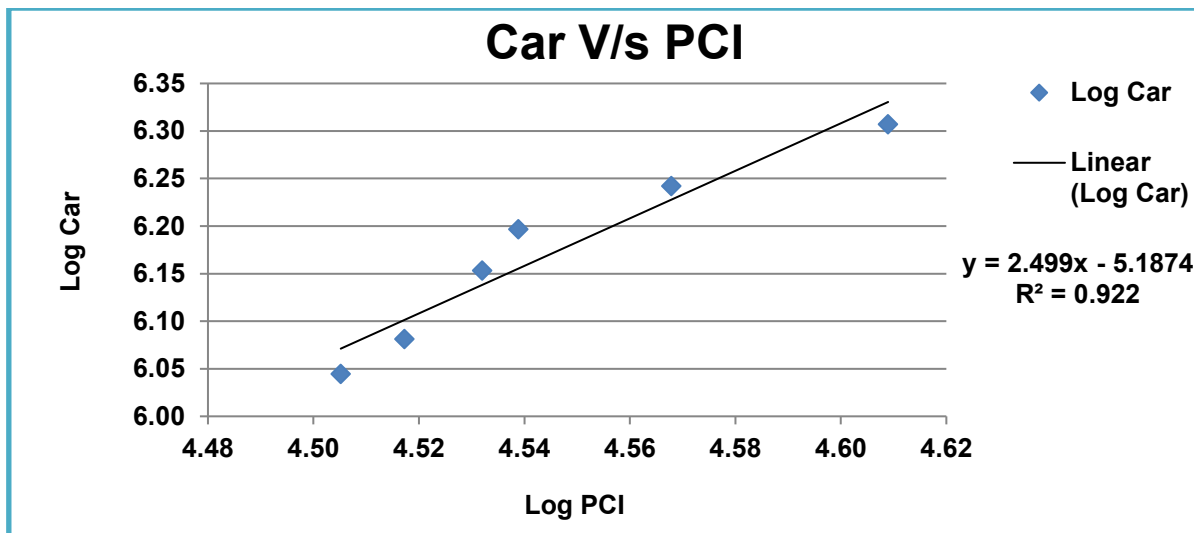
The following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

**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.

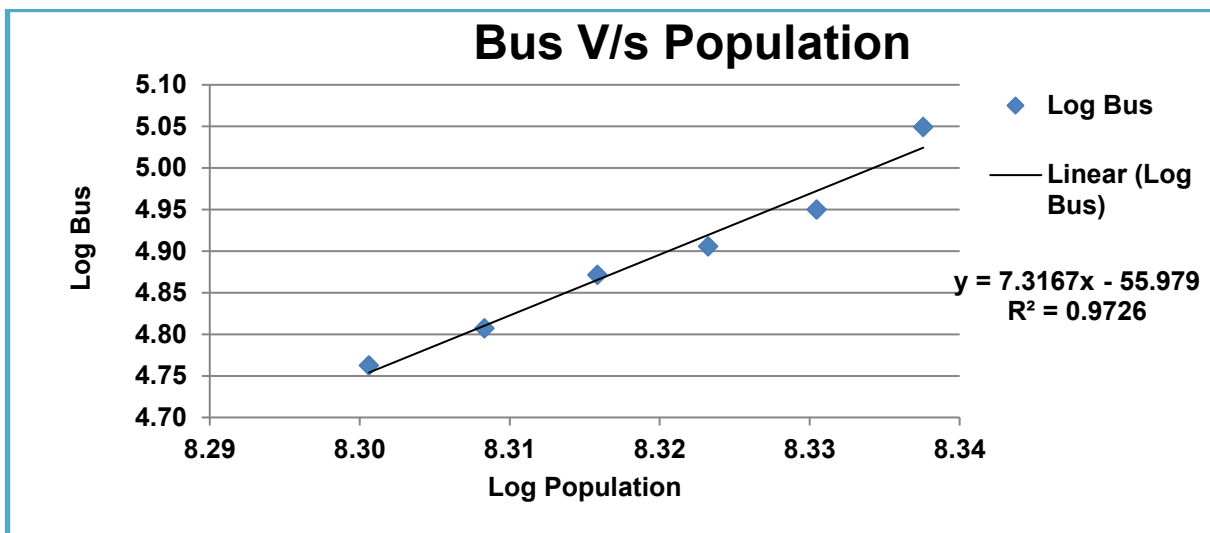


*Figure 5-1: Regression and Elasticity PCI vs. Car–Extrapolation Uttar Pradesh*

*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.



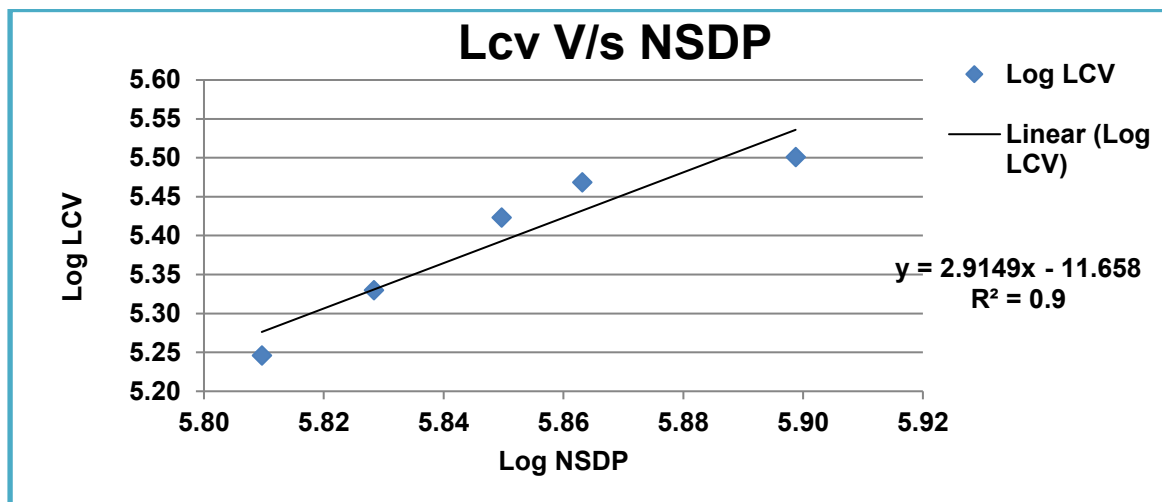


Figure 5-3: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Uttar Pradesh

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.

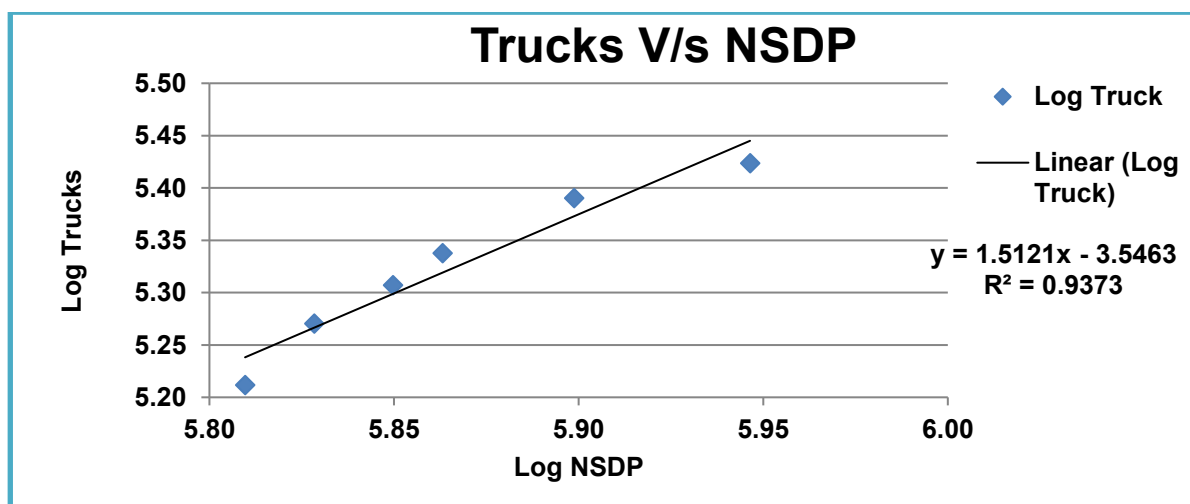


Figure 5-4: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Uttar Pradesh

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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R<sup>2</sup> 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 <sup>2</sup> = 0.922	2.4990	4.94%	12.34%
	Bus	Population	$y = 7.3167x - -55.9791$	R <sup>2</sup> = 0.9726	7.3167	1.72%	12.56%
	LCV	NSDP	$y = 2.9149x - -11.6585$	R <sup>2</sup> = 0.9	2.9149	5.28%	15.40%
	Truck	NSDP	$y = 1.5121x - -3.5463$	R <sup>2</sup> = 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.

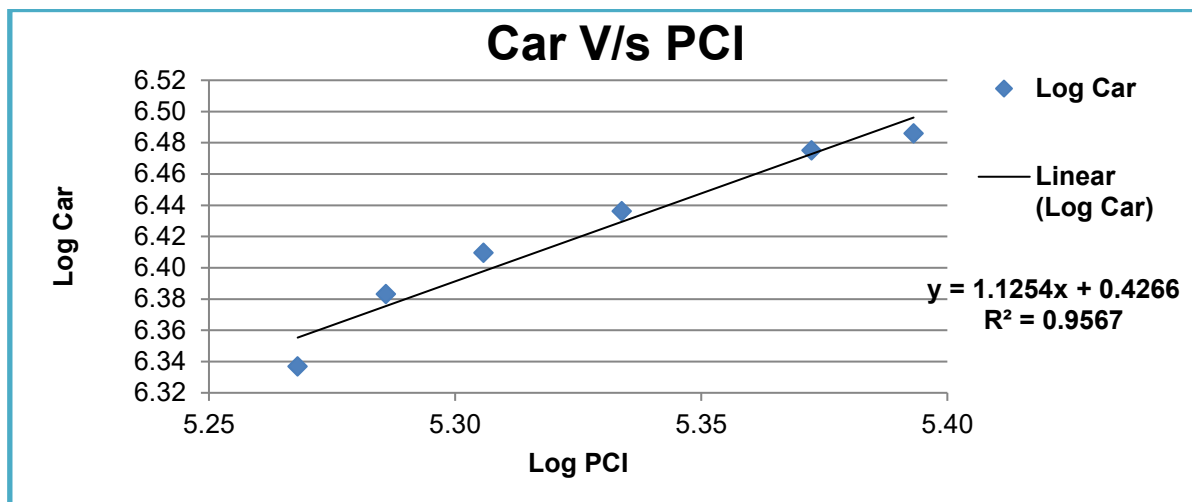


Figure 5-5: Regression and Elasticity PCI vs. Car–Extrapolation Delhi

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.

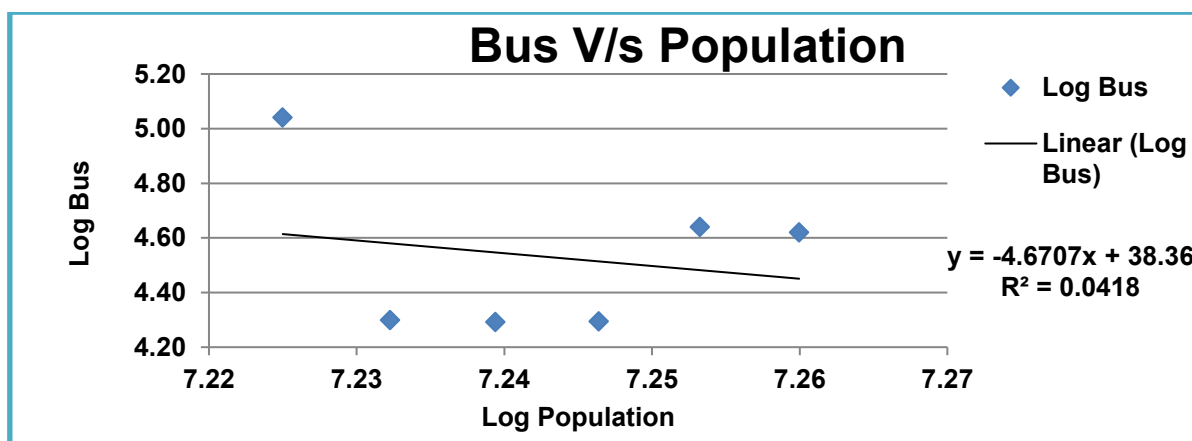


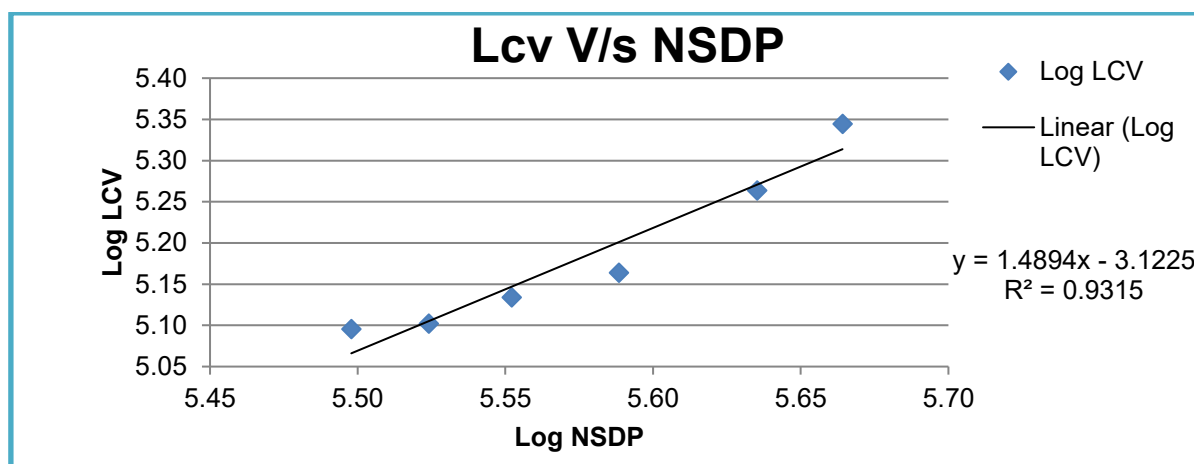
Figure 5-6: Regression and Elasticity Population vs. Bus – Extrapolation Delhi

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.

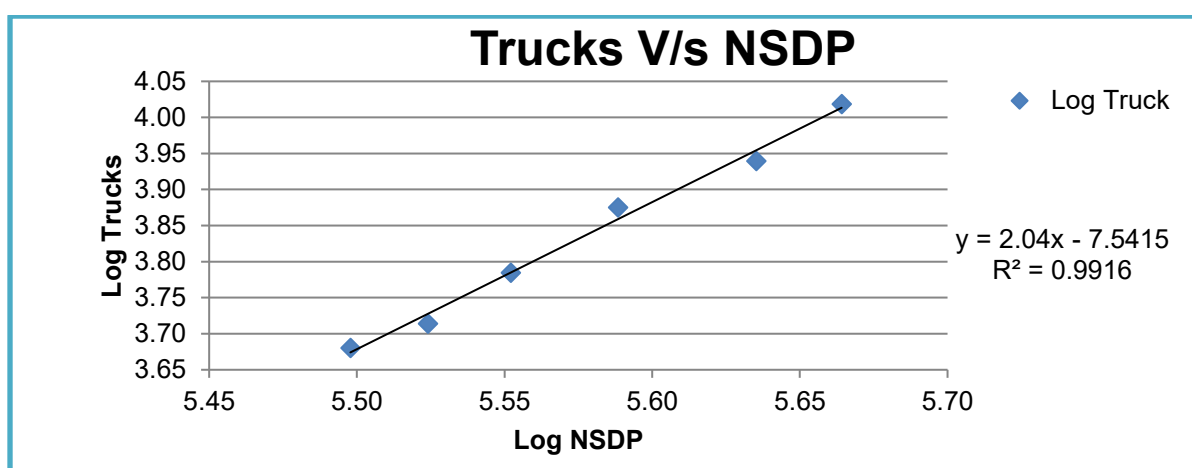


**Figure 5-7: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Delhi**

**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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R<sup>2</sup> values are presented in the Table below.

**Table 5-8 : Summary Regression Analysis Delhi**

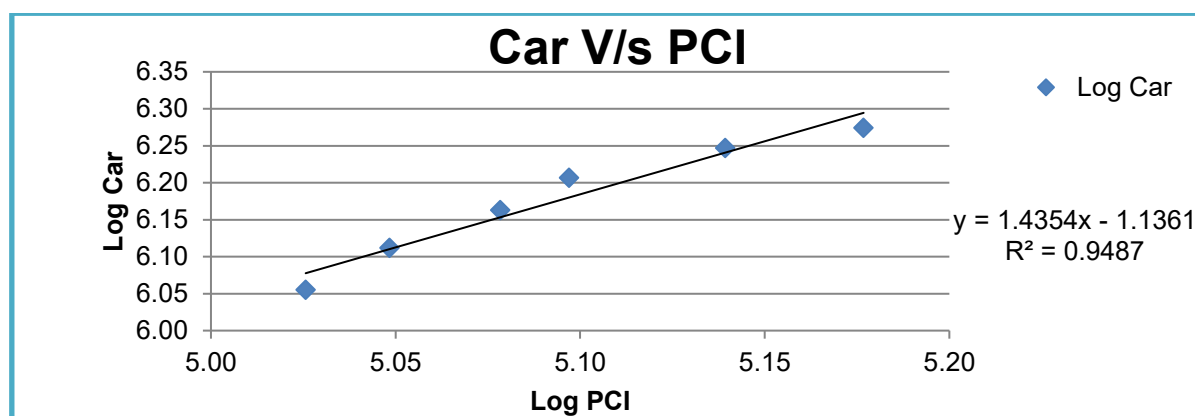
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Delhi	Car/Jeep	PCI	$y = 1.1254x + 0.4266$	$R^2 = 0.9567$	1.1254	5.95%	6.69%
	Bus	Population	$y = -4.6707x - 38.36$	$R^2 = 0.0418$	-4.6707	1.62%	-7.58%
	LCV	NSDP	$y = 1.4894x - 3.1225$	$R^2 = 0.9315$	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.

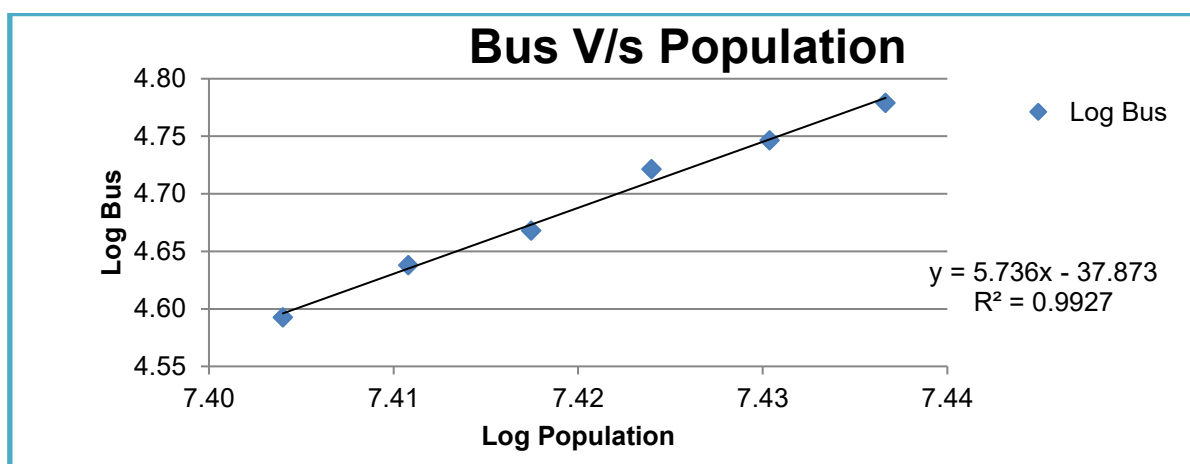
**Figure 5-9: Regression and Elasticity PCI vs. Car–Extrapolation Haryana**



**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.

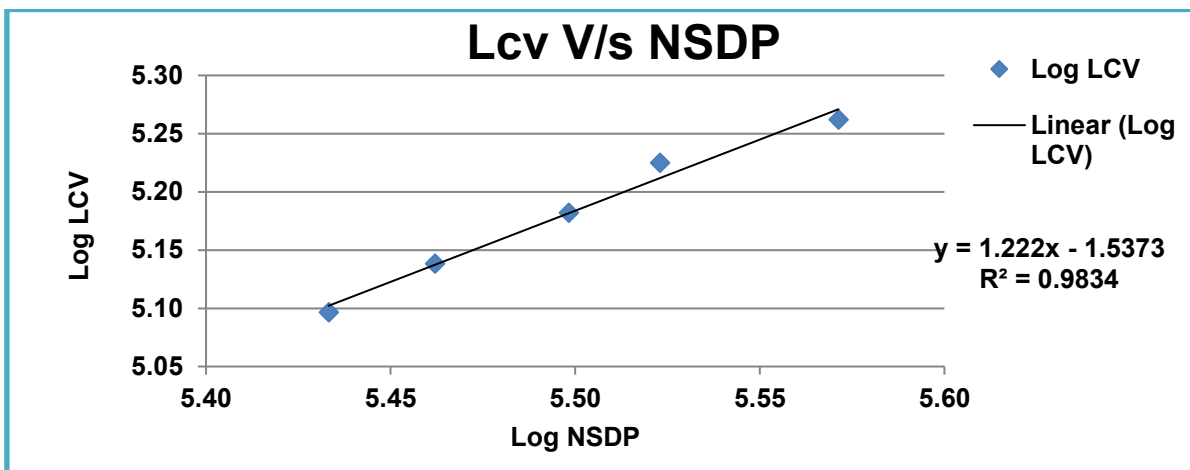


Figure 5-11: Regression and Elasticity NSDP vs. LCV Traffic – extrapolation Haryana

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.

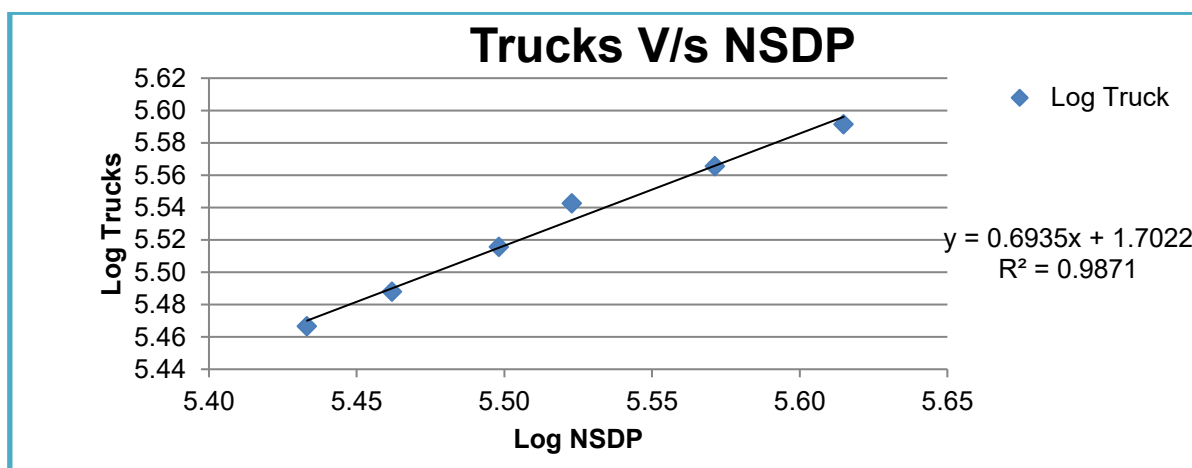


Figure 5-12: Regression and Elasticity NSDP vs. Truck Traffic – extrapolation Haryana

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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for the good fit regression as reflected by R<sup>2</sup> 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.

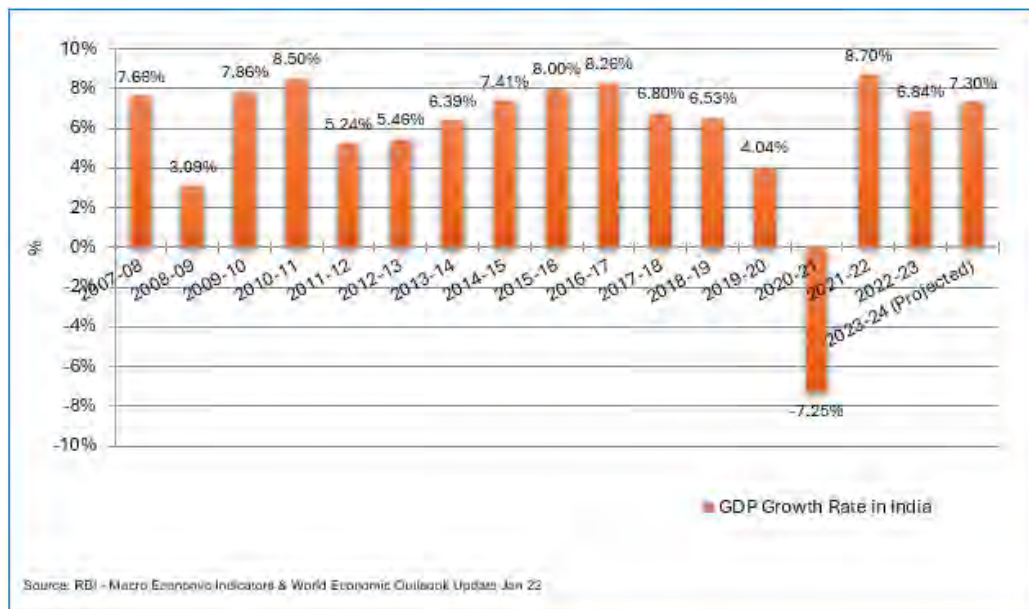
#### 5.5 Other Factors Influencing Growth

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

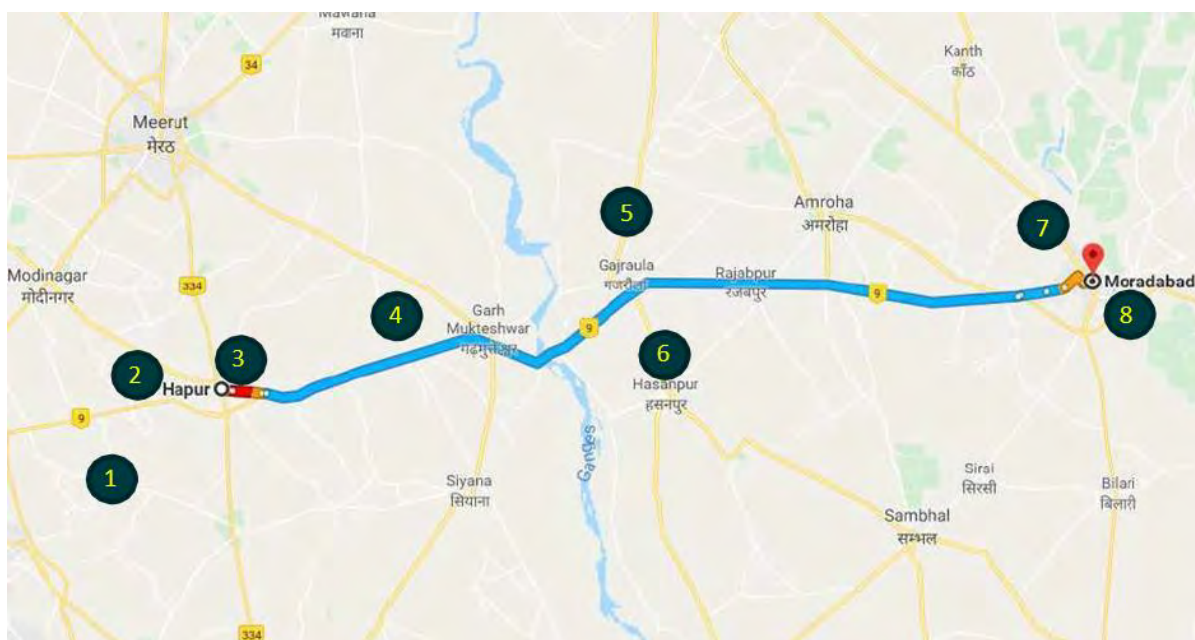
Though growth of Uttar Pradesh has been consistently below the national average economic growth, it is the largest state in terms of population and consumption driven demand for goods and services will remain significantly high. The rate of growth of NSDP also seems to be catching up with the national 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 rich 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**

<b>Category / Year</b>	<b>2024-2026</b>	<b>2026-2031</b>	<b>2031-2036</b>	<b>2036-2041</b>	<b>2041-2046</b>
<b>Car/Jeep/Van</b>	5.98%	5.76%	5.53%	4.11%	3.92%
<b>LCV</b>	3.01%	2.81%	2.22%	1.51%	1.32%
<b>Bus</b>	3.08%	2.95%	3.19%	2.48%	2.37%
<b>2- Axle</b>	3.56%	3.36%	2.92%	1.51%	1.32%
<b>3 - Axle</b>	3.56%	3.36%	2.92%	1.51%	1.32%
<b>4 to 6 Axle</b>	3.89%	3.67%	3.18%	1.64%	1.43%
<b>7 and Above Axle</b>	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 - 1<sup>st</sup> 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

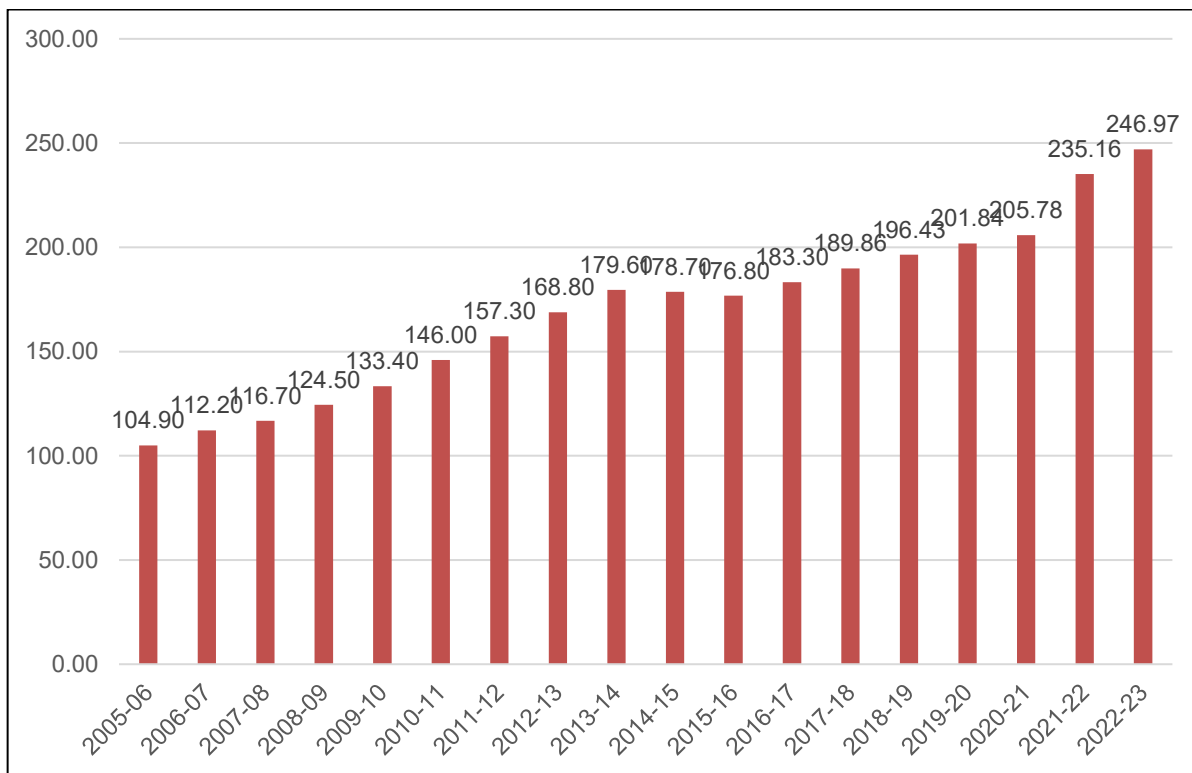
1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips in month at 2/3d rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers 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](http://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	<b>310.18</b>
2024-25	222.06	112.29	<b>334.35</b>
2025-26	250.44	123.92	<b>374.36</b>
2026-27	280.82	134.33	<b>415.16</b>
2027-28	309.00	148.44	<b>457.44</b>
2028-29	338.20	163.80	<b>502.00</b>
2029-30	375.71	180.43	<b>556.14</b>
2030-31	410.09	197.45	<b>607.54</b>
2031-32	453.00	218.01	<b>671.01</b>
2032-33	498.96	237.82	<b>736.79</b>
2033-34	546.16	261.42	<b>807.58</b>
2034-35	598.77	287.18	<b>885.95</b>
2035-36	653.11	310.68	<b>963.79</b>
2036-37	709.60	338.63	<b>1048.23</b>
2037-38	773.44	366.46	<b>1139.90</b>
2038-39	841.17	396.36	<b>1237.54</b>
2039-40	917.89	434.79	<b>1352.68</b>
2040-41	990.69	467.48	<b>1458.17</b>
2041-42	1080.46	509.54	<b>1590.00</b>
2042-43	1173.41	552.52	<b>1725.93</b>
2043-44	1279.55	602.93	<b>1882.48</b>
2044-45	1386.60	652.95	<b>2039.55</b>

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

Year	TP-1	TP2	Total
2023-24	205.34	104.84	<b>310.18</b>
2024-25	221.00	111.75	<b>332.75</b>
2025-26	248.05	122.75	<b>370.80</b>
2026-27	276.74	132.42	<b>409.16</b>
2027-28	303.04	145.58	<b>448.62</b>
2028-29	330.10	159.89	<b>489.99</b>
2029-30	365.00	175.26	<b>540.26</b>
2030-31	396.50	190.88	<b>587.38</b>
2031-32	435.89	209.73	<b>645.62</b>
2032-33	477.79	227.70	<b>705.49</b>
2033-34	520.45	249.09	<b>769.54</b>
2034-35	567.76	272.37	<b>840.12</b>
2035-36	616.22	293.23	<b>909.45</b>
2036-37	666.24	318.02	<b>984.27</b>
2037-38	722.73	342.48	<b>1065.21</b>
2038-39	782.30	368.62	<b>1150.92</b>

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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





**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**

**GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





**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**



# Contents

<b>Chapter 1</b> .....	<b>7</b>
<b>INTRODUCTION</b> .....	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.2.1 Scope of Services .....	8
<b>Chapter 2</b> .....	<b>9</b>
<b>PROJECT DETAILS</b> .....	<b>9</b>
2.1 Project Corridor.....	9
2.2 Project Stretch Description .....	9
2.3 Project Corridor Illustration.....	11
<b>Chapter 3</b> .....	<b>12</b>
<b>TRAFFIC SURVEYS AND ANALYSIS</b> .....	<b>12</b>
3.1 Traffic Surveys .....	12
3.2 Classified Traffic Volume.....	14
3.3 Traffic Characteristic .....	15
3.3.1 Traffic Data .....	15
3.4 Data Analysis .....	18
3.4.1 Analysis of Traffic Volume Count .....	18
3.4.2 Components of Traffic .....	20
3.5 Secondary Data Collection .....	23
<b>Chapter 4</b> .....	<b>25</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS</b> .....	<b>25</b>
4.1 Introduction.....	25
4.2 Competing / Alternate route.....	25
<b>Chapter 5</b> .....	<b>27</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY</b> .....	<b>27</b>
5.1 Introduction.....	27
5.2 Trend Analysis.....	27
5.3 Estimation of Traffic Demand Elasticity.....	28
5.4 Analysis of Historic Traffic Data .....	35
5.5 Other Factors Influencing Growth.....	35
5.6 Developments along and around the Project Corridor & State.....	36
5.7 Recommended Growth Rates of Traffic .....	37
5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....	38

<b>Chapter 6 .....</b>	<b>40</b>
TRAFFIC FORECAST.....	40
6.1 Traffic Projections .....	40
6.2 Modification in Concession Period .....	50
<b>Chapter 7 .....</b>	<b>51</b>
FORECAST OF TOLL REVENUE .....	51
7.1 General.....	51
7.2 Discount Categories .....	51
7.3 Estimation of Toll Rates .....	52
7.4 Toll Revenue .....	59
7.5 Toll Revenue at all toll plazas under Scenarios .....	59
<b>Chapter 8 .....</b>	<b>63</b>
CONCLUSION & RECOMMENDATIONS .....	63
8.1 Conclusion & Recommendations .....	63

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	13
Table 3-2 : Vehicle Classification System .....	15
Table 3-3 : Traffic Data at Belekeri Toll Plaza at Km 119.00.....	16
Table 3-4 : Traffic Data at Hologadde Toll Plaza at Km 184.00.....	16
Table 3-5 : Traffic Data at Shirur Toll Plaza at Km 243.00.....	17
Table 3-6 : PCU Factors Adopted for Study .....	18
Table 3-7 : Traffic in PCU at Project Stretch Base Year 2023-24.....	18
Table 3-8 : Journey Type Bifurcation of Traffic at TP-1 KM 119.00 .....	22
Table 3-9 : Journey Type Bifurcation of Traffic at TP KM 184.00 .....	22
Table 3-10 : Journey Type Bifurcation of Traffic at TP KM 243.00 .....	23
Table 5-1 : Per Capita Income Vs Car Karnataka .....	28
Table 5-2 : Population Vs Bus Karnataka .....	29
Table 5-3 : Goods Traffic Vs NSDP Karnataka.....	30
Table 5-4 : Traffic Truck Vs NSDP Karnataka .....	30
Table 5-5 : Summary Regression Analysis Karnataka .....	31
Table 5-6 : Per Capita Income Vs Car Maharashtra .....	32
Table 5-7 : Population Vs Bus Maharashtra .....	32
Table 5-8 : LCV Traffic Vs NSDP Maharashtra.....	33
Table 5-9 : Trucks Traffic Vs NSDP Maharashtra .....	34
Table 5-10 : Summary Regression Analysis Maharashtra.....	35
Table 5-11 : Recommended Growth Rates Optimistic .....	38
Table 5-12 : Recommended Growth Rates Pessimistic.....	38
Table 5-13 : Recommended Growth Rates Most Likely.....	38
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- 119 KM .....	40
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- 184KM .....	41
Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 243 KM .....	42
Table 6-4 : Total Tollable Traffic @ Toll Plaza 1- Chainage 119 KM .....	43
Table 6-5 : Total Tollable Traffic @ Toll Plaza 2- Chainage 184 KM .....	44
Table 6-6 : Total Tollable Traffic @ Toll Plaza 3- Chainage 243 KM .....	46
Table 6-7 : Total Tollable Traffic @ Toll Plaza 1- Chainage 119 KM .....	47
Table 6-8 : Total Tollable Traffic @ Toll Plaza 2- Chainage 184 KM .....	48
Table 6-9 : Total Tollable Traffic @ Toll Plaza 3- Chainage 230 KM .....	49

Table 7-1 : Base Toll Rates June 2007-08 .....	52
Table 7-2 : Toll Rates for Single Journey @ Km 119.000 .....	53
Table 7-3 : Toll Rates for Single Journey @ Km 184.000 .....	54
Table 7-4 : Toll Rates for Single Journey @ Km 243.000 .....	54
Table 7-5 : Toll Rates for Return journey @ Km 119.000 .....	55
Table 7-6 : Toll Rates for Return Journey @ Km 184.000 .....	55
Table 7-7 : Toll Rates for Return journey @ Km 243.000 .....	56
Table 7-8 : Toll Rates for Monthly Pass Local Car Ticket @ all Toll Plaza .....	57
Table 7-9 : Toll Rates for Monthly Pass @ Km 119.000 .....	57
Table 7-10 : Toll Rates for Monthly Pass @ Km 184.000 .....	58
Table 7-11 : Toll Rates for Monthly Pass @ Km 243.000 .....	59
Table 7-12 : Toll Revenue Optimistic Scenario .....	59
Table 7-13 : Toll Revenue Pessimistic Scenario .....	60
Table 7-14 : Toll Revenue Most Likely Scenario .....	62

## LIST OF FIGURES

<i>Figure 1-1 : Alignment of Project Stretch.....</i>	<i>8</i>
<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	<i>10</i>
<i>Figure 2-2 : Photographs showing Project Corridor .....</i>	<i>11</i>
<i>Figure 3-1 : Comparison of PCU Index.....</i>	<i>20</i>
<i>Figure 4-1 : Project corridor and radial roads .....</i>	<i>26</i>
<i>Figure 4-2 : Alternate route at regional level .....</i>	<i>26</i>
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Karnataka.....</i>	<i>29</i>
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Karnataka .....</i>	<i>29</i>
<i>Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Karnataka .....</i>	<i>30</i>
<i>Figure 5-4 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Karnataka.....</i>	<i>31</i>
<i>Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Maharashtra.....</i>	<i>32</i>
<i>Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra .....</i>	<i>33</i>
<i>Figure 5-7 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra .....</i>	<i>34</i>
<i>Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra .....</i>	<i>35</i>
<i>Figure 5-9 : Growth of GDP in India.....</i>	<i>36</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>52</i>



## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

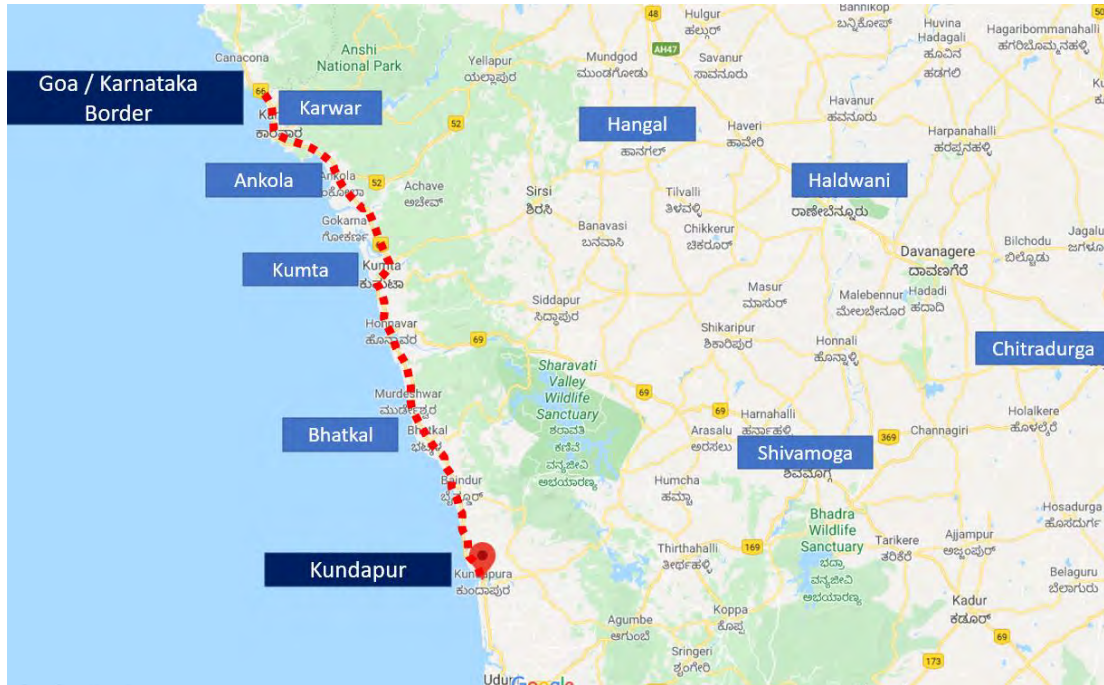
### 1.1 Background

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 coast 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	AA DT 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, 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	AA DT 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, 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
<b>Total</b>		<b>2859</b>	<b>2821</b>	<b>3202</b>	<b>4497</b>	<b>4295</b>

**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
<b>Total</b>		<b>5736</b>	<b>5401</b>	<b>5693</b>	<b>8198</b>	<b>8573</b>

*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
<b>Total</b>		<b>5679</b>	<b>5619</b>	<b>6304</b>	<b>9092</b>	<b>9554</b>



### 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.

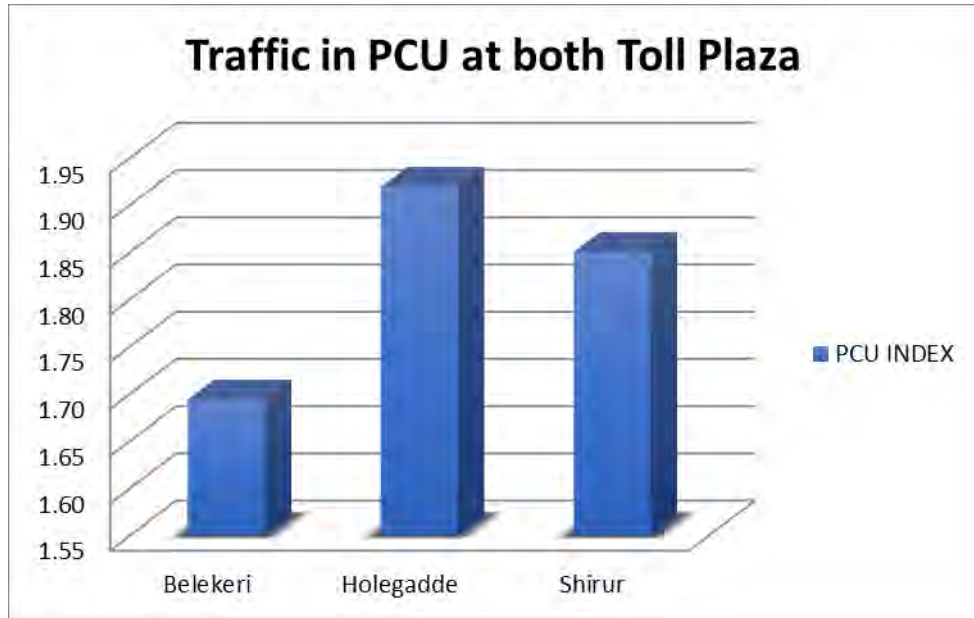
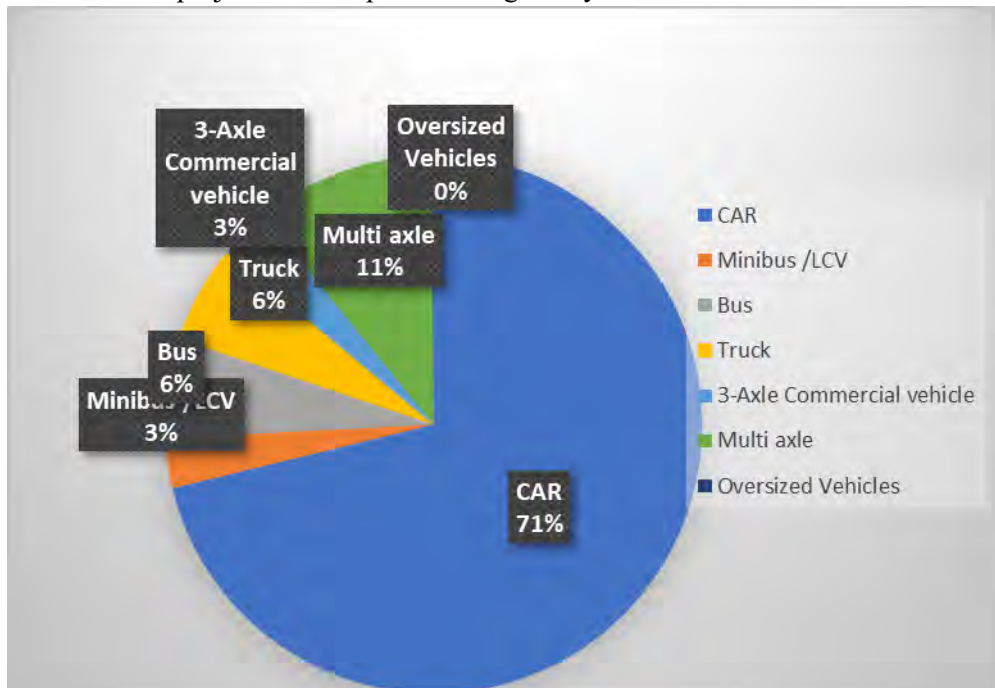


Figure 3-1 : Comparison of PCU Index

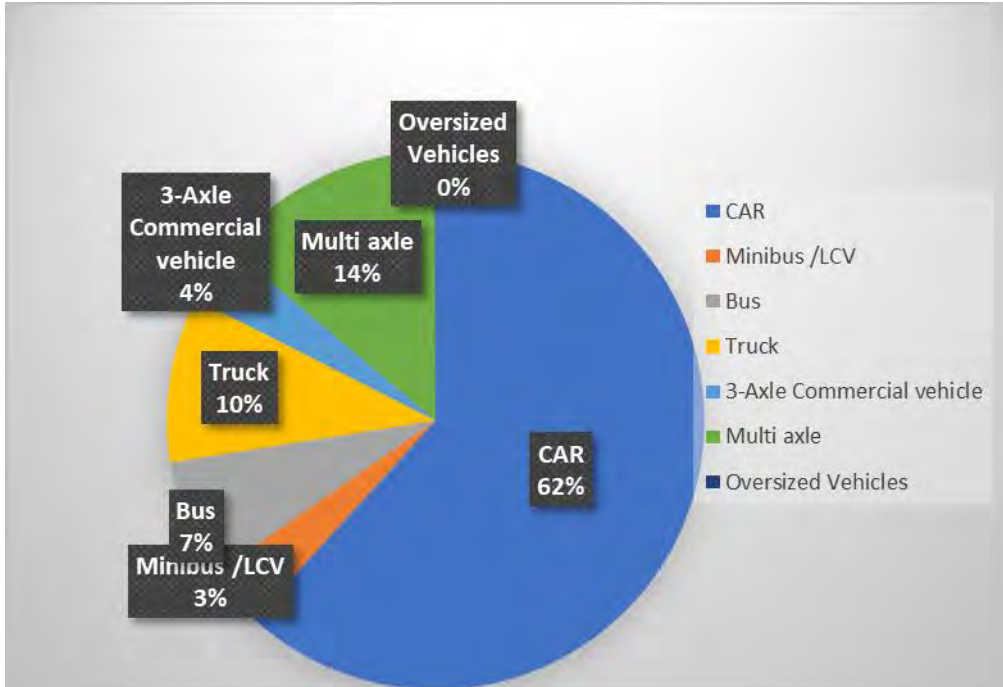
It can be observed that PCU index is consistent at all three plaza locations.

### 3.4.2 Components of Traffic

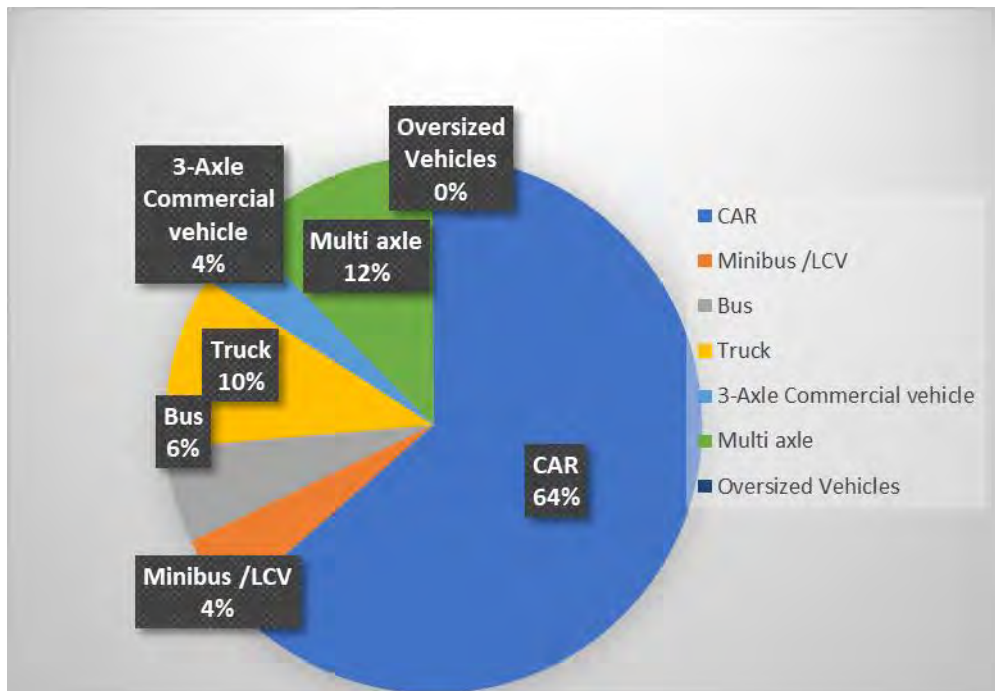
As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential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

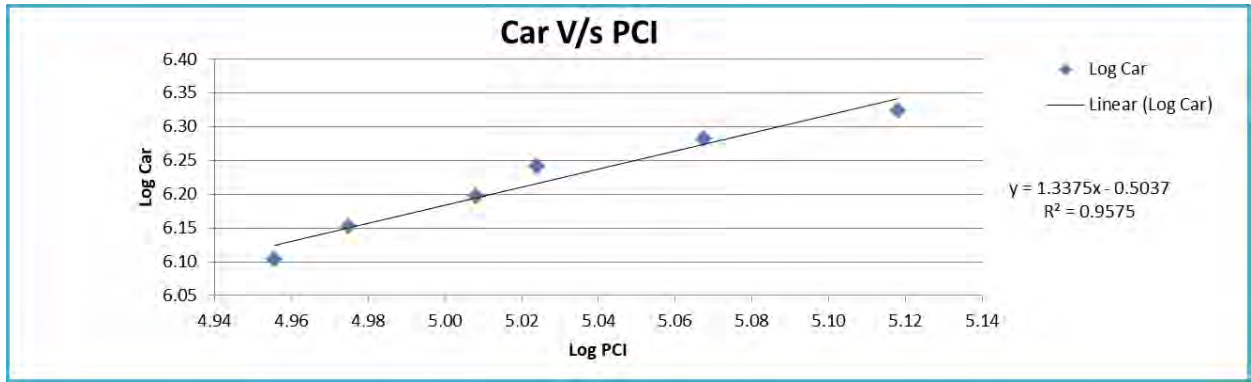
The project corridor spreads across state of Karnataka. Toll plazas at Km 119.00, Km 184.00 and 243.00 are in the state of Karnataka. Contribution of Goa / Maharashtra is also substantial at stretch. For elasticity calculations, working data from Karnataka and Maharashtra / Goa has been analysed.

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

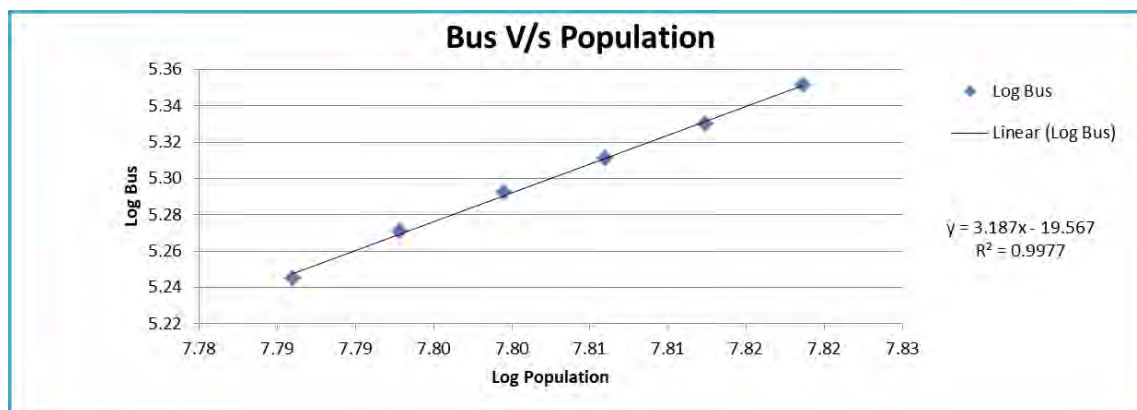


**Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Karnataka**

**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**

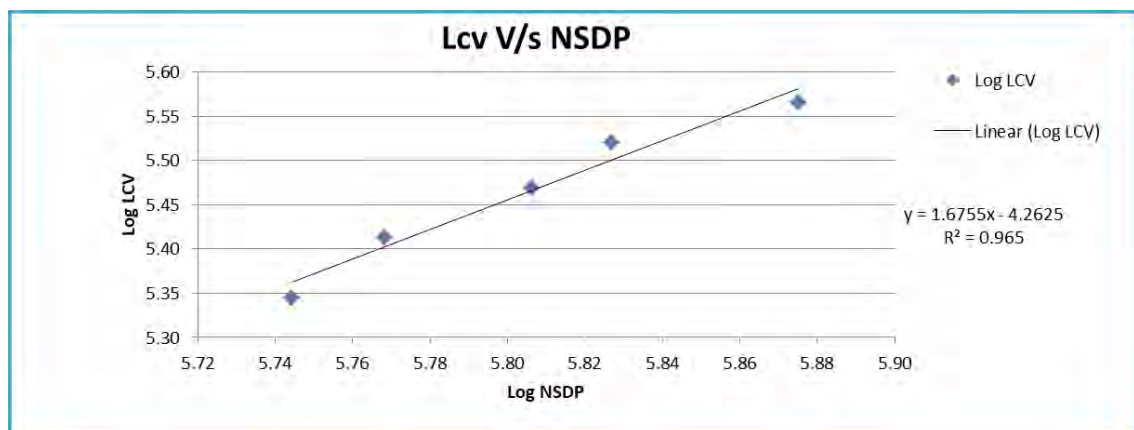
Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details



**Table 5-3 : Goods Traffic Vs NSDP Karnataka**

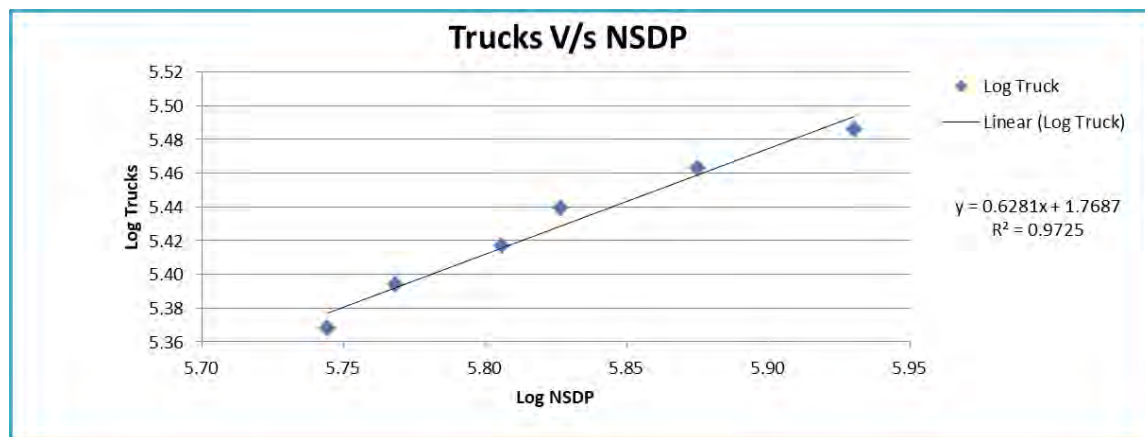
Year	NSDP	LCV	Log NSDP	Log LCV	NSDP Growth	Average Growth
2012	554990	221160	5.74	5.34		
2013	586592	258701	5.77	5.41	6%	
2014	639981	294266	5.81	5.47	9%	
2015	671322	331381	5.83	5.52	5%	
2016	749990	367572	5.88	5.57	12%	7.85%

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 R<sup>2</sup> values are presented in the Table below

**Table 5-5 : Summary Regression Analysis Karnataka**

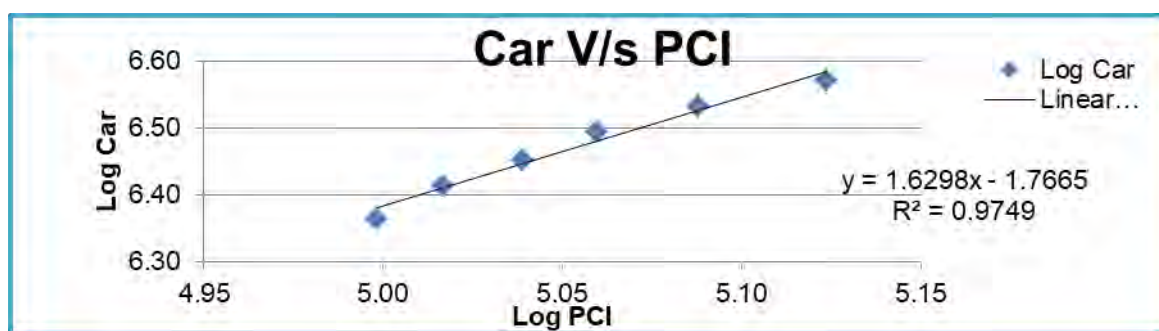
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Karnataka	Car/Jeep	PCI	$y = 1.3375x + -0.5037$	R <sup>2</sup> = 0.9575	1.3375	7.83%	10.47%
	Bus	Population	$y = 3.187x - 19.567$	R <sup>2</sup> = 0.9977	3.1870	1.52%	4.83%
	LCV	NSDP	$y = 1.6755x - -4.2625$	R <sup>2</sup> = 0.965	1.6755	7.85%	13.16%
	Truck	NSDP	$y = 0.6281x - 1.7687$	R <sup>2</sup> = 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**

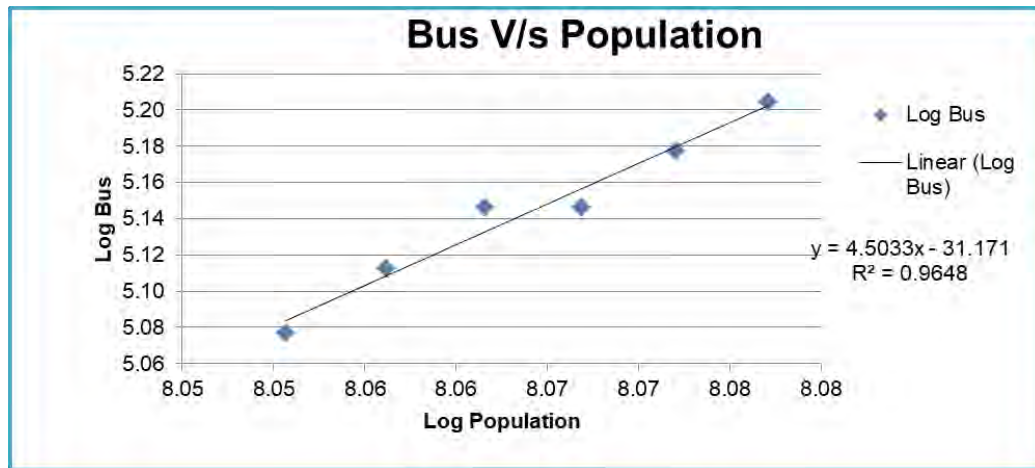
Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2012	99564	2307841	5.00	6.36		
2013	103904	2592565	5.02	6.41	4%	
2014	109399	2834847	5.04	6.45	5%	
2015	114746	3113773	5.06	6.49	5%	
2016	122422	3406872	5.09	6.53	7%	
2017	132899	3715744	5.12	6.57	9%	5.96%

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.

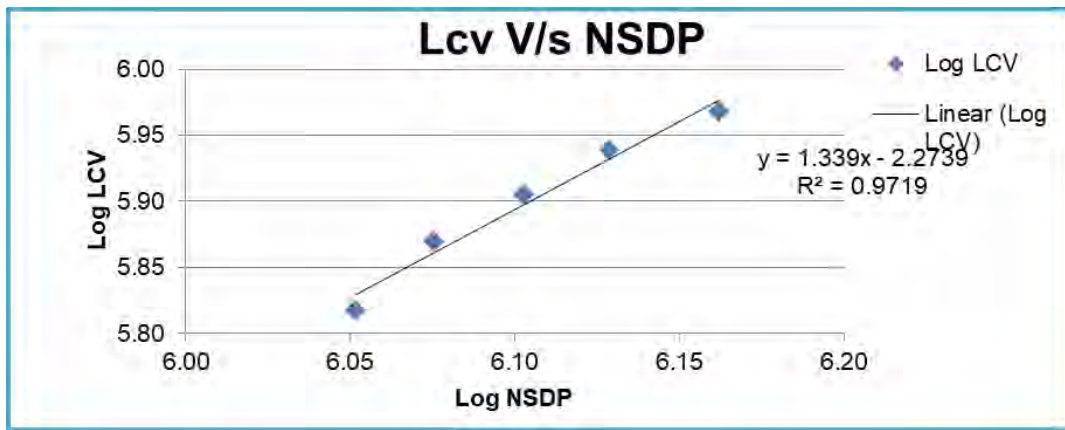
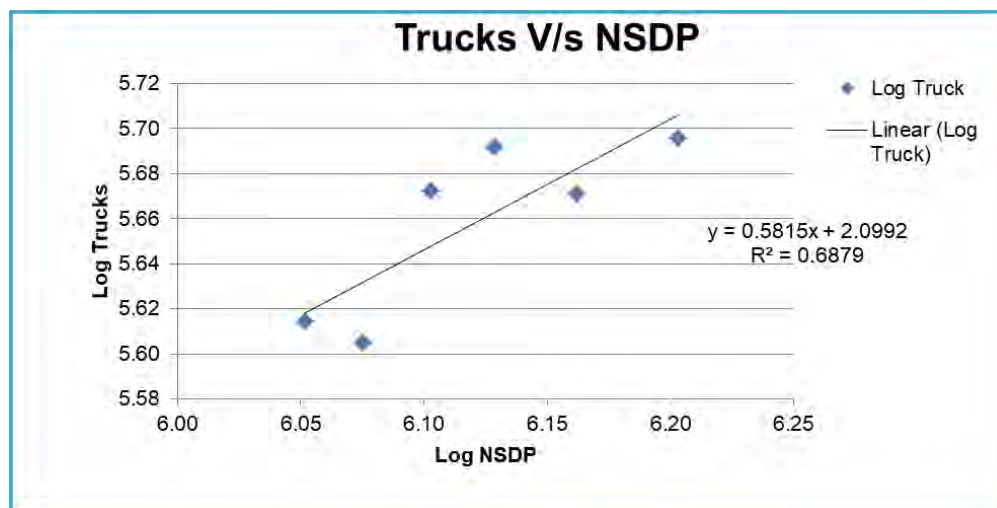


Figure 5-7 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra.

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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R<sup>2</sup> 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 <sup>2</sup> = 0.9749	1.6298	5.96%	9.71%
	Bus	Population	$y = 4.5033x - 31.1713$	R <sup>2</sup> = 0.9648	4.5033	1.23%	5.52%
	LCV	NSDP	$y = 1.339x - 2.2739$	R <sup>2</sup> = 0.9719	1.3390	6.56%	8.78%
	Truck	NSDP	$y = 0.5815x - 2.0992$	R <sup>2</sup> = 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

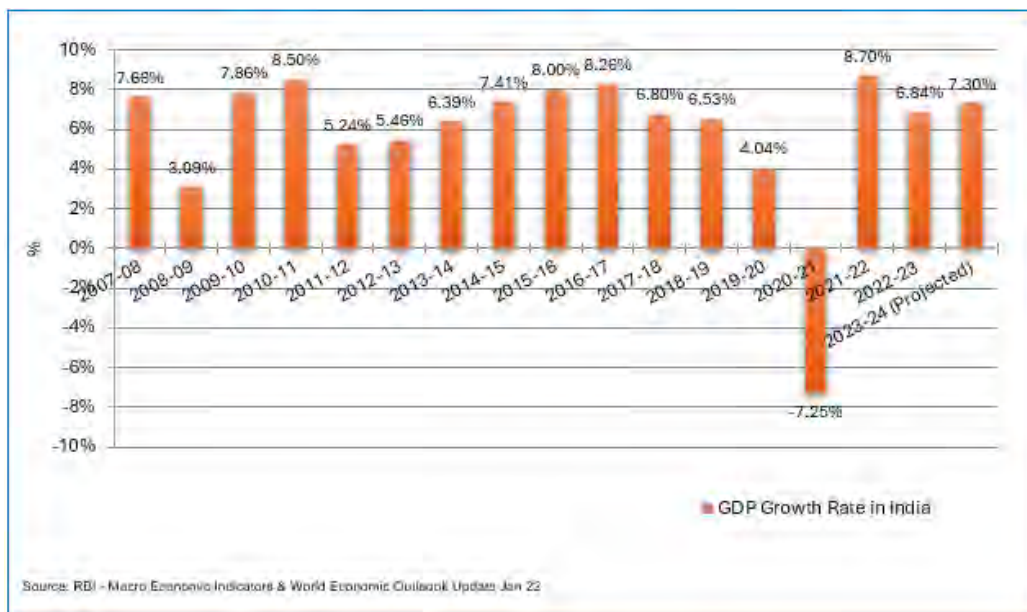
There are many factors which have impact on traffic growth. As discussed previously these factors can be economical, social, educational, and industrial.



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 - 1<sup>st</sup> 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

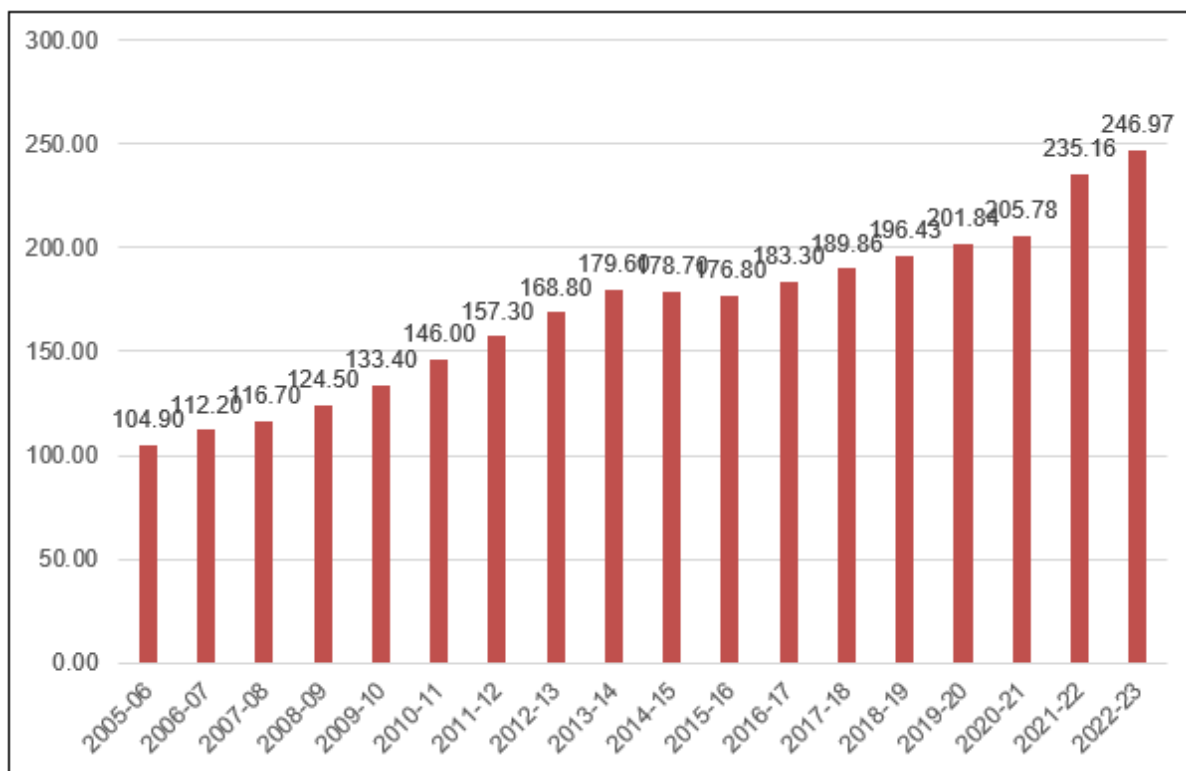
1. Monthly Pass: For frequent users monthly pass would be issued for 50 trips in month at 2/3d rate..
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers 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](http://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	<b>153.03</b>
2024-25	30.33	69.91	67.95	<b>168.18</b>



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

<b>Year</b>	<b>TP-1</b>	<b>TP2</b>	<b>TP3</b>	<b>Total</b>
<b>2024-25</b>	30.19	69.60	67.66	<b>167.45</b>
<b>2025-26</b>	33.86	78.21	75.76	<b>187.84</b>
<b>2026-27</b>	37.90	87.21	84.21	<b>209.31</b>
<b>2027-28</b>	42.95	97.71	94.44	<b>235.11</b>
<b>2028-29</b>	47.83	108.35	105.30	<b>261.48</b>
<b>2029-30</b>	53.49	121.65	118.28	<b>293.42</b>
<b>2030-31</b>	60.03	134.73	130.57	<b>325.33</b>
<b>2031-32</b>	67.27	150.90	145.90	<b>364.07</b>
<b>2032-33</b>	74.35	166.23	162.04	<b>402.61</b>
<b>2033-34</b>	83.23	185.62	179.55	<b>448.41</b>
<b>2034-35</b>	93.18	206.79	200.65	<b>500.62</b>
<b>2035-36</b>	104.17	229.78	223.49	<b>557.44</b>
<b>2036-37</b>	115.57	255.01	247.69	<b>618.27</b>
<b>2037-38</b>	129.07	282.71	275.73	<b>687.51</b>
<b>2038-39</b>	144.36	315.31	306.17	<b>765.84</b>
<b>2039-40</b>	161.31	350.85	340.92	<b>853.08</b>
<b>2040-41</b>	179.92	389.63	378.22	<b>947.77</b>
<b>2041-42</b>	201.08	431.94	421.26	<b>1054.28</b>
<b>2042-43</b>	225.00	480.43	468.14	<b>1173.57</b>
<b>2043-44</b>	251.36	537.01	523.09	<b>1311.46</b>
<b>2044-45</b>	280.01	595.54	582.92	<b>1458.47</b>
<b>2045-46</b>	313.29	663.34	646.17	<b>1622.80</b>
<b>2046-47</b>	347.60	736.98	717.47	<b>1802.05</b>
<b>2047-48</b>	387.73	815.78	795.52	<b>1999.03</b>

**Table 7-14 : Toll Revenue Most Likely Scenario****(Rs. Crores)**

<b>Year</b>	<b>TP-1</b>	<b>TP2</b>	<b>TP3</b>	<b>Total</b>
<b>2023-24</b>	27.18	63.77	62.08	<b>153.03</b>
<b>2024-25</b>	30.25	69.75	67.84	<b>167.84</b>
<b>2025-26</b>	33.96	78.56	76.18	<b>188.70</b>
<b>2026-27</b>	38.11	87.77	84.85	<b>210.73</b>
<b>2027-28</b>	43.30	98.57	95.42	<b>237.29</b>
<b>2028-29</b>	48.36	109.59	106.65	<b>264.59</b>
<b>2029-30</b>	54.19	123.27	120.06	<b>297.52</b>
<b>2030-31</b>	60.97	136.88	132.85	<b>330.69</b>
<b>2031-32</b>	68.49	153.71	148.77	<b>370.98</b>
<b>2032-33</b>	75.86	169.75	165.62	<b>411.23</b>
<b>2033-34</b>	85.11	189.95	183.97	<b>459.02</b>
<b>2034-35</b>	95.48	212.08	206.05	<b>513.61</b>
<b>2035-36</b>	106.94	236.16	230.05	<b>573.16</b>
<b>2036-37</b>	118.94	262.66	255.55	<b>637.14</b>
<b>2037-38</b>	133.13	291.90	285.06	<b>710.09</b>
<b>2038-39</b>	149.19	326.44	317.35	<b>792.99</b>
<b>2039-40</b>	167.06	364.09	354.11	<b>885.26</b>
<b>2040-41</b>	186.77	405.25	393.85	<b>985.88</b>
<b>2041-42</b>	209.21	450.32	439.68	<b>1099.20</b>
<b>2042-43</b>	234.75	502.09	489.66	<b>1226.50</b>
<b>2043-44</b>	262.91	562.51	548.41	<b>1373.83</b>
<b>2044-45</b>	293.55	625.33	612.53	<b>1531.42</b>
<b>2045-46</b>	329.19	698.08	680.61	<b>1707.88</b>
<b>2046-47</b>	366.13	777.47	757.57	<b>1901.17</b>
<b>2047-48</b>	409.40	862.66	842.04	<b>2114.10</b>

## 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



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



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614.

Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





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



## CONTENTS

<b>Chapter 1 .....</b>	<b>6</b>
<b>INTRODUCTION .....</b>	<b>6</b>
<b>1.1 Background.....</b>	<b>6</b>
<b>1.2 Objective of the Study.....</b>	<b>7</b>
<b>1.2.1 Scope of Services .....</b>	<b>7</b>
<b>Chapter 2 .....</b>	<b>8</b>
<b>PROJECT DETAILS.....</b>	<b>8</b>
<b>2.1 Project Corridor.....</b>	<b>8</b>
<b>2.2 Project Stretch Description .....</b>	<b>8</b>
<b>2.3 Project Corridor Illustration.....</b>	<b>9</b>
<b>Chapter 3 .....</b>	<b>10</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>10</b>
<b>3.1 Traffic Surveys .....</b>	<b>10</b>
<b>3.2 Classified traffic volume .....</b>	<b>11</b>
<b>3.3 Traffic Characteristic .....</b>	<b>12</b>
<b>3.3.1 Traffic Data .....</b>	<b>12</b>
<b>3.4 Data Analysis.....</b>	<b>13</b>
<b>3.4.1 Analysis of Traffic Volume Count .....</b>	<b>13</b>
<b>3.4.2 Components of Traffic.....</b>	<b>14</b>
<b>3.5 Secondary Data Collection .....</b>	<b>15</b>
<b>Chapter 4 .....</b>	<b>17</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>17</b>
<b>4.1 Introduction.....</b>	<b>17</b>
<b>4.2 Competing / Alternate route.....</b>	<b>17</b>
<b>Chapter 5 .....</b>	<b>20</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>20</b>
<b>5.1 Introduction.....</b>	<b>20</b>
<b>5.2 Trend Analysis.....</b>	<b>20</b>
<b>5.3 Estimation of Traffic Demand Elasticity.....</b>	<b>21</b>
<b>5.4 Analysis of Historic Traffic Data .....</b>	<b>27</b>
<b>5.5 Other Factors Influencing Growth.....</b>	<b>27</b>
<b>5.6 Developments along and around the Project Corridor &amp; State.....</b>	<b>28</b>
<b>5.6.1 Industrial Units along Project Corridor .....</b>	<b>30</b>
<b>5.7 Recommended Growth Rates of Traffic .....</b>	<b>30</b>
<b>5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....</b>	<b>31</b>
<b>Chapter 6 .....</b>	<b>32</b>

TRAFFIC FORECAST.....	32
6.1 Traffic Projections .....	32
6.2 Modification in Concession Period .....	33
<b>Chapter 7 .....</b>	<b>35</b>
FORECAST OF TOLL REVENUE .....	35
7.1 General.....	35
7.2 Discount Categories .....	35
7.3 Estimation of Toll Rates .....	36
7.4 Toll Revenue .....	39
7.5 Toll Revenue at all toll plazas under Scenarios .....	39
<b>Chapter 8 .....</b>	<b>42</b>
CONCLUSION & RECOMMENDATIONS .....	42
8.1 Conclusion & Recommendations .....	42

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	10
Table 3-2 : Vehicle Classification System .....	11
Table 3-3 : Traffic Data at Bandanwara Toll Plaza at Km 61.020 .....	12
Table 3-4 : PCU Factors Adopted for Study .....	13
Table 3-5 : Traffic in PCU at Project Stretch Base Year 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24.....	13
Table 3-6 : Journey Type Bifurcation of Traffic at Bandanwara TP KM 61.020 .....	15
Table 4-1 : Competing Roads Details .....	18
Table 5-1 : Per Capita Income Vs Car Rajasthan.....	21
Table 5-2 : Population Vs Bus Rajasthan.....	22
Table 5-3 : LCV Traffic Vs NSDP Rajasthan .....	22
Table 5-4 : Goods Traffic Vs NSDP Rajasthan .....	23
Table 5-5 : Summary Regression Analysis Rajasthan .....	24
Table 5-6 : Per Capita Income Vs Car Gujarat .....	24
Table 5-7 : Population Vs Bus Gujarat .....	24
Table 5-8 : LCV Traffic Vs NSDP Gujarat.....	25
Table 5-9 : Goods Traffic Vs NSDP Gujarat.....	26
Table 5-10 : Summary Regression Analysis Gujarat .....	27
Table 5-11 : GDP of India, UP and other important states.....	29
Table 5-12 : Recommended Growth Rates Optimistic .....	31
Table 5-13 : Recommended Growth Rates Pessimistic.....	31
Table 5-14 : Recommended Growth Rates Most Likely.....	31
Table 6-1 : Total Tollable Traffic @ Toll Plaza Chainage KM 61.02.....	32
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage KM 61.02 .....	32
Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage KM 61.02 .....	33
Table 7-1 : Base Toll Rates June 2007-08.....	36
Table 7-2 : Toll Rates for Single Journey @ Chainage KM 61.02 .....	37
Table 7-3 : Toll Rates for Return Journey @ Chainage KM 61.02.....	37
Table 7-4 : Toll Rates for Monthly Pass Local@ Chainage KM 61.02 .....	38
Table 7-5 : Toll Rates for Monthly Pass @ Chainage KM 61.02.....	38
Table 7-6 : Toll Revenue Optimistic Scenario.....	39
Table 7-7 : Toll Revenue Pessimistic Scenario .....	40
Table 7-8 : Toll Revenue Most Likely Scenario .....	40

## LIST OF FIGURES

<i>Figure 1-1 : Alignment of Project Stretch.....</i>	6
<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	9
<i>Figure 2-2 : Photographs showing Project Corridor .....</i>	9
<i>Figure 3-1 : Model Split of Tollable Vehicle .....</i>	14
<i>Figure 4-1 : Alternate route at regional level .....</i>	18
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	22
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	22
<i>Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan .....</i>	23
<i>Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.....</i>	23
<i>Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Gujarat.....</i>	24
<i>Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat .....</i>	25
<i>Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat .....</i>	26
<i>Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Gujarat .....</i>	26
<i>Figure 5-9 : Growth of GDP in India.....</i>	28
<i>Figure 5-10 : Industrial Units along project corridor .....</i>	30
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	36

## ABBREVIATIONS

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



# CHAPTER 1

## INTRODUCTION

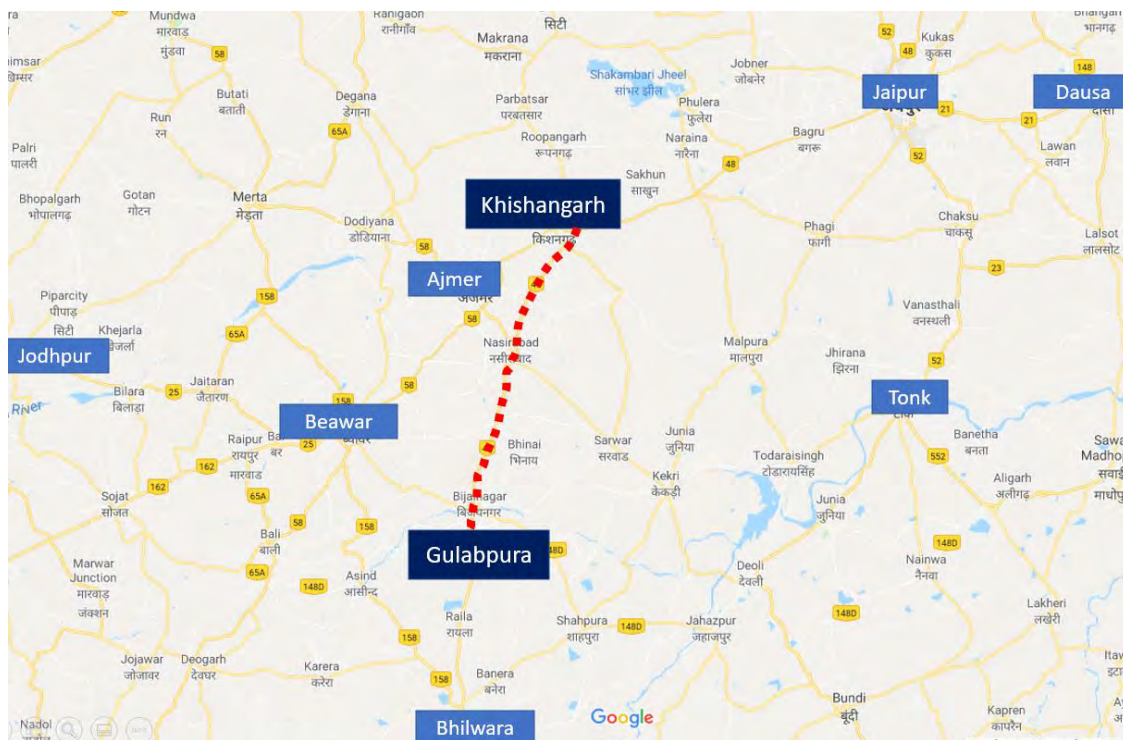
### 1.1 Background

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 21<sup>st</sup> 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)

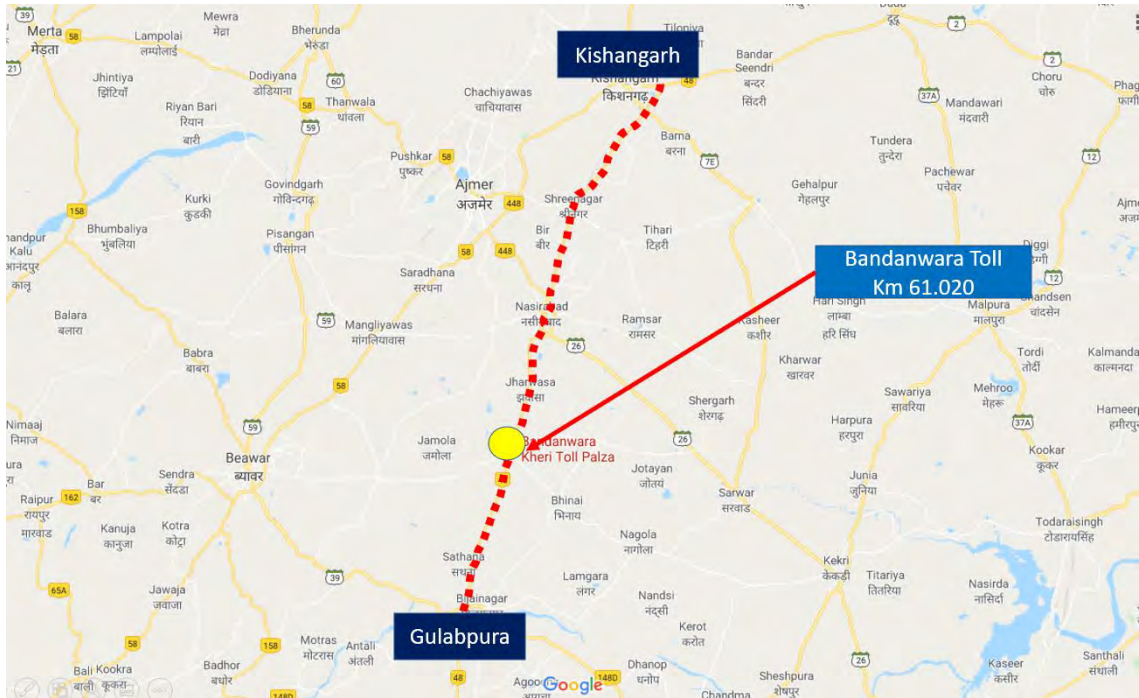
#### 2.2 Project Stretch Description

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, 2021-2022, 2022-2023	For Year 2018-19, 2019-2020, 2020-2021, 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
<b>Total</b>		<b>12003</b>	<b>2212</b>	<b>12707</b>	<b>16046</b>	<b>18770</b>

### 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**

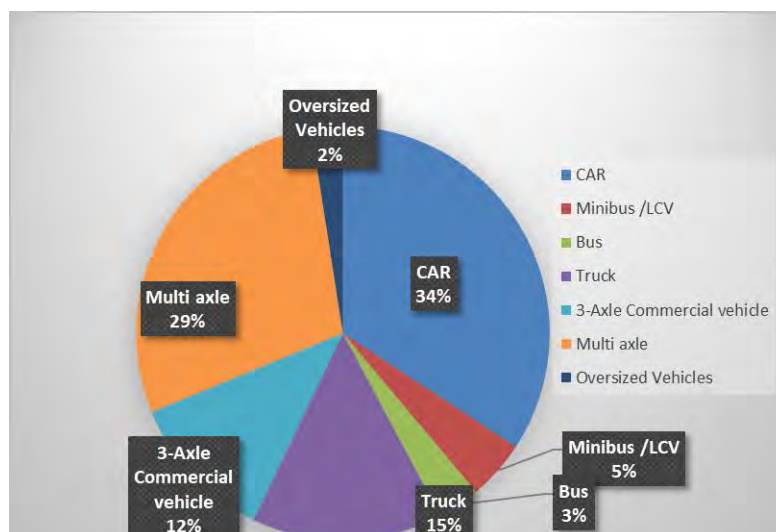
Toll Plaza Location (Km)	Year	Traffic No	PCU	PCU Index
Bandanwara 61.020	2019-20	12003	36011	3.00
	2020-21	2212	6478	2.93

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.

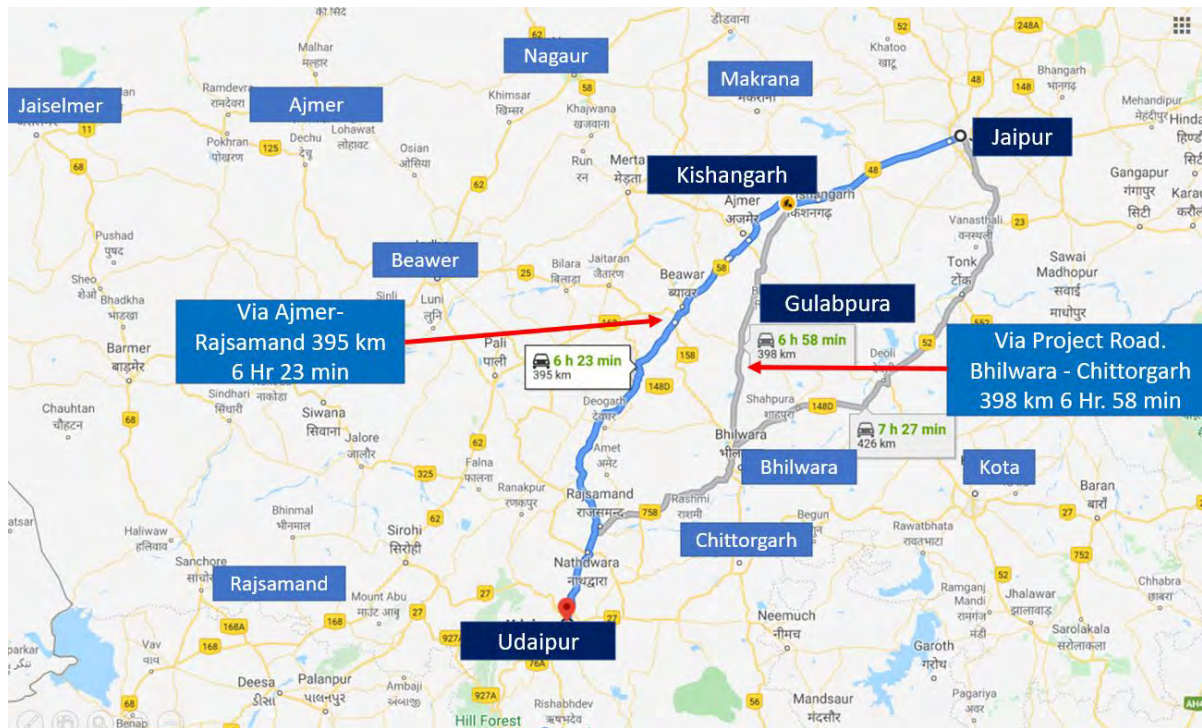
Following Factors can be considered as major contributors to friction on transportation network.

- 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
<b>Regional Level</b>						
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).

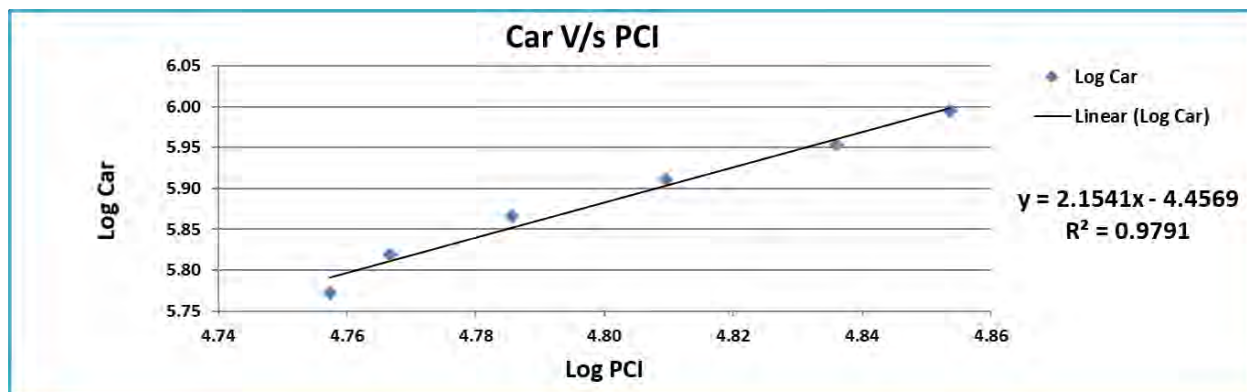
The project corridor spreads across the state of Rajasthan. Toll plaza at Bandanwara is in the state of Rajasthan but it has influence of Gujarat also. For elasticity calculations, working data from Rajasthan and Gujarat has been analyzed.

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%

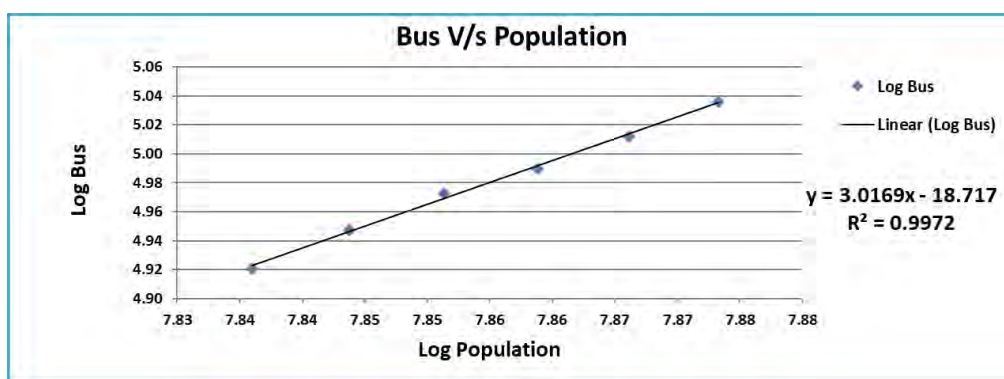
Regression analysis of same is given in figure below.



**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.

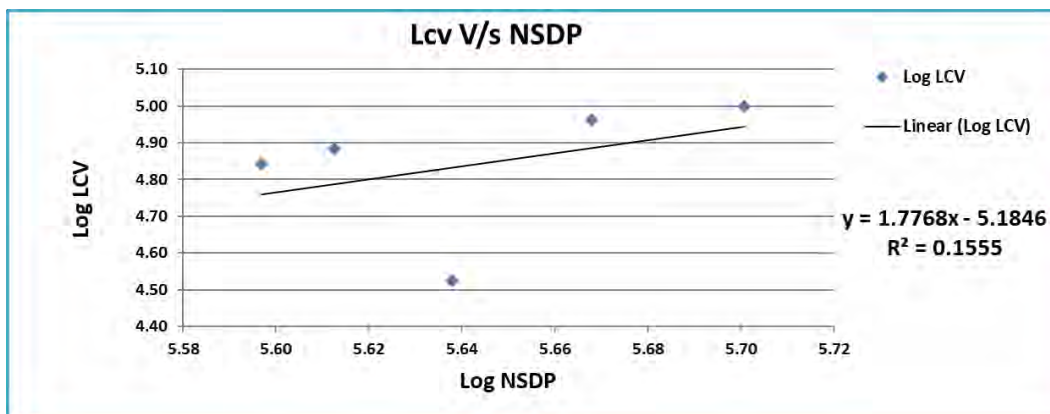


Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.

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%

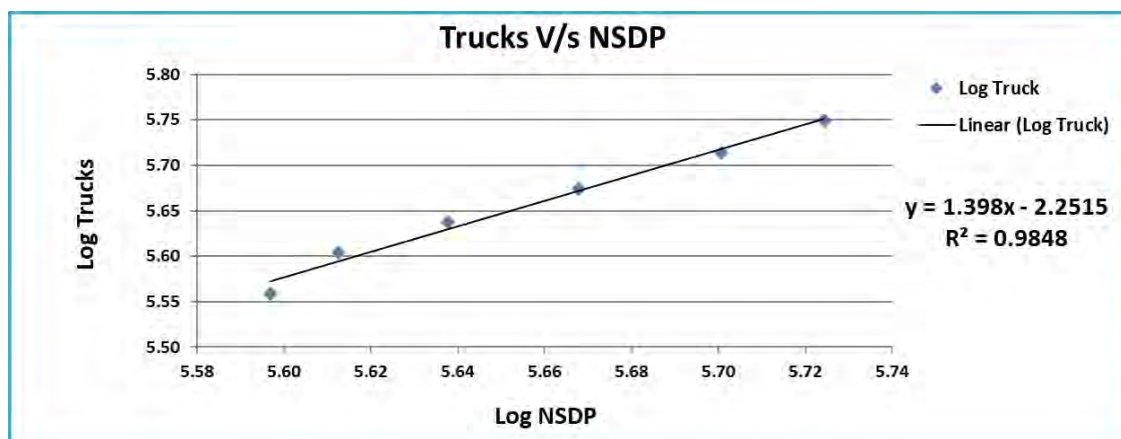


Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.

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<sup>2</sup> values are presented in the Table below.

