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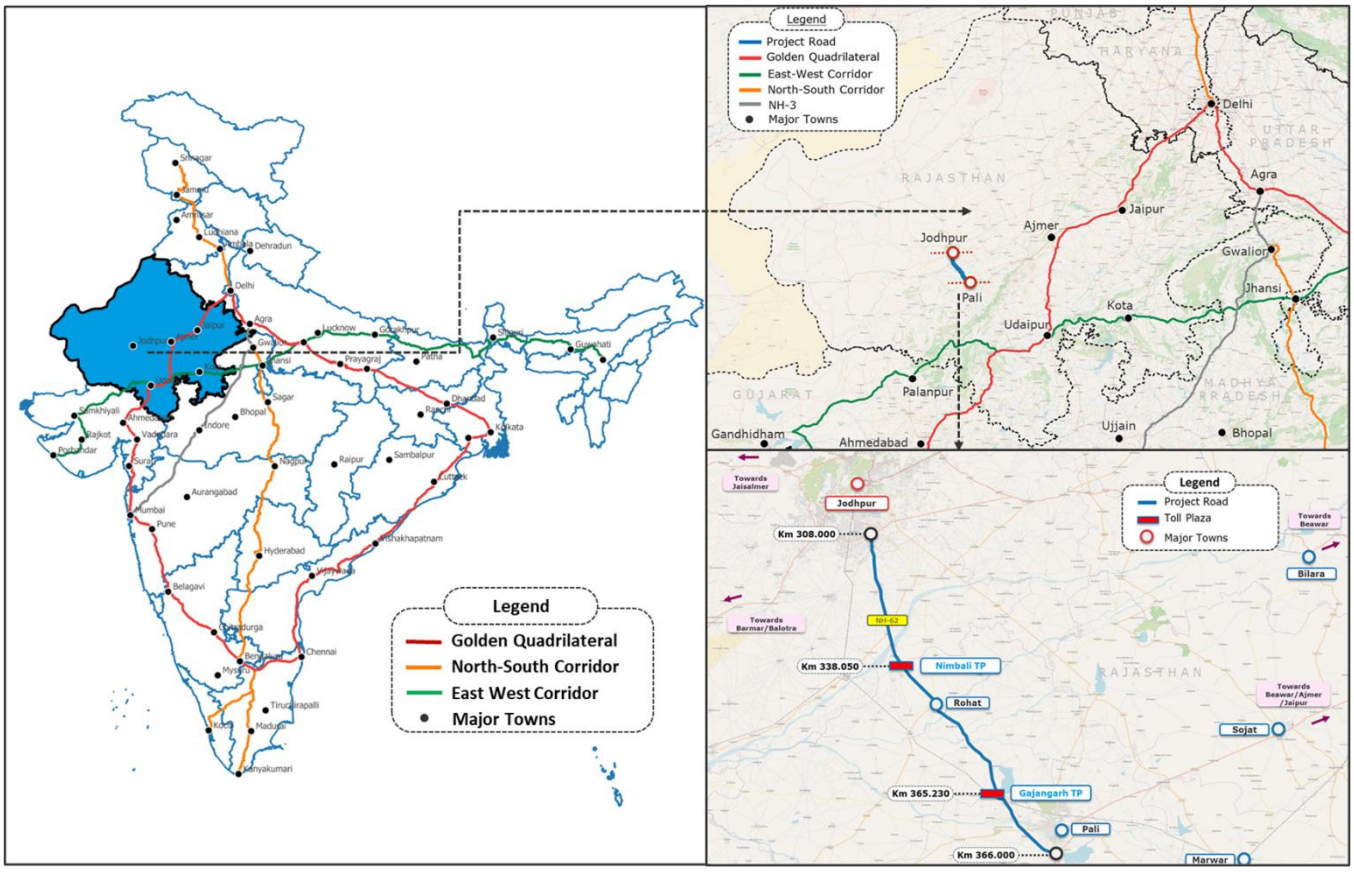
TRAFFIC STUDY FOR JODHPUR – PALI SECTION OF NH-65 IN THE STATE OF RAJASTHAN



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ABBREVIATIONS

$/US$/USD	United States Dollar
%	Percentage
₹/Rs	Indian Rupees
2A	2 Axle Truck
3A	3 Axle Truck
4A	4 Axle Trucks
5A	5 Axle Trucks
6A	6 Axle Trucks
AADT	Annual Average Daily Traffic
AJE	Amritsar Jamnagar Expressway
ACSR	Aluminium conductor steel-reinforced cable
AR	Alternate Route
BIA	Broad Influence Area
CA	Concession Agreement
CAGR	Compounded Annual Growth Rate
CJV	Car/Jeep/Van
COVID	Corona Virus Disease
CR	Cost Ratio
CSO	Central Statistical Organisation
DBFOT	Design, Build, Finance, Operate & Transfer
DFC	Dedicated Freight Corridor
DMIC	Delhi-Mumbai Industrial Corridor
DPIIT	Department for Promotion of Industry and Internal Trade
EI	Economic Indicator
EME	Earth Moving Equipment
FDI	Foreign Direct Investment
FY	Financial Year
GDP	Gross Domestic Product
GSDP	Gross State Domestic Product
GST	Goods & Services Tax
GVW	Gross Vehicle Weight
HCM	Heavy Construction Machinery
IA	Industrial Area
IIA	Immediate Influence Area
IR	Investment Region
IRC	Indian Roads Congress
IT	Information Technology
ITeS/ITES	Information Technology Enabled Services
JPMIA	Jodhpur-Pali-Marwar Investment Area
km	kilometre
LCV	Light Commercial Vehicle
LMV	Light Motor Vehicle
MAV	Multi Axle Vehicle

MBus	Mini-Bus
MLCV	Mini Light Commercial Vehicle
MORTH	Ministry of Road Transport and Highways
MTPA	Million Tonnes Per Annum
NH	National highway
NHAI	National Highway Authority of India
NHDP	National Highway Development Programme
OD	Origin & Destination
OSV	Oversized Vehicle
PCU	Passenger Car Unit
PIA	Project Influence Area
PR	Project Road
RBI	Reserve Bank of India
RFP	Request For Proposal Document
RUCS	Road User Cost Study
SEZ	Special Economic Zone
SH	State Highway
SMS	Steel Melting-Shop
SP	Special Publication
SPV	Special Purpose Vehicle
sq.km	Square Kilometre
TC	Toll Cost
TP	Toll Plaza
TTC	Travel Time Cost
VOC	Vehicle Operating Cost
WPI	Wholesale Price Index
YOY	Year on Year

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1. INTRODUCTION

1.1 General

The Public Works Department, Government of Rajasthan on behalf of Ministry of Road Transport and Highways, Government of India has identified important corridors in the state under the core road network. The Jodhpur-Pali section of NH-65 is one of many such corridors that have been four laned considering the future capacity constraints.

The project road section of Jodhpur-Pali of NH-65 starts at Jodhpur (km 308.000) and ends near Pali (km 366.000) & includes bypass to Pali starting from km 366.000 on NH-65, connecting NH-14 at km 114.000 in the state of Rajasthan and has a total length of about 71.535 km.

The project road was upgraded to 4-lane highway and was awarded to GR Infraprojects Ltd. which in turn formed a SPV Jodhpur Pali Expressway Limited. The project is undertaken through Public-Private Partnership on DBFOT basis for a concession period of 25 years and tolling is operational at two existing toll plazas viz., Nimbali TP (km 338.050) and Gajangarh TP (km 365.230) since November 2014.

The National Highway-65 (NH-65) with a length of 690 km connects Ambala in Haryana to Pali in Rajasthan. The highway passes through the states of Haryana and Rajasthan. The major cities located along this highway are Ambala, Kaithal, Hisar, Churu, Fatehpur, Nagaur, Jodhpur and Pali. Alignment of the NH-65 is shown in **Figure 1-1.**

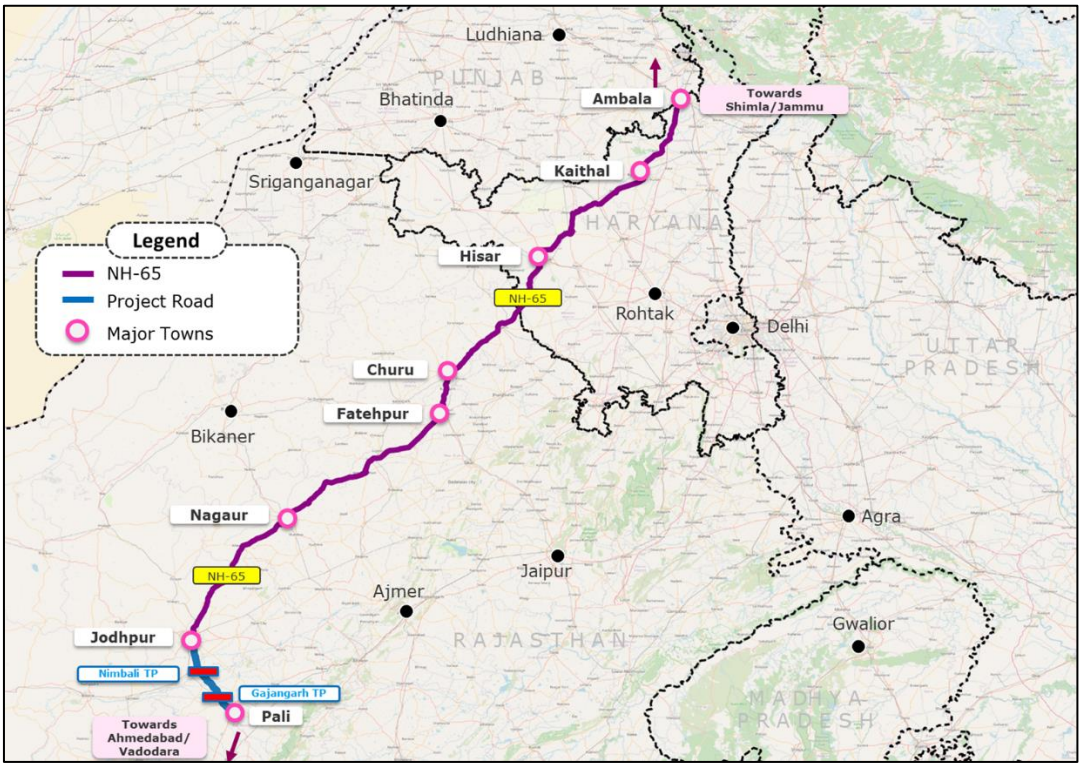


Figure 1-1: Alignment of NH-65 Connecting Ambala & Pali

M/s. Ramboll India Private Ltd has been engaged as Traffic Consultant to carry out a study for assessing the present traffic levels, travel pattern and revenue estimation duly

considering the network characteristics, future economic perspective in the influence area of the project and the provisions in the Concession Agreement of the project for the balance concession period.

1.2 Scope of Services

The objective of the study is to analyse the existing tollable traffic, travel pattern and to estimate the future traffic and toll revenue for the project road.

The scope of services includes preparation of a due diligence report for the project road covering the following:

- 1 day OD Survey at each toll plaza
- Analysis of recent toll/traffic data up to February 2023 and its growth trends
- Estimation of the base AADT for FY23
- Analysis of OD data to cover:
  - Trip matrix and influence factors for different zones contributing traffic on the corridor
  - Identification of Project Influence Area from analysis of travel pattern - regional distribution of traffic
  - Commodity composition- Goods type distribution
  - Top OD pairs by vehicle types
- To study the impact of traffic diversion (from/to project road) in present condition and future improved scenario, a cost ratio-based diversion analysis using spreadsheet-based modelling out for potential OD pairs
- Identify factors which may have a positive and / or negative impact on the traffic - all major developments like industrial corridors, freight corridor, economic corridors, ports, Bharatmala, Sagarmala
- Upcoming developments and future development potential of the region would be assessed for the induced/newly generated traffic
- Traffic projections for the balance concession period in three scenarios – low, most likely and high
- Toll revenue estimates using WPI forecasts and tolling ticket segmentation
- Scenario analysis of toll revenue

1.3 Report Structure

This report is divided into four chapters, including this introduction chapter. Chapter 2 details upon the project road characteristics and socio – economic profile of the districts in the project influence area including the estimation of AADT and travel characteristics

in the Project Influence Area (PIA). Chapter 3 contains the details on the derivation of traffic growth rates used for traffic forecasting and presents traffic projections for the study period. Chapter 4 presents the details regarding tolling strategy, toll rates and the revenue projections for the duration of the concession.

2. TRAFFIC SURVEY AND ANALYSIS

2.1 General

In order to understand the traffic characteristics, the travel pattern of vehicles plying on the project road were collected through primary surveys. This chapter presents the details of the project road characteristics, Annual Average Daily Traffic (AADT), travel characteristics on the project road. The results of the analysis will be utilized in assessing the traffic growth and estimation of traffic and revenue forecast on the project road for the concession period.

2.2 Project Road Characteristics

The project road section of Jodhpur-Pali of NH-65 starts at Jodhpur (km 308.000) and ends near Pali (km 366.000) & includes bypass to Pali starting from km 366.000 on NH-65, connecting NH-14 at km 114.000 in the state of Rajasthan. PR falls under the jurisdiction of two districts viz., Jodhpur and Pali and passes through the settlements of Rohat, Nimbali, Gajangarh and Kharda. There are two toll plazas present on the project road, one near Nimbali (km 338.050) and other near Gajangarh (km 365.230) both being located in Pali district.

The alignment of project road and toll plaza locations is shown in **Figure 2-1**.

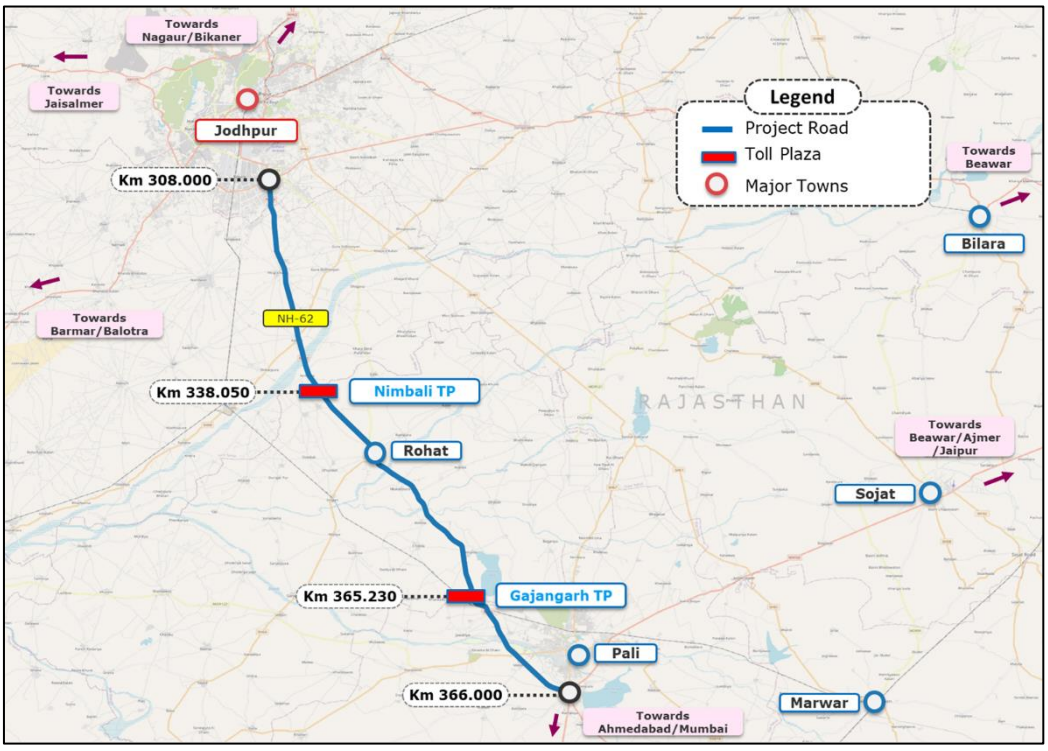


Figure 2-1: Project Road and Location of Toll Plazas

The project road, in wider context, serves the long-distance traffic which is majorly plying from/to Punjab/Rajasthan & beyond on the north to/from Gujarat/Maharashtra & beyond on the south. Apart from long distance traffic, it also serves the short distance traffic which is mainly generated between the settlements of Jodhpur and Pali.