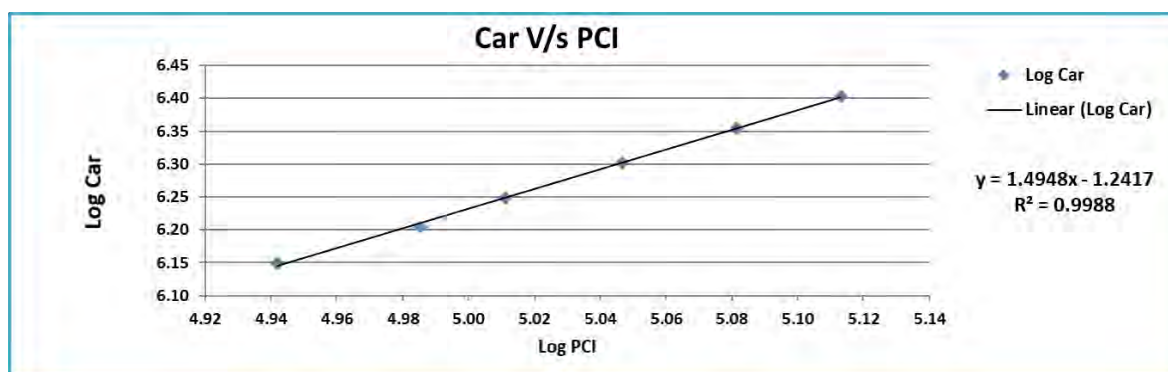
**Table 5-5 : Summary Regression Analysis Rajasthan**

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 <sup>2</sup> = 0.9791	2.1541	4.55%	9.79%	Good Regression
	Bus	Population	$y = 3.0169x - 18.7174$	R <sup>2</sup> = 0.9972	3.0169	1.73%	5.22%	Good Regression
	LCV	NSDP	$y = 1.7768x - 5.1846$	R <sup>2</sup> = 0.1555	1.7768	6.16%	10.95%	Poor Regression
	Truck	NSDP	$y = 1.398x - 2.2515$	R <sup>2</sup> = 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.

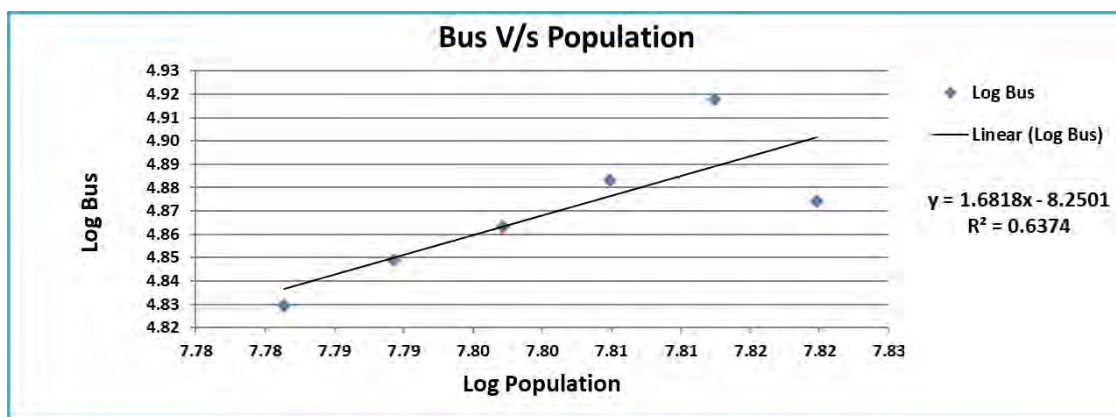


**Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Gujarat**

**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.

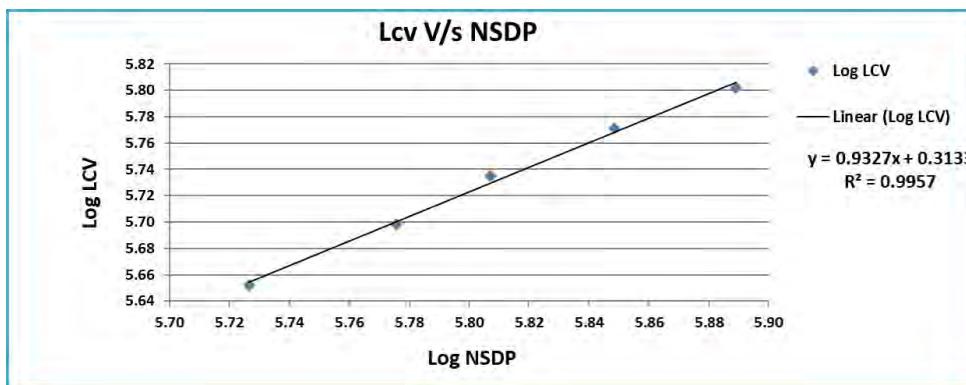


Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat.

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%

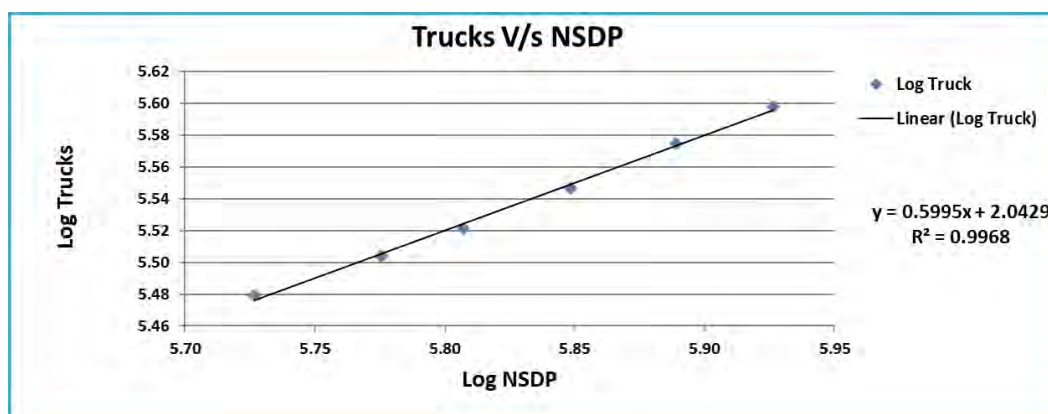


Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Gujarat.

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 R<sup>2</sup> 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.

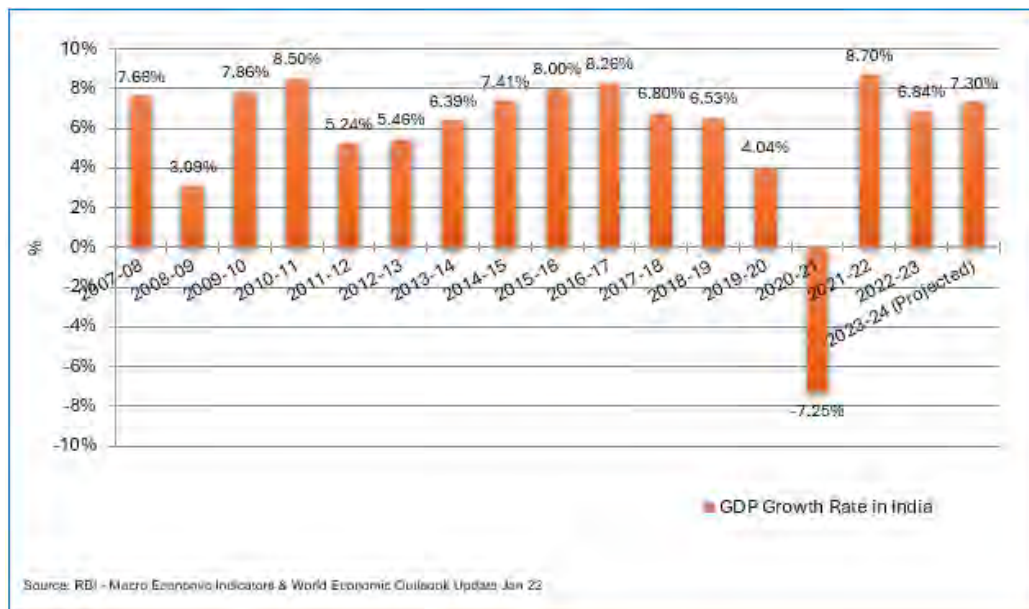
#### 5.5 Other Factors Influencing Growth

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**

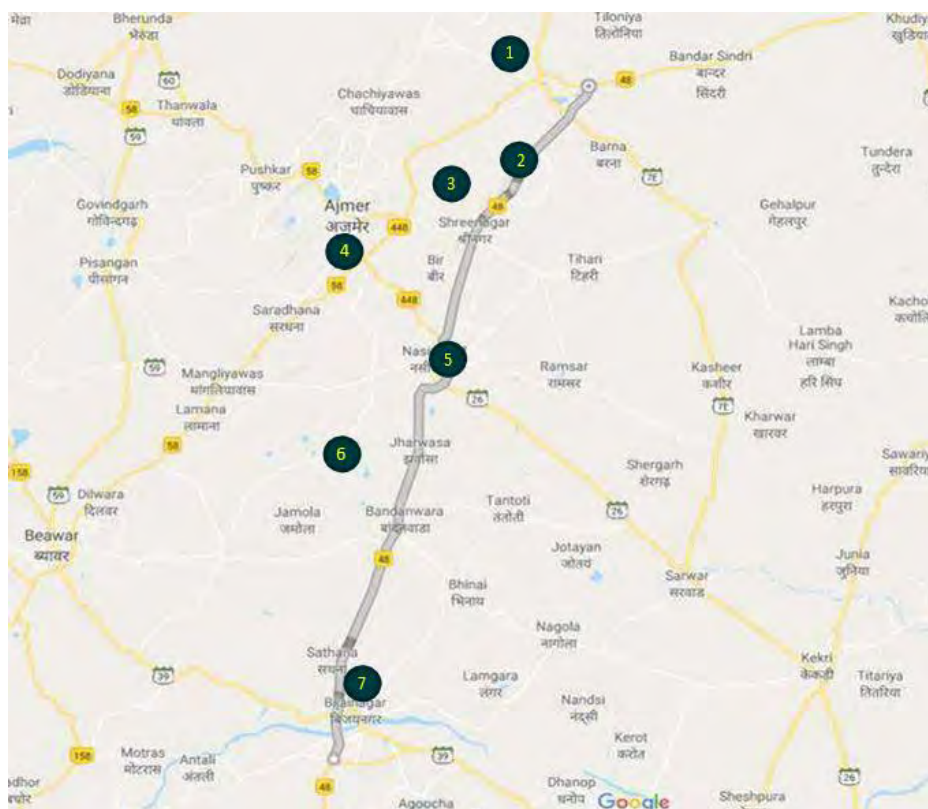
Year	India (GDP)	Bihar	Haryana	Madhya Pradesh	Maharashtra	Odisha	Punjab	Rajasthan	Uttar Pradesh	Uttarakhand	West Bengal	Delhi
1980-81	12336	514	357	623	1464	529	504	560	1631	138	830	269
1981-82	13030	543	371	639	1498	528	551	607	1670	141	808	291
1982-83	13411	548	394	668	1556	497	568	620	1800	152	840	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
<b>Car/Jeep/Van</b>	9.26%	8.70%	8.16%	7.62%	7.58%	7.03%
<b>Bus</b>	4.38%	4.12%	3.88%	3.64%	3.57%	3.33%
<b>LCV</b>	3.56%	3.74%	3.92%	4.10%	4.27%	4.44%
<b>2- Axle</b>	4.39%	3.95%	3.52%	3.09%	2.86%	2.41%
<b>3 - Axle</b>	5.43%	4.88%	4.33%	3.80%	3.67%	3.08%
<b>4 to 6 Axle</b>	6.46%	5.80%	5.15%	4.50%	4.27%	3.58%
<b>7 and Above Axle</b>	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
<b>Car/Jeep/Van</b>	8.76%	8.20%	7.66%	7.12%	7.08%	6.53%
<b>Bus</b>	3.88%	3.62%	3.38%	3.14%	3.07%	2.83%
<b>LCV</b>	3.06%	3.24%	3.42%	3.60%	3.77%	3.94%
<b>2- Axle</b>	3.89%	3.45%	3.02%	2.59%	2.36%	1.91%
<b>3 - Axle</b>	4.93%	4.38%	3.83%	3.30%	3.17%	2.58%
<b>4 to 6 Axle</b>	5.96%	5.30%	4.65%	4.00%	3.77%	3.08%
<b>7 and Above Axle</b>	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
<b>Car/Jeep/Van</b>	9.01%	8.45%	7.91%	7.37%	7.33%	6.78%
<b>Bus</b>	4.13%	3.87%	3.63%	3.39%	3.32%	3.08%
<b>LCV</b>	3.31%	3.49%	3.67%	3.85%	4.02%	4.19%
<b>2- Axle</b>	4.14%	3.70%	3.27%	2.84%	2.61%	2.16%
<b>3 - Axle</b>	5.18%	4.63%	4.08%	3.55%	3.42%	2.83%
<b>4 to 6 Axle</b>	6.21%	5.55%	4.90%	4.25%	4.02%	3.33%
<b>7 and Above Axle</b>	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 - 1<sup>st</sup> 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

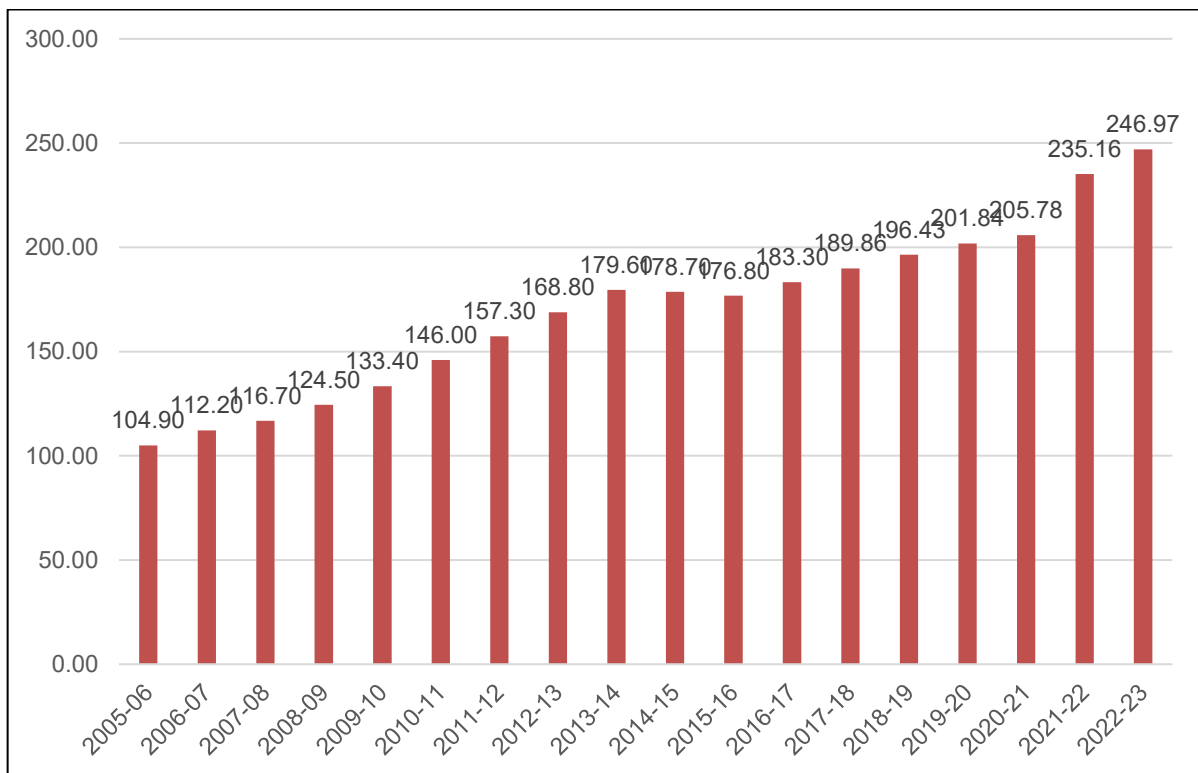
Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

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](http://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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



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)**



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614.

Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



KAITHAL TO RAJASTHAN SECTION OF NH-152/65

(KM 33.250 TO 241.580)

IN THE STATE OF HARYANA

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

MARCH 2024



## CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.2.1 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS.....</b>	<b>9</b>
2.1 Project Corridor.....	9
2.2 Project Stretch Description .....	9
2.3 Project Corridor Illustration.....	10
<b>Chapter 3 .....</b>	<b>12</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>12</b>
3.1 Traffic Surveys .....	12
3.2 Classified traffic volume .....	14
3.3 Traffic Characteristic .....	14
3.3.1 Traffic Data .....	15
3.4 Data Analysis.....	16
3.4.1 Analysis of Traffic Volume Count .....	16
3.4.2 Components of Traffic .....	18
3.5 Secondary Data Collection .....	21
<b>Chapter 4 .....</b>	<b>23</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>23</b>
4.1 Introduction.....	23
4.2 Competing / Alternate route.....	23
<b>Chapter 5 .....</b>	<b>27</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>27</b>
5.1 Introduction.....	27
5.2 Trend Analysis.....	27
5.3 Estimation of Traffic Demand Elasticity.....	28
5.4 Analysis of Historic Traffic Data .....	34
5.5 Other Factors Influencing Growth.....	34
5.6 Developments along and around the Project Corridor & State.....	35
5.7 Recommended Growth Rates of Traffic .....	39
5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....	39
<b>Chapter 6 .....</b>	<b>41</b>
<b>TRAFFIC FORECAST.....</b>	<b>41</b>
6.1 Traffic Projections .....	41
6.2 Modification in Concession Period .....	47
<b>Chapter 7 .....</b>	<b>49</b>
<b>FORECAST OF TOLL REVENUE .....</b>	<b>49</b>
7.1 General.....	49

---

7.2	Discount Categories .....	49
7.3	Estimation of Toll Rates .....	50
7.4	Toll Revenue .....	58
7.5	Toll Revenue at all toll plazas under Scenarios .....	58
<b>Chapter 8</b>	.....	<b>61</b>
<b>CONCLUSION &amp; RECOMMENDATIONS .....</b>		<b>61</b>
8.1	Conclusion & Recommendations .....	61



## LIST OF TABLES

Table 2-1 : Bypass Details .....	9
Table 3-1 : Traffic Data Details .....	12
Table 3-2 : Vehicle Classification System .....	14
Table 3-3 : Traffic Data at Narwana Toll Plaza at Km 125 .....	15
Table 3-4 : Traffic Data at Badopatti Toll Plaza at Km 171 .....	15
Table 3-5 : Traffic Data at Chaudhariwas Toll Plaza at Km 212 .....	16
Table 3-6 : PCU Factors Adopted for Study .....	17
Table 3-7 : Traffic in PCU at Project Stretch Base Year 2023-24.....	17
Table 3-8 : Journey Type Bifurcation of Traffic at Narwana TP-1 KM 125.....	20
Table 3-9 : Journey Type Bifurcation of Traffic at Badopatti TP KM 171.....	21
Table 3-10 : Journey Type Bifurcation of Traffic at Chaudhariwas TP KM 212 .....	21
Table 4-1 : Summary Network analysis .....	26
Table 4-2 : Competing Roads Details .....	26
Table 5-1 : Per Capita Income Vs Car Haryana.....	28
Table 5-2 : Population Vs Bus Haryana.....	29
Table 5-3 : LCV Traffic Vs NSDP Haryana .....	29
Table 5-4 : Goods Traffic Vs NSDP Haryana .....	30
Table 5-5 : Summary Regression Analysis Haryana .....	31
Table 5-6 : Per Capita Income Vs Car Rajasthan.....	31
Table 5-7 : Population Vs Bus Rajasthan.....	31
Table 5-8 : LCV Traffic Vs NSDP Rajasthan .....	32
Table 5-9 : Goods Traffic Vs NSDP Rajasthan .....	33
Table 5-10 : Summary Regression Analysis Rajasthan .....	33
Table 5-11 : Recommended Growth Rates Optimistic .....	39
Table 5-12 : Recommended Growth Rates Pessimistic.....	39
Table 5-13 : Recommended Growth Rates Most Likely.....	40
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Narwana 125.00 KM .....	41
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Badopatti 171.00 KM.....	42
Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 212.00 KM .....	42
Table 6-4 : Total Tollable Traffic @ Toll Plaza 1- Chainage 125.000 KM .....	43
Table 6-5 : Total Tollable Traffic @ Toll Plaza 2- Chainage 171.00 KM .....	44
Table 6-6 : Total Tollable Traffic @ Toll Plaza 3- Chainage 212.00 KM .....	44
Table 6-7 : Total Tollable Traffic @ Toll Plaza 1- Chainage 125.000 KM .....	45
Table 6-8 : Total Tollable Traffic @ Toll Plaza 2- Chainage 171.00 KM .....	46
Table 6-9 : Total Tollable Traffic @ Toll Plaza 3- Chainage 212.00 KM .....	46
Table 7-1 : Base Toll Rates June 2007-08.....	50
Table 7-2 : Toll Rates for Single Journey @ Km 125.000 .....	51

Table 7-3 : Toll Rates for Single Journey @ Km 171.00 .....	51
Table 7-4 : Toll Rates for Single Journey @ Km 212.00 .....	52
Table 7-5 : Toll Rates for Return Journey @ Km 125.000.....	53
Table 7-6 : Toll Rates for Return Journey @ Km 171.00.....	53
Table 7-7 : Toll Rates for Return Journey @ Km 212.00.....	54
Table 7-8 : Toll Rates for Monthly Pass Local @ Km125.000.....	54
Table 7-9 : Toll Rates for Monthly Pass Local @ Km171.000.....	55
Table 7-10 : Toll Rates for Monthly Pass Local @ Km212.000.....	56
Table 7-11 : Toll Rates for Monthly Pass @ Km125.000 .....	56
Table 7-12 : Toll Rates for Monthly Pass @ Km 171.00 .....	57
Table 7-13 : Toll Rates for Monthly Pass @ Km 212.00 .....	58
Table 7-14 : Toll Revenue Optimistic Scenario .....	59
Table 7-15 : Toll Revenue Pessimistic Scenario .....	59
Table 7-16 : Toll Revenue Most Likely Scenario .....	60

## LIST OF FIGURES

<i>Figure 1-1 : Alignment of Project Stretch.....</i>	<i>8</i>
<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	<i>10</i>
<i>Figure 2-2 : Photographs showing Project Corridor .....</i>	<i>11</i>
<i>Figure 3-1 : Comparison of PCU Index.....</i>	<i>18</i>
<i>Figure 3-2 :Model Split of Tollable Vehicle-Km 125.790.....</i>	<i>19</i>
<i>Figure 3-3 :Model Split of Tollable Vehicle-Km 171.58.....</i>	<i>19</i>
<i>Figure 3-4 :Model Split of Tollable Vehicle-Km 212.400.....</i>	<i>20</i>
<i>Figure 4-1 : Alternate route at regional level between Zones .....</i>	<i>24</i>
<i>Figure 4-2 : Alternate route at regional level between Ludhiana &amp; Ajmer.....</i>	<i>25</i>
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana .....</i>	<i>29</i>
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana.....</i>	<i>29</i>
<i>Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Haryana.....</i>	<i>30</i>
<i>Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Haryana.....</i>	<i>30</i>
<i>Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	<i>31</i>
<i>Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	<i>32</i>
<i>Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.....</i>	<i>32</i>
<i>Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.....</i>	<i>33</i>
<i>Figure 5-9 : Growth of GDP in India.....</i>	<i>35</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>50</i>

## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

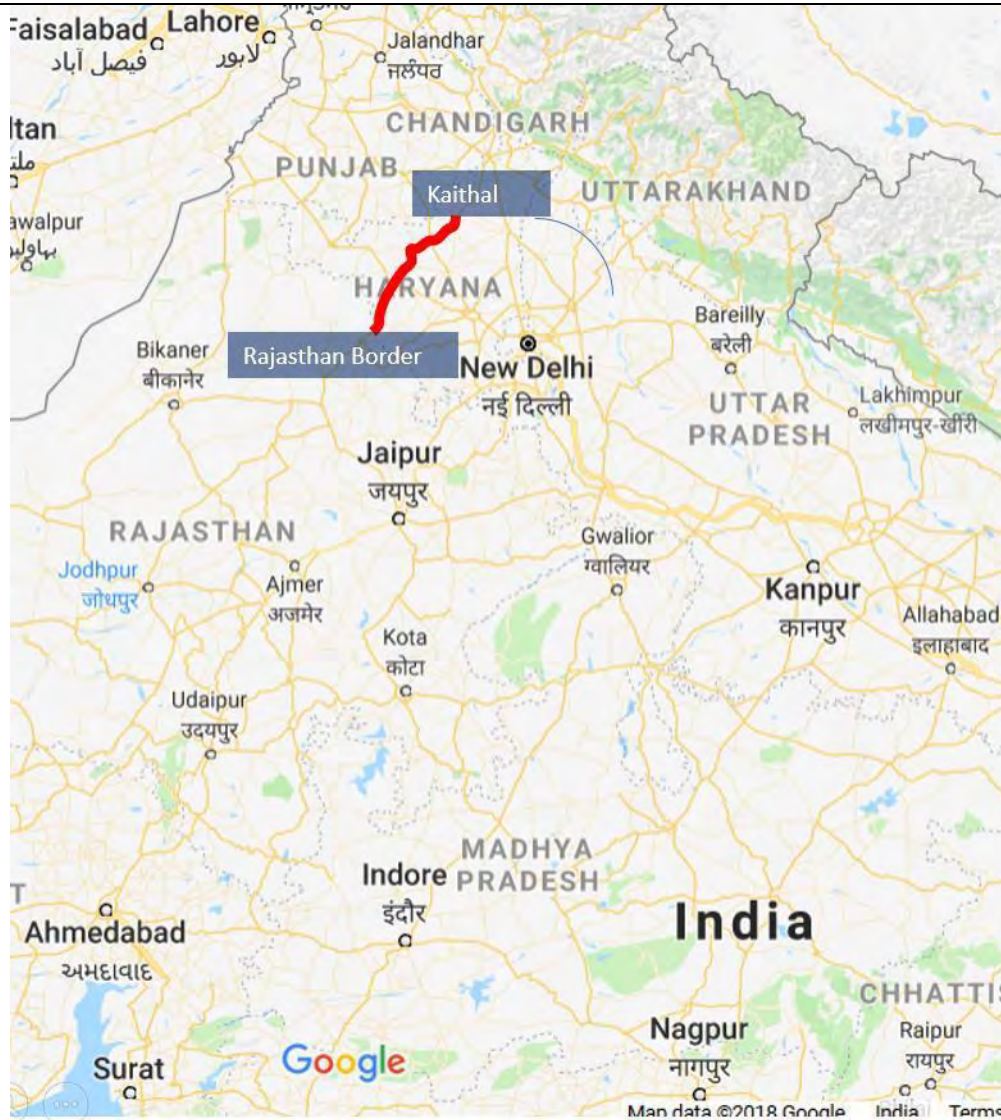
The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under various NHDP Phases.

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 15<sup>th</sup> 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 29<sup>th</sup> 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 Coastal parts of Maharashtra and then to down to south.

Project road section from 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 29<sup>th</sup> 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.

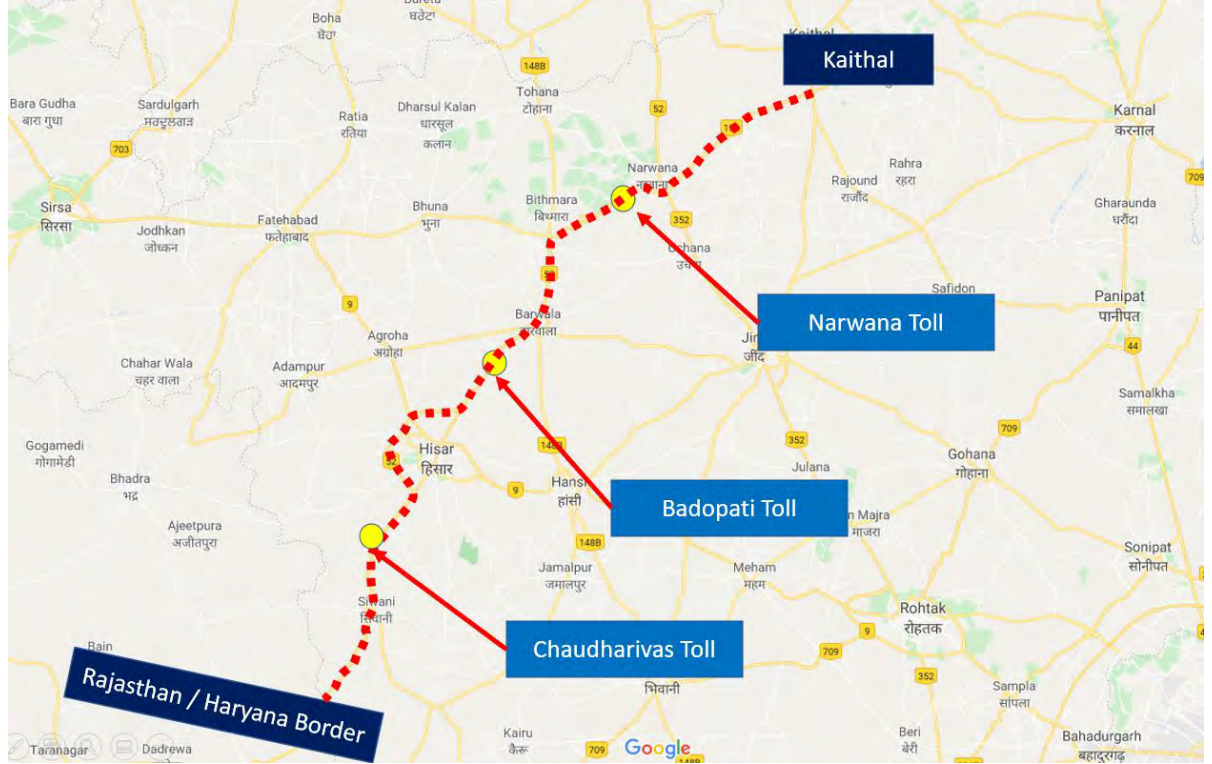


Figure 2-1 : Project Alignment with Toll Plaza

### 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, 2019-2020, 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
	<b>Total</b>	<b>5305</b>	<b>4774</b>	<b>7357</b>	<b>6905</b>	<b>7215</b>

**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
	<b>Total</b>	<b>8077</b>	<b>7272</b>	<b>8303</b>	<b>7581</b>	<b>6800</b>

*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
	<b>Total</b>	<b>5939</b>	<b>5347</b>	<b>8295</b>	<b>7506</b>	<b>7356</b>

### 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

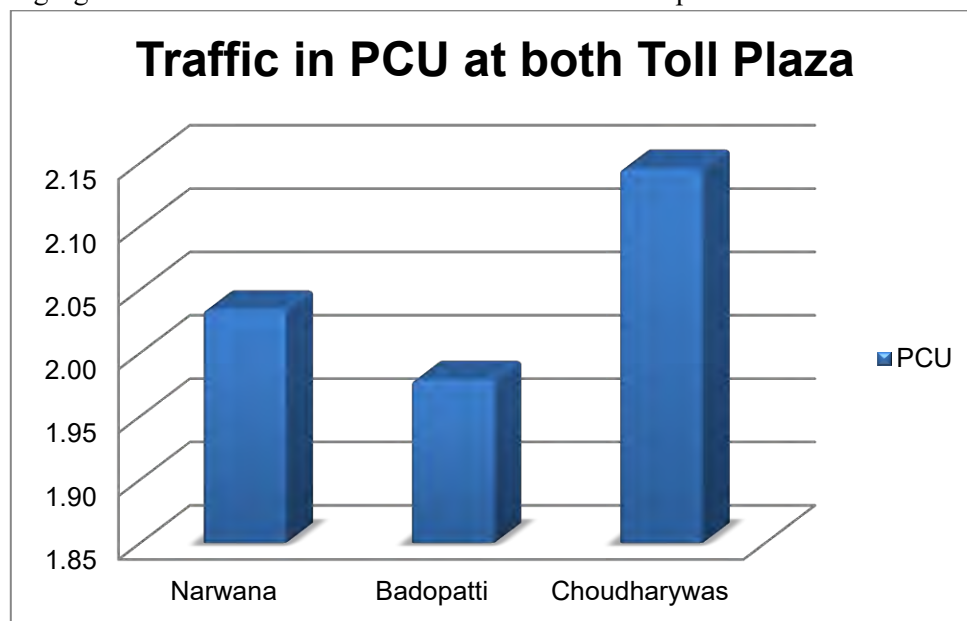
Traffic volume at each toll plaza was converted to PCU and same is presented as under

**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.

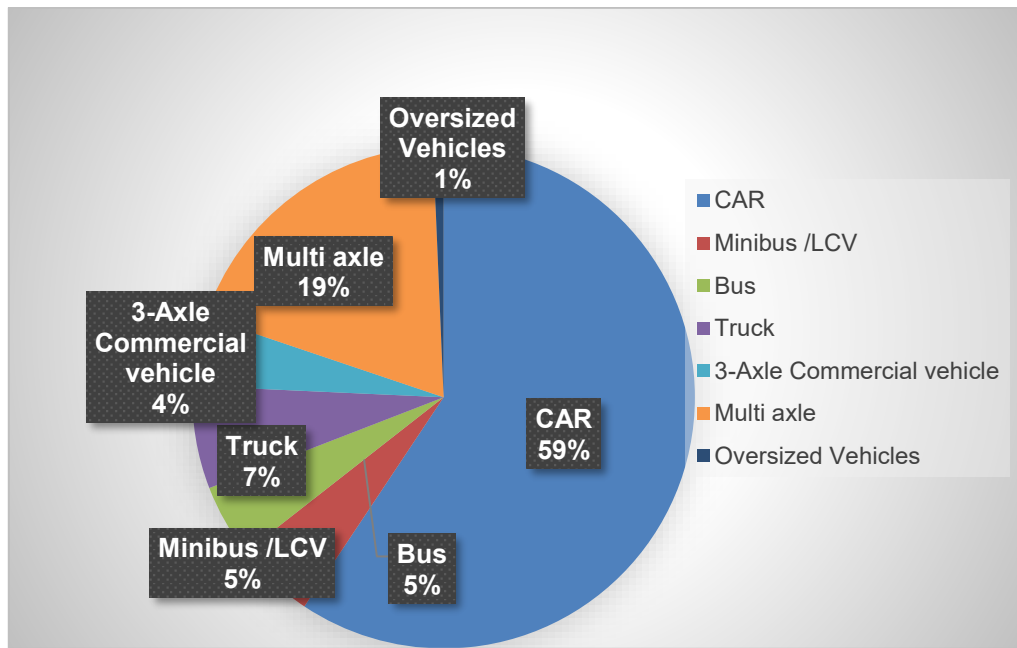


**Figure 3-1 : Comparison of PCU Index**

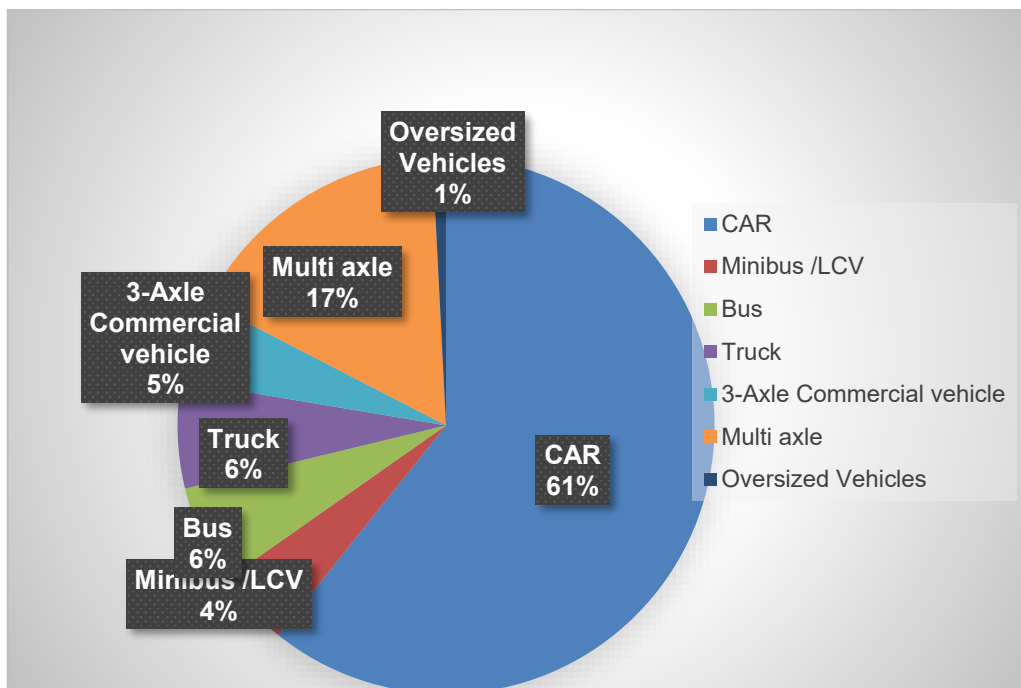
### 3.4.2 Components of Traffic

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.

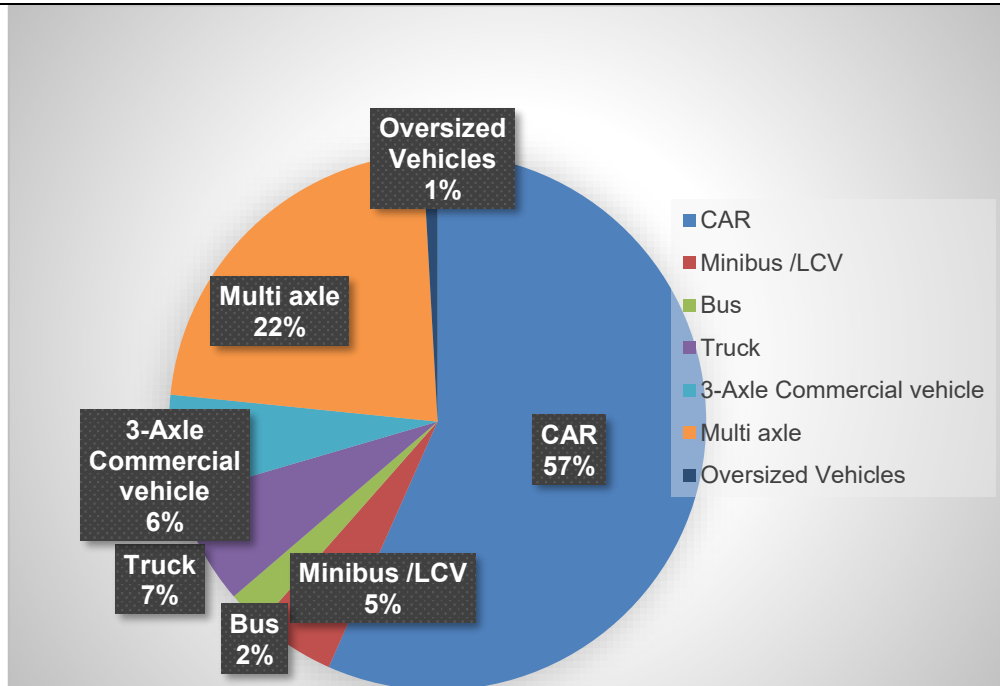
It is observed that car traffic forms about 50%- 60% of total traffic at toll plaza locations while multi axle commercial vehicles are about 20% -35% of total traffic. Truck / Bus and LCV share about 12% and 5 % of traffic volume respectively.



**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 a 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,

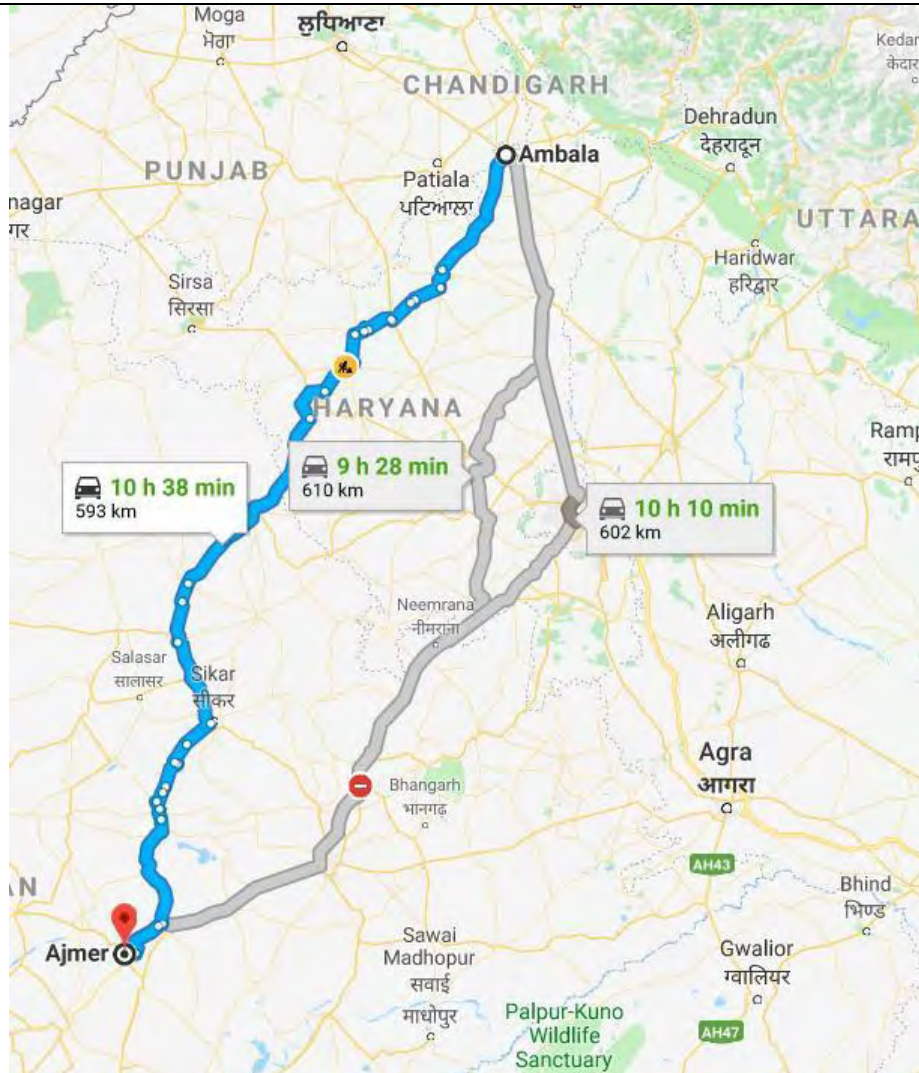
### 4.2 Competing / Alternate route

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).

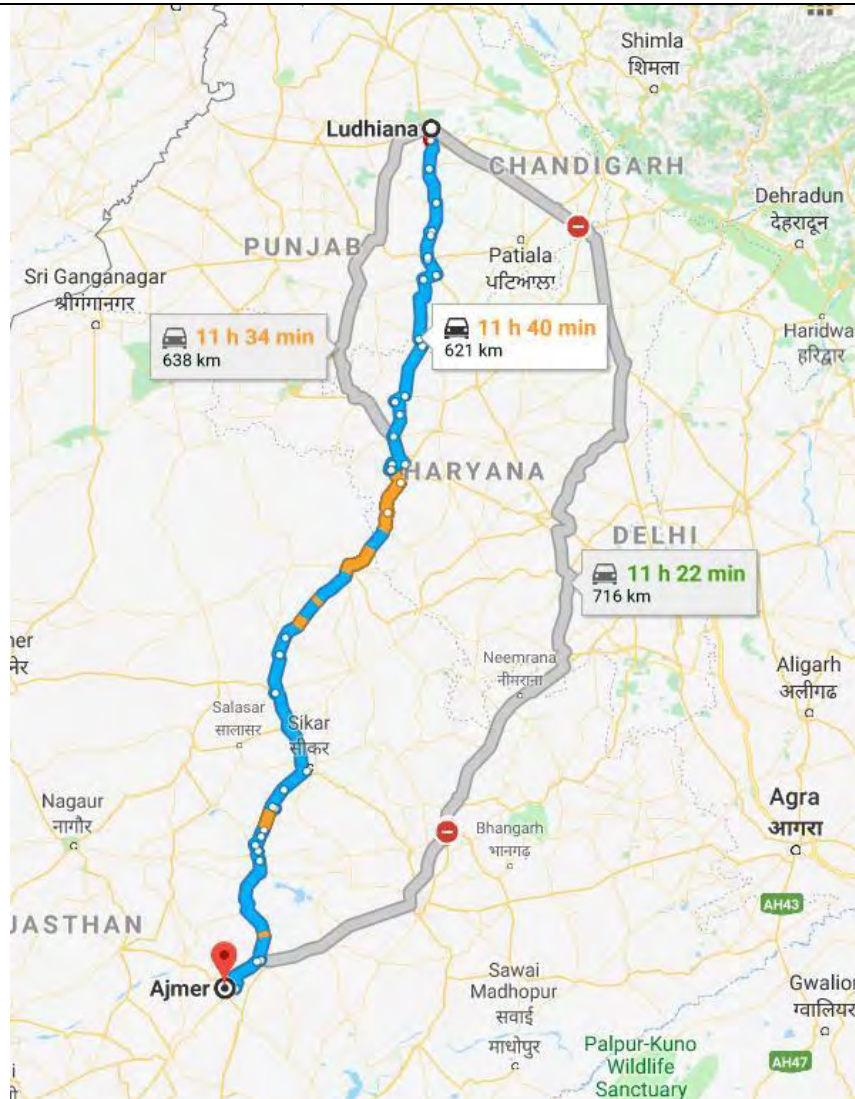
As alternate routes converge at Ajmer, the Project Influence Area (PIA) is considered between Ambala and Ajmer only.

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
<b>Regional Level</b>						
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).

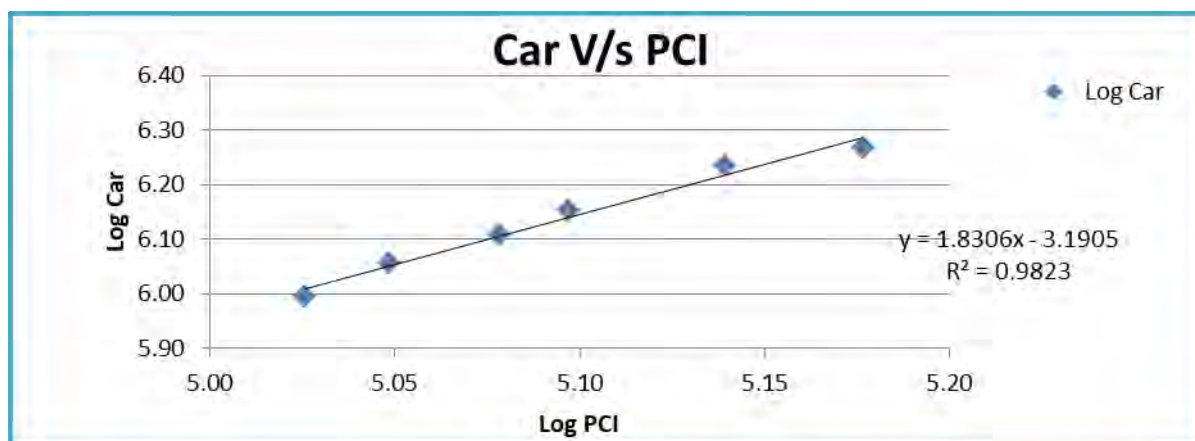
The project corridor spreads across state of Haryana. Toll plazas at Narwana, Badopatti and Choudhariwas are in the state of Haryana, but project stretch is under impact of Rajasthan state as well. In such circumstances for elasticity calculations, working data from above two states has been analysed.

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%

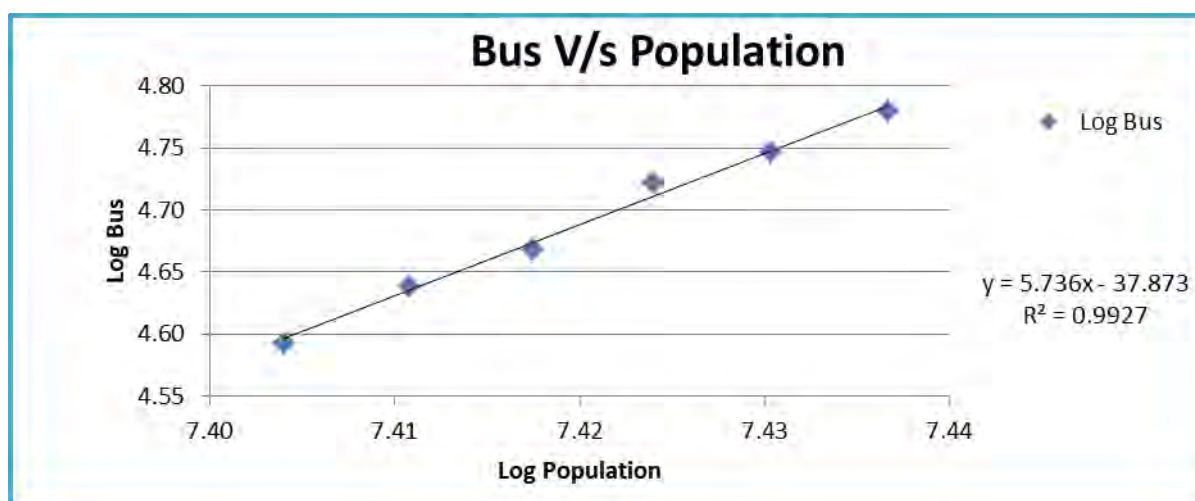
Regression analysis of same is given in figure below.



**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.

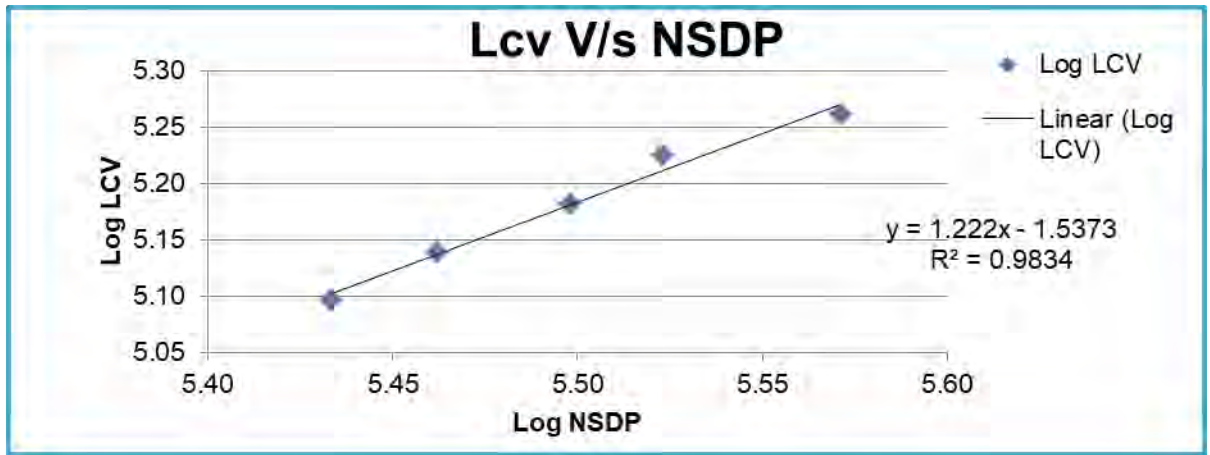


Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Haryana.

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.

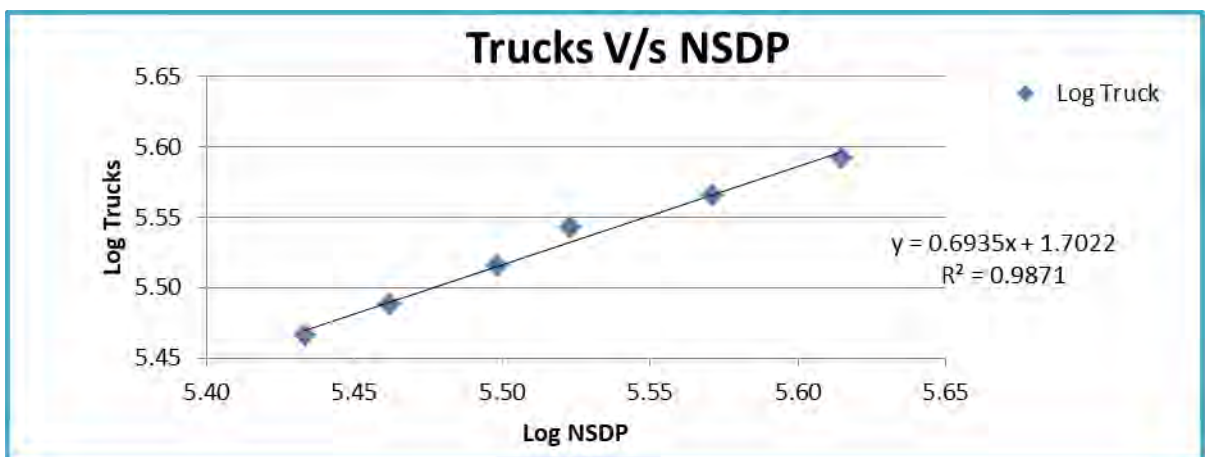


Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Haryana.

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-5 : Summary Regression Analysis Haryana**

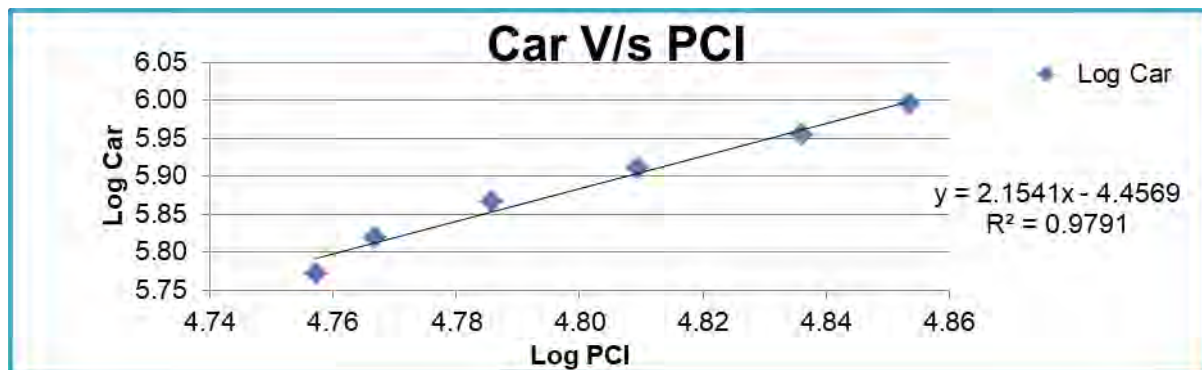
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average IV Growth (5yrs)	Growth Elastic Model	Remarks
Haryana	Car/Jeep	PCI	$y = 1.8306x - 3.1905$	$R^2 = 0.9823$	1.8306	7.23%	13.24%	Good Regression
	Bus	Population	$y = 5.736x - 37.8732$	$R^2 = 0.9927$	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**

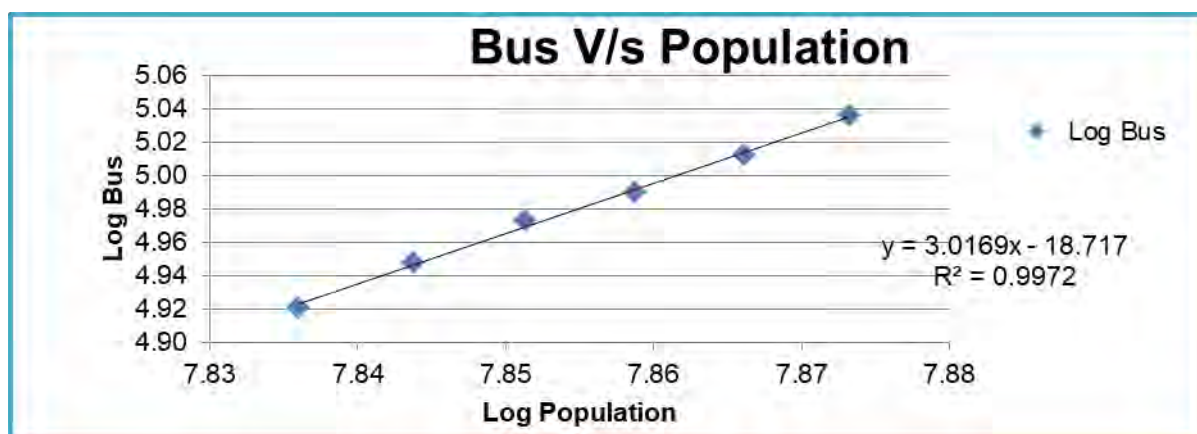
Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2012	57192	591069	4.76	5.77		
2013	58441	659542	4.77	5.82	2%	
2014	61053	733916	4.79	5.87	4%	
2015	64496	814079	4.81	5.91	6%	
2016	68565	899307	4.84	5.95	6%	
2017	71394	988391	4.85	5.99	4%	4.55%

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.



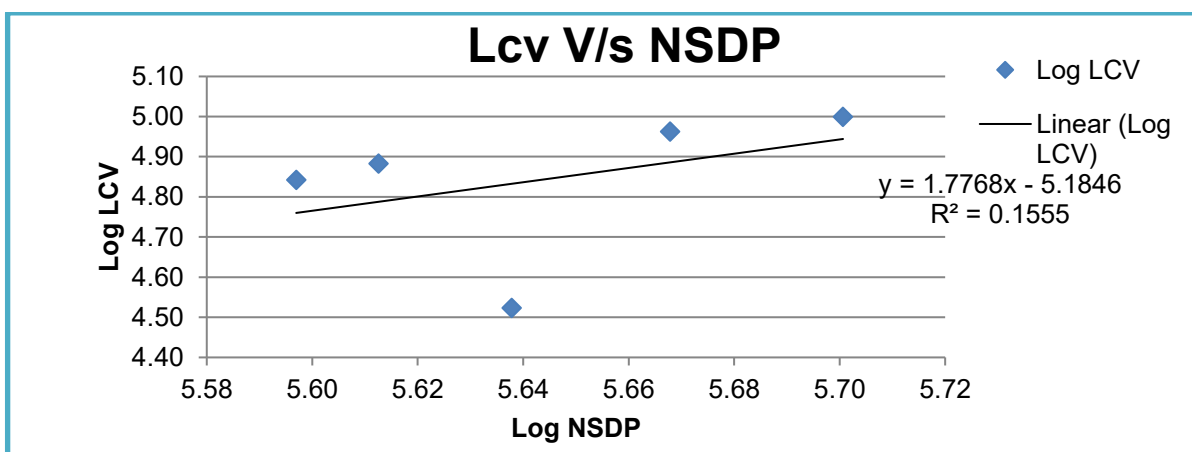
**Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan**

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.

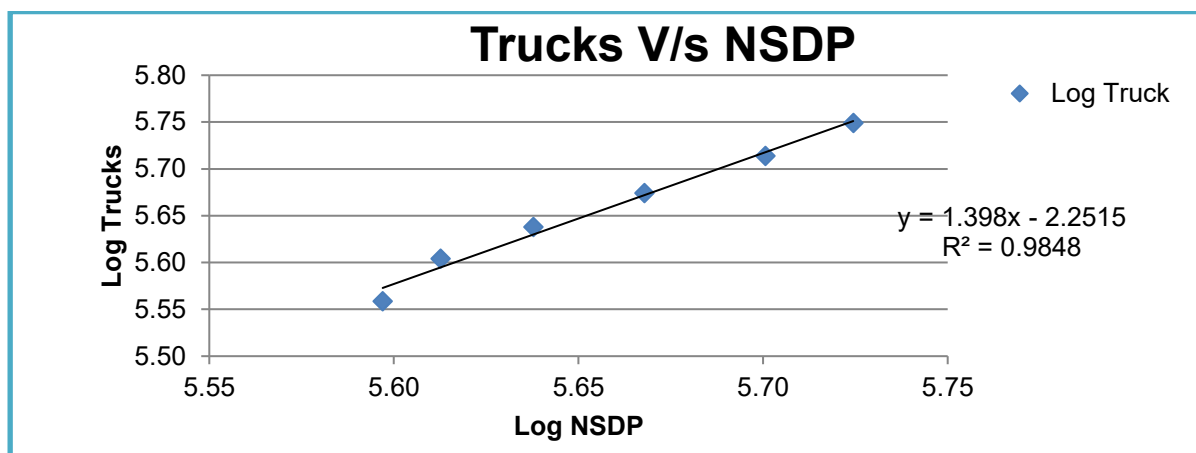


Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.

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<sup>2</sup> 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/Jep	PCI	y = 2.1541x + -4.4569	R <sup>2</sup> = 0.9791	2.1541	4.55%	9.79%	Good Regression
	Bus	Population	y = 3.0169x - 18.7174	R <sup>2</sup> = 0.9972	3.0169	1.73%	5.22%	Good Regression
	LCV	NSDP	y = 1.7768x - 5.1846	R <sup>2</sup> = 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, Dundahera 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
<b>2- Axle</b>	3.46%	3.24%	2.73%	2.54%	2.36%	2.17%
<b>3 - Axle</b>	3.46%	3.24%	2.73%	2.54%	2.36%	2.17%
<b>4 to 6 Axle</b>	3.46%	3.24%	3.03%	2.82%	2.62%	2.41%
<b>7 and Above Axle</b>	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
<b>Car/Jeep/Van</b>	5.42%	5.20%	4.97%	4.75%	4.53%	4.31%
<b>Bus</b>	2.96%	2.84%	2.47%	2.36%	2.25%	2.15%
<b>LCV</b>	3.13%	2.92%	2.47%	2.28%	2.10%	1.92%
<b>2- Axle</b>	3.71%	3.49%	2.98%	2.79%	2.61%	2.42%
<b>3 - Axle</b>	3.71%	3.49%	2.98%	2.79%	2.61%	2.42%
<b>4 to 6 Axle</b>	3.71%	3.49%	3.28%	3.07%	2.87%	2.66%
<b>7 and Above Axle</b>	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 - 1<sup>st</sup> 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

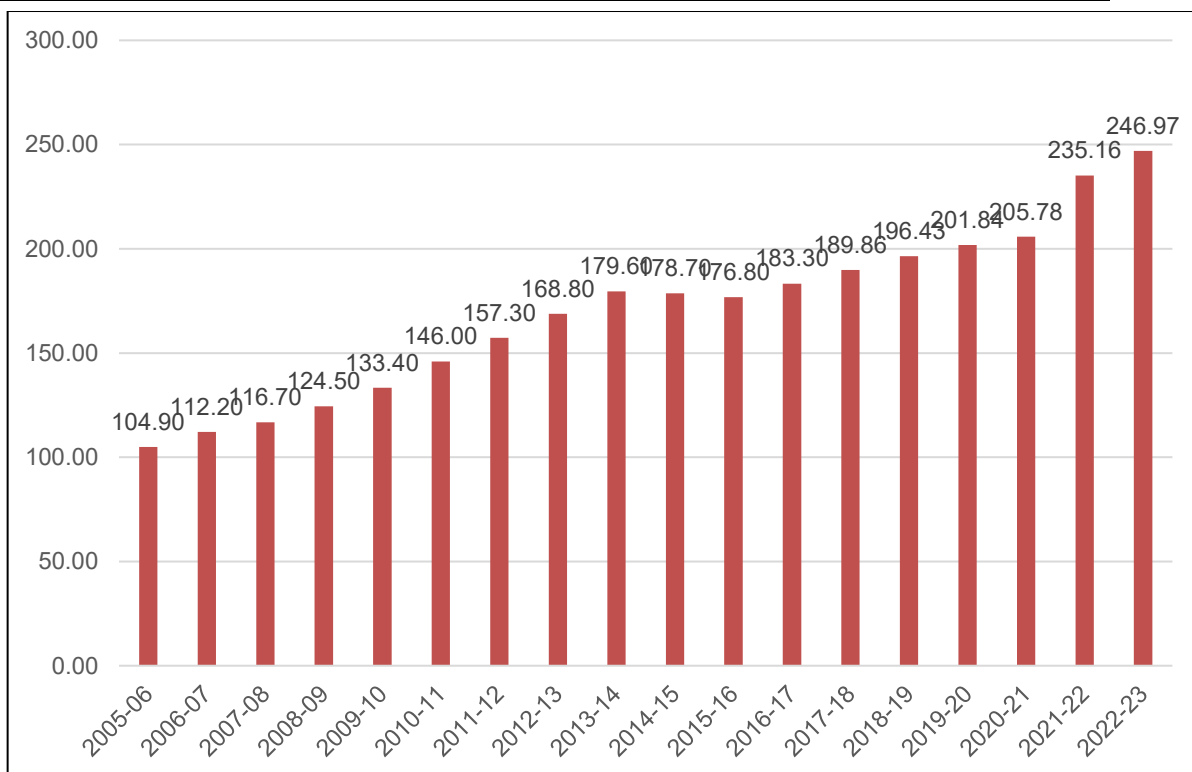
1. Monthly Pass: For frequent user's monthly pass would be issued at fee 50 time the single journey fee.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travellers 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](http://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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





# 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**



**GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991  
Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)  
Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**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**



## CONTENTS

<b>Chapter 1</b> .....	<b>7</b>
<b>INTRODUCTION</b> .....	<b>7</b>
<b>1.1 Background</b> .....	<b>7</b>
<b>1.2 Objective of the Study</b> .....	<b>7</b>
<b>1.2.1 Scope of Services</b> .....	<b>8</b>
<b>Chapter 2</b> .....	<b>9</b>
<b>PROJECT DETAILS</b> .....	<b>9</b>
<b>2.1 Project Corridor</b> .....	<b>9</b>
<b>2.2 Project Stretch Description</b> .....	<b>9</b>
<b>2.3 Project Corridor Illustration</b> .....	<b>10</b>
<b>Chapter 3</b> .....	<b>11</b>
<b>TRAFFIC SURVEYS AND ANALYSIS</b> .....	<b>11</b>
<b>3.1 Traffic Surveys</b> .....	<b>11</b>
<b>3.2 Classified Traffic Volume</b> .....	<b>12</b>
<b>3.3 Traffic Characteristic</b> .....	<b>13</b>
<b>3.3.1 Traffic Data</b> .....	<b>13</b>
<b>3.4 Data Analysis</b> .....	<b>15</b>
<b>3.4.1 Analysis of Traffic Volume Count</b> .....	<b>15</b>
<b>3.4.2 Components of Traffic</b> .....	<b>17</b>
<b>3.5 Secondary Data Collection</b> .....	<b>19</b>
<b>Chapter 4</b> .....	<b>21</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS</b> .....	<b>21</b>
<b>4.1 Introduction</b> .....	<b>21</b>
<b>4.2 Competing / Alternate route</b> .....	<b>21</b>
<b>Chapter 5</b> .....	<b>23</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY</b> .....	<b>23</b>
<b>5.1 Introduction</b> .....	<b>23</b>
<b>5.2 Trend Analysis</b> .....	<b>23</b>
<b>5.3 Estimation of Traffic Demand Elasticity</b> .....	<b>24</b>
<b>5.4 Analysis of Historic Traffic Data</b> .....	<b>31</b>
<b>5.5 Other Factors Influencing Growth</b> .....	<b>31</b>
<b>5.6 Developments along and around the Project Corridor &amp; State</b> .....	<b>32</b>
<b>5.7 Recommended Growth Rates of Traffic</b> .....	<b>33</b>
<b>5.7.1 Recommended Growth Rates of Traffic for Project Stretch</b> .....	<b>34</b>
<b>Chapter 6</b> .....	<b>36</b>

TRAFFIC FORECAST.....	36
6.1 Traffic Projections .....	36
6.2 Modification in Concession Period .....	40
<b>Chapter 7 .....</b>	<b>42</b>
FORECAST OF TOLL REVENUE .....	42
7.1 General.....	42
7.2 Discount Categories .....	42
7.3 Estimation of Toll Rates .....	43
7.4 Toll Revenue .....	49
7.5 Toll Revenue at all toll plazas under Scenarios .....	49
<b>Chapter 8 .....</b>	<b>53</b>
CONCLUSION & RECOMMENDATIONS .....	53
8.1 Conclusion & Recommendations .....	53

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	12
Table 3-3 : Traffic Data at Immamwadi Toll Plaza at Km 19.300 .....	14
Table 3-4 : Traffic Data at Yedeshi Toll Plaza at Km 77.400 .....	14
Table 3-5 : PCU Factors Adopted for Study .....	15
Table 3-6 : Traffic in PCU at Project Stretch Base Year 2023-24.....	16
Table 3-7 : Journey Type Bifurcation of Traffic at Tamalwadi TP-1 KM 19.300 .....	18
Table 3-8 : Journey Type Bifurcation of Traffic at Yedashi TP-2 KM 77.400 .....	19
Table 4-1 : Competing Roads Details .....	22
Table 5-1 : Per Capita Income Vs Car Maharashtra .....	24
Table 5-2 : Population Vs Bus Maharashtra .....	25
Table 5-3 : LCV Traffic Vs NSDP Maharashtra.....	26
Table 5-4 : Summary Regression Analysis Maharashtra.....	27
Table 5-5 : Per Capita Income Vs Car Karnataka .....	28
Table 5-6 : Population Vs Bus Karnataka .....	28
Table 5-7 : LCV Traffic Vs NSDP Karnataka .....	29
Table 5-8 : Summary Regression Analysis Karnataka .....	31
Table 5-9 : Recommended Growth Rates Optimistic .....	34
Table 5-10 : Recommended Growth Rates Pessimistic.....	34
Table 5-11 : Recommended Growth Rates Most Likely.....	35
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Tamalwadi 19.300 KM.....	36
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Yedashi 77.400 KM.....	37
Table 6-3 : Total Tollable Traffic @ Toll Plaza 1- Tamalwadi 19.300 KM .....	37
Table 6-4 : Total Tollable Traffic @ Toll Plaza 2- Yedashi 77.400 KM .....	38
Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Tamalwadi 19.300 KM.....	39
Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Yedeshi 77.400 KM.....	40
Table 7-1 : Base Toll Rates June 2007-08.....	43
Table 7-2 : Toll Rates for Single Journey @ Toll Plaza 1- Tamalwadi 19.300 KM.....	44
Table 7-3 : Toll Rates for Single Journey @ Toll Plaza 2- Yedashi 77.400 KM.....	44
Table 7-4 : Toll Rates for Return Journey @ Toll Plaza 1- Tamalwadi 19.300 KM .....	45
Table 7-5 : Toll Rates for Return Journey @ Toll Plaza 2- Yedashi 77.400 KM.....	46
Table 7-6 : Toll Rates for Monthly Pass Local @ Toll Plaza 1- Tamalwadi 19.300 KM.....	46
Table 7-7 : Toll Rates for Monthly Pass Local @ Toll Plaza 2- Yedashi 77.400 KM.....	47
Table 7-8 : Toll Rates for Monthly Pass @ Toll Plaza 1- Tamalwadi 19.300 KM.....	48
Table 7-9 : Toll Rates for Monthly Pass @ Toll Plaza 2- Yedashi 77.400 KM .....	48

---

<i>Table 7-10 : Toll Revenue Optimistic Scenario .....</i>	<i>49</i>
<i>Table 7-11 : Toll Revenue Pessimistic Scenario .....</i>	<i>50</i>
<i>Table 7-12 : Toll Revenue Most Likely Scenario .....</i>	<i>51</i>



## LIST OF FIGURES

<i>Figure 1-1: Alignment of Project Stretch.....</i>	7
<i>Figure 2-1: Project Alignment with Toll Plaza.....</i>	9
<i>Figure 2-2: Photographs showing Project Corridor .....</i>	10
<i>Figure 3-1: Comparison of PCU Index.....</i>	17
<i>Figure 4-1: Alternate route at Regional level .....</i>	22
<i>Figure 5-1: Regression and Elasticity PCI vs. Car-Extrapolation Maharashtra.....</i>	25
<i>Figure 5-2: Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra .....</i>	25
<i>Figure 5-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation Maharashtra .....</i>	27
<i>Figure 5-4: Regression and Elasticity PCI vs. Car-Extrapolation Karnataka.....</i>	28
<i>Figure 5-5: Regression and Elasticity Population vs. Bus – Extrapolation Karnataka .....</i>	29
<i>Figure 5-6: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation Karnataka.....</i>	30
<i>Figure 5-7 : Growth of GDP in India.....</i>	32
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	43

## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

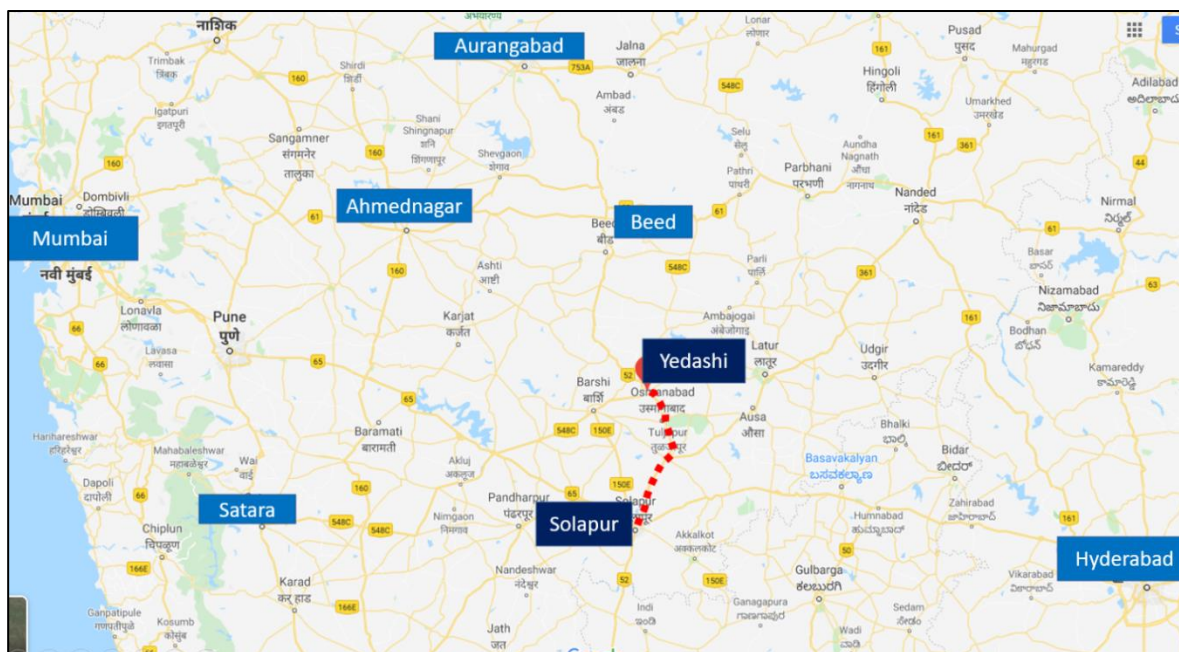
### 1.1 Background

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 21<sup>st</sup> January 2015. COD was achieved for part length of project on 15<sup>th</sup> 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.

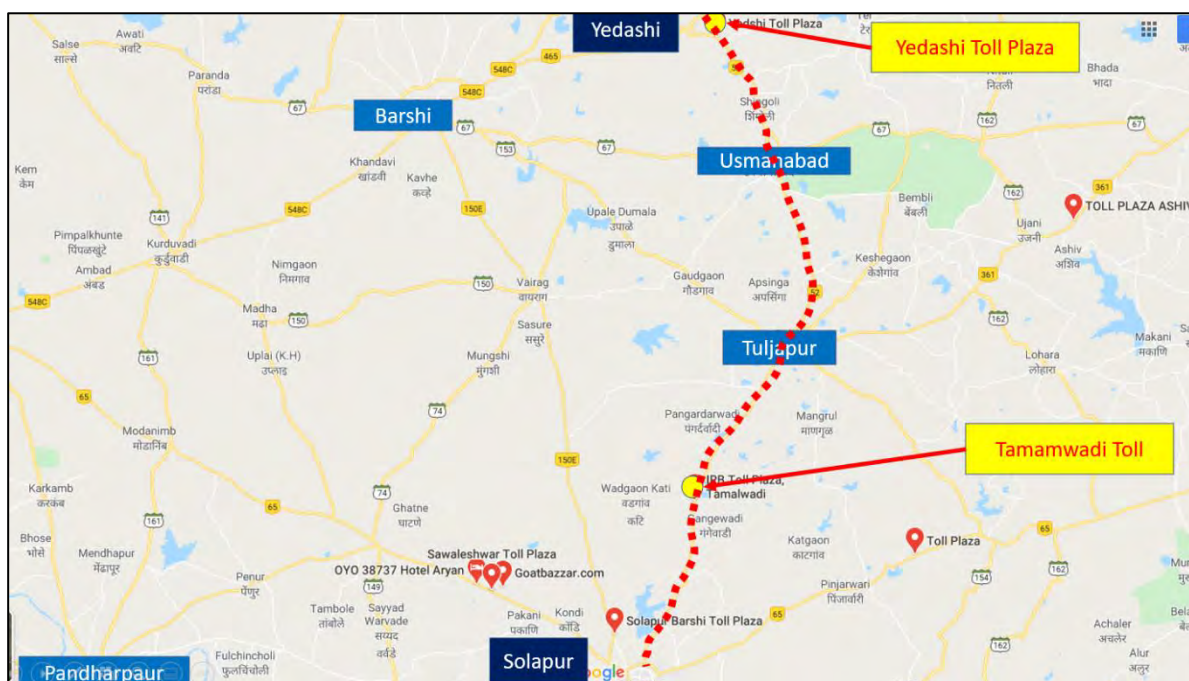
Solapur, the textile and sugar belt of Maharashtra, Jalna, India's first dry port, Aurangabad fall in project corridor. Bidkin, Shendre areas which are coming up with mega green field Industrial smart city of 10000 acre at Bidkin and Shendra in Maharashtra also fall in influence zone of project corridor.

#### 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
<b>Total</b>		<b>9413</b>	<b>7343</b>	<b>10070</b>	<b>12958</b>	<b>14326</b>

**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
<b>Total</b>		<b>6269</b>	<b>5616</b>	<b>6967</b>	<b>8245</b>	<b>8850</b>

### 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

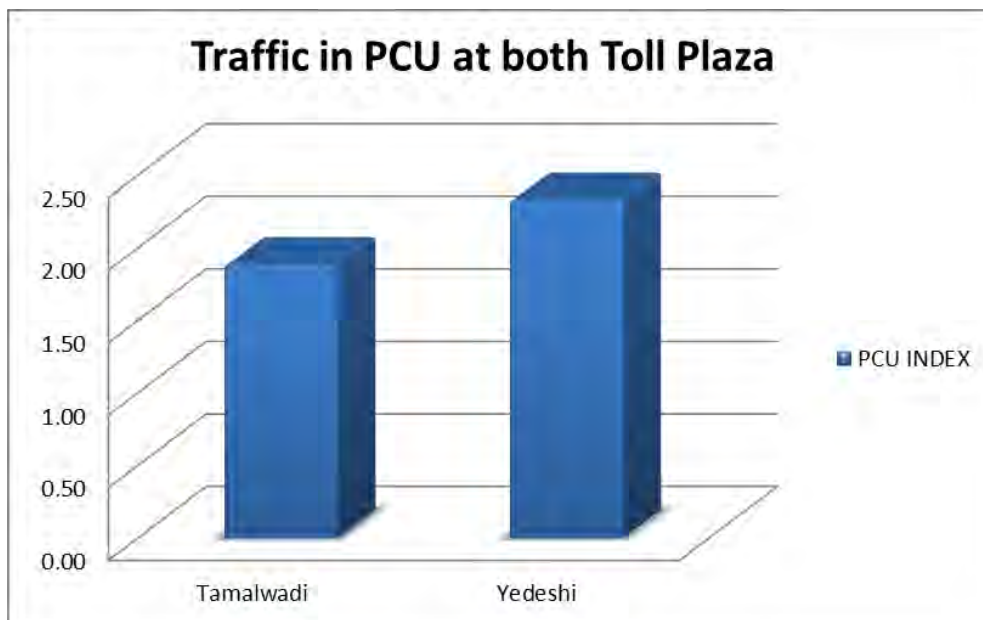
Traffic volume at each toll plaza was converted to PCU and same is presented as under

**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.



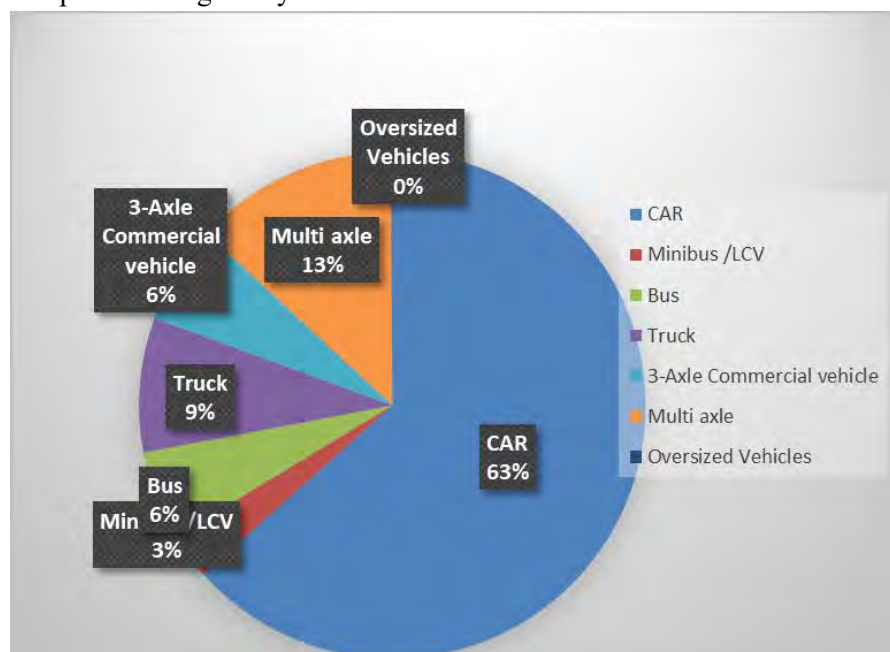


**Figure 3-1: Comparison of PCU Index**

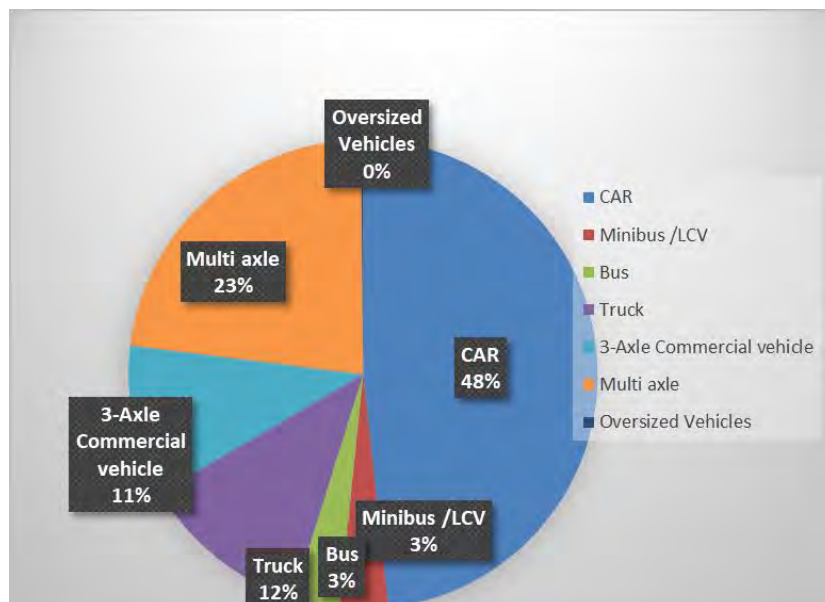
It can be observed that PCU index is consistent at two toll plaza locations with commercial traffic slightly higher at Yedeshi toll plaza.

**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.

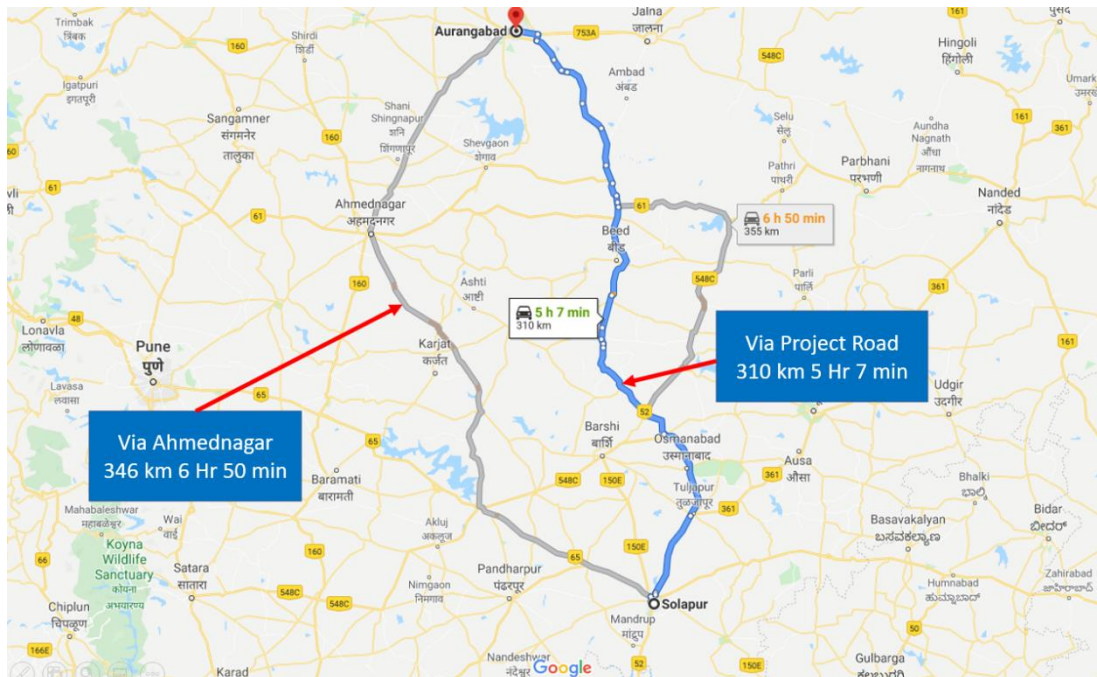
- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

### 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
<b>Regional Level</b>						
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).

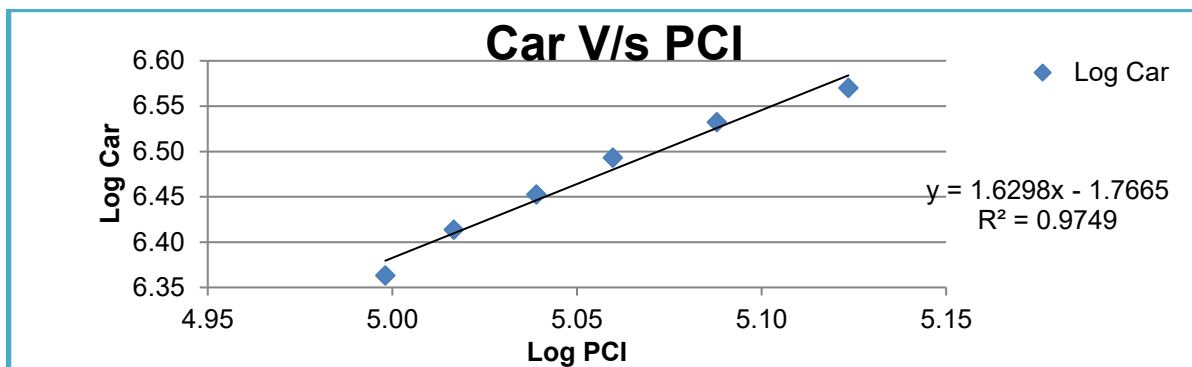
The project corridor is entirely in the state of Maharashtra but being at the border of Karnataka there is certain of Karnataka on project traffic. In such circumstances for elasticity calculations, working data from above Maharashtra and Karnataka states has been analyzed.

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.

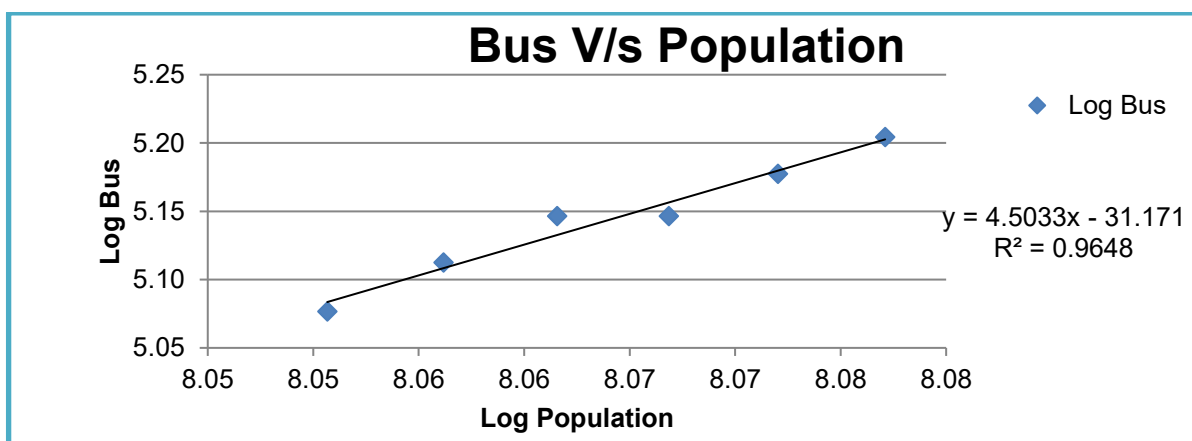


**Figure 5-1: Regression and Elasticity PCI vs. Car-Extrapolation Maharashtra**

**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.



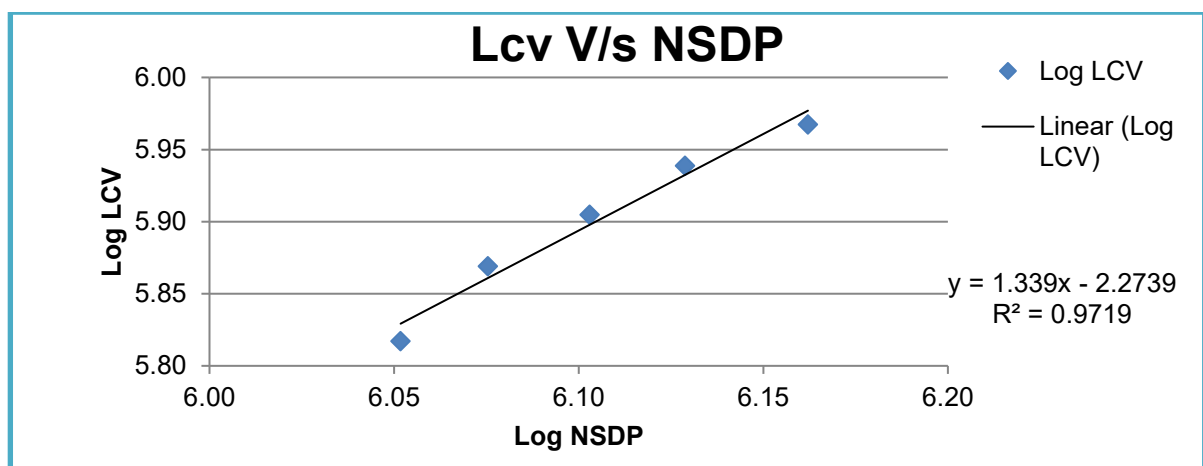
**Figure 5-2: Regression and Elasticity Population vs. Bus - Extrapolation Maharashtra**

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**

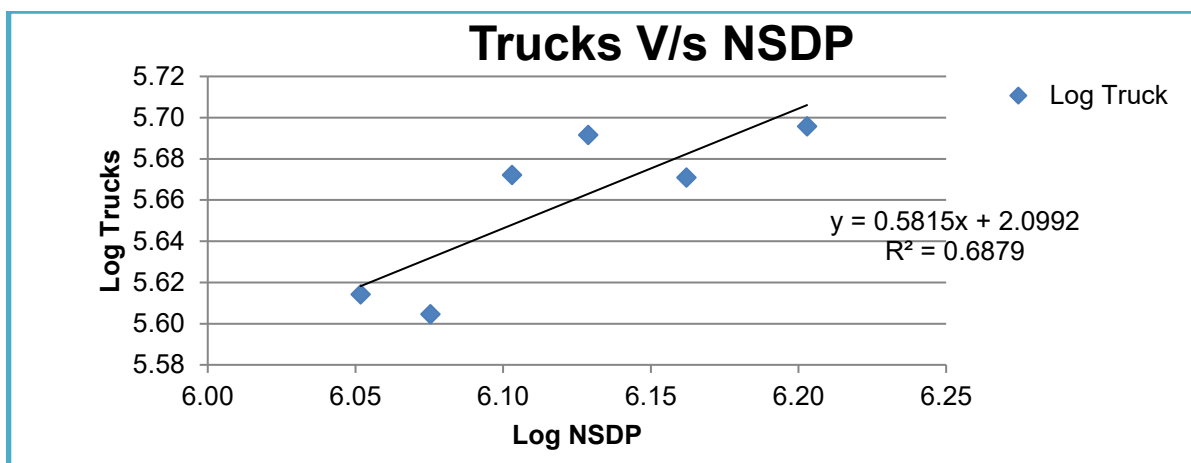
Year	NSDP	LCV	Log NSDP	Log Truck	NSDP Growth	Average Growth (5 Year)
2012	1126595	656407	6.05	5.82		
2013	1189711	739725	6.08	5.87	6%	
2014	1267551	803128	6.10	5.90	7%	
2015	1345341	868632	6.13	5.94	6%	
2016	1452439	927903	6.16	5.97	8%	6.56%

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-4 : Summary Regression Analysis Maharashtra**

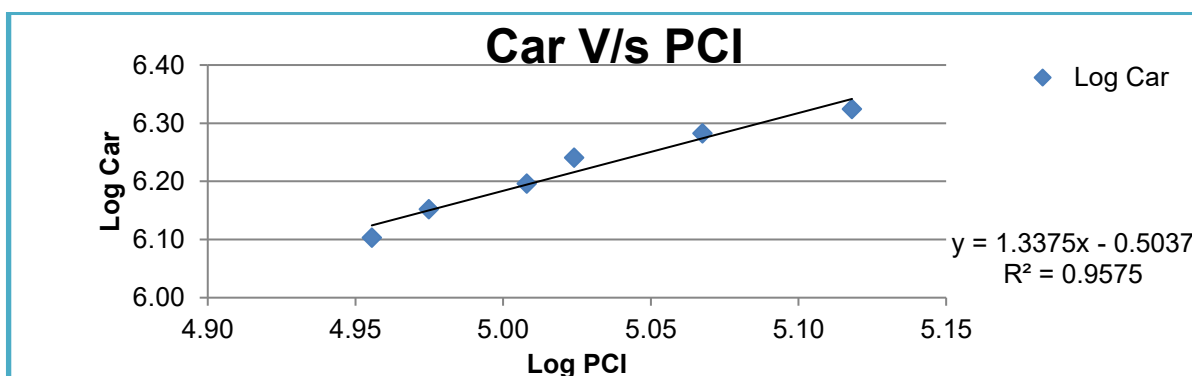
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Maharashtra	Car/Jeep	PCI	$y = 1.6298x - 1.7665$	R <sup>2</sup> = 0.9749	1.6298	5.96%	9.71%
	Bus	Population	$y = 4.5033x - 31.1713$	R <sup>2</sup> = 0.9648	4.5033	1.23%	5.52%
	LCV	NSDP	$y = 1.339x - 2.2739$	R <sup>2</sup> = 0.9719	1.3390	6.56%	8.78%
	Truck	NSDP	$y = 0.5815x - 2.0992$	R <sup>2</sup> = 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**

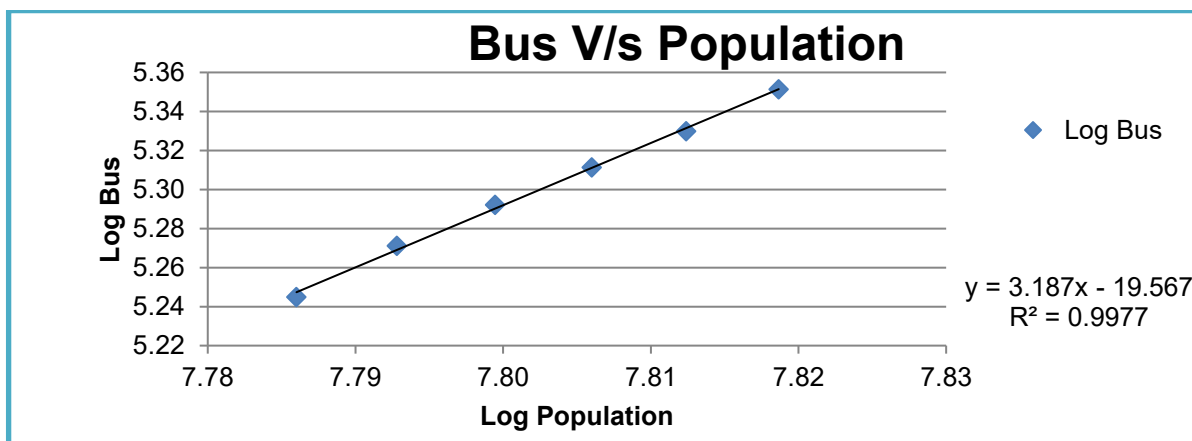
**Table 5-6 : Population Vs Bus Karnataka**

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.