2.2.1 Network characteristics in vicinity of the project road

The detail network assessment in the vicinity of the project section is presented in **Figure 2-2**.

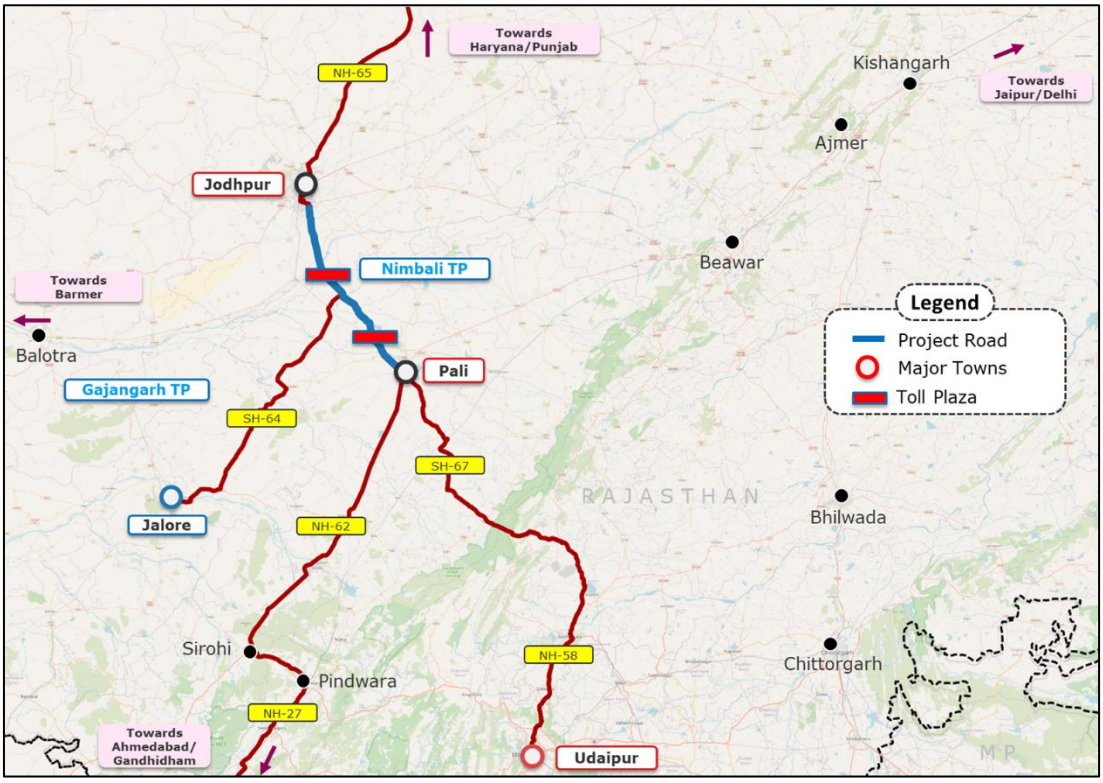


Figure 2-2: Network Characteristics in Vicinity of the Project Road

The project road section provides direct connectivity to/from the traffic from Haryana/Punjab and beyond in the north to Ahmedabad/Kandla/Gandhidham/Surat/ Mumbai on the south.

From the network assessment, it is evident that the traffic from/to Haryana/Punjab and beyond enters the network at Jodhpur and travels the project section (NH-65) crossing both the toll plazas and further travels to Ahmedabad/Kandla/Gandhidham/Mumbai/Pune and beyond.

In addition, the traffic travelling from/to Jodhpur and beyond on the north to/from Jalore and surroundings takes an exit from NH-65 to SH-64 at Rohat thus crossing only TP01 of the project corridor.

It was observed that the traffic travelling between Jodhpur & beyond and Udaipur and beyond travels the entire project section and takes an exit on SH-67 from NH-65 after Pali and further takes NH-58 to reach Udaipur and beyond.

2.2.2 Profile of Project Influence Area District

The project road section lies entirely in the state of Rajasthan. It passes through the districts of Jodhpur and Pali. The districts of Jodhpur and Pali fall under the DMIC region identified along the Western DFC corridor running from Delhi to Mumbai. The DMIC corridor is proposed to include 24 industrial nodes: 13 investment regions of ~ 200 sq.km

area and 11 Industrial areas of ~100 sq.km area. The Jodhpur-Pali-Marwar Industrial Area (JPM IA) is proposed in Jodhpur Division of Rajasthan. The key industries currently present in Jodhpur include handicrafts and textile products. Also, an Integrated Multimodal Logistics Hub has been proposed near Rohat Railway Station as per the JPM IA Master Plan (2016).

Jodhpur District

Jodhpur district, situated in central Rajasthan, spreads in 22,850 sq. km and accommodates a population of 3.687 million (as per 2011 census). It is the divisional headquarters of state's largest administrative division covering western districts of Rajasthan i.e., Barmer, Jaisalmer, Jalore, Jodhpur, Pali and Sirohi.

Almost 60 percent of land area is under agricultural or related use. Maize, bajra, moth, chanwala, guar, till, moong, groundnut, cotton, barley, chilli and wheat are the major crops cultivated within the district. Minerals are playing important role in development of Jodhpur district. District is rich in non-metallic minerals like sandstone, rhyolite, dolomite, jasper, granite and clay.

Handicraft is the major industry in the district. Jodhpur is famous for its solid wooden furniture market. Some big furniture manufactures and sellers like Induscraft, Urban Ladder, Pepperfry, Home glamour and Fabfurnish are located in the district. Tourism and related sectors are the next major economic activities in district. Jodhpur city which is also known as 'blue city' and 'sun city' is famous for its historical monuments, forts and museums. Textiles, cement, mineral based, plastic, chemicals, electrical and electronics are the other major industries in the district.

Pali District

Pali district, situated in central Rajasthan, spreads in 12,387 sq. km and accommodates a population of 2.038 million (as per 2011 census). Chemical grade limestone, quartz, feldspar and calcite produced in the district are famous for its quality. Asbestos, soap stone, magnesite, gypsum, marble and barytes are the other major minerals found in the district. Agriculture is the major economic activity in the district. Millet, cotton, wheat, mustard, beans and barley are the major crops cultivated in the district.

Medicines, pesticides and steel furniture are the major industrial sectors found in the district. Industrial units of textile dyeing and printing, umbrellas and wire netting, cotton ginning and medium and small sized manufacturing units of mehandi, ACSR conductors, agricultural equipment, conduct pipes are also found within district boundaries.

2.3 Traffic Surveys

In order to understand the characteristics of traffic using the project road, data on road network, traffic and travel pattern of vehicles plying on the project road were collected through primary traffic surveys. Origin-destination (OD) survey as roadside interview method for one day at the toll plaza locations was conducted on the project road. The

schedule of the traffic surveys carried out as part of this study and location on the project road are given in **Table 2-1**.

Location	Chainage	Duration	Date(s)
Origin and Destination Survey			
Nimbali (TP01)	km 338.050	1 Day	10th March 2023
Gajangarh (TP02)	km 365.230		

Table 2-1: Traffic Survey Locations and Schedule

Trained enumerators were engaged for conducting traffic surveys under the supervision of experienced transport planners.

2.4 Traffic Characteristics – AADT FY23

The traffic data at the toll plaza location was provided by the client for the period from November 2014 to March 2023.

For FY23, 12 months data from April 2022 to Mar 2023 is available and is presented in **Figure 2-3**.

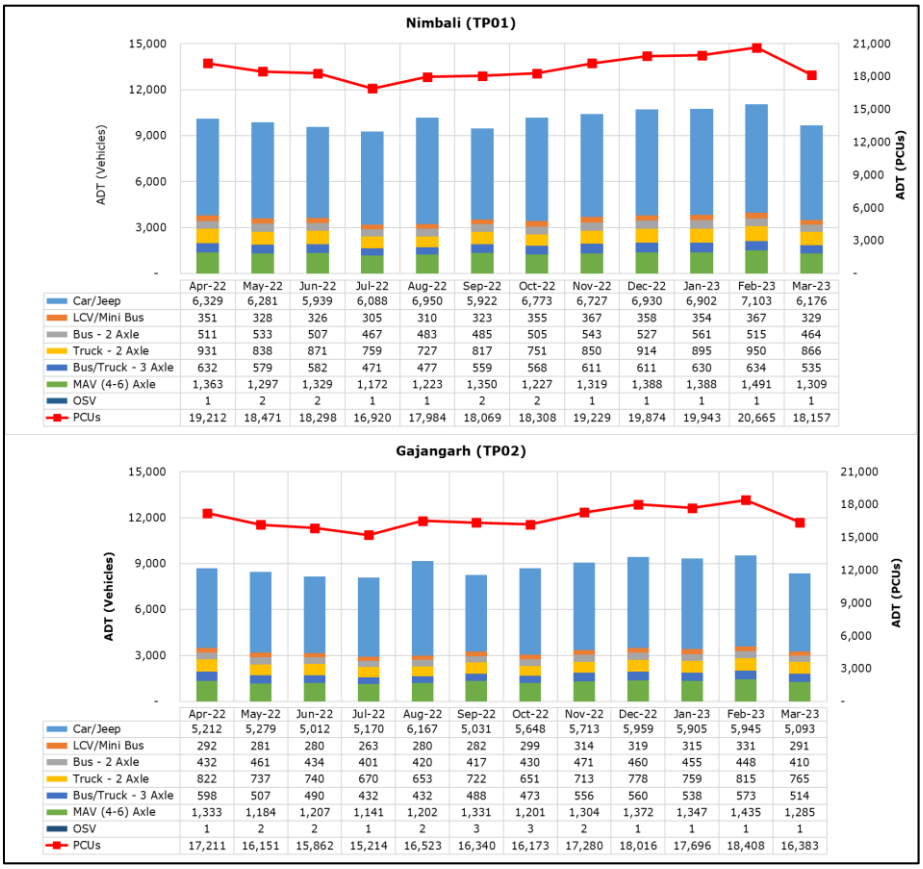


Figure 2-3: MoM Traffic of FY23 on the Project Road

For the estimation of base traffic for FY23, the 12-month average traffic of April 2022 to March 2023 has been considered as the AADT for FY23 which is presented in **Table 2-2**.

Mode	Car	LCV	Bus	2A	3A	MAV	OSV	PCU
Nimbali (TP01)	6,510	339	508	847	574	1,321	1	18,761
Gajangarh (TP02)	5,511	296	437	735	513	1,279	2	16,772

Table 2-2: AADT FY23 as Per Tolling Categories

2.5 Travel Characteristics

2.5.1 Survey Methodology

In order to understand the travel demand pattern in the region and tollable traffic streams, origin and destination (OD) surveys were carried out at the toll plaza locations. The OD survey was carried out for 24 hours for two days, by 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.

The travel characteristics obtained by OD survey facilitate the identification of:

1. Local and through traffic on the project road.
2. Potential divertible traffic to/from project road to various alternative routes.

Trained enumerators under the supervision of transport planners collected the trip characteristics using survey forms designed for this purpose. The OD survey elicited characteristics like origin, destination, frequency, purpose of trip for passenger vehicles and commodity being transported for goods vehicles. The information pertaining to origin and destination of trips collected during roadside interviews was analysed to obtain the trip distribution based on a zoning system suitably designed for the present study.

2.5.2 Traffic Zoning System

To understand the spatial dimensions of the trip characteristics of the vehicles interviewed during the O-D survey, a detailed zoning system was developed giving due consideration to the following factors:

- The road network catering to the traffic on the project road and its generating points
- Important towns, villages, factories, and industrial centres around the project road area
- Administrative boundaries of districts and states.
- Configuration of the project road in the regional road network with respect to other roads

Two major types of areas were identified for analysis purpose: -

Immediate Influence Area (IIA): It includes the cities/towns/villages and districts along the project road and adjacent to it, which generate/attract trips to the project road. In this study, it consists of districts of Jodhpur, Pali, Sirohi, Jalor and Barmer in the state of Rajasthan.

Broad Influence Area (BIA): It includes the remaining districts of Rajasthan and other neighbouring states such as Haryana, Punjab, Delhi, Gujarat, Uttar Pradesh, Madhya Pradesh, and remaining states of India.

Detailed zoning system is prepared for IIA, while more aggregate or broad zoning is developed for BIA. The zoning system adopted for data collection was based on 79 zones and is presented in **Appendix 2.1**.

2.5.3 Sample Size

The vehicles during the OD surveys were interviewed on a random sample basis. **Table 2-3** shows the AADT and the sample size (both in absolute numbers and in percentage terms) captured during the exercise.

Modes	Car	Bus	LCV	2A	3A	MAV/ OSV
Nimbali (TP01)						
Sample	4,342	454	267	394	252	898
AADT	6,510	508	339	847	574	1,322
Percentage (%)	66.7	89.3	78.7	46.5	43.9	67.9
Gajangarh (TP02)						
Sample	3,442	363	248	349	419	653
AADT	5,511	437	296	735	513	1,281
Percentage (%)	62.5	83.2	83.9	47.5	81.6	51.0

Table 2-3: Sample Size Collected in OD Survey at TP01 & TP02

Based on the sample size of different categories of vehicles interviewed during the OD survey, direction-wise expansion factors were calculated based on FY23 AADT. The OD matrices for all vehicle categories were generated and analysis was done in terms of regional distribution, travel pattern and commodity distribution.

2.5.4 Regional Distribution

Based on the OD matrices, the regional distribution of tollable vehicles at the toll plaza locations has been calculated. **Table 2-4** gives the distribution indicating the attraction and generation zones for the traffic on the project road.

Region/Modes	Car	Bus	LCV	2A	3A	MAV/ OSV
Nimbali (TP01)						
Rajasthan	95.5	92.5	81.2	84.4	63.7	48.7
Gujarat	2.9	4.1	11.9	11.0	16.2	19.5
Punjab	0.1	0.3	3.0	2.7	10.5	14.7
Maharashtra	0.6	1.8	2.6	1.7	5.7	6.2
Southern India	0.1	0.3	0.0	0.0	1.8	6.0
Haryana	0.0	0.1	1.0	0.0	0.7	2.2
Northern Indian states	0.0	0.0	0.0	0.0	0.8	1.4
Uttar Pradesh	0.1	0.0	0.0	0.0	0.0	0.4
Madhya Pradesh	0.4	0.7	0.2	0.2	0.2	0.4
Delhi	0.1	0.2	0.2	0.0	0.0	0.2
Eastern India	0.1	0.1	0.0	0.0	0.2	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Gajangarh (TP02)						
Rajasthan	91.9	87.9	73.0	78.8	55.0	48.9
Gujarat	5.3	6.3	14.8	12.2	23.6	19.0
Punjab	0.4	0.4	5.7	4.7	12.0	13.7
Maharashtra	1.3	1.7	2.0	2.3	4.8	6.1

Region/Modes	Car	Bus	LCV	2A	3A	MAV/ OSV
Southern India	0.1	2.2	0.7	0.2	0.4	5.8
Haryana	0.4	0.3	0.9	0.5	1.9	2.6
Northern Indian states	0.1	0.1	2.1	0.9	1.3	3.1
Uttar Pradesh	0.2	0.9	0.7	0.3	0.1	0.3
Madhya Pradesh	0.2	0.2	0.0	0.0	0.6	0.2
Delhi	0.0	0.0	0.0	0.0	0.0	0.0
Eastern India	0.1	0.0	0.1	0.1	0.2	0.3
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Combined for two locations						
Rajasthan	93.8	90.4	77.4	81.8	59.6	48.8
Gujarat	4.0	5.1	13.2	11.5	19.7	19.3
Punjab	0.3	0.3	4.2	3.6	11.2	14.2
Maharashtra	0.9	1.8	2.3	2.0	5.3	6.2
Southern India	0.1	1.2	0.3	0.1	1.2	5.9
Haryana	0.2	0.2	0.9	0.2	1.3	2.4
Northern Indian states	0.1	0.1	1.0	0.4	1.1	2.3
Uttar Pradesh	0.2	0.4	0.3	0.1	0.1	0.3
Madhya Pradesh	0.3	0.4	0.1	0.1	0.4	0.3
Delhi	0.1	0.1	0.1	0.0	0.0	0.1
Eastern India	0.1	0.1	0.1	0.1	0.2	0.3
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 2-4: Regional Distribution of Tollable Traffic (in %) On Project Road

Passenger traffic:

- Rajasthan contributes to the highest share of car traffic of about 95.5 and 91.9 percent at TP01 and TP02 respectively. Gujarat also contributes about 3-5 percent at both the toll plazas.
- In case of Bus traffic, Rajasthan contributes about 92.5 percent and 87.9 percent at TP01 and TP02 respectively.
- The car traffic is observed to be having Jodhpur-Pali as top OD pair at both toll plazas.