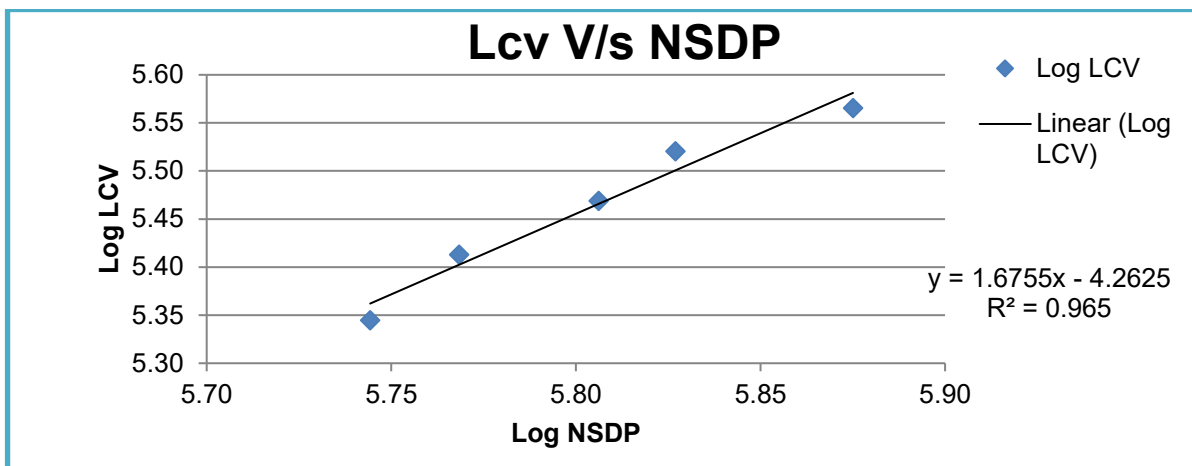
**Figure 5-5: Regression and Elasticity Population vs. Bus – Extrapolation Karnataka**

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%

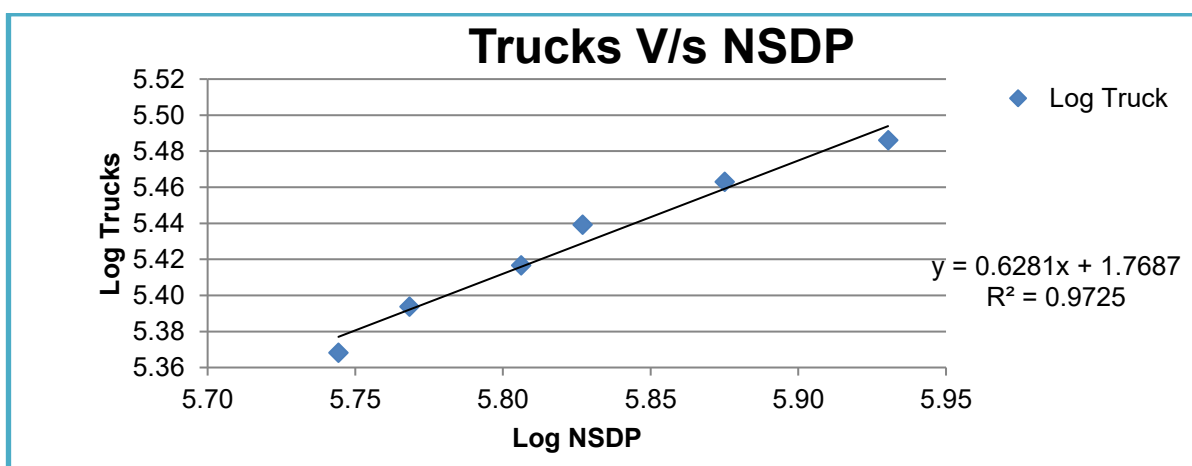
The following figure depicts regression analysis and extrapolation.



**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 R<sup>2</sup> 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 <sup>2</sup> = 0.9575	1.3375	7.83%	10.47%
	Bus	Population	$y = 3.187x - 19.567$	R <sup>2</sup> = 0.9977	3.1870	1.52%	4.83%
	LCV	NSDP	$y = 1.6755x - 4.2625$	R <sup>2</sup> = 0.965	1.6755	7.85%	13.16%
	Truck	NSDP	$y = 0.6281x - 1.7687$	R <sup>2</sup> = 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
- Tembhorni, 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
<b>Car/Jeep/Van</b>	9.28%	8.67%	8.52%	8.22%	7.86%
<b>Bus</b>	5.58%	5.25%	5.22%	5.16%	4.90%
<b>LCV</b>	4.06%	3.77%	3.63%	3.36%	3.07%
<b>2- Axle</b>	4.88%	4.31%	4.18%	3.90%	3.61%
<b>3 - Axle</b>	6.21%	5.47%	5.30%	4.95%	4.57%
<b>4 to 6 Axle</b>	6.87%	6.05%	5.86%	5.47%	5.05%
<b>7 and Above Axle</b>	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 - 1<sup>st</sup>October 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

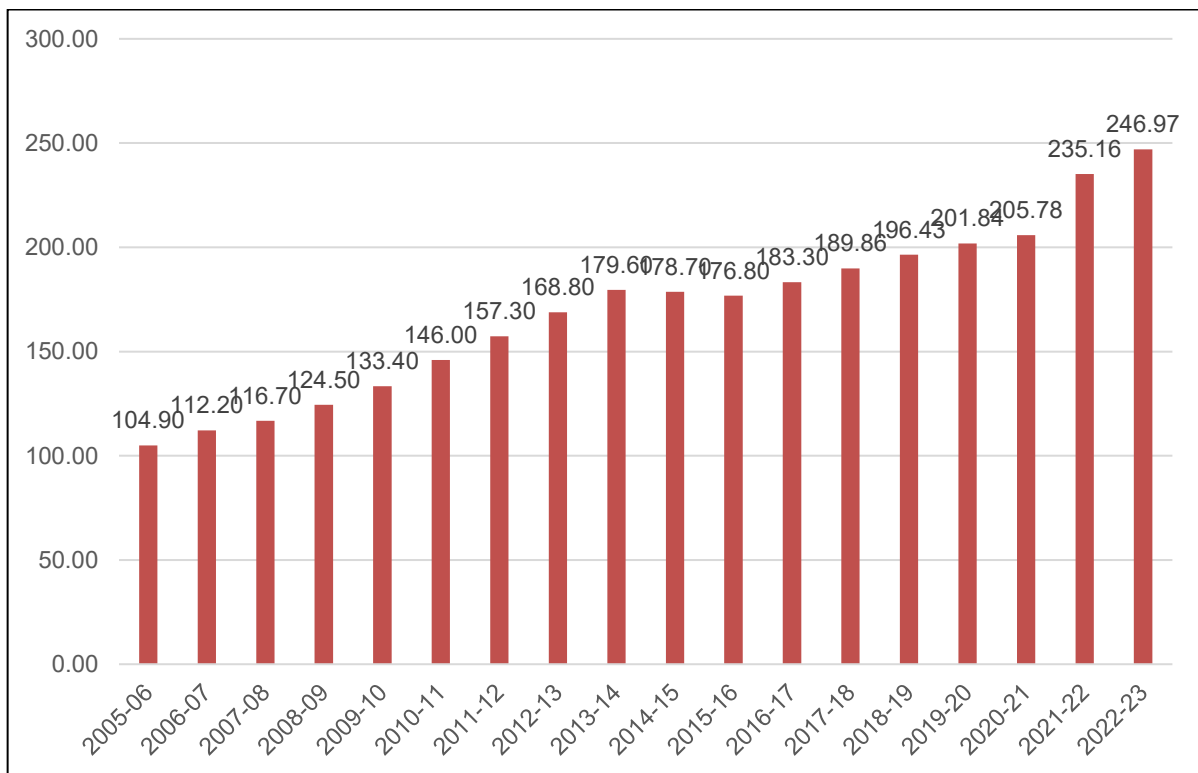
1. Monthly Pass: For frequent user's monthly pass would be issued for 50 trips at 2/3<sup>rd</sup> rate as per provision of fee notification.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category 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](http://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 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- Yedashi 77.400 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

<b>Year</b>	<b>Toll Plaza Km 19.300</b>	<b>Toll Plaza Km 77.400</b>	<b>Total</b>
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)

<b>Year</b>	<b>Toll Plaza Km 19.300</b>	<b>Toll Plaza Km 77.400</b>	<b>Total</b>
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

<b>Year</b>	<b>Toll Plaza Km 19.300</b>	<b>Toll Plaza Km 77.400</b>	<b>Total</b>
<b>2028-29</b>	132.35	107.24	<b>239.59</b>
<b>2029-30</b>	148.77	120.15	<b>268.92</b>
<b>2030-31</b>	166.14	133.61	<b>299.75</b>
<b>2031-32</b>	186.93	149.74	<b>336.67</b>
<b>2032-33</b>	207.89	166.44	<b>374.33</b>
<b>2033-34</b>	232.73	185.46	<b>418.19</b>
<b>2034-35</b>	262.15	207.65	<b>469.80</b>
<b>2035-36</b>	293.07	231.18	<b>524.25</b>
<b>2036-37</b>	325.79	256.17	<b>581.96</b>
<b>2037-38</b>	365.88	286.60	<b>652.48</b>
<b>2038-39</b>	407.33	318.06	<b>725.39</b>
<b>2039-40</b>	459.62	357.21	<b>816.83</b>
<b>2040-41</b>	508.54	394.11	<b>902.65</b>
<b>2041-42</b>	568.32	437.86	<b>1006.18</b>
<b>2042-43</b>	635.72	487.39	<b>1123.11</b>
<b>2043-44</b>	712.65	544.33	<b>1256.98</b>
<b>2044-45</b>	793.16	604.50	<b>1397.66</b>

# 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



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)**



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





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



## CONTENTS

<b>Chapter 1 .....</b>	<b>6</b>
<b>INTRODUCTION .....</b>	<b>6</b>
<b>1.1 Background.....</b>	<b>6</b>
<b>1.2 Objective of the Study.....</b>	<b>7</b>
<b>1.2.1 Scope of Services .....</b>	<b>7</b>
<b>Chapter 2 .....</b>	<b>8</b>
<b>PROJECT DETAILS.....</b>	<b>8</b>
<b>2.1 Project Corridor.....</b>	<b>8</b>
<b>2.2 Project Stretch Description .....</b>	<b>8</b>
<b>2.3 Project Corridor Illustration.....</b>	<b>9</b>
<b>Chapter 3 .....</b>	<b>10</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>10</b>
<b>3.1 Traffic Surveys .....</b>	<b>10</b>
<b>3.2 Classified traffic Volume .....</b>	<b>11</b>
<b>3.3 Traffic Characteristic .....</b>	<b>12</b>
<b>3.3.1 Traffic Data .....</b>	<b>12</b>
<b>3.4 Data Analysis.....</b>	<b>13</b>
<b>3.4.1 Analysis of Traffic Volume Count .....</b>	<b>13</b>
<b>3.4.2 Components of Traffic.....</b>	<b>14</b>
<b>3.5 Secondary Data Collection .....</b>	<b>15</b>
<b>Chapter 4 .....</b>	<b>17</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>17</b>
<b>4.1 Introduction.....</b>	<b>17</b>
<b>4.2 Competing / Alternate route.....</b>	<b>17</b>
<b>Chapter 5 .....</b>	<b>21</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>21</b>
<b>5.1 Introduction.....</b>	<b>21</b>
<b>5.2 Trend Analysis.....</b>	<b>21</b>
<b>5.3 Estimation of Traffic Demand Elasticity.....</b>	<b>22</b>
<b>5.4 Analysis of Historic Traffic Data .....</b>	<b>29</b>
<b>5.5 Other Factors Influencing Growth.....</b>	<b>29</b>
<b>5.6 Developments along and around the Project Corridor &amp; State.....</b>	<b>30</b>
<b>5.7 Recommended Growth Rates of Traffic .....</b>	<b>32</b>
<b>5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....</b>	<b>32</b>
<b>Chapter 6 .....</b>	<b>34</b>

TRAFFIC FORECAST.....	34
6.1 Traffic Projections .....	34
6.2 Modification in Concession Period .....	36
<b>Chapter 7 .....</b>	<b>37</b>
FORECAST OF TOLL REVENUE .....	37
7.1 General.....	37
7.2 Discount Categories .....	37
7.3 Estimation of Toll Rates .....	38
7.4 Toll Revenue .....	41
7.5 Toll Revenue at all toll plazas under Scenarios .....	41
<b>Chapter 8 .....</b>	<b>44</b>
CONCLUSION & RECOMMENDATIONS .....	44
8.1 Conclusion & Recommendations .....	44

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	10
Table 3-2 : Vehicle Classification System .....	11
Table 3-3 : Traffic Data at Khandi Obri Toll Plaza at Km 348.450 .....	12
Table 3-4 : PCU Factors Adopted for Study .....	13
Table 3-5 : Traffic in PCU at Project Stretch Base Year 2023-24.....	13
Table 3-6 : Journey Type Bifurcation of Traffic at Khandi Obri TP KM 348.450 .....	15
Table 4-1 : Competing Roads Details .....	20
Table 5-1 : Per Capita Income Vs Car Rajasthan.....	22
Table 5-2 : Population Vs Bus Rajasthan.....	23
Table 5-3 : LCV Vs NSDP Rajasthan .....	24
Table 5-4 : GOODS Traffic Vs NSDP Rajasthan.....	24
Table 5-5 : Summary Regression Analysis Rajasthan .....	25
Table 5-6 : Per Capita Income Vs Car Gujarat .....	26
Table 5-7 : Population Vs Bus Gujarat .....	26
Table 5-8 : LCV Vs NSDP Gujarat .....	27
Table 5-9 : GOODS Traffic Vs NSDP Gujarat .....	28
Table 5-10 : Summary Regression Analysis Gujarat .....	29
Table 5-11 : GDP of India, Rajasthan and other important states.....	31
Table 5-12 : Recommended Growth Rates Optimistic .....	32
Table 5-13 : Recommended Growth Rates Pessimistic.....	32
Table 5-14 : Recommended Growth Rates Most Likely.....	32
Table 6-1 : Total Tollable Traffic @ Toll Plaza - 348.450 KM .....	34
Table 6-2 : Total Tollable Traffic @ Toll Plaza - Chainage 348.450 KM .....	34
Table 6-3 : Total Tollable Traffic @ Toll Plaza - Chainage 348.450KM .....	35
Table 7-1 : Base Toll Rates June 2007-08.....	38
Table 7-2 : Toll Rates for Single Journey @ Km TP-348.450 KM .....	39
Table 7-3 : Toll Rates for Return Journey @ TP-348.450 KM.....	39
Table 7-4 : Toll Rates for Monthly Pass Local @ TP-348.450 KM.....	40
Table 7-5 : Toll Rates for Monthly Pass @ TP-348.450 KM .....	40
Table 7-6 : Toll Revenue Optimistic Scenario.....	41
Table 7-7 : Toll Revenue Pessimistic Scenario .....	42
Table 7-8 : Toll Revenue Most Likely Scenario .....	42

## LIST OF FIGURES

<i>Figure 1-1 : Alignment of Project Stretch.....</i>	<i>6</i>
<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	<i>8</i>
<i>Figure 2-2 : Photographs showing Project Corridor .....</i>	<i>9</i>
<i>Figure 3-1 : Model Split of Tollable Vehicle.....</i>	<i>14</i>
<i>Figure 4-1 : Alternate route at regional level Udaipur - Ahmedabad.....</i>	<i>18</i>
<i>Figure 4-2 : Alternate route at regional level Delhi - Vadodara .....</i>	<i>19</i>
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	<i>23</i>
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	<i>23</i>
<i>Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.....</i>	<i>24</i>
<i>Figure 5-4 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Rajasthan.....</i>	<i>25</i>
<i>Figure 5-5 : Regression and Elasticity PCI vs. Car – Extrapolation Gujarat.....</i>	<i>26</i>
<i>Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat .....</i>	<i>27</i>
<i>Figure 5-7 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Gujarat .....</i>	<i>27</i>
<i>Figure 5-8 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Gujarat .....</i>	<i>28</i>
<i>Figure 5-9 : Growth of GDP in India.....</i>	<i>30</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>38</i>

## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

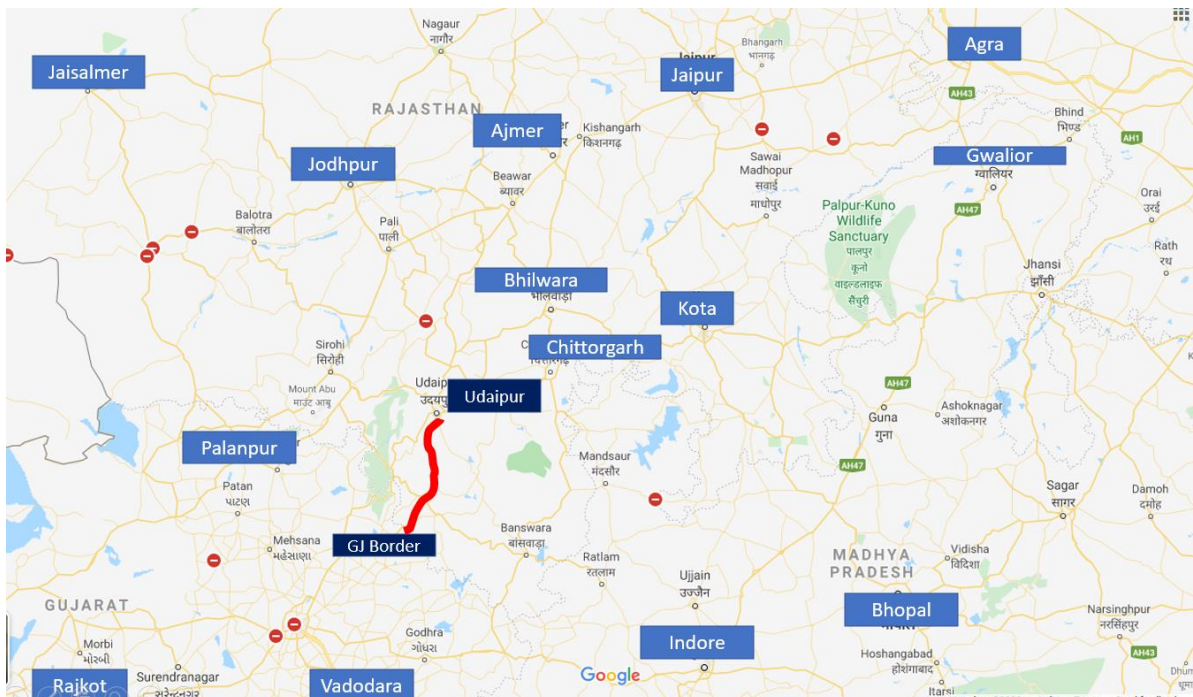
### 1.1 Background

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 3<sup>rd</sup> 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.

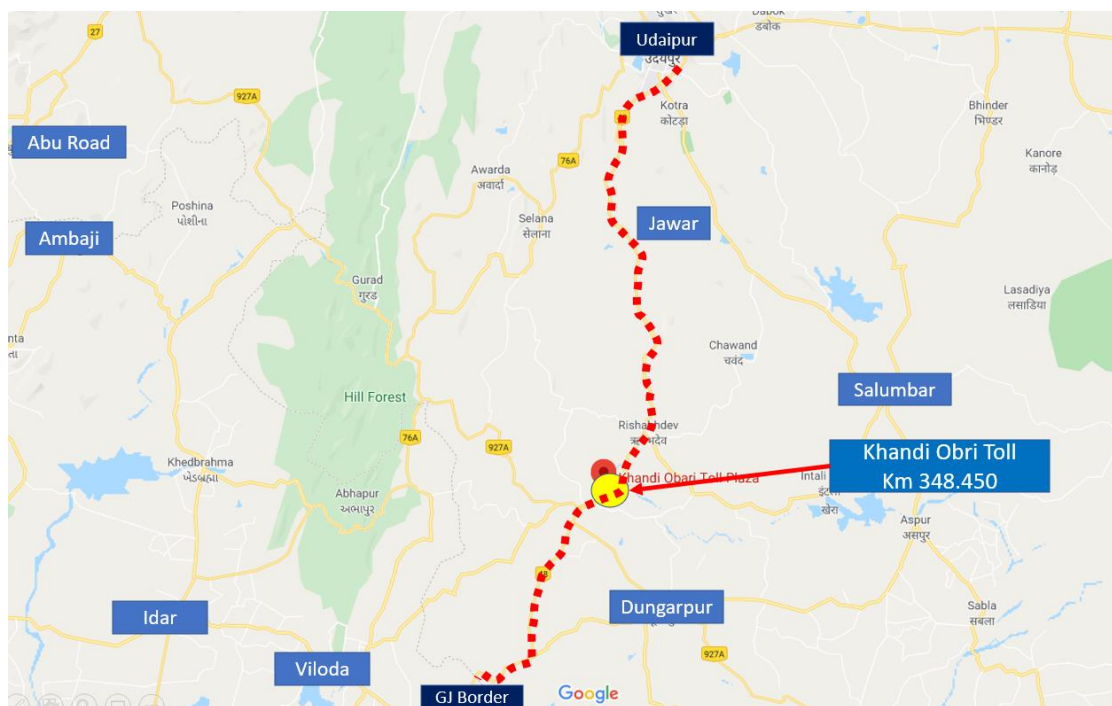
#### 2.2 Project Stretch Description

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
	<b>Total</b>	<b>13248</b>	<b>11113</b>	<b>13355</b>	<b>14545</b>	<b>16919</b>

### 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

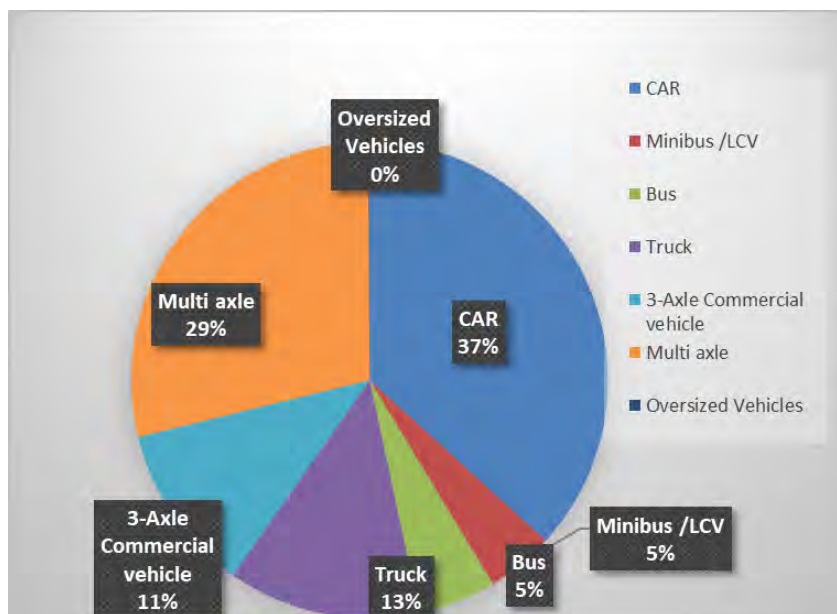


Year	Toll Plaza Location (Km)	Traffic No	PCU	PCU Index
	348.450			
2022-23	Khandi Obri at Km 348.450	14545	38213	2.63
2023-24	Khandi Obri at Km 348.450	16919	44472	2.63

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.

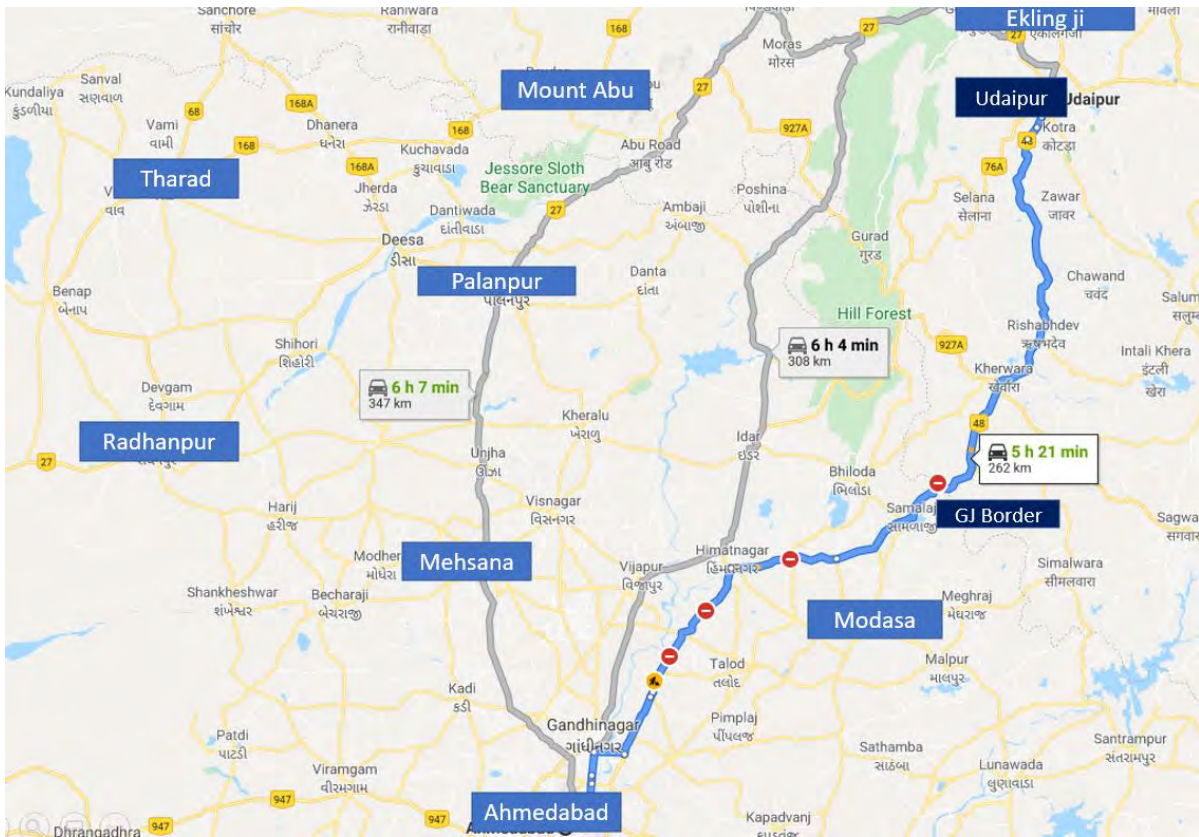
- Travel Speed / Travel Time
- Geometric deficiencies like blind horizontal curves and steep vertical gradients etc,
- Configuration of road
- Riding quality
- Traffic delays,
- Length of road,
- Passing through built up or Urban Area,
- Terrain,
- Facilities,

### 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.

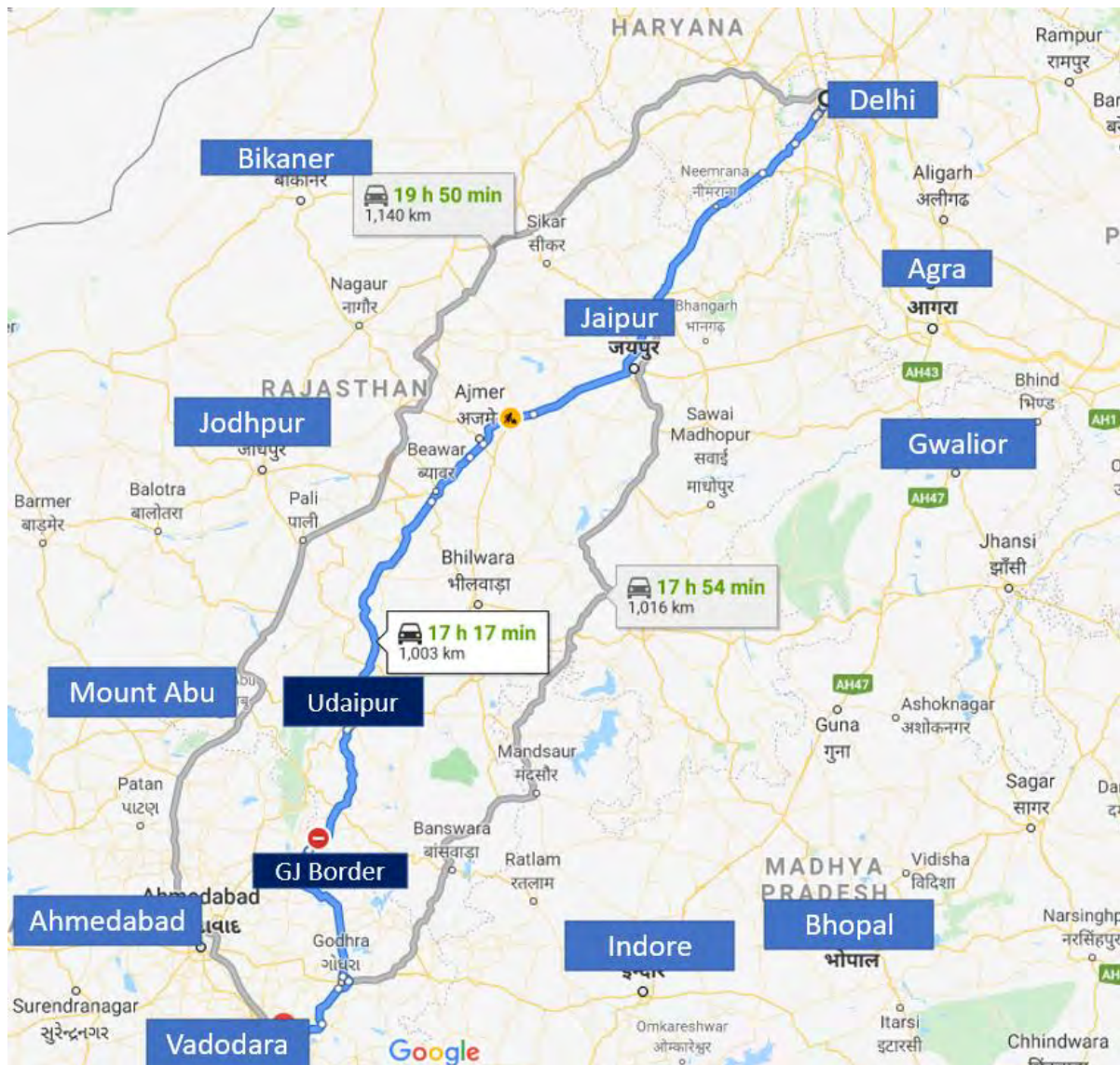


**Figure 4-1 : Alternate route at regional level Udaipur - Ahmedabad**

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- Mandsauar – 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
<b>Regional Level</b>						
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).

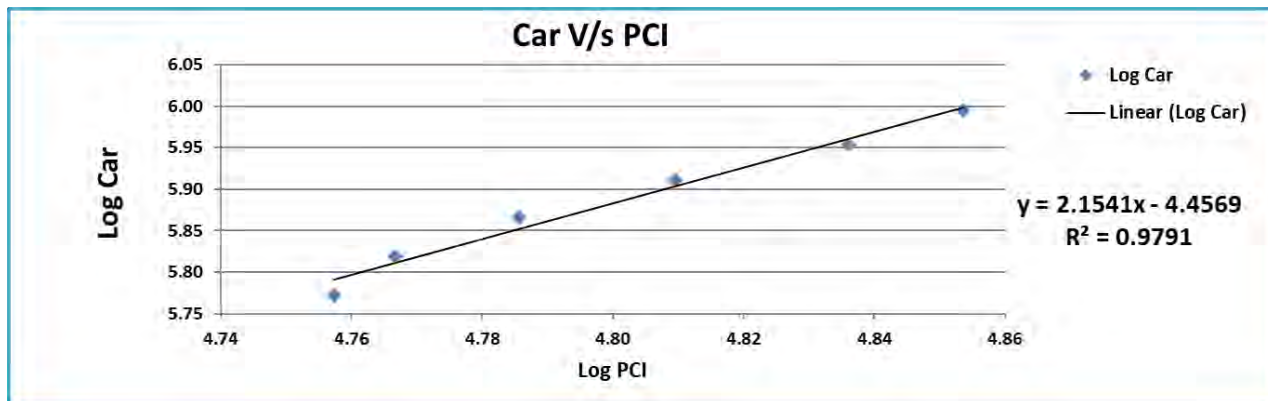
The project corridor spreads across the state of Rajasthan. Toll plazas at Khondi Obri is in the state of Rajasthan but the traffic on project stretch has certain contribution from other states as well. For elasticity calculations, working data from such states in addition to Rajasthan has been analyzed.

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.

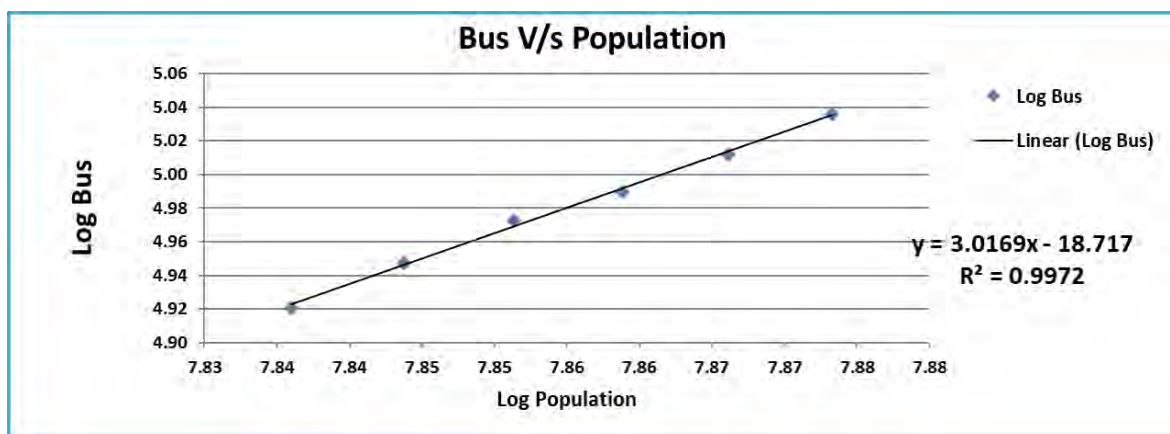


**Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan**

**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.



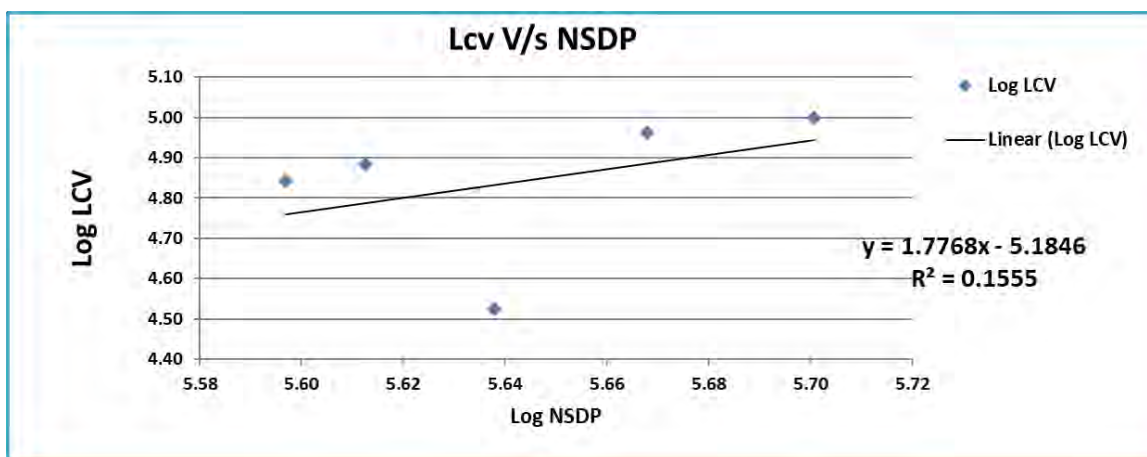
**Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan**

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.

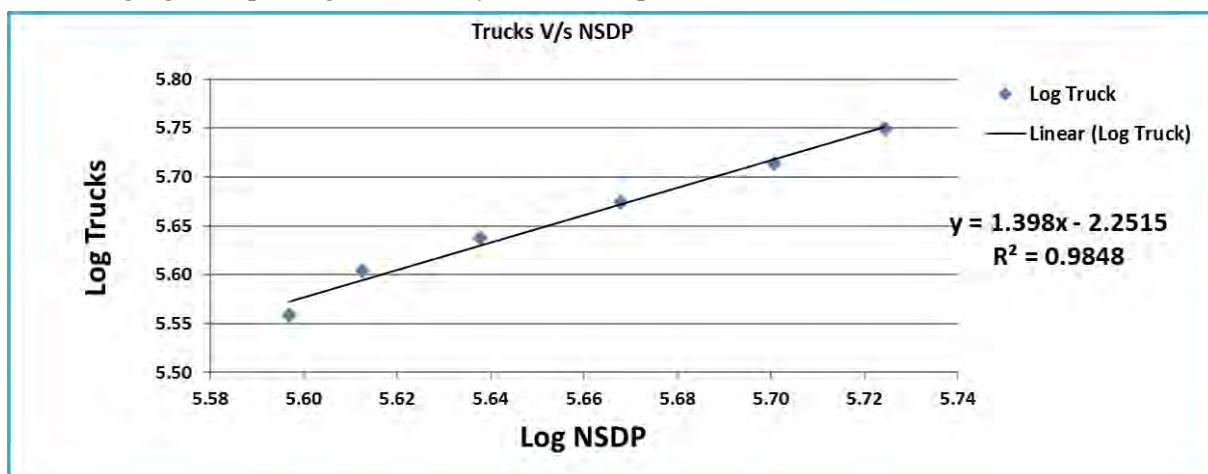
**Figure 5-3 : Regression and Elasticity NSDP vs. LCV Traffic - extrapolation Rajasthan.**

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-5 : Summary Regression Analysis Rajasthan**

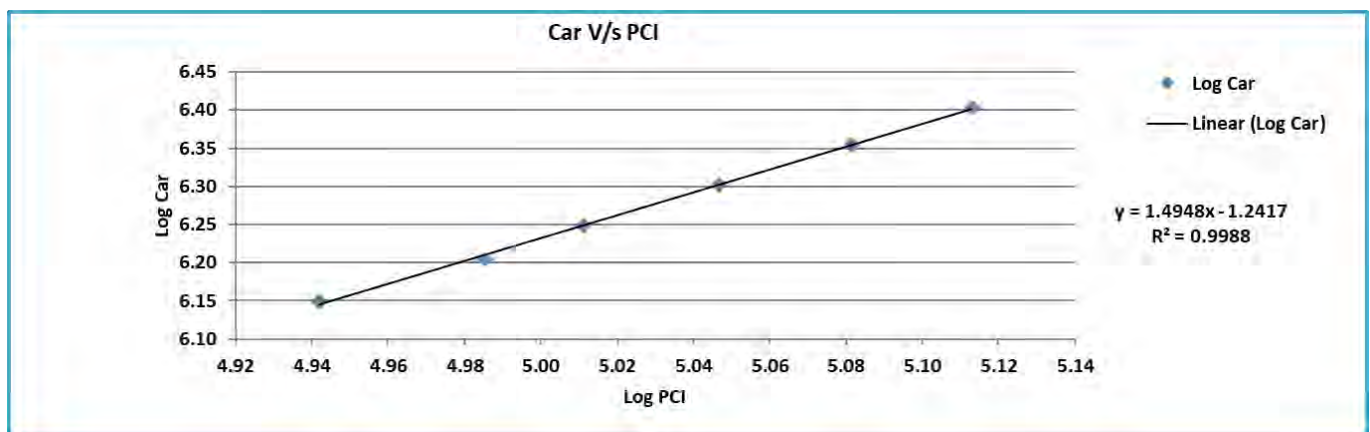
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average IV Growth (5yrs)	Growth Elastic Model	Remarks
Rajasthan	Car/Jeep	PCI	$y = 2.1541x - 4.4569$	R <sup>2</sup> = 0.9791	2.1541	4.55%	9.79%	Good Regression
	Bus	Population	$y = 3.0169x - 18.7174$	R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

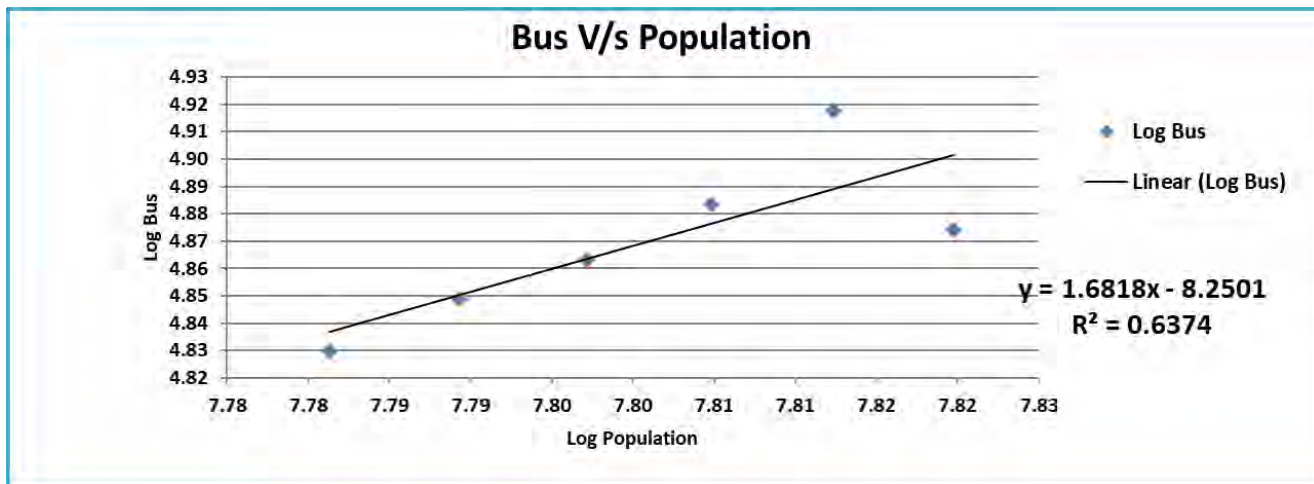
Regression analysis of same is given in figure below.

**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.





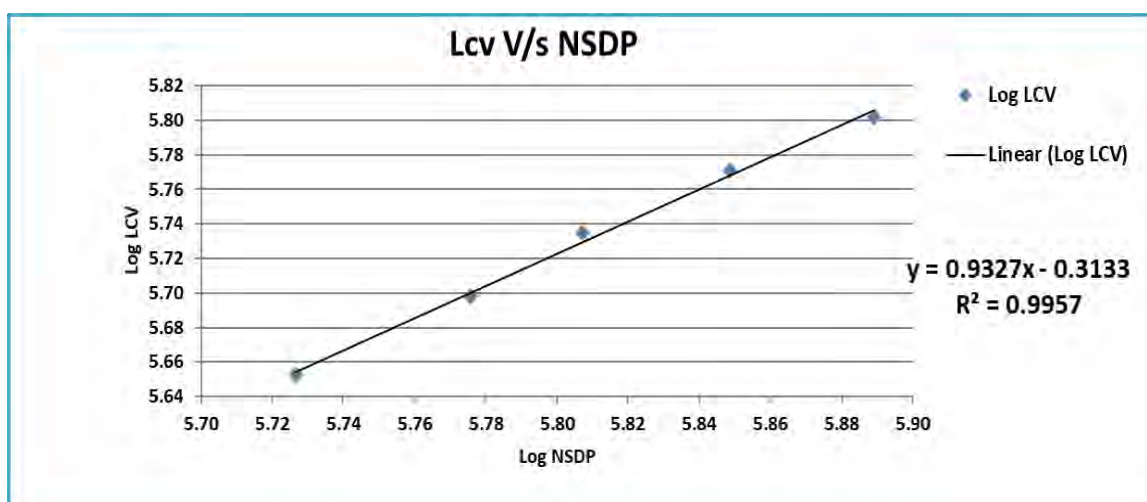
**Figure 5-6 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat**

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.**

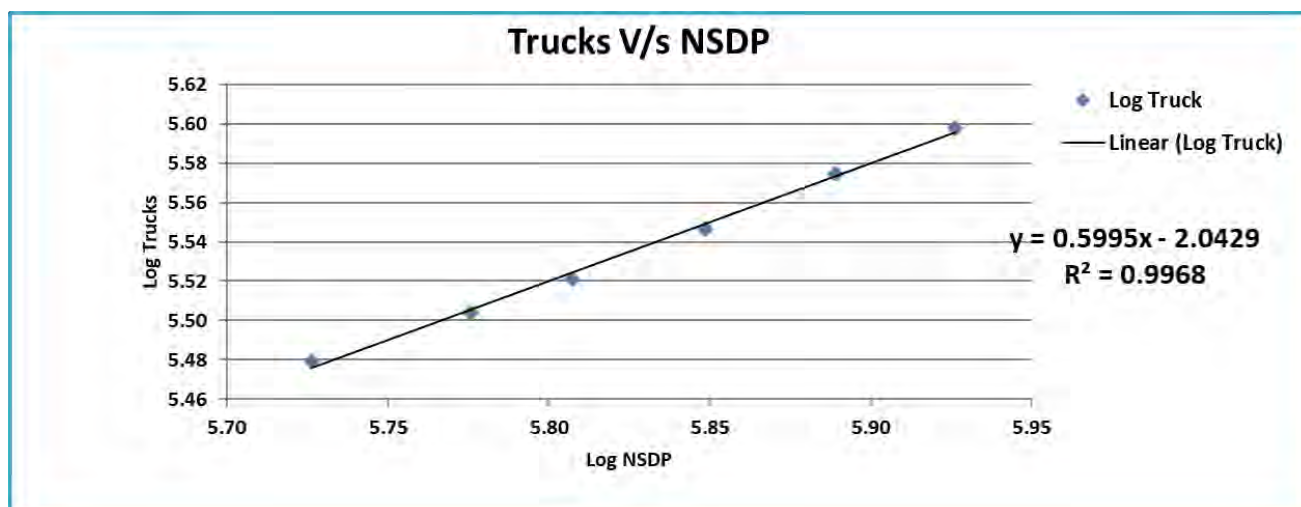


Elasticity of Goods Traffic has been worked out by regression analysis with NSDP. The following table represents the data and details.

**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 R<sup>2</sup> 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.

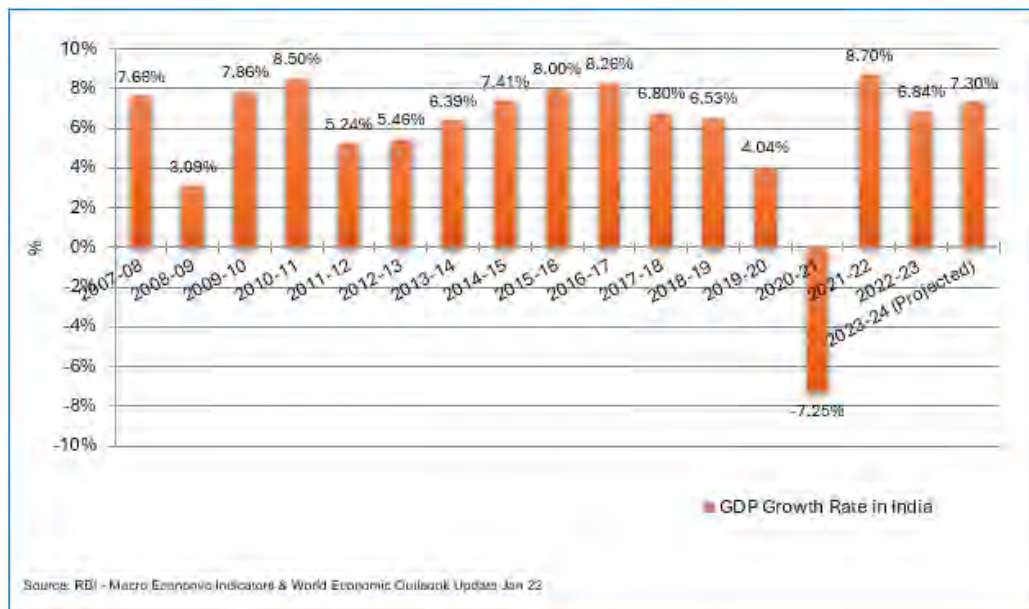
#### 5.5 Other Factors Influencing Growth

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.

Rishabhdeo 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
<b>LCV</b>	3.30%	2.84%	2.39%	1.94%	1.50%	1.06%
<b>2- Axle</b>	3.48%	3.10%	2.71%	2.33%	1.96%	1.59%
<b>3 - Axle</b>	5.57%	4.95%	4.34%	3.74%	3.14%	2.55%
<b>4 to6 Axle</b>	6.27%	5.57%	4.88%	4.20%	3.53%	2.87%
<b>7 and Above Axle</b>	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 – 21<sup>st</sup> 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

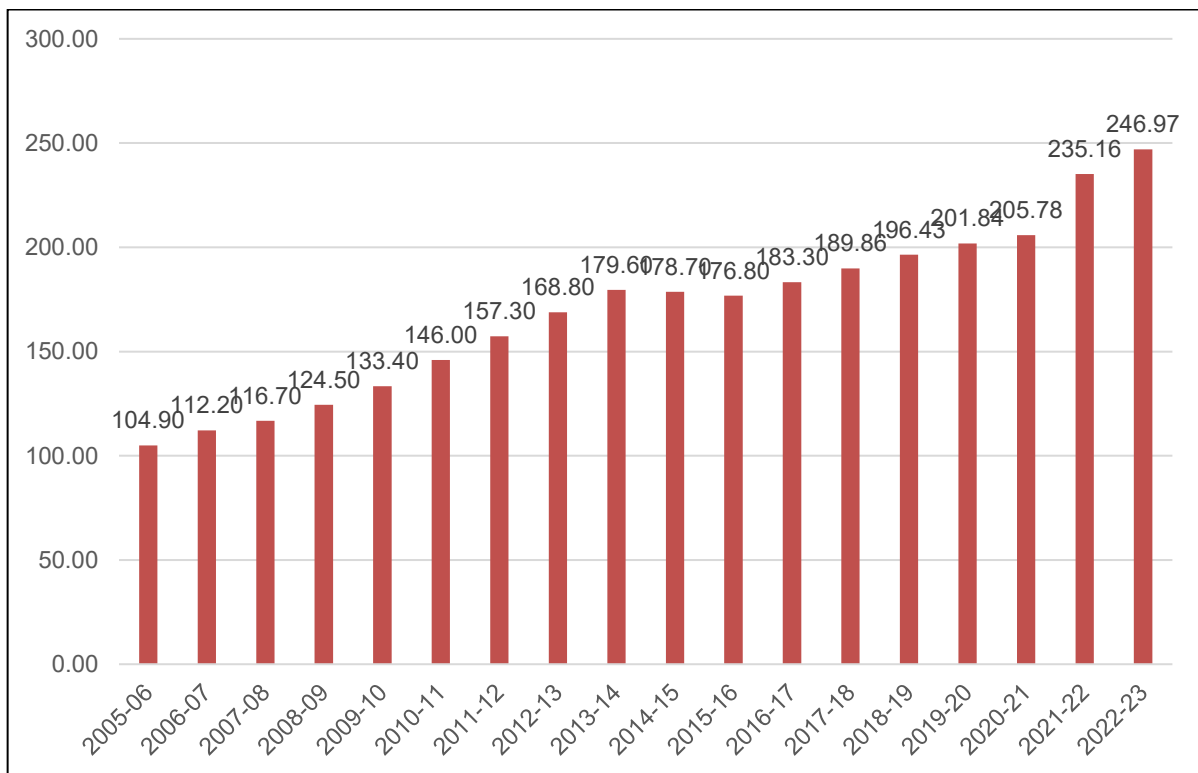
1. Monthly Pass: For frequent user's monthly pass would be issued at fee 30 time the single journey fee.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers 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](http://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	<b>311.30</b>
2024-25	336.21	<b>336.21</b>
2025-26	370.88	<b>370.88</b>
2026-27	409.72	<b>409.72</b>
2027-28	454.47	<b>454.47</b>
2028-29	501.07	<b>501.07</b>
2029-30	552.65	<b>552.65</b>
2030-31	609.81	<b>609.81</b>
2031-32	672.54	<b>672.54</b>
2032-33	739.28	<b>739.28</b>
2033-34	812.29	<b>812.29</b>
2034-35	895.47	<b>895.47</b>
2035-36	984.17	<b>984.17</b>
2036-37	1077.43	<b>1077.43</b>
2037-38	1179.75	<b>1179.75</b>
2038-39	1298.03	<b>1298.03</b>
2039-40	1427.93	<b>1427.93</b>
2040-41	1553.63	<b>1553.63</b>
2041-42	1697.48	<b>1697.48</b>
2042-43	1852.60	<b>1852.60</b>

**Table 7-8 : Toll Revenue Most Likely Scenario****(Rs. Crores)**

Year	TP-1	Total
2023-24	311.30	<b>311.30</b>
2024-25	337.04	<b>337.04</b>
2025-26	372.65	<b>372.65</b>
2026-27	412.64	<b>412.64</b>
2027-28	458.82	<b>458.82</b>
2028-29	506.96	<b>506.96</b>
2029-30	560.37	<b>560.37</b>
2030-31	619.86	<b>619.86</b>
2031-32	685.20	<b>685.20</b>
2032-33	754.88	<b>754.88</b>
2033-34	831.51	<b>831.51</b>
2034-35	918.86	<b>918.86</b>
2035-36	1012.28	<b>1012.28</b>
2036-37	1110.92	<b>1110.92</b>
2037-38	1219.48	<b>1219.48</b>
2038-39	1344.98	<b>1344.98</b>
2039-40	1483.37	<b>1483.37</b>

<b>Year</b>	<b>TP-1</b>	<b>Total</b>
<b>2040-41</b>	1617.87	<b>1617.87</b>
<b>2041-42</b>	1771.98	<b>1771.98</b>
<b>2042-43</b>	1938.76	<b>1938.76</b>

## 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



# 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**

**GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991  
Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)  
Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**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**



# CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.2.1 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS.....</b>	<b>9</b>
2.1 Project Corridor.....	9
2.2 Project Corridor Illustration.....	10
<b>Chapter 3 .....</b>	<b>11</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>11</b>
3.1 Traffic Surveys .....	11
3.2 Classified Traffic Volume .....	13
3.3 Traffic Characteristic .....	14
3.3.1 Traffic Data .....	14
3.4 Data Analysis.....	16
3.4.1 Analysis of Traffic Volume Count .....	16
3.4.2 Components of Traffic.....	19
3.5 Secondary Data Collection .....	22
<b>Chapter 4 .....</b>	<b>24</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>24</b>
4.1 Introduction.....	24
4.2 Competing / Alternate route.....	24
<b>Chapter 5 .....</b>	<b>28</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>28</b>
5.1 Introduction.....	28
5.2 Trend Analysis.....	28
5.3 Estimation of Traffic Demand Elasticity.....	29
5.4 Analysis of Historic Traffic Data .....	43
5.5 Other Factors Influencing Growth.....	43
5.6 Developments along and around the Project Corridor & State.....	44
5.7 Recommended Growth Rates of Traffic .....	45
5.7.1 Recommended Growth Rates of Traffic for Maharashtra Part of Stretch.....	45



<b>Chapter 6 .....</b>	<b>48</b>
TRAFFIC FORECAST.....	48
6.1 Traffic Projections .....	48
6.2 Modification in Concession Period .....	54
<b>Chapter 7 .....</b>	<b>55</b>
FORECAST OF TOLL REVENUE .....	55
7.1 General.....	55
7.2 Discount Categories .....	55
7.3 Estimation of Toll Rates .....	56
7.4 Toll Revenue .....	62
7.5 Toll Revenue at all toll plazas under Scenarios .....	62
<b>Chapter 8 .....</b>	<b>65</b>
CONCLUSION & RECOMMENDATIONS .....	65
8.1 Conclusion & Recommendations .....	65

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	12
Table 3-2 : Vehicle Classification System .....	13
Table 3-3 : Traffic Data at Pargaon Toll Plaza at Km 134.000 .....	14
Table 3-4 : Traffic Data at Padalshingi Toll Plaza at Km 194.000 .....	15
Table 3-5 : Traffic Data at Maliwadi Toll Plaza at Km 254.000 .....	15
Table 3-6 : PCU Factors Adopted for Study .....	16
Table 3-7 : Traffic in PCU at Project Stretch .....	17
Table 3-8 : Journey Type Bifurcation of Traffic at Pargaon Toll Plaza KM 134.000.....	21
Table 3-9 : Journey Type Bifurcation of Traffic at Padalshingi Toll Plaza KM 194.000 .....	21
Table 3-10 : Journey Type Bifurcation of Traffic at Maliwadi Toll Plaza KM 254.000 .....	22
Table 4-1 : Competing Roads Details .....	26
Table 5-1 : Per Capita Income Vs Car Maharashtra .....	29
Table 5-2 : Population Vs Bus Maharashtra .....	30
Table 5-3 : LCV Traffic Vs NSDP Maharashtra.....	31
Table 5-4 : Truck Traffic Vs NSDP Maharashtra.....	31
Table 5-5 : Summary Regression Analysis Maharashtra.....	32
Table 5-6 : Per Capita Income Vs Car Gujarat .....	32
Table 5-7 : Population Vs Bus Gujrat .....	33
Table 5-8 : LCV Traffic Vs NSDP Gujarat.....	34
Table 5-9 : Truck Traffic Vs NSDP Gujarat .....	35
Table 5-10 : Summary Regression Analysis Gujrat.....	36
Table 5-11 : Per Capita Income Vs Car Haryana.....	36
Table 5-12 : Population Vs Bus Haryana.....	37
Table 5-13 : LCV Traffic Vs NSDP Haryana .....	37
Table 5-14 : Truck Traffic Vs NSDP Haryana .....	38
Table 5-15 : Summary Regression Analysis Haryana .....	39
Table 5-16 : Per Capita Income Vs Car Karnataka .....	39
Table 5-17 : Population Vs Bus Karnataka .....	40
Table 5-18 : LCV Traffic Vs NSDP Karnataka.....	41
Table 5-19 : Truck Traffic Vs NSDP Karnataka.....	42
Table 5-20 : Summary Regression Analysis Karnataka .....	43
Table 5-21 : Recommended Growth Rates Optimistic .....	46

Table 5-22 : Recommended Growth Rates Pessimistic.....	46
Table 5-23 : Recommended Growth Rates Most Likely.....	46
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 134.000 KM .....	48
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 194.000 KM .....	49
Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 254.000 KM .....	49
Table 6-4 : Total Tollable Traffic @ Toll Plaza 1- Chainage 134.000 KM .....	50
Table 6-5 : Total Tollable Traffic @ Toll Plaza 2- Chainage 194.000 KM .....	51
Table 6-6 : Total Tollable Traffic @ Toll Plaza 3- Chainage 254.000 KM .....	51
Table 6-7 : Total Tollable Traffic @ Toll Plaza 1- Chainage 134.000 KM .....	52
Table 6-8 : Total Tollable Traffic @ Toll Plaza 2- Chainage 194.000 KM .....	52
Table 6-9 : Total Tollable Traffic @ Toll Plaza 3- Chainage 254.000 KM .....	53
Table 7-1 : Base Toll Rates June 2007-08.....	56
Table 7-2 : Toll Rates for Single Journey @ Km 134.000 .....	57
Table 7-3 : Toll Rates for Single Journey @ Km 194.000 .....	57
Table 7-4 : Toll Rates for Single Journey @ Km 243.00 .....	58
Table 7-5 : Toll Rates for Return Journey @ Km 134.000.....	58
Table 7-6 : Toll Rates for Return journey @ Km 194.000.....	59
Table 7-7 : Toll Rates for Return journey @ Km 243.000.....	60
Table 7-8 : Toll Rates for Monthly Pass Local@ all Toll Plaza .....	60
Table 7-9 : Toll Rates for Monthly Pass @ Km 134.000 .....	61
Table 7-10 : Toll Rates for Monthly Pass @ Km 194.000 .....	61
Table 7-11 : Toll Rates for Monthly Pass @ Km 243.000 .....	62
Table 7-12 : Toll Revenue Optimistic Scenario .....	63
Table 7-13 : Toll Revenue Pessimistic Scenario .....	63
Table 7-14 : Toll Revenue Most Likely Scenario .....	64

## LIST OF FIGURES

<i>Figure 1-1 : Alignment of Project Stretch.....</i>	<i>7</i>
<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	<i>9</i>
<i>Figure 2-2 : Photographs showing Project Corridor .....</i>	<i>10</i>
<i>Figure 3-1 : Comparison of PCU Index.....</i>	<i>18</i>
<i>Figure 4-1 : Alternate routes – Yedashi- Aurangabad.....</i>	<i>25</i>
<i>Figure 4-2 : Alternate route Between Solapur and Aurangabad .....</i>	<i>26</i>
<i>Figure 4-3 : Project Road in regional network .....</i>	<i>27</i>
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Maharashtra.....</i>	<i>30</i>
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra .....</i>	<i>30</i>
<i>Figure 5-3 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Maharashtra .....</i>	<i>32</i>
<i>Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh .....</i>	<i>33</i>
<i>Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat .....</i>	<i>34</i>
<i>Figure 5-6 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Gujarat.....</i>	<i>35</i>
<i>Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana .....</i>	<i>36</i>
<i>Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana.....</i>	<i>37</i>
<i>Figure 5-9 : Regression and Elasticity NSDP vs. Lcv – Extrapolation Haryana.....</i>	<i>38</i>
<i>Figure 5-10 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Haryana.....</i>	<i>39</i>
<i>Figure 5-11 : Regression and Elasticity PCI vs. Car – Extrapolation Karnataka.....</i>	<i>40</i>
<i>Figure 5-12 : Regression and Elasticity Population vs. Bus – Extrapolation Karnataka .....</i>	<i>41</i>
<i>Figure 5-13 : Regression and Elasticity NSDP vs. Lcv – Extrapolation Karnataka .....</i>	<i>41</i>
<i>Figure 5-14 : Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Karnataka .....</i>	<i>42</i>
<i>Figure 5-15 : Growth of GDP in India.....</i>	<i>44</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>56</i>

## ABBREVIATIONS

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

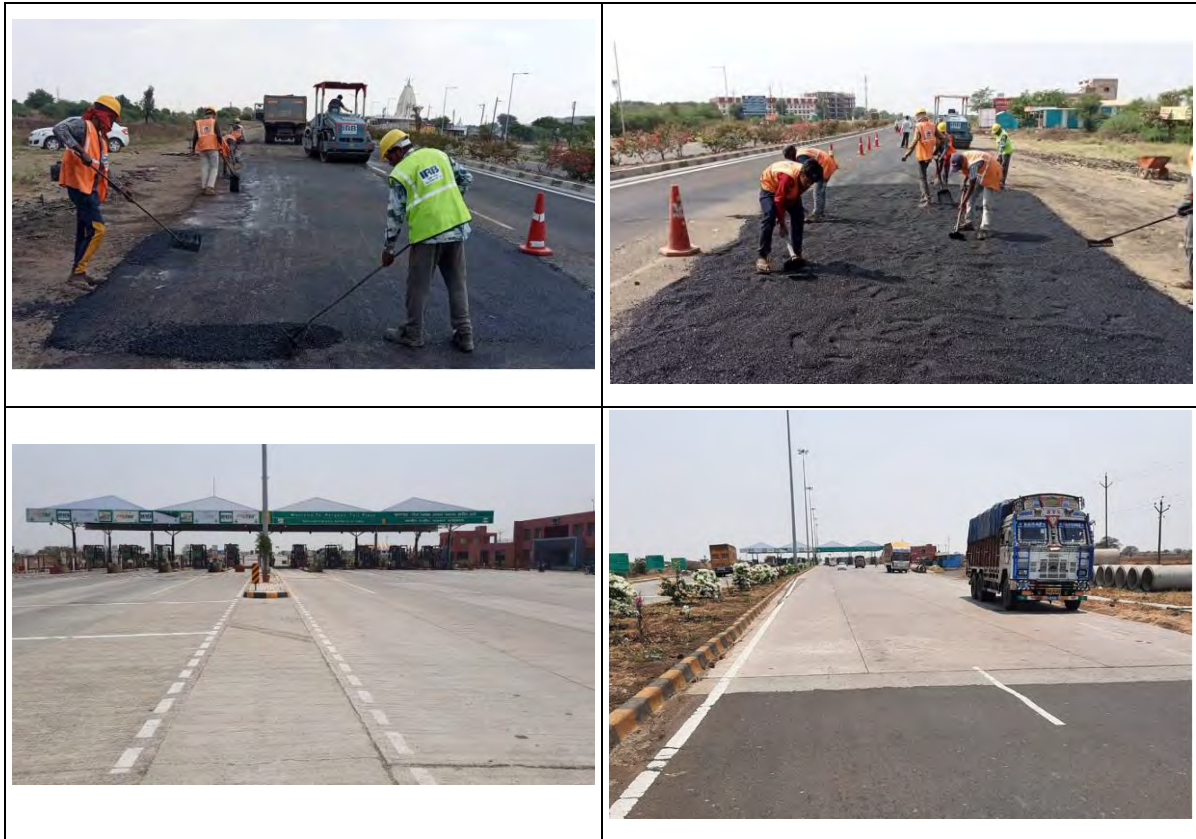
There are three operative toll plazas at project stretch. The first is at Yedeshi at Km 134.000, second at Padalshingi at Km 194.000 and third at Bhokarwadi at Km 254.000. The following figure show project alignment and toll plaza locations.



**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
	<b>Total</b>	<b>5007</b>	<b>4913</b>	<b>6096</b>	<b>7544</b>	<b>8084</b>

**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
	<b>Total</b>	<b>8549</b>	<b>7620</b>	<b>9299</b>	<b>10985</b>	<b>12357</b>

**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
	<b>Total</b>	<b>6216</b>	<b>5623</b>	<b>6862</b>	<b>9023</b>	<b>10484</b>

### 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

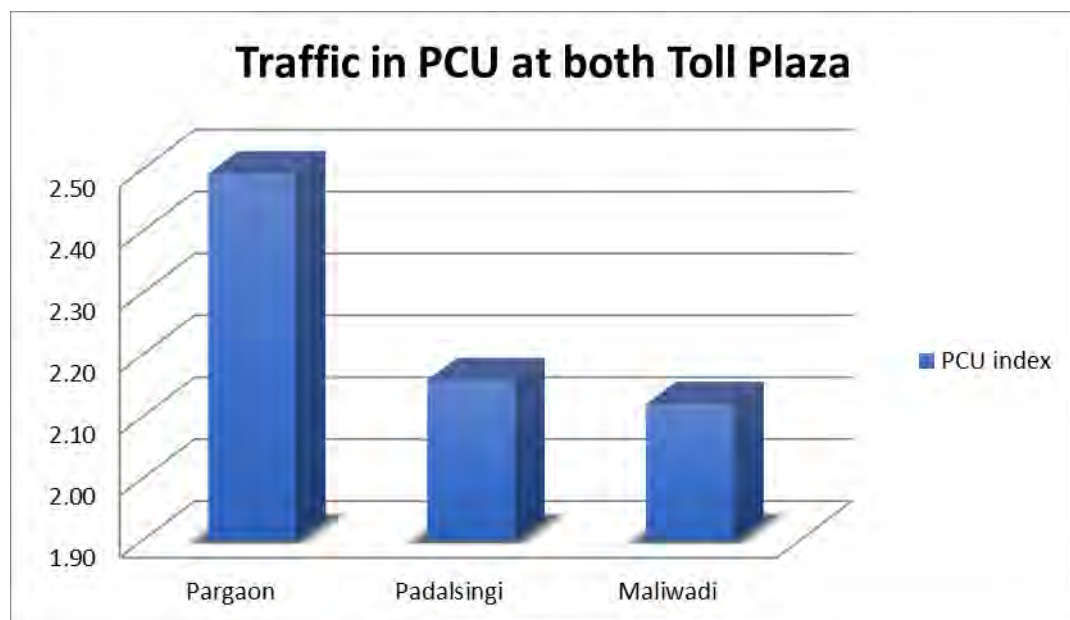
Traffic volume at each toll plaza was converted to PCU and same is presented as under

**Table 3-7 : Traffic in PCU at Project Stretch**

<b>Year</b>	<b>Toll Plaza Location (Km)</b>	<b>Traffic No</b>	<b>PCU</b>	<b>PCU Index</b>
<b>2019-2020</b>	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
<b>2020-2021</b>	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
<b>2021-2022</b>	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
<b>2022-2023</b>	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.

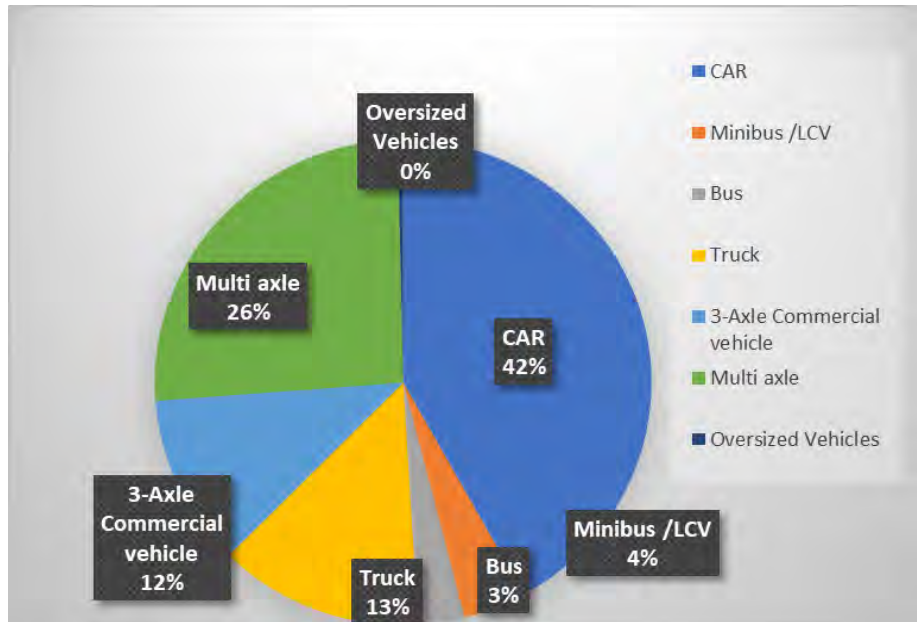


**Figure 3-1 : Comparison of PCU Index**

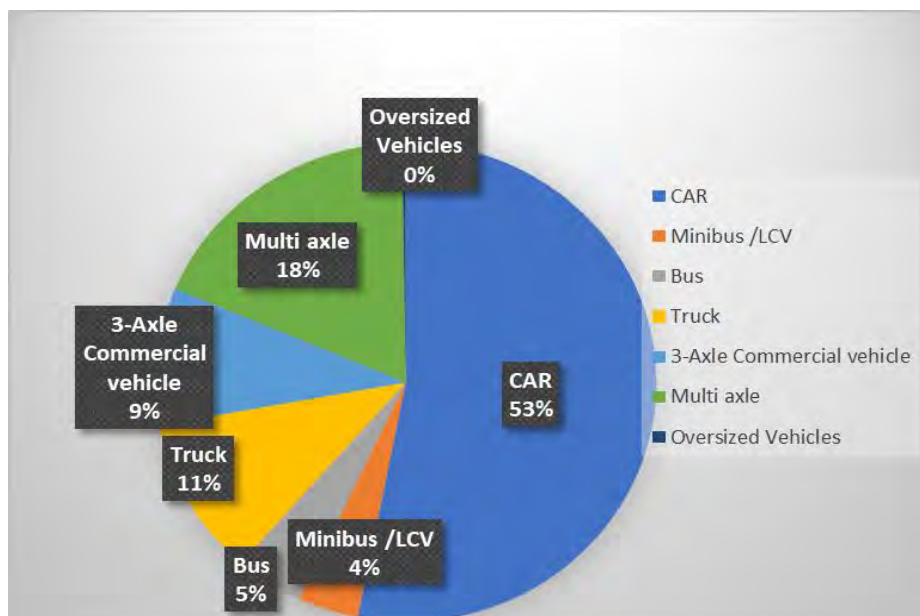
It can be observed that PCU index is consistent at all three toll plaza locations.

### 3.4.2 Components of Traffic

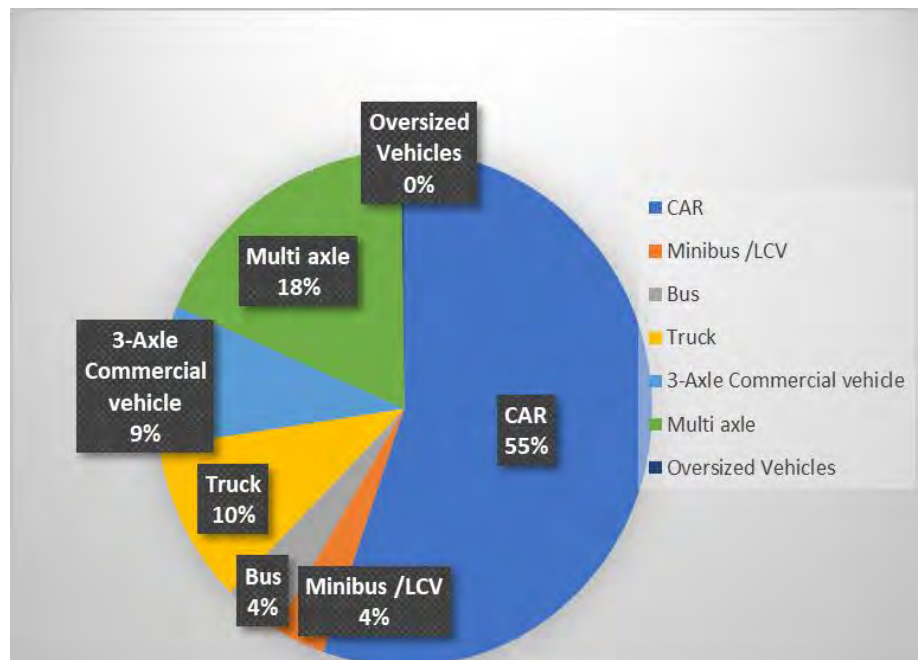
As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential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

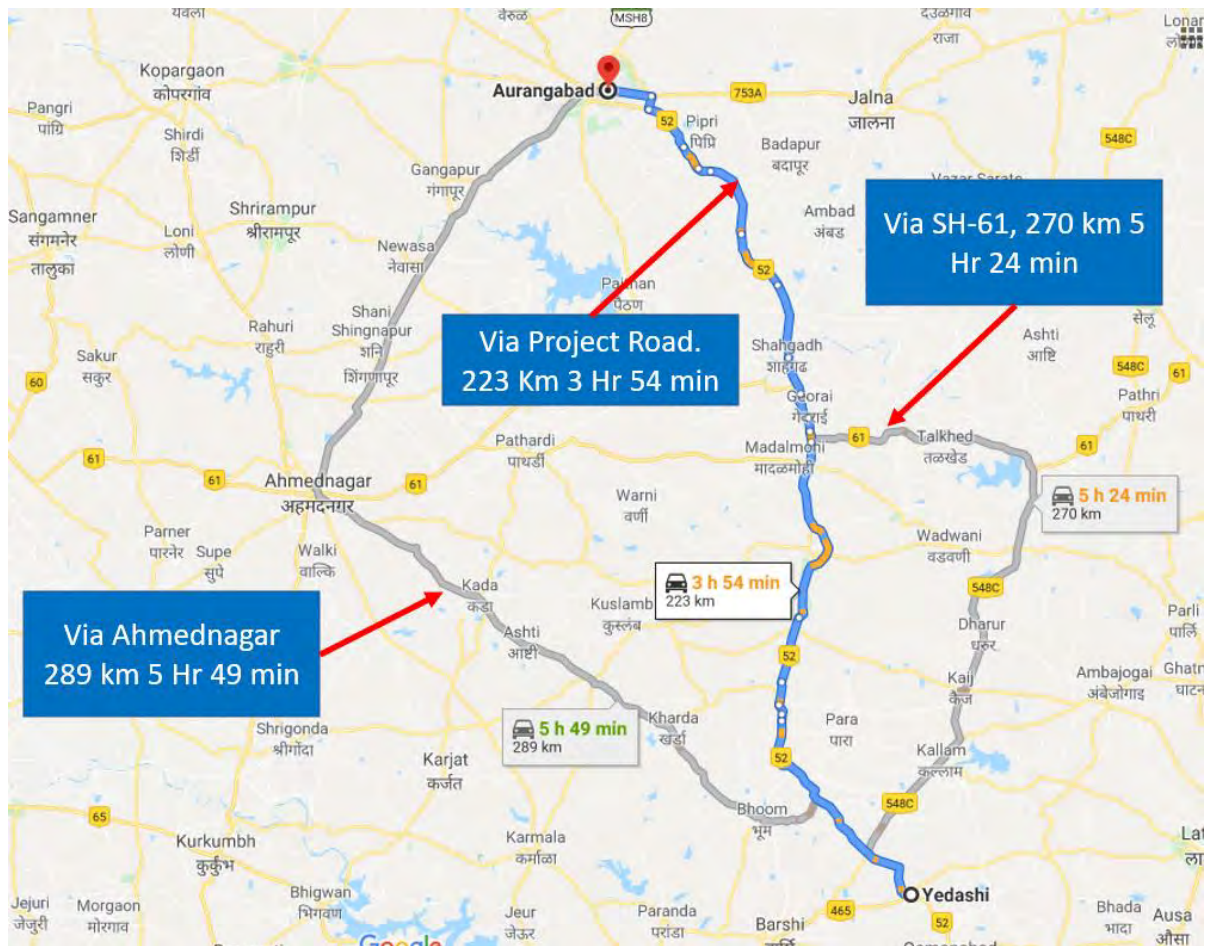
Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

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

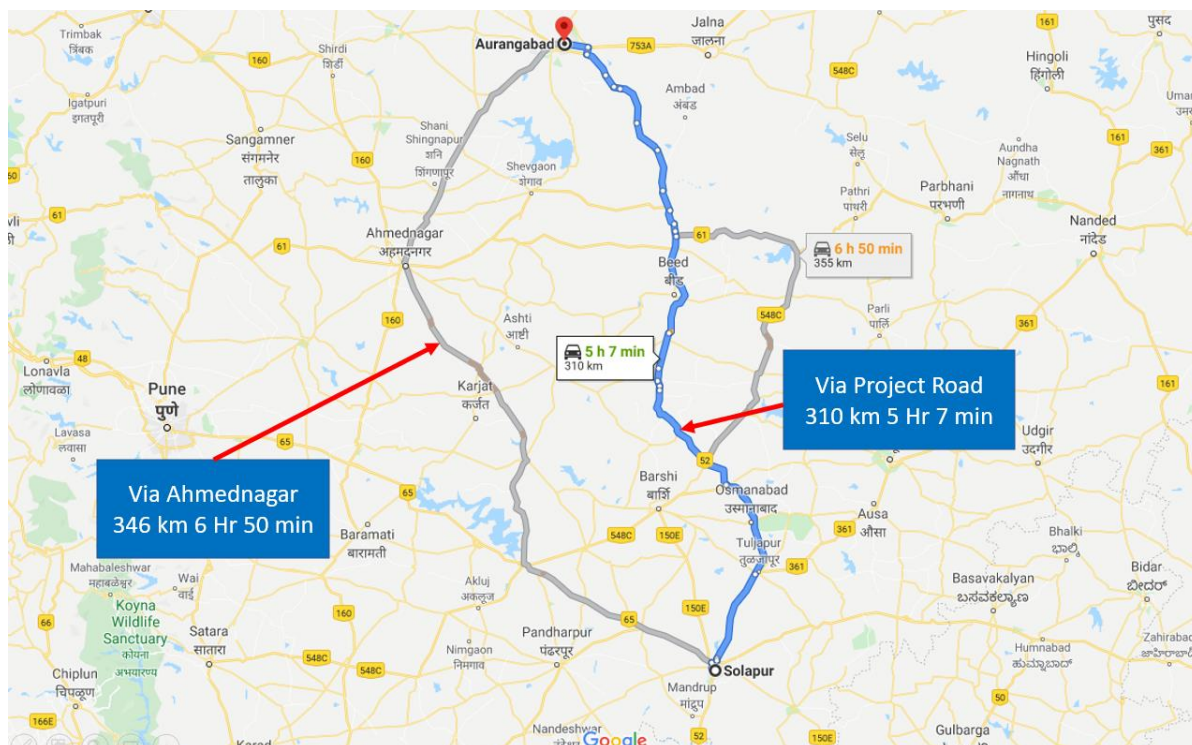
In BOT projects there is always a risk factor of traffic shifting on competing roads after imposition of toll. Shifting of traffic depends on factors such as road length, type, geometry, riding quality and capacity. Competing road networks were identified around section and a speed delay analysis was 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**

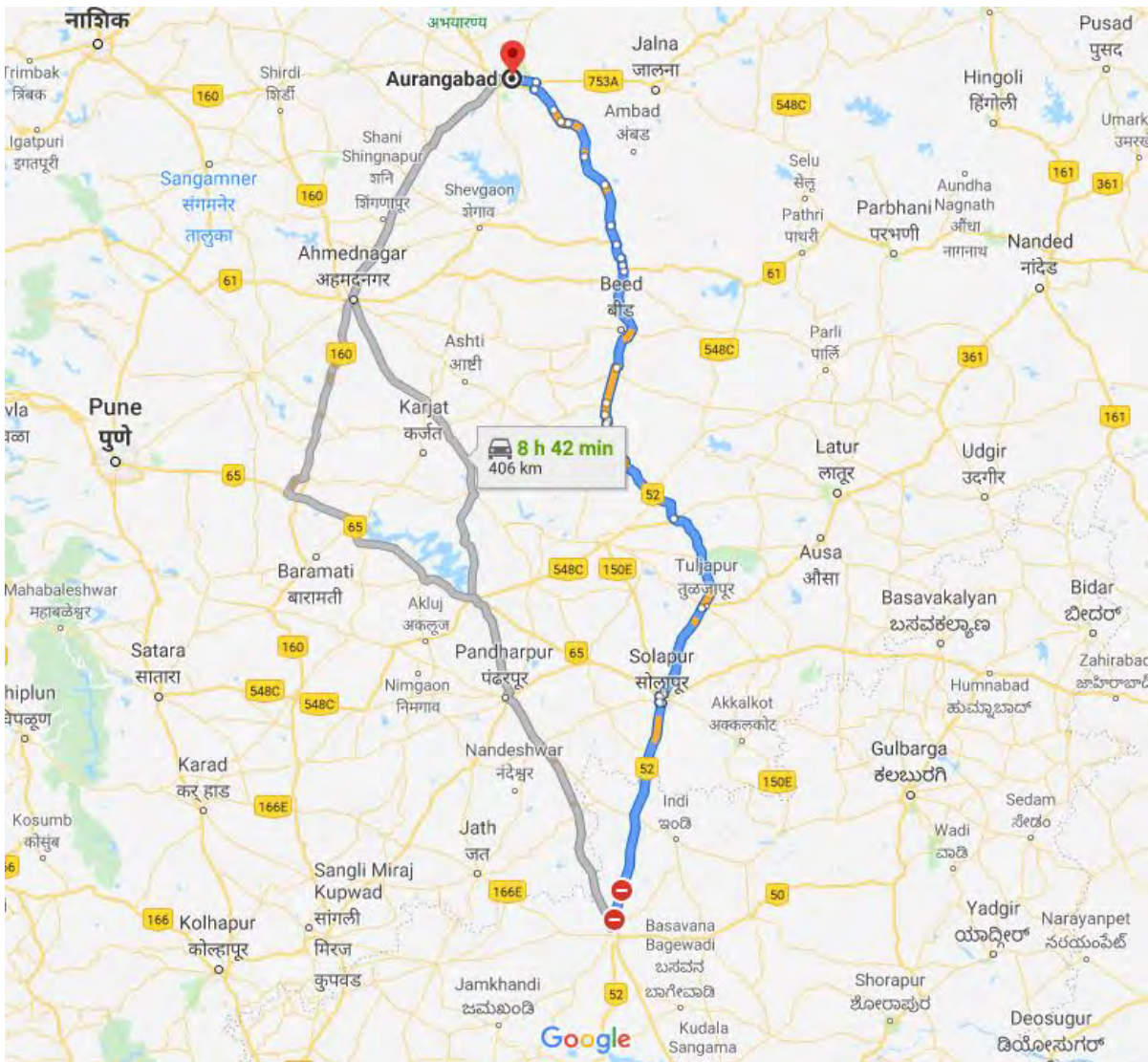
Sr. No	Route Details	Designation	Length (Km)	Avg. Speed (KMPH)	Time Taken (Min)	Observations
<b>Regional Level</b>						
1	Solapur-Ahmednagar-Aurangabad	Alternate Route	346	50	6 Hr 50 Min	Project road has minimum travel time and shortest road
	Solapur- Yedashi- Aurangabad	Project Road	310	60	5 Hr 10 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.

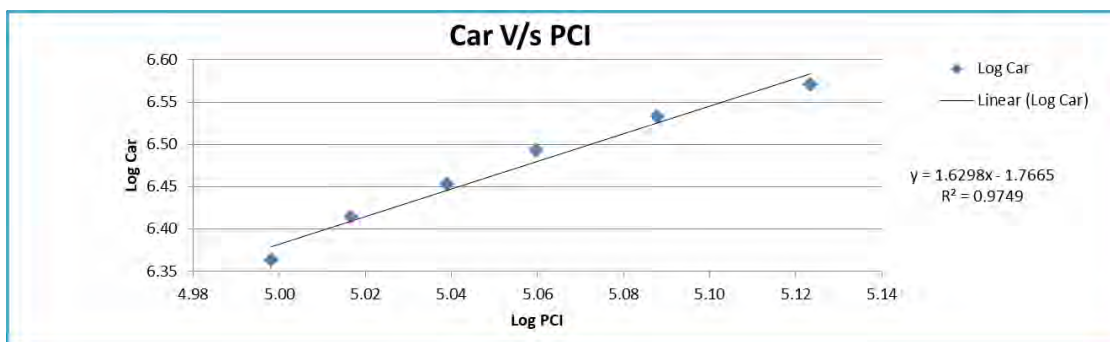
Following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

**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



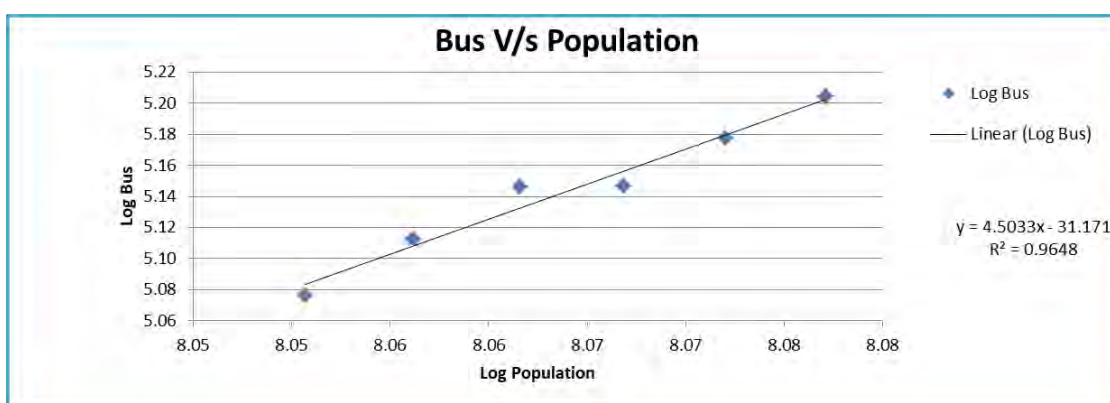


**Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Maharashtra**

**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



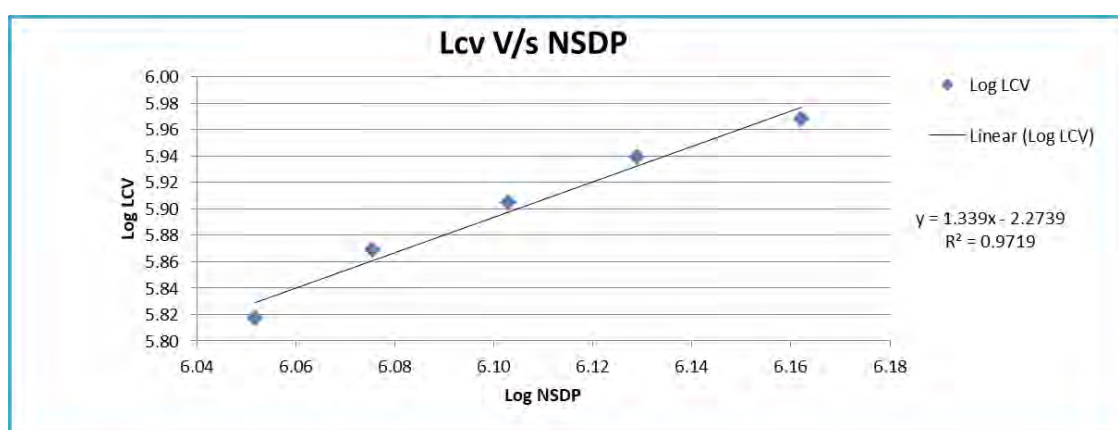
**Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra**

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**

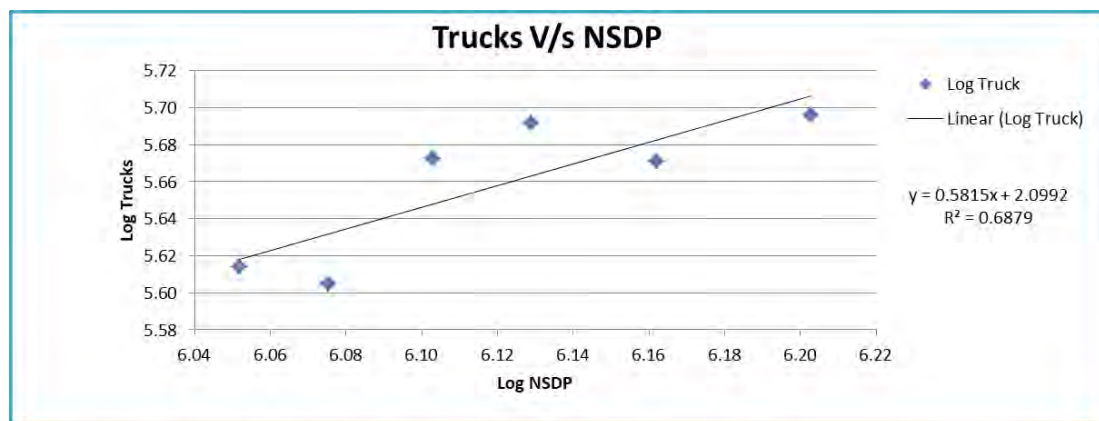
Year	NSDP	LCV	Log NSDP	Log LCV	NSDP Growth	Average Growth (5 Year)
2012	1126595	656407	6.05	5.82		
2013	1189711	739725	6.08	5.87	6%	
2014	1267551	803128	6.10	5.90	7%	
2015	1345341	868632	6.13	5.94	6%	
2016	1452439	927903	6.16	5.97	8%	6.56%

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 R<sup>2</sup> 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 <sup>2</sup> = 0.9749	1.6298	5.96%	9.71%
	Bus	Population	$y = 4.5033x - 31.1713$	R <sup>2</sup> = 0.9648	4.5033	1.23%	5.52%
	LCV	NSDP	$y = 1.339x - 2.2739$	R <sup>2</sup> = 0.9719	1.3390	6.56%	8.78%
	Truck	NSDP	$y = 0.5815x - 2.0992$	R <sup>2</sup> = 0.6879	0.5815	7.22%	4.20%

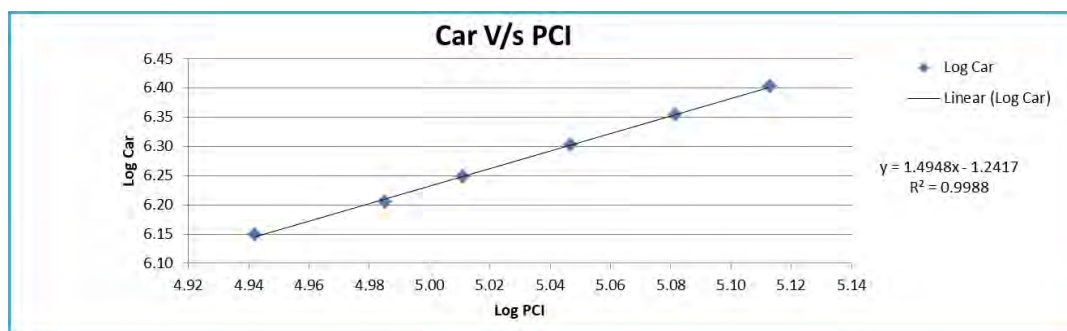
Following tables and graphs depict regression and elasticity of growth model for stretch falling in Gujrat State.

**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

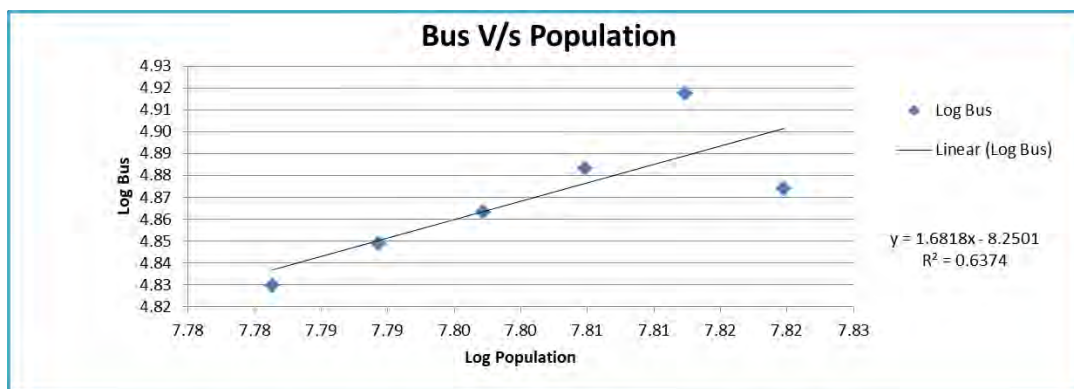


**Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh**

**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



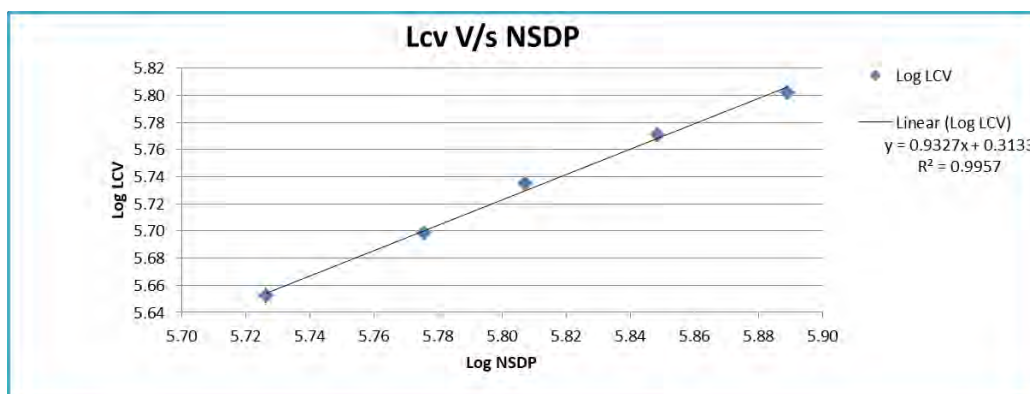
**Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Gujarat**

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%

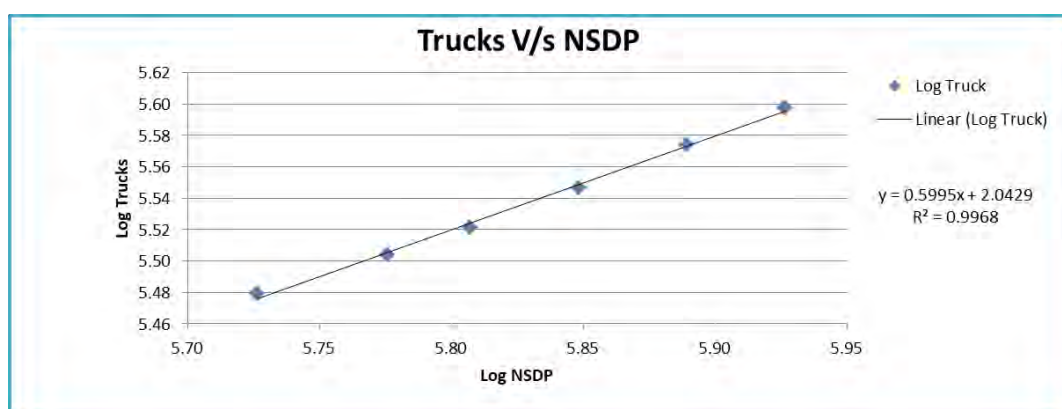
Following figure depict regression analysis and extrapolation.