Freight Traffic

- In case of 2A traffic, Rajasthan contributes about 84.4 and 78.8 percent at TP01 and TP02 respectively, followed by Gujarat and Punjab accounting for 11-12 percent and 3-5 percent respectively at both the toll plazas.
- Rajasthan contributes to about 81.2 percent at TP01 in case of LCV and 73.0 percent at TP02, followed by Gujarat which accounts about 12-15 percent.
- In case of MAV, share of Rajasthan state at TP01 and TP02 is about 48.7 and 48.9 percent respectively. Gujarat contributes around 19.5 percent at TP01 and 19.0 percent at TP02, followed by Punjab accounting about 14.7 percent and 13.7 percent at TP01 and TP02 respectively.

The mode wise top 20 OD pairs are given in **Appendix 2.2**.

2.5.5 Travel Pattern

In order to assess the travel pattern of vehicles, the important streams of traffic plying on the project road are estimated. The list of the popular movements found at the toll plaza locations is presented in **Table 2-5** and **Table 2-6**.

S. No	Traffic Streams	Car	Bus	LCV	2A	3A	MAV
1	North of toll plaza - Zones between TP01 and TP02	29.4%	21.6%	9.5%	14.7%	13.1%	0.9%
2	Jodhpur and surroundings - Pali and surrounding	40.0%	34.1%	39.2%	36.9%	13.7%	10.4%
3	Jodhpur and surroundings - Jaipur and beyond	2.1%	0.9%	1.1%	0.0%	0.3%	0.9%
4	Jodhpur and surroundings - Jalore and surrounding	4.5%	4.8%	4.8%	8.0%	4.2%	2.0%
5	Jodhpur and surroundings - Rajsamand/ Bhilwara/ Kota and surroundings	10.3%	15.9%	8.5%	8.6%	11.2%	6.7%
6	Jodhpur and surroundings - Madhya Pradesh/ Telangana/ Andhra Pradesh and beyond	1.5%	1.5%	1.1%	0.9%	0.8%	2.0%
7	Jodhpur and surroundings - Gujarat/ Mumbai/ Pune and beyond	5.1%	8.6%	18.5%	14.8%	15.0%	24.0%
8	North/ West districts of Rajasthan (Jaisalmer/ Bikaner/ Nagaur) - Pali and beyond	6.5%	11.4%	9.1%	10.7%	17.8%	16.5%
9	Haryana/ Delhi/ Punjab and beyond - Pali and beyond	0.6%	1.1%	8.3%	5.5%	23.8%	36.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2-5: Traffic Streams at TP01

S. No	Traffic Streams	Car	Bus	LCV	2A	3A	MAV
1	Zones between TP01 and TP02 - South of Toll Plaza	22.3%	8.9%	5.4%	12.6%	1.7%	1.5%
2	Jodhpur and surroundings - Pali and surrounding	45.7%	41.1%	28.5%	28.6%	13.7%	11.9%
3	Jodhpur and surroundings - Jaipur and beyond	2.8%	5.0%	0.9%	4.6%	2.3%	2.0%
4	Jodhpur and surroundings - Jalore and surrounding	0.2%	0.4%	0.3%	0.0%	0.7%	0.0%
5	Jodhpur and surroundings - Rajsamand/ Bhilwara/ Kota and surroundings	10.2%	21.1%	12.1%	9.5%	7.0%	3.9%
6	Jodhpur and surroundings - Madhya Pradesh/ Telangana/ Andhra Pradesh and beyond	1.3%	3.5%	0.3%	1.2%	2.1%	4.1%
7	Jodhpur and surroundings - Gujarat/ Mumbai/ Pune and beyond	6.8%	11.7%	21.2%	13.7%	24.2%	19.3%
8	North/ West districts of Rajasthan (Jaisalmer/ Bikaner/ Nagaur) - Pali and beyond	8.7%	6.8%	14.0%	17.5%	17.8%	18.4%
9	Haryana/ Delhi/ Punjab and beyond - Pali and beyond	1.9%	1.7%	17.4%	12.2%	30.5%	38.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2-6: Traffic Streams at TP02

Passenger Traffic:

- The car traffic from/to Jodhpur & surroundings to/from Pali & surroundings at TP01 is about 40 percent and about 45.7 percent at TP02 (stream 2).
- The local car traffic is found to be 29.4 percent at TP01 and about 22.3 percent at TP02 (stream 1). It may be noted that majority of car trips were found to be for the purpose of work and business at both the toll plaza locations.
- Around 34.1 percent bus traffic at TP01 and about 41.1 percent at TP02 are found to be travelling between Jodhpur & surroundings and Pali & surroundings (stream 2)

Freight Traffic:

- In case of LCV/2A, around 38 percent each at TP01 and about 28 percent each at TP02 were found to be plying between Jodhpur & surroundings and Pali & surroundings (stream 2).
- About 24 percent (318 vehicles) of MAV at TP01 and about 19.3 (248 vehicles) percent at TP02 were found to be traveling from/to Jodhpur and surroundings to/from Gujarat/ Mumbai/ Pune & beyond (stream 7).
- About 36.6 percent MAV at TP01 and about 38.8 percent at TP02 were found to be traveling between Haryana/ Delhi/ Punjab and beyond and Pali and beyond (stream 9).
- About 17.8 percent each at TP01 and TP02 of 3A were found to be traveling from/to North/ West districts of Rajasthan (Jaisalmer/ Bikaner/ Nagaur) to/from Pali and beyond (stream 8).
- About 82-95 percent (473-489 vehicles) of 3A and around 96 percent each (1235-1272 vehicles) percent of MAV are found to be crossing both the toll plazas (stream 2 and 5-9). The major through interaction is between Haryana/Punjab/Delhi & beyond and Pali & beyond.

2.5.6 Commodity Distribution

Analysis was also carried out to understand the different commercial vehicles being used to transport different commodities. The commodity distribution for project corridor is presented in **Figure 2-4**.

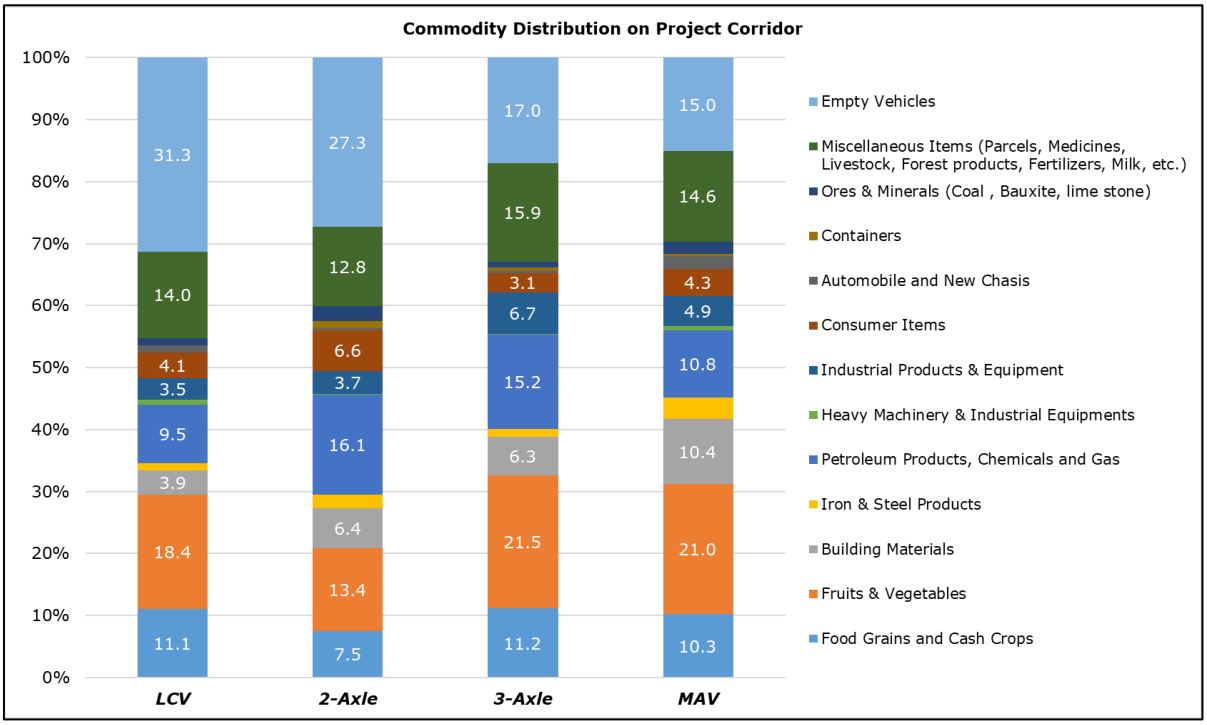


Figure 2-4: Commodity Distribution for Project Corridor

- Major commodities being transported across all the toll plazas are food grains/fruits & vegetables, petroleum products, chemicals and gas and miscellaneous items (parcels, medicines etc.)
- Around 10-11 percent of 3A/MAV are found to be transporting food grains and cash crops along the entire project corridor.
- Around 13-18 percent of LCV/2A are found to be transporting fruits and vegetables along the entire project corridor.
- About 15-16 percent of 2A/3A are found to be transporting petroleum products, chemicals and gas along the entire project corridor.

Table 2-7 presents the commodity-wise share of the total commercial traffic at each of the toll plazas on the project road.

Modes/ Commodity	LCV	2A	3A	MAV	LCV	2A	3A	MAV
	Nimbali (TP01)				Gajangarh (TP02)			
Food Grains and Cash Crops	16.9	13.2	13.5	9.0	4.8	4.3	9.8	11.2
Fruits & Vegetables	21.7	9.1	18.3	20.5	14.9	15.8	23.4	21.3
Building Materials	2.6	8.1	5.6	10.3	5.2	5.4	6.7	10.6
Iron & Steel Products	1.1	1.5	1.2	3.6	1.2	2.6	1.2	3.5
Petroleum Products, Chemicals and Gas	7.9	11.7	18.7	13.4	11.3	18.6	13.1	8.9
Heavy Machinery & Industrial Equipments	0.7	0.5	0.0	0.6	0.8	0.0	0.2	0.8
Industrial Products & Equipment	4.1	4.1	6.7	5.0	2.8	3.4	6.7	4.7
Consumer Items	2.2	1.5	1.6	3.1	6.0	9.5	4.1	5.2
Automobile and New Chassis	1.5	0.5	0.4	1.9	0.8	0.3	0.5	2.3
Containers	0.0	0.0	0.0	0.2	0.0	1.7	0.7	0.3
Ores & Minerals (Coal, Bauxite, limestone)	2.2	6.6	2.4	3.6	0.0	0.0	0.0	0.9
Miscellaneous Items (Parcels, Medicines, Livestock, Forest products, Fertilizers, Milk, etc.)	8.2	14.7	11.1	10.3	20.2	11.7	18.9	17.8
Empty Vehicles	30.7	28.4	20.6	18.4	31.9	26.6	14.8	12.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 2-7: Commodity Distribution at TP01 and TP02

- Fruits and vegetables are transported across both the toll plaza locations which account for 18-20 percent of 3A/MAV at TP01 and 21-23 percent at TP02. Major travel pattern is observed between Jodhpur/ Punjab and Pali/ Ahmedabad/ Vadodara/ Surat.
- Petroleum products, chemicals and gas tankers were observed at both the toll plaza locations which account for around 11-18 percent in case of 2A/3A at TP01 and about 13-18 percent at TP02.
- Movement of miscellaneous items such as medicines, livestock, forest products, fertilizers, milk are significant at both toll plazas and accounts for 10-11 percent of 3A/MAV at TP01 and 17-18 percent of total freight traffic at TP01 and TP02 respectively.
- In case of empty vehicles, top OD pairs of freight vehicles are from/to Jodhpur/Rohat to/from Pali/Gujarat at both toll plaza locations. These vehicles return empty to their source points after unloading of goods to nearby destination points such as Sirohi, Pali etc.

3. TRAFFIC GROWTH RATE AND PROJECTIONS

3.1 General

As the project road has been executed on a DBFOT basis with a concession period of 25 years, an estimation of the traffic using the tolled highway and its future growth are important elements to assess the project's economics as they are generally the main/sole source of revenue for the project. This chapter details various aspects of the current traffic of the project road and its growth potential.

3.2 Project Road Traffic

The traffic that is likely to use the project road was estimated on the basis of the traffic and travel characteristics gathered as part of the study. The traffic on the project road would normally consist of the following components:

- Normal Traffic
- Diverted Traffic
- Induced/Developmental Traffic

3.2.1 Normal Traffic

Normal traffic is the traffic which is already plying on the project road as assessed in Table 2.2.

3.2.2 Diverted Traffic

Diverted traffic is generally dictated by the presence of an alternative route at a lower generalised cost, which is in-turn defined by the road configuration and its condition, the type of vehicle and its operating costs, the average riding speed, the route distance and any tolling that may apply on a specific route. A detailed road network assessment along with site reconnaissance survey was conducted on the project road and vicinity to identify alternate routes. In case of the project road, the tolling has been at place since 2014, the travel pattern is well established. No alternate route has been found in the vicinity from/to where the traffic may divert.

However, there is one major development i.e., Amritsar – Jamnagar Expressway that could impact the project road traffic.

Diverted traffic is generally dictated by the presence of an alternative route at a lower generalised cost, which is in-turn defined by the road configuration and its condition, the type of vehicle and its operating costs, the average riding speed, the route distance and any tolling that may apply on a specific route.

The assessment of any likely traffic addition to/diversion away from the Project Road (PR) has been done using the cost ratio analysis as described below:

- Assessment of the potential divertible traffic sensitive to network improvements based on the observed travel pattern

- Calculation of road user cost of travelling on the project road and the alternative route. The road user cost includes vehicle operating cost (VOC), travel time cost (TTC) and toll cost (TC), if any. VOC comprises of the cost of fuel, spare parts, maintenance labour, tyre, engine oil, grease, fixed cost, depreciation and crew wages.
- The toll rates for AJE are considered as 1.5 times the normal NHAI per km toll rates (accounting for 1.25 times for normal length of expressway and increase for the likely equivalent structure length).
- Analysis has been done only for larger axle trucks as these vehicles travel long lead and are potential to shift to AJE

The road user cost is estimated based on vehicle operating cost equations presented in IRC SP-30,2019 which is based on updation of Road User Cost Study (RUCS) carried out by Central Road Research Institute in 2019 for Ministry of Road Transport and Highways. Using the likely traffic stream speeds and lane configuration, the vehicle operating, and travel time costs are estimated for each of the routes. Road user cost on the identified routes is calculated and diversion percentages are estimated using diversion curve method mainly for trucks. In this method, traffic likely to be diverted from/to the project road, was estimated using Logit model, which computes expected diversion percentage based on the ratio of perceived cost on the existing and proposed facilities. The perceived cost is the financial vehicle operating cost and the time saving cost including toll charges (if any). According to the model, a vehicle will shift if the perceived cost on an alternative route is lower in comparison to existing route. The diversion equations for estimating diversion have been adopted from Indian National Expressway Network Report, MORTH (2009) as mentioned in IRC 108:2015. These equations are presented in **Table 3-1**.

Vehicle	Cost Ratio (CR) Interval	Equations
Truck	<= 0.750	% Div. = 100 - ((CR/0.75) * 5)
	0.750 <= CR <= 1.250	% Div. = 95 - ((CR-0.75)/0.5) * 90
	1.250 <= CR <= 2.0	% Div. = ((2-CR)/0.75) * 5

Source: IRC 108-2015

Table 3-1: Diversion Equations Used for Analysis

Amritsar – Jamnagar Expressway (AJE)

Amritsar – Jamnagar Expressway is a 1,224 km long, partially access-controlled expressway having 4/6 lane configuration which is being constructed under Bharatmala Phase I as the Amritsar – Jamnagar economic corridor. The expressway passes through the states of Punjab, Haryana, Rajasthan and Gujarat and is intended to connect the ports of Gujarat to the industrial centres of Punjab. About 3/4th length of the total expressway is greenfield construction (Sangariya in Rajasthan to Santalpur in Gujarat). The entire corridor is expected to reduce the distance between Amritsar and Jamnagar

by about 200 km and reduce the travel time from existing 26 hours to half. The project roads and the tentative alignment of the expressway is presented in **Figure 3-1**.

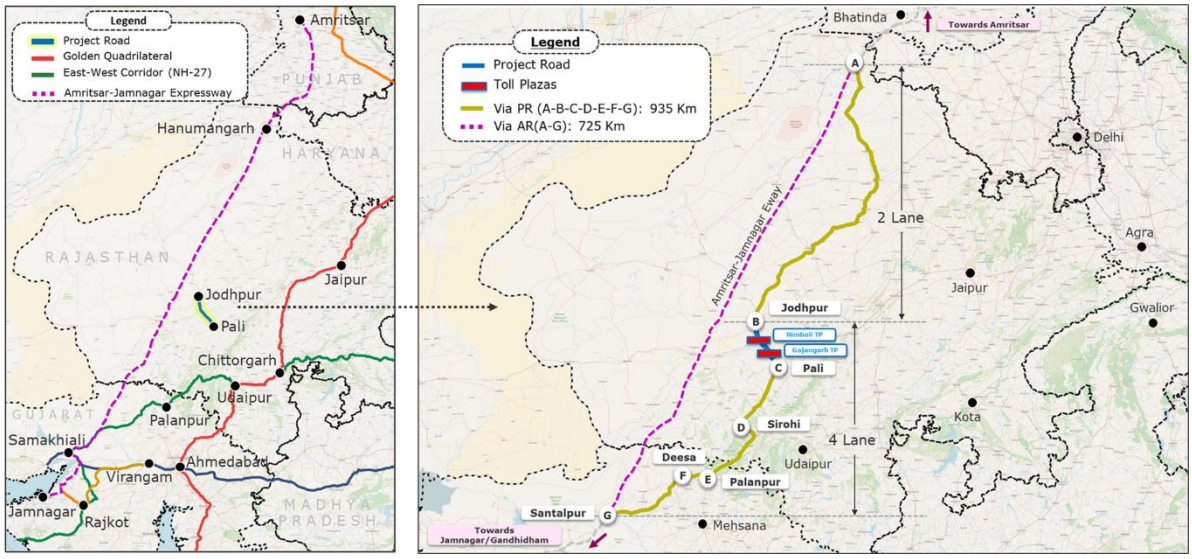


Figure 3-1: Project Road and Tentative Amritsar - Jamnagar Alignment

The expressway runs parallel to the route via project road between Sangariya and Santalpur. The traffic plying from/ to Punjab & beyond to/ from Kandla/ Morbi/ Rajkot/ Gandhidham & beyond is potential traffic which is likely to be impacted after the expressway becomes operational.

The route via project section from Sangariya in Rajasthan to Santalpur in Gujarat is about 935 km as against 725 km via AJE. Thus, the route via AJE is about 210 km shorter than the route via PR.

Assessment of potential divertible traffic has been done from the OD analysis of the toll plazas. The potential divertible traffic for these streams of traffic is presented in **Table 3-2**.

Modes	3A	MAV
Potential Traffic as % of AADT		
A) TP01	5.9	7.0
B) TP02	6.6	7.2
Diversion % from cost ratio analysis		
C) AR Share in %	95.4	95.7
Loss as % of AADT		
D) TP01 (A*C)	5.6	6.7
E) TP02 (B*C)	6.3	6.9
Adopted Loss as % of AADT		
F) Captive Traffic for PR (%)	0.33	0.33
G) Diverted to Expressway (%) _TP01 = D*(1-F)	4.0	5.0
H) Diverted to Expressway (%) _TP02= E*(1-F)	4.0	5.0

Table 3-2: Potential Divertible traffic to the Expressway

The cost-ratio based analysis indicates loss of 5-6 percent of 3A and 7 percent of MAV at both the plazas. However, the alternate route consisting of the greenfield expressway of AJE may not be able to attract whole of this traffic. The freight vehicles using the route via project road may still prefer the national highway network due to cargo distribution

points along the route, familiarity of the route and wayside amenities along the route via project road. In light of this, about 2/3rd of the total diverted traffic is envisaged to shift to the alternate route. Thus, the project road may lose about 4 percent of 3A and 5 percent of MAV at both the plazas once the alternate route is fully operational.

The impact of this diversion has been considered under the base case from FY25 onwards and phased over three years with 50 percent diversion in FY25, 75 percent in FY26 and 100 percent in FY27 onwards.

3.2.3 Induced/ Development Traffic

Developmental /new generated traffic is the one which would be generated, over and above normal growth, because of lowering of transport costs or new developments in the immediate influence area of the project road.

Bharatmala Pariyojana is the second largest highways construction project in the country since NHDP, under which almost 50,000 km or highway roads were targeted across the country. It will look to improve connectivity particularly on economic corridors, border areas and far-flung areas with an aim of quicker movement of cargo and boosting exports.

It will connect 550 district headquarters to minimum 4-lane highway by raising the number of corridors to 50 (from current 6) and move 80 percent freight traffic (currently 40 percent) to national highways by connecting 24 logistics parks and 7 north east multimodal waterway ports.

The Phase-I includes economic corridors of around 9,000 km; inter-corridor and feeder routes of around 6,000 km; 5,000 km roads under the National Corridors Efficiency Program, border and international connectivity roads of around 2,000 km; coastal and port connectivity roads of around 2,000 km; expressways of around 800 km and 10,000 km of NHDP roads. The total length in phase 1 comes to around 34,800 km.

Figure 3-2 presents the details of the upcoming projects under Bharatmala in the project influence area in the context of the project section.

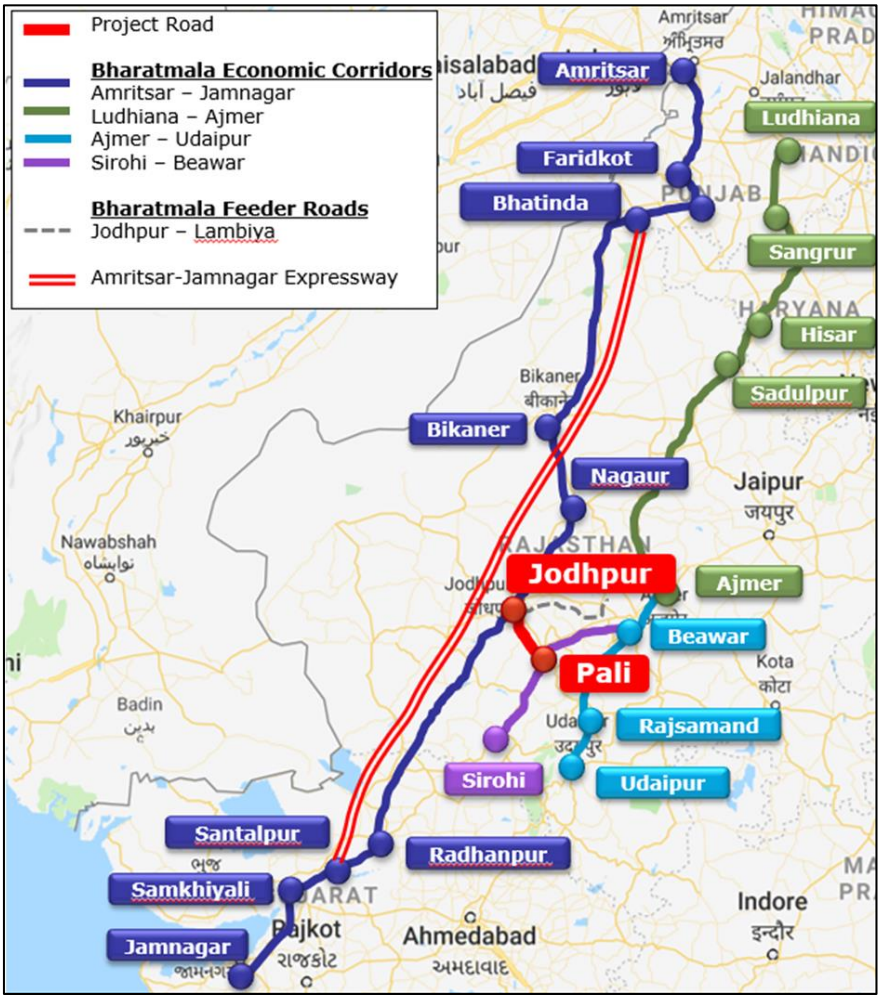


Figure 3-2: Alignment of the Economic Corridors and Feeder Roads

As the project road is a connecting link to these economic corridors and feeder roads, it is likely to remain an important state highway for the North-South movement and may see sustained growth in the future. This has been considered while setting out traffic growth rates for rest of the concession period.

Two major developments of DMIC node (Jodhpur-Pali) and operation of western DFC may have an impact on the PR traffic. The following sections provide an assessment of the impact.

Impact of DMIC

Along the alignment of the Delhi-Mumbai Freight Corridor, "Delhi Mumbai Industrial Corridor (DMIC)" is being set up in a strip of 150-200 km. The proposed alignment of dedicated freight corridor passes through the region that already has well-developed industrial base. However, to optimize on the alignment of DFC and feeder transport infrastructure for freight distribution, influence region for development of high impact economic regions with quality infrastructure is considered to be extended up to 150-200 km on both sides of the alignment of the DFC.

Project influence area (PIA) for DMIC comprises 436,486 sq km and constitutes 29.2% of the total area of DMIC states (1,492,557 sq km) and 13.8% of overall India. The

influence area states for DMIC include Delhi, Haryana, Rajasthan, Gujarat, Maharashtra, Union Territories of Diu & Daman and Dadra & Nagar Haveli along with parts of Western Uttar Pradesh, Uttaranchal and Madhya Pradesh.

Under DMIC, high impact/ market driven nodes- integrated Investment Region (IRs) and Industrial Areas (IAs) have been identified within the corridor to provide transparent and investment friendly facility regimes.

An Investment Region (IR) would be a specifically delineated industrial region with a minimum area of over 200 square km (20,000 hectares), while an Industrial Area (IA) would be developed with a minimum area of over 100 square km (10,000 hectares). 24 such nodes - 11 IRs and 13 IAs spanning across six states have been identified after wide consultations with the stakeholders i.e., the State Governments and the concerned Central Ministries. It is proposed that 6 IR and 6 IAs would be taken up for implementation in the Phase 1. Phase I development is very much delayed and now is likely to be completed by 2020-21. The revised deadlines for phase 2 and 3 are 2027 and 2037, respectively.

In case of the project road, DMIC node for Jodhpur-Pali-Marwar (JPM) is proposed to be developed as an Industrial Area in Phase II with an area of 154 sq. km. Proposed DMIC investment region of JPM along with the alignment of the project road is presented in **Figure 3-3**.

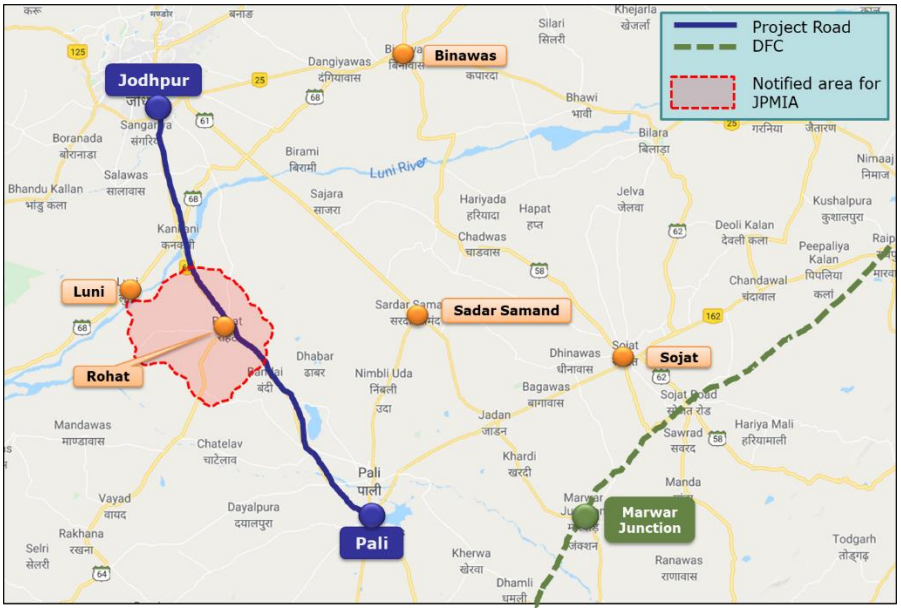


Figure 3-3: Proposed DMIC Node of JPMIA

As per the draft master plan of this IA, Jodhpur-Pali-Marwar industrial area is proposed to be developed in three phases. The first phase (2014-22) will kick in with the Multi-Modal Logistic hub which is anticipated to be the main catalyst of growth in the initial phases. Four basic industry groups are expected to be attracted to the IA and consolidated as regional economic drivers i.e., agro food, apparel and textile, building materials and handicrafts.

In the draft master plan of Jodhpur-Pali-Marwar Industrial Area (IA), regional network analysis of IA has been done. It mentions, under existing conditions, NH-65, SH-64 and SH-61 are major highways linking the IA to the outside region. To better serve the freight transport of IA area, it is recommended to add two highways in the future. One proposed new highway construction is to extend SH-64 to SH-61 to facilitate truck access to Jodhpur Airport and to DFC at Marwar Junction. The other highway project is to connect the IA with SH-64 and SH-68. Also, a feeder road link is planned from Rohat on NH65 to SH61.

Passenger trips from the JPM IA to outside are expected to be relatively low because most people will work and reside within the IA. As per the draft master plan, the passenger vehicle generation from this IA is expected to be around 19,000 car/taxi and 134 buses per day by 2042. The draft master plan states that the total cargo generated by IA is likely to be 0.32 million ton in 2022, 1.76 million ton in 2032 and 7.18 million ton in 2042. Of all the cargo, average 30% will use rail and 70% use the road to transport. Using the rail- road split for different commodity types, the total road cargo tonnage is expected to be 0.24 MTPA in 2022, 1.27 MTPA in 2032 and 5.14 MTPA in 2042.

The assessment of the likely generation by different types of trucks from this industrial area to use the project road of Jodhpur-Pali was based on likely composition of freight traffic, average load carried by different type of freight vehicles and likely percentage of total traffic which would have desire pattern towards the project road. The vehicles likely to be generated per day for the project road are presented in **Table 3-3**.

FY ending March/Mode	Vehicles per day					
	Car	LCV	Bus	2-Axle	3-Axle	MAV
2027	803	6	5	2	3	3
2037	2,006	14	28	10	17	14
2047	3,810	27	113	42	70	55

Table 3-3: Vehicle generation from DMIC to the Project Road (per day)

Given the delays and uncertainties in the implementation of such large-scale projects and considering the development of Phase 1 is much delayed beyond the revised deadlines, the impact of this development has not been considered for further analysis. However, the main impact could be an upside on the car traffic, for which the growth rates have been set out considering this development in the future.

Impact of DFC

The Ministry of Railways has embarked upon the Dedicated Freight Corridor (DFC) project which would provide a quantum leap in the railways transportation capacity which will be enough to meet the transportation demands generated by the rapidly growing economy and industrial production for the next four to five decades.

Two Dedicated Freight Corridors (DFC) i.e., between Mumbai-Delhi (Western DFC) and Delhi- Kolkata (Eastern DFC) legs of the golden quadrilateral are proposed under Phase 1 for a total length of 2,792 km.