**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 R<sup>2</sup> values are presented in the Table below

**Table 5-10 : Summary Regression Analysis Gujrat**

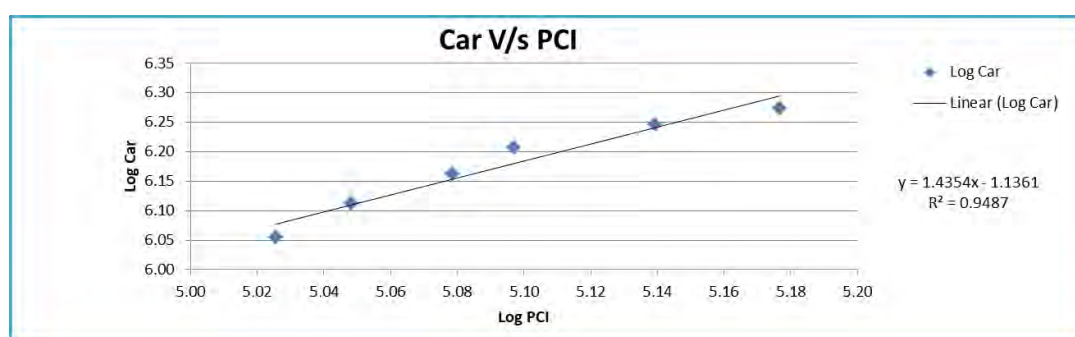
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Gujarat	Car/Jeep	PCI	$y = 1.4948x + -1.2417$	$R^2 = 0.9988$	1.4948	8.21%	12.27%
	Bus	Population	$y = 1.6818x - 8.2501$	$R^2 = 0.6374$	1.6818	1.79%	3.00%
	LCV	NSDP	$y = 0.9327x - 0.3133$	$R^2 = 0.9957$	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

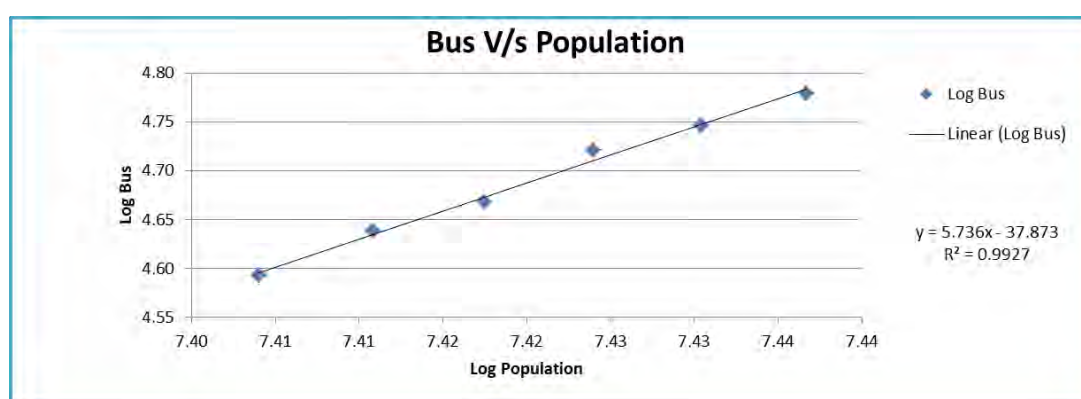
**Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana**



**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**

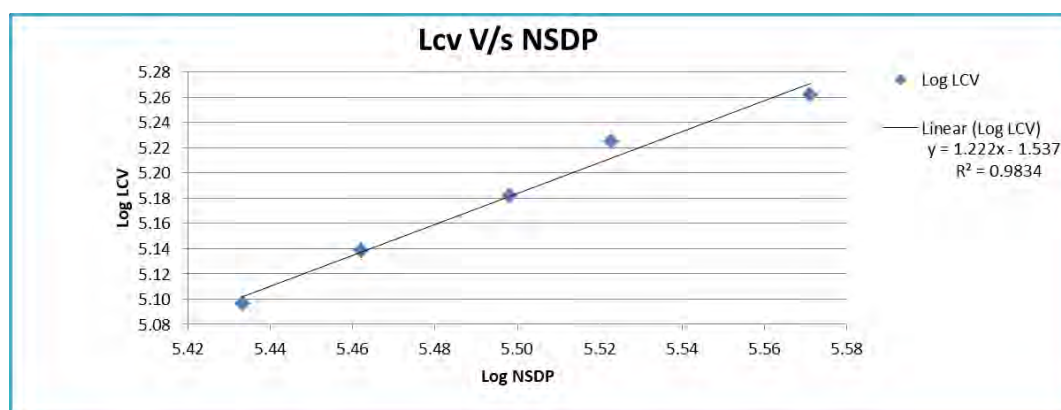
Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details.

**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.

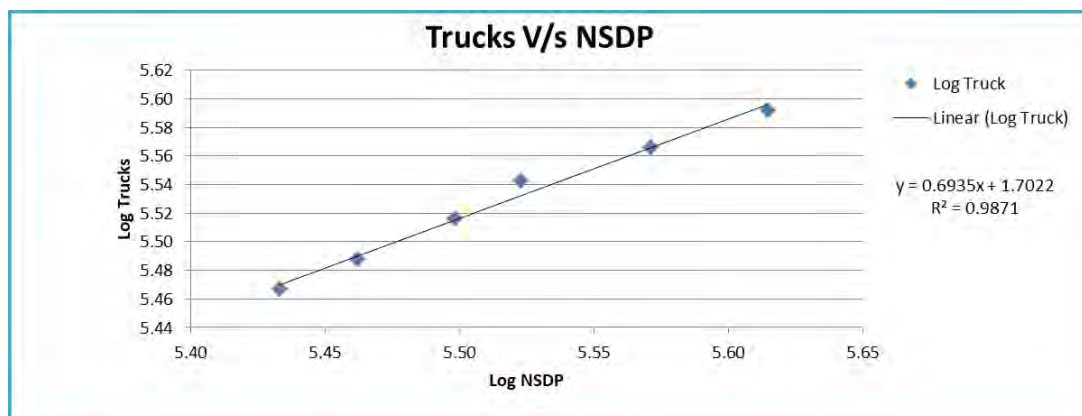


**Figure 5-9 : Regression and Elasticity NSDP vs. Lcv – Extrapolation Haryana**

**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 R<sup>2</sup> 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 <sup>2</sup> = 0.9487	1.4354	7.23%	10.38%
	Bus	Population	$y = 5.736x - 37.8732$	R <sup>2</sup> = 0.9927	5.7360	1.52%	8.69%
	LCV	NSDP	$y = 1.222x - 1.5373$	R <sup>2</sup> = 0.9834	1.2220	8.30%	10.14%
	Truck	NSDP	$y = 0.6935x - 1.7022$	R <sup>2</sup> = 0.9871	0.6935	8.75%	6.07%

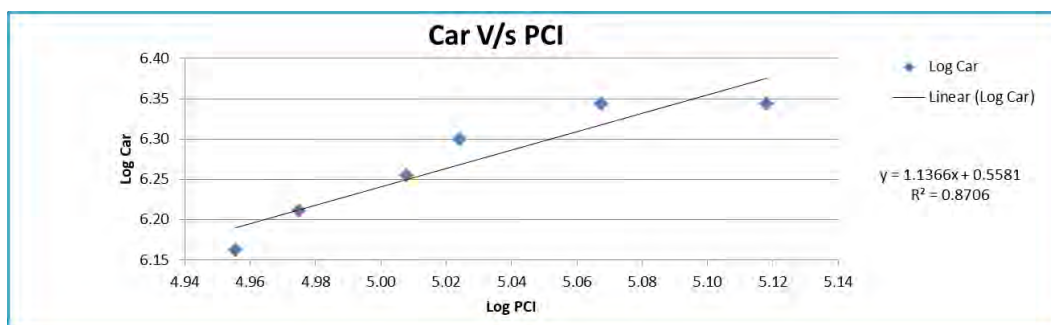
Following tables and graphs depict regression and elasticity of growth model for stretch falling in Karnataka State.

**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

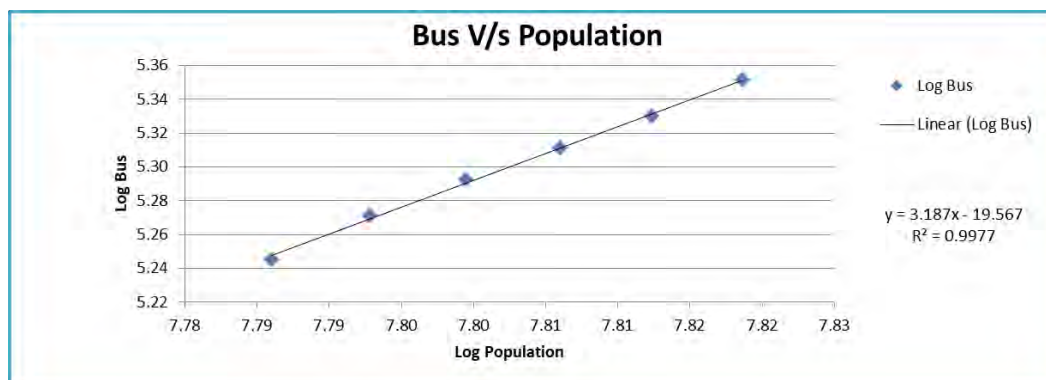


**Figure 5-11 : Regression and Elasticity PCI vs. Car – Extrapolation Karnataka**

**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



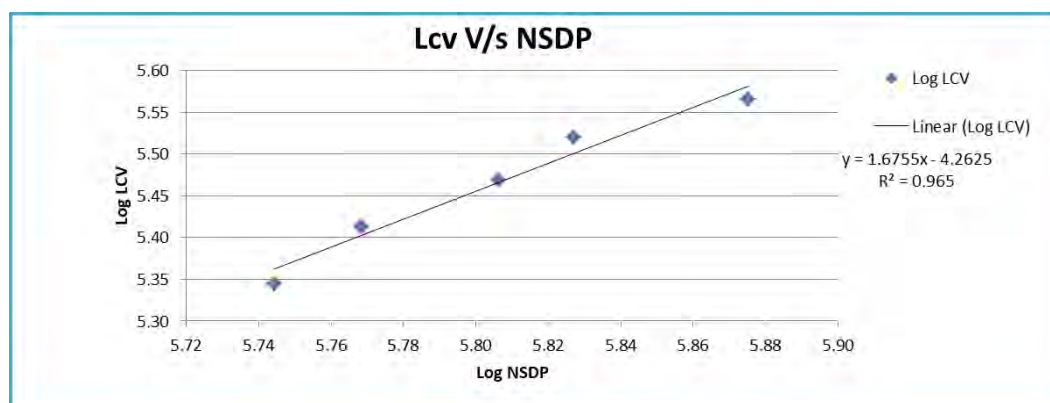
**Figure 5-12 : Regression and Elasticity Population vs. Bus – Extrapolation Karnataka**

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.

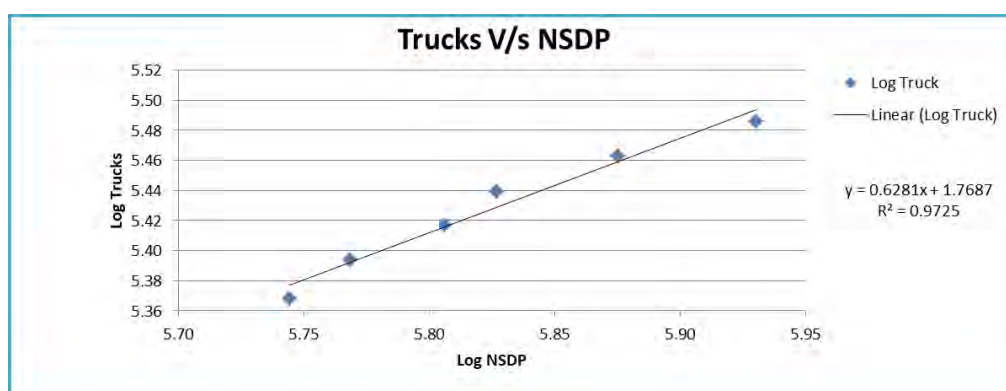


**Figure 5-13 : Regression and Elasticity NSDP vs. Lcv – Extrapolation Karnataka**

**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 R<sup>2</sup> 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 - 1<sup>st</sup> 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

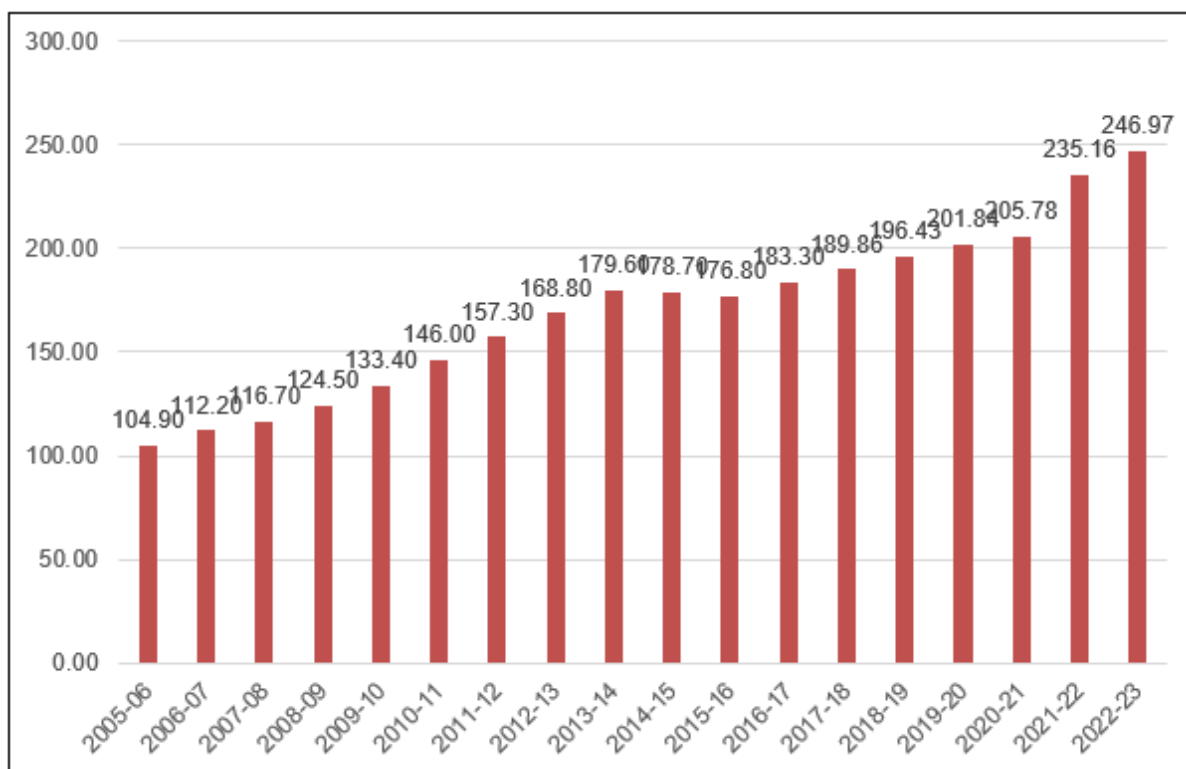
1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3<sup>rd</sup> rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles 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](http://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
<b>2042-43</b>	372.45	675.94	560.98	<b>1609.38</b>

**Table 7-14 : Toll Revenue Most Likely Scenario  
(Rs. Crores)**

Year	TP-1	TP-2	TP-3	Total
<b>2023-24</b>	63.62	110.08	91.03	<b>264.73</b>
<b>2024-25</b>	71.76	124.43	102.74	<b>298.92</b>
<b>2025-26</b>	81.75	142.14	117.58	<b>341.47</b>
<b>2026-27</b>	89.70	156.50	129.61	<b>375.82</b>
<b>2027-28</b>	98.80	173.52	143.46	<b>415.77</b>
<b>2028-29</b>	108.46	190.54	156.85	<b>455.85</b>
<b>2029-30</b>	119.21	209.88	174.10	<b>503.20</b>
<b>2030-31</b>	130.76	231.66	190.88	<b>553.30</b>
<b>2031-32</b>	144.04	253.88	210.61	<b>608.54</b>
<b>2032-33</b>	157.35	277.54	230.51	<b>665.40</b>
<b>2033-34</b>	172.34	305.72	253.22	<b>731.28</b>
<b>2034-35</b>	188.73	335.22	278.42	<b>802.37</b>
<b>2035-36</b>	207.65	367.83	305.45	<b>880.92</b>
<b>2036-37</b>	226.31	402.23	333.94	<b>962.47</b>
<b>2037-38</b>	247.56	441.90	367.42	<b>1056.89</b>
<b>2038-39</b>	270.15	485.21	404.11	<b>1159.46</b>
<b>2039-40</b>	297.31	534.37	443.90	<b>1275.58</b>
<b>2040-41</b>	324.11	584.55	487.77	<b>1396.43</b>
<b>2041-42</b>	356.20	641.42	534.48	<b>1532.10</b>
<b>2042-43</b>	390.05	706.44	587.76	<b>1684.25</b>



## 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



# 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)**



**GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**PALSIT TO DANKUNI SECTION OF NH 19  
IN THE STATE OF WEST BENGAL  
(KM 588.870 TO KM 652.700)**

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

**MARCH 2024**



# Contents

<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
<b>1.1 Background.....</b>	<b>7</b>
<b>1.2 Objective of the Study.....</b>	<b>8</b>
<b>1.2.1 Scope of Services .....</b>	<b>8</b>
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS.....</b>	<b>9</b>
<b>2.1 Project Corridor.....</b>	<b>9</b>
<b>2.2 Project Stretch Description .....</b>	<b>9</b>
<b>2.3 Project Corridor Illustration.....</b>	<b>10</b>
<b>Chapter 3 .....</b>	<b>12</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>12</b>
<b>3.1 Traffic Surveys .....</b>	<b>12</b>
<b>3.2 Classified Traffic Volume.....</b>	<b>13</b>
<b>3.3 Traffic Characteristic .....</b>	<b>13</b>
<b>3.3.1 Traffic Data .....</b>	<b>14</b>
<b>3.4 Data Analysis.....</b>	<b>14</b>
<b>3.4.1 Analysis of Traffic Volume Count .....</b>	<b>14</b>
<b>3.4.2 Components of Traffic .....</b>	<b>15</b>
<b>3.5 Secondary Data Collection .....</b>	<b>17</b>
<b>Chapter 4 .....</b>	<b>18</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>18</b>
<b>4.1 Introduction.....</b>	<b>18</b>
<b>4.2 Competing / Alternate route.....</b>	<b>18</b>
<b>Chapter 5 .....</b>	<b>23</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>23</b>
<b>5.1 Introduction .....</b>	<b>23</b>
<b>5.2 Trend Analysis.....</b>	<b>23</b>
<b>5.3 Estimation of Traffic Demand Elasticity.....</b>	<b>24</b>
<b>5.4 Analysis of Historic Traffic Data .....</b>	<b>35</b>
<b>5.5 Other Factors Influencing Growth.....</b>	<b>35</b>
<b>5.6 Developments along and around the Project Corridor &amp; State.....</b>	<b>36</b>
<b>5.7 Recommended Growth Rates of Traffic .....</b>	<b>38</b>
<b>5.7.1 Recommended Growth Rates of Traffic for Project Stretch.....</b>	<b>39</b>
<b>Chapter 6 .....</b>	<b>41</b>

TRAFFIC FORECAST.....	41
6.1 Traffic Projections .....	41
6.2 Modification in Concession Period .....	42
<b>Chapter 7 .....</b>	<b>44</b>
FORECAST OF TOLL REVENUE .....	44
7.1 General.....	44
7.2 Discount Categories .....	44
7.3 Toll Revenue .....	47
7.4 Toll Revenue at all toll plazas under Scenarios .....	47
<b>Chapter 8 .....</b>	<b>50</b>
CONCLUSION & RECOMMENDATIONS .....	50
8.1 Conclusion & Recommendations .....	50

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	12
Table 3-2 : Vehicle Classification System .....	13
Table 3-3 : Traffic Data at Dankuni Toll Plaza at Km 646.005 .....	14
Table 3-4 : PCU Factors Adopted for Study .....	15
Table 3-5 : Traffic in PCU at Project Stretch Base Year 2022-23 .....	15
Table 3-6 : Journey Type Bifurcation of Traffic at Dankuni Toll Plaza KM 646.005 .....	16
Table 4-1 Project Road and GT road comparison .....	20
Table 4-2 Length time comparison of alternate route at Dankuni Toll .....	22
Table 5-1 : Per Capita Income Vs. Car- West Bengal .....	24
Table 5-2 : NSDP Vs. Truck- West Bengal .....	25
Table 5-3 : Summary Regression Analysis- West Bengal .....	26
Table 5-4 : Per Capita Income Vs. Car- Jharkhand .....	26
Table 5-5 : Population Vs. Bus- Jharkhand .....	26
Table 5-6 : NSDP Vs. Truck- Jharkhand .....	27
Table 5-7 : Summary Regression Analysis- Jharkhand .....	28
Table 5-8 : Per Capita Income Vs. Car- Bihar .....	28
Table 5-9 : Population Vs. Bus- Bihar .....	29
Table 5-10 : NSDP Vs. Truck- Bihar .....	30
Table 5-11 : Summary Regression Analysis- Bihar .....	30
Table 5-12 : Per Capita Income Vs. Car- Uttar Pradesh .....	31
Table 5-13 : Population Vs. Bus- Uttar Pradesh .....	31
Table 5-14 : NSDP Vs. Truck- Uttar Pradesh .....	32
Table 5-15 : Summary Regression Analysis- Uttar Pradesh .....	33
Table 5-16 : Per Capita Income Vs. Car- Delhi .....	33
Table 5-17 : Population Vs. Bus- Delhi .....	34
Table 5-18 : NSDP Vs. Truck- Delhi .....	34
Table 5-19 : Summary Regression Analysis- Delhi .....	35
Table 5-20 : Recommended Growth Rates Optimistic .....	39
Table 5-21 : Recommended Growth Rates Pessimistic .....	39
Table 5-22 : Recommended Growth Rates Most Likely .....	39
Table 6-1 : Total Tollable Traffic @ Toll Plaza Dankuni- Chainage 646.005 KM .....	41
Table 6-2 : Total Tollable Traffic @ Toll Plaza Dankuni- Chainage 646.005 KM .....	41
Table 6-3 : Total Tollable Traffic @ Toll Plaza Dankuni- Chainage 646.005 KM .....	42
Table 7-1 : Base Toll Rates June 2007-08 .....	45
Table 7-2 : Toll Rates for Single Journey Dankuni @ Km 646.005 .....	46



---

<i>Table 7-3 : Toll Revenue Optimistic Scenario</i> .....	48
<i>Table 7-4 : Toll Revenue Pessimistic Scenario</i> .....	48
<i>Table 7-5 : Toll Revenue Most Likely Scenario</i> .....	49

## LIST OF FIGURES

Figure 1-1: Alignment of Project Stretch.....	7
Figure 2-1: Project Alignment with Toll Plaza.....	10
Figure 2-2: Photographs showing Project Corridor .....	11
Figure 3-1 :Model Split of Tollable Vehicle-Dankuni Km 646.005 .....	16
Figure 4-1 Project stretch and alternate GT Road .....	19
Figure 4-2 Project stretch and alternate GT Road Condition .....	19
Figure 4-3 Railway level crossing at GT road.....	20
Figure 4-4 Local roads bypassing toll plaza .....	21
Figure 4-5 ROB & Toll Plaza under construction.....	22
Figure 5-1 : Regression Analysis Car Vs. PCI West Bengal .....	25
Figure 5-2 : Regression Analysis NSDP Vs. Truck West Bengal .....	25
Figure 5-3 : Regression Analysis Car Vs. PCI Jharkhand .....	26
Figure 5-4 : Regression Analysis Population Vs. Bus Jharkhand.....	27
Figure 5-5 : Regression Analysis NSDP Vs. Jharkhand.....	28
Figure 5-6 : Regression Analysis Car Vs. PCI Bihar.....	29
Figure 5-7 : Regression Analysis Population Vs. Bus Bihar .....	29
Figure 5-8 : Regression Analysis NSDP Vs. Truck Bihar.....	30
Figure 5-9 : Regression Analysis Car Vs. PCI Uttar Pradesh.....	31
Figure 5-10 : Regression Analysis Population Vs. Bus Uttar Pradesh .....	32
Figure 5-11 : Regression Analysis NSDP Vs. Truck Uttar Pradesh.....	32
Figure 5-12 : Regression Analysis Car Vs. PCI Delhi.....	33
Figure 5-13 : Regression Analysis Population Vs. Bus Delhi .....	34
Figure 5-14 : Regression Analysis NSDP Vs. Truck Delhi.....	35
Figure 5-15 : Growth of GDP in India.....	36
Figure 7-1 : Historical Rate of WPI Inflation in India.....	45

## ABBREVIATIONS

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

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

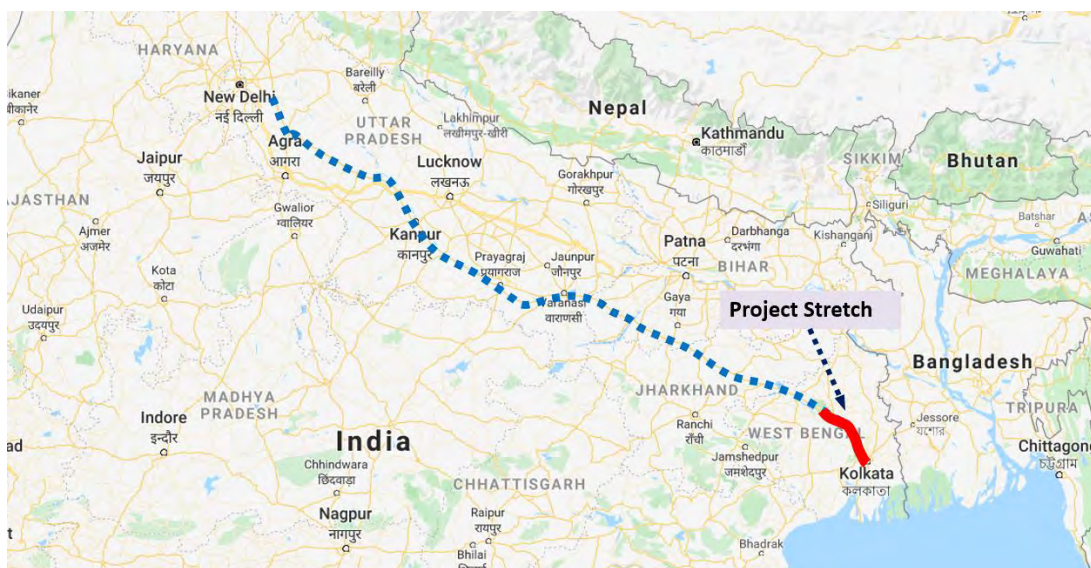
The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 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 2<sup>nd</sup> 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 Bardhaman. 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
	<b>Total</b>	<b>28451</b>	<b>26121</b>

## 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

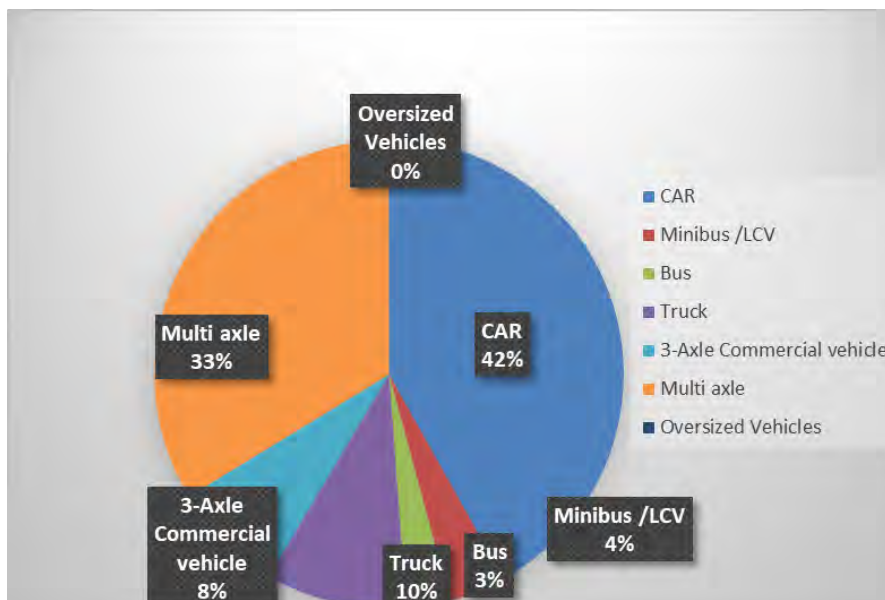
**Table 3-5 : Traffic in PCU at Project Stretch Base Year 2022-23**

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,

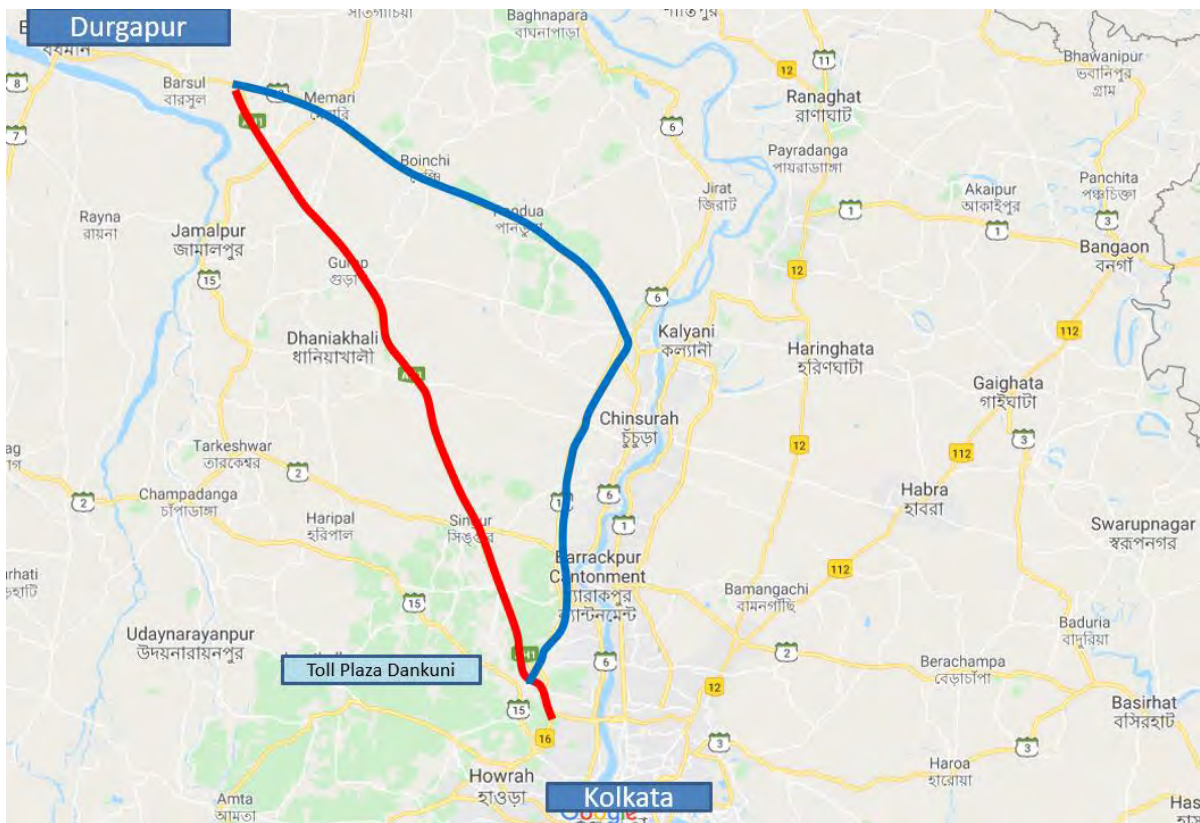
### 4.2 Competing / Alternate route

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.

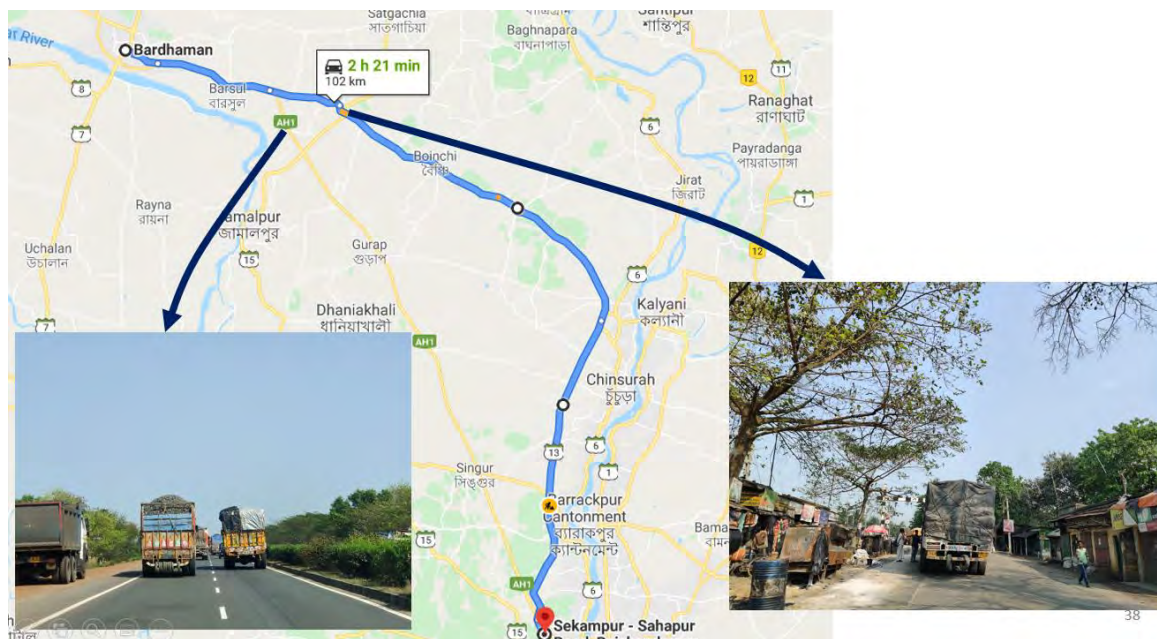
#### Old NH-2 (GT Road)

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 Bardhman and Dankuni.

**Table 4-1 Project Road and GT road comparison**

Route	Distance (Km)	Time (Min)	Remarks
Bardhman -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.
<b>Bardhman -Kolkata Via Project Road</b>	<b>84</b>	<b>79</b>	<b>Preferred Route</b>

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
<b>Via Project Road (Dankuni)</b>	<b>21.4</b>	<b>24</b>	<b>Preferred Route</b>

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).

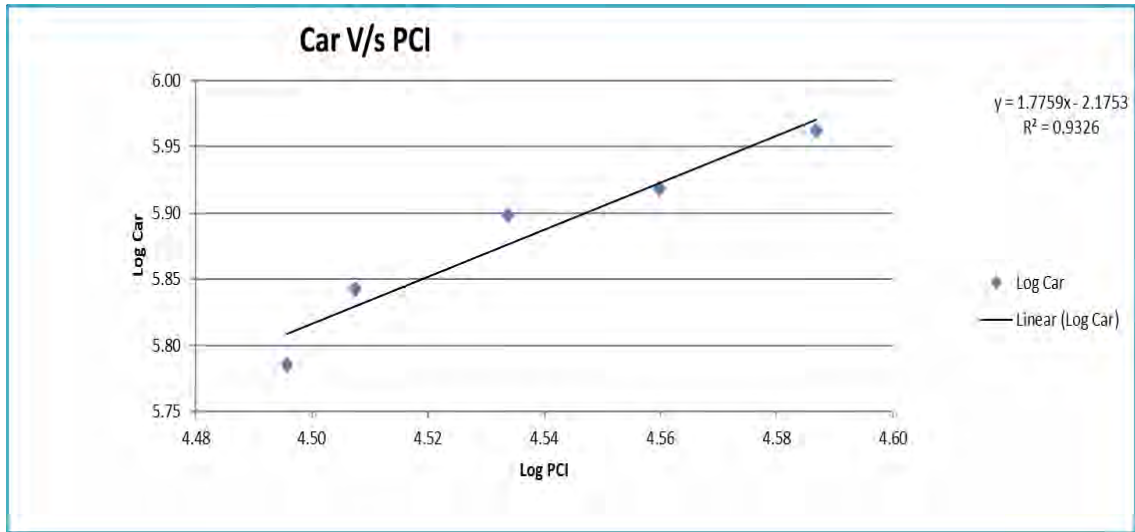
As observed in OD analysis, the project stretch has a share of traffic from mainly three states of West Bengal, Jharkhand and Bihar and some traffic from Uttar Pradesh and Delhi. Hence regression of dependent variable and traffic has been done for these three states. The following tables and graphs present 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.

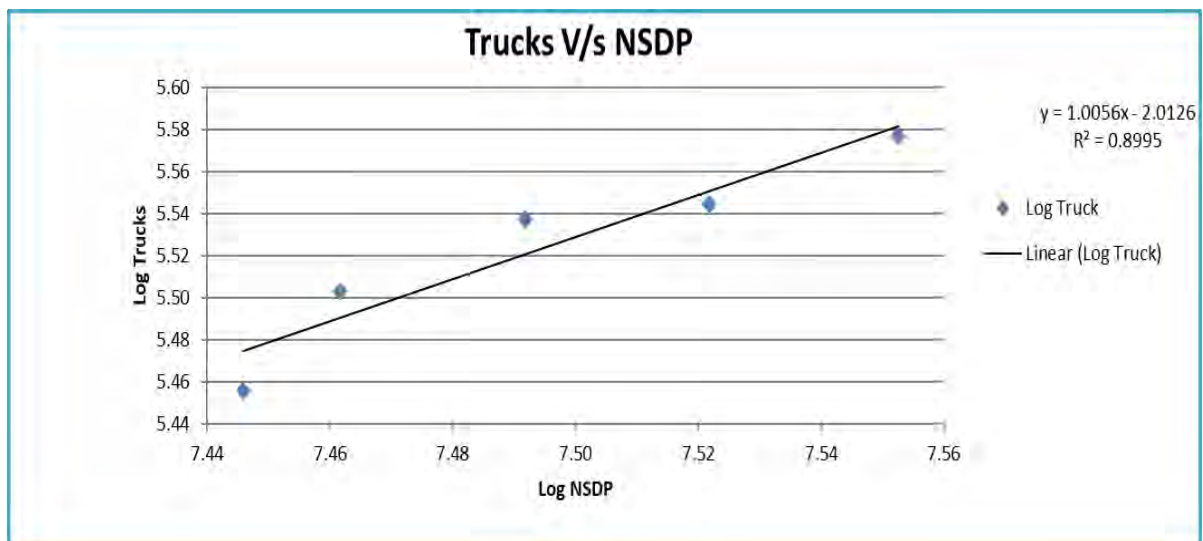




**Figure 5-1 : Regression Analysis Car Vs. PCI West Bengal**

**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**

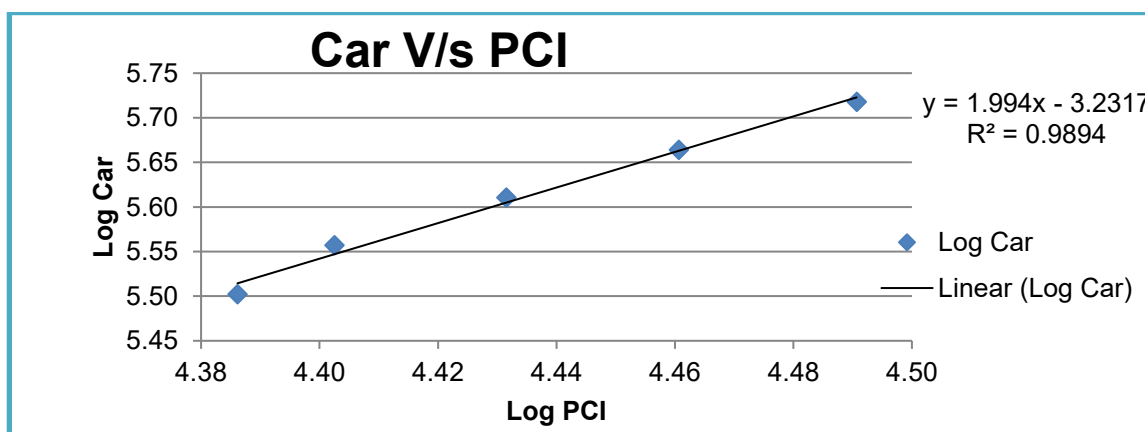
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average IV Growth (5yrs)	Growth Elastic Model	Remarks
West Bengal	Car/Jeep	PCI	$y = 1.7759x - 2.1753$	$R^2 = 0.9326$	1.7759	5.40%	9.58%	Good Regression
	Bus	Population	$y = 0.5092x - 0.5636$	$R^2 = 0.0364$	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**

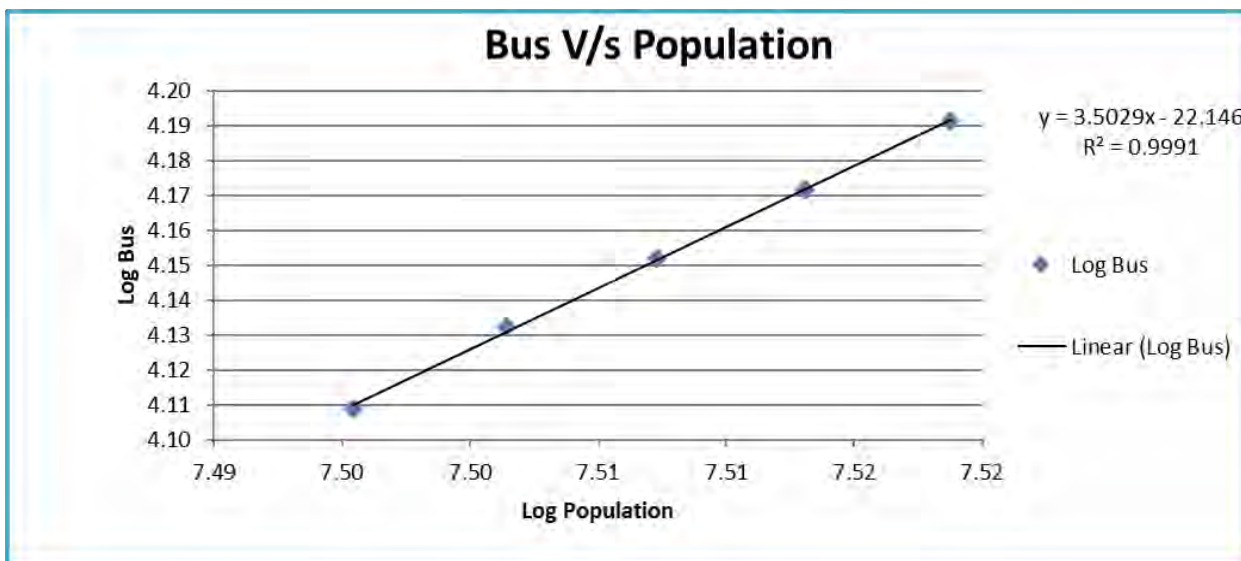
Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2011	24330	317931	4.39	5.50		
2012	25265	360662	4.40	5.56	4%	
2013	27010	408016	4.43	5.61	7%	
2014	28882	461587	4.46	5.66	7%	
2015	30950	522192	4.49	5.72	7%	6.2%

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%	

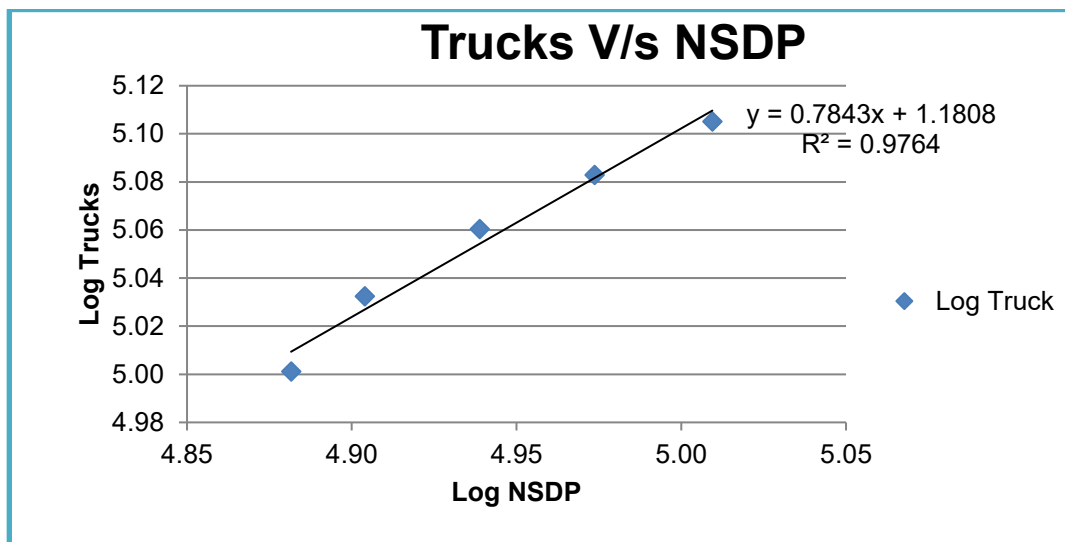
Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2013	32159000	14189	7.51	4.15	1%	
2014	32588000	14846	7.51	4.17	1%	
2015	33020000	15534	7.52	4.19	1%	1.35%



**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.

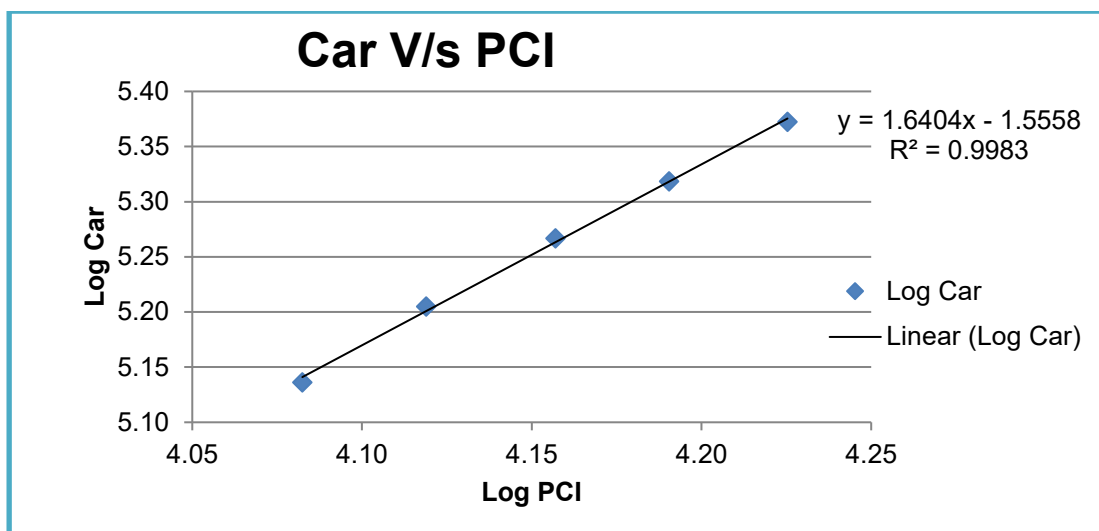


Figure 5-6 : Regression Analysis Car Vs. PCI Bihar

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%

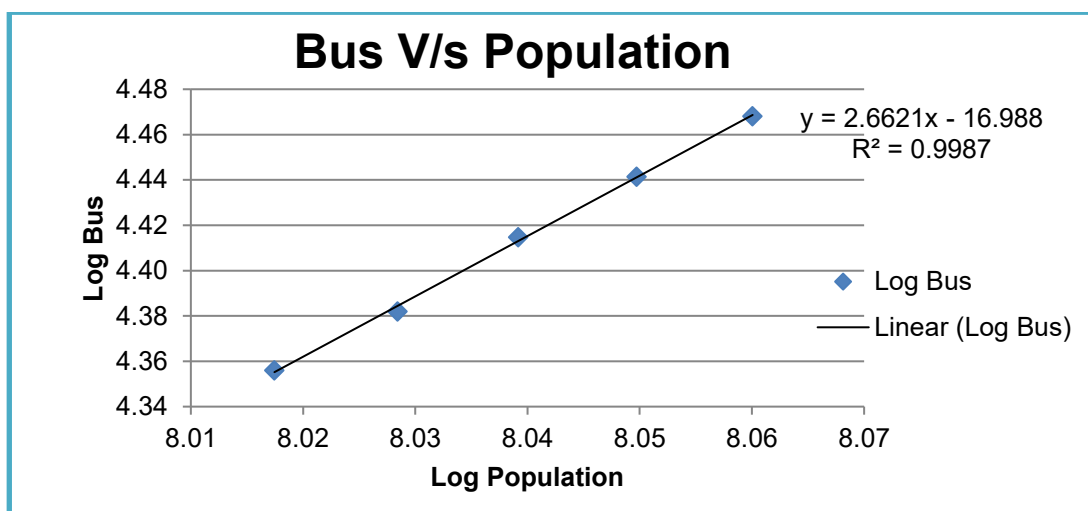


Figure 5-7 : Regression Analysis Population Vs. Bus Bihar

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%

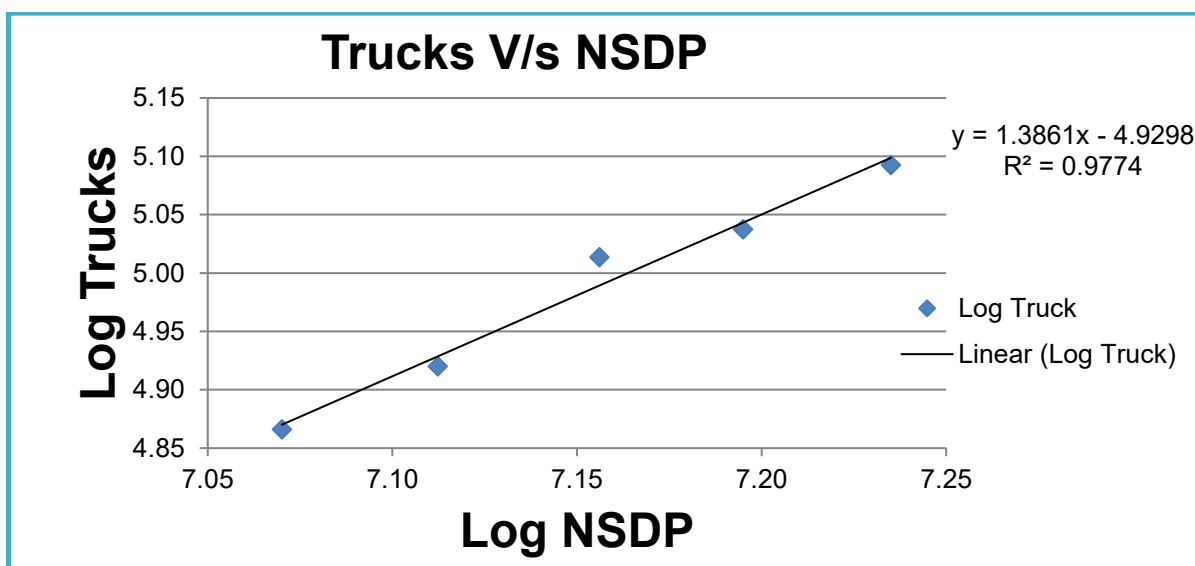


Figure 5-8 : Regression Analysis NSDP Vs. Truck Bihar

Summary of regression analysis for elasticity and growth estimation for Biharis given in following table

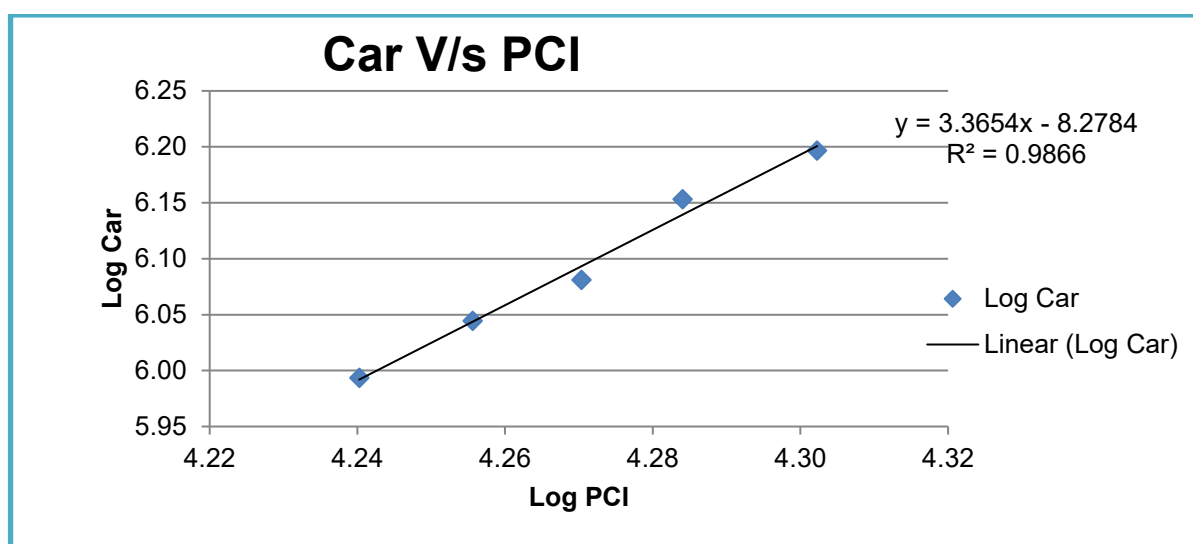
Table 5-11 : Summary Regression Analysis- Bihar

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%



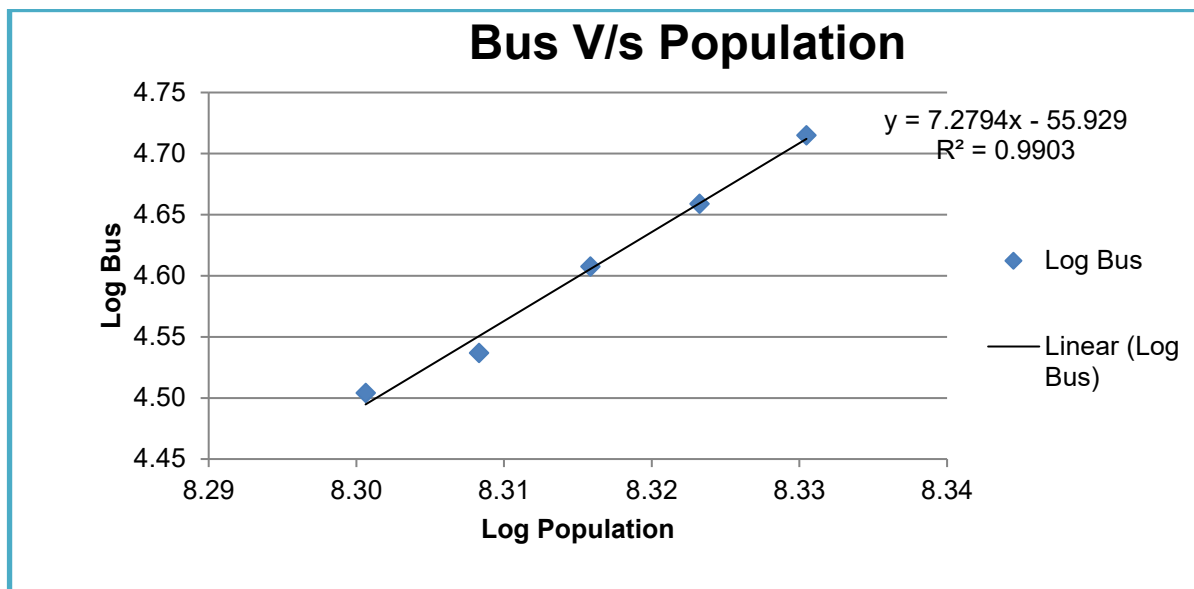


Figure 5-10 : Regression Analysis Population Vs. Bus Uttar Pradesh

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%

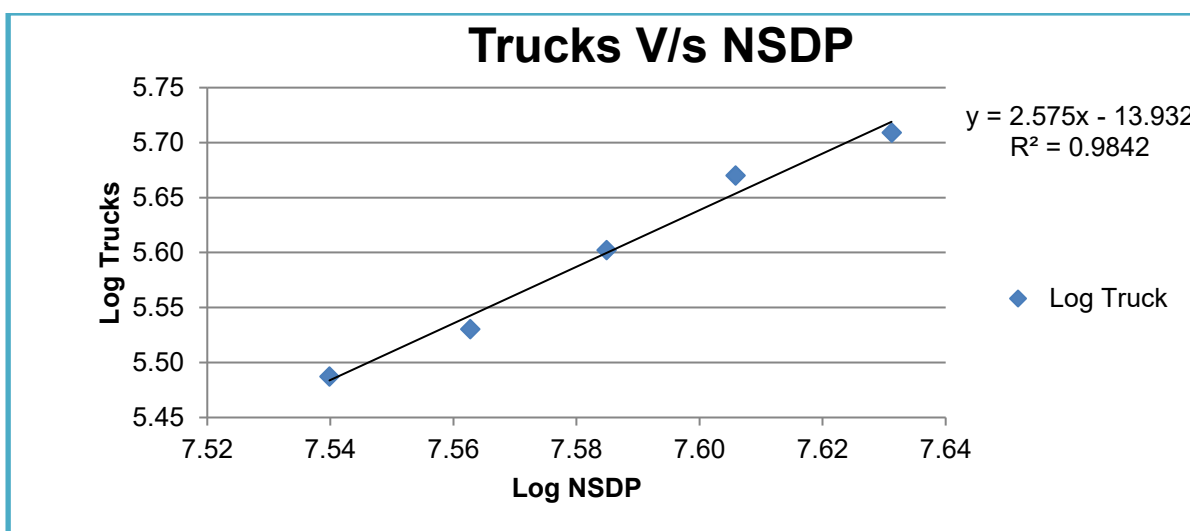


Figure 5-11 : Regression Analysis NSDP Vs. Truck Uttar Pradesh

Summary of regression analysis for elasticity and growth estimation for Uttar Pradesh are given in following table.

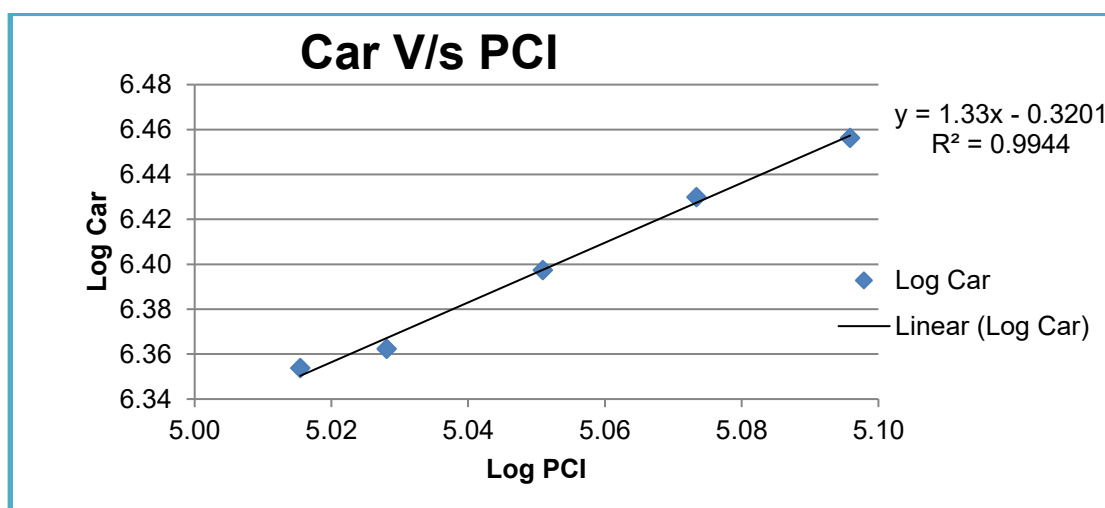
**Table 5-15 : Summary Regression Analysis- Uttar Pradesh**

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%

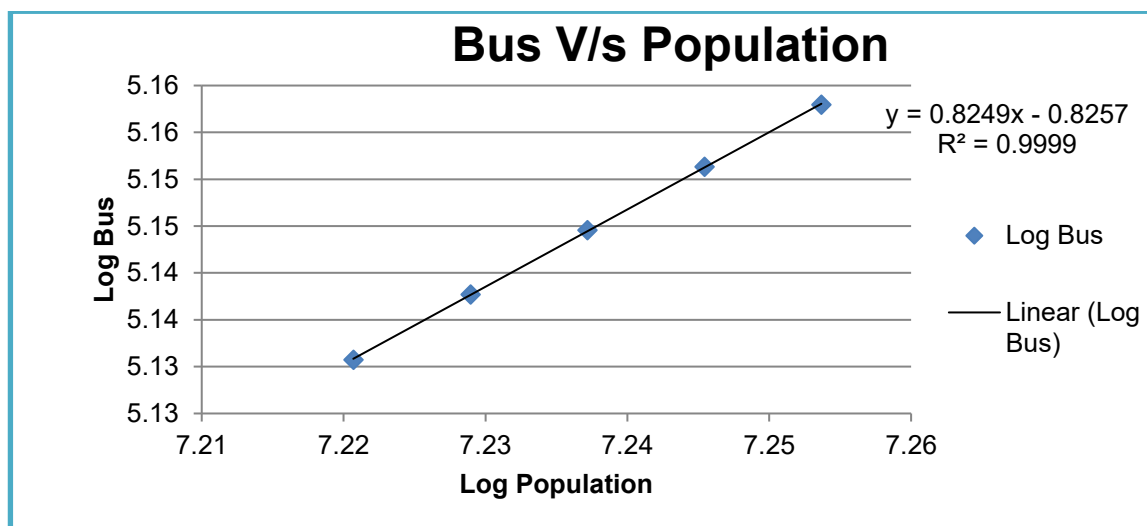
Regression analysis of above is given in following figure.



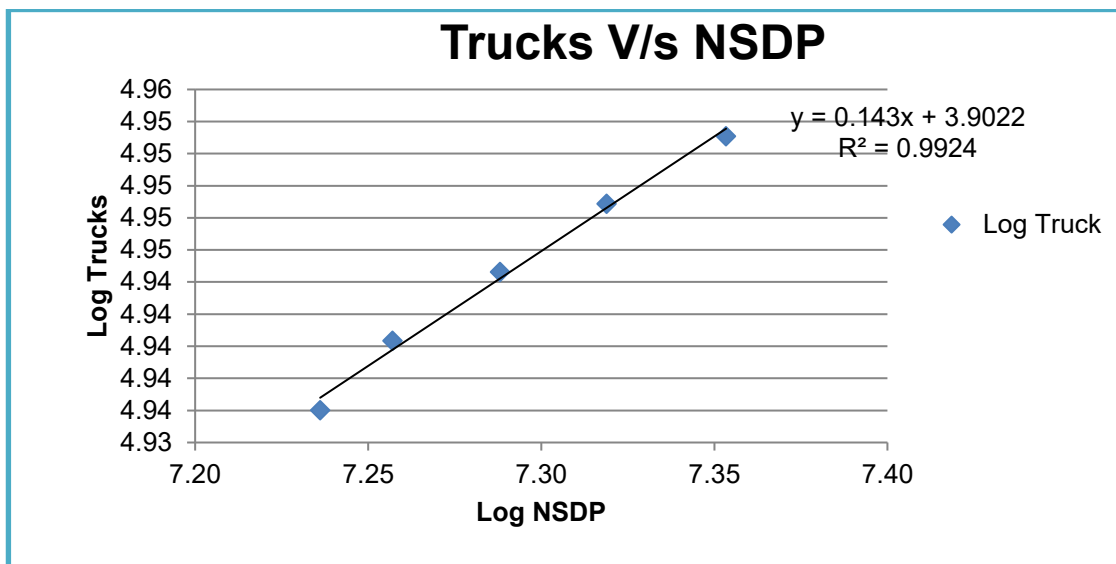
**Figure 5-12 : Regression Analysis Car Vs. PCI Delhi**

**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 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.

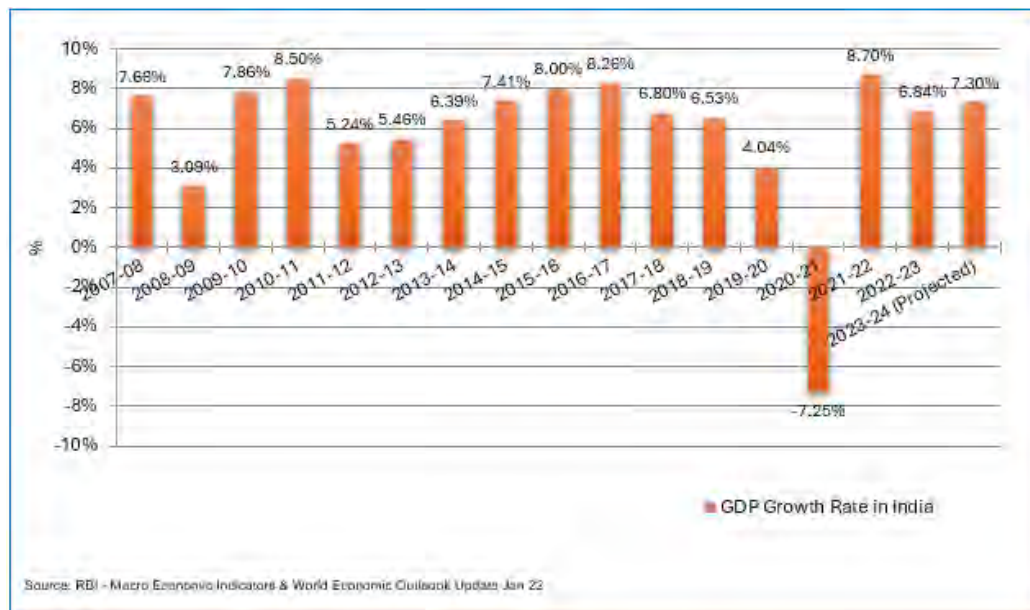
#### 5.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be 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
<b>2- Axle</b>	3.44%	3.09%	2.43%	1.78%	1.13%	0.50%
<b>3 - Axle</b>	5.16%	4.64%	3.64%	2.66%	1.70%	0.74%
<b>4 to 6 Axle</b>	6.20%	5.57%	4.37%	3.20%	2.04%	0.89%
<b>7 and Above Axle</b>	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	<b>-2.2</b>
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	<b>-2.5</b>
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	<b>-2.3</b>
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

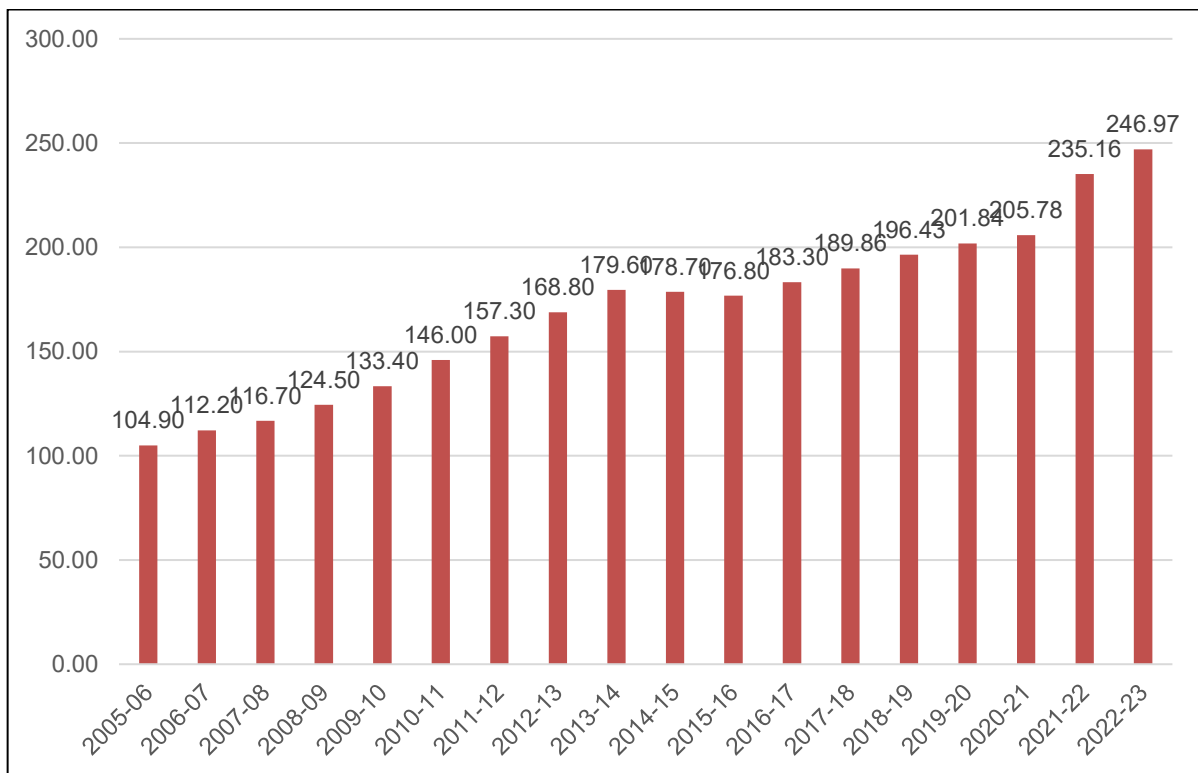
1. Monthly Pass: For frequent user's monthly pass would be issued at fee 50 time the single journey fee at 2/3<sup>rd</sup> Rate.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles 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](http://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)**

<b>Year</b>	<b>TP-1</b>	<b>Total</b>
<b>2023-24</b>	185.82	<b>185.82</b>
<b>2024-25</b>	250.21	<b>250.21</b>
<b>2025-26</b>	330.70	<b>330.70</b>
<b>2026-27</b>	366.25	<b>366.25</b>
<b>2027-28</b>	408.22	<b>408.22</b>
<b>2028-29</b>	451.35	<b>451.35</b>
<b>2029-30</b>	500.44	<b>500.44</b>
<b>2030-31</b>	549.33	<b>549.33</b>
<b>2031-32</b>	604.00	<b>604.00</b>
<b>2032-33</b>	660.97	<b>660.97</b>
<b>2033-34</b>	725.50	<b>725.50</b>
<b>2034-35</b>	797.97	<b>797.97</b>
<b>2035-36</b>	869.43	<b>869.43</b>
<b>2036-37</b>	947.34	<b>947.34</b>

## 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

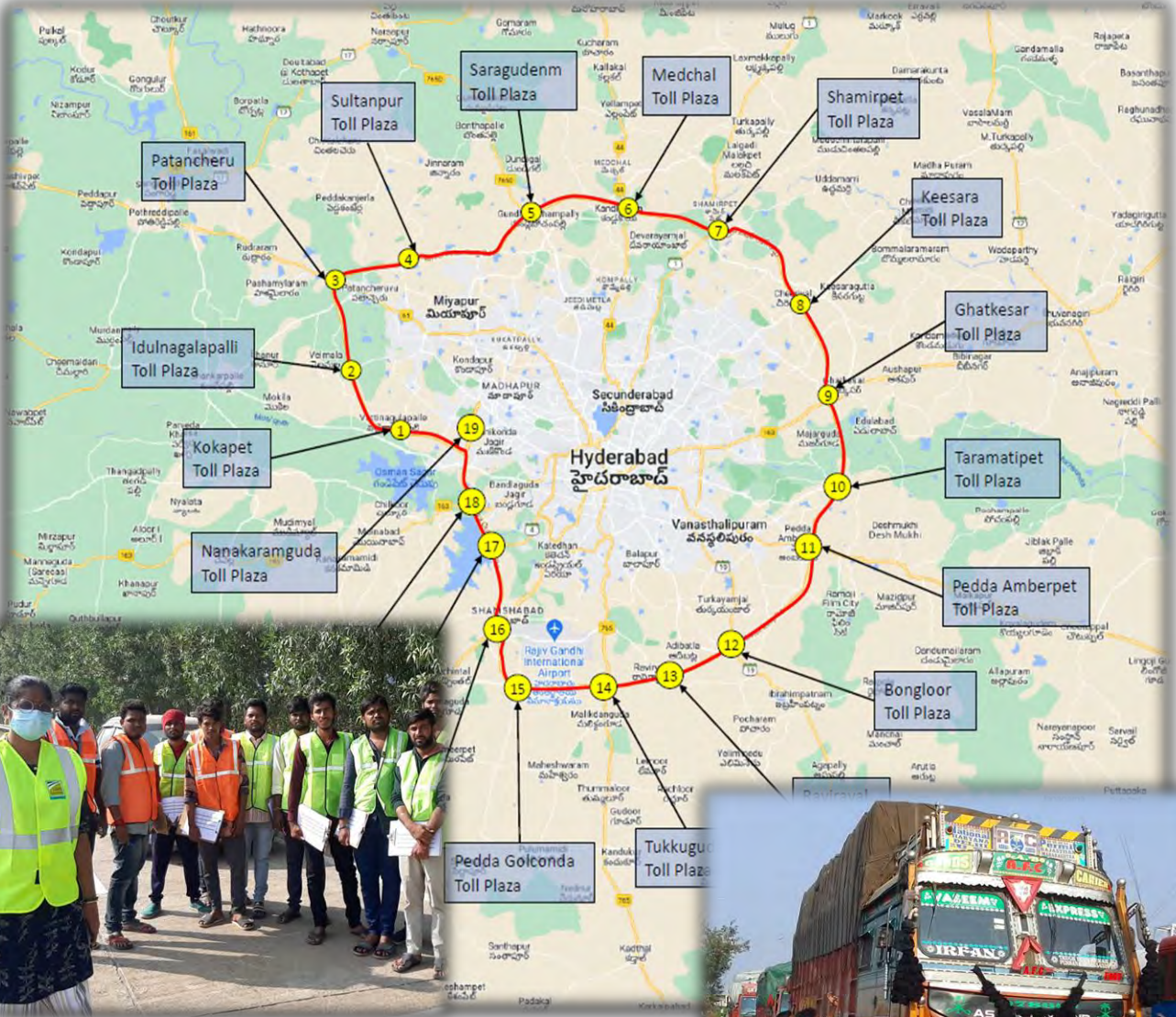
Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





# 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)



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11, CBD Belapur, Navi Mumbai. 400 614. Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





***Nehru Outer Ring Road in Hyderabad from Km 0.000 to  
Km 158.000 in State of Telangana on TOT mode***

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

**MARCH 2024**



# CONTENTS

<b>Chapter 1</b> .....	<b>6</b>
INTRODUCTION .....	6
1.1 Background .....	6
<b>Chapter 2</b> .....	<b>8</b>
PROJECT DETAILS .....	8
2.1 Brief Description of the Project Influence Area (PIA) .....	8
2.2 Project Appreciation .....	11
2.3 Project Corridor Illustration .....	16
<b>Chapter 3</b> .....	<b>17</b>
TRAFFIC SURVEYS AND ANALYSIS .....	17
3.1 Traffic Surveys .....	17
3.2 Classified Traffic Volume .....	19
3.3 Traffic Characteristic .....	19
3.3.1 Traffic Data .....	19
3.4 Traffic Characteristic .....	33
3.4.1 Analysis of Traffic Volume Count .....	33
3.4.2 Components of Traffic .....	34
<b>Chapter 4</b> .....	<b>35</b>
GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....	35
4.1 Introduction .....	35
4.2 Secondary Data Collection .....	35
4.3 Development in the Project Influence Area .....	35
4.4 Trend Analysis .....	42
4.5 Estimation of Traffic Demand Elasticity .....	43
4.6 Basis for arriving at growth rates. ....	48
4.7 Growth of Economy and Projection of GDP in India and States .....	49
4.7.1 Recommended Growth Rates of Traffic .....	49
<b>Chapter 5</b> .....	<b>51</b>
FORECAST OF TOLL REVENUE .....	51
5.1 General .....	51
5.2 Toll Rate Guidelines .....	51
5.4 Discounts .....	51
5.4 Travel Passes .....	51
5.2 Segmentation of traffic .....	52
5.2 Estimation of Toll Rates .....	53
5.2 Traffic Forecast .....	80
5.2 Toll Revenue at all toll plazas .....	84
5.4 Revenue Forecast .....	84
5.4 Modification in concession period .....	88
<b>Chapter 6</b> .....	<b>91</b>

**CONCLUSION & RECOMMENDATIONS .....91**  
**6.1 Conclusion & Recommendations .....91**

## LIST OF TABLES

<i>Table 2-1: Details of Toll plazas locations.....</i>	<i>12</i>
<i>Table 3-1 : Traffic Data Details.....</i>	<i>17</i>
<i>Table 3-2 : Vehicles classification system.....</i>	<i>19</i>
<i>Table 3-3 : Tollable Annual Average Daily Traffic (AADT) Matrix for Car/Jeep/Van.....</i>	<i>21</i>
<i>Table 3-4 : Tollable Annual Average Daily Traffic (AADT) Matrix for Minibus/LCV.....</i>	<i>22</i>
<i>Table 3-5 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>23</i>
<i>Table 3-6 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>24</i>
<i>Table 3-7 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>25</i>
<i>Table 3-8 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>26</i>
<i>Table 3-9 : Tollable Annual Average Daily Traffic (AADT) Matrix for Car/Jeep/Van.....</i>	<i>27</i>
<i>Table 3-10 : Tollable Annual Average Daily Traffic (AADT) Matrix for Minibus/LCV.....</i>	<i>28</i>
<i>Table 3-11 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>29</i>
<i>Table 3-12 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>30</i>
<i>Table 3-13 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>31</i>
<i>Table 3-14 : Tollable Annual Average Daily Traffic (AADT) Matrix for.....</i>	<i>32</i>
<i>Table 3-15 : PCU Factors Adopted for Study.....</i>	<i>33</i>
<i>Table 3-16 : Traffic in PCU at Project Stretch Base Year 2023-24.....</i>	<i>33</i>
<i>Table 4-1 : Results of Regression analysis.....</i>	<i>48</i>
<i>Table 4-2 : Growth of Independent Variables.....</i>	<i>49</i>
<i>Table 4-3: Recommended Growth Rates Pessimistic case.....</i>	<i>50</i>
<i>Table 4-4: Recommended Growth Rates Most likely case.....</i>	<i>50</i>
<i>Table 4-5: Recommended Growth Rates Optimistic case.....</i>	<i>50</i>
<i>Table 5-1 : Base Toll Rates 2007 - 08.....</i>	<i>53</i>
<i>Table 5-2 : Tollable Length.....</i>	<i>55</i>
<i>Table 5-3: Car/Jeep/Van Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>56</i>
<i>Table 5-4: Minibus/LCV Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>57</i>
<i>Table 5-5: Bus/2-axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>58</i>
<i>Table 5-6: 3-axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>59</i>
<i>Table 5-7: 4 to 6 axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>60</i>
<i>Table 5-8: 7 &amp; above axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>61</i>
<i>Table 5-9: Car/Jeep/Van Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>62</i>
<i>Table 5-10: Minibus/LCV Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>63</i>
<i>Table 5-11: Bus/2-axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>64</i>
<i>Table 5-12: 3-axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>65</i>
<i>Table 5-13: 4 to 6 axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>66</i>
<i>Table 5-14: 7 &amp; above axle Toll Rates for Year 2023-2024 (Rs. Rupees).....</i>	<i>67</i>

*Table 5-15: Car/Jeep/Van Toll Rates for Year 2024-2025 (Rs. Rupees)..... 68*

*Table 5-16: Minibus/LCV Toll Rates for Year 2024-2025 (Rs. Rupees) ..... 69*

*Table 5-17: Bus/2-axle Toll Rates for Year 2024-2025 (Rs. Rupees)..... 70*

*Table 5-18: 3-axle Toll Rates for Year 2024-2025 (Rs. Rupees)..... 71*

*Table 5-19: 4 to 6 axle Toll Rates for Year 2024-2025 (Rs. Rupees) ..... 72*

*Table 5-20: 7 & above axle Toll Rates for Year 2024-2025 (Rs. Rupees) ..... 73*

*Table 5-21: Car/Jeep/Van Toll Rates for Year 2024-2025 (Rs. Rupees)..... 74*

*Table 5-22: Minibus/LCV Toll Rates for Year 2024-2025 (Rs. Rupees) ..... 75*

*Table 5-23: Bus/2-axle Toll Rates for Year 2024-2025 (Rs. Rupees)..... 76*

*Table 5-24: 3-axle Toll Rates for Year 2024-2025 (Rs. Rupees)..... 77*

*Table 5-25: 4 to 6 axle Toll Rates for Year 2024-2025 (Rs. Rupees) ..... 78*

*Table 5-26: 7 & above axle Toll Rates for Year 2024-2025 (Rs. Rupees) ..... 79*

*Table 5-27: Total Tollable Traffic (Pessimistic Growth Scenario) ..... 80*

*Table 5-28: Total Tollable Traffic (Most likely Growth Scenario) ..... 81*

*Table 5-29: Total Tollable Traffic (Optimistic Growth Scenario) ..... 83*

*Table 5-30: Total Toll Revenue – Rs. Cr (Pessimistic)..... 84*

*Table 5-31: Total Toll Revenue – Rs. Cr (Most Likely)..... 85*

*Table 5-32: Total Toll Revenue –Rs. Cr (Optimistic)..... 87*

## LIST OF FIGURES

<i>Figure 1-1: Location &amp; Alignment of ORR in Regional Context</i> .....	7
<i>Figure 2-1: Positioning of ORR in city context.</i> .....	8
<i>Figure 2-2: Major urban &amp; commercial hubs.</i> .....	9
<i>Figure 2-3: Upcoming Development Locations in context of ORR.</i> .....	10
<i>Figure 2-4: Regional context of ORR.</i> .....	11
<i>Figure 2-5 : Rotary Type Interchange with 4 toll booths.</i> .....	13
<i>Figure 2-6 : Diamond Type Interchange with 4 toll booths.</i> .....	14
<i>Figure 2-7 : Double Trumpet Type Interchange.</i> .....	14
<i>Figure 2-8 : Shamashabad Interchange and Ramps</i> .....	15
<i>Figure 2-9 : Toll Plaza Nanakramguda and movements.</i> .....	15
<i>Figure 2-10 : Photographs showing Project Corrido</i> .....	16
<i>Figure 3-1 : Model Split of Tollable Vehicle</i> .....	34
<i>Figure 4-1: Elasticity by Graphical Extrapolation for Telangana</i> .....	44
<i>Figure 4-2: Elasticity by Graphical Extrapolation for Andhra Pradesh</i> .....	45
<i>Figure 4-3: Elasticity by Graphical Extrapolation for Karnataka</i> .....	46
<i>Figure 4-4: Elasticity by Graphical Extrapolation for Maharashtra</i> .....	47
<i>Figure 4-5 : Growth of GDP in India</i> .....	49
<i>Figure 5-1: Base Rate (Per Km) enhancement as per NORR amendment Policy.</i> .....	51

# 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.

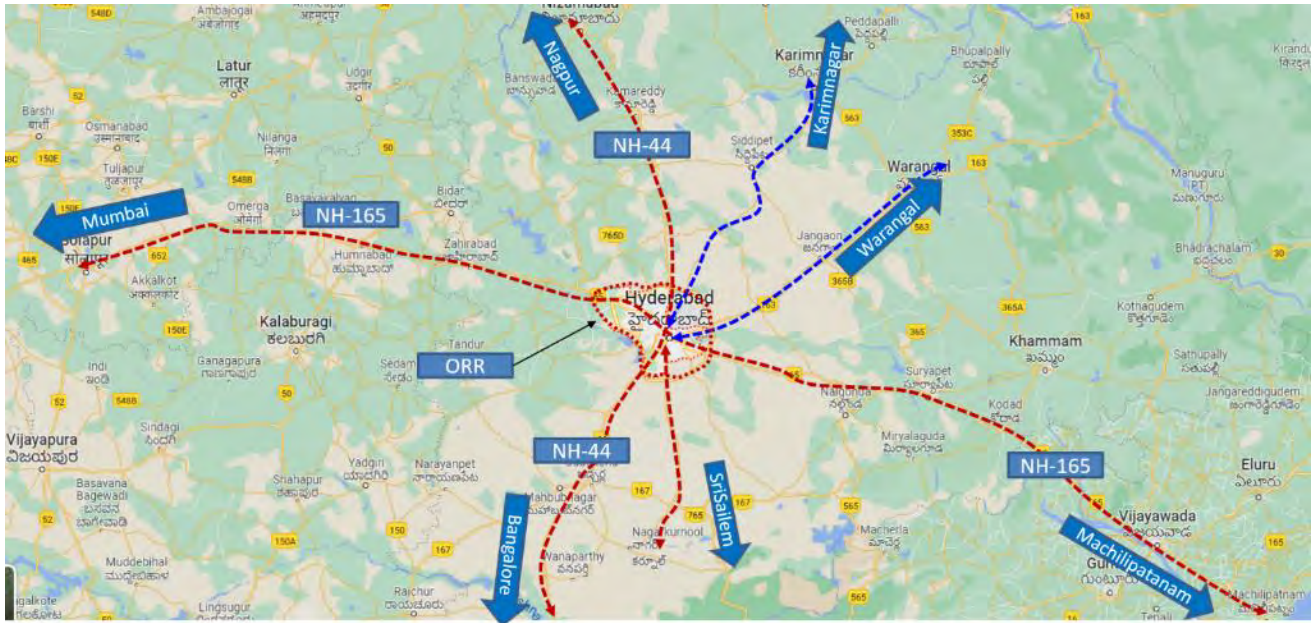
The Outer Ring Road also helps in reducing the travel time from Rajiv Gandhi International Airport to cities like Nizamabad & Adilabad as it connects to NH44. The expressway is fenced, and 33 radial roads connect it with the Inner Ring Road.

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.

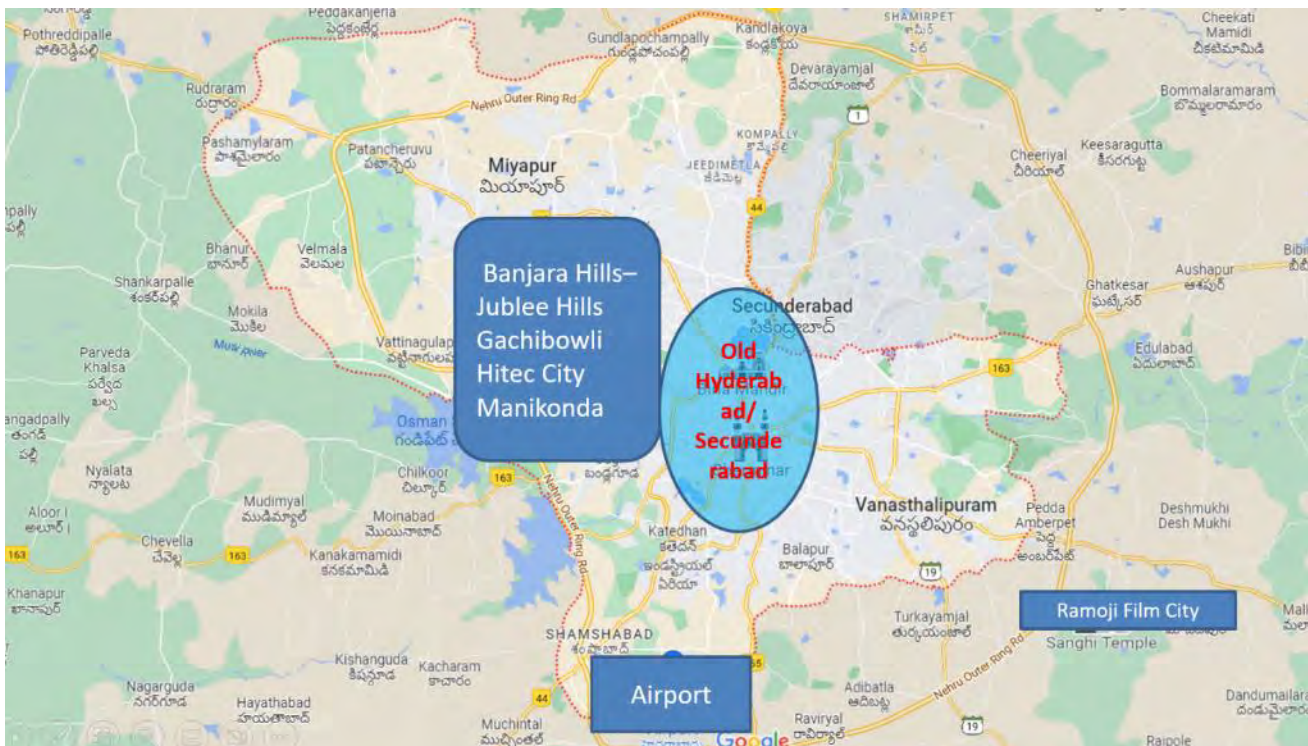
For making the proper assessment of traffic volume on project stretch, base year traffic and its projection.

## 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 Shamshabad) from various parts of city. Following figure shows positioning of ORR in city context.



**Figure 2-1: Positioning of ORR in city context.**

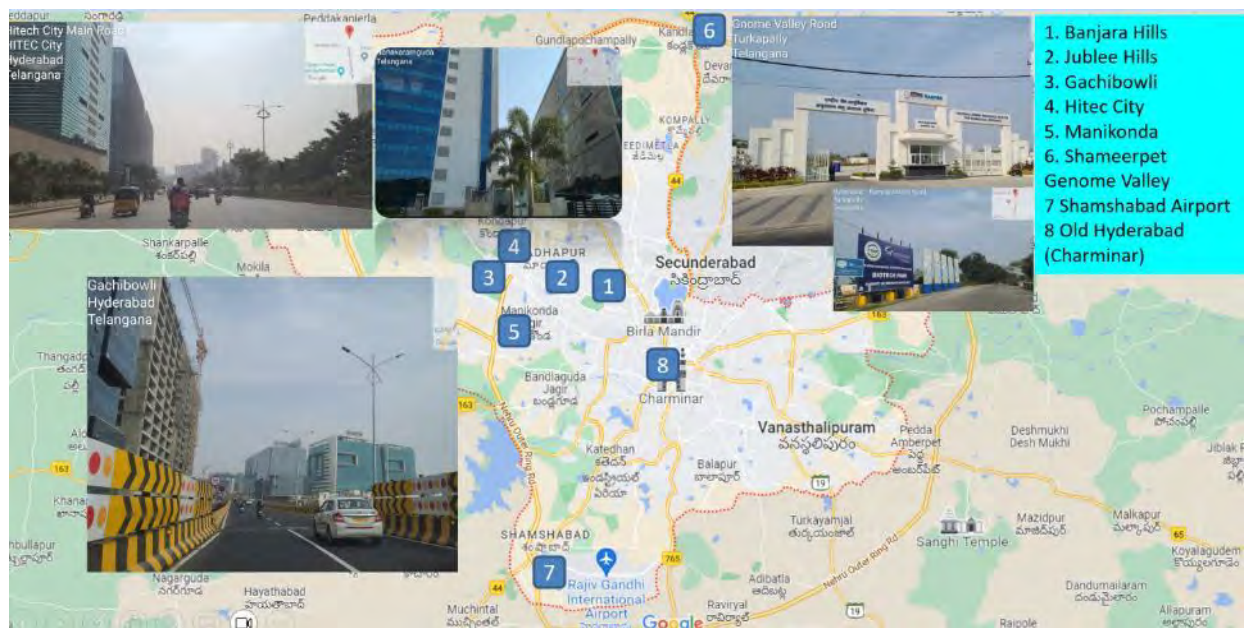
NORR makes a complete circle around city of Hyderabad and Secunderabad. It provides fast connectivity to all part of Hyderabad Metropolitan Area (HMA). Hyderabad Metropolitan Area includes part of following districts.

- **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.



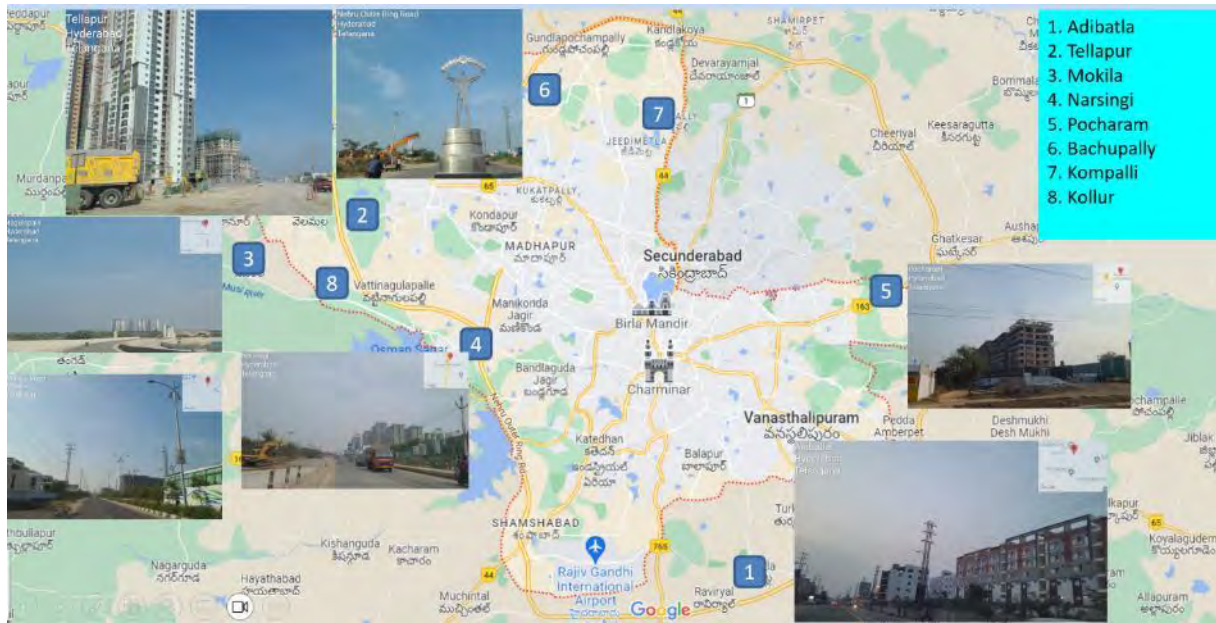
- **Nalgonda** – Nalgonda is another district which is part of HMA. This touches southeastern boundary of Hyderabad
- **Mahboob Nagar** - Mahabubnagar district is a district in **Telangana**. Mahabubnagar is the district headquarters which is popularly known as Palamoor. The district shares boundaries 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, Jubilee 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**

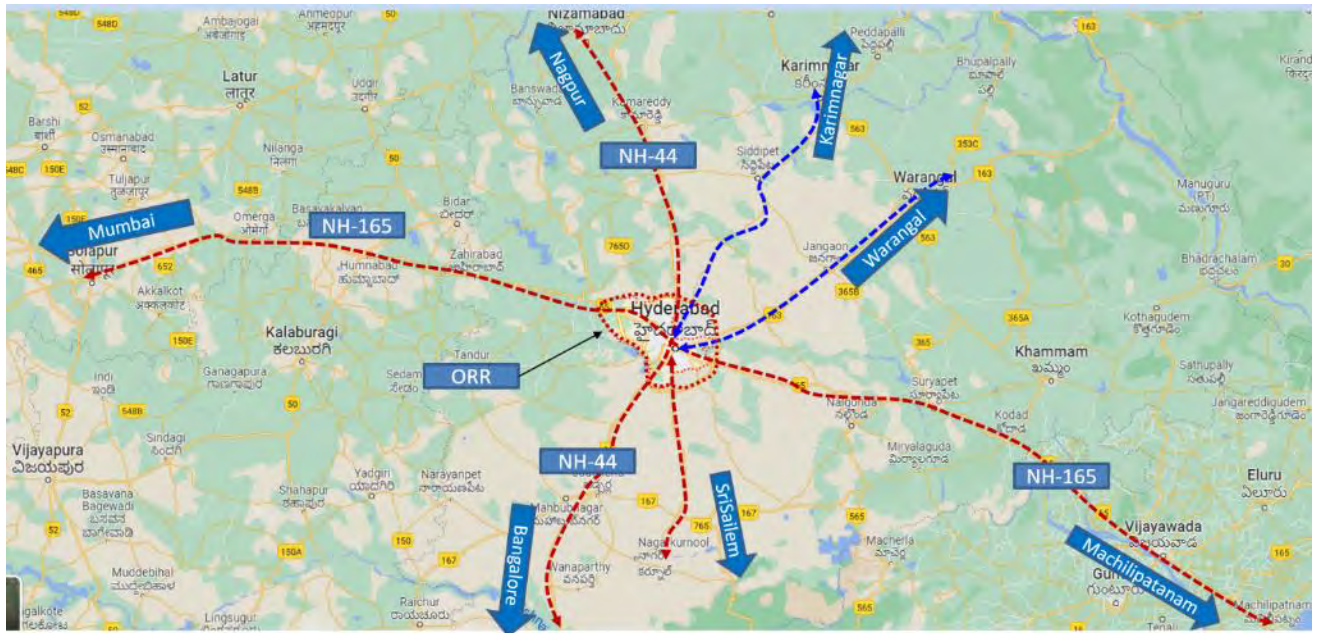
Located approximately 35 kilometres away from Hyderabad city, Mokila’s biggest advantage is its proximity to HiTech City, IT hubs like Kokapet, and prime neighbourhoods like Gachibowli. Well-connected via the Outer Ring Road (ORR), Mokila has witnessed a consistent increase in prices in recent years. 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.



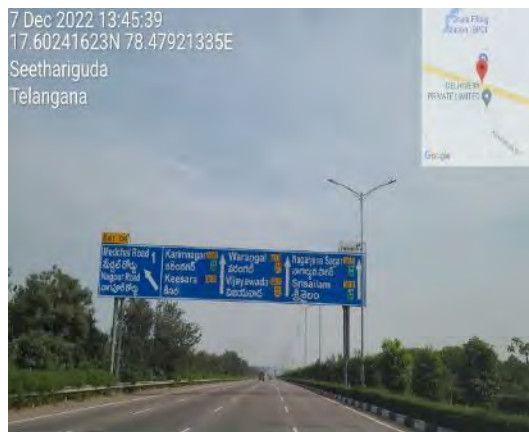
**Figure 2-4: Regional context of ORR.**

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.