The distribution of length of dedicated freight corridor indicates that Rajasthan and Gujarat together constitute 77% of total length of the alignment of freight corridor between Delhi and Mumbai. The envisaged alignment of freight corridor is shown in **Figure 3-4**.

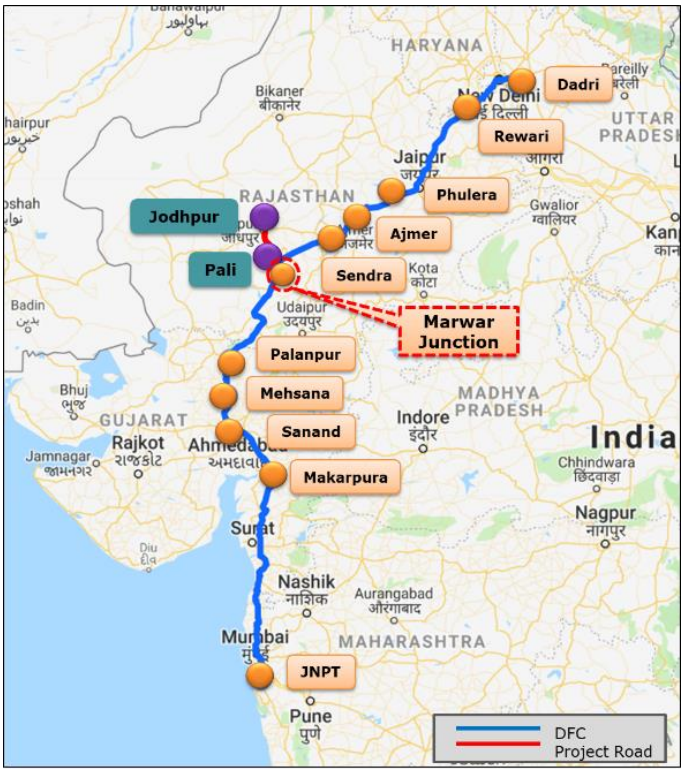


Figure 3-4: Proposed DFC Alignment

The proposed Western DFC is on the eastern side of the project road. Marwar station is the nearest DFC junction to the project road and is around 40 kms east of Pali. With the operation of DFC as a complete link from Delhi to Mumbai, may result in an upside with distributive traffic from railway node to surrounding areas along the project road. Therefore, LCV and MAV are likely to witness a higher growth in the initial years of operation of DFC as these vehicles are more likely to be used for distributive purpose which has been considered while setting the future growth rates.

3.3 Methodology for Traffic Growth Rate Estimation

3.3.1 Methodology

Traffic growth for both passenger and freight vehicles has been estimated using the econometric approach as described in IRC-108, 2015. For freight traffic, due consideration has been given to the total tonnage transported and the shift in types of vehicles used for moving goods.

The econometric model applied, relates traffic growth to changes in state (or district) domestic product via an elasticity factor. According to IRC guidelines, elasticity based econometric model for highway projects should be derived in the following form:

Log e (P) = A0 + A1 Log e (EI)

Where:

P = Traffic Volume

EI = Economic Indicator

A0 = Regression constant

A1 = Regression co-efficient (Elasticity Index).

In order to estimate traffic on the project road the methodology described below has been followed:

- Identify the influence area - From the analysis of travel patterns observed during the OD surveys, the influencing states and districts, which are likely to impact the traffic growth on the project road, were identified.
- Review Past traffic Data – Based on data points available for the project corridor from different sources a review of past traffic and tonnage growth is carried out.
- Analysis of economic growth of the Project Influencing Area (PIA) - For each PIA state an economic profile describing past performance and future outlook was prepared. This also considers India's past economic performance and its future outlook.
- Estimation of traffic elasticity to income – in order to translate economic growth into traffic growth, an elasticity factor was estimated.
- Derivation of traffic growth rates – On the basis of the traffic weighted PIA outlook and related traffic elasticity, traffic growth rates were estimated.

The methodology thus adopted incorporates, as basic data inputs, the perspective growth envisaged in the influence area and the changes in transport demand elasticities over a period of time. The traffic growth rates by vehicle type for the project road have been determined till FY44 in line with the maximum possible extension of the concession period.

3.4 Identification of PIA States

The travel pattern observed on the project road reveals that total passenger traffic (CJV/Buses) is contributed by Rajasthan and Gujarat.

The normalised shares of all the influencing states derived from the OD survey analysis for the project road (combined for both toll plazas) are presented in **Figure 3-5**.

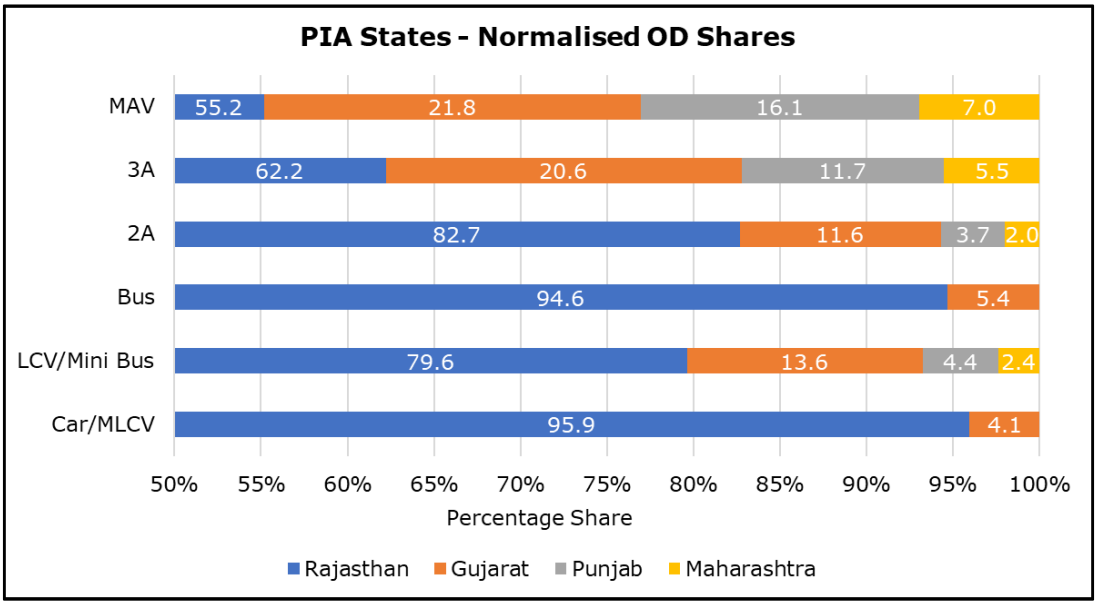


Figure 3-5: Normalised OD Shares for the Project Road

In case of LCVs, about 79.6 percent is from Rajasthan, Gujarat contributes for about 13.6 percent, Punjab contributes for about 4.4 percent and Maharashtra contributes to a nominal share of 2.4 percent in the traffic.

In 2A trucks, Rajasthan has a share of about 82.7 percent and Gujarat contributes about 11.6 percent. States of Punjab and Maharashtra contribute to around 3.7 and 2.0 percent respectively. Coming to the MAV trucks, a major percentage of 55.2 percent is from Rajasthan followed by 21.8 percent from Gujarat and 16.1 percent from Punjab. The state of Maharashtra contributes around 7 percent in MAVs.

With the passenger traffic being entirely from Rajasthan and Gujarat, these two states have been considered as the PIA states for passenger vehicles. For freight traffic, besides the major contribution from Rajasthan and Gujarat, states of Punjab and Maharashtra also contribute a notable share. Thus, in addition to Rajasthan and Gujarat, the states of Punjab and Maharashtra have also been considered as the PIA states for freight vehicles.

3.5 Past Economic Growth of PIA

Growth of traffic on the project road depends on existing developments and future growth prospects of the connecting regions. A number of economic indicators for the PIA state, as published by Central Statistical Organisation (2011/12 prices), have been studied to assess their past performance.

Primary PIA State - Rajasthan

The state of Rajasthan has been considered as the Primary PIA state, as it contributes the majority share of traffic on the project road. Past economic performance of the state has been as follows:

- Rajasthan's Gross State Domestic Product (GSDP) stood at Rs 6,795.6 billion in 2019-20 and has been growing at a compounded annual growth rate of 6.0 percent since 2011-12.
- The GSDP for the year 2021-22 is Rs 7,330.2 billion and shows a growth of 11 percent due to low base of FY21.
- The services sector is the largest contributor to GSDP (44.8 percent), agriculture allied activities sector at 31.7 percent and secondary sector at 23.5 percent of the GSDP in 2021-22.

The change of sectoral composition of GSDP over the years is presented in **Figure 3-6**.

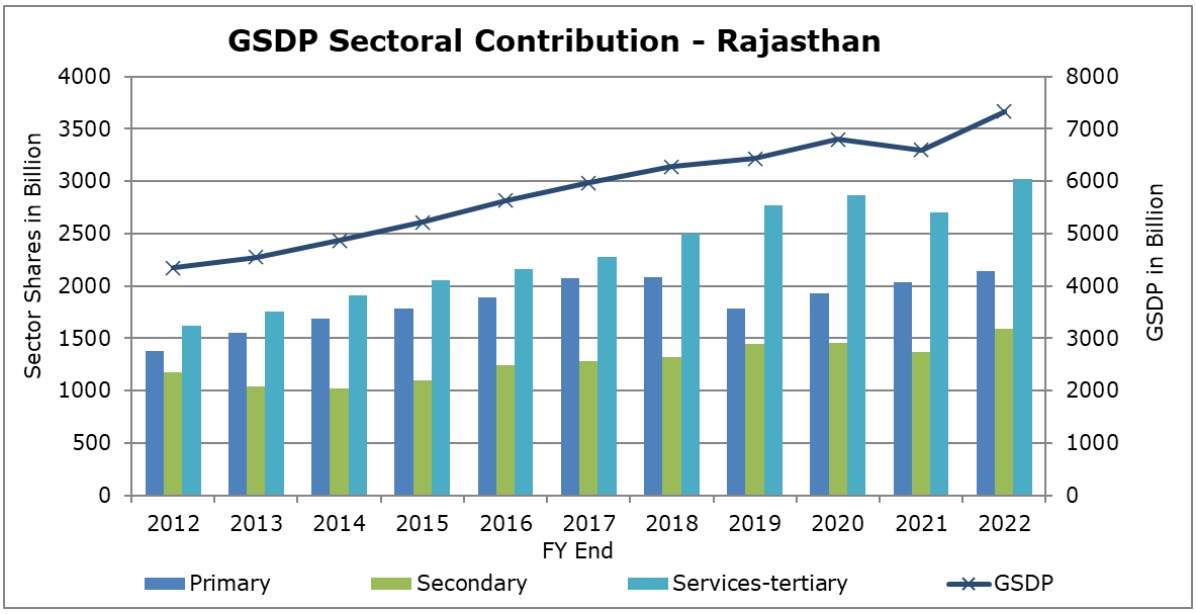


Figure 3-6: GSDP (in Rs billion) and its Sectoral Composition for Rajasthan

The performance of the state economy and its different sectors has been studied using time trend analysis. The average annual growth rates as obtained using regression analysis are presented in **Table 3-4**.

Particulars	2011-12 to 2019-20	2014-15 to 2019-20
GSDP	6.0	5.2
Agriculture and Allied	4.0	0.7
Industry	4.2	5.5
Services	7.4	7.4
Construction	2.2	3.0
Per Capita Income	4.4	3.6

Table 3-4 : Average Annual Growth Rates (%) of State Income for Rajasthan

Rajasthan is known for its textile industry and the state is the fourth largest producer of spun yarn in India. The main industries of Rajasthan include textile, rugs, woollen goods, vegetable oil and dyes. Heavy industries consist of copper and zinc smelting and the manufacture of railway rolling stock. The other industries related to private sector include steel, cement, ceramics and glass wares, electronic, leather and footwear, stone and other chemical industries.

Rajasthan has huge reserves of cement-grade and Steel Melting-Shop (SMS) grade limestone. SMS-grade limestone from Jaisalmer is supplied to various steel plants in the country. Rajasthan has 21 major cement plants, having a total capacity of 55 million tonnes per annum (MTPA). It is the largest cement-producing state in India. The state has about 17 per cent share in cement grade limestone reserves of India. Given the availability of huge cement grade limestone reserves, more than 10 cement plants would be installed in the state in near future, particularly in Chittorgarh, Jaipur, Jhunjhunu, Nagaur and Pali.

The state is a leading producer of major minerals such as lead-zinc, calcite, gypsum, rock phosphate, ochre, silver as well as minor minerals such as marble, sandstone, serpentine (green marble), etc. which contribute a major percentage to national production.

According to the Department for Promotion of Industry and Internal Trade (DPIIT), foreign direct investment (FDI) inflows in the state stood at US$ 1.6 billion between 2020 and 2022.

In September 2020, the state government entered an understanding with SVP International Group for an investment of Rs. 4,000 crore (US$ 541.57 million) for development of facilities related to textile, defense, and aviation sectors.

The state is developing sector specific infrastructure, such as special purpose industrial parks and special economic zones (SEZs) for exports of handicrafts, IT and electronic goods. There are six notified SEZs in the state. The primary industries for these SEZs are IT/ITES, Handicrafts, Gems and Jewellery, Engineering, and related services.

The per capita income of Rajasthan is Rs 91,868 in the year 2021-22 and has been growing at 3.7 percent during 2011-12 to 2021-22. The growth in per capita income is presented in **Figure 3-7**.

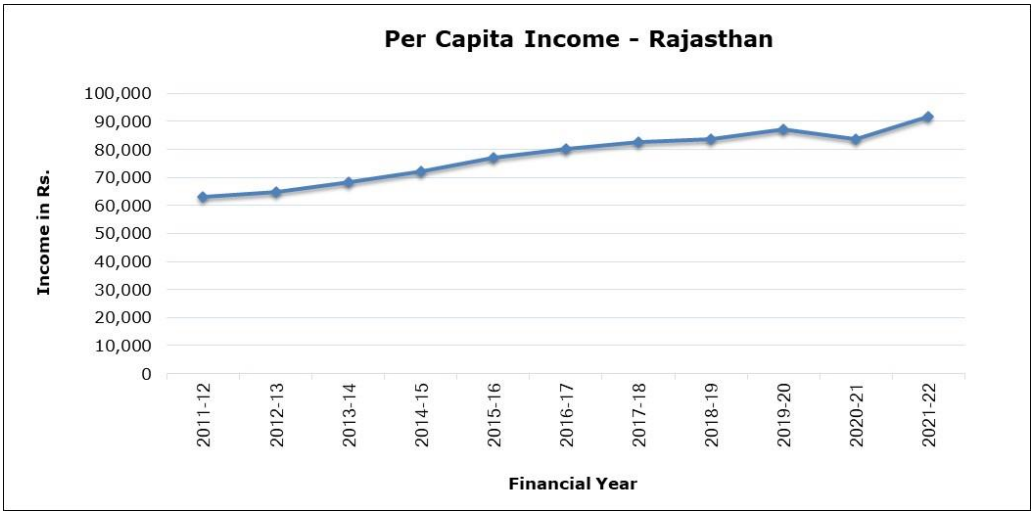


Figure 3-7: Per Capita Income of Rajasthan from 2011-12 to 2020-21

Other PIA States

The other PIA states contributing to the traffic on the project road are Gujarat, Punjab, and Maharashtra. Economic indicators of PIA states are as follows.

- Gujarat's Gross State Domestic Product (GSDP) stood at Rs 12,652.8 billion in 2019-20 and has been growing at a compounded annual growth rate of 9.6 percent since 2011-12.
- Gross State Domestic Product (GSDP) of Punjab stood at Rs 4,132.9 billion in 2019-20 and has been growing at a compounded annual growth rate of 5.8 percent since 2011-12. The GSDP for the year 2021-22 is Rs 4,275.4 billion and has shown a growth of 6.9 percent over FY21.
- Gross State Domestic Product (GSDP) of Maharashtra stood at Rs 20,439.8 billion in 2019-20 and has been growing at a compounded annual growth rate of 6.3 percent since 2011-12. FY21 growth has been impacted due to the impact of Covid 19.
- The services sector is the largest contributor to GSDP of the PIA states, 50.9 percent in Punjab and 57.6 percent in Maharashtra whereas secondary sector is the largest contributor to GSDP of the PIA state of Gujarat (46.3 percent) in the year FY20.

The average annual growth rates as obtained using regression analysis till FY20 are presented in **Table 3-5**.

State/Particular	Gujarat	Punjab	Maharashtra
2011-12 to 2019-20			
GSDP	9.6	5.8	6.3
Primary	6.5	2.3	2.7
Secondary	10.9	5.1	5.4
Tertiary	8.6	7.0	7.5
Construction	3.7	3.1	3.1
Per Capita Income	8.2	4.4	5.2

Table 3-5: Average Annual Growth Rates (%) of State Income for PIA states

The GSDP over the years for the states of Rajasthan, Gujarat, Punjab and Maharashtra are presented in **Figure 3-8**.

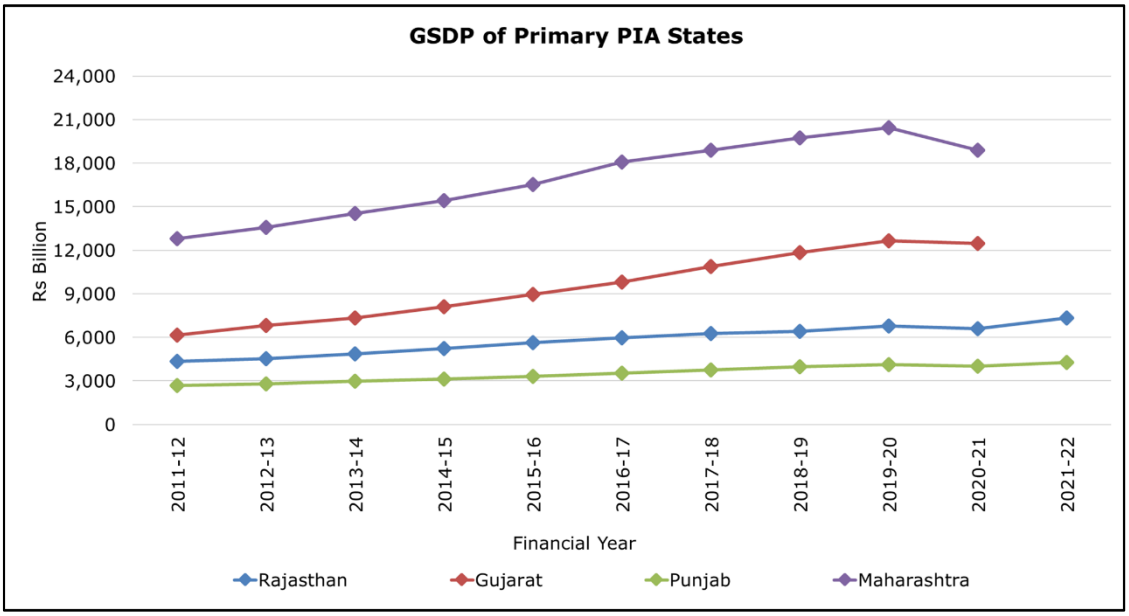


Figure 3-8: GSDP (in Rs Billion) for Influencing PIA States

3.6 India and PIA Outlook

3.6.1 India's Past Performance and Outlook for Future

India's growth trend during the recent years has been presented in **Figure 3-9**.

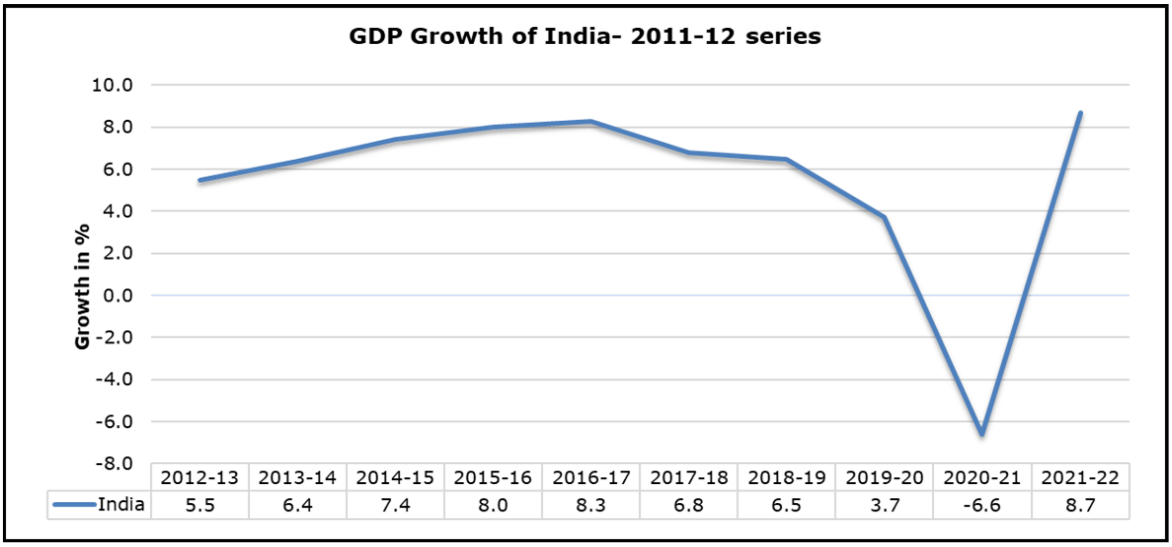


Figure 3-9: GDP Growth in India

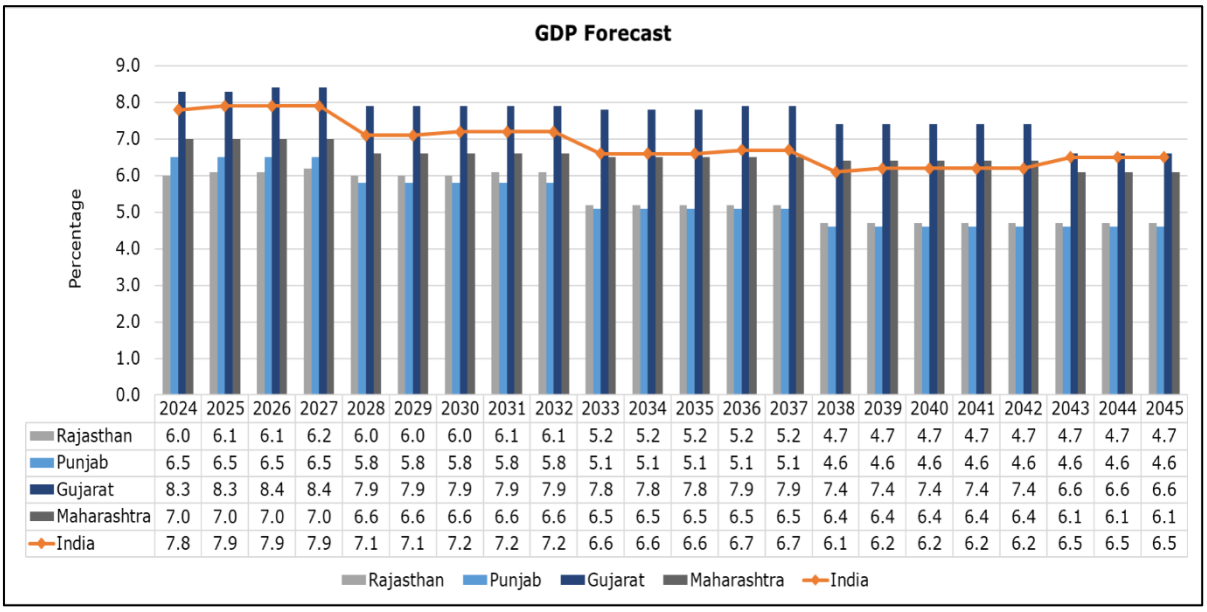
Economic growth in India has been broadly on an accelerating path till FY18. It is likely to be the fastest growing major economy in the world in the medium-term. The growth in real GDP was 8.3 percent for FY17 and 6.8 percent in FY18, while the growth in FY19 was slightly lower at 6.5 percent. The long-term trend line growth of 7.2 percent has been achieved between FY12 to FY19. During FY20, growth has slowed down due to some structural issues and global headwinds resulting in an average GDP growth rate of 3.7 percent.

With the outbreak of COVID-19, global recession was witnessed across all the economies. The lockdown period announced by Indian government had an adverse impact on the economy. The first quarter estimated for FY21 has indicated a contraction of 23.9

percent, second quarter showed a rebound in growth by contracting 7.5 percent and third & fourth quarter grew by 0.5 percent and 1.6 percent respectively. The resultant contraction for FY21 has been 6.6 percent.

The Indian economy is likely to see the impact of global slowdown due to COVID-19 and hence, the GDP forecast for India by various international agencies has been revised for the next two years. As per the latest update by Central Statistical Organisation (CSO), GDP in FY22 has grown by 8.7 percent. As per Economic Survey of India for FY23, the economy is predicted to have a growth rate of 7.0 percent in FY23 and 6.0-6.8 percent in FY24. As per the latest forecast of RBI, the economy is likely to grow at 6.4 percent in FY24.

In light of the outlook being predicted by various agencies for the current years and likely revival thereafter spread over a couple of years, the year-on-year growth for Indian economy and PIA states as provided by the client from FY24 and beyond is presented in **Figure 3-10**.



	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Rajasthan	6.0	6.1	6.1	6.2	6.0	6.0	6.0	6.1	6.1	5.2	5.2	5.2	5.2	5.2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Punjab	6.5	6.5	6.5	6.5	5.8	5.8	5.8	5.8	5.8	5.1	5.1	5.1	5.1	5.1	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Gujarat	8.3	8.3	8.4	8.4	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.9	7.9	7.4	7.4	7.4	7.4	7.4	6.6	6.6	6.6
Maharashtra	7.0	7.0	7.0	7.0	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.1	6.1	6.1
India	7.8	7.9	7.9	7.9	7.1	7.1	7.2	7.2	7.2	6.6	6.6	6.6	6.7	6.7	6.1	6.2	6.2	6.2	6.2	6.5	6.5	6.5

Figure 3-10: GDP Forecast

3.6.2 PIA States Outlook

A snapshot of the main economic indicators in the past for the PIA states is presented in **Table 3-6**.

Indicators	Rajasthan	Gujarat	Punjab	Maharashtra
GSDP in Rs Billion in FY20	6,795.6	12,652.8	4,132.9	20,439.8
GSDP growth (FY12 to FY20)	6.0	9.6	5.8	6.3
Per capita Income in Rs (FY20)	87,288	186,980	133,231	166,422
Sector Share (%) in FY20				
Agriculture and allied	30.9	17.2	24.5	13.9
Industry	23.3	46.3	24.6	28.5
Services	45.9	36.4	50.9	57.6

Table 3-6: Main Economic Indicators of PIA States

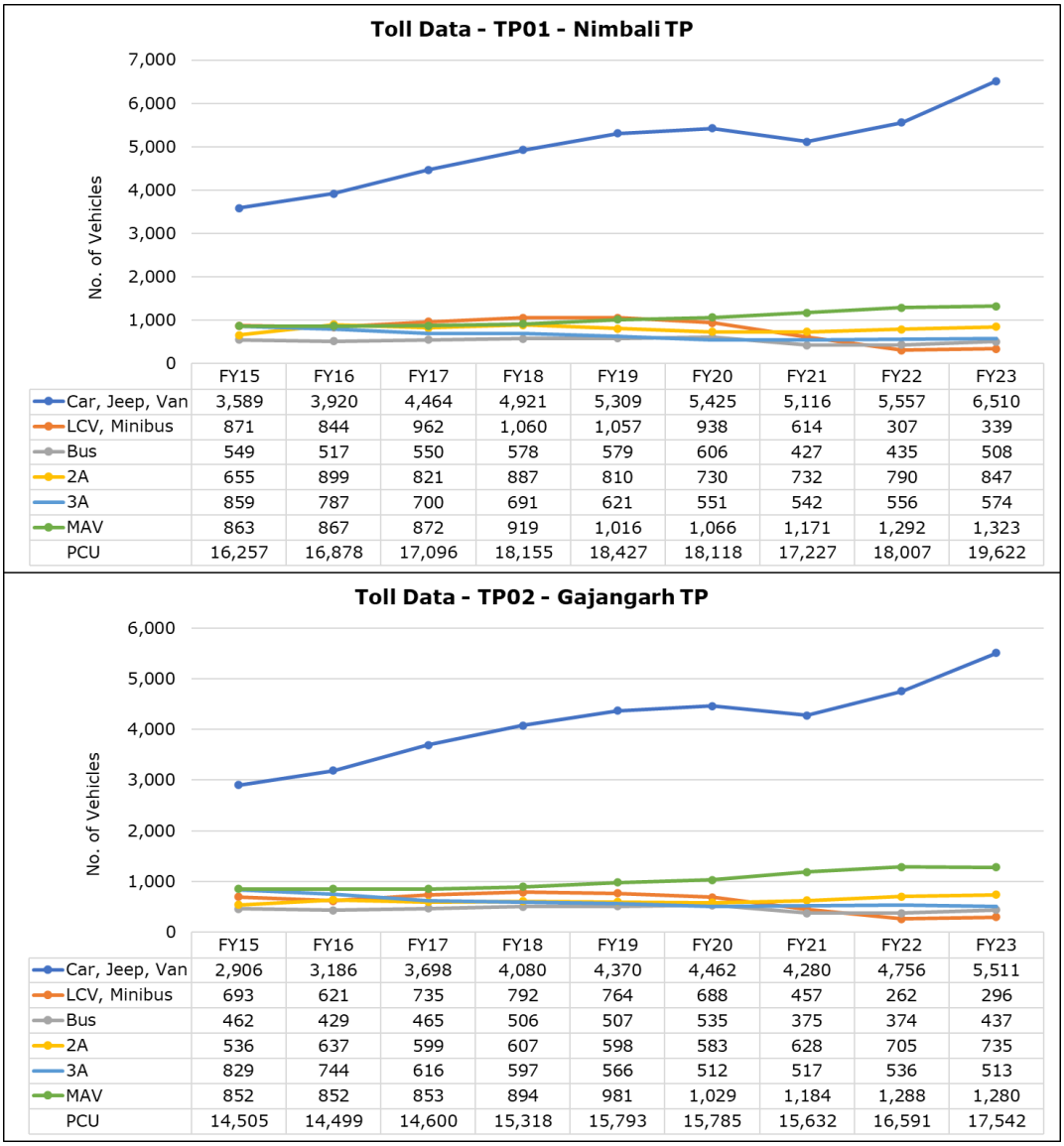
Based on the OD shares of the toll plaza location and the outlooks adopted for PIA states, the future weighted income for different vehicle types is presented in **Table 3-7**.

FY End/Mode	CJV	LCV/M Bus	Bus	2A	3A	MAV
2024	6.0	6.2	6.0	6.2	6.4	6.5
2025	6.1	6.3	6.1	6.3	6.5	6.5
2026	6.1	6.3	6.1	6.3	6.5	6.6
2027	6.2	6.4	6.2	6.3	6.5	6.6
2028	6.0	6.0	6.0	6.0	6.1	6.2
2029	6.0	6.0	6.0	6.0	6.1	6.2
2030	6.0	6.0	6.0	6.0	6.1	6.2
2031	6.1	6.1	6.1	6.1	6.2	6.2
2032	6.1	6.1	6.1	6.1	6.2	6.2
2033	5.2	5.3	5.2	5.3	5.5	5.6
2034	5.2	5.3	5.2	5.3	5.5	5.6
2035	5.2	5.3	5.2	5.3	5.5	5.6
2036	5.2	5.3	5.2	5.3	5.5	5.6
2037	5.2	5.3	5.2	5.3	5.5	5.6
2038	4.7	4.8	4.7	4.8	5.1	5.2
2039	4.7	4.8	4.7	4.8	5.1	5.2
2040	4.7	4.8	4.7	4.8	5.1	5.2
2041	4.7	4.8	4.7	4.8	5.1	5.2
2042	4.7	4.8	4.7	4.8	5.1	5.2
2043	4.7	4.8	4.7	4.8	5.0	5.0
2044	4.7	4.8	4.7	4.8	5.0	5.0

Table 3-7: Future Perspective of PIA Weighted Income

3.7 Past Traffic Data on Project Road

The toll traffic data for the project road from the date of operation till FY23 was provided by the client. The past traffic data along with the FY23 AADT is presented in **Figure 3-11**.