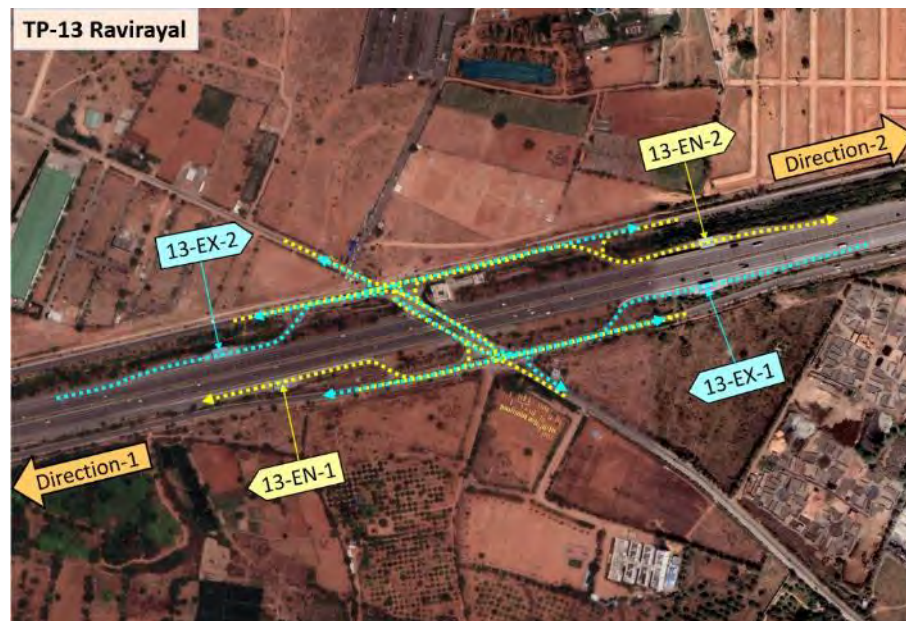


**Figure 2-5 : Rotary Type Interchange with 4 toll booths.**



## 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.



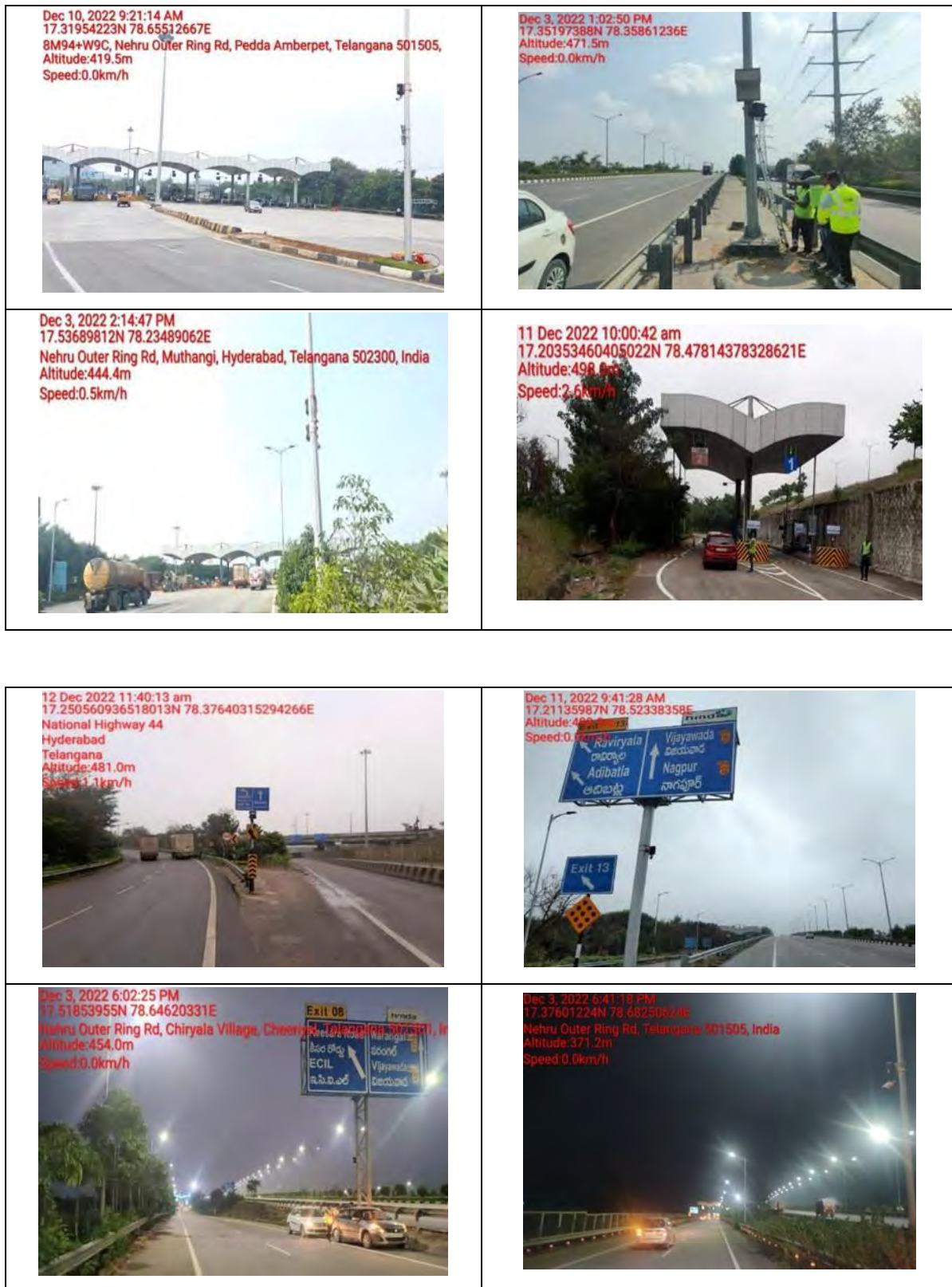
*Figure 2-9 : Toll Plaza Nanakramguda and movements.*

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	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

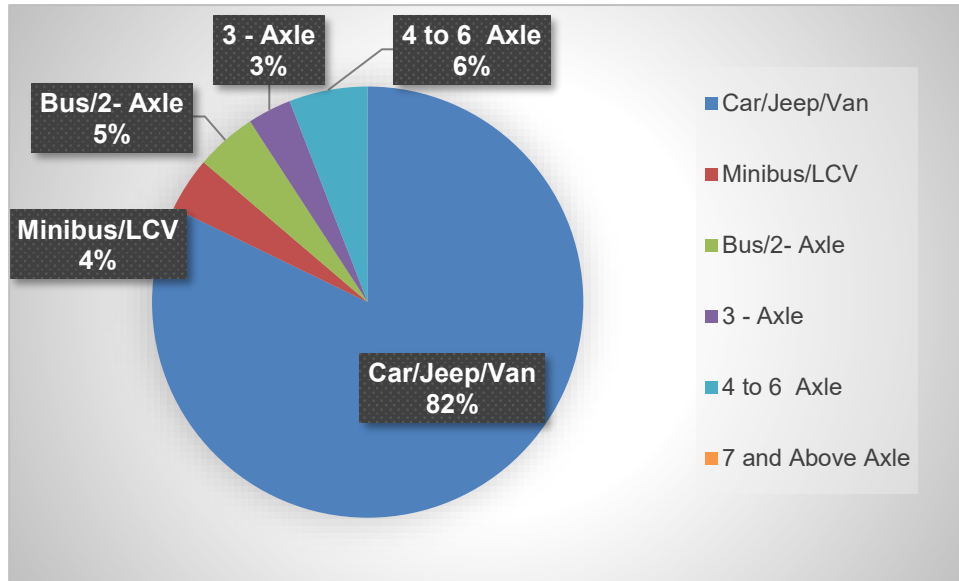
**Table 3-16 : Traffic in PCU at Project Stretch Base Year 2023-24**

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 NORR 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.



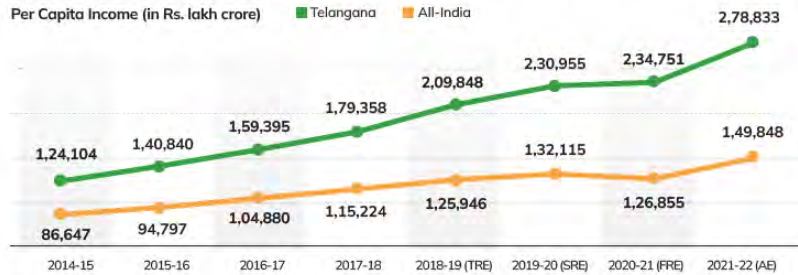
### Growth of IT Sector

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**

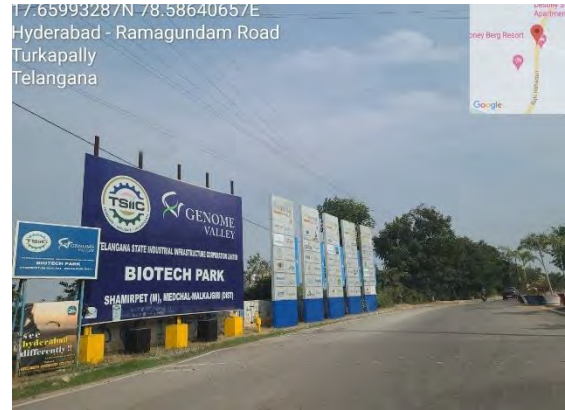
Life Sciences sector continues to continue to consolidate the position of the State as one of the most important life sciences hubs in the world.



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)

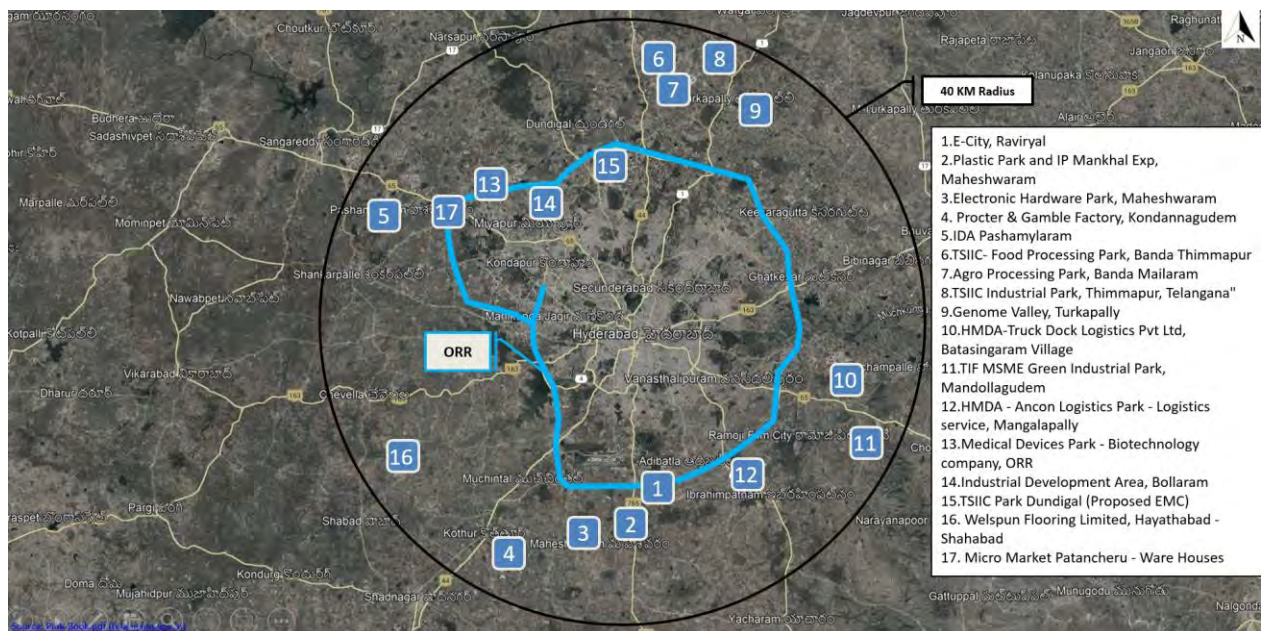
**Hyderabad Pharma City:** world’s largest integrated pharma cluster spread over approx 19,333 acres. The cluster has been recognized as National Investment and Manufacturing Zone (NIMZ) by Government of India, given its national and international importance.



**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

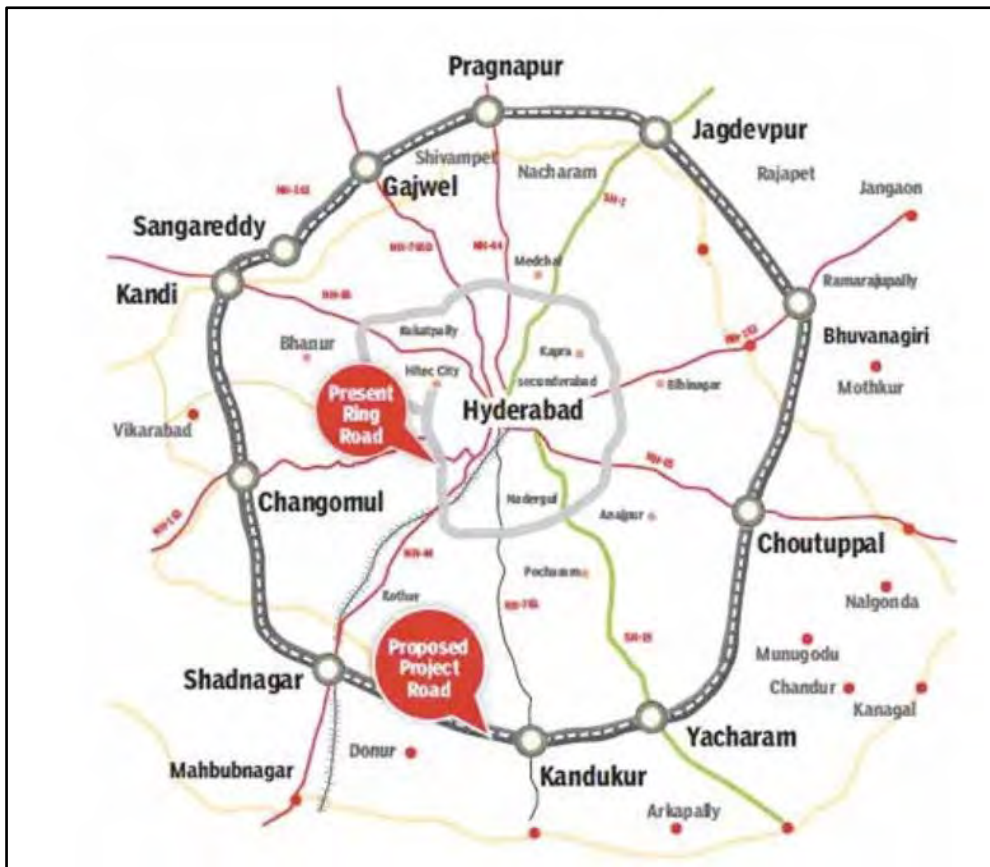
There is considerable industrial development on peripheries of Hyderabad as well. ORR being a fast connectivity has provided boost to such development. Following figure marks such developments on periphery of Hyderabad.



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)- Hyderabad**

- 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 – Per 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)

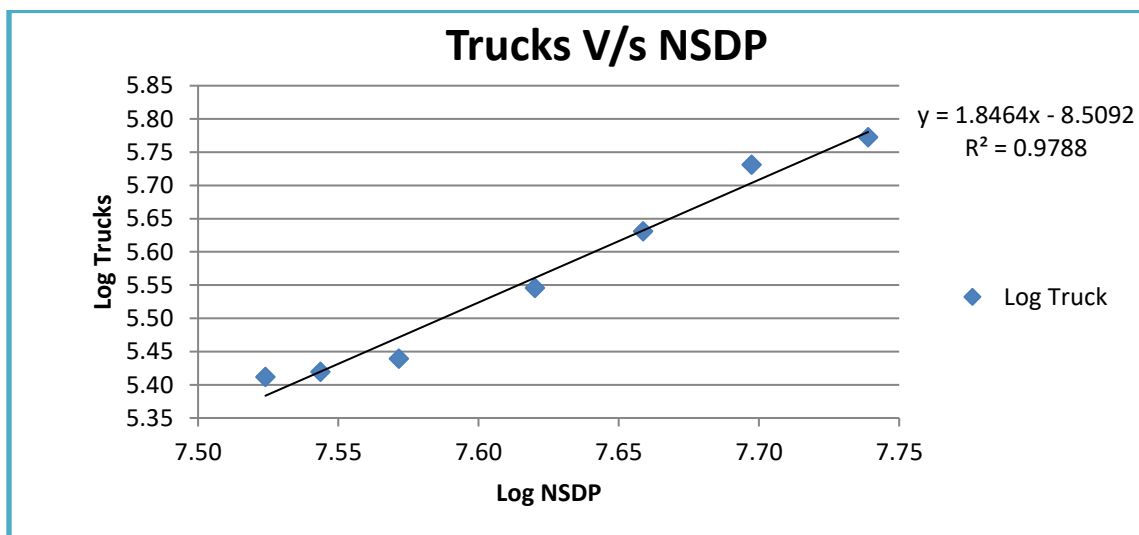
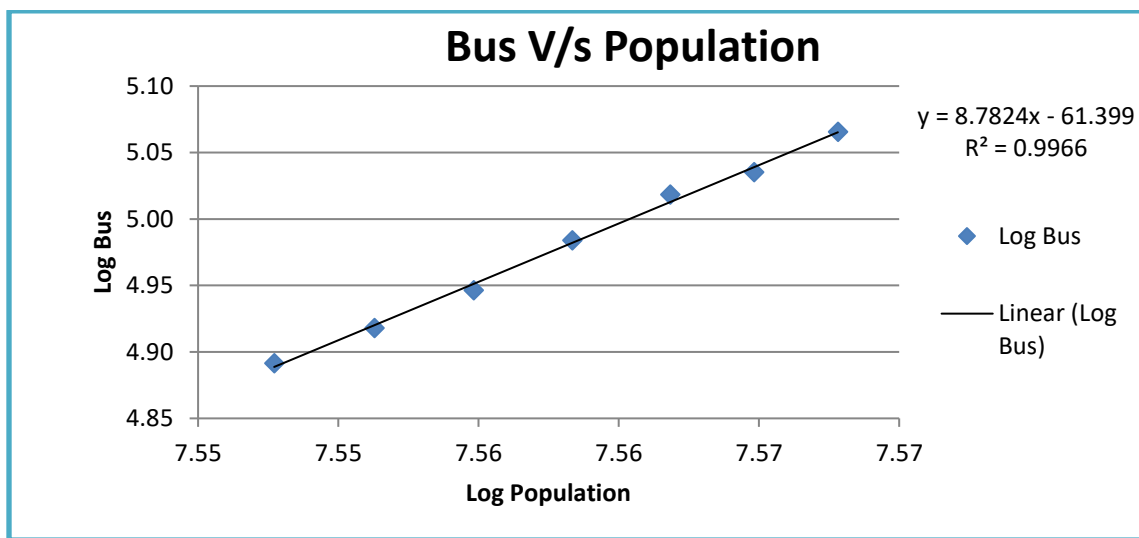
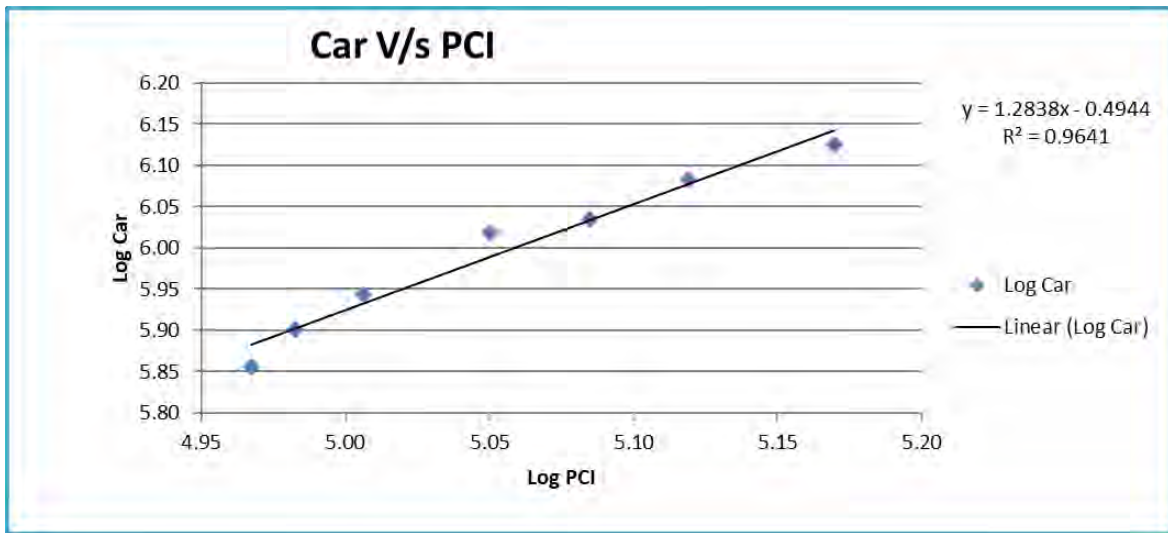
$EI$  = Economic Indicator

$A$  = Regression constant

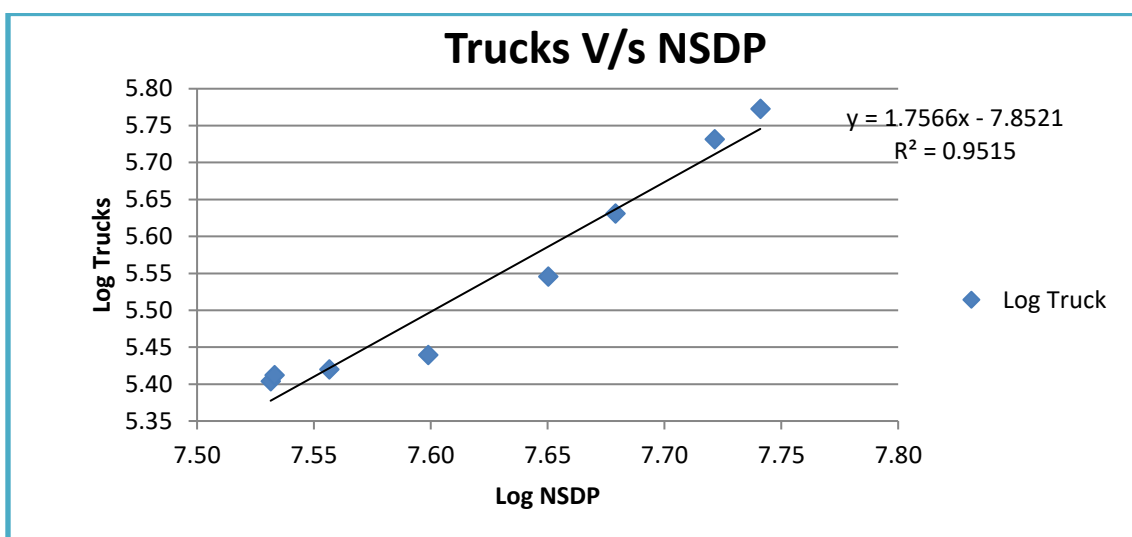
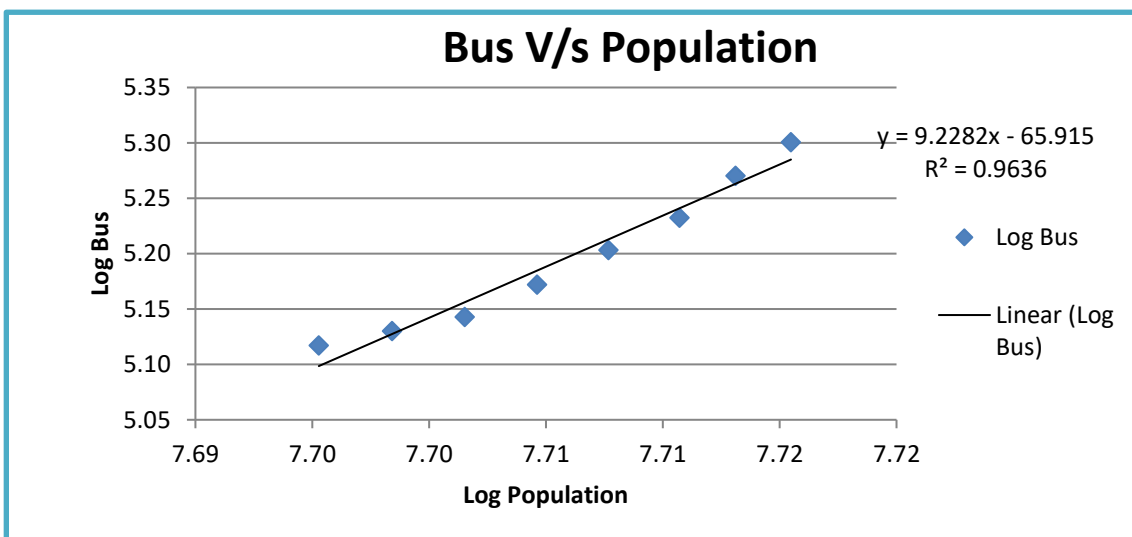
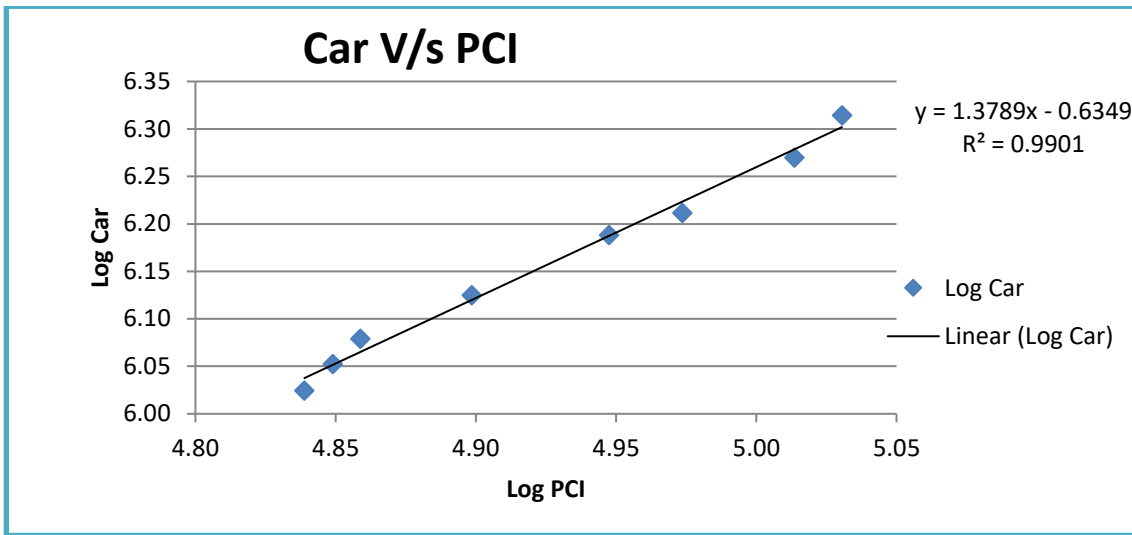
$k$  = Elasticity coefficient (Regression coefficient)

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:

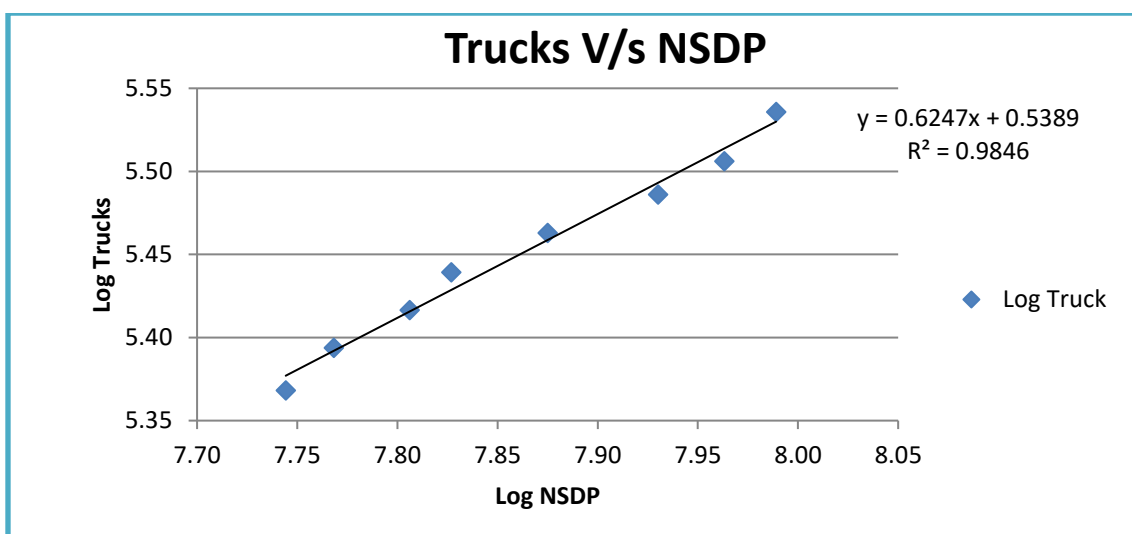
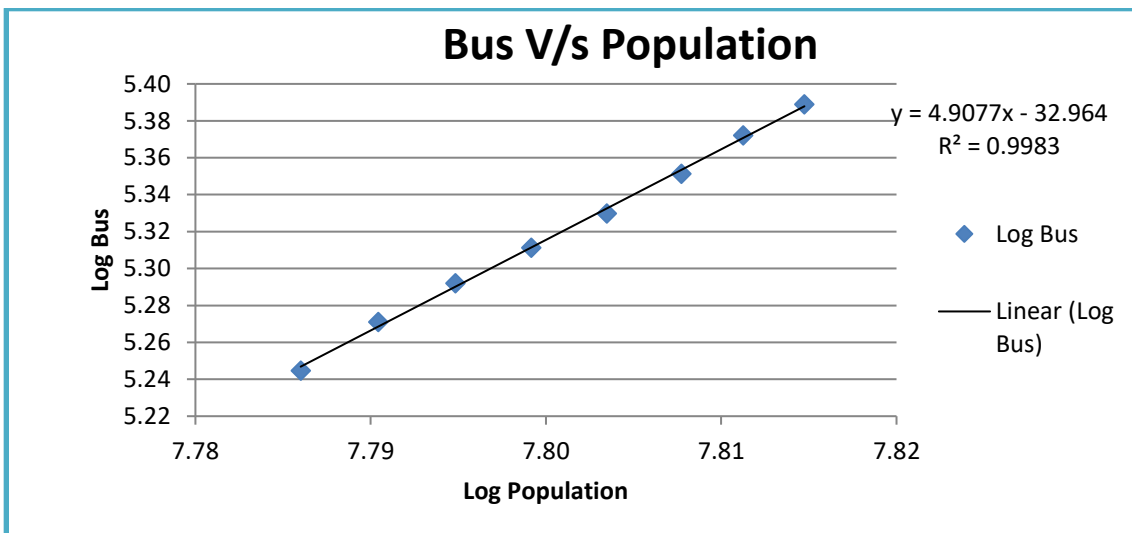
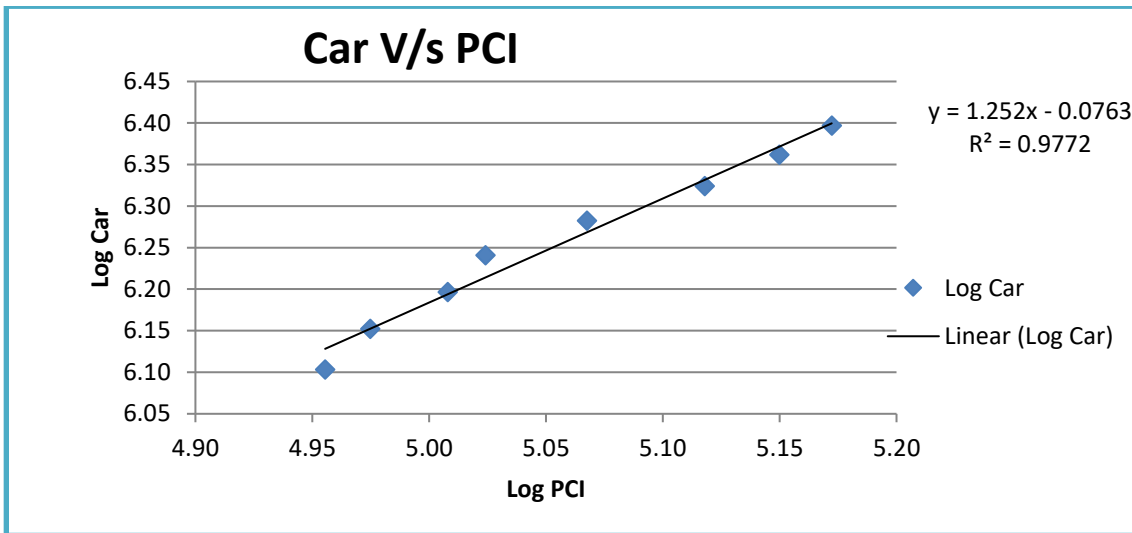




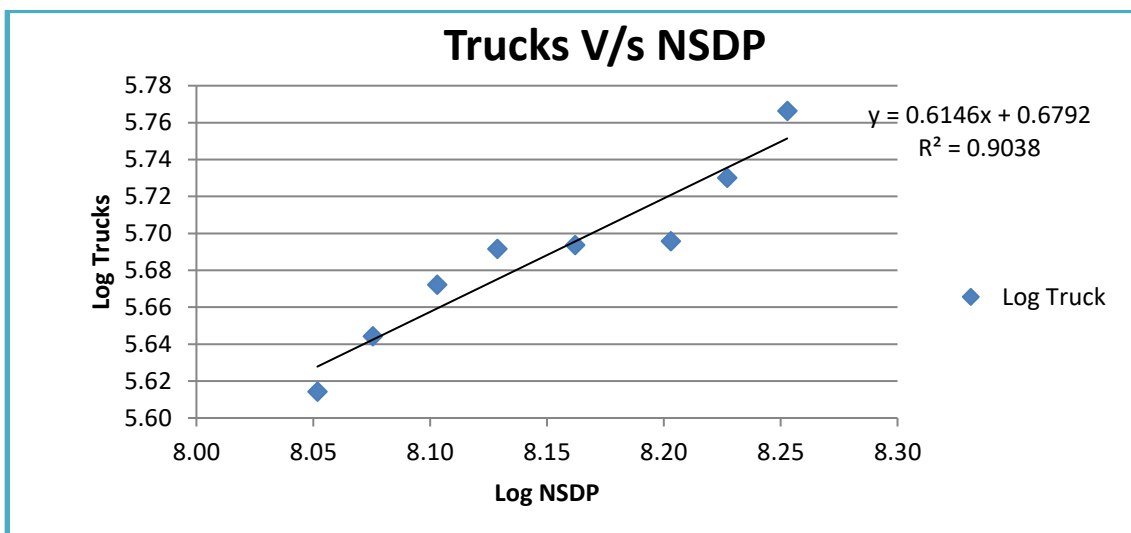
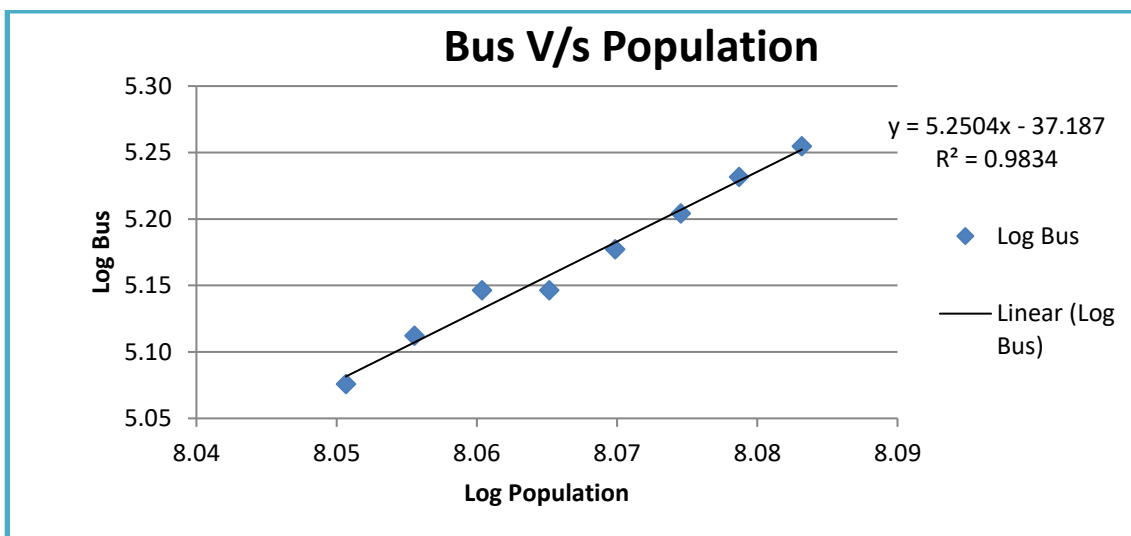
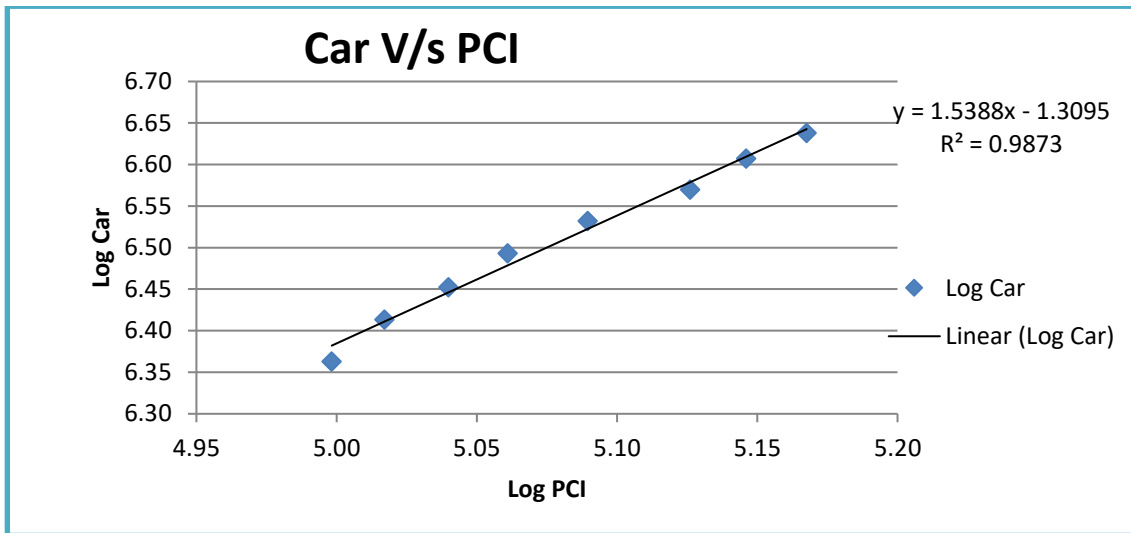
**Figure 4-1: Elasticity by Graphical Extrapolation for Telangana**



**Figure 4-2: Elasticity by Graphical Extrapolation for Andra 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.

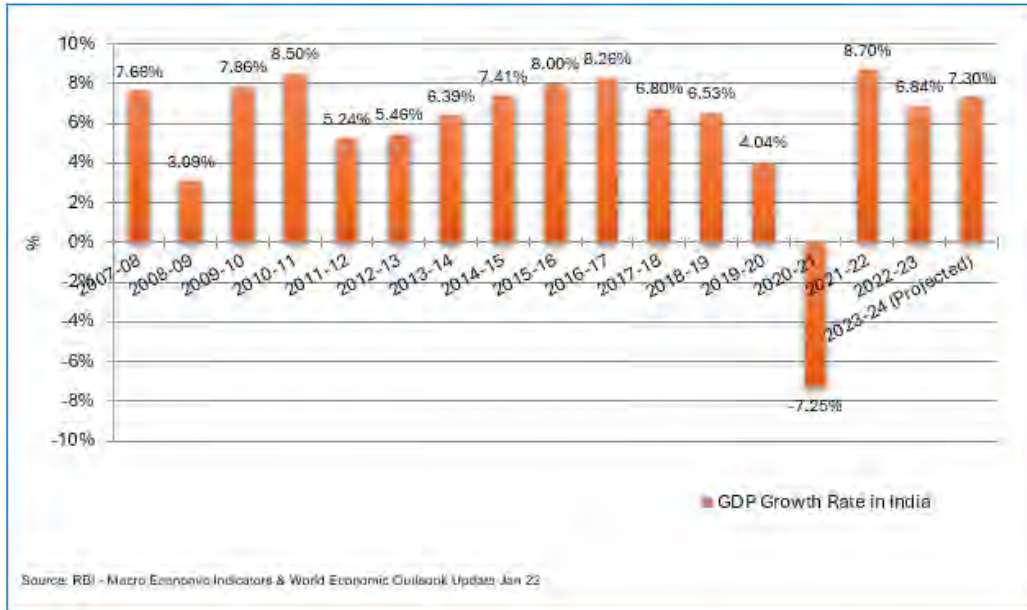


Figure 4-5 : Growth of GDP in India

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 12<sup>th</sup> 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 2/3<sup>rd</sup> 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 12<sup>th</sup> 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	F/T	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
		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
<b>1</b>	0	10	40	80	110	130	150	190	220	270	280	250	220	180	150	130	100	70	40	30	10	30
<b>1A</b>	10	0	40	70	100	130	150	180	220	260	290	260	230	180	160	140	100	80	50	40	20	30
<b>2</b>	40	40	0	30	60	90	110	140	180	220	260	290	270	220	190	170	140	120	90	80	60	70
<b>3</b>	80	70	30	0	30	50	80	110	150	190	220	250	280	250	230	210	180	150	120	110	90	100
<b>4</b>	110	100	60	30	0	20	40	80	110	160	190	220	250	290	260	240	210	180	150	140	120	140
<b>4A</b>	130	130	90	50	20	0	20	60	90	140	170	200	230	270	280	260	230	210	170	160	150	160
<b>5</b>	150	150	110	80	40	20	0	40	70	110	150	180	200	250	280	280	250	230	200	180	170	180
<b>6</b>	190	180	140	110	80	60	40	0	30	80	110	140	170	210	240	260	290	260	230	220	200	220
<b>7</b>	220	220	180	150	110	90	70	30	0	40	80	110	130	180	210	230	260	280	270	250	240	250
<b>8</b>	270	260	220	190	160	140	110	80	40	0	30	60	90	140	160	180	210	240	270	280	280	300
<b>9</b>	280	290	260	220	190	170	150	110	80	30	0	30	60	100	130	150	180	210	240	250	270	290
<b>10</b>	250	260	290	250	220	200	180	140	110	60	30	0	30	70	100	120	150	180	210	220	240	260
<b>11</b>	220	230	270	280	250	230	200	170	130	90	60	30	0	50	70	90	130	150	180	190	210	230
<b>12</b>	180	180	220	250	290	270	250	210	180	140	100	70	50	0	30	50	80	100	130	150	160	190
<b>13</b>	150	160	190	230	260	280	280	240	210	160	130	100	70	30	0	20	50	80	110	120	140	160
<b>14</b>	130	140	170	210	240	260	280	260	230	180	150	120	90	50	20	0	30	60	90	100	120	140
<b>15</b>	100	100	140	180	210	230	250	290	260	210	180	150	130	80	50	30	0	20	60	70	80	110
<b>16</b>	70	80	120	150	180	210	230	260	280	240	210	180	150	100	80	60	20	0	30	40	60	80
<b>17</b>	40	50	90	120	150	170	200	230	270	270	240	210	180	130	110	90	60	30	0	10	30	50
<b>18</b>	30	40	80	110	140	160	180	220	250	280	250	220	190	150	120	100	70	40	10	0	20	40
<b>18A</b>	10	20	60	90	120	150	170	200	240	280	270	240	210	160	140	120	80	60	30	20	0	20
<b>19</b>	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
<b>1</b>	0	10	75	125	180	215	255	310	365	440	460	410	365	290	245	210	160	120	70	50	20	45
<b>1A</b>	10	0	65	115	170	205	240	300	355	430	470	420	375	300	255	220	170	130	80	60	35	55
<b>2</b>	75	65	0	55	105	145	180	240	295	365	420	470	440	365	320	285	235	195	145	125	95	120
<b>3</b>	125	115	55	0	55	90	125	185	240	315	365	415	460	415	375	340	290	250	195	175	150	170
<b>4</b>	180	170	105	55	0	35	75	130	185	260	315	365	405	470	425	390	340	300	250	230	200	225
<b>4A</b>	215	205	145	90	35	0	35	95	150	225	275	325	370	445	465	430	380	340	285	265	240	260
<b>5</b>	255	240	180	125	75	35	0	60	115	190	240	290	335	410	455	465	415	375	325	300	275	300
<b>6</b>	310	300	240	185	130	95	60	0	55	130	180	235	275	350	395	430	470	435	380	360	335	355
<b>7</b>	365	355	295	240	185	150	115	55	0	75	125	180	220	295	340	375	425	465	435	415	390	410
<b>8</b>	440	430	365	315	260	225	190	130	75	0	55	105	145	225	265	300	350	390	445	465	465	485
<b>9</b>	460	470	420	365	315	275	240	180	125	55	0	50	95	170	215	250	300	340	390	410	435	475
<b>10</b>	410	420	470	415	365	325	290	235	180	105	50	0	45	120	165	195	250	290	340	360	385	425
<b>11</b>	365	375	440	460	405	370	335	275	220	145	95	45	0	75	120	155	205	245	295	315	345	380
<b>12</b>	290	300	365	415	470	445	410	350	295	225	170	120	75	0	45	80	130	170	220	240	270	305
<b>13</b>	245	255	320	375	425	465	455	395	340	265	215	165	120	45	0	35	85	125	175	195	225	260
<b>14</b>	210	220	285	340	390	430	465	430	375	300	250	195	155	80	35	0	50	90	140	160	190	230
<b>15</b>	160	170	235	290	340	380	415	470	425	350	300	250	205	130	85	50	0	40	90	110	140	175
<b>16</b>	120	130	195	250	300	340	375	435	465	390	340	290	245	170	125	90	40	0	50	70	100	135
<b>17</b>	70	80	145	195	250	285	325	380	435	445	390	340	295	220	175	140	90	50	0	20	45	85
<b>18</b>	50	60	125	175	230	265	300	360	415	465	410	360	315	240	195	160	110	70	20	0	25	65
<b>18A</b>	20	35	95	150	200	240	275	335	390	465	435	385	345	270	225	190	140	100	45	25	0	40
<b>19</b>	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

<b>Year/ Types of vehicles</b>	<b>Car/Jeep/Van</b>	<b>Minibus /LCV</b>	<b>Bus/ 2- Axle</b>	<b>3 - Axle</b>	<b>4 to 6 Axle</b>	<b>7 and Above Axle</b>	<b>Total Tollable Traffic (No.)</b>	<b>PCU (Including Exempted)</b>
<b>2029-30</b>	246808	11164	11018	8295	15040	5	<b>292330</b>	<b>389196</b>
<b>2030-31</b>	260806	11619	11249	8529	15481	5	<b>307689</b>	<b>407256</b>
<b>2031-32</b>	275601	12097	11481	8772	15932	5	<b>323888</b>	<b>426222</b>
<b>2032-33</b>	291231	12597	11719	9017	16393	5	<b>340962</b>	<b>446126</b>
<b>2033-34</b>	302529	13075	11859	9168	16685	5	<b>353321</b>	<b>460328</b>
<b>2034-35</b>	314282	13571	12004	9319	16979	5	<b>366160</b>	<b>475036</b>
<b>2035-36</b>	326474	14078	12150	9471	17278	5	<b>379456</b>	<b>490228</b>
<b>2036-37</b>	339135	14609	12297	9626	17585	5	<b>393257</b>	<b>505973</b>
<b>2037-38</b>	352296	15166	12445	9786	17896	5	<b>407594</b>	<b>522293</b>
<b>2038-39</b>	362941	15687	12539	9892	18106	5	<b>419170</b>	<b>535264</b>
<b>2039-40</b>	373903	16227	12633	9999	18320	5	<b>431087</b>	<b>548602</b>
<b>2040-41</b>	385192	16787	12728	10106	18536	5	<b>443354</b>	<b>562309</b>
<b>2041-42</b>	396825	17364	12823	10213	18754	5	<b>455984</b>	<b>576395</b>
<b>2042-43</b>	408805	17966	12920	10321	18975	5	<b>468992</b>	<b>590887</b>
<b>2043-44</b>	418069	18534	12974	10385	19102	5	<b>479069</b>	<b>601929</b>
<b>2044-45</b>	427534	19111	13028	10450	19230	5	<b>489358</b>	<b>613192</b>
<b>2045-46</b>	437211	19712	13083	10515	19359	5	<b>499885</b>	<b>624711</b>
<b>2046-47</b>	447122	20326	13138	10580	19488	5	<b>510659</b>	<b>636484</b>
<b>2047-48</b>	457252	20972	13193	10645	19617	5	<b>521684</b>	<b>648523</b>
<b>2048-49</b>	464635	21568	13210	10666	19672	5	<b>529756</b>	<b>657162</b>
<b>2049-50</b>	472136	22175	13227	10687	19727	5	<b>537957</b>	<b>665935</b>
<b>2050-51</b>	479764	22791	13244	10708	19783	5	<b>546295</b>	<b>674853</b>
<b>2051-52</b>	487501	23439	13261	10729	19839	5	<b>554774</b>	<b>683928</b>
<b>2052-53</b>	495370	24099	13278	10750	19895	5	<b>563397</b>	<b>693153</b>
<b>2053-54</b>	502843	24780	13295	10771	19951	5	<b>571645</b>	<b>702013</b>

**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)
<b>2051-52</b>	521584	25305	14235	11574	21294	5	<b>593997</b>	<b>732814</b>
<b>2052-53</b>	531303	26093	14287	11624	21401	5	<b>604713</b>	<b>744503</b>
<b>2053-54</b>	540550	26898	14339	11674	21509	5	<b>614975</b>	<b>755749</b>

## 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
<b>2023-24</b>	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	<b>700.88</b>
<b>2024-25</b>	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	<b>757.19</b>
<b>2025-26</b>	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	<b>842.30</b>
<b>2026-27</b>	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	<b>938.80</b>
<b>2027-28</b>	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	<b>1,047.02</b>
<b>2028-29</b>	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	<b>1,158.91</b>
<b>2029-30</b>	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	<b>1,272.57</b>
<b>2030-31</b>	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	<b>1,407.00</b>
<b>2031-32</b>	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	<b>1,562.37</b>
<b>2032-33</b>	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	<b>1,716.02</b>
<b>2033-34</b>	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	<b>1,882.31</b>
<b>2034-35</b>	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	<b>2,053.99</b>

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
<b>2035-36</b>	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	<b>2,255.94</b>
<b>2036-37</b>	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	<b>2,474.48</b>
<b>2037-38</b>	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	<b>2,690.80</b>
<b>2038-39</b>	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	<b>2,934.54</b>
<b>2039-40</b>	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	<b>3,206.09</b>
<b>2040-41</b>	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	<b>3,490.38</b>
<b>2041-42</b>	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	<b>3,802.19</b>
<b>2042-43</b>	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	<b>4,153.98</b>
<b>2043-44</b>	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	<b>4,516.36</b>
<b>2044-45</b>	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	<b>4,882.84</b>
<b>2045-46</b>	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	<b>5,310.10</b>
<b>2046-47</b>	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	<b>5,765.56</b>
<b>2047-48</b>	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	<b>6,295.60</b>
<b>2048-49</b>	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	<b>6,777.51</b>
<b>2049-50</b>	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	<b>7,347.05</b>
<b>2050-51</b>	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	<b>7,951.89</b>
<b>2051-52</b>	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	<b>8,644.04</b>
<b>2052-53</b>	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	<b>9,332.71</b>
<b>2053-54</b>	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	<b>10103.10</b>

**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
<b>2023-24</b>	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	<b>700.88</b>
<b>2024-25</b>	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	<b>758.82</b>
<b>2025-26</b>	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	<b>846.02</b>
<b>2026-27</b>	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	<b>945.12</b>
<b>2027-28</b>	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	<b>1,056.53</b>
<b>2028-29</b>	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	<b>1,172.15</b>
<b>2029-30</b>	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	<b>1,290.28</b>
<b>2030-31</b>	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	<b>1,429.94</b>

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
<b>2031-32</b>	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	<b>1,591.31</b>
<b>2032-33</b>	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	<b>1,751.96</b>
<b>2033-34</b>	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	<b>1,926.32</b>
<b>2034-35</b>	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	<b>2,107.14</b>
<b>2035-36</b>	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	<b>2,319.96</b>
<b>2036-37</b>	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	<b>2,550.89</b>
<b>2037-38</b>	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	<b>2,780.70</b>
<b>2038-39</b>	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	<b>3,040.07</b>
<b>2039-40</b>	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	<b>3,329.73</b>
<b>2040-41</b>	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	<b>3,633.75</b>
<b>2041-42</b>	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	<b>3,967.86</b>
<b>2042-43</b>	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	<b>4,345.32</b>
<b>2043-44</b>	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	<b>4,734.99</b>
<b>2044-45</b>	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	<b>5,130.70</b>
<b>2045-46</b>	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	<b>5,592.86</b>
<b>2046-47</b>	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	<b>6,086.96</b>
<b>2047-48</b>	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	<b>6,662.27</b>
<b>2048-49</b>	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	<b>7,189.28</b>
<b>2049-50</b>	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	<b>7,812.00</b>
<b>2050-51</b>	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	<b>8,475.11</b>
<b>2051-52</b>	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	<b>9,234.48</b>
<b>2052-53</b>	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	<b>9,993.66</b>
<b>2053-54</b>	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	<b>10844.07</b>

**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
<b>2023-24</b>	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	<b>700.88</b>
<b>2024-25</b>	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	<b>761.01</b>
<b>2025-26</b>	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	<b>851.01</b>
<b>2026-27</b>	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	<b>953.37</b>
<b>2027-28</b>	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	<b>1,068.50</b>
<b>2028-29</b>	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	<b>1,188.07</b>
<b>2029-30</b>	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	<b>1,310.69</b>
<b>2030-31</b>	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	<b>1,455.88</b>
<b>2031-32</b>	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	<b>1,623.97</b>
<b>2032-33</b>	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	<b>1,792.13</b>
<b>2033-34</b>	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	<b>1,975.94</b>
<b>2034-35</b>	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	<b>2,167.32</b>
<b>2035-36</b>	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	<b>2,392.58</b>
<b>2036-37</b>	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	<b>2,637.85</b>
<b>2037-38</b>	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	<b>2,883.16</b>
<b>2038-39</b>	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	<b>3,160.04</b>
<b>2039-40</b>	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	<b>3,469.99</b>
<b>2040-41</b>	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	<b>3,796.65</b>
<b>2041-42</b>	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	<b>4,156.45</b>
<b>2042-43</b>	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	<b>4,563.50</b>
<b>2043-44</b>	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	<b>4,984.99</b>
<b>2044-45</b>	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	<b>5,414.86</b>
<b>2045-46</b>	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	<b>5,916.50</b>
<b>2046-47</b>	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	<b>6,454.54</b>
<b>2047-48</b>	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	<b>7,081.34</b>
<b>2048-49</b>	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	<b>7,659.05</b>
<b>2049-50</b>	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	<b>8,341.50</b>



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
<b>2050-51</b>	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	<b>9,070.83</b>
<b>2051-52</b>	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	<b>9,906.51</b>
<b>2052-53</b>	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	<b>10,746.23</b>
<b>2053-54</b>	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	<b>11687.77</b>

#### 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

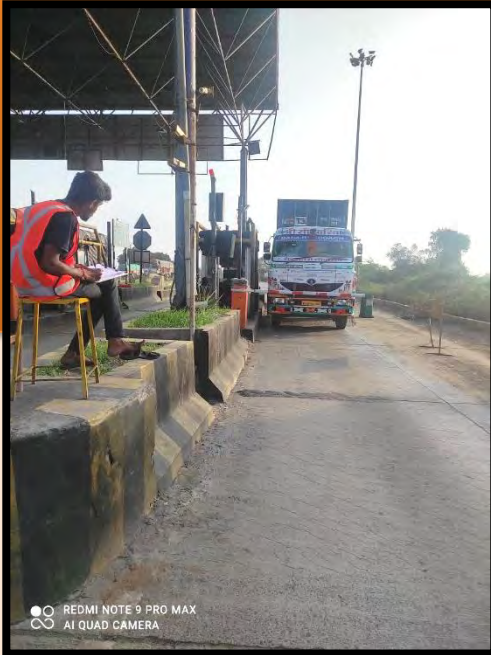
Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



# Six Laning of Santalpur – Samakhiyali Section of NH-27 from Km 339.700 to km 430.100 in State of Gujarat



**MARCH 2024**

## TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)



### **GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614. Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**Six Laning of Santalpur – Samakhiyali Section of NH-27  
from Km 339.700 to km 430.100 in  
State of Gujarat**

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

**MARCH 2024**





# CONTENTS

<b>Contents</b> .....	<b>i</b>
<b>Chapter 1</b> .....	<b>5</b>
INTRODUCTION .....	5
1.1 General .....	5
1.2 Project Scope.....	6
1.3 Brief Description of the Project Influence Area (PIA) .....	6
1.4 Project Appreciation .....	7
1.5 Organization of Report .....	10
<b>Chapter 2</b> .....	<b>11</b>
TRAFFIC SURVEYS AND ANALYSIS .....	11
2.1 Traffic Surveys .....	11
2.2 Classified Traffic Volume Count.....	15
2.3 Origin Destination Survey .....	16
2.3.1 Sample Size .....	16
2.4 Data Analysis .....	16
2.4.1 Analysis of Traffic Volume Count .....	16
2.4.2 Average Daily Traffic (ADT) .....	17
2.4.3 Classified Average Daily Traffic (ADT).....	19
2.4.4 Seasonal Correction Factor .....	19
2.4.5 Annual Average Daily Traffic (AADT).....	21
2.4.6 Origin - Destination Survey .....	21
2.4.7 Data Validation .....	22
2.4.8 Zoning System .....	22
2.4.9 State Dominance.....	27
2.4.10 Major OD Pairs .....	30
2.4.11 Trip Segmentation Impact.....	34
2.4.12 Additional OD Survey at Mehsana .....	35
<b>Chapter 3</b> .....	<b>38</b>
TRAFFIC FORCAST .....	38
3.1 Introduction .....	38
3.2 Secondary Data Collection.....	38
3.3 Development in the Project Influence Area .....	39
3.4 Trend Analysis .....	48
3.5 Estimation of Traffic Demand Elasticity .....	48
3.6 Basis for arriving at growth rates. ....	55
3.7 Growth of Economy and Projection of GDP in India and states.....	55
3.7.1 Recommended Growth Rates of Traffic .....	55
3.8 Traffic Forecast .....	56
3.8.1 AADT .....	56
<b>Chapter 4</b> .....	<b>59</b>

---

<b>FORECAST OF TOLL REVENUE .....</b>	<b>59</b>
<b>4.1 General .....</b>	<b>59</b>
<b>4.2 Toll Rate Guidelines .....</b>	<b>59</b>
<b>4.2.1 Discounts.....</b>	<b>59</b>
<b>4.2.2 Travel Passes .....</b>	<b>59</b>
<b>4.3 Estimation of Toll Rates.....</b>	<b>60</b>
<b>4.3.1 Revenue Forecast .....</b>	<b>62</b>
<b>4.3.2 Analysis of actual toll collection on the Project stretch .....</b>	<b>64</b>
<b>4.3.3 Modifications in concession period.....</b>	<b>65</b>
<b>Chapter 5.....</b>	<b>67</b>
<b>STRENGTH WEAKNESS OPPORTUNITY &amp; THREAT (SWOT) .....</b>	<b>67</b>
<b>5.1 Introduction .....</b>	<b>67</b>
<b>5.2 SWOT Analysis.....</b>	<b>67</b>

## LIST OF TABLES

<i>Table 2-1 : Vehicle Classification System .....</i>	<i>15</i>
<i>Table 2-2 : Sample size for O-D Surveys at the Toll Plaza Location .....</i>	<i>16</i>
<i>Table 2-3 : PCU Factors Adopted for Study .....</i>	<i>17</i>
<i>Table 2-4: ADT (14 Days) at Makhel Toll.....</i>	<i>18</i>
<i>Table 2-5: Classified ADT (14 Days) at Makhel Toll.....</i>	<i>19</i>
<i>Table 2-6: Fuel sale Seasonal correction factor .....</i>	<i>20</i>
<i>Table 2-7: Fast Tag ETC collection Seasonal correction factor.....</i>	<i>20</i>
<i>Table 2-8: AADT (14 Days) at Makhel Toll .....</i>	<i>21</i>
<i>Table 2-9: Zoning System considered for the study (Project Stretch) .....</i>	<i>23</i>
<i>Table 2-10 : Zoning System considered for the study (State Codes) .....</i>	<i>25</i>
<i>Table 2-11 : State wise distribution of vehicles at Survey locations for passenger vehicles. 28</i>	
<i>Table 2-12: State wise distribution of vehicles at Survey locations for commercial vehicles 29</i>	
<i>Table 2-13: Major OD Pairs .....</i>	<i>30</i>
<i>Table 2-14: Commodity share .....</i>	<i>31</i>
<i>Table 2-15: Traffic Distribution- Commercial Vehicles.....</i>	<i>32</i>
<i>Table 2-16 : Port Traffic Distribution (OD Sample) .....</i>	<i>33</i>
<i>Table 2-17 : DPMP Factors for four months .....</i>	<i>34</i>
<i>Table 2-18 : DP/MP Factor.....</i>	<i>34</i>
<i>Table 3-1 : Results of Regression Analysis.....</i>	<i>54</i>
<i>Table 3-2 : Recommended Growth Rates Optimistic Scenario.....</i>	<i>55</i>
<i>Table 3-3 : Recommended Growth Rates Pessimistic Scenario .....</i>	<i>56</i>
<i>Table 3-4 : Recommended Growth Rates Most Likely Scenario .....</i>	<i>56</i>
<i>Table 3-5 : Traffic Forecast at Makhel Toll Plaza (Optimistic).....</i>	<i>57</i>
<i>Table 3-6 : Traffic Forecast at Makhel Toll Plaza (Pessimistic) .....</i>	<i>57</i>
<i>Table 3-7 : Traffic Forecast at Makhel Toll Plaza (Most Likely).....</i>	<i>58</i>
<i>Table 4-1 : Base Toll Rates 2007 - 08 .....</i>	<i>61</i>
<i>Table 4-2 : Toll Rates for Base Year 2022-23 (Rs. Rupees).....</i>	<i>62</i>
<i>Table 4-3 : Toll Rates for Forecasting Year (Rs. Rupees).....</i>	<i>62</i>
<i>Table 4-4 : Total Toll Revenue – Base Case Rs. Cr (Optimistic).....</i>	<i>63</i>
<i>Table 4-5 : Total Toll Revenue – Base Case Rs. Cr (Pessimistic).....</i>	<i>64</i>
<i>Table 4-6 : Total Toll Revenue – Base Case Rs. Cr (Most Likely).....</i>	<i>64</i>

## LIST OF FIGURES

<i>Figure 1-1: Project Location</i> .....	5
<i>Figure 1-2 : Project Road in regional context</i> .....	7
<i>Figure 1-3 : Worn out wearing course of project road.</i> .....	8
<i>Figure 1-4 : Heavy Commercial Traffic on Project Stretch</i> .....	8
<i>Figure 1-5 : Railway Line Palanpur- Kandla along Project Stretch</i> .....	9
<i>Figure 1-6 : Interchange at connection of Amritsar – Jamnagar Expressway near Santalpur</i> 9	
<i>Figure 1-7 : Toll Plaza at Makhel</i> .....	10
<i>Figure 2-1 : Traffic Survey Locations</i> .....	12
<i>Figure 2-2 : Classified Traffic Survey with Videography</i> .....	13
<i>Figure 2-3: Origin Destination Survey in Progress</i> .....	13
<i>Figure 2-4: NPR Survey in Progress</i> .....	14
<i>Figure 2-5: TMC Survey@ Sidhada junction in Progress</i> .....	14
<i>Figure 2-6: OD Coding Local Map</i> .....	26
<i>Figure 2-7: OD Coding Country Level</i> .....	27
<i>Figure 2-8: Distribution of project traffic.</i> .....	33
<i>Figure 3-1: Elasticity Regression for Rajasthan</i> .....	50
<i>Figure 3-2: Elasticity Regression for Uttar Pradesh</i> .....	51
<i>Figure 3-3: Elasticity Regression for Haryana</i> .....	52
<i>Figure 3-4: Elasticity Regression for Gujarat</i> .....	53

## CHAPTER 1

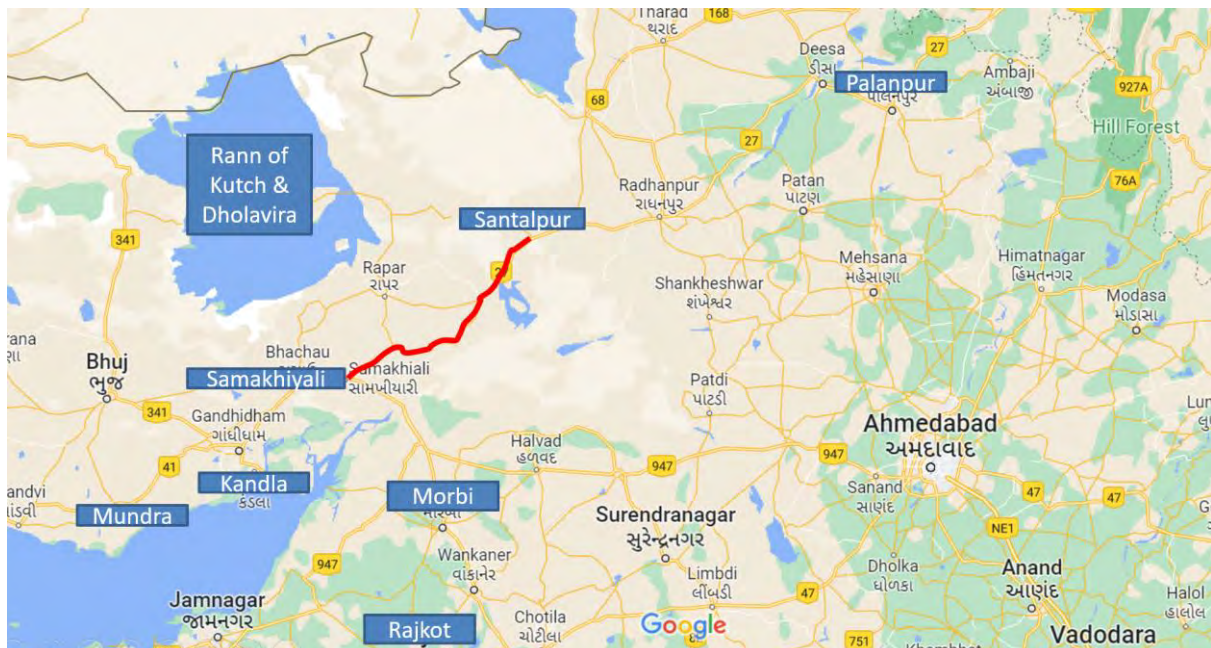
### INTRODUCTION

#### 1.1 General

Project stretch from Santalpur to Samakhiali (Km 339.700 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 339.700 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

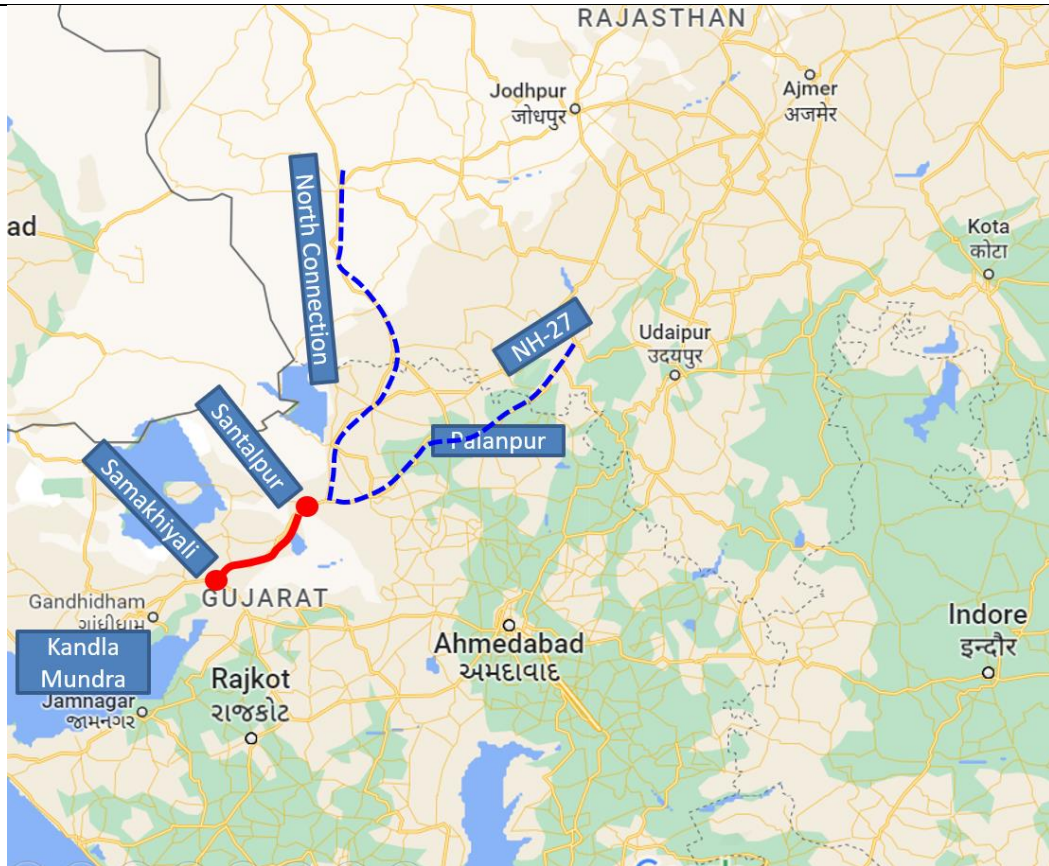
Following may be referred to as broad scope of Traffic Study of Six laning of Santalpur - Samakhiyali section of NH-27

- 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.

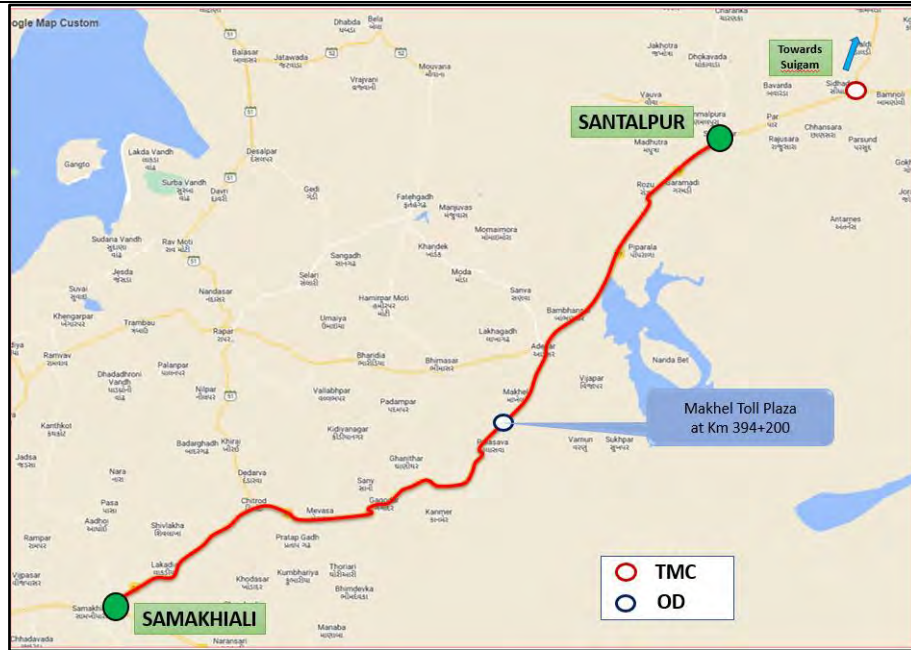
Traffic data forecast is one of the important inputs required for a TOT/BOT/DBFO highway/roadway project. In order to arrive at a fair estimate of traffic forecast it is necessary to collect data, analyse, model, validate and then forecast. The Consultants have carried out a reconnaissance survey of 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

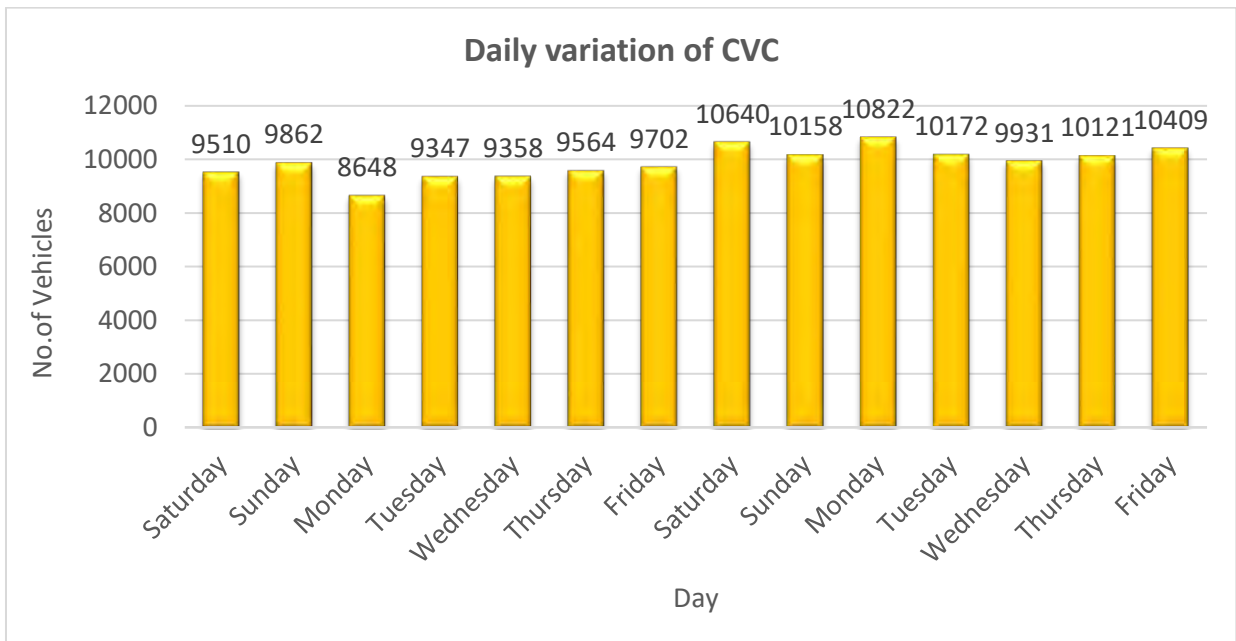
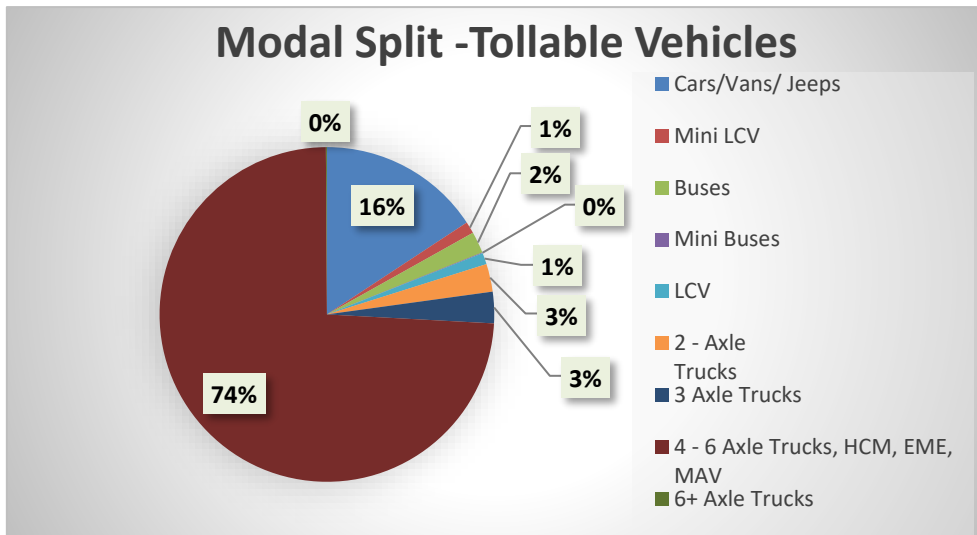
Source: IRC: 64-1990

#### 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	
	<b>ADT</b>	<b>1554</b>	<b>112</b>	<b>205</b>	<b>7</b>	<b>109</b>	<b>265</b>	<b>300</b>	<b>7309</b>	<b>10</b>	<b>4</b>	<b>9875</b>	



### 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
<b>Passenger Vehicles</b>	Cars/Vans/Jeeps	0.96	1123	1079
	Mini LCV	0.96	96	93
	Buses	0.96	205	197
	Minibuses	0.96	6	6
<b>Goods Vehicles</b>	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)**

<b>Below Makhel TP (21-99)</b>	<b>Codes</b>
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

<b>Below Makhel TP (21-99)</b>	<b>Codes</b>
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
Hajjpir	71
Dhordo	72
Khavda	73
Dhrobana	74
Navsari	75

<b>Above Makhe TP (100-200)</b>	<b>Codes</b>
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

<b>Above Makhel TP (100-200)</b>	<b>Codes</b>
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)**

<b>State in India above Gujrat (1-10)</b>	<b>Codes</b>
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

<b>State in India below Gujrat (11-20)</b>	<b>Codes</b>
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 Samkhayali -sanatlpur alignment for better understanding.

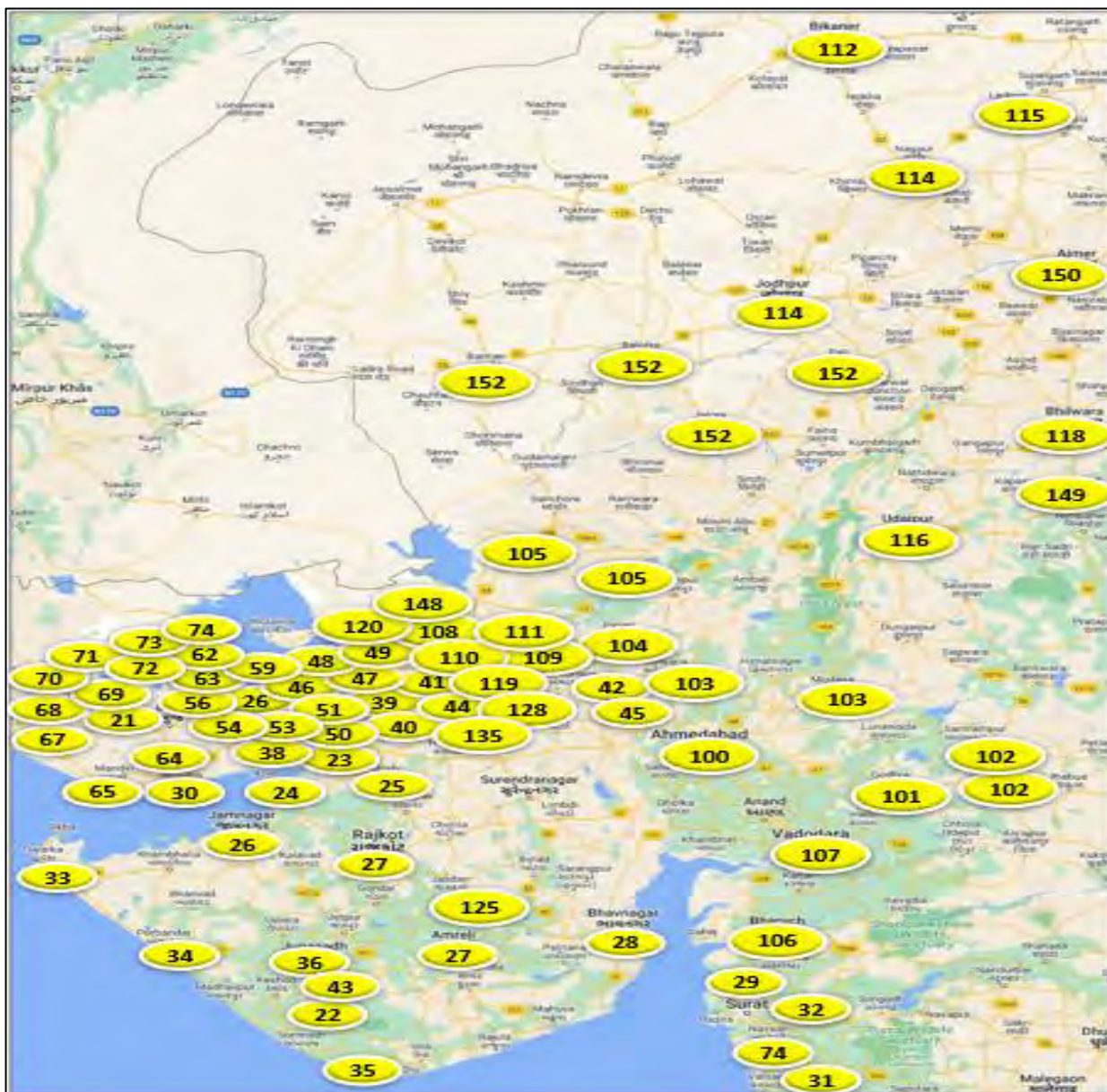
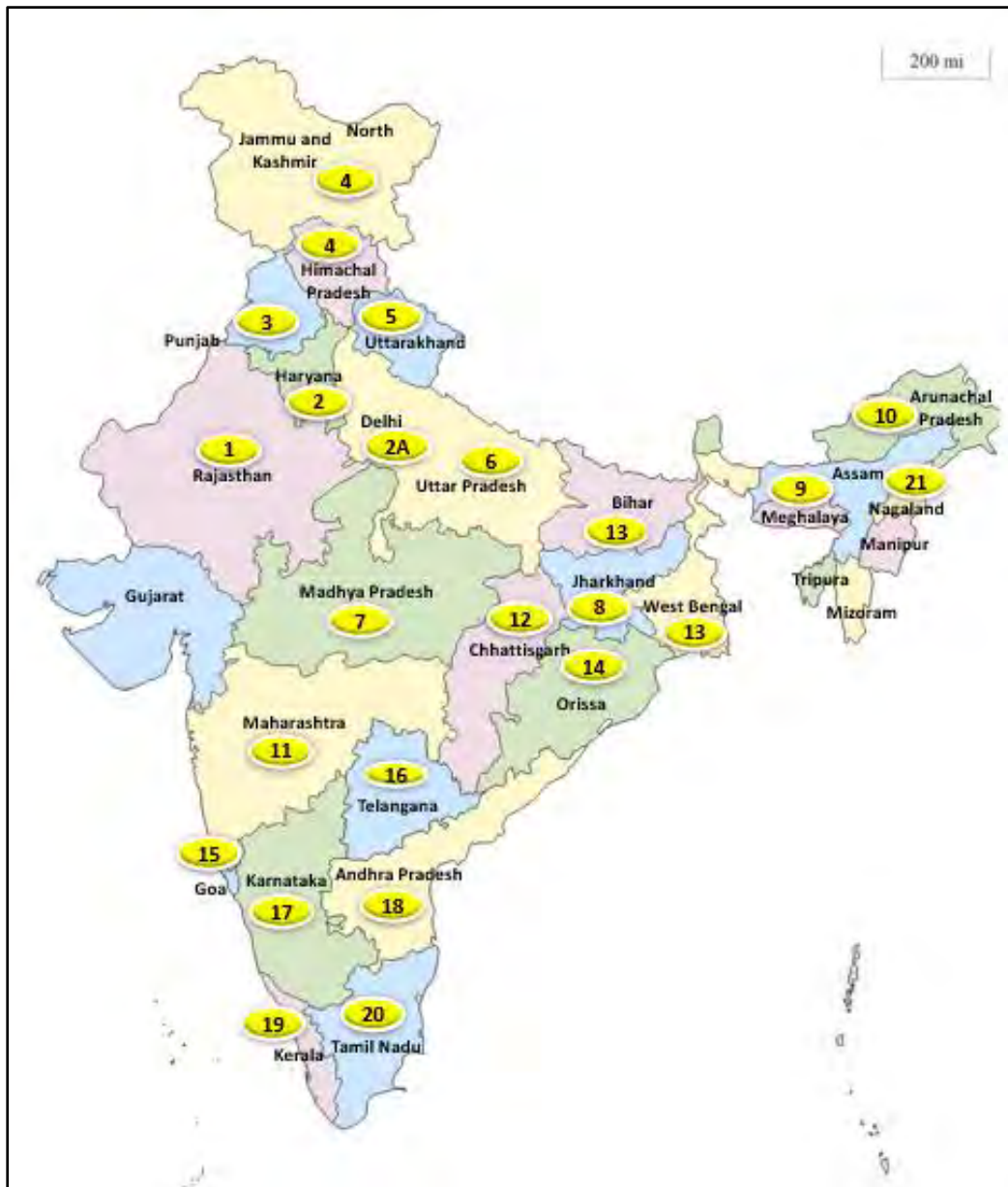


Figure 2-6: OD Coding Local Map

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%
<b>Grand Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

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%
<b>Grand Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

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	<b>17.92%</b>
Petrol/ Diesel/Gas/LPG/Sulphur	<b>13.91%</b>
Chemicals & Fertilisers	<b>13.49%</b>
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%
<b>Grand Total</b>	<b>100.00%</b>

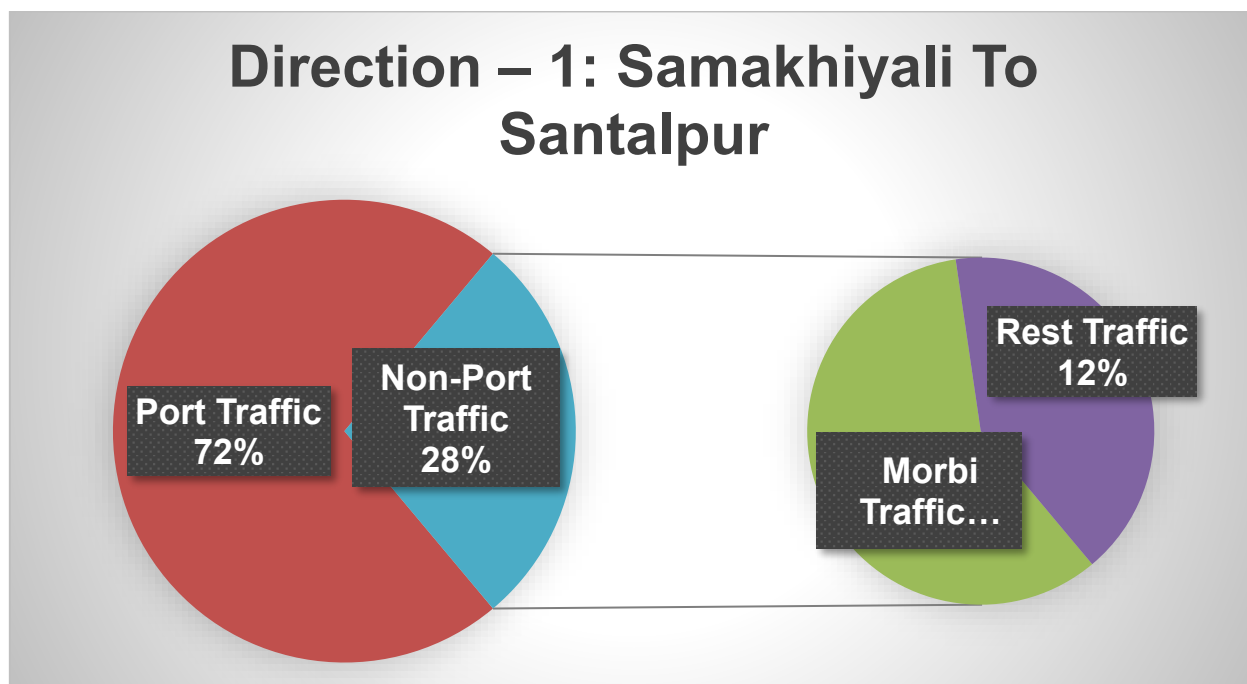
Following tables and graphs provide directional distribution of traffic on project highway in both directions respectively.

**Table 2-15: Traffic Distribution- Commercial Vehicles**

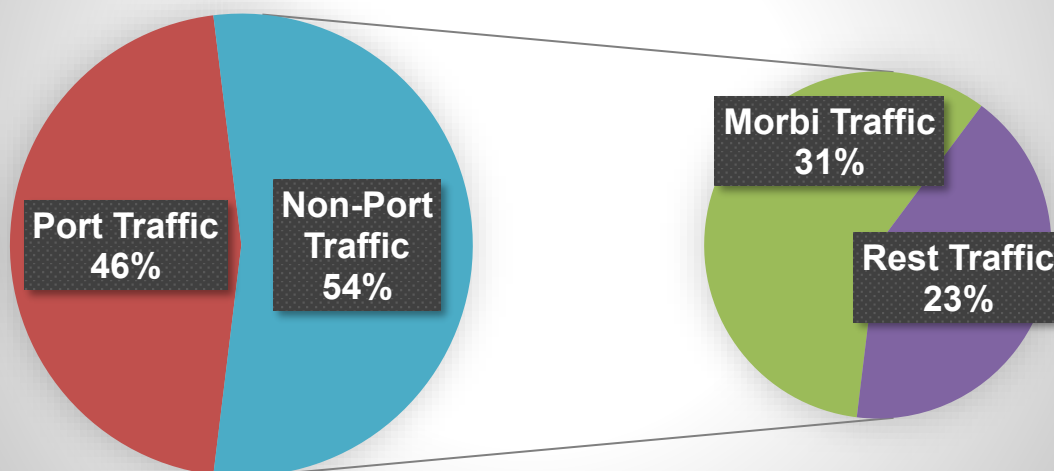
Traffic in %		Port Traffic	Non-Port Traffic	
			Morbi	Other
<b>Direction - 1</b>	Samakhiyali to Santalpur	72.20%	16.34%	11.46%
<b>Direction - 2</b>	Santalpur to Samakhiyali	46.14%	31.38%	22.48%
<b>Average for both direction</b>		<b>59.17%</b>	<b>23.86%</b>	<b>16.97%</b>

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%
<b>Total Traffic Nos.</b>	<b>1197</b>	

D-2 (Santalpur to Samakhiyali) Port Traffic (Destination)		
North Zone	616	71.63%
Local	231	26.86%
East zone	13	1.51%
<b>Total Traffic Nos.</b>	<b>860</b>	

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
<b>Goods</b>	Ex. Route	4 Lane / 4 lane NH	1238.00	<b>57201.82</b>	<b>19418.87</b>	9866.86	<b>86487.55</b>	0.73	99.52
	Comp Route	6 Lane / 6 lane Expressway	1180.00	<b>37448.85</b>	<b>13881.82</b>	11484.77	<b>62815.44</b>		

**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
<b>Goods</b>	Ex. Route	4 Lane / 4 lane NH	1141.00	<b>52719.93</b>	<b>17897.36</b>	9093.77	79711.06	0.76	93.25
	Comp Route	6 Lane / 6 lane Expressway	1139.00	<b>36147.66</b>	<b>13399.49</b>	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
<b>Goods</b>	Ex. Route	4 Lane / 4 lane NH	618.00	<b>28554.70</b>	<b>9693.75</b>	4925.46	43173.91	0.74	99.51
	Comp Route	6 Lane / 6 lane Expressway	599.00	<b>19010.05</b>	<b>7046.79</b>	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
<b>Goods</b>	Ex. Route	4 Lane / 4 lane Expressway	586.00	<b>27076.14</b>	<b>9191.81</b>	4670.42	40938.37	0.83	79.99
	Comp Route	6 Lane / 6 lane Expressway	640.00	<b>20311.24</b>	<b>7529.13</b>	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	<b>33082.80</b>	<b>11230.95</b>	5706.52	50020.26	0.88	72.04
	Comp Route	6 Lane / 6 lane Expressway	830.00	<b>26341.14</b>	<b>9764.33</b>	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
<b>Potential Traffic for diversion</b>			<b>60</b>	<b>67</b>	<b>195</b>
<b>Total Potential Traffic for diversion</b>			<b>322</b>		
<b>Diversion % (weighted avg.)</b>			<b>93%</b>		
<b>Total diverging Traffic</b>			<b>299</b>		

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

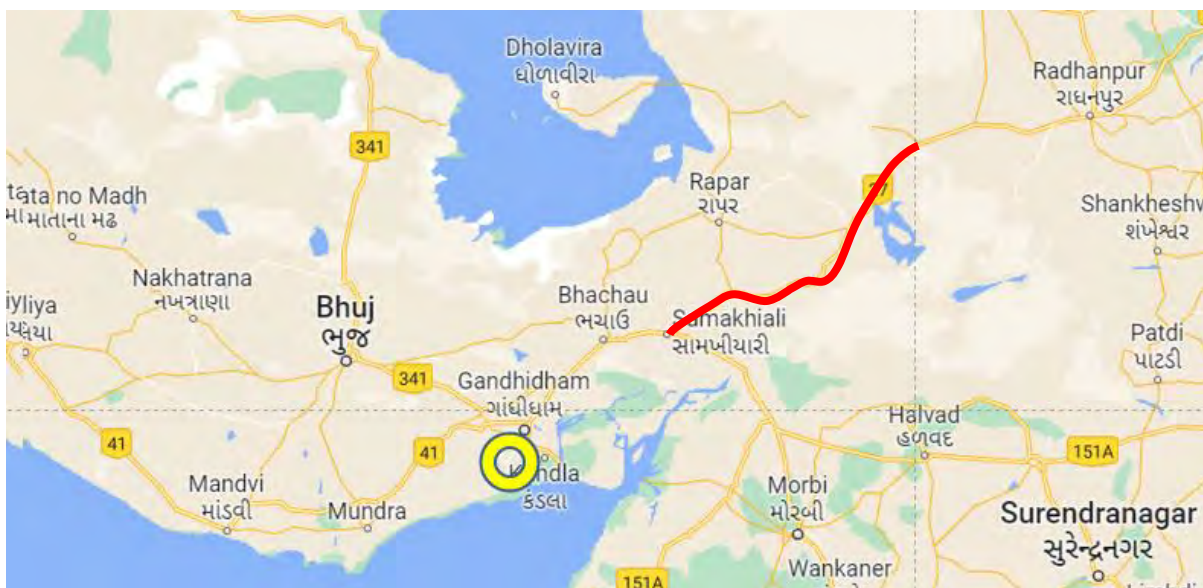
In addition to the above-mentioned traffic surveys, secondary data was also collected from the sources wherever the data available. This data is effectively used to determine and estimate past trends of growth and future pattern. Following secondary data was collected for study:

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.



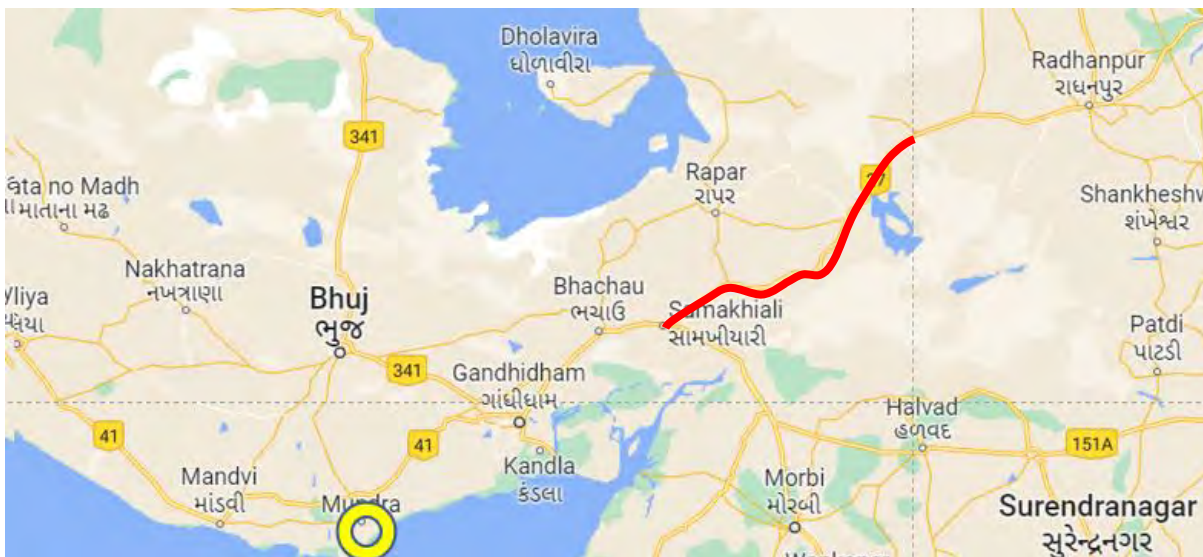


- The Government of India has recently approved the development of two new mega container terminals at Tuna-Tekra in Kandla Port at an estimated cost of ~ Rs 6,000 crores. This would result in increase in capacity of dry cargo from 60MMTA to about 79 MMTA and increase in container cargo capacity from 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.



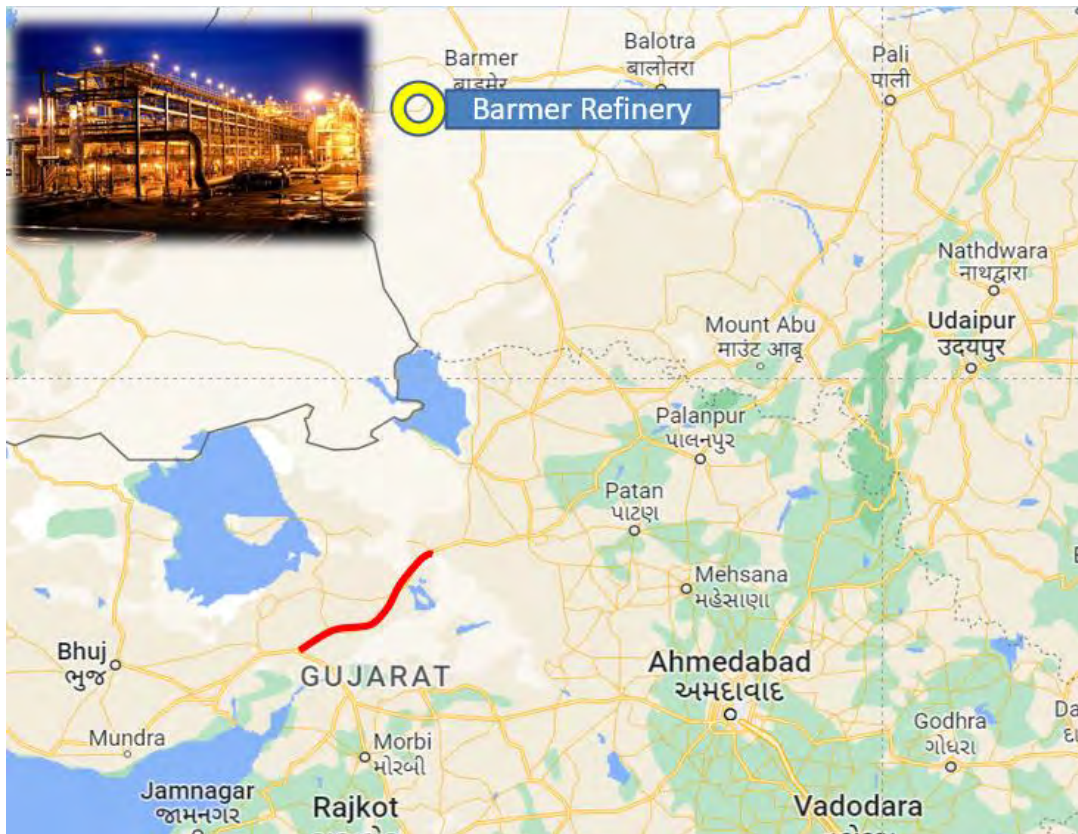
- Mundra port is coming up with expansion of Container Terminal of 1.2 MTEU at estimated expense of R. 1239 Cr. The expansion work of Container Terminal is under progress and is expected to be operational by FY24.
- Other growth drivers in long term at ports of Kandla and Mundra Ports will be increasingly 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.