	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Car, Jeep, Van	3,589	3,920	4,464	4,921	5,309	5,425	5,116	5,557	6,510
LCV, Minibus	871	844	962	1,060	1,057	938	614	307	339
Bus	549	517	550	578	579	606	427	435	508
2A	655	899	821	887	810	730	732	790	847
3A	859	787	700	691	621	551	542	556	574
MAV	863	867	872	919	1,016	1,066	1,171	1,292	1,323
PCU	16,257	16,878	17,096	18,155	18,427	18,118	17,227	18,007	19,622

	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Car, Jeep, Van	2,906	3,186	3,698	4,080	4,370	4,462	4,280	4,756	5,511
LCV, Minibus	693	621	735	792	764	688	457	262	296
Bus	462	429	465	506	507	535	375	374	437
2A	536	637	599	607	598	583	628	705	735
3A	829	744	616	597	566	512	517	536	513
MAV	852	852	853	894	981	1,029	1,184	1,288	1,280
PCU	14,505	14,499	14,600	15,318	15,793	15,785	15,632	16,591	17,542

Figure 3-11: Past Traffic Data at the Project Road

A time series analysis of the traffic data and comparison of the yearly averages with the current estimates of FY23 of the total traffic including exemptions and violations is presented in **Table 3-8**.

Period/Modes	CJV	LCV/MBus	Bus	2A	3A	MAV	PCU
TP01-Nimbali							
Trendline Growth in %							
FY15 vs FY23	6.5	-12.2	-2.5	0.4	-5.5	6.3	1.6
FY19 vs FY23	4.4	-28.7	-5.7	1.7	-1.5	7.5	1.2
FY20 vs FY23	6.5	-31.2	-5.0	5.4	1.5	7.7	2.9
TP02- Gajangarh							
Trendline Growth in %							
FY15 vs FY23	7.1	-11.1	-1.7	2.7	-5.5	6.3	2.2
FY19 vs FY23	5.4	-24.9	-6.4	6.2	-1.5	7.9	2.6
FY20 vs FY23	7.7	-26.6	-6.0	8.4	0.4	7.7	3.8

Table 3-8: Past Growth and Trend Analysis

The comparison of the past data shows a about 7 percent growth in cars at the both the toll plazas between FY15 and FY23. The YOY growth has been positive except for FY20

vs FY21.The slowdown in FY20 can be attributed to manufacturers deciding to reduce production of diesel cars in the near-future, technology disruption in the form of compliance to Bharat Stage VI norms, economic downturn and COVID 19.

The growth in the past few years has been around 5 percent between FY16 to FY20. The growth thereafter shows the impact of Covid-19 and it seems to be slowly picking up now in FY23. A growth of about 17 percent is observed in case of Buses during FY22 and FY23 at both the toll plazas.

The trend-based comparison of year-on-year counts indicates a decline in traffic growth of LCV (since FY18). Comparison of FY22 and FY23 shows a growth of around 10-12 percent.

2A trucks have been showing a negative growth between FY18 and FY20 at both the plazas. The growth in 2A truck in FY22 vs actual FY23 comparison has been positive at 7.3 percent at TP01 and 4.4 percent at TP02.

In case of MAV, the recent period of FY17 and FY23 has shown a growth rate of about 6.3-7.9 percent each at both the toll plazas. The trend line growth between FY15 and FY23 is observed around 6.3 percent at the two toll plazas in MAVs.

At both toll plaza locations, a clear trend of decline/ minimal growth is witnessed 3A trucks and high growth in MAV substantiating the tonnage shifts happening towards MAV from 2A/3A across all highways in India. It has been observed in some of the mature National Highways that 3A trucks have stabilized after reaching a base level of 500-600 trucks and show a low growth after that.

On a broad level, the corridor has seen a good level of growth in the recent years. The first two years of operation could have faced some initial hiccups after tolling became operational on the corridor. During FY17, the earlier operator, GR Infra was allowing some of their trucks (plying for construction of a nearby stretch) to pass through plaza without payment of toll. The reason impacting the corridor growth in FY18 could be due to proper capture of traffic in the first year post takeover by India Infrastructure Fund II. The traffic in Jul – Aug 2016 was impacted by heavy rainfall in Gujarat and Rajasthan. The annual Ramdev Yatra (conducted in Aug-Sep every year) wherein devotees come from all states to visit Baba Ramdev temple in Jaisalmer contributes to higher passenger traffic movement on the corridor in these months. This was also disrupted due to heavy rain during 2016. One more event which impacted the freight traffic is the truckers strike for 8 days (20th to 27th July 2018). In addition to the above, FY20 was impacted by a general economic downturn witnessed in Indian economy wherein the GDP growth was subdued and recorded below 5 percent. FY21 was impacted by COVID 19 in the initial months but the traffic showed a strong recovery post opening of lockdown restrictions.

The other main factors that might have impacted the traffic in the past include the impact of demonetisation in November 2016, GST in July 2017, all India truckers' strike in July

2018, revision of permissible Gross Vehicle Weights (GVW) for freight vehicle as per the new notification released by NHAI on 18th July,2018 and the impact of country wide/ state lockdowns starting from March 2020 and continuing in few months of FY21.

3.8 Present and Future Transport Demand Elasticity

The econometric model applied for the project, relates traffic growth to changes in state domestic product via an elasticity factor according to IRC guidelines. The elasticity by vehicle types have been estimated based on the regression analysis of weighted income of PIA states with the actual traffic data.

A regression between GSDP (as independent variable) and registered vehicles (as dependant variable) of PIA states was carried out for the state of Rajasthan which showed an elasticity of 1.7 during the period between FY12 and FY19.

The best measure of deriving traffic elasticity to income is time series data of traffic on the road. In case of the project road, past traffic data is available since the year of operation of the toll plaza. The YOY mode wise traffic elasticity has been derived using rate of growth in the traffic vis a vis the rate of growth in income (weighted income derived from weighted OD shares). The elasticity estimates for different time periods have been done using regression analysis with mode wise traffic as dependent variable and weighted income as independent variable. The point to point and trend line actual elasticity between GSDP and traffic is presented in **Table 3-9**.

Period/Modes	Car, Jeep, Van	LCV, Minibus	Bus	2A	3A	MAV
TP01-Nimbali						
YOY Elasticity						
FY16 vs FY15	1.1	-0.4	-0.7	4.5	-1.0	0.0
FY17 vs FY16	2.2	2.0	1.0	-1.3	-1.5	0.1
FY18 vs FY17	1.8	1.6	0.9	1.3	-0.2	0.8
FY19 vs FY18	2.8	-0.1	0.0	-2.3	-2.1	2.1
FY20 vs FY19	0.4	-1.9	0.8	-1.7	-2.0	0.9
FY21 vs FY20	2.1	12.2	10.9	-0.1	0.5	-3.1
FY22 vs FY21	0.8	-4.8	0.2	0.8	0.3	1.1
FY23 vs FY22	2.8	1.5	2.7	1.1	0.4	0.3
Trend Line Elasticity						
FY15 vs FY23	1.4	-2.3	-0.3	0.2	-1.1	1.1
FY19 vs FY23	1.1	-6.2	-0.5	0.5	-0.2	1.3
FY20 vs FY23	1.3	-5.6	0.0	1.0	0.3	1.1
TP02- Gajangarh						
YOY Elasticity						
FY16 vs FY15	1.2	-1.3	-0.9	2.3	-1.2	0.0
FY17 vs FY16	2.6	2.7	1.4	-0.9	-2.3	0.0
FY18 vs FY17	1.8	1.2	1.5	0.2	-0.4	0.7
FY19 vs FY18	2.5	-0.9	0.1	-0.4	-1.1	1.9
FY20 vs FY19	0.4	-1.7	1.0	-0.4	-1.7	0.9
FY21 vs FY20	1.5	11.9	11.0	-2.7	-0.3	-4.7
FY22 vs FY21	1.0	-4.1	0.0	1.2	0.4	0.9
FY23 vs FY22	2.5	1.9	2.6	0.7	-0.6	-0.1
Trend Line Elasticity						

Period/Modes	Car, Jeep, Van	LCV, Minibus	Bus	2A	3A	MAV
FY15 vs FY23	1.5	-2.1	-0.2	0.5	-1.1	1.1
FY19 vs FY23	1.2	-5.1	-0.7	1.2	-0.3	1.3
FY20 vs FY23	1.4	-4.4	-0.2	1.3	0.0	0.9

Table 3-9: Actual Past Traffic Elasticity

CJV

- The elasticities and the past growth levels for cars are a result of increasing income levels, increasing vehicle ownership and higher propensity to travel on highways in India due to network level developments and higher levels of service. These levels of growth are likely to continue in the near to medium term since car ownership levels are still very low and the road network is undergoing continual development. Actual trend line elasticity for the period FY15/ FY19 to FY23 has been varying between 1.1 to 1.5 in the past across the two toll plazas.
- It is likely that this growth would slow down over time as the market becomes more mature and saturated, therefore elasticity to GSDP can be expected to decline over time. CJV elasticity has been considered as 1.2 for the two toll plazas up to FY25 and tapered in subsequent years.
- The motorisation levels in India also play an important role in determining car growth. With the increasing car ownership levels, propensity to travel and network level improvements on National Highways, car growth is likely to be at a high rate as witnessed in the recent past. The low motorization rate suggests that there is room for continued growth for many years to come. With the continual increase in motorization rate and improved road network usage by cars for inter-urban travel, car growth is expected to be robust in India.

Bus

- Over the years in India there has been a change in passenger's travel mode preferences with increasingly more people shifting from public transport systems towards personalised modes. This has resulted in elasticity of bus traffic/demand to GSDP majorly varying between 0.4 and 0.8 during different time periods (FY15/FY16 to FY19) across the two toll plazas and different national highways.
- For the project road, an elasticity 0.4 has been adopted for Bus traffic for both the toll plazas till the end of concession period.

Trucks

- The switch between MLCV and LCV is being observed across other national highways wherein MLCVs have been gaining importance lately over LCV category. Actual trend line elasticity for LCV in FY15 to FY21 has been negative at both toll plazas. The volume of LCV is low at both the plazas. For future, 0.2 has been adopted for all the toll plazas till the end of concession period.

- At both the toll plazas, elasticity of 2 Axle trucks has been varying between 0.2-0.5 in FY15 to FY23. In light of these changing freight composition in the automobile industry and giving due consideration to the freight mix on the PR, an elasticity of 0.3 for 2A trucks has been adopted for both the toll plazas.
- 3A trucks show a negative elasticity in the past over all the years. The elasticity values adopted for 3A trucks are 0.2 for both the toll plazas due to their low base and likely slow growth in the future due to replacements with MAVs.
- The elasticity values achieved in the past for MAV at TP01 and TP02 is 1.3-1.4 between FY19 and FY23. In case of MAV, an elasticity of 1.0 has been adopted for both the plazas between FY23-FY25 and further on it has been tapered till the end of concession.

It is likely that this growth would slow down over time as the market becomes more mature and saturated, therefore elasticity to GSDP can be expected to decline over time. With the anticipated growth momentum in the coming years, higher elasticity values have been considered in the initial slabs for cars and further tapering has been done in the future slabs.

In India as a whole, the freight vehicle mix has been changing in the last decade favouring MAV to 2 Axle/ 3 Axle vehicles for long-distance traffic, given the operational efficiencies achievable with larger vehicles. Considering the ongoing technical advancements in automobile industry, some of the standard 2 Axle/ 3 Axle trucks would gradually be replaced by MAVs. Mature national highways with tolling in operation for few years, have already witnessed the shift in 2A/3A trucks to MAV for long distance movement. As per the latest industry trends, there is a shift happening between various categories of MAVs also - 4A, 5A and 6A and above. 4A trucks are likely to see a replacement soon to 5A and above axle trucks which can carry more tonnage as compared to 4A trucks.

On an overall level, due consideration has been given to the tonnage shifts happening in the market with Mini LCV gaining importance for short distance movements over LCVs and MAVs being preferred over 2A/3A for long distance movements due to better operational efficiencies. Some of the 2A/3A trucks are also being used for local movements.

Giving due consideration to the growth momentum being witnessed in the immediate past, higher elasticity values have been considered for the slab up to FY25 and further tapering has been done in the next slab. The recommended elasticity values adopted for all vehicle types in line with the past traffic data and changes in freight traffic pattern observed on the project road are presented in **Table 3-10**.

Period/ Modes	Car/MLCV	Minibus/ LCV	Bus	2A	3A	MAV
TP01 and TP02						
Up to 2025	1.2	0.2	0.4	0.3	0.2	1.0
2025-2030	1.1	0.2	0.4	0.3	0.2	0.9
2030-2035	1.0	0.2	0.4	0.3	0.2	0.8
Beyond 2035	1.0	0.2	0.4	0.3	0.2	0.7

Table 3-10: Recommended Elasticity for Project Road

3.9 Projected Traffic Growth Rates

Based on the perspective elasticity values and the projected growth rates of the income for PIA states, the future average annual compound traffic growth rates by vehicle type have been estimated for the project road by using the following relationship:

Tgr = (GSDPgr) x E

Where,

Tgr – Traffic growth rate for mode

GSDPgr – Growth rate of GSDP

E – Elasticity value for mode

The estimated traffic growth rates for the project road have been presented in **Table 3-11**.

FY Ending March /Mode	CJV	Minibus /LCV	Bus	2A	3A	MAV
TP01 and TP02						
2024	7.2	1.2	2.4	1.9	1.3	6.5
2025	7.4	1.3	2.5	1.9	1.3	6.5
2026	6.7	1.3	2.5	1.9	1.3	5.9
2027	6.8	1.3	2.5	1.9	1.3	5.9
2028	6.6	1.2	2.4	1.8	1.2	5.6
2029	6.6	1.2	2.4	1.8	1.2	5.6
2030	6.6	1.2	2.4	1.8	1.2	5.6
2031	6.1	1.2	2.4	1.8	1.2	5.0
2032	6.1	1.2	2.4	1.8	1.2	5.0
2033	5.2	1.1	2.1	1.6	1.1	4.5
2034	5.2	1.1	2.1	1.6	1.1	4.5
2035	5.2	1.1	2.1	1.6	1.1	4.5
2036	5.2	1.1	2.1	1.6	1.1	3.9
2037	5.2	1.1	2.1	1.6	1.1	3.9
2038	4.7	1.0	1.9	1.4	1.0	3.6
2039	4.7	1.0	1.9	1.4	1.0	3.6
2040	4.7	1.0	1.9	1.4	1.0	3.6
2041	4.7	1.0	1.9	1.4	1.0	3.6
2042	4.7	1.0	1.9	1.4	1.0	3.6
2043	4.7	1.0	1.9	1.4	1.0	3.5
2044	4.7	1.0	1.9	1.4	1.0	3.5

Table 3-11: Projected Traffic Growth Rates for PIA (%)

3.10 Traffic Projections and Capacity Analysis on PR

The projected total traffic for the two toll plazas based on the above traffic growth rates after considering the impact of diversion to Amritsar-Jamnagar Expressway is presented in **Table 3-12**.

FY Ending March	TP01	TP02	Average
2023	18,755	16,775	17,765
2024	19,726	17,647	18,686
2025	20,362	18,195	19,278
2026	21,363	19,091	20,227
2027	22,435	20,051	21,243
2028	23,516	21,018	22,267
2029	24,658	22,039	23,349
2030	25,865	23,119	24,492
2031	27,042	24,169	25,606
2032	28,280	25,275	26,777
2033	29,415	26,289	27,852
2034	30,601	27,350	28,975
2035	31,842	28,459	30,150
2036	33,082	29,561	31,322
2037	34,376	30,713	32,544
2038	35,606	31,808	33,707
2039	36,886	32,947	34,916
2040	38,218	34,132	36,175
2041	39,604	35,364	37,484
2042	41,046	36,646	38,846
2043	42,536	37,969	40,253
2044	44,086	39,346	41,716

Table 3-12: Total Traffic Projections in PCUs at the Toll Plazas

The target traffic as per RFP is deemed to be 35,938 PCUs as on 1st Jan 2030. Based on the forecast detailed above, the traffic estimated on the project road considering the average of both TPs and the average of the traffic for the three consecutive accounting years (FY29 to FY31) is estimated to be 24,482 PCUs which is 31.8 percent lower than the target traffic.