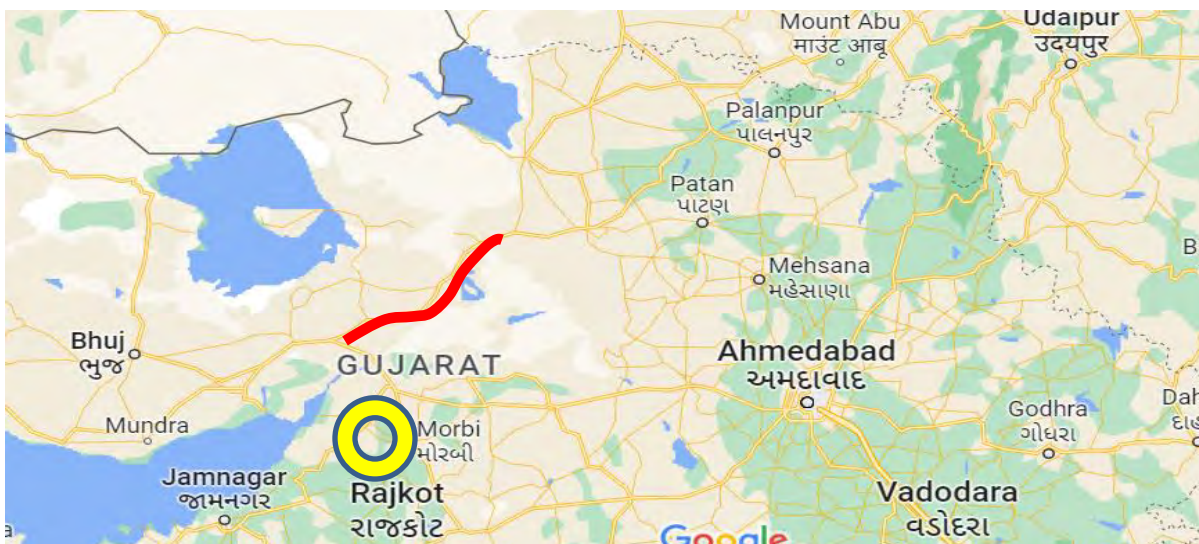
- This refinery will be connected with Jamnagar Refinery and Bathinda Refinery through Amritsar Jamnagar Expressway
- The refinery is likely to be commissioned by FY25.
- About 6.5 MTA crude will be transported from Gujarat for processing



- 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.

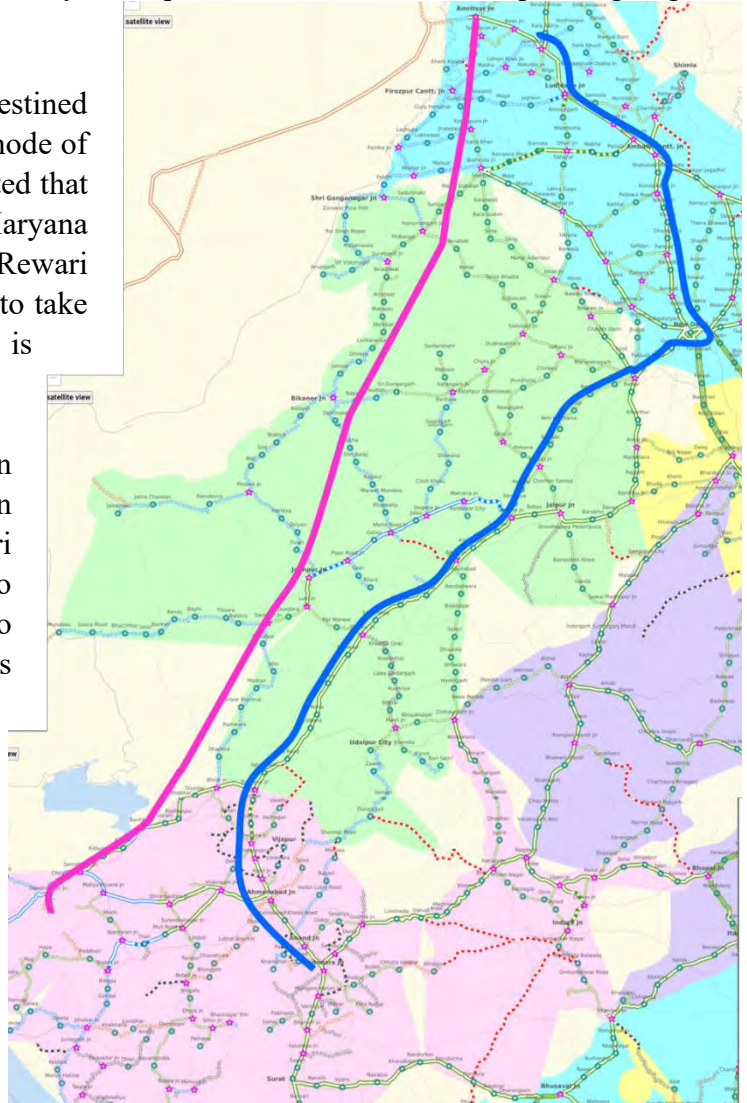


The Kandla and Mundra ports are connected to Palanpur by an operational western railway line. Since rail movement from Rewari to Palanpur and Palanpur to Kandla / Mundra are operational since long, the modal shift of traffic from road to rail has already taken place and no diversion is expected going 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.

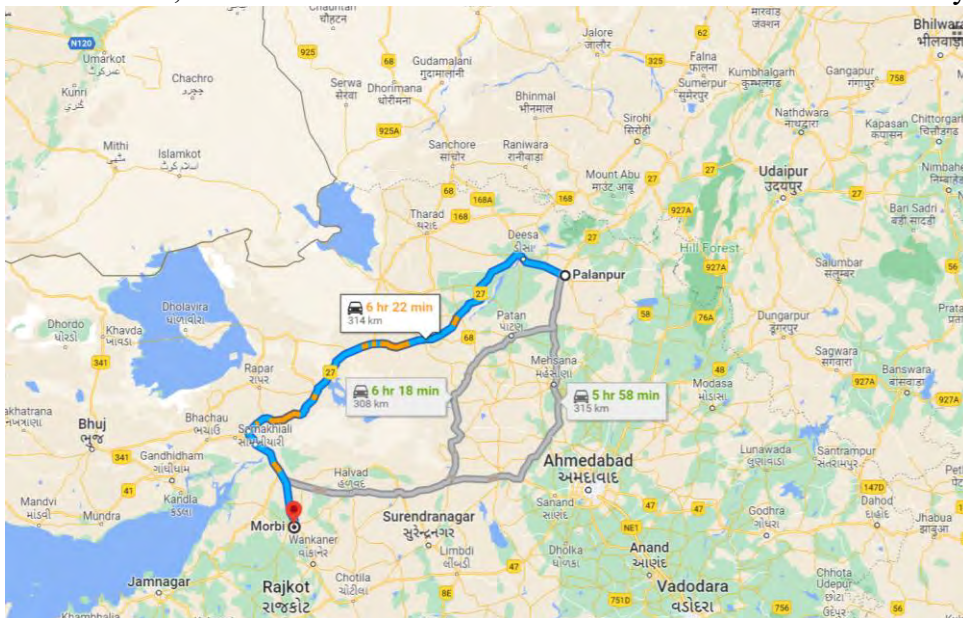


**e. Amritsar – Jamnagar Expressway**

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)

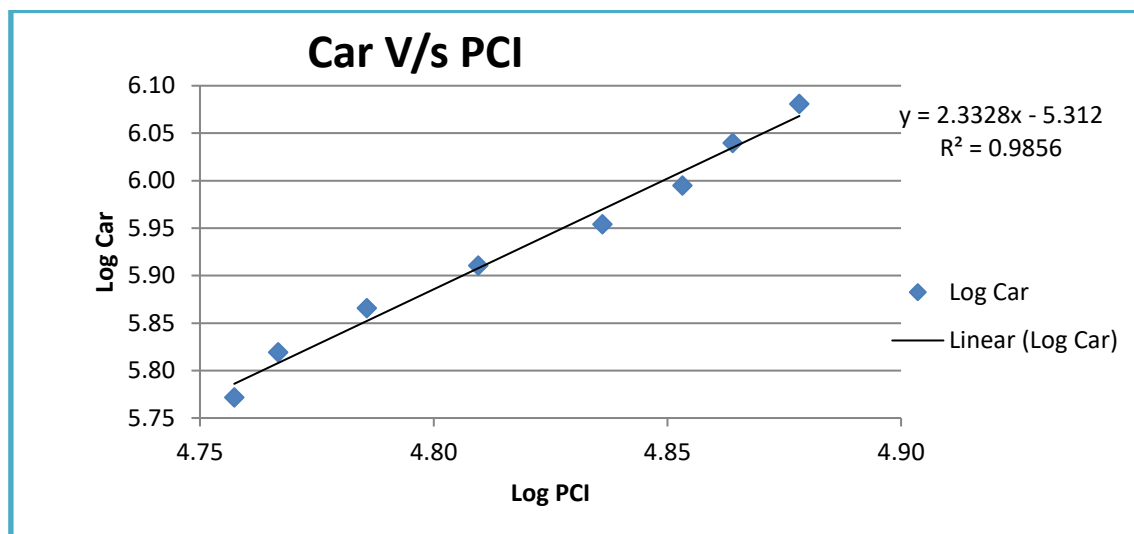
$EI$  = Economic Indicator

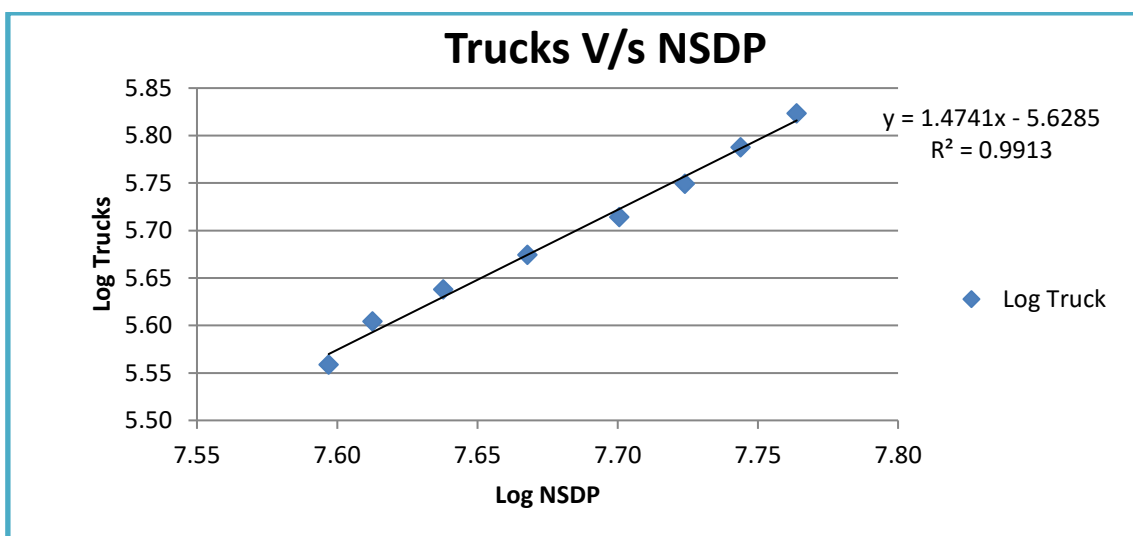
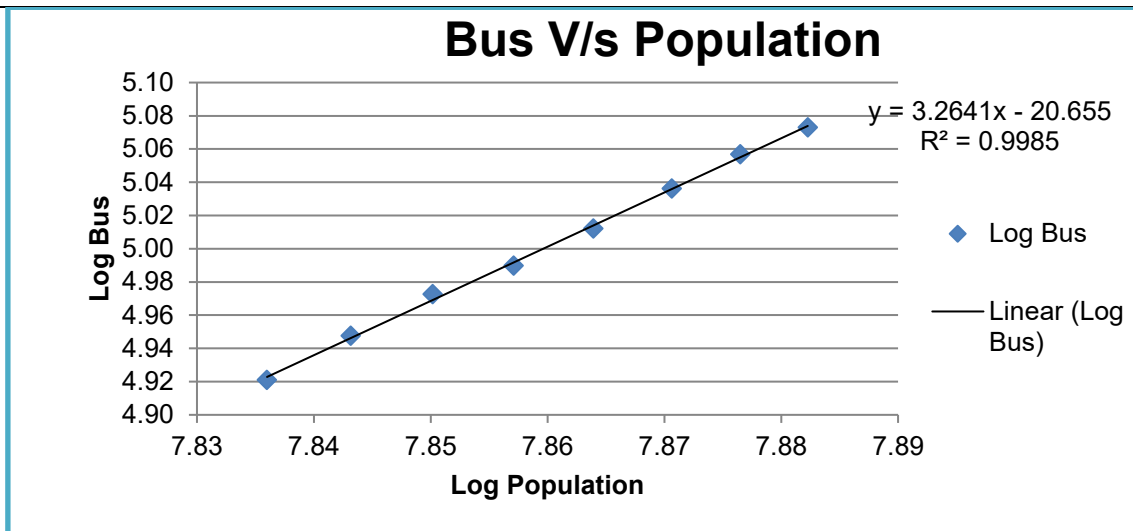
$A$  = Regression constant

$k$  = Elasticity coefficient (Regression coefficient)

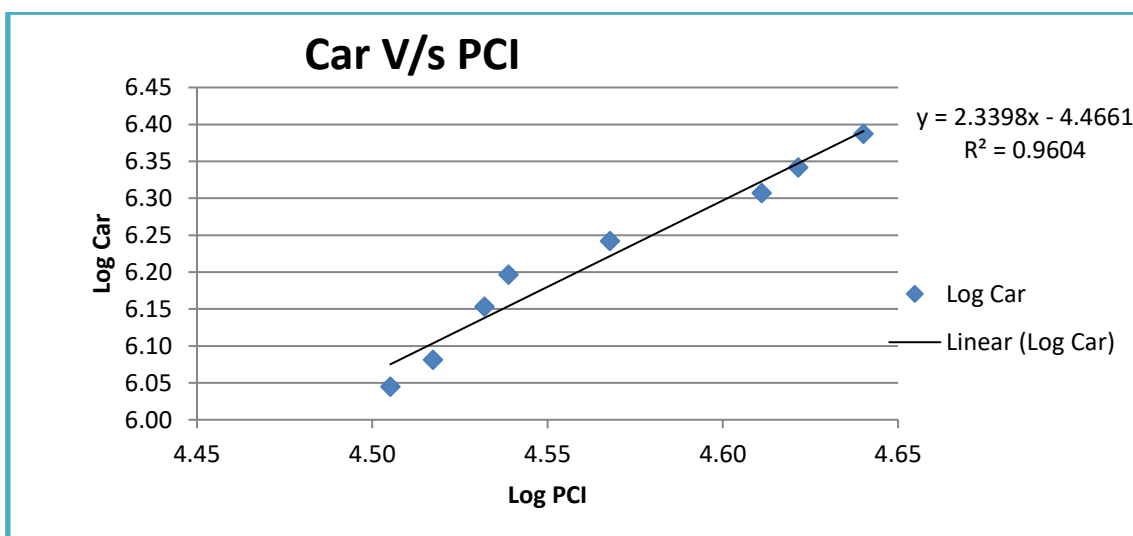
The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

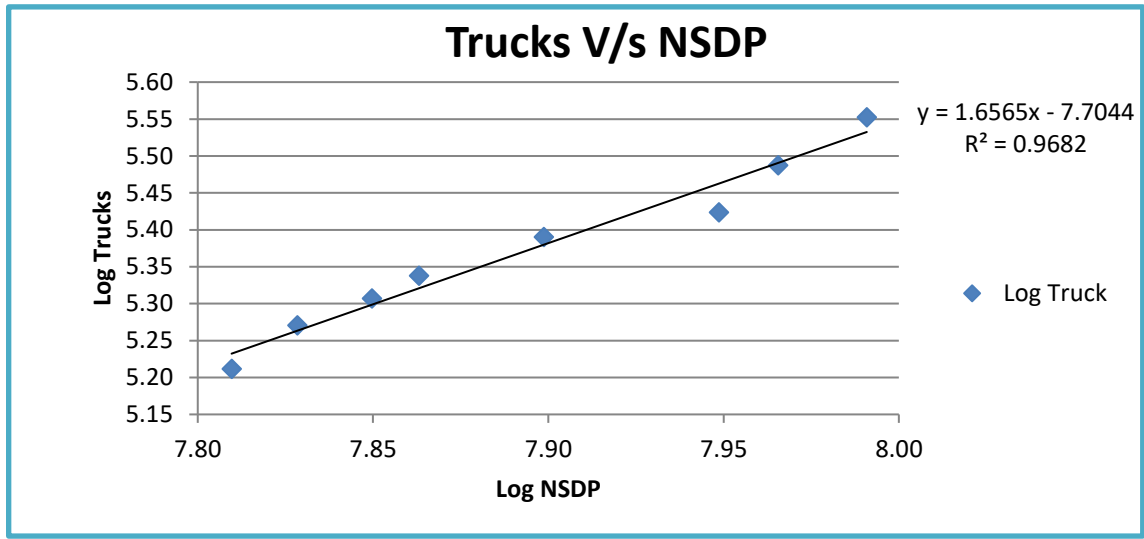
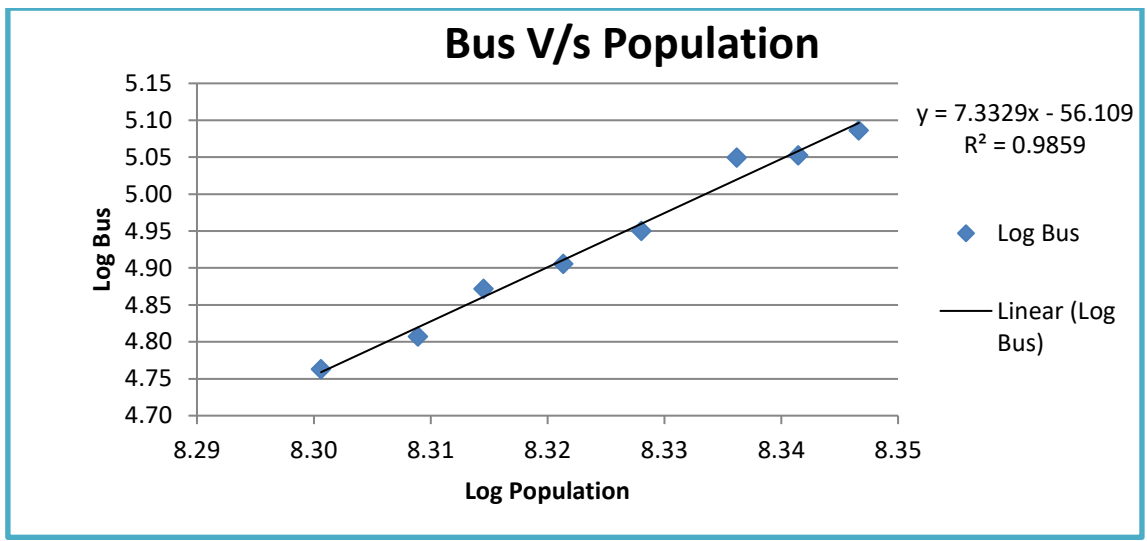
It is observed that most of the traffic at project stretch comes from Rajasthan, Haryana, Uttar Pradesh and Gujarat state. Hence economical model regression has been done for independent indicators for these states. The graphical presentation of the elasticity regression is presented in figures below:



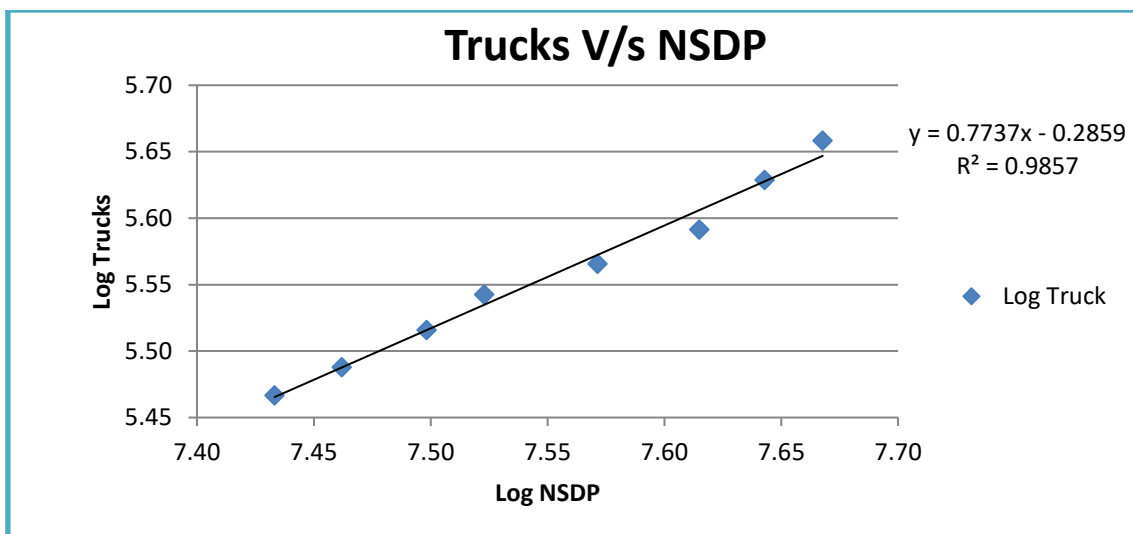
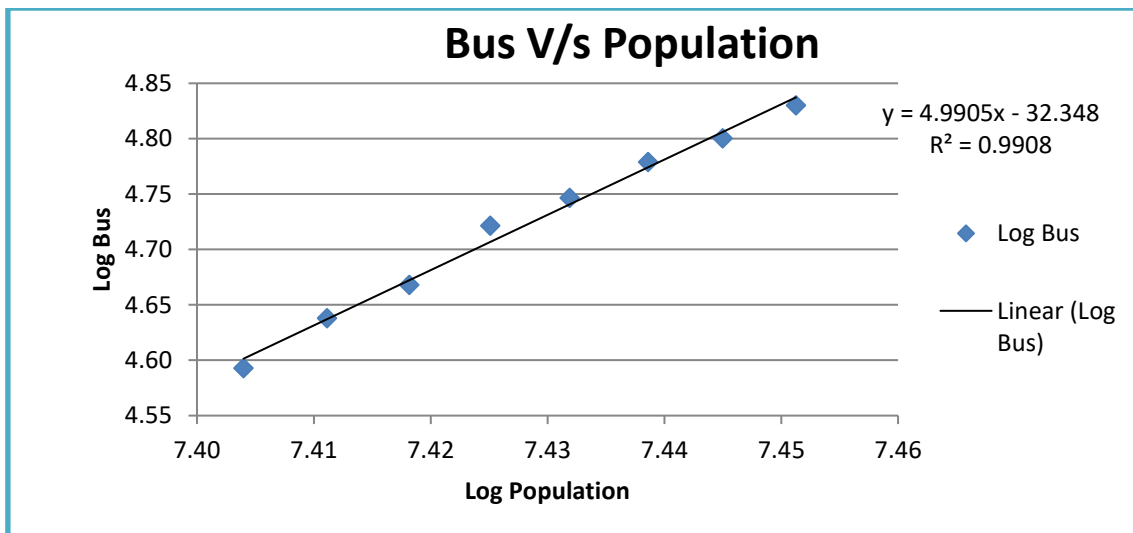
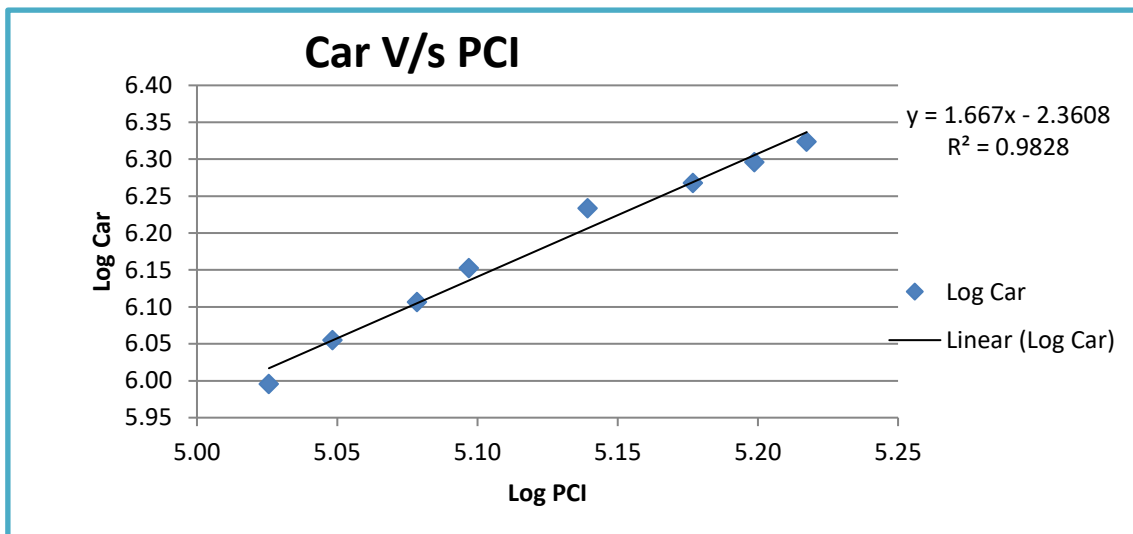


*Figure 3-1: Elasticity Regression for Rajasthan*



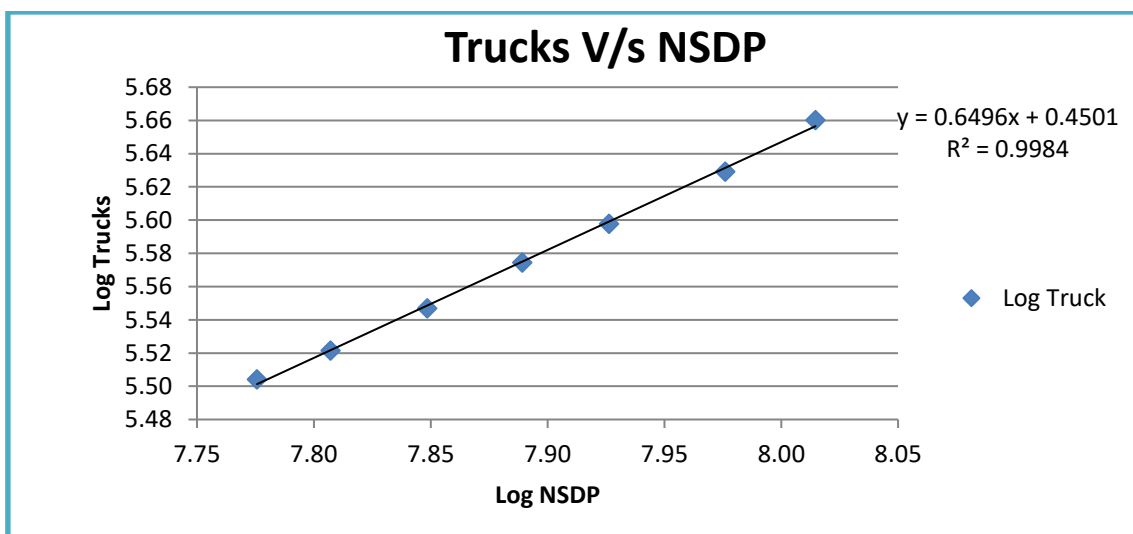
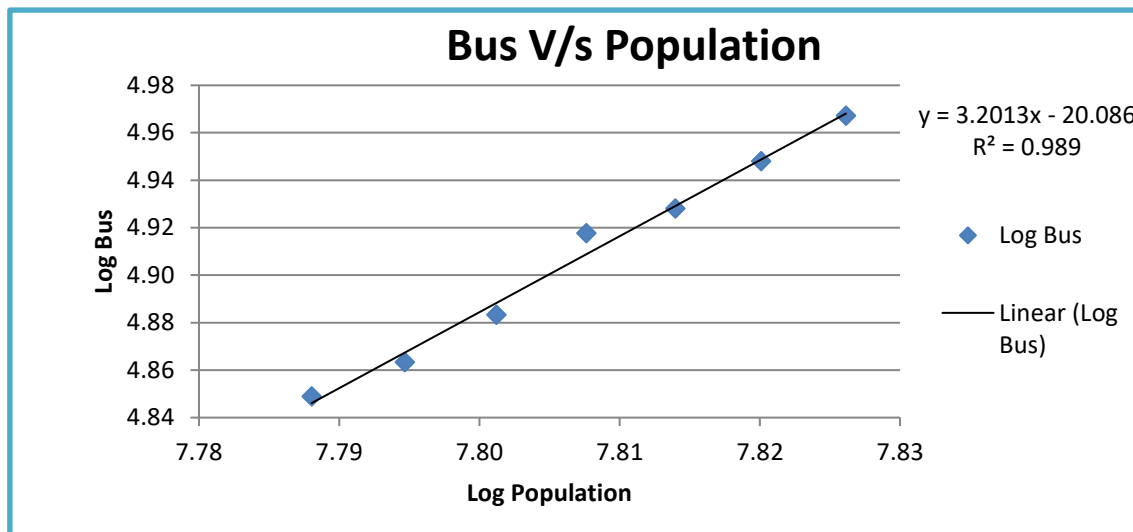
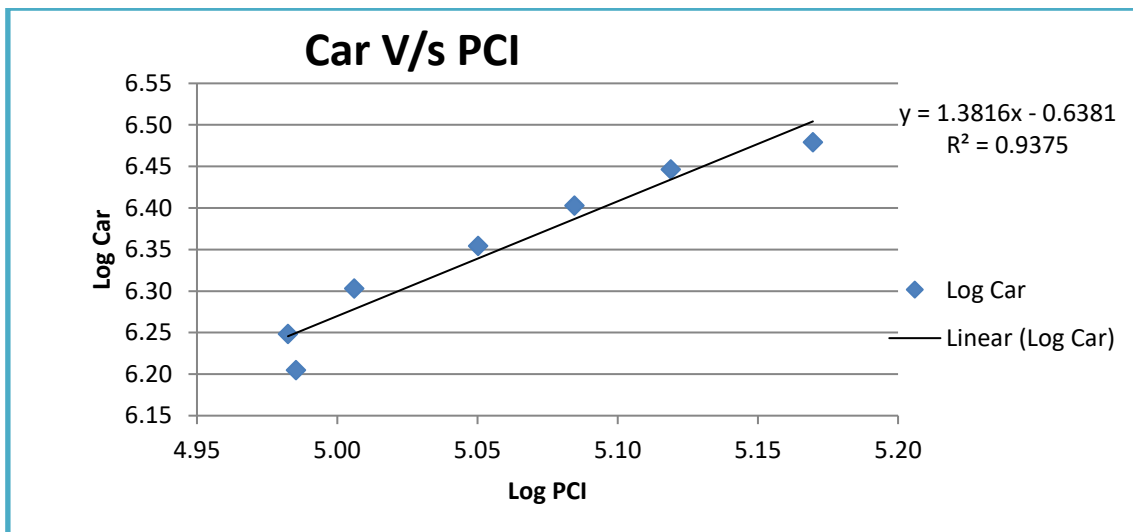


*Figure 3-2: Elasticity Regression for Uttar Pradesh*



**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 R<sup>2</sup> 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 <sup>2</sup> = 0.9375	1.3816
	Bus	Population	$y = 3.2013x - 20.0857$	R <sup>2</sup> = 0.989	3.2013
	Truck	NSDP	$y = 0.6496x - 0.4501$	R <sup>2</sup> = 0.9984	0.6496
UTTAR PRADESH	Car/Jeep	PCI	$y = 2.3398x - 4.4661$	R <sup>2</sup> = 0.9604	2.3398
	Bus	Population	$y = 7.3329x - 56.1092$	R <sup>2</sup> = 0.9859	7.3329
	Truck	NSDP	$y = 1.6565x - 7.7044$	R <sup>2</sup> = 0.9682	1.6565
RAJASTHAN	Car/Jeep	PCI	$y = 2.3328x - 5.312$	R <sup>2</sup> = 0.9856	2.3328
	Bus	Population	$y = 3.2641x - 20.6548$	R <sup>2</sup> = 0.9985	3.2641
	Truck	NSDP	$y = 1.4741x - 5.6285$	R <sup>2</sup> = 0.9913	1.4741
HARYANA & PUNJAB	Car/Jeep	PCI	$y = 1.667x - 2.3608$	R <sup>2</sup> = 0.9828	1.667
	Bus	Population	$y = 4.9905x - 32.348$	R <sup>2</sup> = 0.9908	4.9905
	Truck	NSDP	$y = 0.7737x - 0.2859$	R <sup>2</sup> = 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

Year	Car/Jeep/Van	Mini LCV	Bus	Minibus	LCV	2-Axle	3 - Axle	4 to6 Axle	7 and Above Axle	TOTAL
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
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 2/3<sup>rd</sup> 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 : 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 : 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

Location / Year	Makhel Toll	Total
2031-32	538.19	538.19
2032-33	600.07	600.07
2033-34	666.31	666.31
2034-35	741.31	741.31
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)
<b>Fastag Collection</b>	
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
<b>Base year Toll Collection as per traffic study (FY23)</b>	<b>INR~ 50 lakhs</b>

\*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 – 28<sup>th</sup> December 2023
- Concession Period (Days) – 7300 (For 20 Years)
- Hence, Original Concession end date is – 23<sup>rd</sup> 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	<b>0.3</b>
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	<b>- 0.1</b>
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	<b>0.1</b>
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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**Annexure 3**

Valuation Report of IRBLTPL, IRBKTPL and IRBGTPPL as on January 31, 2024 (with Traffic Reports)

*(Enclosed separately below)*





# Security Cover

Valuation Report

—  
March 2024





# IRB Infrastructure Trust

Valuation of IRB Lalitpur Tollway Private Limited

Valuation Report

—  
March 2024





**Strictly private and confidential**

08 March 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 along with Addendum to the letter of engagement dated 01<sup>st</sup> March 2024 (together referred as “LoE”), wherein KPMG Valuation Services LLP (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 Equity Valuation of IRB Lalitpur Tollway Private Limited (“SPV” or “ILTPL” or “Target”) as on the agreed date of the valuation for the proposed rights issue. The Valuation is to be conducted 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”).

KPMG is appointed as a registered valuer for the purpose of the Engagement (Registered valuer entity under Companies (Registered Valuers and Valuation) Rules, 2017 having IBBI Registration No. IBBI/RV-E/06/2020/115).

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

We hereby enclose our Valuation Report dated 08 March 2024. This is our deliverable and sets out KPMG’s conclusions on the valuation of the Target 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 Target (“Management”).

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 Target 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

<b>%</b>	Percentage	<b>IMF</b>	International Monetary Fund	<b>PV</b>	Present Value
<b>A</b>	Actual	<b>INR</b>	Indian Rupee	<b>R(f)</b>	Risk free rate of Return
<b>Adj.</b>	Adjusted	<b>InvIT</b>	Investment Trust	<b>R(m)</b>	Market rate of Return
<b>B</b>	Budgeted	<b>k</b>	Thousands	<b>Rf</b>	Risk-free Rate
<b>bn</b>	Billion	<b>Kd</b>	Cost of Debt	<b>SEBI</b>	Securities and Exchange Board of India
<b>CAGR</b>	Compounded Annual Growth Rate	<b>Ke</b>	Cost of Equity	<b>Sponsor</b>	IRB Infrastructure Developers Limited
<b>Capex</b>	Capital Expenditure	<b>Km</b>	Kilometer	<b>SPV</b>	Special Purpose Vehicle
<b>CoCo</b>	Comparable Companies	<b>KPMG</b>	KPMG Valuation Services LLP	<b>Valuation Date</b>	31 January 2024
<b>COD</b>	Commercial operation date	<b>LoE</b>	Letter of Engagement	<b>WACC</b>	Weighted Average Cost Of Capital
<b>CoTrans</b>	Comparable Transactions	<b>Management</b>	Management of Target	<b>WPI</b>	Wholesale Price Index
<b>Cr</b>	Crore	<b>MAT</b>	Minimum Alternate Tax	<b>y-o-y</b>	Year on year
<b>CWIP</b>	Capital Work In Progress	<b>mn</b>	Million	<b>YTD</b>	Year to date
<b>DBFOT</b>	Design, Build, Finance, Operate and Transfer	<b>MoRTH</b>	The Ministry of Road Transport and Highways		
<b>DCF</b>	Discounted Cash Flow	<b>n.a.</b>	Not applicable		
<b>EBIT</b>	Earnings Before Interest and Tax	<b>n.m.</b>	No Meaningful Figure		
<b>EBITDA</b>	Earnings Before Interest, Tax, Depreciation and Amortization	<b>NA</b>	Not applicable		
<b>EV</b>	Enterprise Value	<b>NAV</b>	Net Asset Value		
<b>FCFF</b>	Free Cash Flows to Firm	<b>NHAI</b>	National Highways Authority of India		
<b>FV</b>	Fair Value	<b>NHIDCL</b>	National Highway and Infrastructure Development Corporation Limited		
<b>FY</b>	Financial Year	<b>NWC</b>	Net Working Capital		
<b>IBEF</b>	India Brand Equity Foundation	<b>O&amp;M</b>	Operation and Maintenance		
<b>ILTPL</b>	IRB Lalitpur Tollway Private Limited	<b>PAT</b>	Profit After Tax		
		<b>PBT</b>	Profit Before Tax		
		<b>PIB</b>	Press Information Bureau		

# Contents

<b>Executive Summary</b>	6
<b>Industry Overview</b>	9
<b>Valuation Methodology and Approach</b>	14
• Valuation Methodology and Approach	15
• WACC Analysis	20
<b>Valuation of ILTPL</b>	23
<b>Valuation Conclusion</b>	28
<b>Annexures</b>	30
<b>Scope &amp; Limitations</b>	37



**1.**

# **Executive Summary**



# Overview

## Terms of the Engagement

- We have been appointed by IRBI Trust to undertake Equity Valuation of IRB Lalitpur Tollway Private Limited (“ILTPL” or “Target”)
- The Valuation shall be undertaken 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 January 2024. This report has been prepared by KPMG pursuant to terms of LoE.

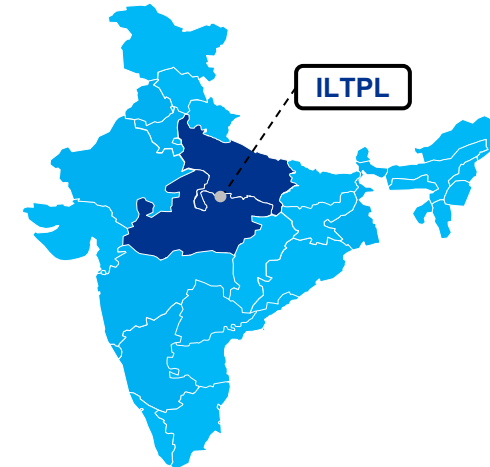
## IRBI Trust Overview

- 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.
- The object and purpose of IRBI Trust is to carry on the activity of an infrastructure investment trust under the InvIT regulations. Investment by 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.
- IRBI Trust is held by IRBIDL as sponsor with 51% stake and remaining 49% stake is held by GIC through its affiliates.
- We understand that IRBI Trust is contemplating a rights issue, to fund the upfront fee payments of three new road projects, including the Target.
- As of 31<sup>st</sup> January 2024, IRBI Trust owns stake in 15 SPVs, including the Target.

Source(s): Management information, IRBI Trust website, KPMG Analysis

## SPV Overview

- IRBI Trust has acquired Toll, Operate and Transfer (“ToT”) rights from the NHA1 to operate the Lalitpur – Sagar – Lakhnadon section of NH26 in Uttar Pradesh and Madhya Pradesh for an upfront concession fee of 4,428 crores
- The concession agreement for the project was executed between IRBI Trust and NHA1 on 24<sup>th</sup> November 2023.
- For the duration of the concession period, the SPV is required to maintain and operate the tollway and carry out repair and refurbishment whenever required.



## Valuation Approach and Methodology

Approach	Method
Income Approach	Discounted Cash Flow Method (DCF)

# Valuation Conclusion

## Equity Value of Target

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	222
<b>Enterprise Valuation</b>	<b>222</b>
Add: Net Cash/ Debt	-
<b>Equity Valuation</b>	<b>222</b>

*The Enterprise Value of the ILTPL is INR 222 crores. As represented by the Management, there is no surplus cash or debt outstanding as on Valuation Date. Hence, the 100% Equity Value of ILTPL is estimated to be INR 222 crores as on 31 January 2024.*

Source(s): Management information, KPMG analysis



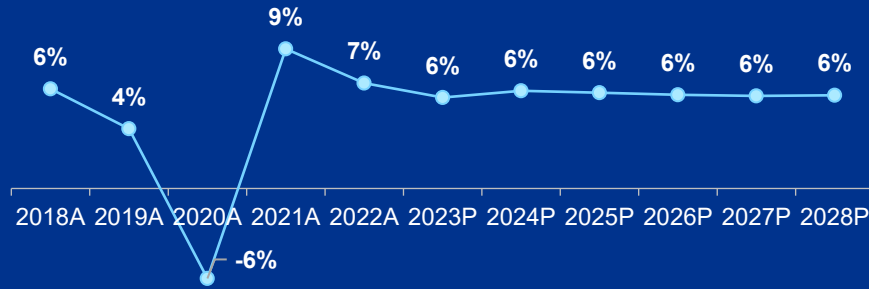
**2.**

# **Industry Overview**

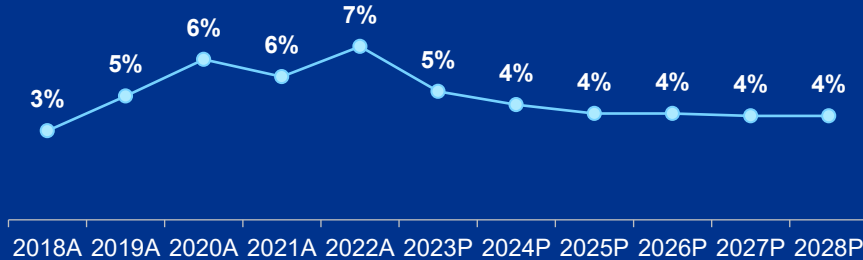
# Indian Economy Outlook

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 (%)



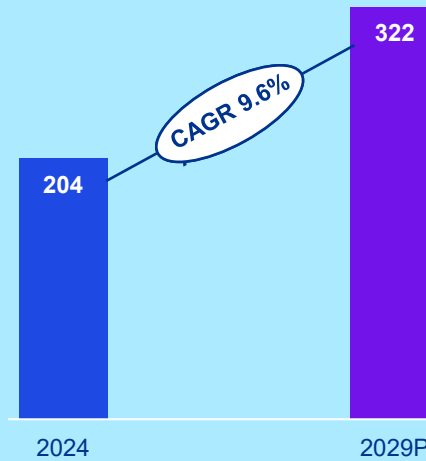
Source(s): International Monetary Fund ("IMF"), India Brand Equity Foundation ("IBEF"), Modor intelligence, EMIS

## 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.

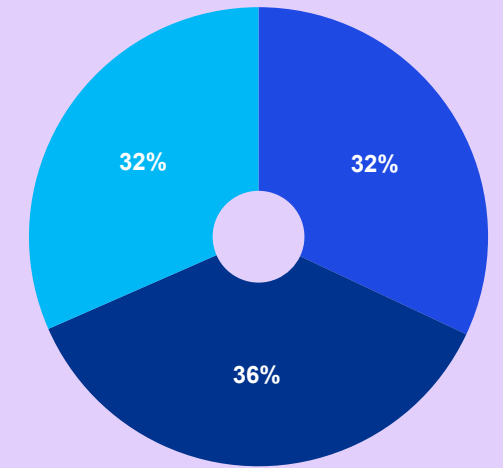
Capital investment outlay for infrastructure is being increased by 33 per cent, which would be 3.3 per cent of GDP and almost three times the outlay in 2019-20.

India Infrastructure market (USD billion)



## Construction Industry

Market segmentation of India's Construction industry (2022)



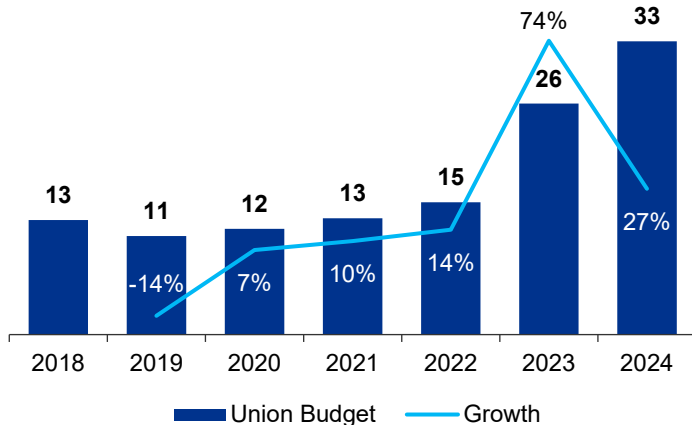
- Infrastructure construction
- Residential construction
- Commercial and special economic zones

# 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)



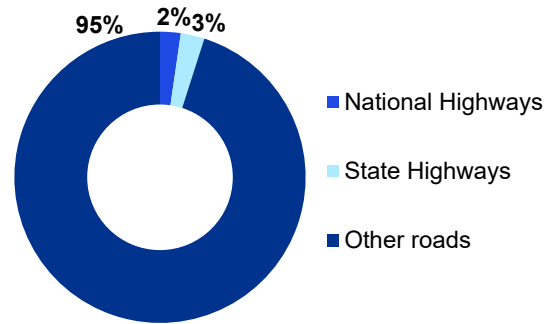
\*2023 data is as of 30 December 2022

Source(s): MoRTH, IBEF, Invest India

# 2<sup>nd</sup>

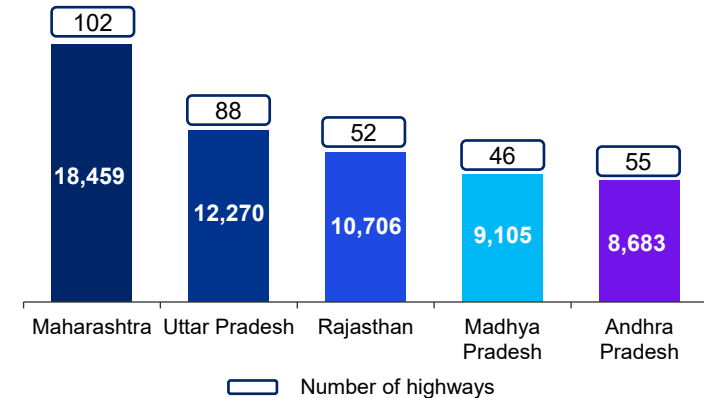
India has the second largest road network in the world of about 67 lakh km. This comprises National Highways, Expressways, State Highways, District Roads, Other District Roads and Village Roads.

### 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)

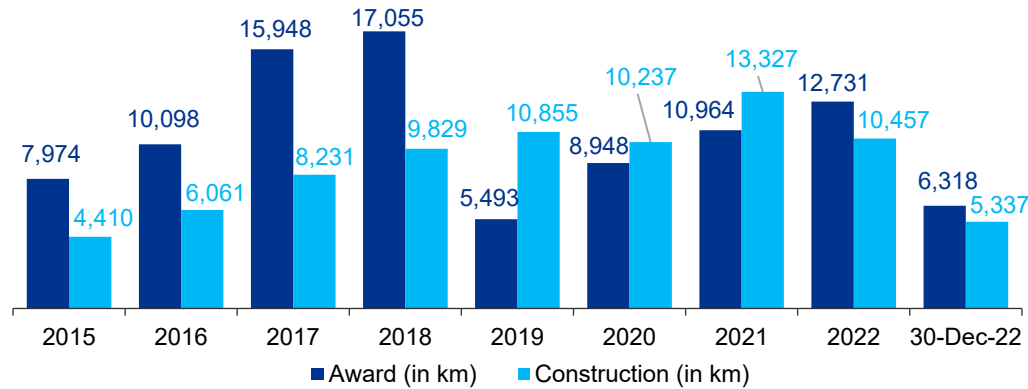
# 36.2%

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

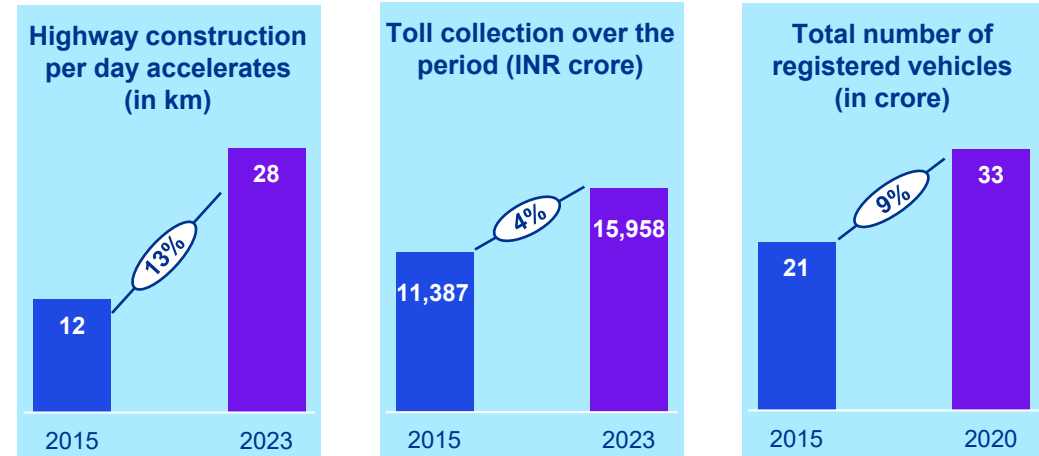
## Toll operations efficiency increased due to adoption and growth of FASTag

7.9 Cr

As of 30<sup>th</sup> 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

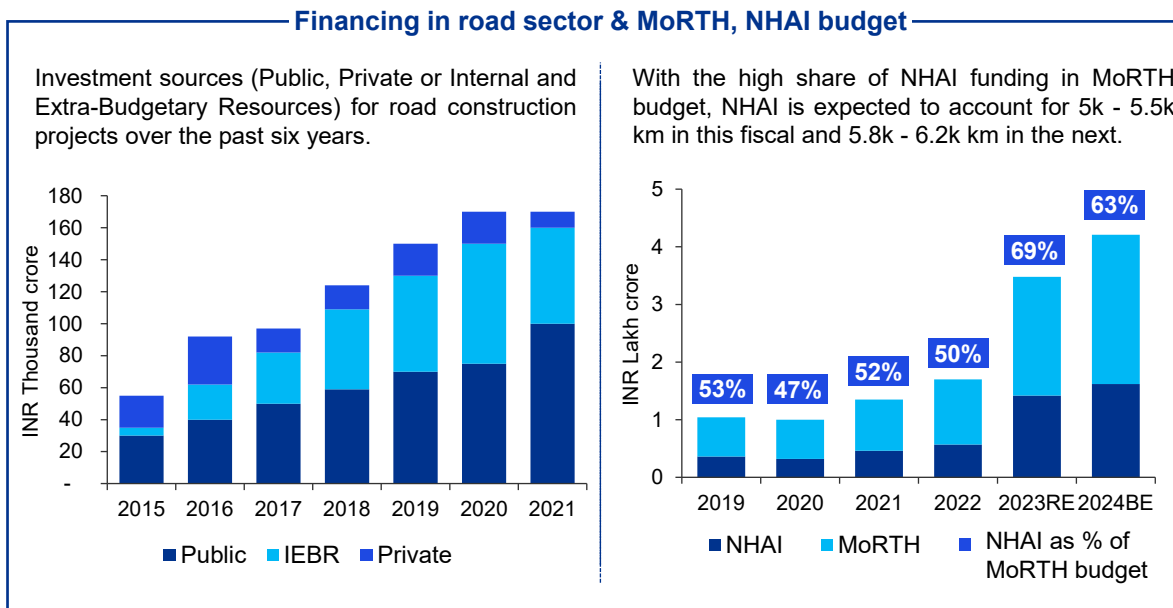
Investment in road infrastructure is long-term and returns are seen several years after construction. Roads and highways are financed through Government and private sources. Funding from Government sources includes budgetary allocations.

## 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 NHAI

### a. Engineering Procurement & Construction

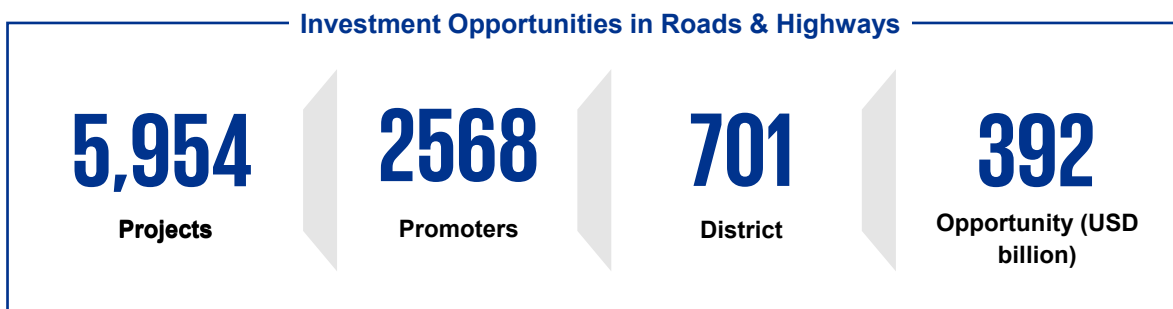
Under the EPC model, Government pays private players to lay roads. The private player has no role in the road's ownership, toll collection or maintenance.

### 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, NHAI 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

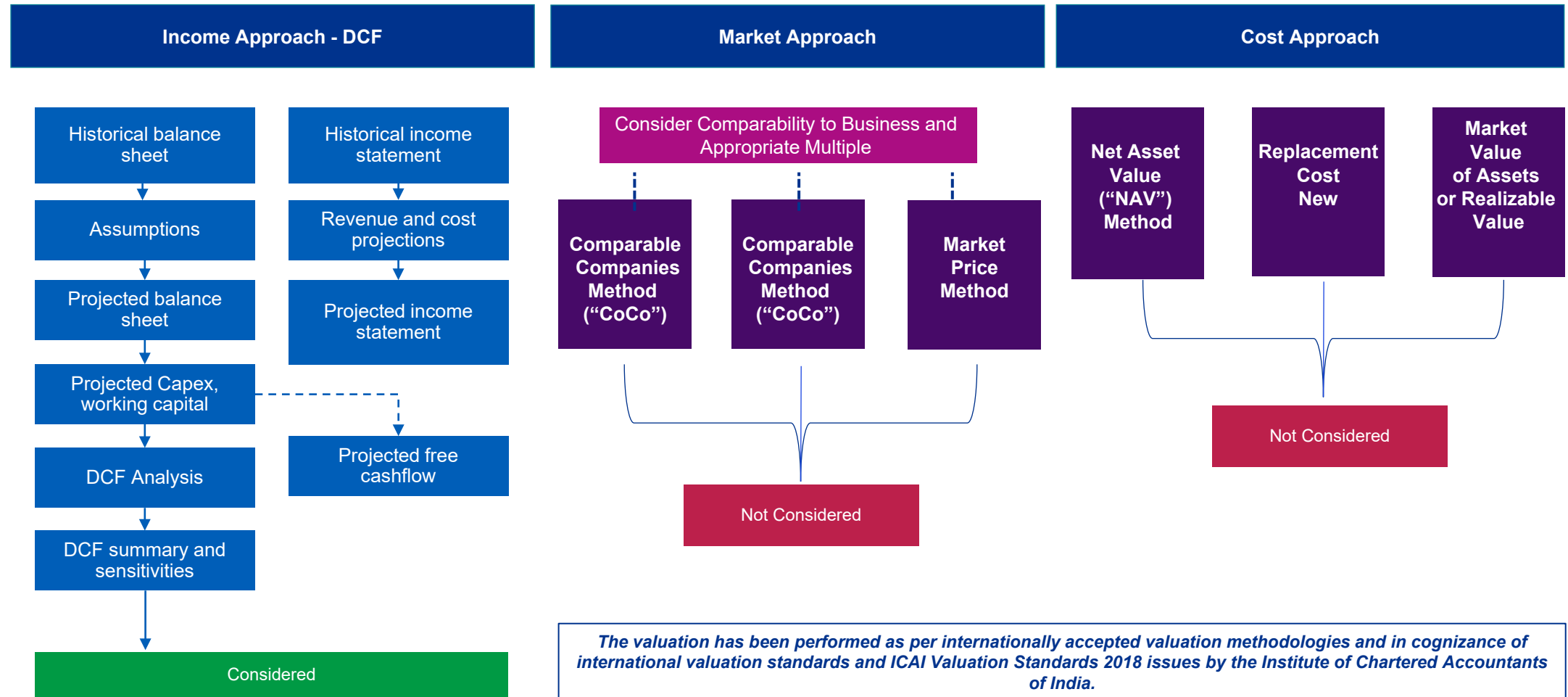
**3.**

# **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 Target, we have not computed a terminal value for the valuation of the Target
- 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 Target.

# 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 the Target.
- 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 the Target.



## 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 the Target 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 the Target as the Target is 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 Target, we have not computed a terminal value for the valuation of the Target.

## 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
$\beta$	=	the beta factor, being the measure of the systematic risk of a particular asset relative to the risk of a portfolio of all risky assets
$\alpha$	=	company specific risk factor (alpha)

# Summary - WACC

<p>Risk free rate (Rf) 7.2%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Equity risk premium 7%</p>	<ul style="list-style-type: none"> <li>Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India.</li> </ul>
<p>Relevered beta 1.01</p>	<ul style="list-style-type: none"> <li>Beta is a measure of the risk of the shares of a company. <math>\beta</math> 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.</li> <li>We have considered companies involved in the road operating industry and infrastructure investment trusts.</li> <li>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.</li> </ul>
<p>Cost of equity 14.3%</p>	<ul style="list-style-type: none"> <li>Based on above parameters cost of equity is 14.3%.</li> </ul>
<p>Post Tax Cost of Debt (Kd) 6.5 per cent</p>	<ul style="list-style-type: none"> <li>We have considered the average marginal cost of borrowing of 8.75 per cent as provided by Management.</li> <li>Based on a Pre-tax cost of debt of 8.75 per cent and tax rate of 25.17 per cent which is the tax rate applicable to the Target. Post-tax cost of debt is arrived at by multiplying pre-tax cost of debt by (1-Tax Rate).</li> </ul>
<p>WACC 9.64 per cent</p>	<ul style="list-style-type: none"> <li>Based on our analysis and discussion with management, we have considered a debt-to-equity ratio of 150%.</li> <li>Considering the above cost of equity of 14.3 per cent, the post-tax cost of debt of 6.5 per cent and the debt-to-equity ratio of 150%, the estimated weighted average cost of capital (WACC) is 9.64 per cent.</li> </ul>

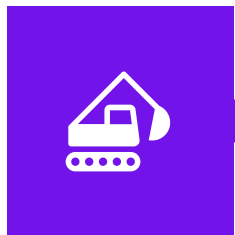
Source: KPMG analysis, Capital IQ



# 4.

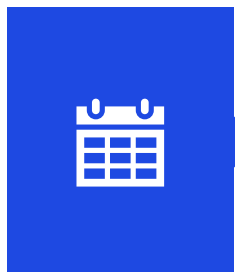
# Valuation of ILTPL

# Overview



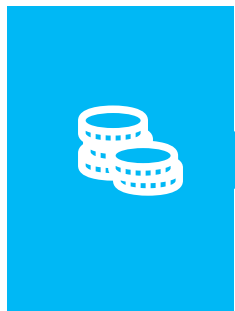
### Project details

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.

Source(s): Management information

## Highlights

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

## Shareholding as at 31 January 2024

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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.
- Management informed us that they are expected to make payment of upfront fee to authority in the fourth week of March 2024, post which they can begin tolling and operations. Thus, Management have assumed appointed date to be 01 April 2024 for ILTPL. We have relied on Management assumption and are considering appointed date as 01 April 2024. Considering the concession period of 20 years, the concession end date has been estimated as 31 March 2044. Thus, the explicit period for the current valuation exercise has been considered from 1 February 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 costs have been considered from a technical feasibility study performed by the Management. Given the technical nature of this study, review of the same is not part of our scope of work. Hence, We have considered the routine and periodic maintenance based on Management representation.

## 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 5,026 Cr in FY2024 and FY2025. Management represented that the cost primarily pertains to the upfront concession fee of INR 4,428 Cr to be paid by ILTPL to NHAI. The remaining pertains to EPC cost and, preliminary and pre-operative cost..

Source(s): Management information



# Discounted Cash Flows (1/2)

Discounted Cash Flow											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		2 months	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
<b>EBITDA</b>	<b>[A]</b>	-	342	391	431	477	451	501	556	619	685
EBITDA margin		0%	84%	85%	86%	87%	76%	77%	78%	80%	81%
Depreciation		-	(97)	(108)	(118)	(129)	(142)	(155)	(169)	(186)	(203)
<b>EBIT</b>		-	245	283	313	347	309	346	386	433	482
EBIT margin		0%	60%	62%	63%	63%	52%	53%	54%	56%	57%
Less: Tax on EBIT	[B]		(25)	(35)	(45)	(57)	(50)	(63)	(77)	(92)	(109)
Change in working capital	[C]	(150)	-	-	-	150	-	-	-	-	-
Less : Capex	[D]	(4,450)	(576)								
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>(4,600)</b>	<b>(258)</b>	<b>356</b>	<b>386</b>	<b>570</b>	<b>401</b>	<b>438</b>	<b>479</b>	<b>526</b>	<b>576</b>
Discounting period		0.083	0.667	1.667	2.667	3.667	4.667	5.667	6.667	7.667	8.667
Discount factor	[F]	0.992	0.940	0.858	0.782	0.714	0.651	0.594	0.541	0.494	0.450
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>(4,565)</b>	<b>(243)</b>	<b>305</b>	<b>302</b>	<b>407</b>	<b>261</b>	<b>260</b>	<b>259</b>	<b>260</b>	<b>259</b>

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	
<b>EBITDA</b> [A]	839	912	878	959	1,049	1,148	1,252	1,494	1,617	1,567	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)	
<b>EBIT</b>	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)	(166)	(157)	(178)	(201)	(226)	(252)	(313)	(344)	(331)	(368)	
Change in working capital [C]	-	-	-	-	-	-	-	-	-	-	-	
Less : Capex [D]	-	-	-	-	-	-	-	-	-	-	-	
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>691</b>	<b>746</b>	<b>720</b>	<b>781</b>	<b>848</b>	<b>922</b>	<b>1,000</b>	<b>1,181</b>	<b>1,273</b>	<b>1,236</b>	<b>1,347</b>	
Discounting period	9.667	10.667	11.667	12.667	13.667	14.667	15.667	16.667	17.667	18.667	19.667	
Discount factor [F]	0.411	0.375	0.342	0.312	0.284	0.259	0.236	0.216	0.197	0.179	0.164	
<b>Present value of cash flows [E*F]</b>	<b>284</b>	<b>279</b>	<b>246</b>	<b>243</b>	<b>241</b>	<b>239</b>	<b>236</b>	<b>255</b>	<b>250</b>	<b>222</b>	<b>220</b>	

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	222
Present value of release of working capital	-
<b>Enterprise Valuation</b>	<b>222</b>
<b>WACC</b>	<b>9.64%</b>

Basis the above and using a WACC of 9.64%, the Enterprise Value of ILTPL on 31 January 2024 is INR 222 crore.

Refer page no 22 for details WACC calculation

**5.**

# **Valuation Conclusion**

# Valuation Conclusion

## Equity Value of Target

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	222
<b>Enterprise Valuation</b>	<b>222</b>
Add: Net Cash/ Debt	-
<b>Equity Valuation</b>	<b>222</b>

*The Enterprise Value of the ILTPL is INR 222 crores. As represented by the Management, there is no surplus cash or debt outstanding as on Valuation Date. Hence, the 100% Equity Value of ILTPL is estimated to be INR 222 crores as on 31 January 2024.*

Source(s): Management information, KPMG analysis



**6.**

# **Annexures**

# Annexure 1: Sources of Information

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:

- Financial projections of ILTPL from 01 February 2024 till the end of the concession period
- Other data for ILTPL which is as follows –
  - Concession Agreement
  - Traffic Report prepared by GMD consultants
- List of approvals, permits, licenses and litigations for ILTPL as at 31 January 2024.
- Management has provided Traffic consultant report prepared by GMD Consultants (appointed independently by Client) dated March 2024 for ILTPL. Management has confirmed that the traffic study shared are the most recent study available. Forecast revenue has been considered from the aforesaid traffic study report for the SPV. We have compared the revenue considered in the forecast model with the revenue forecasted in the traffic study report and noted that the Management has considered the pessimistic revenue scenario in their forecast.
- Management has informed us that as at Valuation Date there are no material balances in the financial statements of ILTPL, as ILTPL was incorporated in November 2023. We have relied on Management representation and are considering NIL opening balance sheet.
- Management informed us that they are expected to make payment of upfront fee to authority in the fourth week of March 2024, post which they can begin tolling and operations. Thus, Management have assumed appointed date to be 01 April 2024 for ILTPL. We have relied on Management assumption and considering appointed date as 01 April 2024.
- Management has informed us that routine and periodic maintenance for ILTPL has been considered from a technical feasibility study performed by the Management. Given the technical nature of this study, review of the same is not part of our scope of work. Hence, We have considered the routine and periodic maintenance based on Management representation
- The EPC costs and the preliminary and pre-operative expenses have been provided by the Management.
- 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; Ms. Shilpa Todankar; and Mr. Rushabh Gandhi.
- 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 2: Beta Computation

Beta computation 31 January 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	279,497	180,906	64.7%	39.3%	1.03	25.17%	0.63	150.0%	25.17%	1.34
PNC Infratech Limited	96,451	70,738	73.3%	42.3%	0.91	25.17%	0.59	150.0%	25.17%	1.24
Dilip Buildcon Limited	56,906	67,629	118.8%	54.3%	1.03	25.17%	0.55	150.0%	25.17%	1.16
Bharat Road Network Limited	5,558	13,693	246.4%	71.1%	1.10	25.17%	0.39	150.0%	25.17%	0.82
National Highways Infra Trust	na	na	na	na	na	na	na	na	na	na
India Infrastructure Trust	na	na	na	na	na	na	na	na	na	na
India Grid Trust	98,821	186,972	189.2%	65.4%	0.42	25.17%	0.17	150.0%	25.17%	0.37
Powergrid Infrastructure Investment Trust	88,963	5,721	6.4%	6.0%	0.43	25.17%	0.41	150.0%	25.17%	0.87
IRB InvIT Fund	40,180	30,380	75.6%	43.1%	0.43	25.17%	0.28	150.0%	25.17%	0.59
G R Infraprojects Limited	107,503	63,080	58.7%	37.0%	0.87	25.17%	0.60	150.0%	25.17%	1.28
<b>Median</b>			74.5%				0.48			<b>1.01</b>

**Note:**

(a) Market capitalization of comparable companies has been considered based on 3-month volume weighted average share prices till 31 January 2024.

(b) Beta has been computed based on 1-year daily average adjusted beta.

(c) Although, National Highway Infra Trust and India Infrastructure Trust are part of our comparable companies set, they has 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 3: Other disclosures as required under SEBI InvIT Regulations

The following disclosures are as at 31 January 2024 for the Target

1. **Valuation of the project in the previous 3 years:** Management has represented that no previous valuation of the project has been undertaken.
2. **List of one-time sanctions/approvals which are obtained or pending/ List of up to date/overdue periodic clearances:** Refer annexure 3a 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 3b for the aforementioned information.
4. **Purchase price of the project by the InvIT:** Not Applicable
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 the Target.
6. **Statement of assets:** Management has represented that there are no assets under the Target as on the Valuation Date.
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 Target.
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 Target.
9. **Latest pictures of the SPV:** Refer annexure 3c 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 Target 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 3a: One-time sanctions and approvals and overdue periodic clearances

Sr. No	Description	Remarks
a.	Permission of State Government for extraction of boulder from quarries	Not Applicable
b.	Permission of Village Panchayat and Pollution Control Board for installation of crushers	Not Applicable
c.	License for use of explosives	Not Required
d.	Permission of the 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 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 Panchayat & PCB for Asphalt Plant	
h.	Permission of Village Panchayat and State Government for Borrow Earth	
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 3b: Estimates of already carried as well as proposed major repairs and improvements

Estimate of already carried out as well as proposed major repairs										
INR Crore										
Name of SPV	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034
IRB Lalitpur Tollway Pvt. Ltd.	-	-	-	-	66	69	72	75	78	-

Estimate of already carried out as well as proposed major repairs										
INR Crore										
Name of SPV	FY2035	FY2036	FY2037	FY2038	FY 2039	FY 2040	FY2041	FY2042	FY 2043	FY2044
IRB Lalitpur Tollway Pvt. Ltd.	-	117	121	124	128	132	-	-	185	185

Source(s): Management information



# Annexure 3c: Site pictures



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

**7.**

# **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 Equity Valuation of IRB Lalitpur Tollway Private Limited (“ILTPL” or “Target”) as on the agreed date of the valuation for the proposed rights issue 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 along with Addendum to the letter of engagement dated 01 March 2024 (together referred as “LoE”).
- The date of Valuation is 31 January 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 Target/ 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. We also understand from you that the Report may be included in the offer document for the rights issue and therefore, we understand that the Report may enter 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 Target 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 business plan of the Target for the period from 1 February 2024 to the end of the concession periods of the Target 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 Target, 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 Target. 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 Target. Our conclusion of value assumes that the title to the assets and liabilities of the Target 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.



[kpmg.com/socialmedia](https://kpmg.com/socialmedia)

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.

© 2024 KPMG Valuation Services LLP, an Indian limited liability partnership and a member firm of KPMG global organization of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

**Document Classification: KPMG Confidential**



# Security Cover

Valuation Report

—  
March 2024





# IRB Infrastructure Trust

Valuation of IRB Kota Tollway Private Limited

Valuation Report

—  
March 2024







**Strictly private and confidential**

08 March 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 along with Addendum to the letter of engagement dated 1<sup>st</sup> March 2024 (together referred as “LoE”), wherein KPMG Valuation Services LLP (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 Equity Valuation of IRB Kota Tollway Private Limited (“SPV” or “IKTPL” or “Target”) as on the agreed date of the valuation for the proposed rights issue. The Valuation is to be conducted 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”).

KPMG is appointed as a registered valuer for the purpose of the Engagement (Registered valuer entity under Companies (Registered Valuers and Valuation) Rules, 2017 having IBBI Registration No. IBBI/RV-E/06/2020/115).

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

We hereby enclose our Valuation Report dated 08 March 2024. This is our deliverable and sets out KPMG’s conclusions on the valuation of the Target 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 Target (“Management”).

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 Target 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

<b>%</b>	Percentage	<b>IMF</b>	International Monetary Fund	<b>PV</b>	Present Value
<b>A</b>	Actual	<b>INR</b>	Indian Rupee	<b>R(f)</b>	Risk free rate of Return
<b>Adj.</b>	Adjusted	<b>InvIT</b>	Investment Trust	<b>R(m)</b>	Market rate of Return
<b>B</b>	Budgeted	<b>k</b>	Thousands	<b>Rf</b>	Risk-free Rate
<b>bn</b>	Billion	<b>Kd</b>	Cost of Debt	<b>SEBI</b>	Securities and Exchange Board of India
<b>CAGR</b>	Compounded Annual Growth Rate	<b>Ke</b>	Cost of Equity	<b>Sponsor</b>	IRB Infrastructure Developers Limited
<b>Capex</b>	Capital Expenditure	<b>Km</b>	Kilometer	<b>SPV</b>	Special Purpose Vehicle
<b>CoCo</b>	Comparable Companies	<b>KPMG</b>	KPMG Valuation Services LLP	<b>Valuation Date</b>	31 January 2024
<b>COD</b>	Commercial operation date	<b>LoE</b>	Letter of Engagement	<b>WACC</b>	Weighted Average Cost Of Capital
<b>CoTrans</b>	Comparable Transactions	<b>Management</b>	Management of Target	<b>WPI</b>	Wholesale Price Index
<b>Cr</b>	Crore	<b>MAT</b>	Minimum Alternate Tax	<b>y-o-y</b>	Year on year
<b>CWIP</b>	Capital Work In Progress	<b>mn</b>	Million	<b>YTD</b>	Year to date
<b>DBFOT</b>	Design, Build, Finance, Operate and Transfer	<b>MoRTH</b>	The Ministry of Road Transport and Highways		
<b>DCF</b>	Discounted Cash Flow	<b>n.a.</b>	Not applicable		
<b>EBIT</b>	Earnings Before Interest and Tax	<b>n.m.</b>	No Meaningful Figure		
<b>EBITDA</b>	Earnings Before Interest, Tax, Depreciation and Amortization	<b>NA</b>	Not applicable		
<b>EV</b>	Enterprise Value	<b>NAV</b>	Net Asset Value		
<b>FCFF</b>	Free Cash Flows to Firm	<b>NHAI</b>	National Highways Authority of India		
<b>FV</b>	Fair Value	<b>NHIDCL</b>	National Highway and Infrastructure Development Corporation Limited		
<b>FY</b>	Financial Year	<b>NWC</b>	Net Working Capital		
<b>IBEF</b>	India Brand Equity Foundation	<b>O&amp;M</b>	Operation and Maintenance		
<b>IKTPL</b>	IRB Kota Tollway Private Limited	<b>PAT</b>	Profit After Tax		
		<b>PBT</b>	Profit Before Tax		
		<b>PIB</b>	Press Information Bureau		



# Contents

<b>Executive Summary</b>	6
<b>Industry Overview</b>	9
<b>Valuation Methodology and Approach</b>	14
• Valuation Methodology and Approach	15
• WACC Analysis	20
<b>Valuation of IKTPL</b>	23
<b>Valuation Conclusion</b>	28
<b>Annexures</b>	30
<b>Scope &amp; Limitations</b>	37



**1.**

# **Executive Summary**

# Overview

## Terms of the Engagement

- We have been appointed by IRBI Trust to undertake Equity Valuation of IRB Kota Tollway Private Limited (“IKTPL” or “Target”)
- The Valuation shall be undertaken 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 January 2024. This report has been prepared by KPMG pursuant to terms of LoE.

## 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.
- The object and purpose of IRBI Trust is to carry on the activity of an infrastructure investment trust under the InvIT regulations. Investment by 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.
- IRBI Trust is held by IRBIDL as sponsor with 51% stake and remaining 49% stake is held by GIC through its affiliates.
- We understand that IRBI Trust is contemplating a rights issue, to fund the upfront fee payments of three new road projects, including the Target.
- As of 31<sup>st</sup> January 2024, IRBI Trust owns stake in 15 SPVs, including the Target.

Source(s): Management information, IRBI Trust website, KPMG Analysis

## SPV Overview

- IRBI Trust has acquired Toll, Operate and Transfer (“TOT”) rights from the NHA1 to operate the Kota bypass and cable stay bridge on NH76 in Rajasthan, for an upfront concession fee of INR 522 crores
- The concession agreement for the project was executed between IRBI Trust and NHA1 on 12<sup>th</sup> January 2024.
- For the duration of the concession period, the SPV is required to maintain and operate the tollway and carry out repair and refurbishment whenever required.



## Valuation Approach and Methodology

Approach	Method
Income Approach	Discounted Cash Flow Method (DCF)

# Valuation Conclusion

## Equity Value of Target

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	149
<b>Enterprise Valuation</b>	<b>149</b>
Add: Net Cash/ Debt	-
<b>Equity Valuation</b>	<b>149</b>

*The Enterprise Value of the IKTPL is INR 149 crores. As represented by the Management, there is no surplus cash or debt outstanding as on Valuation Date. Hence, the 100% Equity Value of IKTPL is estimated to be INR 149 crores as on 31 January 2024.*

Source(s): Management information, KPMG analysis



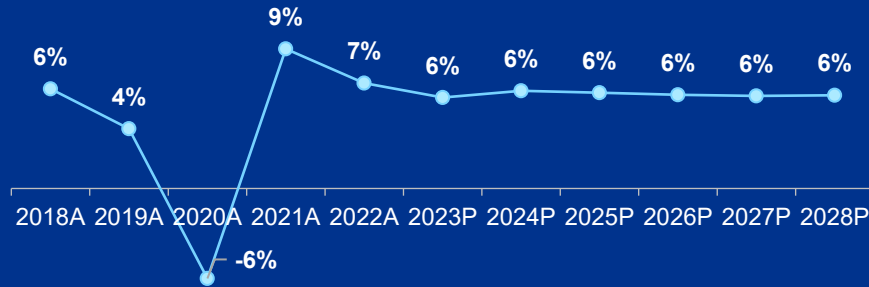
**2.**

# **Industry Overview**

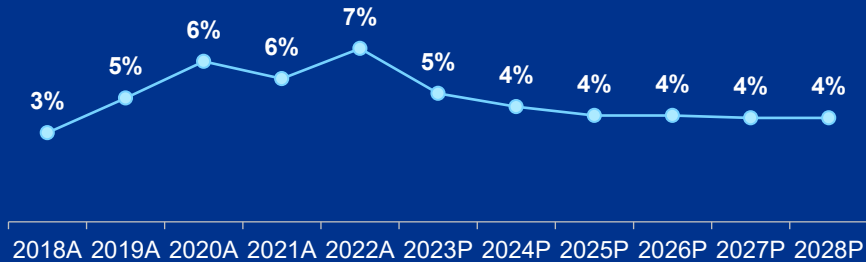
# Indian Economy Outlook

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 (%)



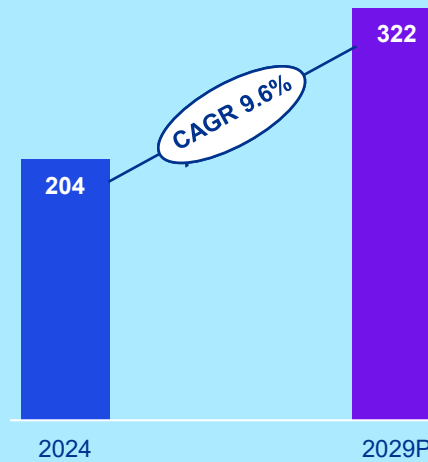
Source(s): International Monetary Fund ("IMF"), India Brand Equity Foundation ("IBEF"), Modor intelligence, EMIS

## 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.

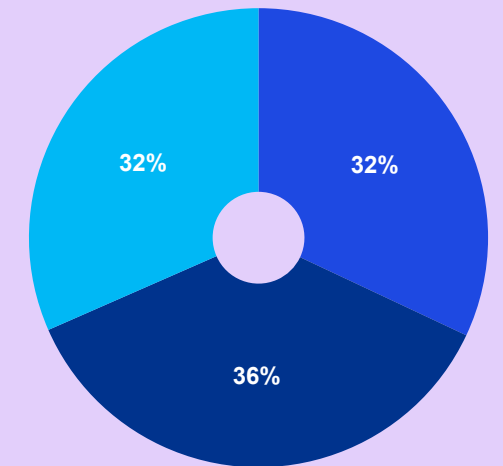
Capital investment outlay for infrastructure is being increased by 33 per cent, which would be 3.3 per cent of GDP and almost three times the outlay in 2019-20.

India Infrastructure market (USD billion)



## Construction Industry

Market segmentation of India's Construction industry (2022)



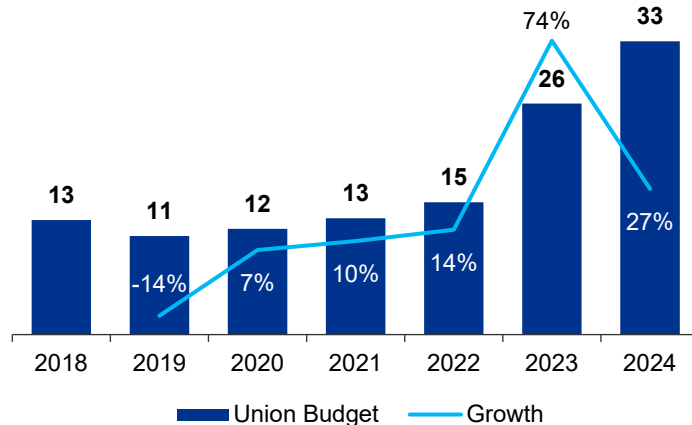
- Infrastructure construction
- Residential construction
- Commercial and special economic zones

# 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)



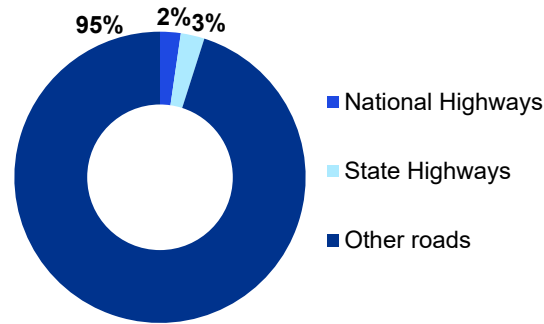
\*2023 data is as of 30 December 2022

Source(s): MoRTH, IBEF, Invest India

# 2<sup>nd</sup>

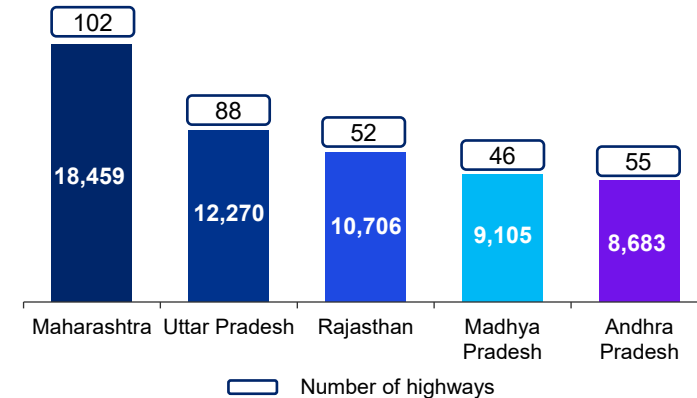
India has the second largest road network in the world of about 67 lakh km. This comprises National Highways, Expressways, State Highways, District Roads, Other District Roads and Village Roads.

### 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%

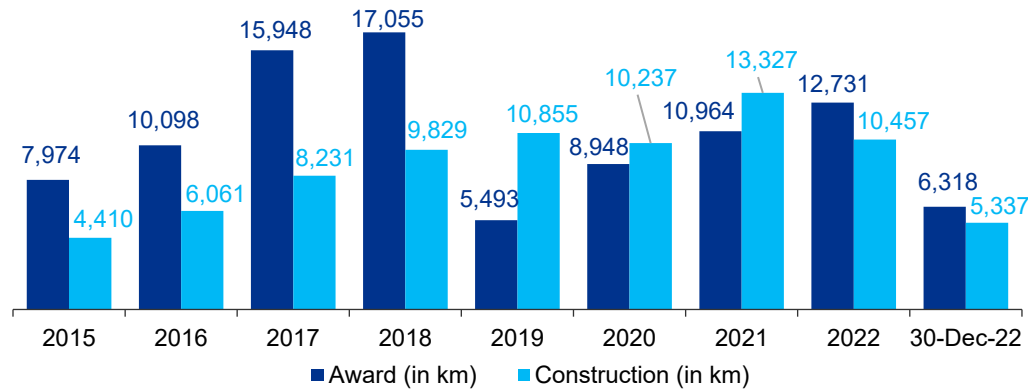
The market for roads and highways in India is projected to grow at a CAGR of 36.2 per cent during 2016-2025, on account of growing government initiatives to improve transportation infrastructure in the country.



# 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

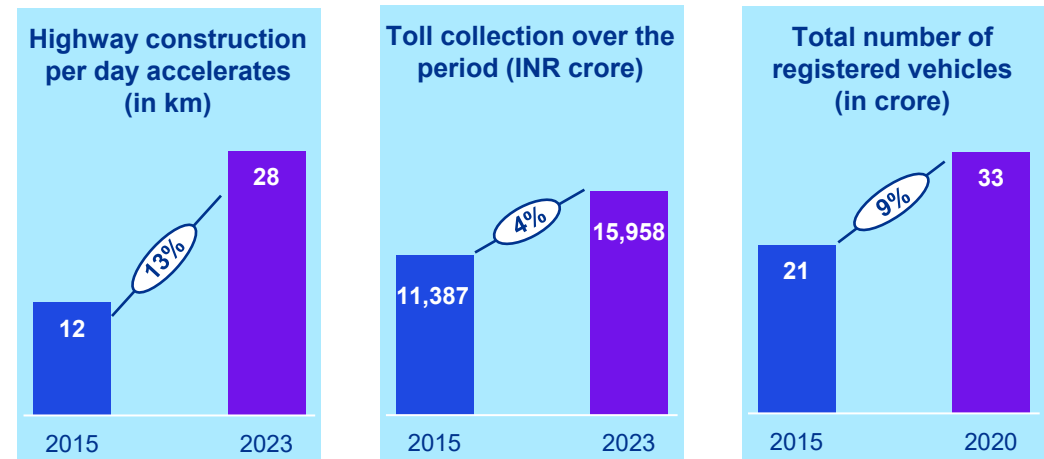
## Toll operations efficiency increased due to adoption and growth of FASTag

7.9 Cr

As of 30<sup>th</sup> 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

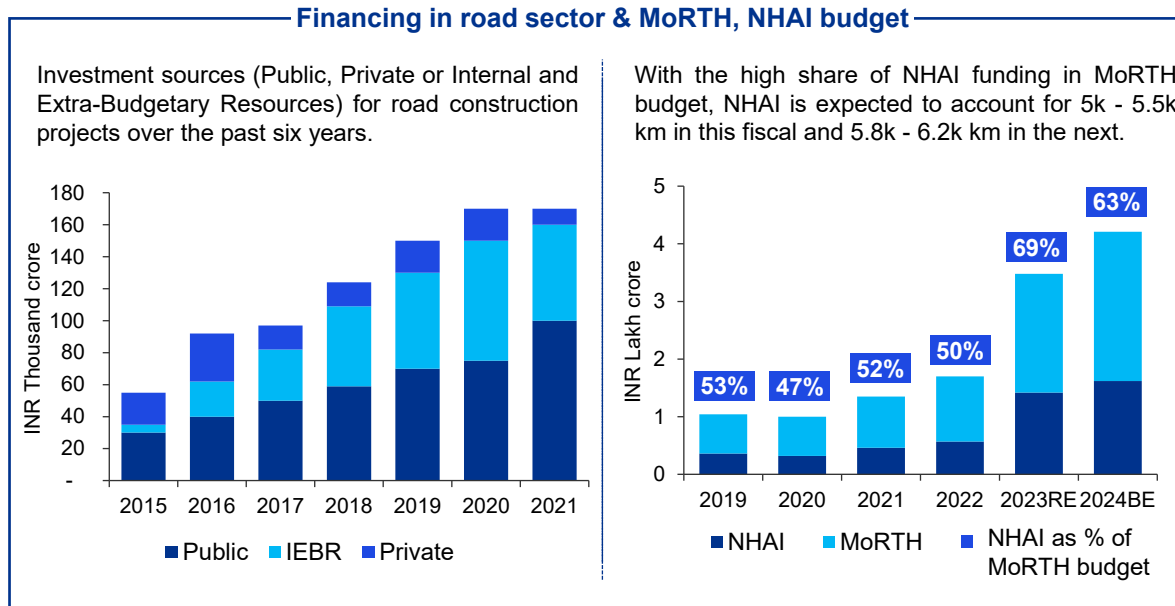
Investment in road infrastructure is long-term and returns are seen several years after construction. Roads and highways are financed through Government and private sources. Funding from Government sources includes budgetary allocations.

## 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 NHAI

### a. Engineering Procurement & Construction

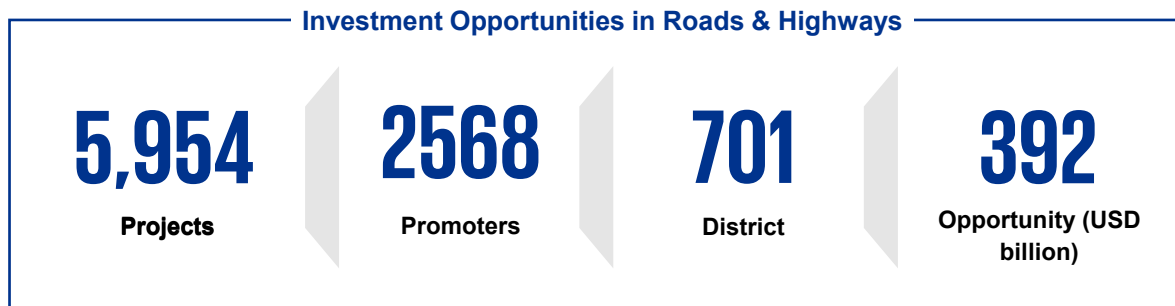
Under the EPC model, Government pays private players to lay roads. The private player has no role in the road's ownership, toll collection or maintenance.

### 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, NHAI 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

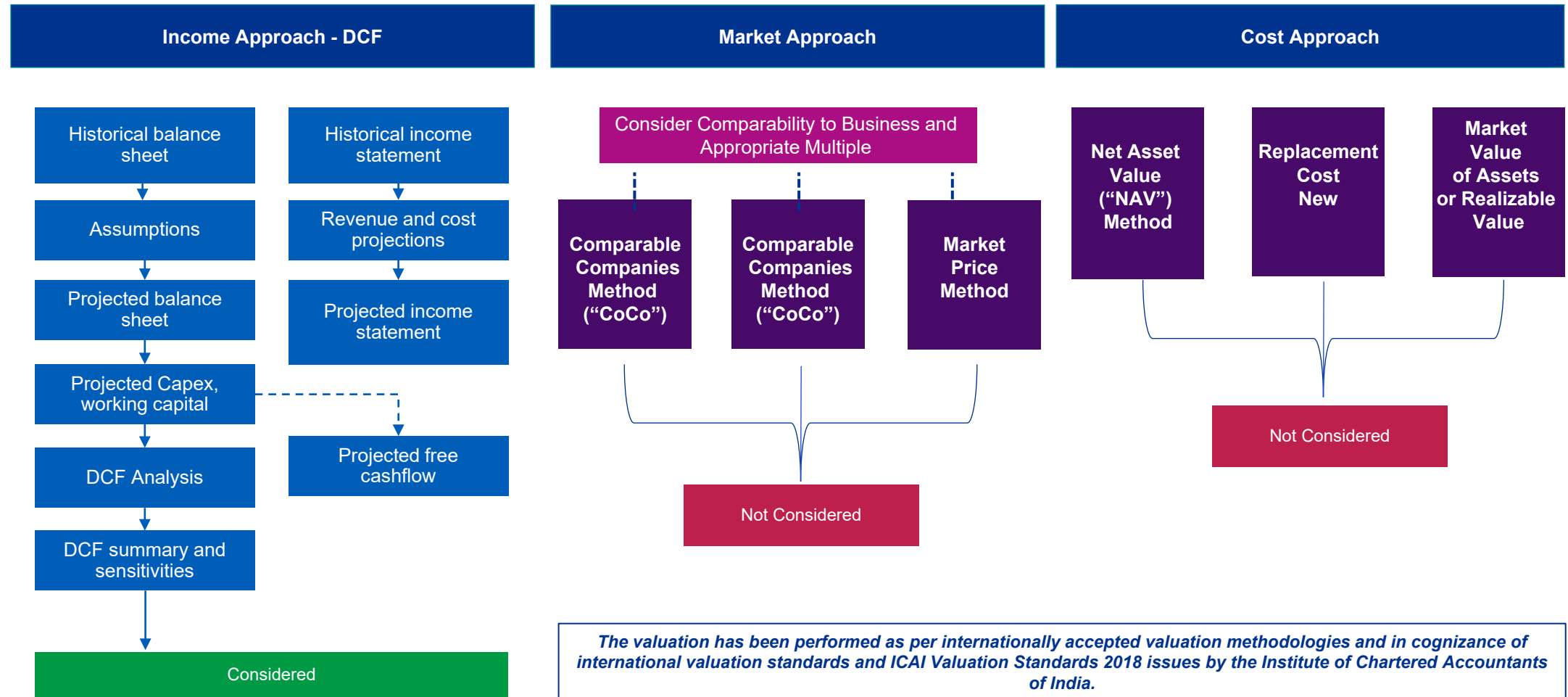
**3.**

# **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 Target, we have not computed a terminal value for the valuation of the Target
- 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 Target.

# 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 the Target.
- 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 the Target.



## 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 the Target 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 the Target as the Target is 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 Target, we have not computed a terminal value for the valuation of the Target.

## 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
$\beta$	=	the beta factor, being the measure of the systematic risk of a particular asset relative to the risk of a portfolio of all risky assets
$\alpha$	=	company specific risk factor (alpha)

# Summary - WACC

<p>Risk free rate (Rf) 7.2%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Equity risk premium 7%</p>	<ul style="list-style-type: none"> <li>Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India.</li> </ul>
<p>Relevered beta 1.01</p>	<ul style="list-style-type: none"> <li>Beta is a measure of the risk of the shares of a company. <math>\beta</math> 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.</li> <li>We have considered companies involved in the road operating industry and infrastructure investment trusts.</li> <li>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.</li> </ul>
<p>Cost of equity 14.3%</p>	<ul style="list-style-type: none"> <li>Based on above parameters cost of equity is 14.3%.</li> </ul>
<p>Post Tax Cost of Debt (Kd) 6.5 per cent</p>	<ul style="list-style-type: none"> <li>We have considered the average marginal cost of borrowing of 8.75 per cent as provided by Management.</li> <li>Based on a Pre-tax cost of debt of 8.75 per cent and tax rate of 25.17 per cent which is the tax rate applicable to the Target. Post-tax cost of debt is arrived at by multiplying pre-tax cost of debt by (1-Tax Rate).</li> </ul>
<p>WACC 9.64 per cent</p>	<ul style="list-style-type: none"> <li>Based on our analysis and discussion with management, we have considered a debt-to-equity ratio of 150%.</li> <li>Considering the above cost of equity of 14.3 per cent, the post-tax cost of debt of 6.5 per cent and the debt-to-equity ratio of 150%, the estimated weighted average cost of capital (WACC) is 9.64 per cent.</li> </ul>

Source: KPMG analysis, Capital IQ



# 4.

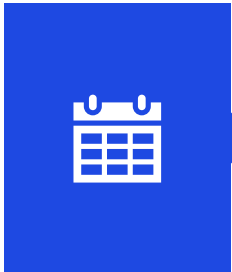
# Valuation of IKTPL

# Overview



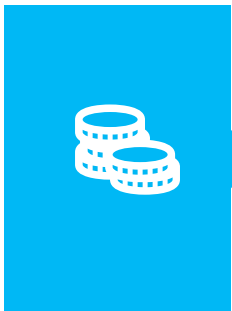
### Project details

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.

Source(s): Management information

## Highlights

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

## Shareholding as at 31 January 2024

Particulars	Stake %
<b>IRB Infrastructure Trust</b>	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.
- Management informed us that they are expected to make payment of upfront fee to authority in the fourth week of March 2024, post which they can begin tolling and operations. Thus, Management have assumed appointed date to be 01 April 2024 for IKTPL. We have relied on Management assumption and are considering appointed date as 01 April 2024. Considering the concession period of 20 years, the concession end date has been estimated as 31 March 2044. Thus, the explicit period for the current valuation exercise has been considered to be from 1 February 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 costs have been considered from a technical feasibility study performed by the Management. Given the technical nature of this study, review of the same is not part of our scope of work. Hence, We have considered the routine and periodic maintenance based on Management representation.

## 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 589 Cr in FY2024 and FY2025. Management represented that the cost primarily pertains to the upfront concession fee of INR 522 crores to be paid by IKTPL to NHAI. The remaining pertains to EPC cost and, preliminary and pre-operative cost.

Source(s): Management information





# Discounted Cash Flows (1/2)

Discounted Cash Flow											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		2 months	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
<b>EBITDA</b>	<b>[A]</b>	-	40	49	55	62	61	69	85	96	106
EBITDA margin		0%	65%	70%	72%	73%	66%	68%	77%	78%	80%
Depreciation		-	(11)	(12)	(13)	(15)	(16)	(18)	(20)	(21)	(24)
<b>EBIT</b>		-	29	37	42	47	45	51	66	74	83
EBIT margin		0%	47%	53%	54%	56%	48%	50%	59%	61%	62%
Less: Tax on EBIT	[B]		(3)	(5)	(6)	(8)	(8)	(10)	(14)	(17)	(19)
Change in working capital	[C]	(19)	-	-	-	19	-	-	-	-	-
Less : Capex	[D]	(531)	(58)	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>(550)</b>	<b>(21)</b>	<b>44</b>	<b>49</b>	<b>73</b>	<b>53</b>	<b>59</b>	<b>71</b>	<b>79</b>	<b>87</b>
Discounting period		0.083	0.667	1.667	2.667	3.667	4.667	5.667	6.667	7.667	8.667
Discount factor	[F]	0.992	0.940	0.858	0.782	0.714	0.651	0.594	0.541	0.494	0.450
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>(546)</b>	<b>(20)</b>	<b>38</b>	<b>38</b>	<b>52</b>	<b>35</b>	<b>35</b>	<b>39</b>	<b>39</b>	<b>39</b>

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
<b>EBITDA</b>	<b>[A]</b>	99	110	142	155	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)
<b>EBIT</b>	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)	(36)	(37)	(41)	(49)	(54)	(60)	(60)
Change in working capital	[C]	-	-	-	-	-	-	-	-	-	-
Less : Capex	[D]	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>81</b>	<b>90</b>	<b>114</b>	<b>123</b>	<b>135</b>	<b>138</b>	<b>152</b>	<b>175</b>	<b>190</b>	<b>207</b>
Discounting period	9.667	10.667	11.667	12.667	13.667	14.667	15.667	16.667	17.667	18.667	19.667
Discount factor	[F]	0.411	0.375	0.342	0.312	0.284	0.259	0.236	0.216	0.197	0.164
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>33</b>	<b>34</b>	<b>39</b>	<b>38</b>	<b>38</b>	<b>36</b>	<b>36</b>	<b>38</b>	<b>37</b>	<b>34</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	149
Present value of release of working capital	-
<b>Enterprise Valuation</b>	<b>149</b>
<b>WACC</b>	<b>9.64%</b>

Basis the above and using a WACC of 9.64%, the Enterprise Value of IKTPL on 31 January 2024 is INR 149 crore.

Refer page no 22 for detailed WACC analysis

**5.**

# **Valuation Conclusion**

# Valuation Conclusion

## Equity Value of Target

### Valuation conclusion

#### INR Crores

Present value of cash flows	149
<b>Enterprise Valuation</b>	<b>149</b>
Add: Net Cash/ Debt	-
<b>Equity Valuation</b>	<b>149</b>

*The Enterprise Value of the IKTPL is INR 149 crores. As represented by the Management, there is no surplus cash or debt outstanding as on Valuation Date. Hence, the 100% Equity Value of IKTPL is estimated to be INR 149 crores as on 31 January 2024.*

Source(s): Management information, KPMG analysis



**6.**

# **Annexures**

# Annexure 1: Sources of Information

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:

- Financial projections of IKTPL from 01 February 2024 till the end of the concession period
- Other data for IKTPL which is as follows –
  - Concession Agreement
  - Traffic report prepared by GMD consultants
- List of approvals, permits, licenses and litigations for IKTPL as at 31 January 2024.
- Management has provided Traffic consultant report prepared by GMD Consultants (appointed independently by Client) dated March 2024 for IKTPL. Management has confirmed that the traffic study shared are the most recent study available. Forecast revenue has been considered from the aforesaid traffic study report for the SPV. We have compared the revenue considered in the forecast model with the revenue forecasted in the traffic study report and noted that the Management has considered the pessimistic revenue scenario in their forecast.
- Management has informed us that as at Valuation Date there are no material balances in the financial statements of IKTPL, as IKTPL was incorporated in January 2024. We have relied on Management representation and are considering NIL opening balance sheet.
- Management informed us that they are expected to make payment of upfront fee to authority in the fourth week of March 2024, post which they can begin tolling and operations. Thus, Management have assumed appointed date to be 01 April 2024 for IKTPL. We have relied on Management assumption and considering appointed date as 01 April 2024.
- Management has informed us that routine and periodic maintenance for IKTPL has been considered from a technical feasibility study performed by the Management. Given the technical nature of this study, review of the same is not part of our scope of work. Hence, We have considered the routine and periodic maintenance based on Management representation
- The EPC costs and the preliminary and pre-operative expenses have been provided by the Management.
- 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; Ms. Shilpa Todankar; and Mr. Rushabh Gandhi.
- 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 2: Beta Computation

Beta computation 31 January 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	279,497	180,906	64.7%	39.3%	1.03	25.17%	0.63	150.0%	25.17%	1.34
PNC Infratech Limited	96,451	70,738	73.3%	42.3%	0.91	25.17%	0.59	150.0%	25.17%	1.24
Dilip Buildcon Limited	56,906	67,629	118.8%	54.3%	1.03	25.17%	0.55	150.0%	25.17%	1.16
Bharat Road Network Limited	5,558	13,693	246.4%	71.1%	1.10	25.17%	0.39	150.0%	25.17%	0.82
National Highways Infra Trust	na	na	na	na	na	na	na	na	na	na
India Infrastructure Trust	na	na	na	na	na	na	na	na	na	na
India Grid Trust	98,821	186,972	189.2%	65.4%	0.42	25.17%	0.17	150.0%	25.17%	0.37
Powergrid Infrastructure Investment Trust	88,963	5,721	6.4%	6.0%	0.43	25.17%	0.41	150.0%	25.17%	0.87
IRB InvIT Fund	40,180	30,380	75.6%	43.1%	0.43	25.17%	0.28	150.0%	25.17%	0.59
G R Infraprojects Limited	107,503	63,080	58.7%	37.0%	0.87	25.17%	0.60	150.0%	25.17%	1.28
<b>Median</b>			74.5%				0.48			<b>1.01</b>

**Note:**

(a) Market capitalization of comparable companies has been considered based on 3-month volume weighted average share prices till 31 January 2024.

(b) Beta has been computed based on 1-year daily average adjusted beta.

(c) Although, National Highway Infra Trust and India Infrastructure Trust are part of our comparable companies set, they has 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 3: Other disclosures as required under SEBI InvIT Regulations

The following disclosures are as at 31 January 2024 for the Target

1. **Valuation of the project in the previous 3 years:** Management has represented that no previous valuation of the project has been undertaken.
2. **List of one-time sanctions/approvals which are obtained or pending/ List of up to date/overdue periodic clearances:** Refer annexure 3a 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 3b for the aforementioned information.
4. **Purchase price of the project by the InvIT:** Not Applicable
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 the Target.
6. **Statement of assets:** Management has represented that there are no assets under the Target as on the Valuation Date.
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 Target.
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 Target.
9. **Latest pictures of the SPV:** Refer annexure 3c 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 Target 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 3a: One-time sanctions and approvals and overdue periodic clearances

Sr. No	Description	Remarks
a.	Permission of State Government for extraction of boulder from quarries	Not Applicable
b.	Permission of Village Panchayat and Pollution Control Board for installation of crushers	Not Applicable
c.	License for use of explosives	Not Required
d.	Permission of the 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 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 Panchayat & PCB for Asphalt Plant	
h.	Permission of Village Panchayat and State Government for Borrow Earth	
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 3b: Estimates of already carried as well as proposed major repairs and improvements

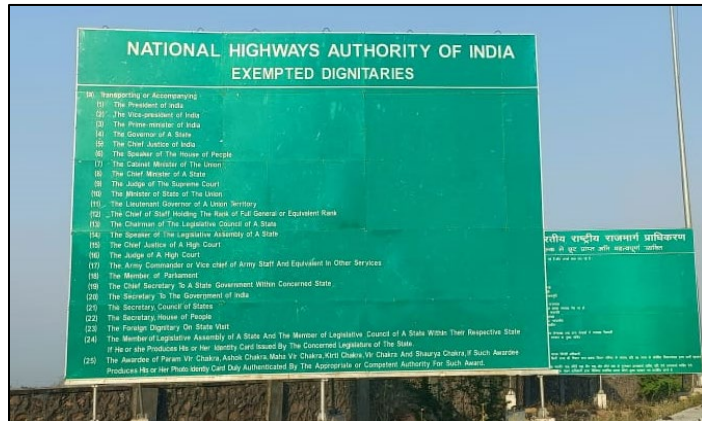
Estimate of already carried out as well as proposed major repairs										
INR Crore										
Name of SPV	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034
IRB Kota Tollway Pvt. Ltd.	2	-	-	-	8	8	-	-	-	19

Estimate of already carried out as well as proposed major repairs										
INR Crore										
Name of SPV	FY2035	FY2036	FY2037	FY2038	FY 2039	FY 2040	FY2041	FY2042	FY 2043	FY2044
IRB Kota Tollway Pvt. Ltd.	19	-	-	-	11	12	-	-	-	23

Source(s): Management information



# Annexure 3c: Site pictures



Source(s): Site visits

# 7.

# 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 Equity Valuation of IRB Kota Tollway Private Limited (“IKTPL” or “Target”) as on the agreed date of the valuation for the proposed rights issue 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 along with Addendum to the letter of engagement dated 01 March 2024 (together referred as “LoE”).
- The date of Valuation is 31 January 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 Target/ 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. We also understand from you that the Report may be included in the offer document for the rights issue and therefore, we understand that the Report may enter 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 Target 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 business plan of the Target for the period from 1 February 2024 to the end of the concession periods of the Target 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 Target, 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 Target. 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 Target. Our conclusion of value assumes that the title to the assets and liabilities of the Target 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.



[kpmg.com/socialmedia](https://kpmg.com/socialmedia)

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.

© 2024 KPMG Valuation Services LLP, an Indian limited liability partnership and a member firm of KPMG global organization of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

**Document Classification: KPMG Confidential**



# Security Cover

Valuation Report

—  
March 2024





# IRB Infrastructure Trust

Valuation of IRB Gwalior Tollway Private Limited

Valuation Report

—  
March 2024





**Strictly private and confidential**

08 March 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 along with Addendum to the letter of engagement dated 01<sup>st</sup> March 2024 (together referred as “LoE”), wherein KPMG Valuation Services LLP (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 Equity Valuation of IRB Gwalior Tollway Private Limited (“SPV” or “IGTPL” or “Target”) as on the agreed date of the valuation for the proposed rights issue. The valuation is to be conducted 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”).

KPMG is appointed as a registered valuer for the purpose of the Engagement (Registered valuer entity under Companies (Registered Valuers and Valuation) Rules, 2017 having IBBI Registration No. IBBI/RV-E/06/2020/115).

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

We hereby enclose our Valuation Report dated 08 March 2024. This is our deliverable and sets out KPMG’s conclusions on the valuation of the Target 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 Target (“Management”).

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 Target 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

<b>%</b>	Percentage	<b>IMF</b>	International Monetary Fund	<b>PV</b>	Present Value
<b>A</b>	Actual	<b>INR</b>	Indian Rupee	<b>R(f)</b>	Risk free rate of Return
<b>Adj.</b>	Adjusted	<b>InvIT</b>	Investment Trust	<b>R(m)</b>	Market rate of Return
<b>B</b>	Budgeted	<b>k</b>	Thousands	<b>Rf</b>	Risk-free Rate
<b>bn</b>	Billion	<b>Kd</b>	Cost of Debt	<b>SEBI</b>	Securities and Exchange Board of India
<b>CAGR</b>	Compounded Annual Growth Rate	<b>Ke</b>	Cost of Equity	<b>Sponsor</b>	IRB Infrastructure Developers Limited
<b>Capex</b>	Capital Expenditure	<b>Km</b>	Kilometer	<b>SPV</b>	Special Purpose Vehicle
<b>CoCo</b>	Comparable Companies	<b>KPMG</b>	KPMG Valuation Services LLP	<b>Valuation Date</b>	31 January 2024
<b>COD</b>	Commercial operation date	<b>LoE</b>	Letter of Engagement	<b>WACC</b>	Weighted Average Cost Of Capital
<b>CoTrans</b>	Comparable Transactions	<b>Management</b>	Management of Target	<b>WPI</b>	Wholesale Price Index
<b>Cr</b>	Crore	<b>MAT</b>	Minimum Alternate Tax	<b>y-o-y</b>	Year on year
<b>CWIP</b>	Capital Work In Progress	<b>mn</b>	Million	<b>YTD</b>	Year to date
<b>DBFOT</b>	Design, Build, Finance, Operate and Transfer	<b>MoRTH</b>	The Ministry of Road Transport and Highways		
<b>DCF</b>	Discounted Cash Flow	<b>n.a.</b>	Not applicable		
<b>EBIT</b>	Earnings Before Interest and Tax	<b>n.m.</b>	No Meaningful Figure		
<b>EBITDA</b>	Earnings Before Interest, Tax, Depreciation and Amortization	<b>NA</b>	Not applicable		
<b>EV</b>	Enterprise Value	<b>NAV</b>	Net Asset Value		
<b>FCFF</b>	Free Cash Flows to Firm	<b>NHAI</b>	National Highways Authority of India		
<b>FV</b>	Fair Value	<b>NHIDCL</b>	National Highway and Infrastructure Development Corporation Limited		
<b>FY</b>	Financial Year	<b>NWC</b>	Net Working Capital		
<b>IBEF</b>	India Brand Equity Foundation	<b>O&amp;M</b>	Operation and Maintenance		
<b>IGTPL</b>	IRB Gwalior Tollway Private Limited	<b>PAT</b>	Profit After Tax		
		<b>PBT</b>	Profit Before Tax		
		<b>PIB</b>	Press Information Bureau		

# Contents

<b>Executive Summary</b>	6
<b>Industry Overview</b>	9
<b>Valuation Methodology and Approach</b>	14
• Valuation Methodology and Approach	15
• WACC Analysis	20
<b>Valuation of IGTPL</b>	23
<b>Valuation Conclusion</b>	28
<b>Annexures</b>	30
<b>Scope &amp; Limitations</b>	37





**1.**

# **Executive Summary**

# Overview

## Terms of the Engagement

- We have been appointed by IRBI Trust to undertake Equity Valuation of IRB Gwalior Tollway Private Limited (“IGTPL” or “Target”)
- The Valuation shall be undertaken 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 January 2024. This report has been prepared by KPMG pursuant to terms of LoE.

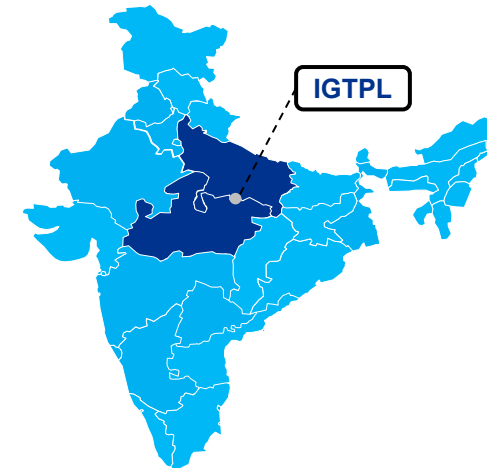
## IRBI Trust Overview

- 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.
- The object and purpose of IRBI Trust is to carry on the activity of an infrastructure investment trust under the InvIT regulations. Investment by 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.
- IRBI Trust is held by IRBIDL as sponsor with 51% stake and remaining 49% stake is held by GIC through its affiliates.
- We understand that IRBI Trust is contemplating a rights issue, to fund the upfront fee payments of three new road projects, including the Target.
- As of 31<sup>st</sup> January 2024, IRBI Trust owns stake in 15 SPVs, including the Target.

Source(s): Management information, IRBI Trust website, KPMG Analysis

## SPV Overview

- IRBI Trust has acquired Toll, Operate and Transfer (“TOT”) rights from the NHA1 to operate Gwalior – Jhansi section from 16.0 km to 98.5 km of NH75 stretching across Madhya Pradesh and Uttar Pradesh, for an upfront concession fee of INR 1,161 crores.
- The concession agreement for the project was executed between IRBI Trust and NHA1 on 12<sup>th</sup> January 2024.
- For the duration of the concession period, the SPV is required to maintain and operate the tollway and carry out repair and refurbishment whenever required.



## Valuation Approach and Methodology

Approach	Method
Income Approach	Discounted Cash Flow Method (DCF)

# Valuation Conclusion

## Equity Value of Target

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	90
<b>Enterprise Valuation</b>	<b>90</b>
Add: Net Cash/ Debt	-
<b>Equity Valuation</b>	<b>90</b>

*The Enterprise Value of the IGTPPL is INR 90 crores. As represented by the Management, there is no surplus cash or debt outstanding as on Valuation Date. Hence, the 100% Equity Value of IGTPPL is estimated to be INR 90 crores as on 31 January 2024.*

Source(s): Management information, KPMG analysis



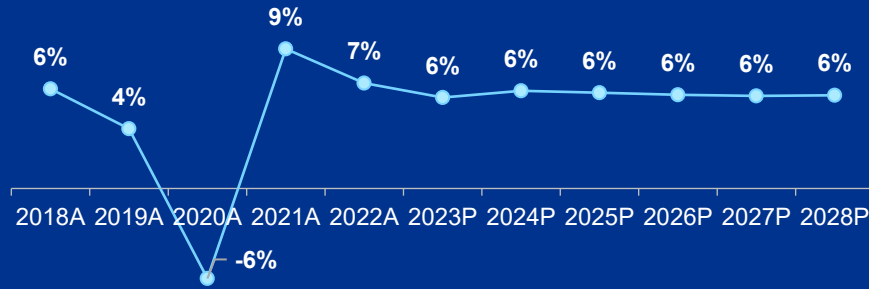
**2.**

# **Industry Overview**

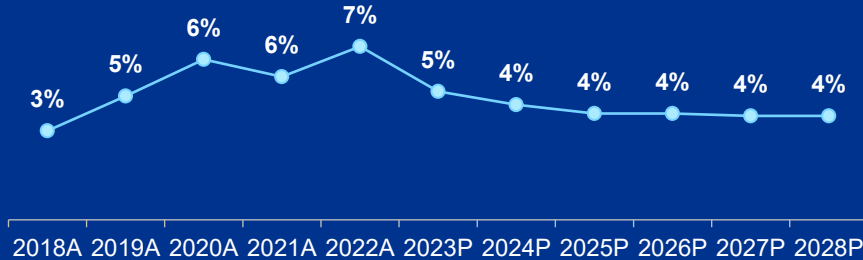
# Indian Economy Outlook

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 (%)



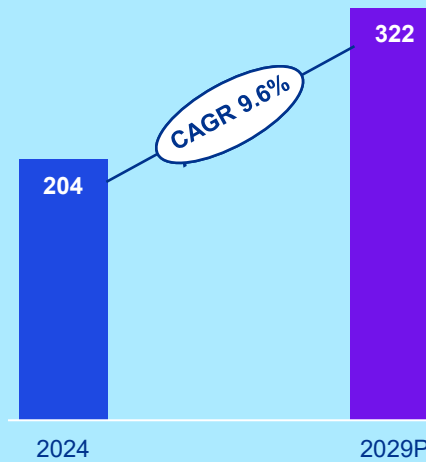
Source(s): International Monetary Fund ("IMF"), India Brand Equity Foundation ("IBEF"), Modor intelligence, EMIS

## 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.

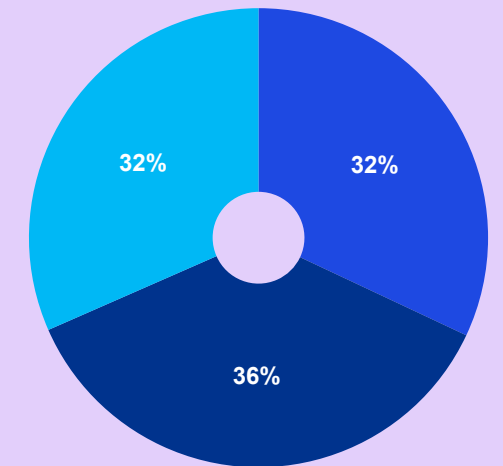
Capital investment outlay for infrastructure is being increased by 33 per cent, which would be 3.3 per cent of GDP and almost three times the outlay in 2019-20.

India Infrastructure market (USD billion)



## Construction Industry

Market segmentation of India's Construction industry (2022)



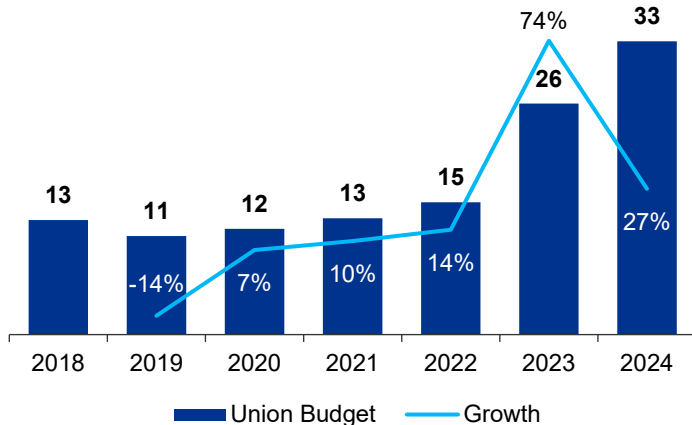
- Infrastructure construction
- Residential construction
- Commercial and special economic zones

# 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)



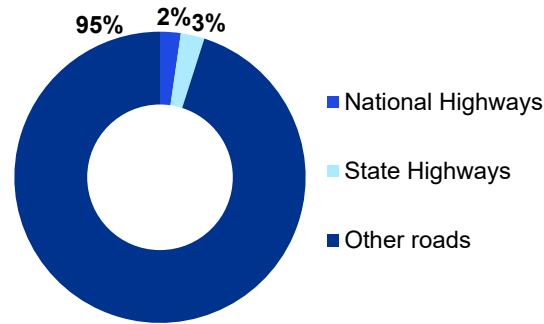
\*2023 data is as of 30 December 2022

Source(s): MoRTH, IBEF, Invest India

# 2<sup>nd</sup>

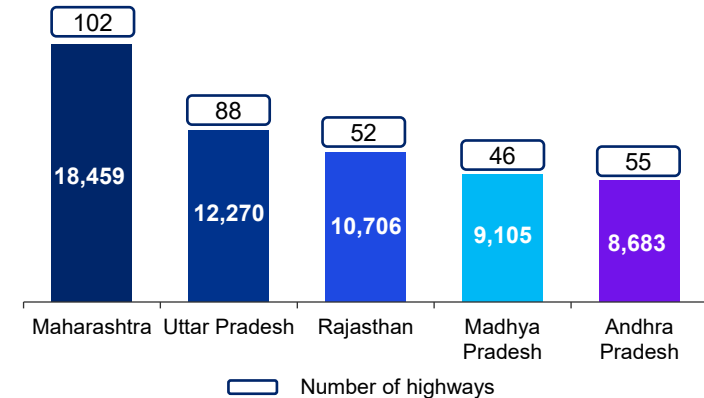
India has the second largest road network in the world of about 67 lakh km. This comprises National Highways, Expressways, State Highways, District Roads, Other District Roads and Village Roads.

### 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)

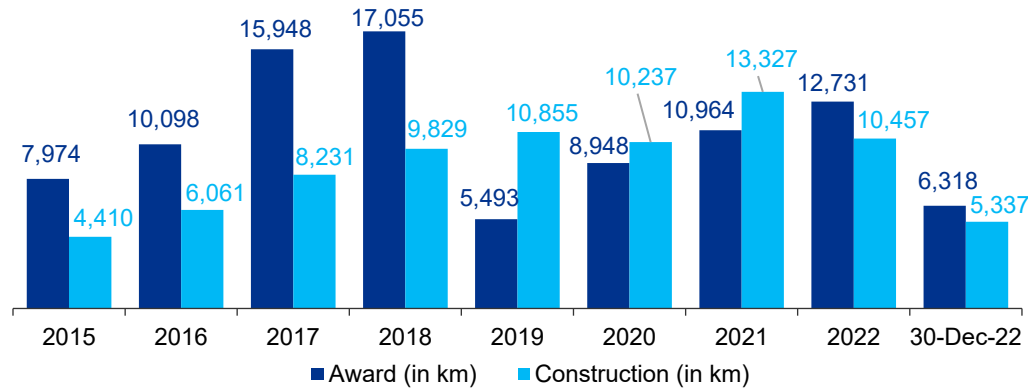
# 36.2%

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

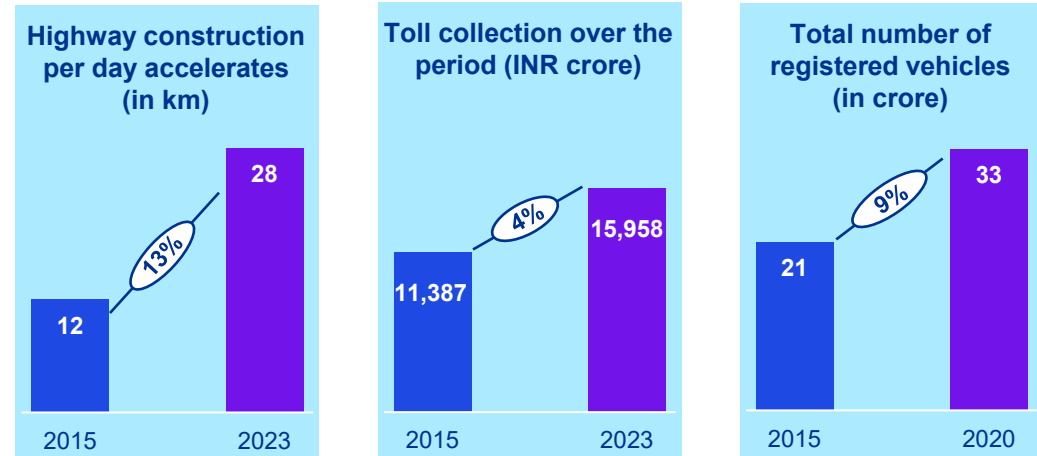
## Toll operations efficiency increased due to adoption and growth of FASTag

7.9 Cr

As of 30<sup>th</sup> 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

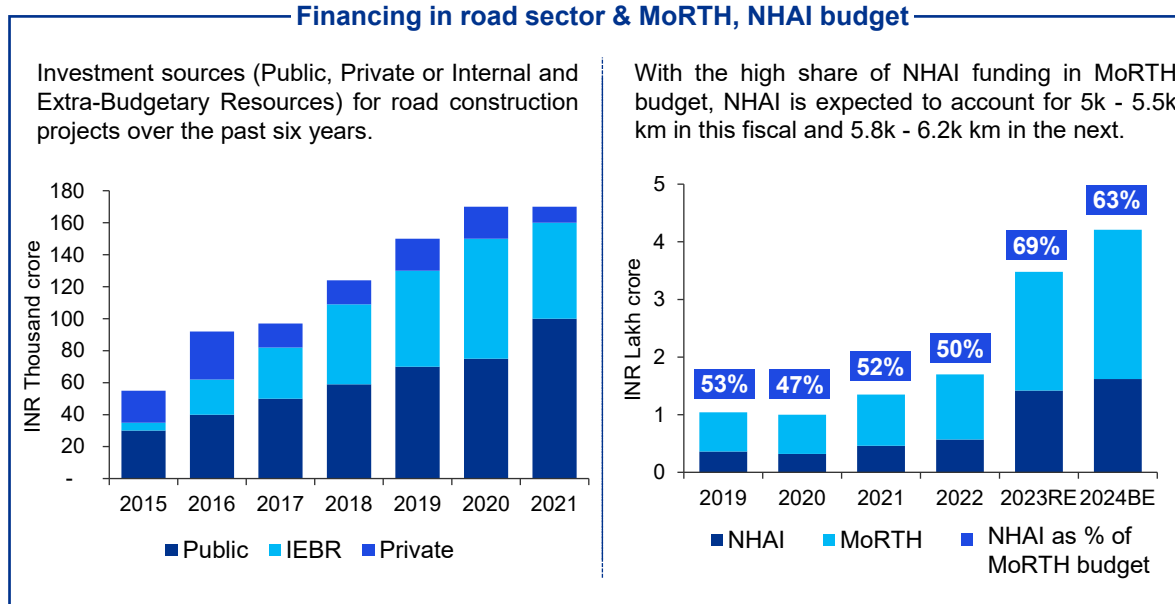
Investment in road infrastructure is long-term and returns are seen several years after construction. Roads and highways are financed through Government and private sources. Funding from Government sources includes budgetary allocations.

## 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 NHAI

### a. Engineering Procurement & Construction

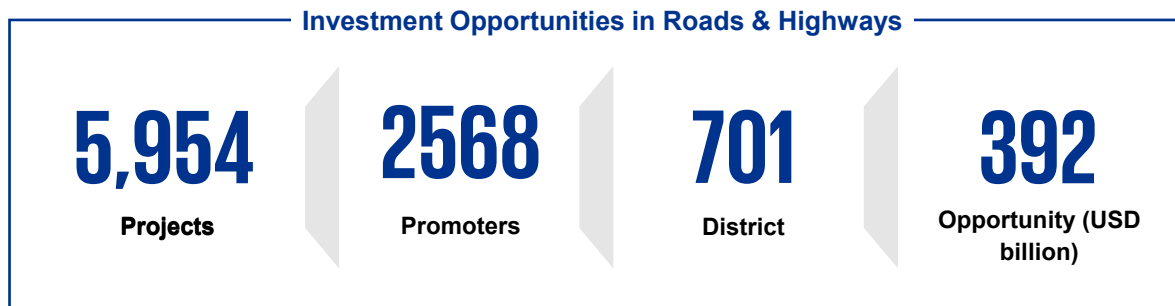
Under the EPC model, Government pays private players to lay roads. The private player has no role in the road's ownership, toll collection or maintenance.

### 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, NHAI 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

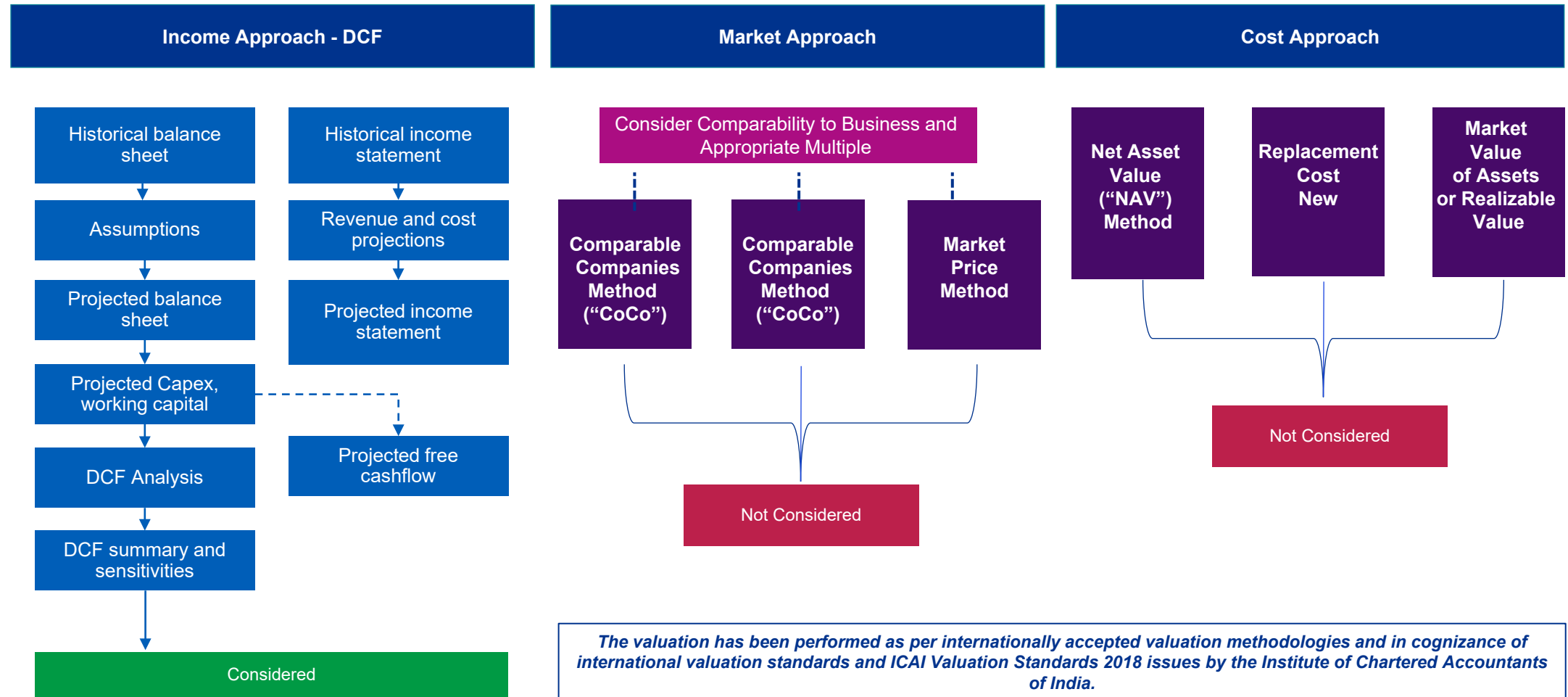
**3.**

# **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 Target, we have not computed a terminal value for the valuation of the Target
- 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 Target.

# 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 the Target.
- 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 the Target.



## 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 the Target 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 the Target as the Target is 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 Target, we have not computed a terminal value for the valuation of the Target.

## 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
$\beta$	=	the beta factor, being the measure of the systematic risk of a particular asset relative to the risk of a portfolio of all risky assets
$\alpha$	=	company specific risk factor (alpha)

# Summary - WACC

<p>Risk free rate (Rf) 7.2%</p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<p>Equity risk premium 7%</p>	<ul style="list-style-type: none"> <li>Equity risk premium is estimated based on KPMG's understanding of prevailing market return in India.</li> </ul>
<p>Relevered beta 1.01</p>	<ul style="list-style-type: none"> <li>Beta is a measure of the risk of the shares of a company. <math>\beta</math> 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.</li> <li>We have considered companies involved in the road operating industry and infrastructure investment trusts.</li> <li>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.</li> </ul>
<p>Cost of equity 14.3%</p>	<ul style="list-style-type: none"> <li>Based on above parameters cost of equity is 14.3%.</li> </ul>
<p>Post Tax Cost of Debt (Kd) 6.5 per cent</p>	<ul style="list-style-type: none"> <li>We have considered the average marginal cost of borrowing of 8.75 per cent as provided by Management.</li> <li>Based on a Pre-tax cost of debt of 8.75 per cent and tax rate of 25.17 per cent which is the tax rate applicable to the Target. Post-tax cost of debt is arrived at by multiplying pre-tax cost of debt by (1-Tax Rate).</li> </ul>
<p>WACC 9.64 per cent</p>	<ul style="list-style-type: none"> <li>Based on our analysis and discussion with management, we have considered a debt-to-equity ratio of 150%.</li> <li>Considering the above cost of equity of 14.3 per cent, the post-tax cost of debt of 6.5 per cent and the debt-to-equity ratio of 150%, the estimated weighted average cost of capital (WACC) is 9.64 per cent.</li> </ul>

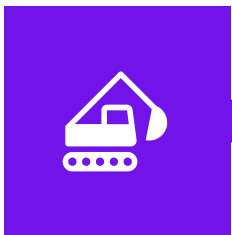
Source: KPMG analysis, Capital IQ



4.

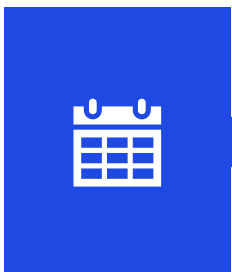
# Valuation of IGTPL

# Overview



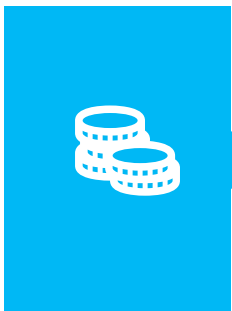
### Project details

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, IGTPL is required to pay INR 1,161 crores as upfront concession fee to NHAI.

Source(s): Management information

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

Shareholding as at 31 January 2024	
Particulars	Stake %
<b>IRB Infrastructure Trust</b>	100%

# Key Assumptions

## a. Modification in concession period

- Article 24 of the concession agreement of IGTPL 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.
- Management informed us that they are expected to make payment of upfront fee to authority in the fourth week of March 2024, post which they can begin tolling and operations. Thus, Management have assumed appointed date to be 01 April 2024 for IGTPL. We have relied on Management assumption and are considering appointed date as 01 April 2024. Considering the concession period of 20 years, the concession end date has been estimated as 31 March 2044. Thus, the explicit period for the current valuation exercise has been considered to be from 1 February 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 costs have been considered from a technical feasibility study performed by the Management. Given the technical nature of this study, review of the same is not part of our scope of work. Hence, We have considered the routine and periodic maintenance based on Management representation.

## 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 1,249 Cr in FY2024 and FY2025. Management represented that the cost primarily pertains to the upfront concession fee of INR 1,161 crore to be paid by IGTPL to NHAI. The remaining pertains to EPC cost and, preliminary and pre-operative cost.

Source(s): Management information



# Discounted Cash Flows (1/2)

Discounted Cash Flow											
		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
INR crores		2 months	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
<b>EBITDA</b>	<b>[A]</b>	-	97	110	110	101	109	110	110	180	198
EBITDA margin		0%	86%	87%	79%	66%	65%	61%	55%	82%	83%
Depreciation		-	(24)	(26)	(29)	(32)	(36)	(39)	(42)	(47)	(51)
<b>EBIT</b>		-	73	83	81	69	74	72	68	133	147
EBIT margin		0%	65%	66%	58%	45%	44%	39%	34%	61%	62%
Less: Tax on EBIT	[B]		(9)	(12)	(12)	(10)	(12)	(12)	(12)	(29)	(34)
Change in working capital	[C]	(39)	-	-	-	39	-	-	-	-	-
Less : Capex	[D]	(1,181)	(68)								
<b>Free cash flows to the firm</b>	<b>E = [A+B+C+D]</b>	<b>(1,220)</b>	<b>20</b>	<b>98</b>	<b>98</b>	<b>131</b>	<b>98</b>	<b>98</b>	<b>98</b>	<b>150</b>	<b>164</b>
Discounting period		0.083	0.667	1.667	2.667	3.667	4.667	5.667	6.667	7.667	8.667
Discount factor	[F]	0.992	0.940	0.858	0.782	0.714	0.651	0.594	0.541	0.494	0.450
<b>Present value of cash flows</b>	<b>[E*F]</b>	<b>(1,211)</b>	<b>18</b>	<b>84</b>	<b>77</b>	<b>93</b>	<b>63</b>	<b>58</b>	<b>53</b>	<b>74</b>	<b>74</b>

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
<b>EBITDA</b> [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)
<b>EBIT</b>	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]	-	-	-	-	-	-	-	-	-	-	-
<b>Free cash flows to the firm E = [A+B+C+D]</b>	<b>172</b>	<b>179</b>	<b>195</b>	<b>200</b>	<b>208</b>	<b>267</b>	<b>289</b>	<b>295</b>	<b>311</b>	<b>332</b>	<b>351</b>
Discounting period	9.667	10.667	11.667	12.667	13.667	14.667	15.667	16.667	17.667	18.667	19.667
Discount factor [F]	0.411	0.375	0.342	0.312	0.284	0.259	0.236	0.216	0.197	0.179	0.164
<b>Present value of cash flows [E*F]</b>	<b>71</b>	<b>67</b>	<b>67</b>	<b>62</b>	<b>59</b>	<b>69</b>	<b>68</b>	<b>64</b>	<b>61</b>	<b>60</b>	<b>57</b>

Source(s): Management information, KPMG analysis

Valuation conclusion	
<b>INR Crores</b>	
Present value of cash flows	90
Present value of release of working capital	-
<b>Enterprise Valuation</b>	<b>90</b>

<b>WACC</b>	<b>9.64%</b>
-------------	--------------

Basis the above and using a WACC of 9.64%, the Enterprise Value of IGTPL on 31 January 2024 is INR 90 crore.

Refer page no 22 for detailed WACC analysis

**5.**

# **Valuation Conclusion**

# Valuation Conclusion

## Equity Value of Target

Valuation conclusion	
INR Crores	
Present value of cash flows	90
<b>Enterprise Valuation</b>	<b>90</b>
Add: Net Cash/ Debt	-
<b>Equity Valuation</b>	<b>90</b>

*The Enterprise Value of the IGTPPL is INR 90 crores. As represented by the Management, there is no surplus cash or debt outstanding as on Valuation Date. Hence, the 100% Equity Value of IGTPPL is estimated to be INR 90 crores as on 31 January 2024.*

Source(s): Management information, KPMG analysis



**6.**

# **Annexures**

# Annexure 1: Sources of Information

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:

- Financial projections of IGTPPL from 01 February 2024 till the end of the concession period
- Other data for IGTPPL which is as follows –
  - Concession Agreement
  - Traffic Report prepared by GMD consultants
- List of approvals, permits, licenses and litigations for IGTPPL as at 31 January 2024.
- Management has provided Traffic consultant report prepared by GMD Consultants (appointed independently by Client) dated March 2024 for IGTPPL. Management has confirmed that the traffic study shared are the most recent study available. Forecast revenue has been considered from the aforesaid traffic study report for the SPV. We have compared the revenue considered in the forecast model with the revenue forecasted in the traffic study report and noted that the Management has considered the pessimistic revenue scenario in their forecast.
- Management has informed us that as at Valuation Date there are no material balances in the financial statements of IGTPPL, as IGTPPL was incorporated in January 2024. We have relied on Management representation and are considering NIL assets and liabilities as on Valuation Date.
- Management informed us that they are expected to make payment of upfront fee to authority in the fourth week of March 2024, post which they can begin tolling and operations. Thus, Management have assumed appointed date to be 01 April 2024 for IGTPPL. We have relied on Management assumption and considering appointed date as 01 April 2024.
- Management has informed us that routine and periodic maintenance for IGTPPL has been considered from a technical feasibility study performed by the Management. Based on article 5 of the concession agreement we understand that O&M obligation for IGTPPL will begin from June 2027. Given the technical nature of this study, review of the same is not part of our scope of work. Hence, We have considered the routine and periodic maintenance based on Management representation
- The EPC costs and the preliminary and pre-operative expenses have been provided by the Management.
- 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; Ms. Shilpa Todankar; and Mr. Rushabh Gandhi.
- 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 2: Beta Computation

Beta computation 31 January 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	279,497	180,906	64.7%	39.3%	1.03	25.17%	0.63	150.0%	25.17%	1.34
PNC Infratech Limited	96,451	70,738	73.3%	42.3%	0.91	25.17%	0.59	150.0%	25.17%	1.24
Dilip Buildcon Limited	56,906	67,629	118.8%	54.3%	1.03	25.17%	0.55	150.0%	25.17%	1.16
Bharat Road Network Limited	5,558	13,693	246.4%	71.1%	1.10	25.17%	0.39	150.0%	25.17%	0.82
National Highways Infra Trust	na	na	na	na	na	na	na	na	na	na
India Infrastructure Trust	na	na	na	na	na	na	na	na	na	na
India Grid Trust	98,821	186,972	189.2%	65.4%	0.42	25.17%	0.17	150.0%	25.17%	0.37
Powergrid Infrastructure Investment Trust	88,963	5,721	6.4%	6.0%	0.43	25.17%	0.41	150.0%	25.17%	0.87
IRB InvIT Fund	40,180	30,380	75.6%	43.1%	0.43	25.17%	0.28	150.0%	25.17%	0.59
G R Infraprojects Limited	107,503	63,080	58.7%	37.0%	0.87	25.17%	0.60	150.0%	25.17%	1.28
<b>Median</b>			74.5%				0.48			<b>1.01</b>

Note:

(a) Market capitalization of comparable companies has been considered based on 3-month volume weighted average share prices till 31 January 2024.

(b) Beta has been computed based on 1-year daily average adjusted beta.

(c) Although, National Highway Infra Trust and India Infrastructure Trust are part of our comparable companies set, they has 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 3: Other disclosures as required under SEBI InvIT Regulations

The following disclosures are as at 31 January 2024 for the Target

1. **Valuation of the project in the previous 3 years:** Management has represented that no previous valuation of the project has been undertaken.
2. **List of one-time sanctions/approvals which are obtained or pending/ List of up to date/overdue periodic clearances:** Refer annexure 3a 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 3b for the aforementioned information.
4. **Purchase price of the project by the InvIT:** Not Applicable
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 the Target.
6. **Statement of assets:** Management has represented that there are no assets under the Target as on the Valuation Date.
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 Target.
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 Target.
9. **Latest pictures of the SPV:** Refer annexure 3c 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 Target 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 3a: One-time sanctions and approvals and overdue periodic clearances

Sr. No	Description	Remarks
a.	Permission of State Government for extraction of boulder from quarries	Not Applicable
b.	Permission of Village Panchayat and Pollution Control Board for installation of crushers	Not Applicable
c.	License for use of explosives	Not Required
d.	Permission of the 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 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 Panchayat & PCB for Asphalt Plant	
h.	Permission of Village Panchayat and State Government for Borrow Earth	
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 3b: Estimates of already carried as well as proposed major repairs and improvements

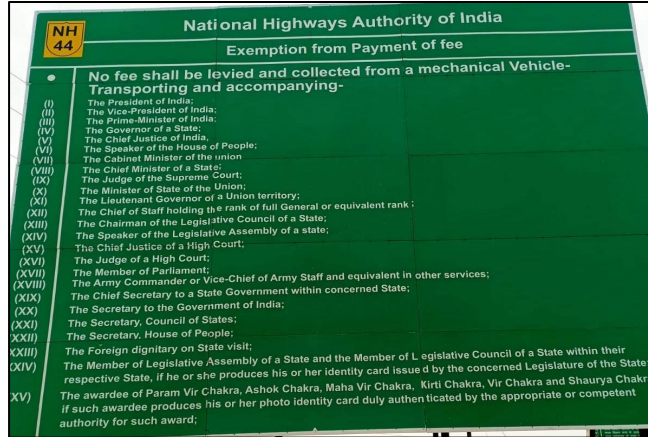
Estimate of already carried out as well as proposed major repairs										
INR Crore										
Name of SPV	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034
IRB Gwalior Tollway Pvt. Ltd.	0	-	11	22	23	36	52	-	-	11

Estimate of already carried out as well as proposed major repairs										
INR Crore										
Name of SPV	FY2035	FY2036	FY2037	FY2038	FY 2039	FY 2040	FY2041	FY2042	FY 2043	FY2044
IRB Gwalior Tollway Pvt. Ltd.	21	22	35	50	-	-	26	38	49	61

Source(s): Management information



# Annexure 3c: Site pictures



NH 44 भारतीय राष्ट्रीय राजमार्ग प्राधिकरण		
वाहन का प्रकार	एक मार्गीय यात्रा के लिए शुल्क	वापसी यात्रा शुल्क निर्धारित समय में
कार/ऑपेन वैन का हल्के वाहन (कुल वजन 7500 किलो तक)	140	210
हल्के वाणिज्यिक वाहन का फिरी वाहन (कुल वजन 7500 किलो से अधिक व 12000 किलो तक)	225	340
बस/ट्रक (टी एक्सस) (कुल वजन 12000 किलो से अधिक व 16200 किलो तक)	475	710
वाणिज्यिक वाहन (टीन एक्सस) (कुल वजन 16200 किलो से अधिक व 25000 किलो तक)	515	775
हवी कम्प्लेक्स मशीनरी/अर्थ मूविंग मशीनरी/बहुयुगीय वाहन (वार से ठे: एक्सस) (कुल वजन 25000 किलो से अधिक व 54200 किलो तक)	745	1115
सामान्य से अधिक बड़े वाहन (लस व अधिक एक्सस) (कुल वजन 54200 किलो से अधिक)	905	1355



Source(s): Site visits

# 7.

# 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 Equity Valuation of IRB Gwalior Tollway Private Limited (“IGTPL” or “Target”) as on the agreed date of the valuation for the proposed rights issue 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 along with Addendum to the letter of engagement dated 01 March 2024 (together referred as “LoE”).
- The date of Valuation is 31 January 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 Target/ 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. We also understand from you that the Report may be included in the offer document for the rights issue and therefore, we understand that the Report may enter 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 Target 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 business plan of the Target for the period from 1 February 2024 to the end of the concession periods of the Target 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 Target, 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 Target. 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 Target. Our conclusion of value assumes that the title to the assets and liabilities of the Target 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.





[kpmg.com/socialmedia](https://kpmg.com/socialmedia)

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.

© 2024 KPMG Valuation Services LLP, an Indian limited liability partnership and a member firm of KPMG global organization of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

**Document Classification: KPMG Confidential**

**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)**



**GMD Consultants**

503, Mayuresh Chambers, Plot No. 60, Sector -11,  
CBD Belapur, Navi Mumbai. 400 614. Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**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)**

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

**MARCH 2024**



# CONTENTS

<b>Contents .....</b>	<b>1</b>
<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.3 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS .....</b>	<b>9</b>
2.1 Project Corridor.....	9
<b>Chapter 3 .....</b>	<b>10</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>10</b>
3.1 Traffic Surveys .....	10
3.2 Classified Traffic Volume.....	11
3.3 Traffic Characteristic .....	12
3.3.1 Traffic Data .....	12
3.4 Data Analysis.....	15
3.4.1 Analysis of Traffic Volume Count .....	15
3.4.2 Components of Traffic.....	17
3.5 Secondary Data Collection .....	22
<b>Chapter 4 .....</b>	<b>24</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>24</b>
4.1 Introduction.....	24
4.2 Regional Network.....	24
<b>Chapter 5 .....</b>	<b>26</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>26</b>
5.1 Introduction.....	26
5.2 Trend Analysis.....	26
5.3 Estimation of Traffic Demand Elasticity.....	27
5.4 Other Factors Influencing Growth.....	35
5.5 Developments along and around the Project Corridor & State.....	36
5.6 Recommended Growth Rates of Traffic .....	37
5.6.1 Recommended Growth Rates of Traffic for Madhya Pradesh Part of Stretch .....	38
<b>Chapter 6 .....</b>	<b>39</b>

TRAFFIC FORECAST.....	39
6.1 Traffic Projections .....	39
<b>Chapter 7 .....</b>	<b>48</b>
FORECAST OF TOLL REVENUE .....	48
7.1 General.....	48
7.2 Discount Categories .....	48
7.3 Estimation of Toll Rates .....	49
7.4 Toll Revenue .....	54
7.5 Toll Revenue at all toll plazas under Scenarios .....	54
7.6 Modification in Concession Period .....	57
<b>Chapter 8 .....</b>	<b>60</b>
CONCLUSION & RECOMMENDATIONS .....	60
8.1 Conclusion & Recommendations .....	60

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	12
Table 3-3 : Traffic Data at Malthone Toll Plaza at Km 142.319 .....	13
Table 3-4 : Traffic Data at Chitora Toll Plaza at Km 226.740 .....	13
Table 3-5 : Traffic Data at Titarpani Toll Plaza at Km 295.000 .....	14
Table 3-6 : Traffic Data at Bakori Toll Plaza at Km 357.739 .....	15
Table 3-7 : PCU Factors Adopted for Study .....	15
Table 3-8 : Traffic in PCU at Project Stretch .....	16
Table 3-9 : Journey Type factor at Malthone Toll Plaza KM 142.319 .....	20
Table 3-10 : Journey Type factor at Chitora Toll Plaza KM 226.740 .....	21
Table 3-11 : Journey Type factor at Titarpani Toll Plaza KM 295.000 .....	21
Table 3-12 : Journey Type factor at Bakori Toll Plaza KM 357.739 .....	22
Table 5-1 : Per Capita Income Vs Car Madhya Pradesh .....	27
Table 5-2 : Population Vs Bus Madhya Pradesh .....	28
Table 5-3 : Trucks Traffic Vs NSDP Madhya Pradesh .....	29
Table 5-4 : Summary Regression Analysis Madhya Pradesh .....	30
Table 5-5 : Per Capita Income Vs Car Uttar Pradesh .....	30
Table 5-6 : Population Vs Bus Uttar Pradesh .....	31
Table 5-7 : Trucks Traffic Vs NSDP Uttar Pradesh .....	31
Table 5-8 : Summary Regression Analysis Uttar Pradesh .....	32
Table 5-9 : Per Capita Income Vs Car Rajasthan .....	33
Table 5-10 : Population Vs Bus Rajasthan .....	33
Table 5-11 : Trucks Traffic Vs NSDP Rajasthan .....	34
Table 5-12 : Summary Regression Analysis Rajasthan .....	35
Table 5-13 : Recommended Growth Rates Optimistic .....	38
Table 5-14 : Recommended Growth Rates Pessimistic .....	38
Table 5-15 : Recommended Growth Rates Most Likely .....	38
Table 6-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.319 KM .....	39
Table 6-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 226.740 KM .....	40
Table 6-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 295.000 KM .....	41
Table 6-4 : Total Tollable Traffic @ Toll Plaza 4- Chainage 357.739 KM .....	41
Table 6-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.319 KM .....	42

Table 6-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 226.740 KM .....	42
Table 6-7 : Total Tollable Traffic @ Toll Plaza 3- Chainage 295.000 KM .....	43
Table 6-8 : Total Tollable Traffic @ Toll Plaza 4- Chainage 357.739 KM .....	44
Table 6-9 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.319 KM .....	44
Table 6-10 : Total Tollable Traffic @ Toll Plaza 2- Chainage 226.740 KM .....	45
Table 6-11 : Total Tollable Traffic @ Toll Plaza 3- Chainage 295.000 KM .....	46
Table 6-12 : Total Tollable Traffic @ Toll Plaza 4- Chainage 357.739 KM .....	46
Table 7-1 : Base Toll Rates June 2007-08 .....	49
Table 7-2 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 142.319.....	50
Table 7-3 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 142.319 .....	50
Table 7-4 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 226.740.....	51
Table 7-5 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 226.740 .....	51
Table 7-6 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 295.000.....	52
Table 7-7 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 295.000 .....	52
Table 7-8 : Toll Rates for Year 2022-23 (Rs. Rupees) @ Km 357.739.....	53
Table 7-9 : Toll Rates for Forecasting Year (Rs. Rupees) @ Km 357.739 .....	54
Table 7-10 : Toll Revenue Optimistic Scenario .....	54
Table 7-11 : Toll Revenue Pessimistic Scenario .....	55
Table 7-12 : Toll Revenue Most Likely Scenario .....	56



## LIST OF FIGURES

<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	<i>9</i>
<i>Figure 3-1 : Comparison of PCU Index.....</i>	<i>17</i>
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh .....</i>	<i>28</i>
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh.....</i>	<i>28</i>
<i>Figure 5-3 : Regression and Elasticity Trucks vs. NSDP – Extrapolation Madhya Pradesh.....</i>	<i>29</i>
<i>Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh .....</i>	<i>31</i>
<i>Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh.....</i>	<i>31</i>
<i>Figure 5-6 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Uttar Pradesh. ....</i>	<i>32</i>
<i>Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	<i>33</i>
<i>Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	<i>34</i>
<i>Figure 5-9 : Regression and Elasticity NSDP vs. Trucks – Extrapolation Rajasthan.....</i>	<i>34</i>
<i>Figure 5-10 : Growth of GDP in India.....</i>	<i>36</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>49</i>

## ABBREVIATIONS

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

# CHAPTER 1

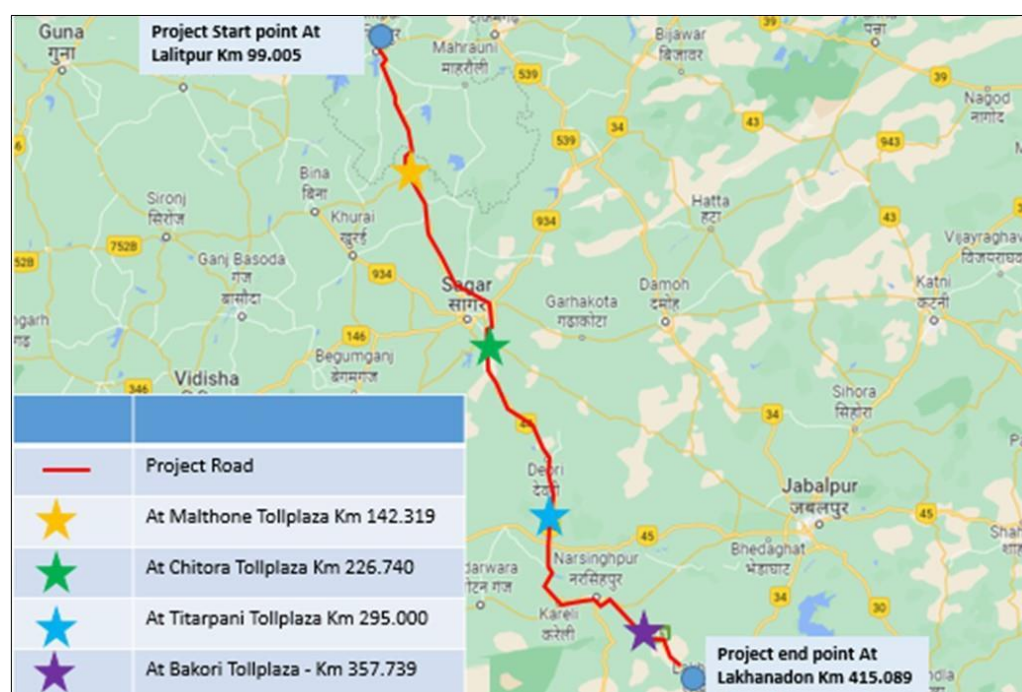
## INTRODUCTION

### 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

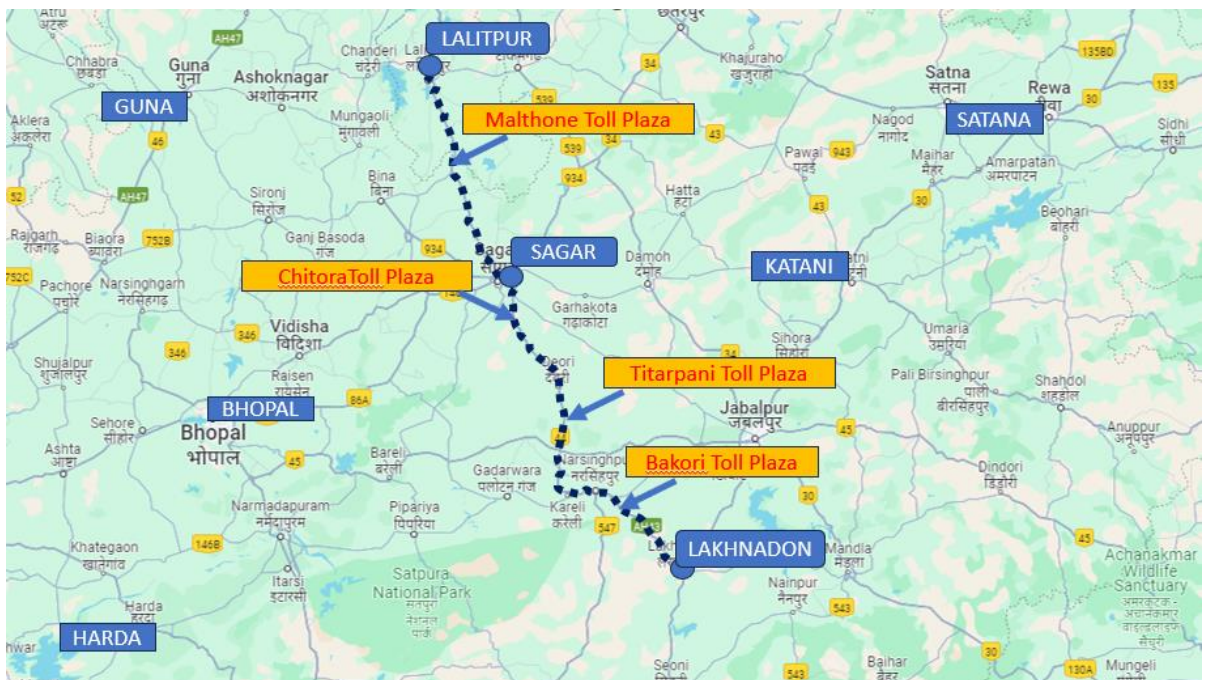
#### 2.1 Project Corridor

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	<b>Km 142.319 Toll Plaza at Malthone</b>	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	<b>Km 226.740 Toll Plaza at Chitora</b>	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	<b>Km 295.000 Toll Plaza at Titarpani</b>	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	<b>Km 357.739 Toll Plaza at Bakori</b>	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
	<b>Total</b>	<b>5589</b>

**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
	<b>Total</b>	<b>6,367</b>

*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
	<b>Total</b>	<b>6,127</b>

**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
	<b>Total</b>	<b>5,333</b>

### 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

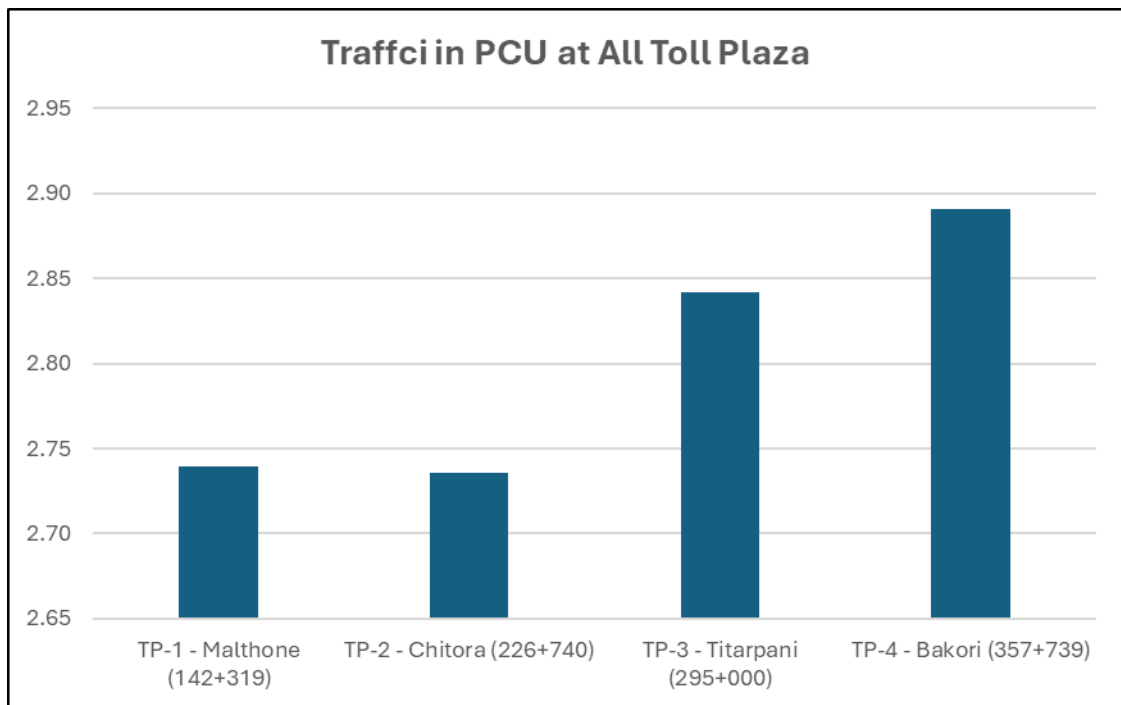
Source: IRC: 64-1990

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
<b>2022 – 2023 (Base Year)</b>	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.

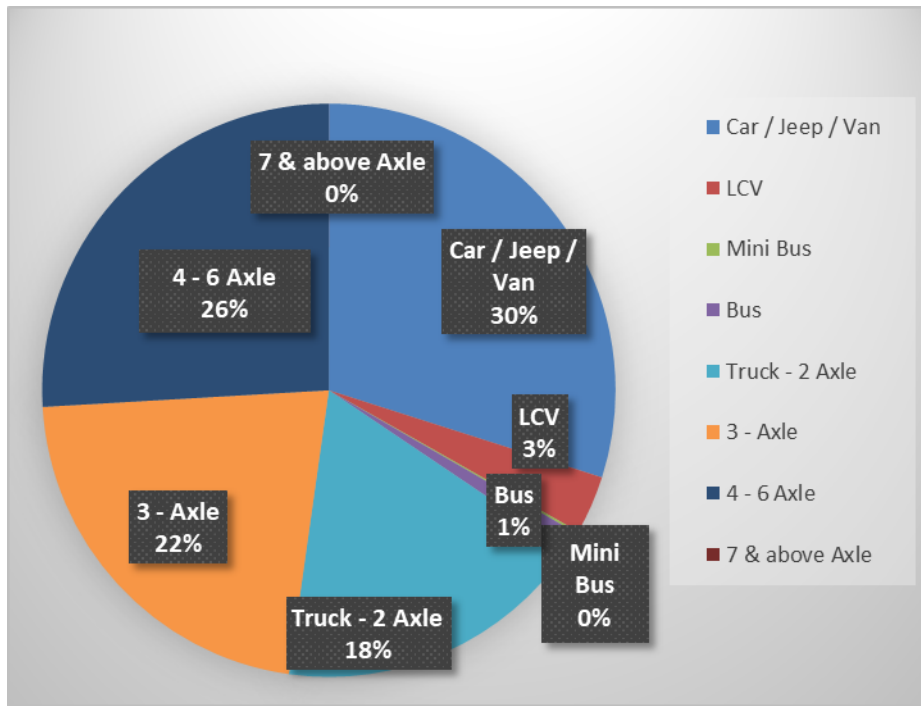


Figure 3-2: Model split of tollable vehicle @ Km 142.319

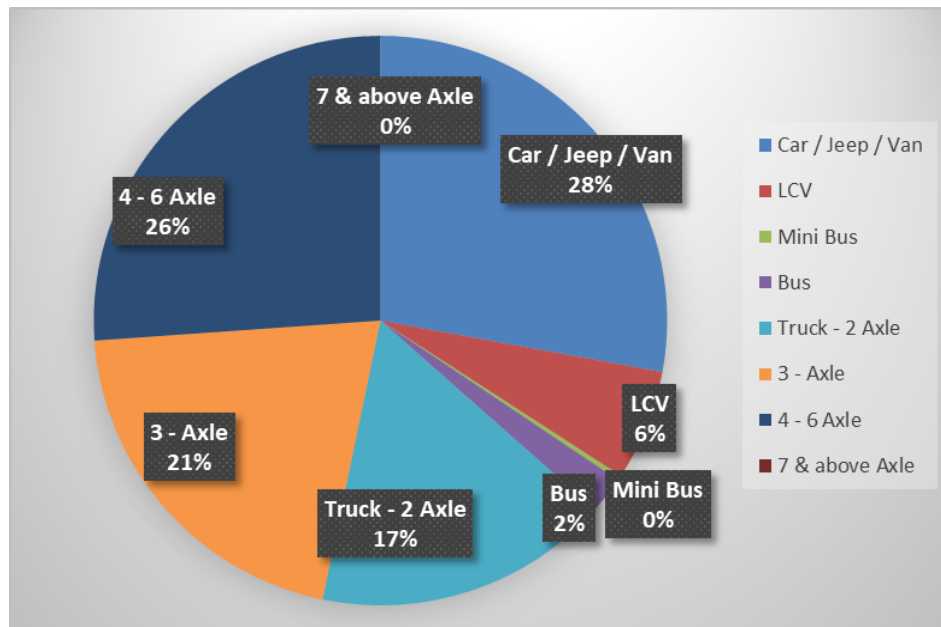


Figure 3-3: Model split of tollable vehicle @ Km 226.740



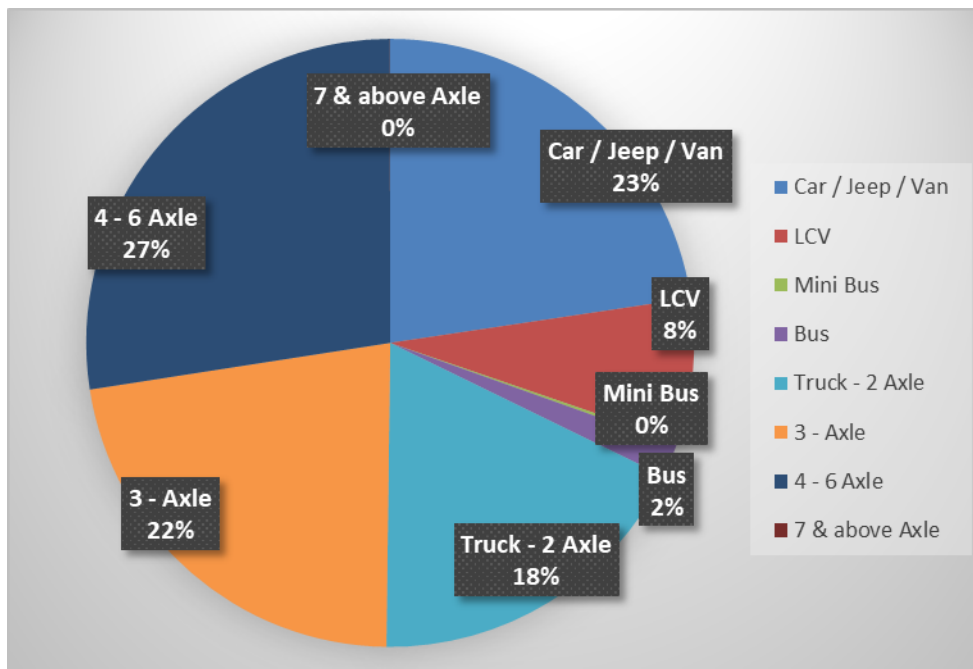


Figure 3-4: Model split of tollable vehicle @ Km 295.000

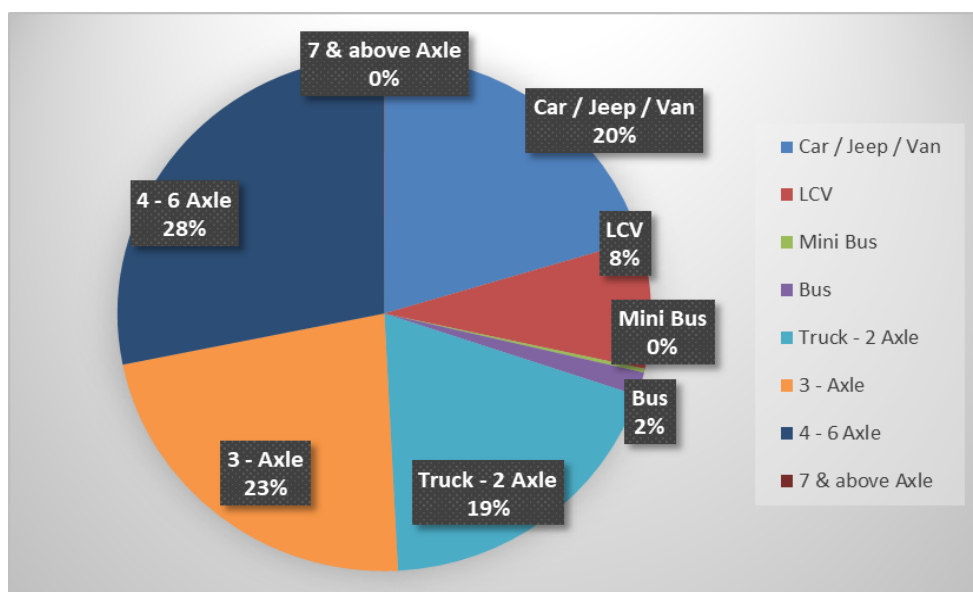


Figure 3-5: Model split of tollable vehicle @ Km 357+739

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).

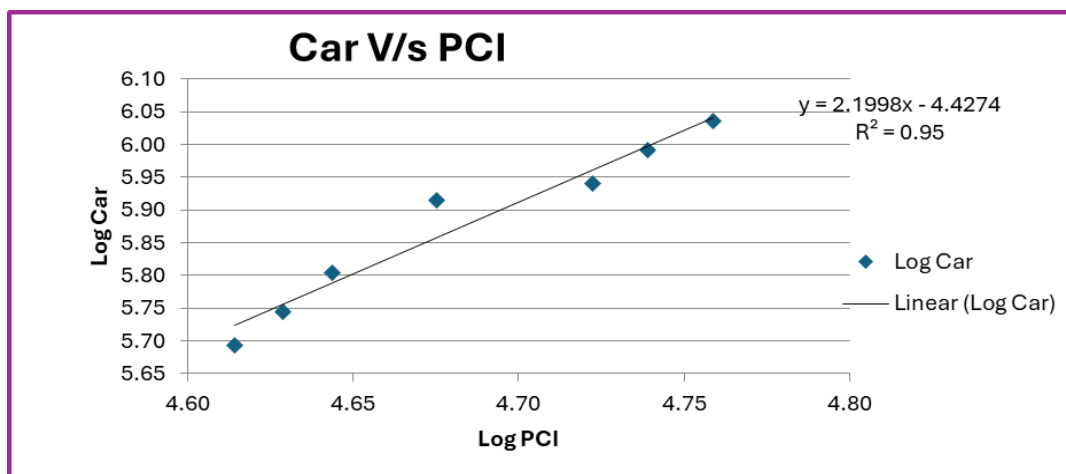
The project corridor spreads across state of Madhya Pradesh & Uttar Pradesh. Toll plazas at Malthone, Chitora, Titarpani and Bakori are in the state of Madhya Pradesh. Project traffic has share of majorly states like Madhya Pradesh, Uttar Pradesh and Rajasthan. For elasticity calculations, working data 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

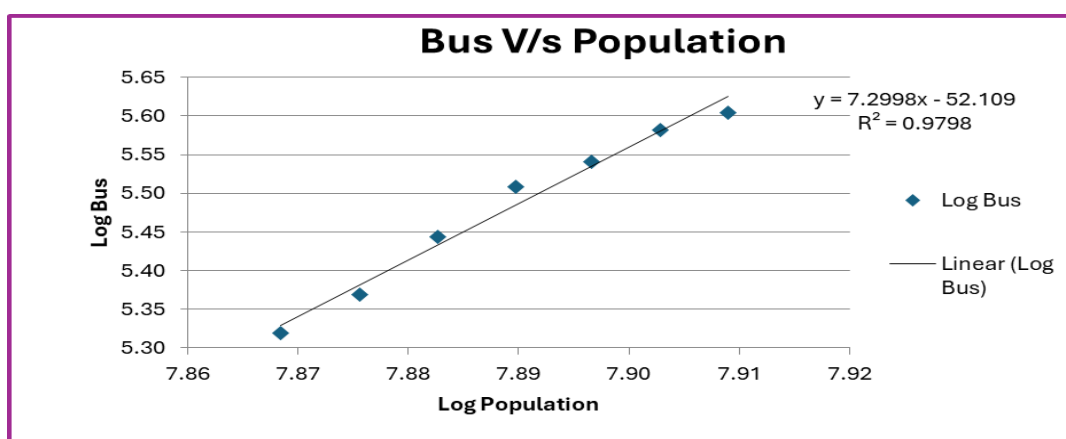


**Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh**

**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



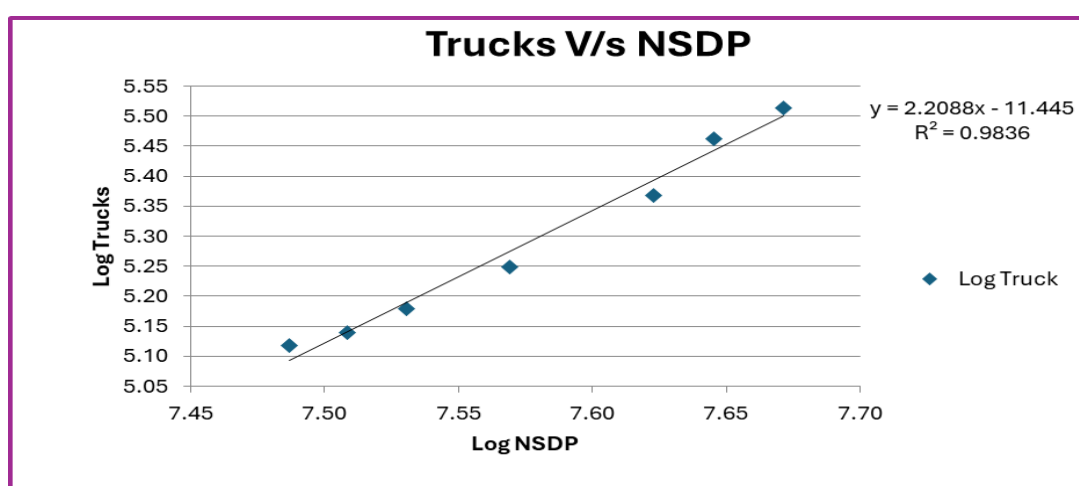
**Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh**

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-4 : Summary Regression Analysis Madhya Pradesh**

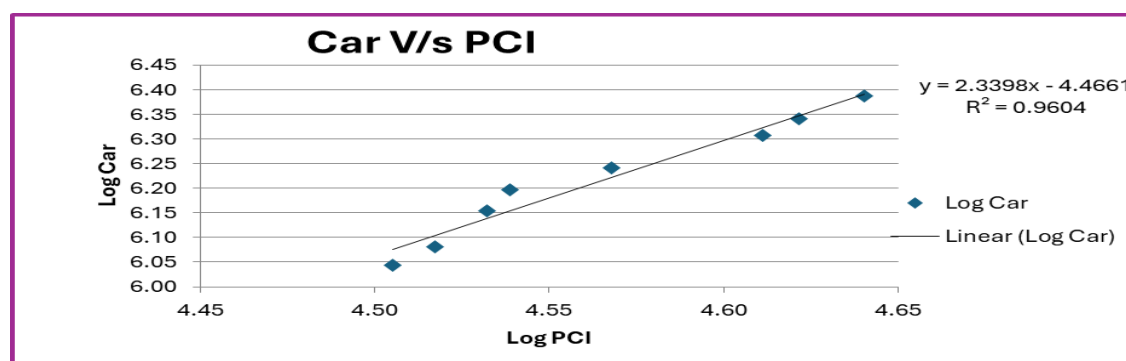
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
<b>MADHYA PRADESH</b>	<b>Car/Jeep</b>	PCI	$y = 2.2965x - 4.8829$	$R^2 = 0.9634$	2.3	6%	13.57%	Good Regression
	<b>Bus</b>	Population	$y = 7.4978x - 53.6722$	$R^2 = 0.9862$	7.5	2%	11.90%	Good Regression
	<b>Truck</b>	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%

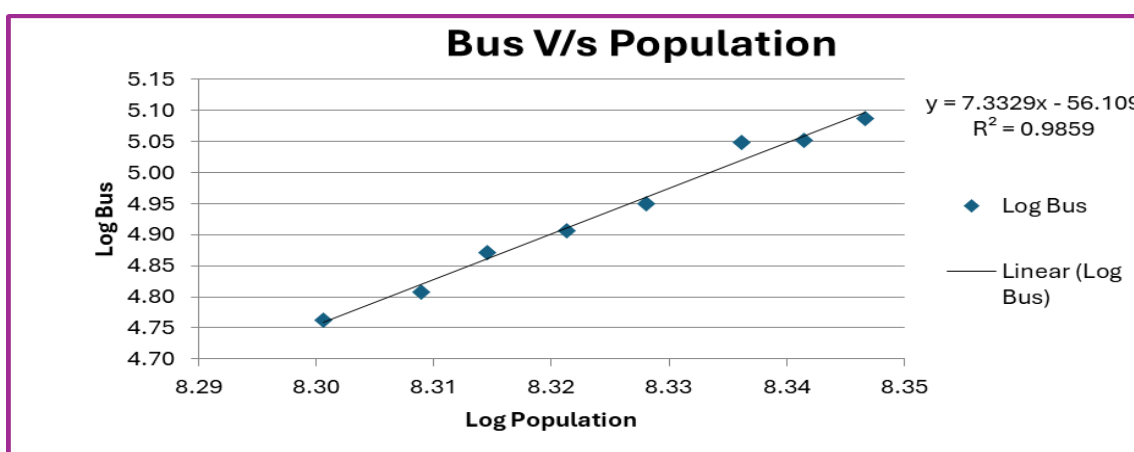
Regression analysis of same is given in figure below



**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.

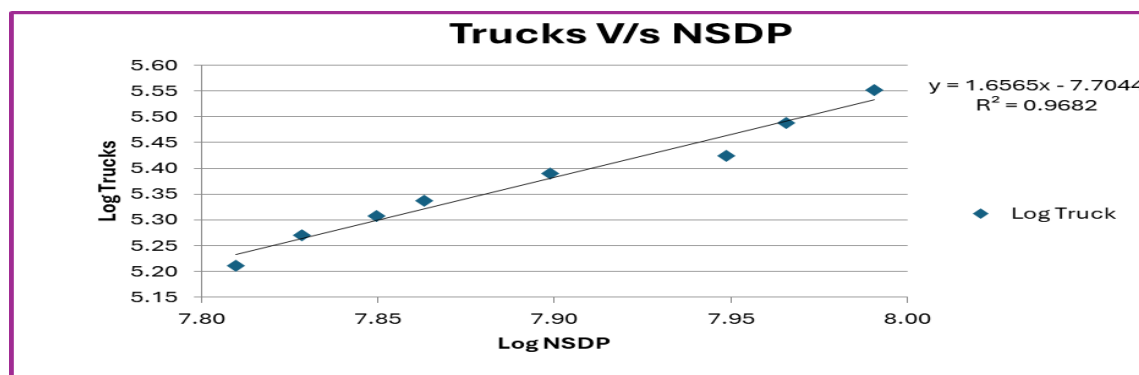


Figure 5-6 : Regression and Elasticity NSDP vs. Truck Traffic - extrapolation Uttar Pradesh.

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 R<sup>2</sup> 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

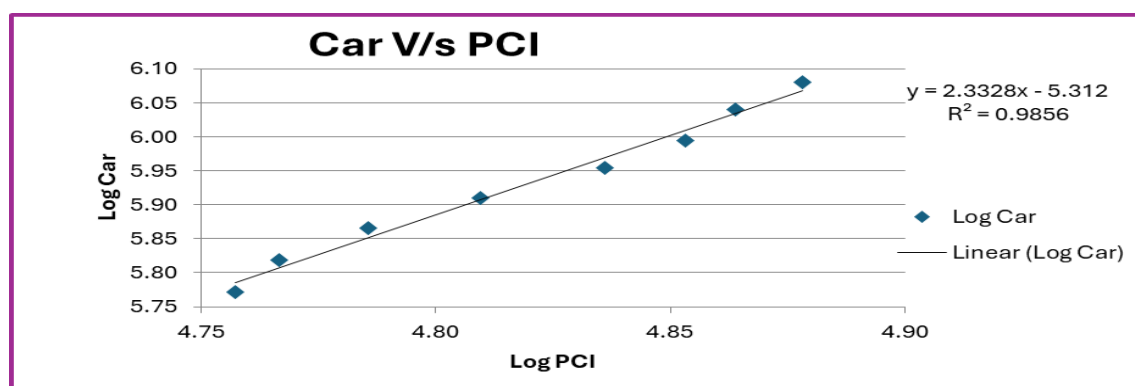


Following tables and graphs depict regression and elasticity of growth model for stretch falling in Rajasthan State.

**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

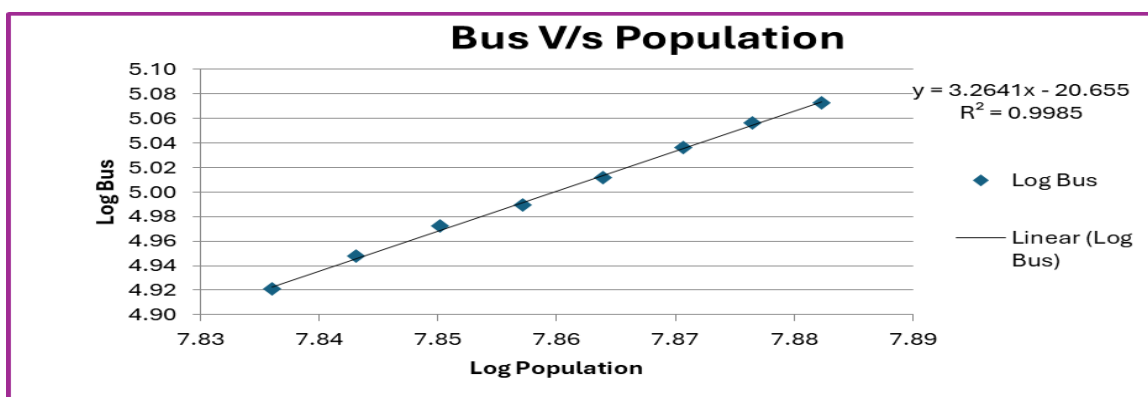


**Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan**

**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



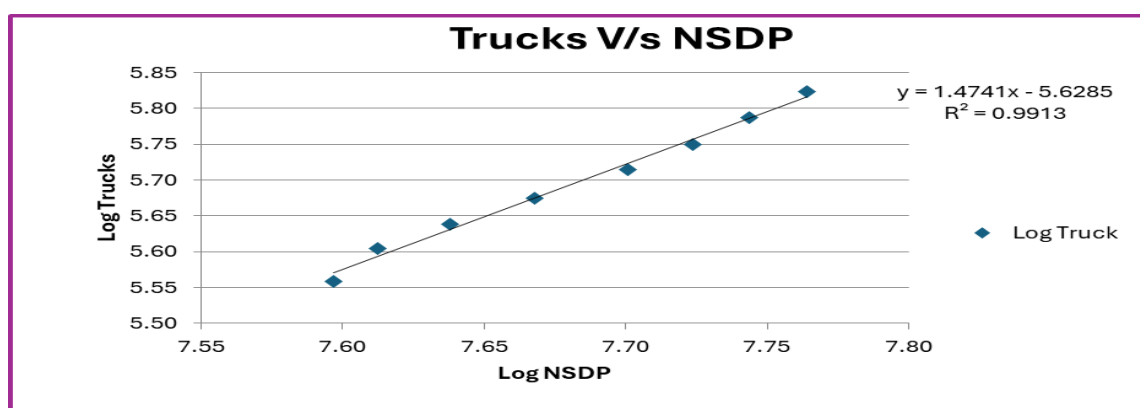
**Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan**

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 R<sup>2</sup> 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 <sup>2</sup> = 0.9856	2.3328	4.07%	9.49%	Good Regression
	Bus	Population	$y = 3.2641x - 20.6548$	R <sup>2</sup> = 0.9985	3.2641	1.53%	5.01%	Good Regression
	Truck	NSDP	$y = 1.4741x - 5.6285$	R <sup>2</sup> = 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.

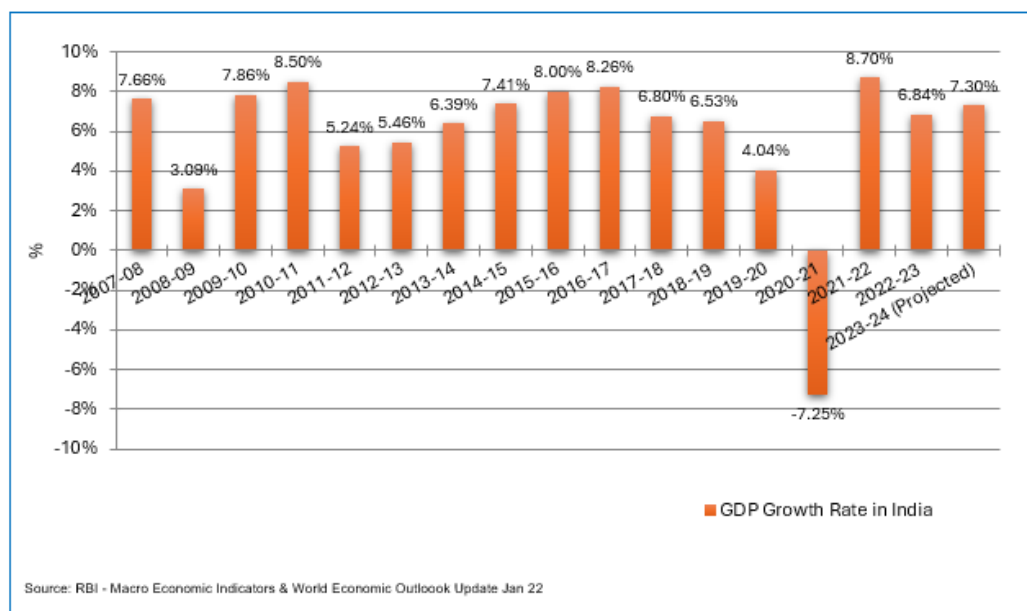
#### 5.4 Other Factors Influencing Growth

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)
<b>2037-38</b>	2482	742	28	127	1861	2217	2639	0	<b>10096</b>	<b>28128</b>
<b>2038-39</b>	2606	758	29	130	1917	2284	2714	0	<b>10438</b>	<b>28993</b>
<b>2039-40</b>	2730	771	30	133	1965	2341	2778	0	<b>10748</b>	<b>29750</b>
<b>2040-41</b>	2860	785	31	136	2014	2399	2843	0	<b>11068</b>	<b>30525</b>
<b>2041-42</b>	2997	799	32	139	2064	2459	2910	0	<b>11400</b>	<b>31325</b>
<b>2042-43</b>	3140	813	33	142	2116	2520	2978	0	<b>11742</b>	<b>32144</b>
<b>2043-44</b>	3290	827	34	145	2169	2583	3048	0	<b>12096</b>	<b>32989</b>

## 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

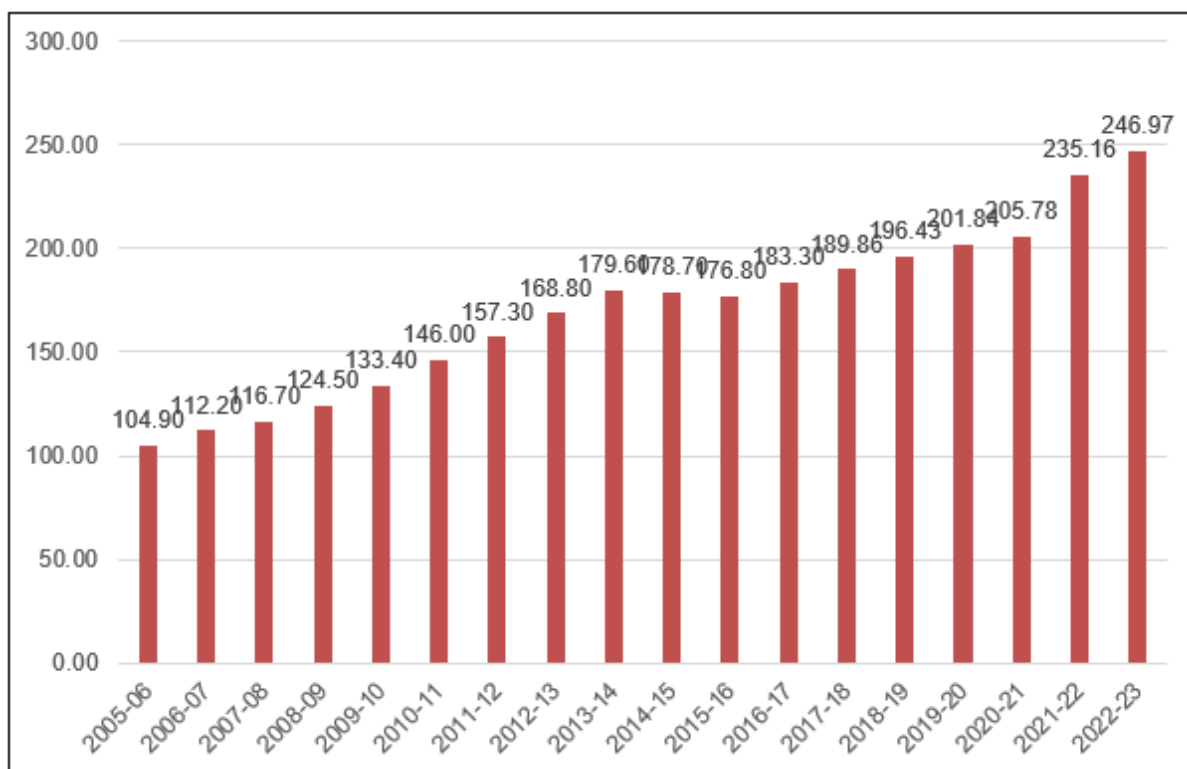
1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3<sup>rd</sup> rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles 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](http://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.





## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

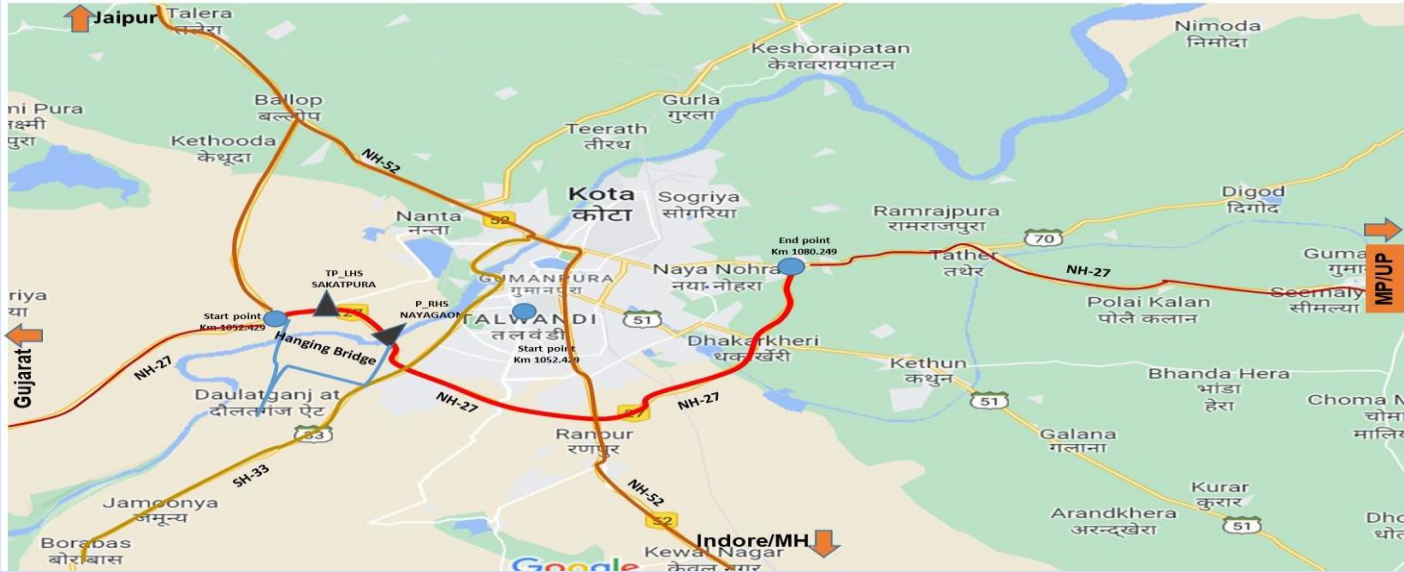
Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



# KOTA BYPASS SECTION OF NH-27 IN THE STATE OF RAJASTHAN UNDER (TOT Bundle-13)



## TRAFFIC STUDY & REVENUE PROJECTION REPORT (FINAL)

**MARCH 2024**



### **GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991  
Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)  
Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**KOTA BYPASS SECTION OF NH-27 IN THE  
STATE OF RAJASTHAN UNDER  
(TOT Bundle-13)**

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

**MARCH 2024**



# CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.3 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS .....</b>	<b>9</b>
2.1 Project Corridor.....	9
<b>Chapter 3 .....</b>	<b>10</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>10</b>
3.1 Traffic Surveys .....	10
3.2 Classified Traffic Volume.....	11
3.3 Traffic Characteristic .....	12
3.3.1 Traffic Data .....	12
3.4 Data Analysis.....	13
3.4.1 Analysis of Traffic Volume Count .....	13
3.4.2 Components of Traffic.....	14
3.5 Secondary Data Collection .....	16
<b>Chapter 4 .....</b>	<b>18</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>18</b>
4.1 Introduction.....	18
4.2 Regional Network.....	18
<b>Chapter 5 .....</b>	<b>20</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>20</b>
5.1 Introduction.....	20
5.2 Trend Analysis.....	20
5.3 Estimation of Traffic Demand Elasticity.....	20
5.4 Analysis of Historic Traffic Data .....	35
5.5 Other Factors Influencing Growth.....	35
5.6 Developments along and around the Project Corridor & State.....	36
5.7 Recommended Growth Rates of Traffic .....	37
5.7.1 Recommended Growth Rates of Traffic for Rajasthan Part of Stretch.....	37
<b>Chapter 6 .....</b>	<b>39</b>

TRAFFIC FORECAST.....	39
6.1 Traffic Projections .....	39
<b>Chapter 7 .....</b>	<b>42</b>
FORECAST OF TOLL REVENUE .....	42
7.1 General.....	42
7.2 Discount Categories .....	42
7.3 Estimation of Toll Rates .....	43
7.4 Toll Revenue .....	45
7.5 Toll Revenue at all toll plazas under Scenarios .....	45
7.6 Modification in Concession Period .....	48
<b>Chapter 8 .....</b>	<b>51</b>
CONCLUSION & RECOMMENDATIONS .....	51
8.1 Conclusion & Recommendations .....	51

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	11
Table 3-3 : Traffic Data at Toll Plaza Sakatpura (Km 1055+217) / Nayagaon (Km 1058+837).....	12
Table 3-4 : PCU Factors Adopted for Study .....	13
Table 3-5 : Traffic in PCU at Project Stretch .....	14
Table 3-6 : Journey Type factor at Sakatpura/Nayagaon Toll Plaza KM 1055+217/ Km 1058+837.16	
Table 5-1 : Per Capita Income Vs Car Rajasthan.....	21
Table 5-2 : Population Vs Bus Rajasthan.....	22
Table 5-3 : Trucks Vs NSDP Rajasthan.....	23
Table 5-4 : Summary Regression Analysis Rajasthan .....	23
Table 5-5 : Per Capita Income Vs Car Madhya Pradesh .....	24
Table 5-6 : Population Vs Bus Madhya Pradesh.....	25
Table 5-7 : Trucks Vs NSDP Madhya Pradesh.....	25
Table 5-8 : Summary Regression Analysis Madhya Pradesh .....	26
Table 5-9 : Per Capita Income Vs Car Uttar Pradesh .....	27
Table 5-10 : Population Vs Bus Uttar Pradesh.....	27
Table 5-11 : Trucks Vs NSDP Uttar Pradesh.....	28
Table 5-12 : Summary Regression Analysis Uttar Pradesh.....	29
Table 5-13 : Per Capita Income Vs Car Gujrat .....	29
Table 5-14 : Population Vs Bus Gujrat.....	30
Table 5-15 : Trucks Vs NSDP Gujrat.....	31
Table 5-16 : Summary Regression Analysis Gujrat.....	32
Table 5-17 : Per Capita Income Vs Car Delhi .....	32
Table 5-18 : Population Vs Bus Delhi .....	33
Table 5-19 : Trucks Vs NSDP Delhi.....	34
Table 5-20 : Summary Regression Analysis Delhi.....	35
Table 5-21 : Recommended Growth Rates Optimistic .....	37
Table 5-22 : Recommended Growth Rates Pessimistic.....	37
Table 5-23 : Recommended Growth Rates Most Likely.....	38
Table 6-1 : Total Tollable Traffic @ Toll Plaza - Chainage 1055+217 KM/1058+837 KM.....	39
Table 6-2 : Total Tollable Traffic @ Toll Plaza 1 - Chainage 1055+217 KM/1058+837 KM.....	40

<i>Table 6-3 : Total Tollable Traffic @ Toll Plaza 1 - Chainage 1055+217 KM/1055+217 KM/1058+837</i>	
<i>KM</i> .....	40
<i>Table 7-1 : Base Toll Rates June 2007-08</i> .....	43
<i>Table 7-2 : Toll Rates for Year 2023-24 (Rs. Rupees) @ Toll Plaza 1 - Chainage 1055+217</i>	
<i>KM/1055+217 KM/1058+837 KM</i> .....	44
<i>Table 7-3 : Toll Rates for Forecasting Year (Rs. Rupees) @ Toll Plaza 1 - Chainage 1055+217</i>	
<i>KM/1055+217 KM/1058+837 KM</i> .....	44
<i>Table 7-4 : Toll Revenue Optimistic Scenario</i> .....	45
<i>Table 7-5 : Toll Revenue Pessimistic Scenario</i> .....	46
<i>Table 7-6 : Toll Revenue Most Likely Scenario</i> .....	47



## LIST OF FIGURES

<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	9
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	22
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	22
<i>Figure 5-3 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Rajasthan. ....</i>	23
<i>Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh .....</i>	24
<i>Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh.....</i>	25
<i>Figure 5-6 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Madhya Pradesh... </i>	26
<i>Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh .....</i>	27
<i>Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh.....</i>	28
<i>Figure 5-9 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Uttar Pradesh.....</i>	29
<i>Figure 5-10 : Regression and Elasticity PCI vs. Car – Extrapolation Gujrat .....</i>	30
<i>Figure 5-11 : Regression and Elasticity Population vs. Bus – Extrapolation Gujrat.....</i>	31
<i>Figure 5-12 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Gujrat.....</i>	31
<i>Figure 5-13 : Regression and Elasticity PCI vs. Car – Extrapolation Delhi .....</i>	33
<i>Figure 5-14 : Regression and Elasticity Population vs. Bus – Extrapolation Delhi.....</i>	33
<i>Figure 5-15 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Delhi.....</i>	34
<i>Figure 5-16 : Growth of GDP in India.....</i>	36
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	43

## ABBREVIATIONS

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

# CHAPTER 1

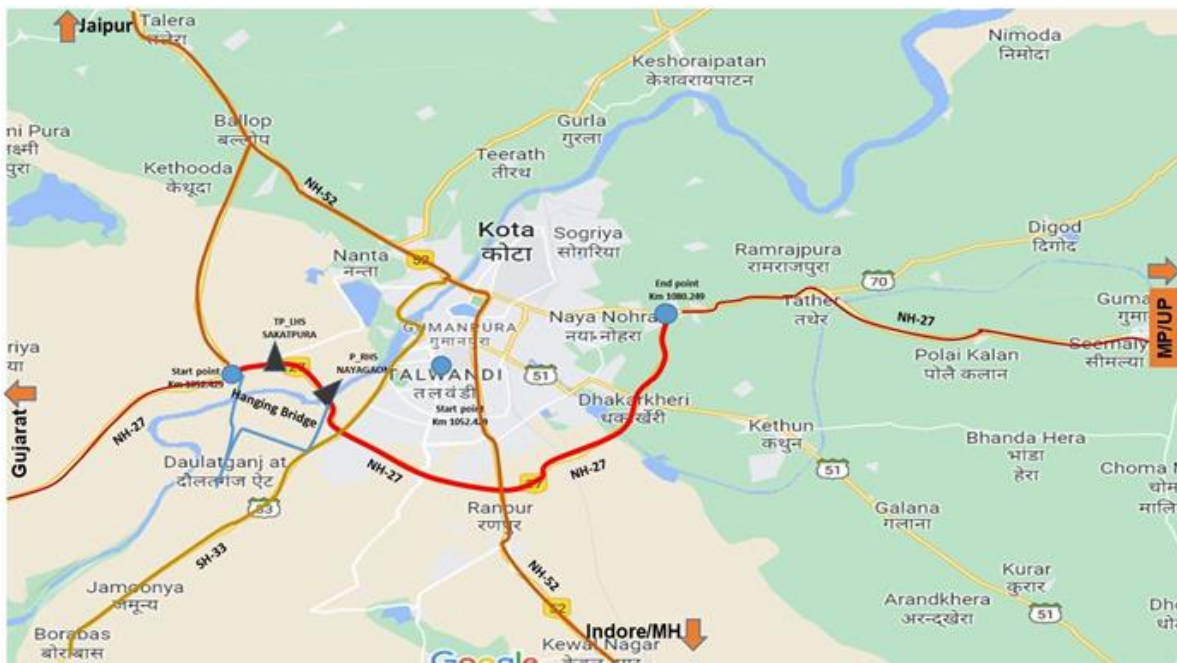
## INTRODUCTION

### 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

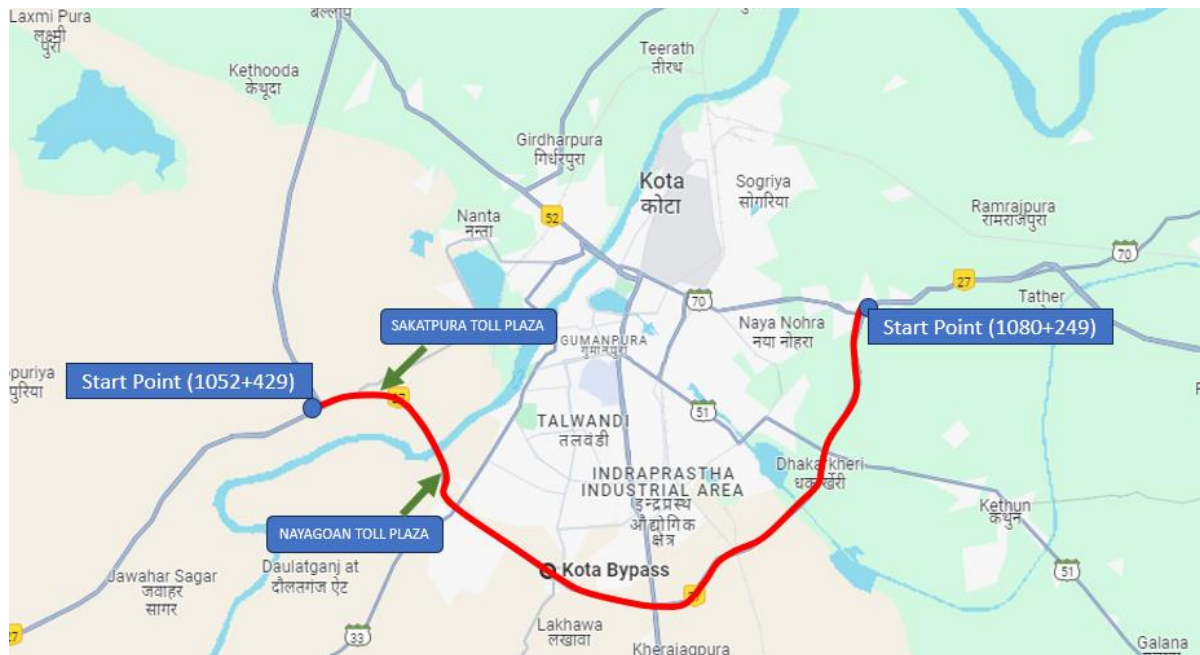
#### 2.1 Project Corridor

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
	<b>Total</b>	<b>8090</b>

### 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

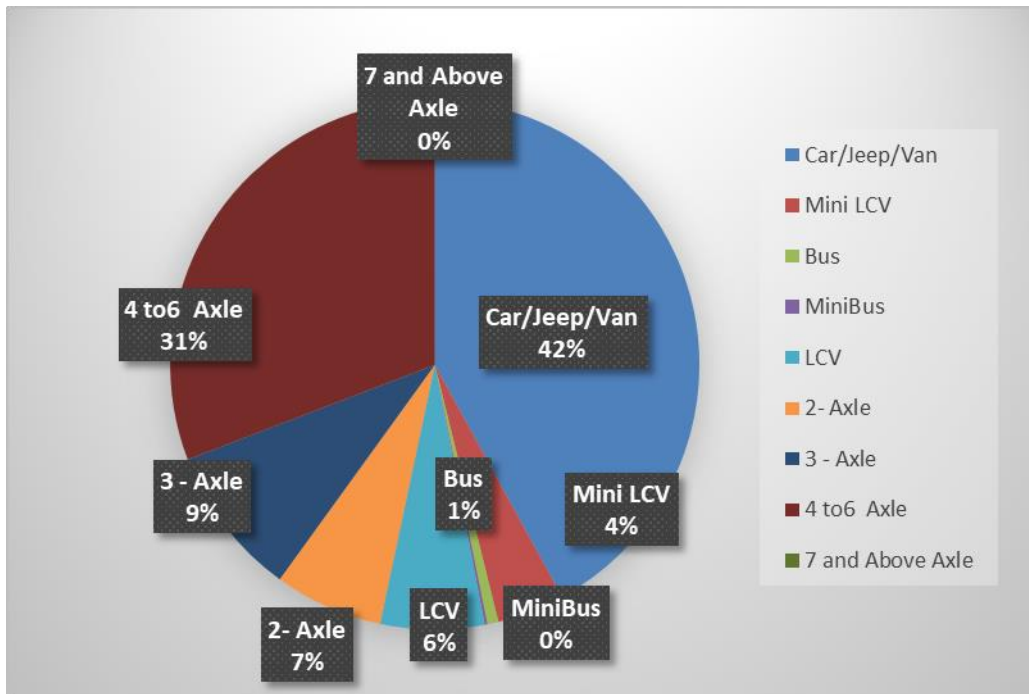
**Table 3-5 : Traffic in PCU at Project Stretch**

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

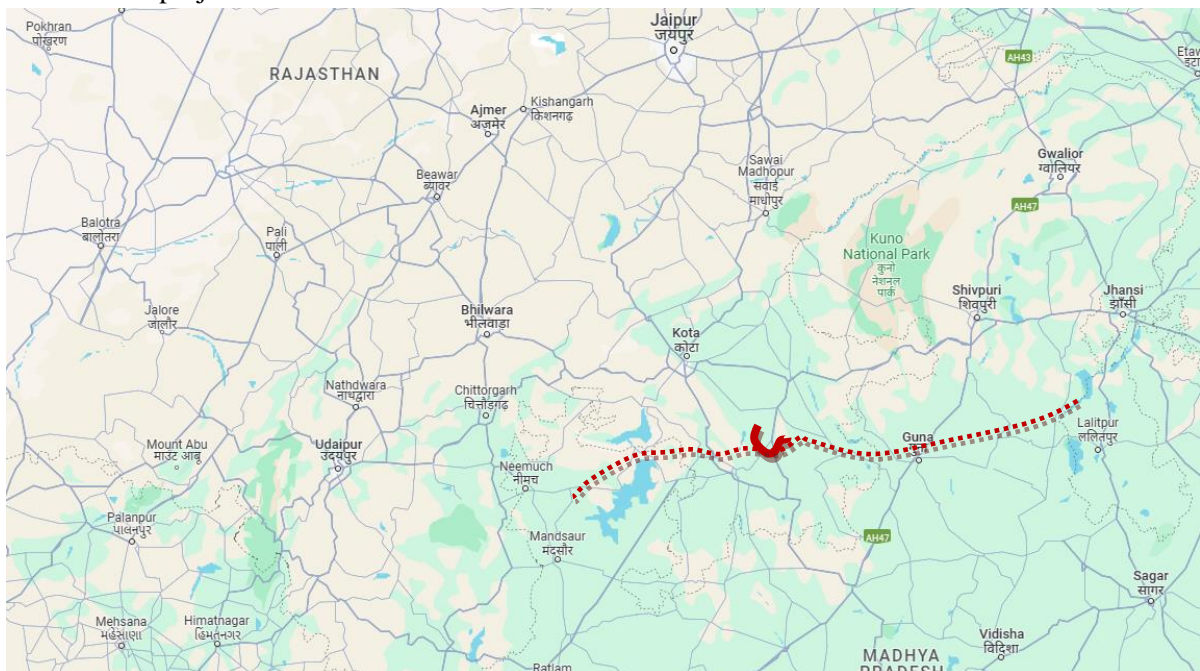
Highway corridors behave like integrated circuit networks and more often than not every road is connected to various networks having different origins and destinations. Traffic running on these networks behaves like fluid and flow on network on alignment of least friction.

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.

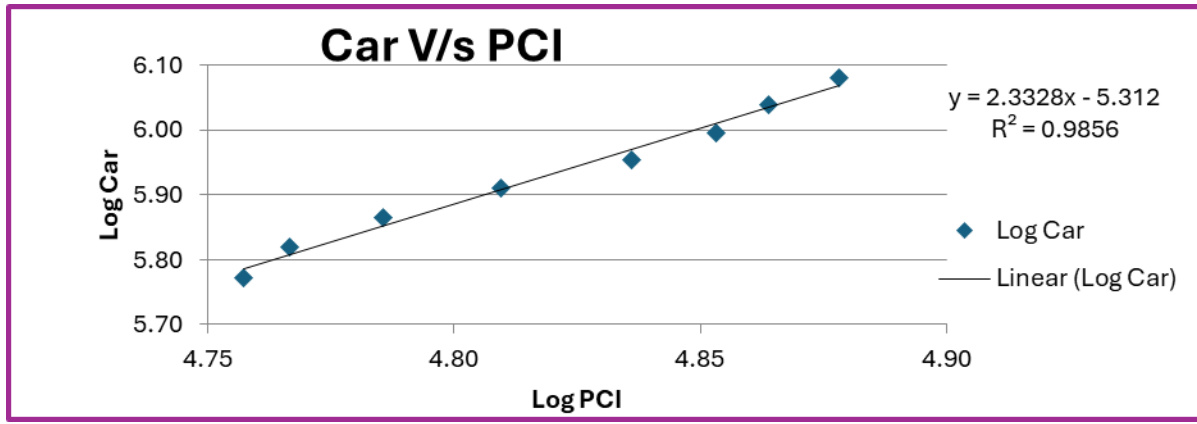


Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan

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.

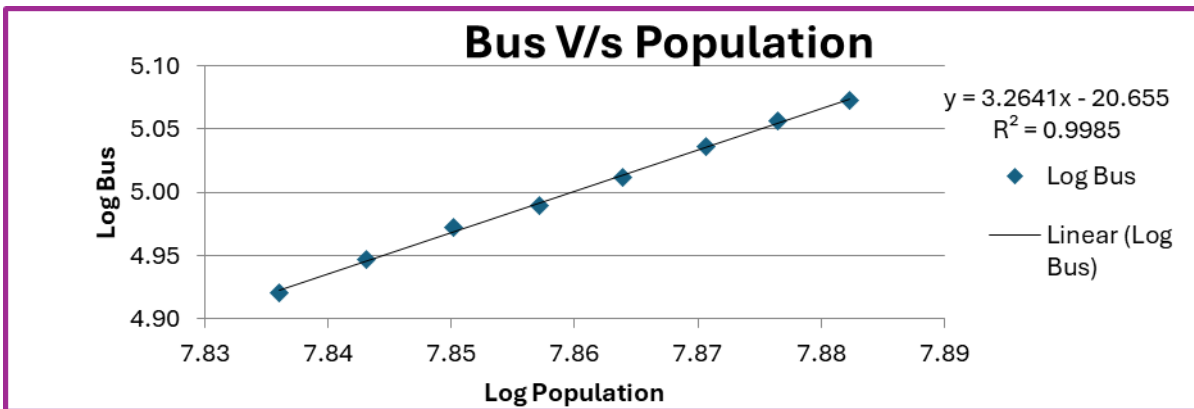


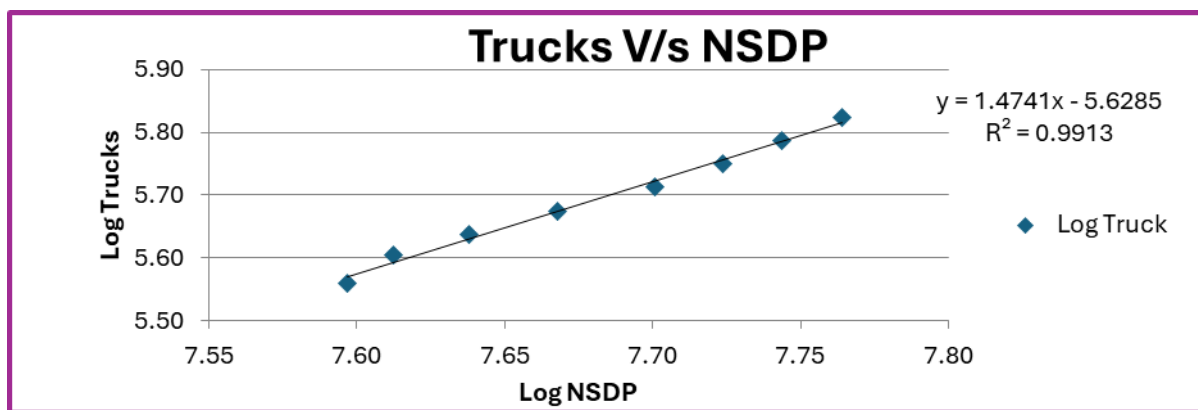
Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan

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 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 5-3 : 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 R<sup>2</sup> 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

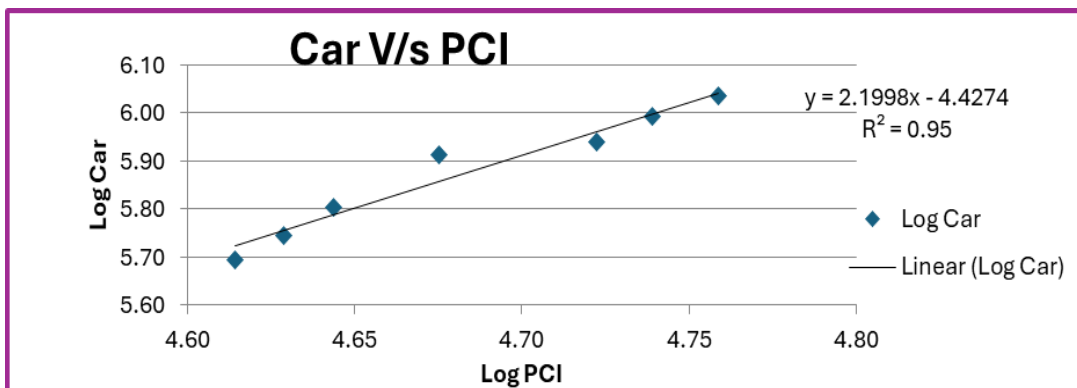
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
	Bus	Population	$y = 3.2641x - 20.6548$	$R^2 = 0.9985$	3.2641	1.53%	5.01%	Good Regression
	Truck	NSDP	$y = 1.4741x - 5.6285$	$R^2 = 0.9913$	1.4741	5.65%	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.

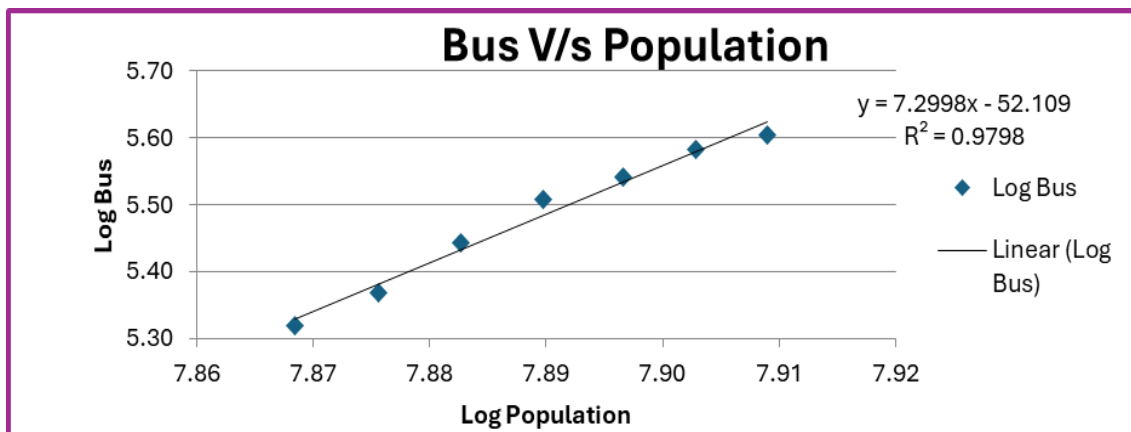


**Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh**

**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.

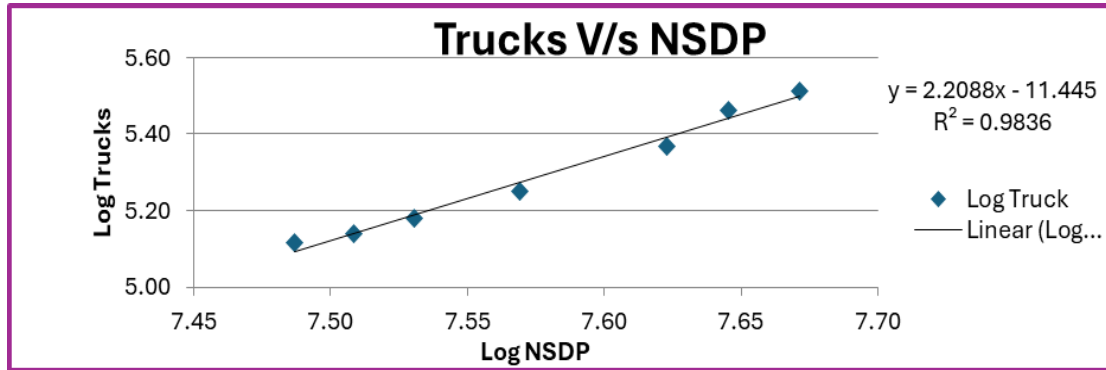
**Table 5-7 : Trucks Vs NSDP Madhya Pradesh**

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-8 : Summary Regression Analysis Madhya Pradesh**

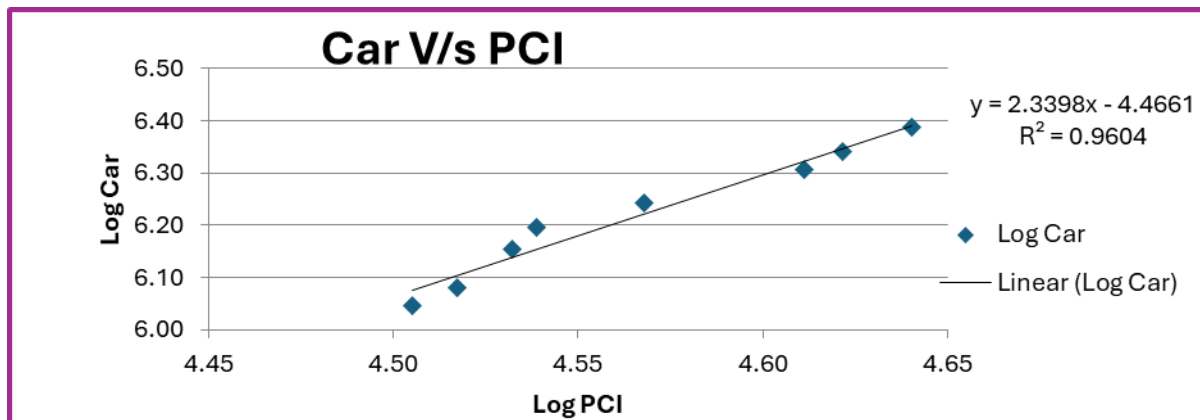
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
MADHYA PRADESH	Car/Jeep	PCI	$y = 2.2965x - 4.8829$	R <sup>2</sup> = 0.9634	2.3	6%	13.57%	Good Regression
	Bus	Population	$y = 7.4978x - 53.6722$	R <sup>2</sup> = 0.9862	7.5	2%	11.90%	Good Regression
	Truck	NSDP	$y = 2.2088x - 11.4451$	R <sup>2</sup> = 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.

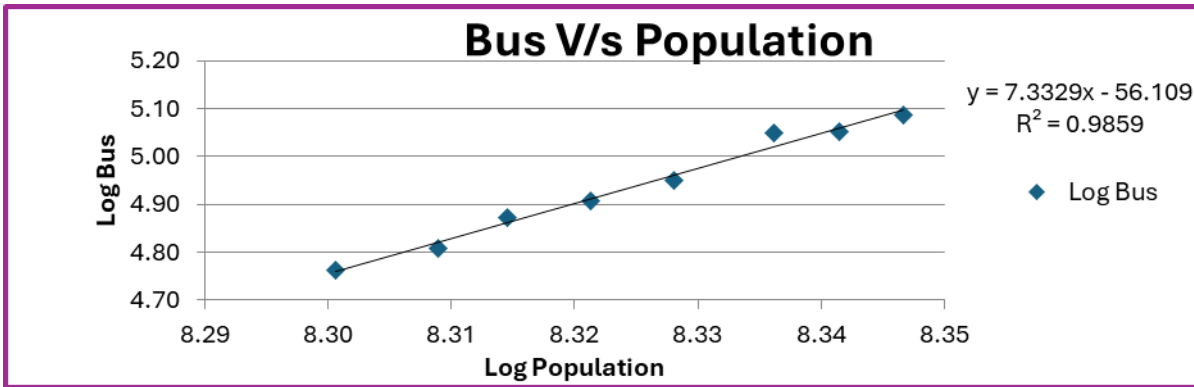


**Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh**

**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.

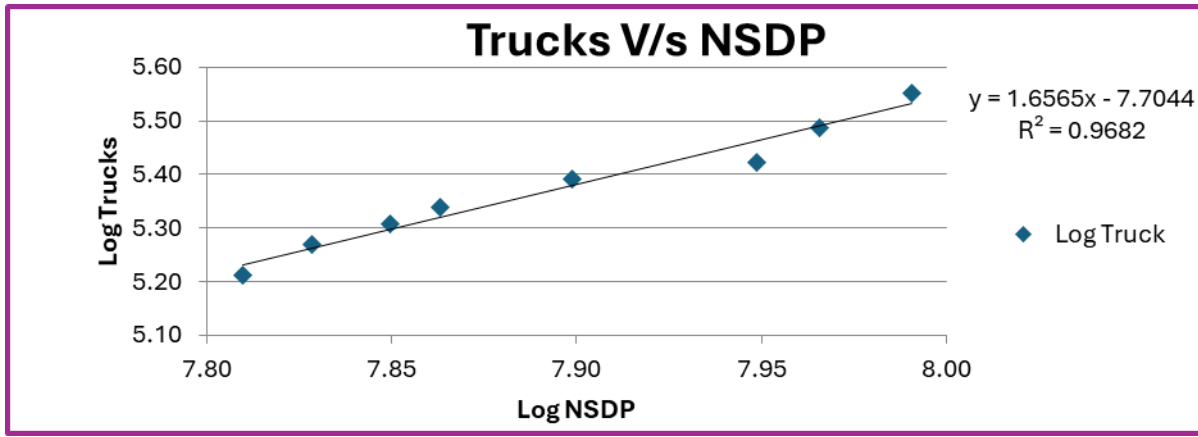


Figure 5-9 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Uttar Pradesh.

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 R<sup>2</sup> 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 <sup>2</sup> = 0.9604	2.3398	4.58%	10.72%	Good Regression
	Bus	Population	y = 7.3329x - 56.1092	R <sup>2</sup> = 0.9859	7.3329	1.53%	11.19%	Good Regression
	Truck	NSDP	y = 1.6565x - 7.7044	R <sup>2</sup> = 0.9682	1.6565	6.18%	10.24%	Good Regression

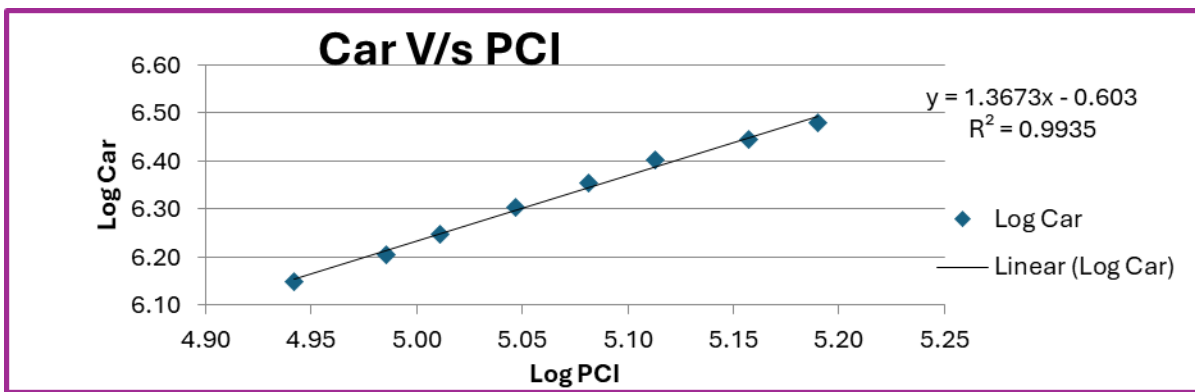
The following tables and graphs depict regression and elasticity of growth model for stretch falling in Gujrat State.

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.

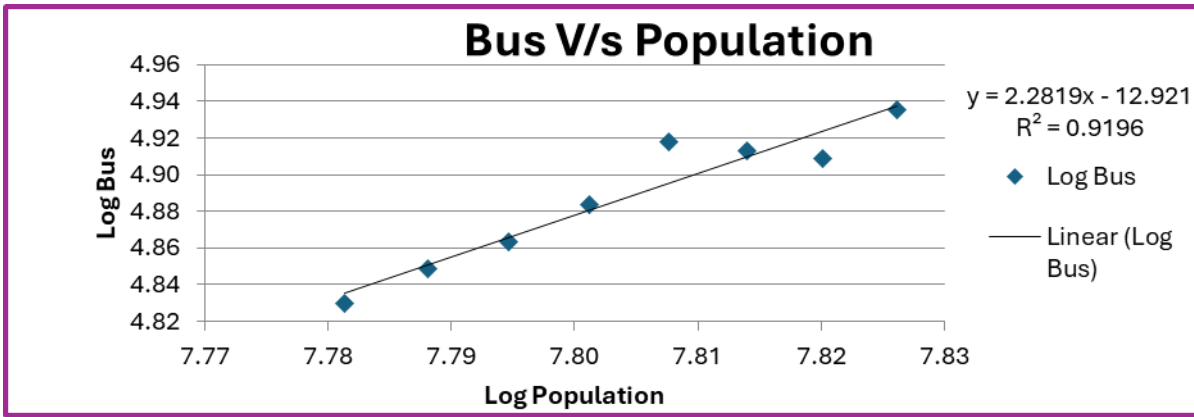


*Figure 5-10 : Regression and Elasticity PCI vs. Car – Extrapolation Gujrat*

*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.



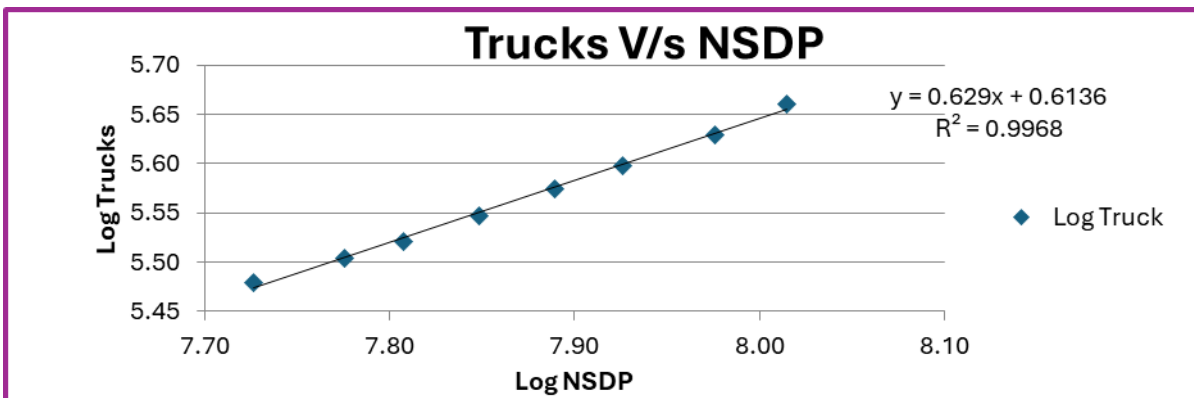
**Figure 5-11 : Regression and Elasticity Population vs. Bus – Extrapolation Gujrat**

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. R<sup>2</sup> statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. The higher the value of R<sup>2</sup> more representative is the regression model of data.

The results of these analyses for *the good fit* regression as reflected by R<sup>2</sup> 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
<b>GURJAT</b>	<b>Car/Jeep</b>	PCI	$y = 1.3673x - 0.603$	R <sup>2</sup> = 0.9935	1.3673	8.51%	11.64%	Good Regression
	<b>Bus</b>	Population	$y = 2.2819x - 12.9206$	R <sup>2</sup> = 0.9196	2.2819	1.49%	3.39%	Good Regression
	<b>Truck</b>	NSDP	$y = 0.629x - 0.6136$	R <sup>2</sup> = 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.



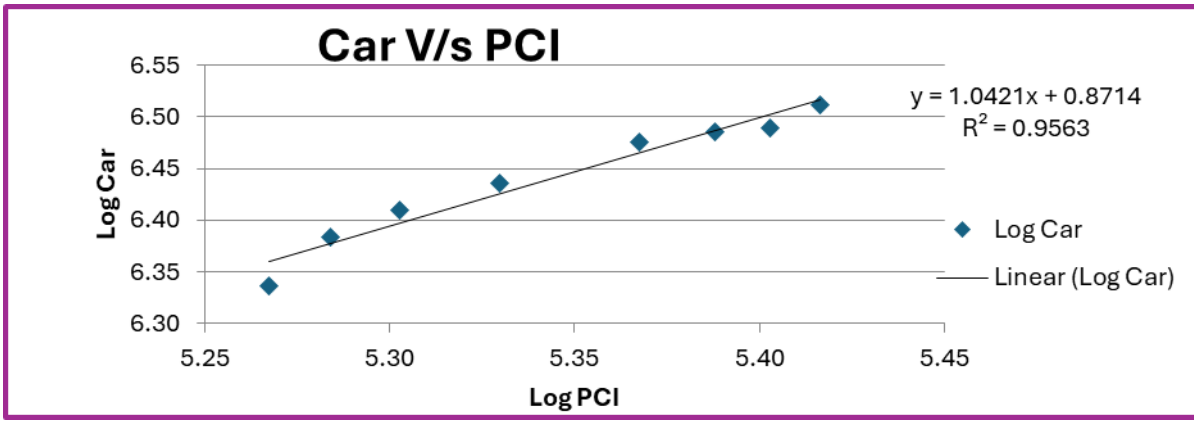


Figure 5-13 : Regression and Elasticity PCI vs. Car – Extrapolation Delhi

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.

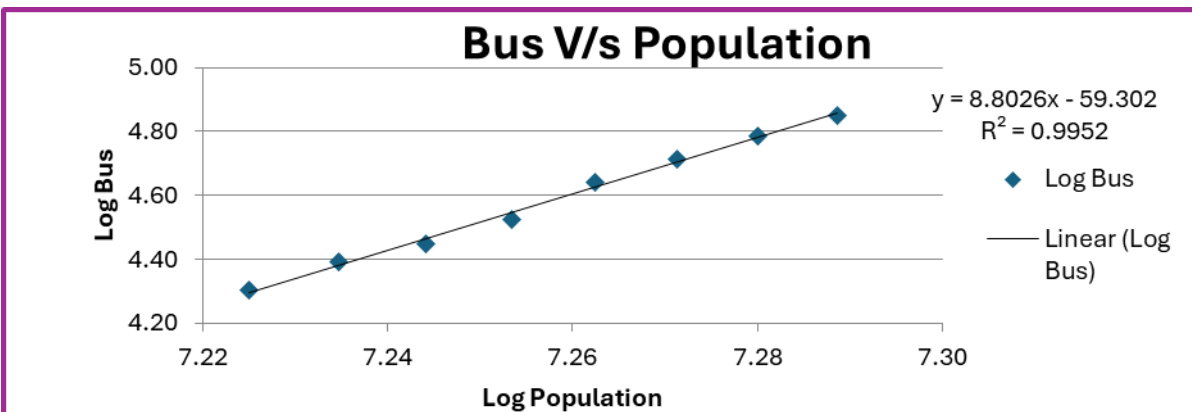


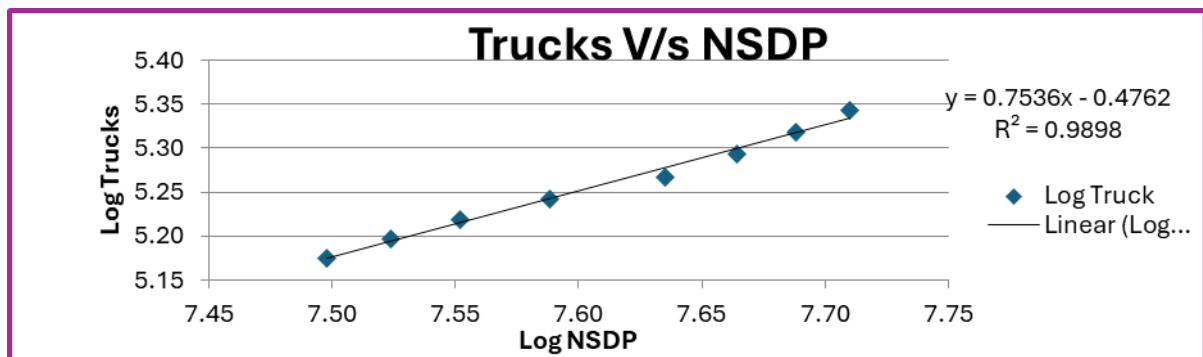
Figure 5-14 : Regression and Elasticity Population vs. Bus – Extrapolation Delhi

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 NSDP	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
<b>DELHI</b>	<b>Car/Jeep</b>	PCI	$y = 1.0421x - 0.8714$	$R^2 = 0.9563$	1.0421	5.05%	5.27%	Good Regression
	<b>Bus</b>	Population	$y = 8.8026x - 59.3021$	$R^2 = 0.9952$	8.8026	2.11%	18.61%	Good Regression
	<b>Truck</b>	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.

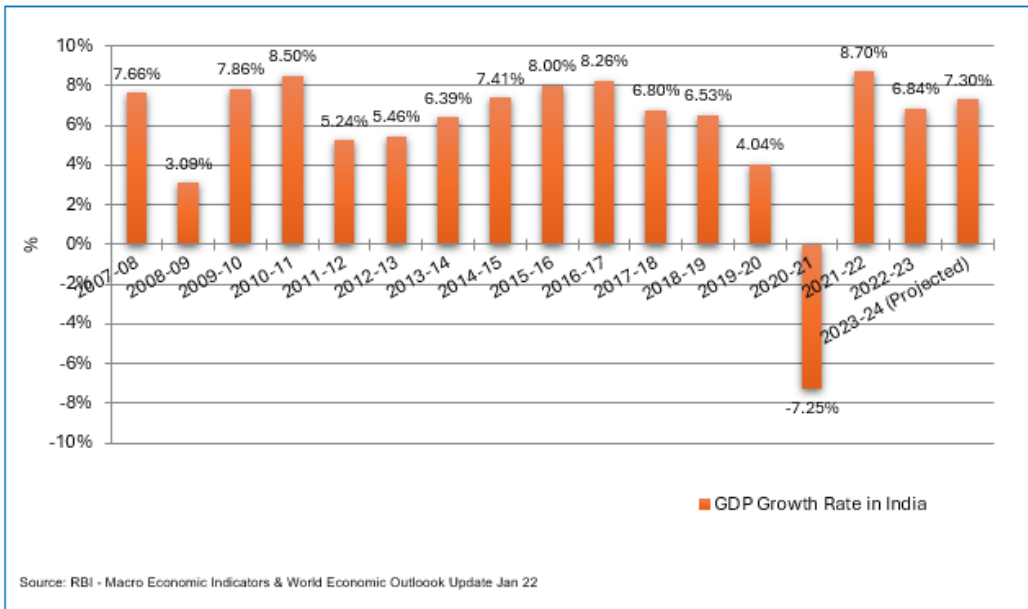
#### 5.5 Other Factors Influencing Growth

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 11<sup>th</sup> 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
<b>Car/Jeep/Van</b>	8.23%	7.23%	6.37%	6.14%	5.26%
<b>Mini LCV</b>	4.53%	3.04%	2.13%	1.76%	2.54%
<b>Bus</b>	3.84%	2.33%	2.11%	1.89%	1.69%
<b>Mini - Bus</b>	3.84%	2.33%	2.11%	1.89%	1.69%
<b>LCV</b>	4.53%	3.04%	2.13%	1.76%	1.57%
<b>2- Axle</b>	4.18%	3.04%	2.13%	1.76%	1.57%
<b>3 - Axle</b>	4.18%	3.04%	2.13%	1.76%	1.57%
<b>4 to6 Axle</b>	5.57%	4.06%	2.84%	2.35%	2.09%
<b>7 and Above Axle</b>	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)
<b>2033-34</b>	7159	484	73	19	742	765	1062	3991	0	14295	32444
<b>2034-35</b>	7615	494	75	19	758	781	1085	4104	0	14931	33566
<b>2035-36</b>	8100	505	77	19	774	798	1108	4220	0	15601	34734
<b>2036-37</b>	8616	516	79	19	790	815	1132	4340	0	16307	35954
<b>2037-38</b>	9165	527	81	19	807	832	1156	4463	0	17050	37222
<b>2038-39</b>	9749	538	83	19	824	850	1181	4590	0	17834	38549
<b>2039-40</b>	10347	547	85	19	839	865	1202	4698	0	18602	39778
<b>2040-41</b>	10982	557	87	19	854	880	1223	4808	0	19410	41055
<b>2041-42</b>	11656	567	89	19	869	896	1245	4921	0	20262	42390
<b>2042-43</b>	12371	577	91	19	884	912	1267	5037	0	21158	43779
<b>2043-44</b>	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

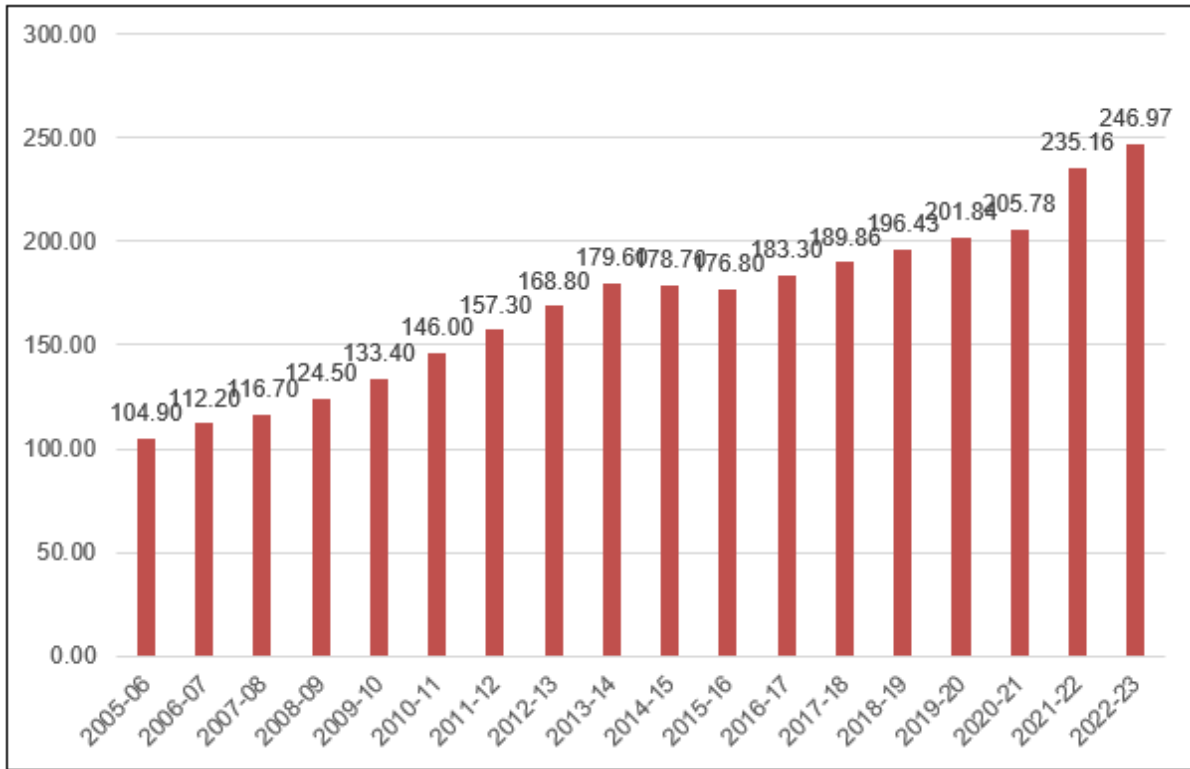
1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3<sup>rd</sup> rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles 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](http://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)**

<b>Location / Year</b>	<b>TP-01</b>	<b>Total</b>
<b>2024-25</b>	61.70	61.70
<b>2025-26</b>	68.93	68.93
<b>2026-27</b>	76.20	76.20
<b>2027-28</b>	84.26	84.26
<b>2028-29</b>	93.50	93.50
<b>2029-30</b>	102.28	102.28
<b>2030-31</b>	112.42	112.42
<b>2031-32</b>	124.04	124.04
<b>2032-33</b>	136.11	136.11
<b>2033-34</b>	148.90	148.90
<b>2034-35</b>	161.69	161.69
<b>2035-36</b>	176.98	176.98
<b>2036-37</b>	191.54	191.54
<b>2037-38</b>	209.22	209.22
<b>2038-39</b>	227.14	227.14
<b>2039-40</b>	247.59	247.59
<b>2040-41</b>	268.73	268.73
<b>2041-42</b>	291.95	291.95
<b>2042-43</b>	317.29	317.29
<b>2043-44</b>	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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

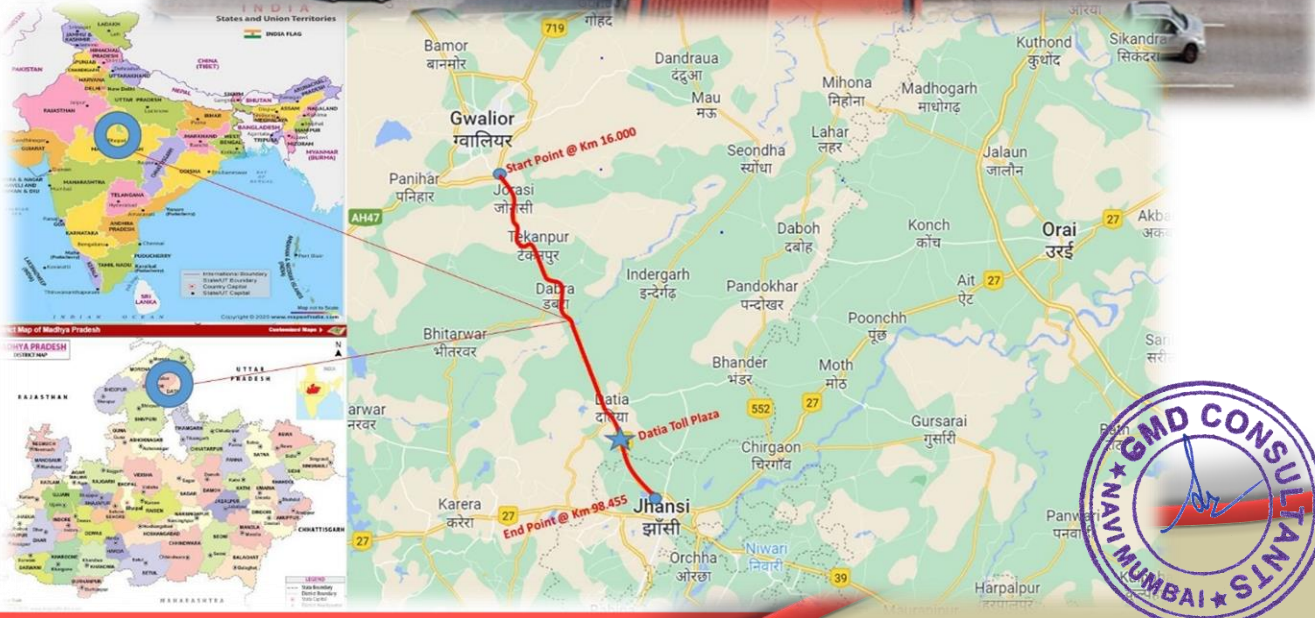
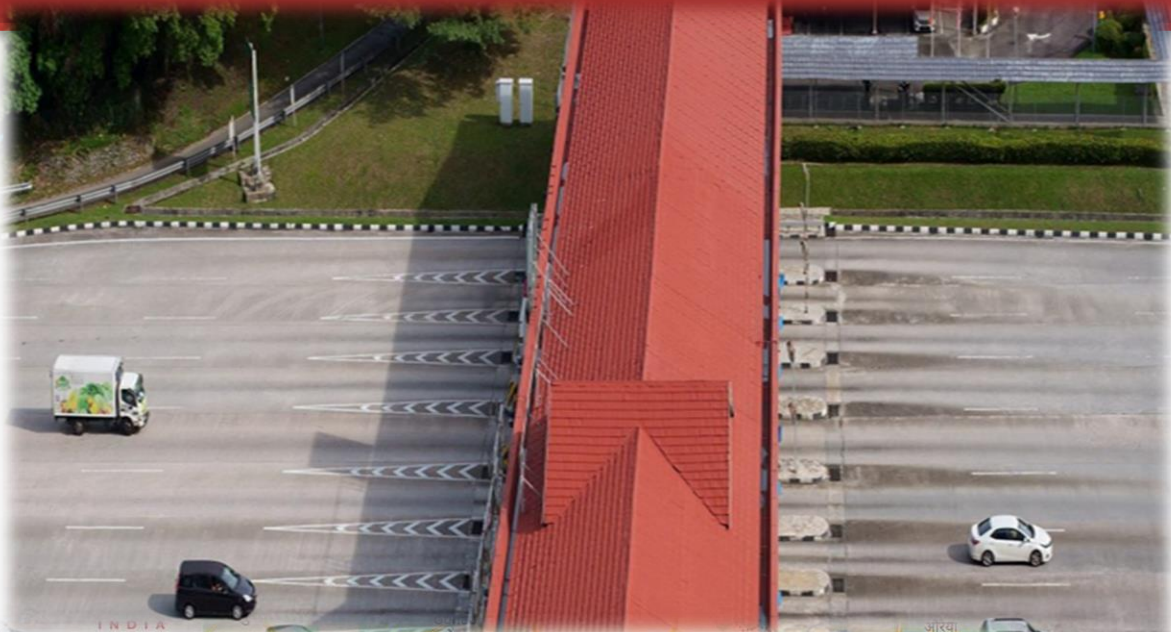
Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)



**Gwalior -Jhansi section from km 16.000 to  
km 56.328 and km54.000 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**

**GMD Consultants**

2, Park View Society, Sector -17,  
Nerul East, Navi Mumbai. 400706. Maharashtra.  
Phone : +91-22-27716391 / 27700233 / 27700991  
Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)  
Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)





**Gwalior -Jhansi section from km 16.000 to km 56.328  
and km54.000 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**



# CONTENTS

<b>Chapter 1 .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>7</b>
1.1 Background.....	7
1.2 Objective of the Study.....	8
1.3 Scope of Services .....	8
<b>Chapter 2 .....</b>	<b>9</b>
<b>PROJECT DETAILS.....</b>	<b>9</b>
2.1 Project Corridor.....	9
<b>Chapter 3 .....</b>	<b>10</b>
<b>TRAFFIC SURVEYS AND ANALYSIS .....</b>	<b>10</b>
3.1 Traffic Surveys .....	10
3.2 Classified Traffic Volume.....	11
3.3 Traffic Characteristic .....	12
3.3.1 Traffic Data .....	12
3.4 Data Analysis.....	13
3.4.1 Analysis of Traffic Volume Count .....	13
3.4.2 Components of Traffic.....	14
3.5 Secondary Data Collection .....	16
<b>Chapter 4 .....</b>	<b>18</b>
<b>INFLUENCE ZONE TRANSPORT NETWORK ANALYSIS .....</b>	<b>18</b>
4.1 Introduction.....	18
4.2 Regional Network.....	18
<b>Chapter 5 .....</b>	<b>20</b>
<b>GROWTH OF TRAFFIC ON PROJECT HIGHWAY .....</b>	<b>20</b>
5.1 Introduction.....	20
5.2 Trend Analysis.....	20
5.3 Estimation of Traffic Demand Elasticity.....	21
5.4 Analysis of Historic Traffic Data .....	35
5.5 Other Factors Influencing Growth.....	35
5.6 Developments along and around the Project Corridor & State.....	36
5.7 Recommended Growth Rates of Traffic .....	38
5.7.1 Recommended Growth Rates of Traffic for Madhya Pradesh Part of Stretch .....	38
<b>Chapter 6 .....</b>	<b>40</b>

TRAFFIC FORECAST.....	40
6.1 Traffic Projections .....	40
<b>Chapter 7 .....</b>	<b>43</b>
FORECAST OF TOLL REVENUE .....	43
7.1 General.....	43
7.2 Discount Categories .....	43
7.3 Estimation of Toll Rates .....	44
7.4 Toll Revenue .....	46
7.5 Toll Revenue at all toll plazas under Scenarios .....	46
7.6 Modification in Concession Period .....	49
<b>Chapter 8 .....</b>	<b>52</b>
CONCLUSION & RECOMMENDATIONS .....	52
8.1 Conclusion & Recommendations .....	52

## LIST OF TABLES

Table 3-1 : Traffic Data Details .....	11
Table 3-2 : Vehicle Classification System .....	11
Table 3-3 : Traffic Data at Dagrai Village Toll Plaza at Km 97.900.....	12
Table 3-4 : PCU Factors Adopted for Study .....	13
Table 3-5 : Traffic in PCU at Project Stretch.....	14
Table 3-6 : Vehicle Type factor at Dagrai Village Toll Plaza KM 97.900.....	16
Table 5-1 : Per Capita Income Vs Car Madhya Pradesh.....	21
Table 5-2 : Population Vs Bus Madhya Pradesh.....	22
Table 5-3 : LCV Vs NSDP Madhya Pradesh .....	23
Table 5-4 : Summary Regression Analysis Madhya Pradesh .....	24
Table 5-5 : Per Capita Income Vs Car Uttar Pradesh .....	24
Table 5-6 : Population Vs Bus Uttar Pradesh.....	25
Table 5-7 Trucks Vs NSDP Uttar Pradesh.....	26
Table 5-8 : Summary Regression Analysis Uttar Pradesh.....	27
Table 5-9 : Per Capita Income Vs Car Delhi .....	27
Table 5-10 : Population Vs Bus Delhi .....	28
Table 5-11 Trucks Vs NSDP Delhi.....	28
Table 5-12 : Summary Regression Analysis Delhi.....	29
Table 5-13 : Per Capita Income Vs Car Haryana.....	30
Table 5-14 : Population Vs Bus Haryana.....	30
Table 5-15 Trucks Vs NSDP Haryana.....	31
Table 5-16 : Summary Regression Analysis Haryana .....	32
Table 5-17 : Per Capita Income Vs Car Rajasthan.....	32
Table 5-18 : Population Vs Bus Rajasthan.....	33
Table 5-19 Trucks Vs NSDP Rajasthan.....	34
Table 5-20 : Summary Regression Analysis Rajasthan .....	35
Table 5-21 : Recommended Growth Rates Optimistic .....	38
Table 5-22 : Recommended Growth Rates Pessimistic.....	38
Table 5-23 : Recommended Growth Rates Most Likely.....	39
Table 6-1 : Total Tollable Traffic @ Toll Plaza - Chainage 97.900 KM .....	40
Table 6-2 : Total Tollable Traffic @ Toll Plaza - Chainage 97.900 KM .....	41
Table 6-3 : Total Tollable Traffic @ Toll Plaza - Chainage 97.900 KM .....	41

<i>Table 7-1 : Base Toll Rates June 2007-08</i> .....	44
<i>Table 7-2 : Toll Rates for Year 2023-24 (Rs. Rupees) @ Toll Plaza 1 – KM 97.900</i> .....	45
<i>Table 7-3 : Toll Rates for Forecasting Year (Rs. Rupees) @ Toll Plaza 1 – KM 97.900</i> .....	45
<i>Table 7-4 : Toll Revenue Optimistic Scenario</i> .....	46
<i>Table 7-5 : Toll Revenue Pessimistic Scenario</i> .....	47
<i>Table 7-6 : Toll Revenue Most Likely Scenario</i> .....	47

## LIST OF FIGURES

<i>Figure 2-1 : Project Alignment with Toll Plaza.....</i>	<i>9</i>
<i>Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh .....</i>	<i>22</i>
<i>Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh.....</i>	<i>22</i>
<i>Figure 5-3 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Madhya Pradesh... 23</i>	<i>23</i>
<i>Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh .....</i>	<i>25</i>
<i>Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh.....</i>	<i>25</i>
<i>Figure 5-6 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Uttar Pradesh.....</i>	<i>26</i>
<i>Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Delhi .....</i>	<i>28</i>
<i>Figure 5-8 : Regression and Elasticity Population vs. Bus – Extrapolation Delhi .....</i>	<i>28</i>
<i>Figure 5-9 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Delhi.....</i>	<i>29</i>
<i>Figure 5-10 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana .....</i>	<i>30</i>
<i>Figure 5-11 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana.....</i>	<i>31</i>
<i>Figure 5-12 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Haryana. ....</i>	<i>31</i>
<i>Figure 5-13 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan .....</i>	<i>33</i>
<i>Figure 5-14 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan.....</i>	<i>33</i>
<i>Figure 5-15 : Regression and Elasticity NSDP vs. Trucks Traffic - extrapolation Rajasthan. ....</i>	<i>34</i>
<i>Figure 5-16 : Growth of GDP in India.....</i>	<i>36</i>
<i>Figure 7-1 : Historical Rate of WPI Inflation in India.....</i>	<i>44</i>

## ABBREVIATIONS

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



# CHAPTER 1

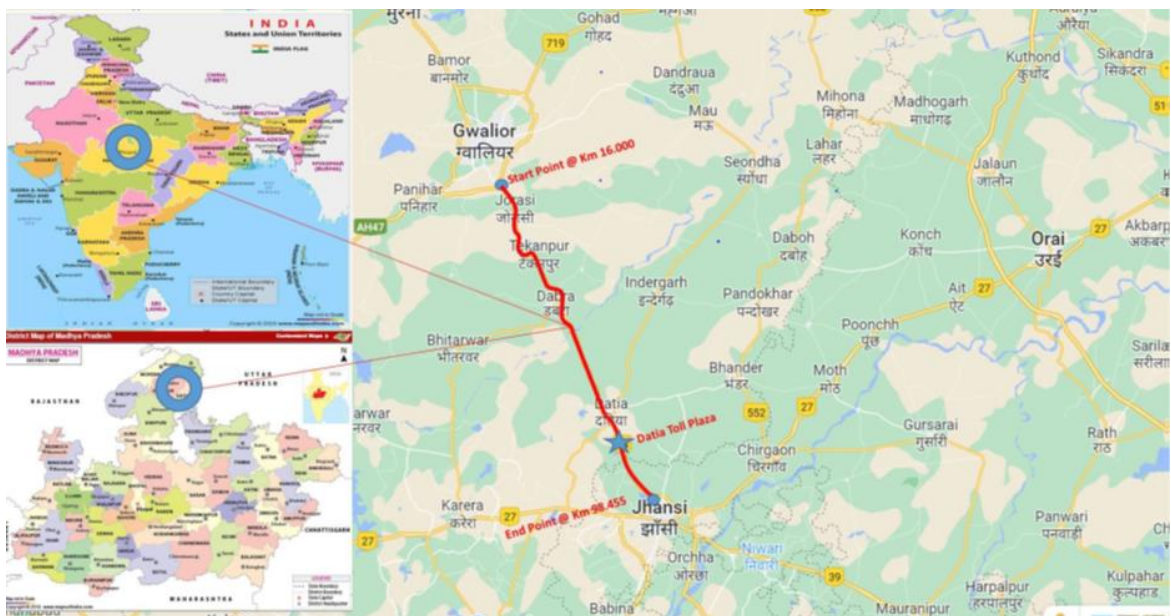
## INTRODUCTION

### 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 16.000 of NH-44 at Gwalior and ends at km 98.455 of NH-44 at Jhansi.

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 16.00 to Km 98.455 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 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 16.00 to Km 98.455 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 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 Gwalior to Jhansi from Km 16.00 to Km 98.455 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

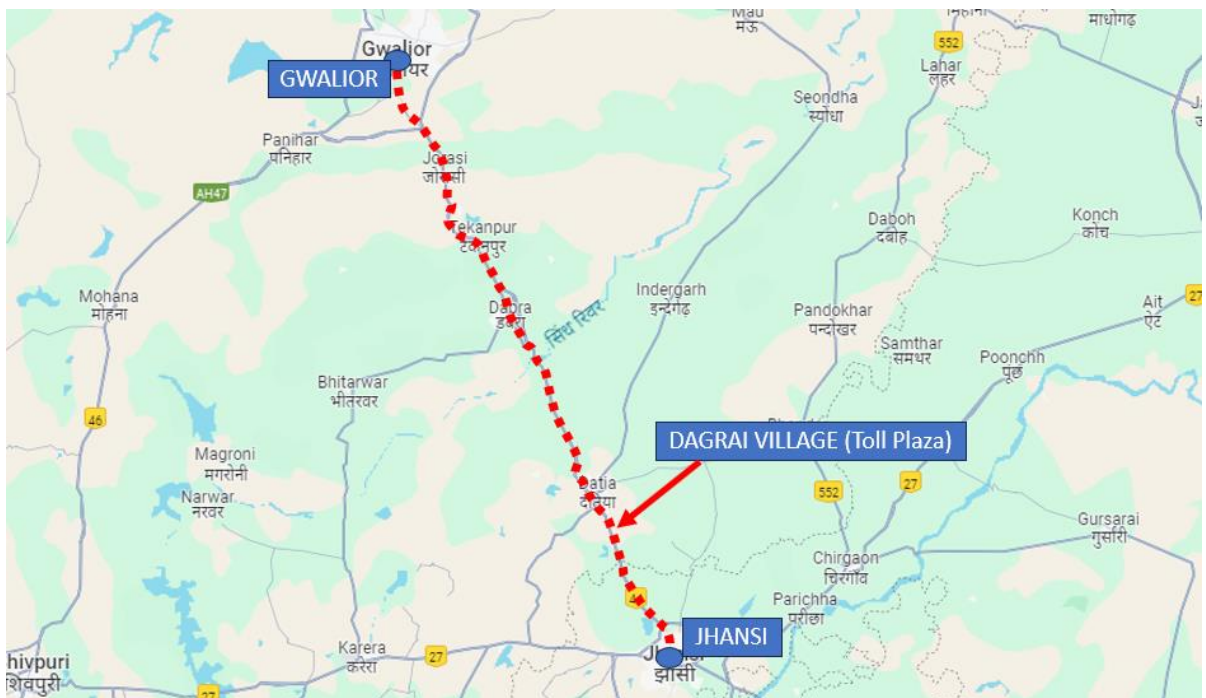
#### 2.1 Project Corridor

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. 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 16.000 of NH-44 at Gwalior in the state of Madhya Pradesh and ends at km 98.455 of NH-44 at Jhansi in the state of 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 show 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 Gwalior- Jhansi section of 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
	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
- 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
3	Bus	210

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.)- 2023-24
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
	<b>Total</b>	<b>9,305</b>

### 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

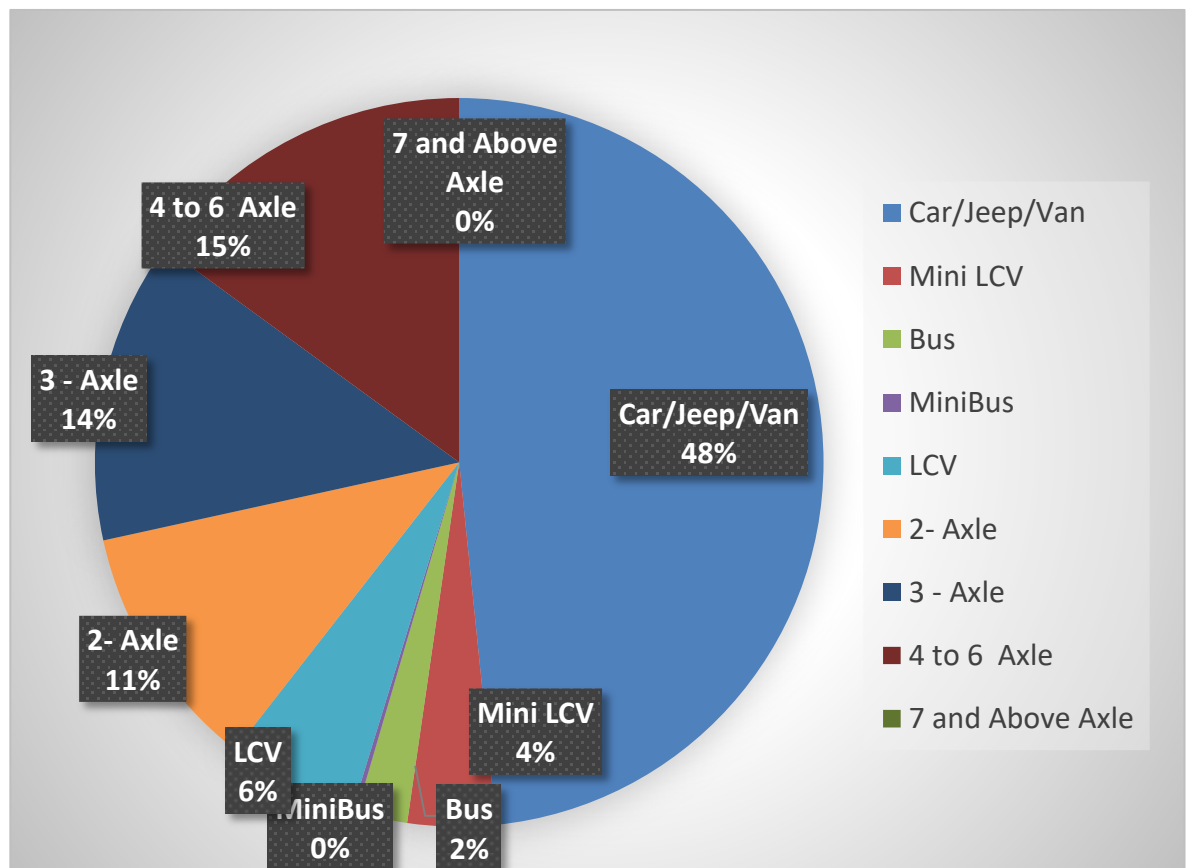
**Table 3-5 : Traffic in PCU at Project Stretch**

Year	Toll Plaza Location (Km)	Traffic No	PCU	PCU Index
2023-2024	Km 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 16.000 to Km 98.455 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).

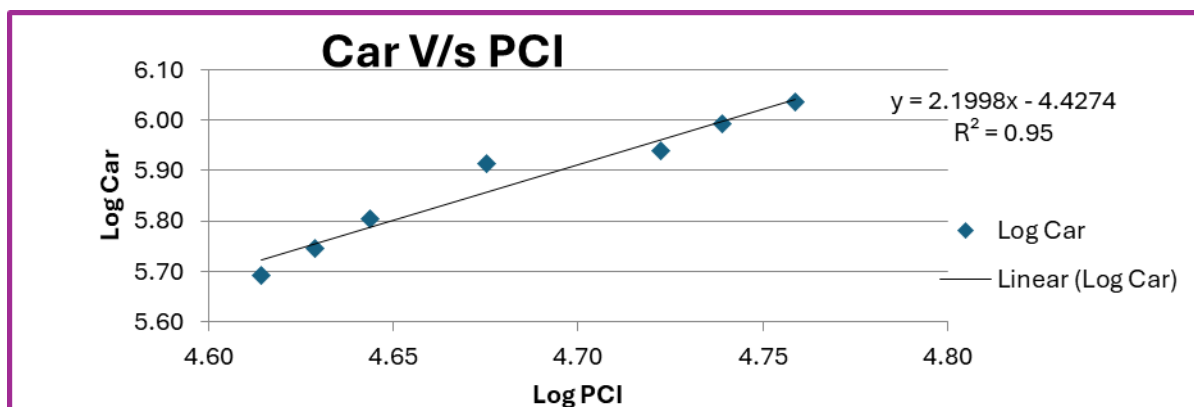
The project corridor spreads across state of Madhya Pradesh & Uttar Pradesh. Toll plaza at Dagrai Village in the state of Uttar Pradesh. Project traffic has share of majorly states like Madhya Pradesh, Uttar Pradesh, Delhi, Haryana and Rajasthan. For elasticity calculations, working data from these states 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.

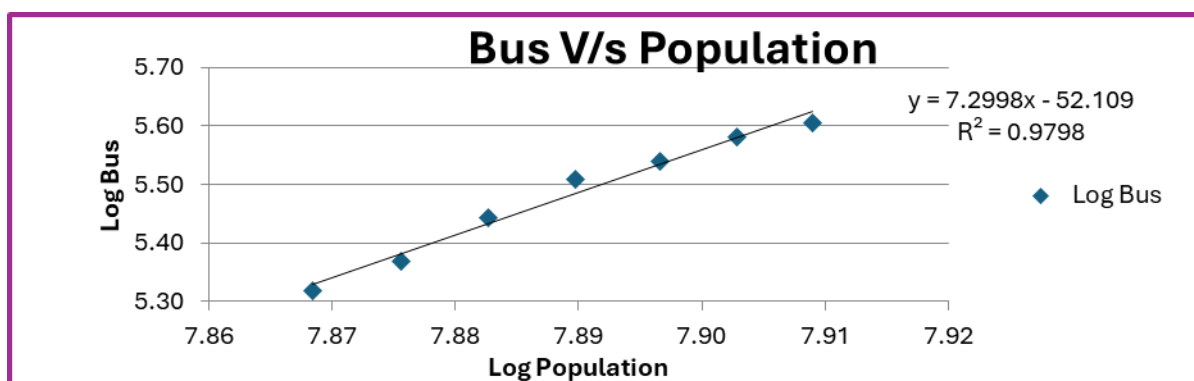


**Figure 5-1 : Regression and Elasticity PCI vs. Car – Extrapolation Madhya Pradesh**

**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.



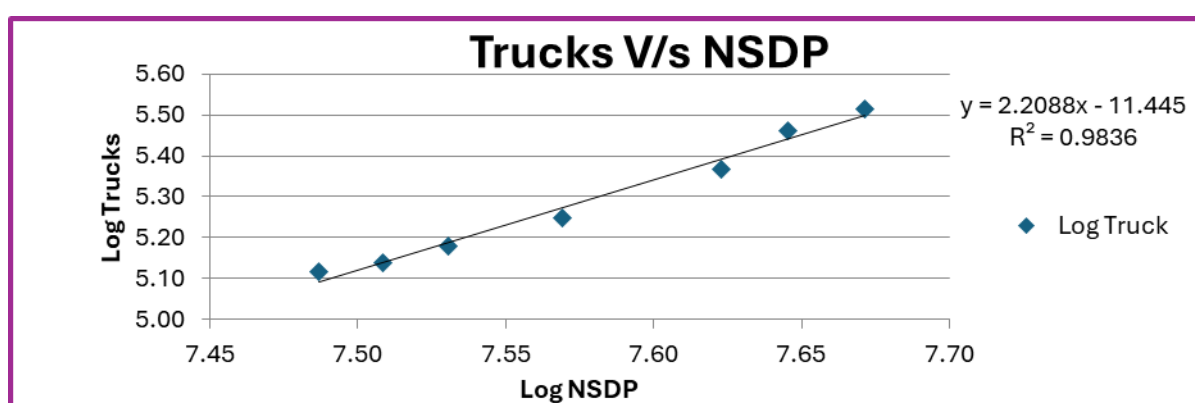
**Figure 5-2 : Regression and Elasticity Population vs. Bus – Extrapolation Madhya Pradesh**

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-4 : Summary Regression Analysis Madhya Pradesh**

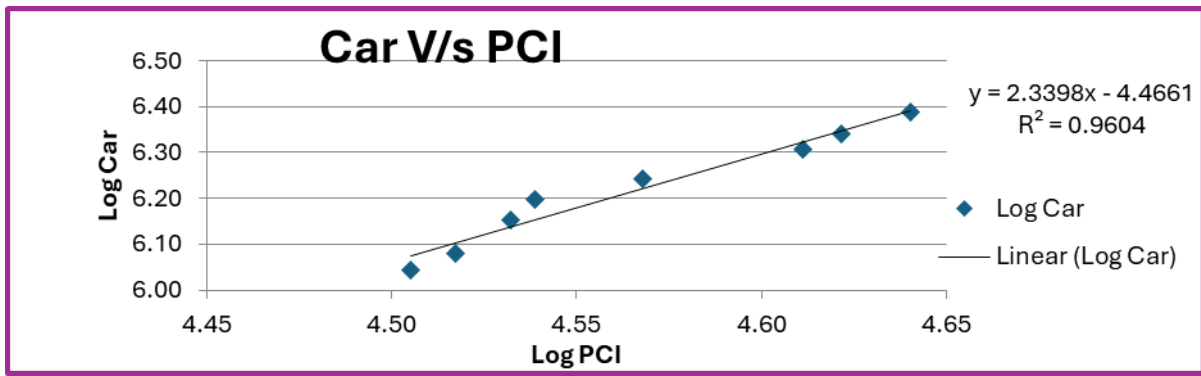
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
<b>MADHYA PRADESH</b>	<b>Car/Jeep</b>	PCI	$y = 2.2965x - 4.8829$	$R^2 = 0.9634$	2.3	6%	13.57%	Good Regression
	<b>Bus</b>	Population	$y = 7.4978x - 53.6722$	$R^2 = 0.9862$	7.5	2%	11.90%	Good Regression
	<b>Truck</b>	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.

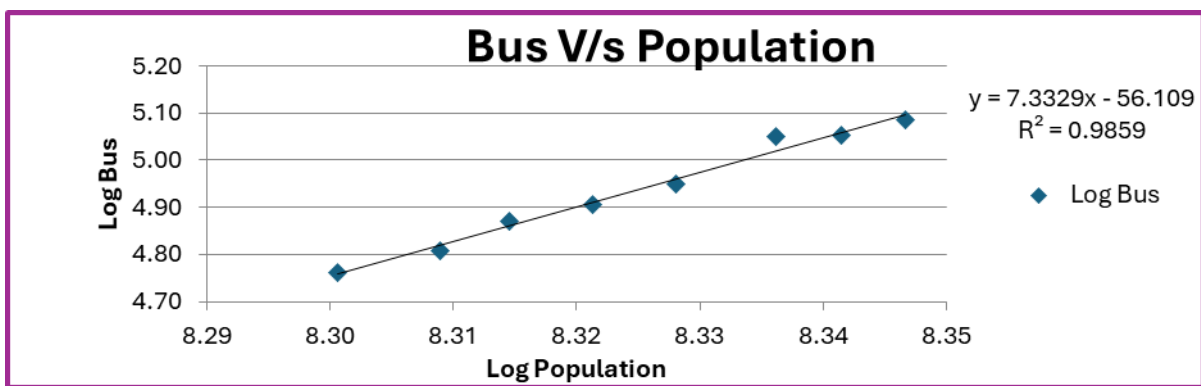


**Figure 5-4 : Regression and Elasticity PCI vs. Car – Extrapolation Uttar Pradesh**

**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.



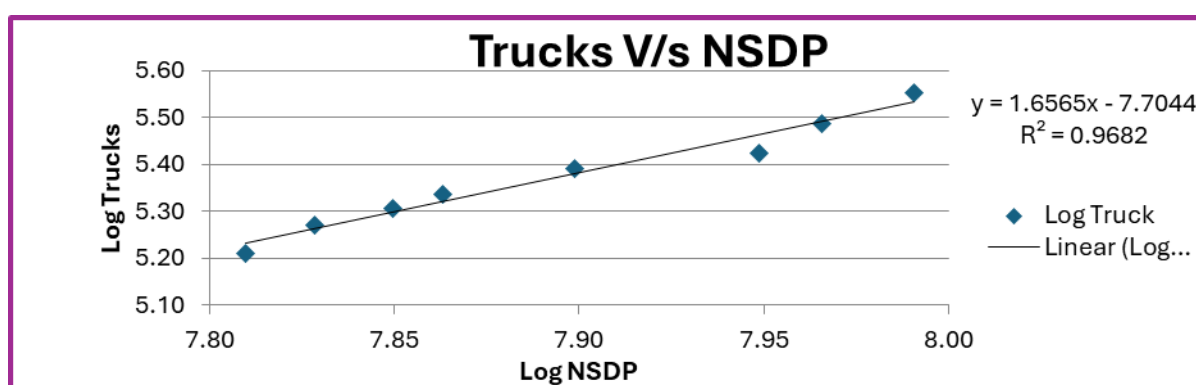
**Figure 5-5 : Regression and Elasticity Population vs. Bus – Extrapolation Uttar Pradesh**

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-8 : Summary Regression Analysis Uttar Pradesh**

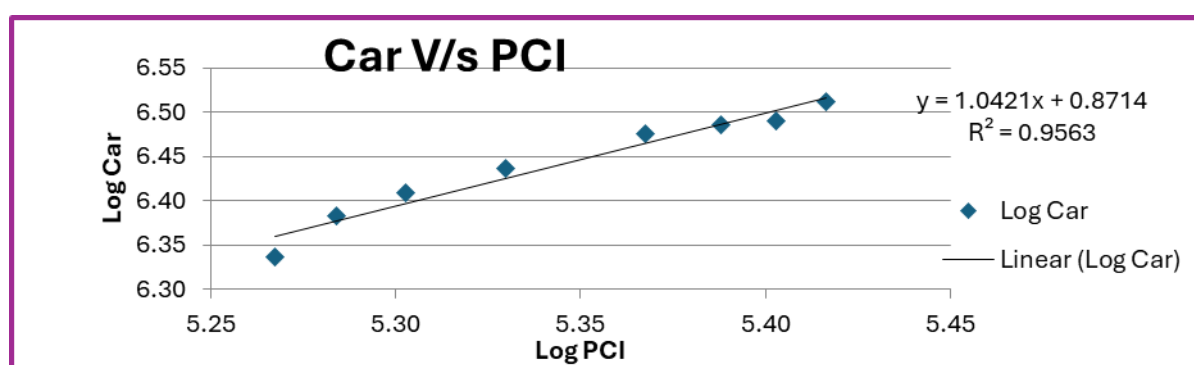
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
UTTAR PRADESH	Car/Jeep	PCI	$y = 2.3398x - 4.4661$	$R^2 = 0.9604$	2.3398	4.58%	10.72%	Good Regression
	Bus	Population	$y = 7.3329x - 56.1092$	$R^2 = 0.9859$	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.

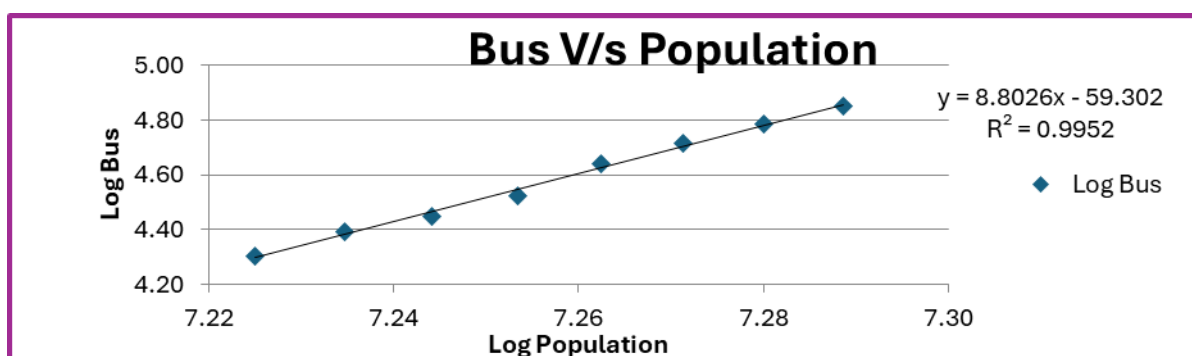




**Figure 5-7 : Regression and Elasticity PCI vs. Car – Extrapolation Delhi****Table 5-10 : Population Vs Bus Delhi**

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**

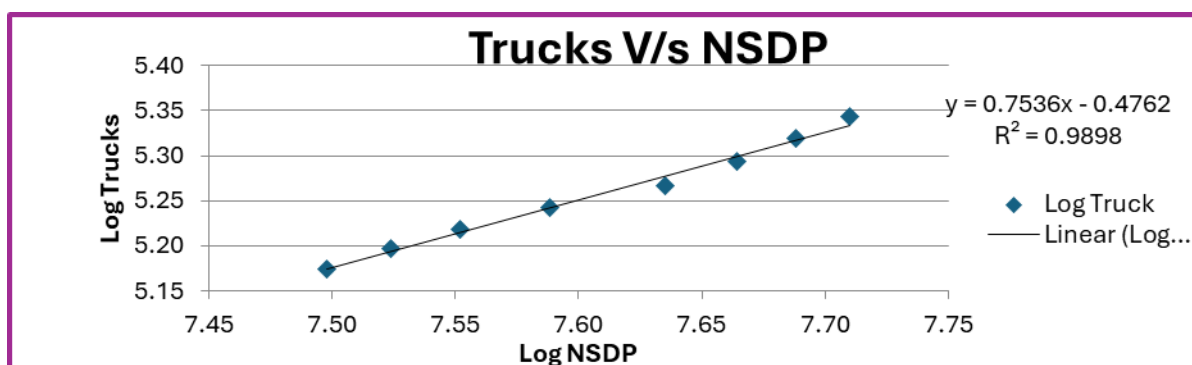
Elasticity of Trucks has been worked out by regression analysis with NSDP. The following table represents the data and details.

**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 NSDP	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 R<sup>2</sup> values are presented in the Table below.

**Table 5-12 : Summary Regression Analysis Delhi**

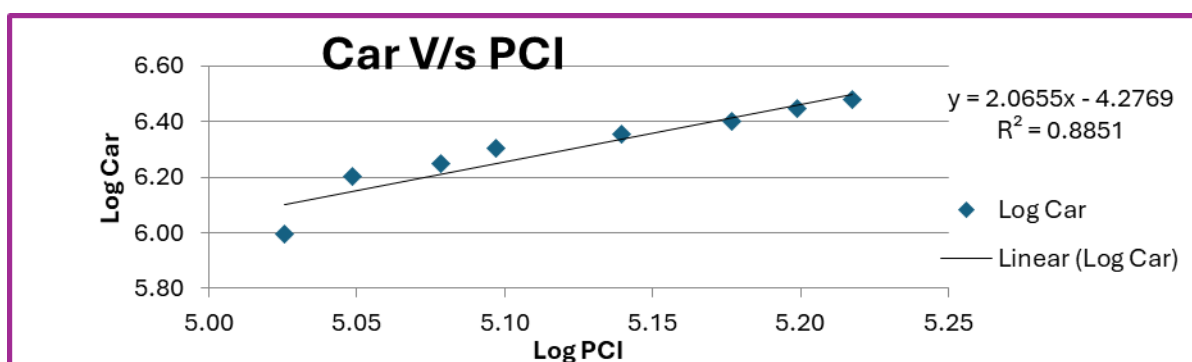
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
DELHI	Car/Jeep	PCI	$y = 1.0421x - 0.8714$	$R^2 = 0.9563$	1.0421	5.05%	5.27%	Good Regression
	Bus	Population	$y = 8.8026x - 59.3021$	$R^2 = 0.9952$	8.8026	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.

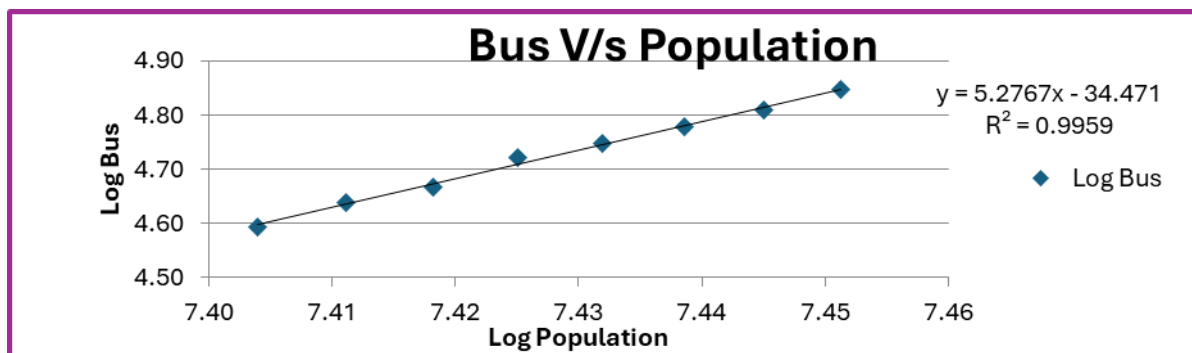


**Figure 5-10 : Regression and Elasticity PCI vs. Car – Extrapolation Haryana**

**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.



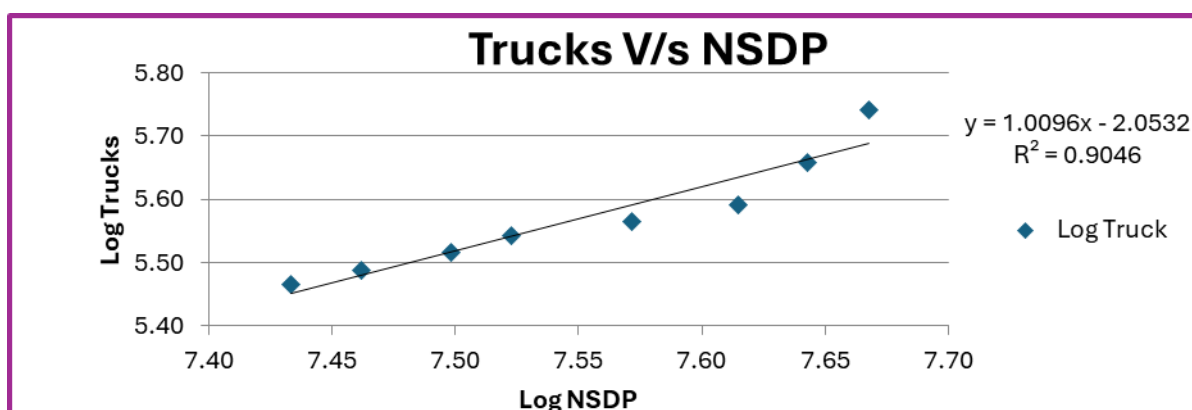
**Figure 5-11 : Regression and Elasticity Population vs. Bus – Extrapolation Haryana**

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 R<sup>2</sup> values are presented in the Table below.

**Table 5-16 : Summary Regression Analysis Haryana**

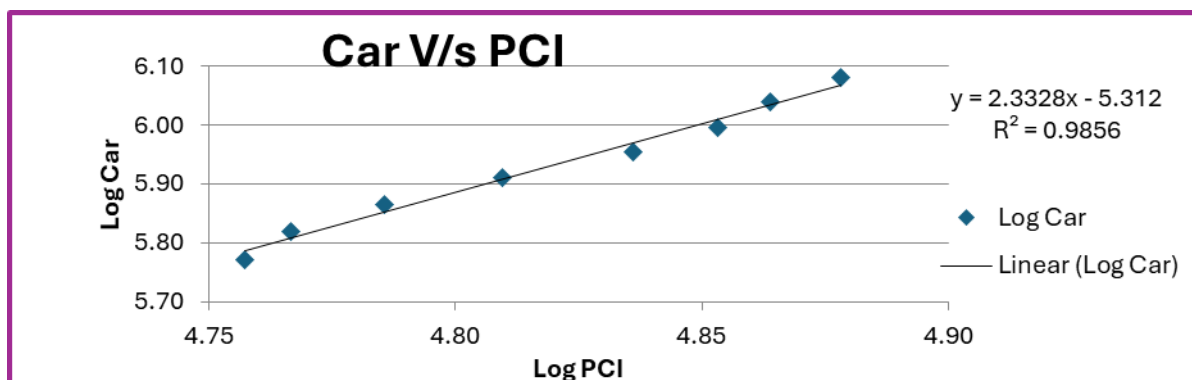
State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth (8yrs)	Growth Elastic Model	Remarks
HARYANA	Car/Jeep	PCI	$y = 2.0655x - 4.2769$	R <sup>2</sup> = 0.8851	2.0655	6.53%	13.49%	Good Regression
	Bus	Population	$y = 5.2767x - 34.4708$	R <sup>2</sup> = 0.9959	5.2767	1.57%	8.27%	Good Regression
	Truck	NSDP	$y = 1.0096x - 2.0532$	R <sup>2</sup> = 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.

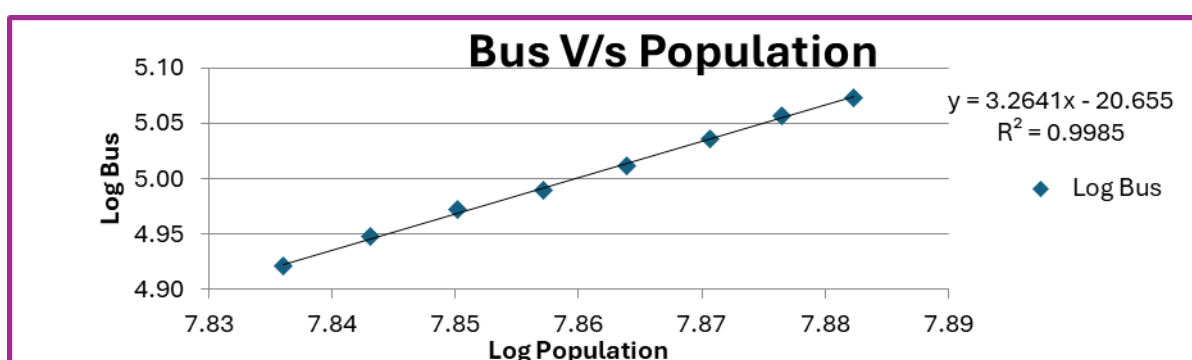


**Figure 5-13 : Regression and Elasticity PCI vs. Car – Extrapolation Rajasthan**

**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.



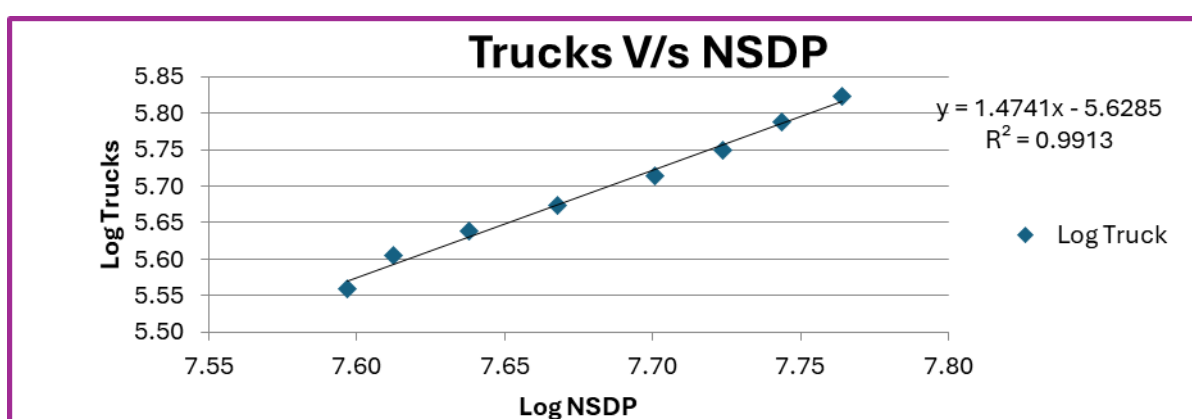
**Figure 5-14 : Regression and Elasticity Population vs. Bus – Extrapolation Rajasthan**

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 R<sup>2</sup> 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.

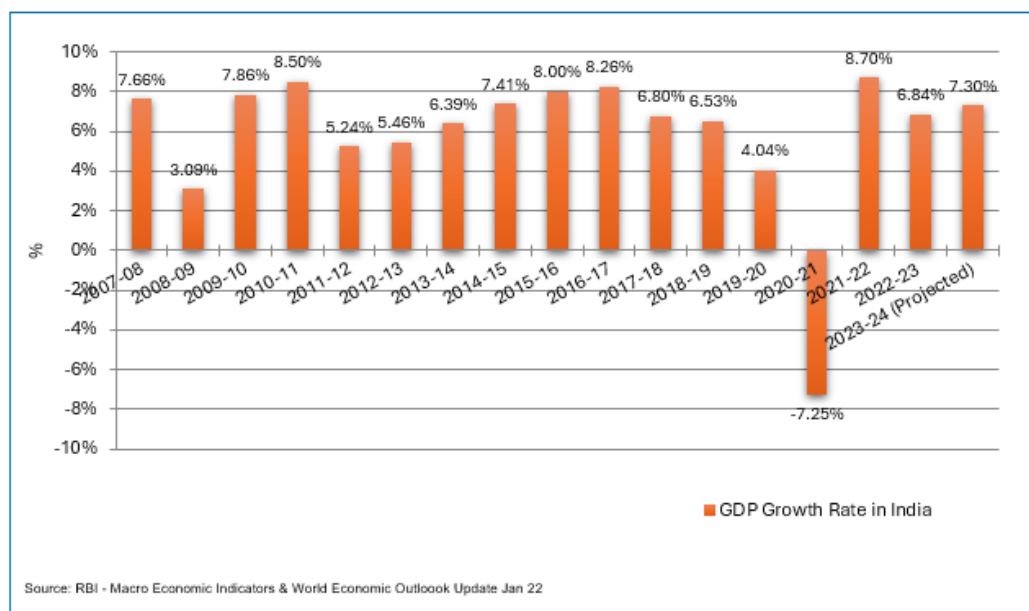
#### 5.5 Other Factors Influencing Growth

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 & South East 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**

<b>Category / Year</b>	<b>FY 25-29</b>	<b>FY 30-34</b>	<b>FY 35-39</b>	<b>FY 40-44</b>	<b>FY 45-49</b>
<b>Car/Jeep/Van</b>	7.65%	6.51%	4.90%	4.71%	4.04%
<b>Mini LCV</b>	4.62%	2.84%	2.13%	1.76%	2.97%
<b>Bus</b>	4.72%	3.66%	2.42%	2.20%	1.98%
<b>Mini - Bus</b>	4.72%	3.66%	2.42%	2.20%	1.98%
<b>LCV</b>	4.29%	2.84%	2.13%	1.76%	1.57%
<b>2- Axle</b>	4.62%	3.31%	2.13%	1.76%	1.57%
<b>3 - Axle</b>	4.62%	3.31%	2.13%	1.76%	1.57%
<b>4 to6 Axle</b>	5.28%	3.78%	2.84%	2.35%	2.09%
<b>7 and Above Axle</b>	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	Minibu s	LCV	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	Minibu s	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	Minibu s	LCV	2- Axle	3 - Axle	4 to 6 Axle	7 and Above Axle	Total Traffic	PCU (Including Exempted)
<b>2036-37</b>	10299	557	340	32	813	1612	1967	2359	0	17979	34496
<b>2037-38</b>	10804	569	348	33	830	1646	2009	2426	0	18665	35594
<b>2038-39</b>	11334	581	356	34	848	1681	2052	2495	0	19381	36733
<b>2039-40</b>	11868	591	364	35	863	1711	2088	2554	0	20074	37788
<b>2040-41</b>	12427	601	372	36	878	1741	2125	2614	0	20794	38876
<b>2041-42</b>	13012	612	380	37	893	1772	2162	2675	0	21543	39999
<b>2042-43</b>	13625	623	388	38	909	1803	2200	2738	0	22324	41163
<b>2043-44</b>	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

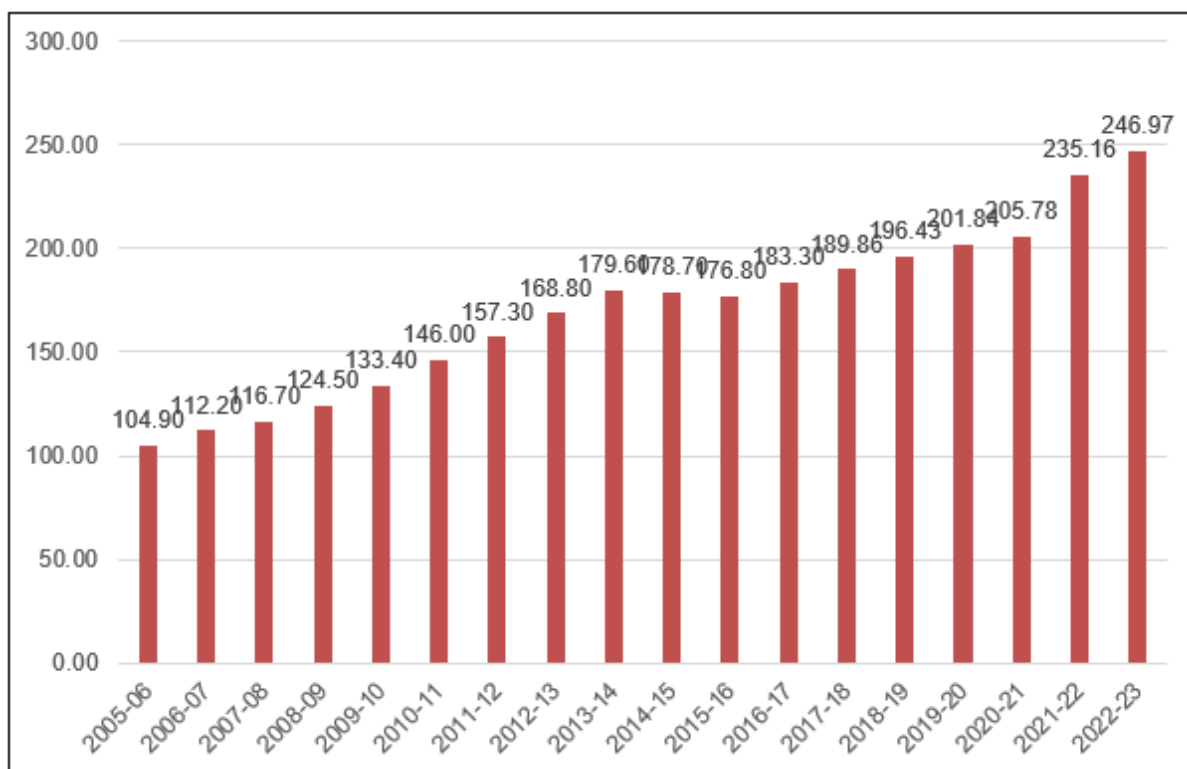
1. Monthly Pass: For frequent users monthly pass would be issued at fee at 2/3<sup>rd</sup> rate for 50 single journey trips.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 times single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles 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](http://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

<b>Location / Year</b>	<b>TP-01</b>	<b>Total</b>
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 16.000 to Km 98.455 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.



## **GMD Consultants**

503-504, Mayuresh Chambers Premises, Plot No. 60,  
Sector -11, CBD Belapur, Navi Mumbai. 400 614.  
Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : [info@gmdconsultants.in](mailto:info@gmdconsultants.in)

Web : [www.gmdconsultants.in](http://www.gmdconsultants.in)