As per clause 29.2.2 of CA, if the Actual Average Traffic shall have fallen short of or exceeded the target traffic by more than 2.5 percent, then there will be an increase or reduction in concession period.

Based on the CA (clause 29.2.2), if the traffic in PCUs at target date is lower than the target traffic, then for every 1 percent decrease, the concession period shall be increased by 1.5 percent, and no more than 20 per cent of the base concession period.

The concession period may, therefore, be subject to an increase by 5 years to 30 years.

The project road traffic is not likely to reach the designed capacity of 60,000 PCUs during the stipulated as well as extended concession period.

4. TOLL REVENUE PROJECTIONS

4.1 Tolling Strategy

The project road has an "Open System" of toll collection which enables the concessionaire to collect tolls from through traffic as well as from short distance one.

As mentioned earlier, two toll plazas are operational on the project road with a tolling length of 39.29 km near Nimbali (TP01) and 19.5 km near Gajangarh (TP02). Additionally, Pali bypass with a total length of 12.3 km is being charged at TP02 at bypass rate of 1.5 times the normal rate.

4.2 Schedule of User Fee

As per Schedule of User Fee (Schedule R) of Concession Agreement for the project, the per km toll rates applicable from 2007/08 for normal tolling length and permanent structures, the revision basis and concessions are provided.

The concessions to traffic have been given in the form of rates as below:

Local traffic

Car / Jeep / Vans - includes local users owning a vehicle registered for non-commercial purposes, residing within a distance of 20 km from the toll plaza and crossing the same for commuting purposes. The discounted fee for these users shall be a monthly pass of Rs. 150.00

Commercial vehicles - includes local users owning a commercial vehicle (excluding vehicles under National Permit), registered with address on the Registration Certificate of a particular district and uses such vehicle for commuting on a section of National Highway, permanent bridge, tunnel or bypass, as the case may be, which is located within that district, shall be levied user fee on all toll plazas which are located within that district at the rate of fifty per cent of the prescribed rate of fee. No such concession shall be provided, if a service road or alternative road is available for use by such commercial vehicles. Thus, local commercial traffic has to pay only 50 percent of the normal ticket.

Daily Pass

When the vehicle has to cross the tolled section more than once in a day, the user shall have the option to pay one and half times (1.5 times) of the fee for a single entry; this pass shall be valid for 2 entries within 24 hours of purchase.

Monthly Pass

A user, who makes use of the project road frequently during a month, may opt to purchase a monthly pass upon payment of a charge equal to two-thirds of the fee payable for 50 single journeys; this pass can be used for a maximum 50 one-way journeys over the month of validity.

Thus, the different categories of toll tickets are as follows:

(i) Traffic paying normal toll rates (single trip)

(ii) Traffic paying return journey rates

(iii) Traffic paying monthly pass rates

(iv) Traffic paying local personal rates

(v) Traffic paying local commercial rates

4.3 Tolling Streams

The tolling stream distribution for each toll plaza has been derived from the toll data of FY23 (April to March) of respective toll plazas and adopted for the present study is presented in **Table 4-1**.

Ticket Type/Modes	Car	LCV	Bus	2A	3A	MAV	OSV
TP01							
Single	39.8	39.1	15.5	56.2	72.1	92.0	100.0
Return	54.1	41.9	73.7	39.5	26.5	7.6	0.0
Monthly	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Local personal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Local commercial	0.5	12.0	10.5	3.4	0.5	0.1	0.0
Exempt	4.8	6.9	0.3	0.9	1.0	0.4	0.0
Violation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
TP02							
Single	41.7	38.3	15.1	61.3	76.9	92.3	100.0
Return	51.6	41.0	69.2	34.3	20.9	7.4	0.0
Monthly	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Local personal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Local commercial	0.4	13.8	15.4	3.5	1.5	0.1	0.0
Exempt	5.2	6.8	0.3	1.0	0.7	0.2	0.0
Violation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 4-1: Tolling Distribution for the PR Including Exemptions and Violations (in %)

The paying traffic for the year FY23 has been worked out by deducting the toll exempt percentage (exemptions and violations, FY23) from total AADT and is presented in **Table 4-2**.

Toll Plaza/Mode	Car	LCV	Bus	2A	3A	MAV	OSV	PCU
TP01 – Nimbali								
Base AADT including toll exempted vehicles	6,510	339	508	847	574	1,321	1	18,755
% of Exemptions/ Violations	4.8%	6.9%	0.3%	0.9%	1.0%	0.4%	0.0%	
Paying Traffic	6,197	315	507	839	568	1,316	1	18,340
TP02 – Gajangarh								
Base AADT including toll exempted vehicles	5,511	296	437	735	513	1,279	2	16,775
% of Exemptions/ Violations	5.2%	6.9%	0.3%	1.0%	0.7%	0.2%	0.0%	
Paying Traffic	5,222	276	436	728	509	1,277	2	16,410

Table 4-2: Toll Paying Traffic, FY23

The tolling stream distribution excluding exemptions and violations from paying traffic is presented in **Table 4-3**.

Ticket Type/ Modes	Car	LCV	Bus	2A	3A	MAV	OSV
TP01							
Single	41.9	42.1	15.5	56.8	72.8	92.3	100.0
Return	56.8	45.1	73.9	39.9	26.7	7.6	0.0
Monthly	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Local personal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Local commercial	0.5	12.9	10.5	3.4	0.5	0.1	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
TP02							
Single	44.0	41.1	15.1	61.9	77.5	92.5	100.0
Return	54.4	44.1	69.4	34.6	21.0	7.4	0.0
Monthly	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Local personal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Local commercial	0.5	14.9	15.4	3.5	1.5	0.1	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 4-3: Tolling Distribution for the PR Excluding Exemptions and Violations (in %)

At TP01, the normal toll paying traffic for cars is around 42 percent and around 56.8 percent are opting for return category. At TP02 also similar travel pattern is visible where the percentages are 44 and 54.4 percent for normal and return categories respectively.

In case of Buses also, majority of the traffic (around 70-74 percent) is falling in the return category for both the toll plazas and about 10-15 percent of the traffic at each toll plaza location may opt for local commercial discount. The single ticket is also around 15 percent at both the plazas.

For LCV category, around 41-42 percent of this category is buying normal ticket across the two toll plaza locations and remaining traffic is opting for return pass and local commercial pass.

In case of freight modes, majority of the traffic falls under normal ticket category. Around 93 percent of the MAVs fall under single ticket as they have a long lead of travel and are less likely to return in the same day and 7 percent of the traffic is opting for the return category. For 3A category, at both the toll plazas, majority (72-77 percent) of the traffic is opting for normal ticket.

The trip rate of 2 for daily pass and 1.67 for monthly pass been considered. For local personal cars a trip rate of 1 has been adopted.

4.4 Toll Rates

This section presents details on the toll rates that are likely to be imposed on the users of the project road during the concession period. The toll rates (Rs/km) for the base year 2007-08 for different vehicle categories as per concession agreement are presented in **Table 4-4**.

Mode	Base rate per km (in Rs)
Car, Jeep, Van, LMV	0.65
LCV /Mini Bus	1.05
Bus/ 2 Axle Truck	2.2
3 Axle	2.2
MAV	2.4
Oversized	3.45

Table 4-4: Toll Rates in Rs/km for Different Vehicle Categories

The CA states that the 2007 toll rates shall be increased without compounding by three per cent each year with effect from the 1st day of April 2008 and such increased rate shall be deemed to be the base rate for the subsequent years.

In addition to this, the rate of fee for use of bypass forming part of a section of a National Highway constructed with a cost of Rs 10 crore or more, for the base year 2007, shall be one and a half times of the per km base rates specified above and the length of such bypass shall be excluded from the length of such section of National Highway.

Additionally, when permanent structures such as bridges, tunnels or flyovers are part of the project road and their construction cost exceeds 500 million Rs (50 Crore), then the length of such structures shall be deducted from the tolling length and the structure tolled according to the rates presented in **Table 4-5**. The toll fee has been rounded to nearest 5 Rupee as per Schedule R of the concession agreement.

Cost of Structure (rupees in crore)	Car, Jeep, Van or Light Motor Vehicle	LCV, Light Goods Vehicle or Mini Bus	Truck or Bus	HCM, EME,3A or MAV	Over size Vehicle
10 to 15	5	7.5	15	22	30
For every additional rupees five crore or part thereof, exceeding rupees fifteen crore and up to rupees one hundred crore.	1	1.5	3	4.5	6
For every additional rupees five crore or part thereof, exceeding rupees one hundred crore and upto rupees two hundred crore.	0.8	1.2	2.3	3.4	4.5
For every additional rupees five crore or part thereof, exceeding rupees two hundred crore.	0.5	0.8	1.5	2.3	3

Table 4-5: Toll Rates in Rs for Permanent Structure Exceeding 500 million Rs Cost

In case of project road, Pali bypass is being charged with a total length of 12.3 km at TP02 at bypass rate of 1.5 times the normal rate.

The applicable base rates shall be revised annually with effect from April 1 each year to reflect the increase in wholesale price index for the month of December of the immediate preceding year in which sub revision is undertaken but such revision shall be restricted for 40 per cent of the increase in wholesale price index.

Actual WPI information for December 2022 of 150.4 under 2011-12 series converted into 1993-94 series (462.3) has been used. The forecast for WPI as provided by the client

has been used for the period till the end of concession period (extended) and is presented in **Table 4-6**.

December in FY End	Applicable for FY	WPI
2024	2025	4.40
2025	2026	4.77
2026	2027	4.95
2027	2028	5.04
2028	2029	5.26
2029	2030	5.37
2030	2031	5.43
2031	2032	5.28
2032	2033	5.21
2033	2034	5.00
2034	2035	4.90
2035	2036	4.67
2036	2037	4.56
2037	2038	4.25
2038	2039	4.09
2039	2040	3.84
2040	2041	3.72
2041	2042	3.72
2042	2043	3.72
2043	2044	3.72

Table 4-6: WPI Forecast for Toll Rate Indexation

The stream of toll rates to be charged at the toll plazas for cardinal years is presented in **Table 4-7**. The toll fee has been rounded to nearest 5 Rupees as per Schedule R of the concession agreement.

FY Ending March	Car	LCV	Bus/ 2A	3A	MAV	OSV	Car Local
TP01							
2023	55	85	185	200	285	350	315
2025	60	95	200	220	315	385	345
2030	75	125	260	285	405	495	445
2035	100	160	335	365	525	640	575
2039	120	195	405	445	640	775	700
2044	145	230	485	525	760	925	830
TP02							
2023	50	85	175	190	275	335	315
2025	55	90	190	210	300	365	345
2030	75	120	245	270	390	470	445
2035	95	155	320	350	505	615	575
2039	115	185	390	425	610	740	700
2044	135	220	460	505	725	880	830

Table 4-7: Toll Rates at The Toll Plazas (in Rs)

The users purchasing return journey tickets will pay 1.5 times the above toll rates; the traffic opting for monthly passes will pay 33.3 times (two-thirds of 50 single journeys) the normal traffic toll rates. All passes have been rounded to the nearest 5 Rupees as per concession agreement.

4.5 Projected Tollable Traffic

The projected toll paying traffic after diversion to Amritsar-Jamnagar Expressway in PCUs (excluding exemptions and violations) based on the traffic growth rates till the end of concession as assessed in this study is presented in **Table 4-8**.

FY Ending March	Tollable Traffic in PCU		
	TP01	TP02	Average
2023	18,340	16,410	17,375
2024	19,286	17,259	18,273
2025	19,895	17,783	18,839
2026	20,869	18,655	19,762
2027	21,912	19,589	20,751
2028	22,963	20,529	21,746
2029	24,073	21,522	22,798
2030	25,247	22,572	23,909
2031	26,390	23,593	24,991
2032	27,593	24,666	26,130
2033	28,696	25,652	27,174
2034	29,849	26,683	28,266
2035	31,055	27,760	29,408
2036	32,258	28,830	30,544
2037	33,513	29,947	31,730
2038	34,707	31,009	32,858
2039	35,949	32,114	34,031
2040	37,241	33,263	35,252
2041	38,585	34,457	36,521
2042	39,984	35,700	37,842
2043	41,428	36,982	39,205
2044	42,930	38,316	40,623

Table 4-8: Projected Toll Paying Traffic in PCUs at the Toll Plazas

4.6 Toll Revenue Estimates

The concession period for the project road is 25 years from the appointed date (the date financial close is achieved). Toll revenue realised for FY23 is Rs 667.71 million.

Toll revenue streams have been calculated assuming that:

- Toll would be collected for all 365 days in a year; for leap years,366 days have been used
- Tolling would terminate on 15th September 2038. On account of target traffic provisions, the concession period is likely to be extended by 5 years till 15th September 2043; however, revenues have been presented till FY44

A mode wise breakdown of the revenue streams is also presented for the project in **Table 4-9**.

FY Ending March	Car	LCV	Bus	2A	3A	MAV	OSV	Total
2023 (Actual)	185.2	15.0	46.5	91.2	71.3	258.2	0.3	667.7
2024	211.1	16.2	50.3	97.7	76.7	292.4	0.4	744.8
2025	238.3	17.0	53.6	103.3	78.0	307.8	0.5	798.5
2026	266.8	18.0	57.7	110.7	82.6	341.9	0.5	878.2
2027	304.6	19.2	62.4	118.6	87.6	381.8	0.6	974.7
2028	340.5	20.4	67.3	128.5	94.3	425.0	0.6	1,076.6
2029	384.0	21.7	72.3	136.6	100.0	472.3	0.7	1,187.5
2030	425.5	23.4	78.1	146.5	107.0	525.0	0.8	1,306.2
2031	469.3	24.8	84.2	157.6	114.1	582.4	0.9	1,433.3
2032	531.7	26.4	91.5	170.0	121.9	642.4	1.0	1,584.8
2033	590.7	28.2	98.0	181.3	129.0	707.1	1.1	1,735.5
2034	650.8	30.3	105.6	193.9	138.4	778.4	1.2	1,898.6
2035	722.4	32.0	112.9	206.4	146.2	854.7	1.3	2,075.9
2036	800.4	34.2	121.5	221.3	156.3	938.1	1.4	2,273.2
2037	881.5	36.1	129.6	235.4	165.0	1,017.1	1.5	2,466.2
2038	965.1	38.1	138.8	250.6	175.0	1,105.0	1.7	2,674.2
2039	1,056.2	40.4	148.1	266.0	185.2	1,202.3	1.8	2,900.0
2040	1,163.8	42.8	158.3	282.8	196.3	1,299.5	2.0	3,145.4
2041	1,263.6	44.7	167.3	299.0	205.5	1,404.4	2.1	3,386.7
2042	1,375.5	47.1	178.1	316.1	216.6	1,519.3	2.3	3,655.0
2043	1,517.4	49.7	189.0	334.5	228.4	1,644.7	2.5	3,966.3
2044*	1,659.0	52.6	201.7	355.0	241.5	1,776.9	2.7	4,289.4

-presented for full year of FY44

Table 4-9: Toll Revenue (in Rs million) for Project Road by Mode

Cars represent around 33.8 percent share in total revenue with Buses having a share of 5.7 percent only. Amongst the freight vehicles category, MAVs represent the highest share of around 40.7 percent of total revenue. 2-Axle trucks have a share of 10.6 percent.

For the project, the normal toll revenue is likely to be about 70.4 percent of total toll revenues for the project road whereas about 28.4 percent of the toll revenue may be generated from daily pass category.

The project road has a revenue CAGR of 9.3 percent during the tenure of concession till FY44.

APPENDICES

APPENDIX 2.1
TRAFFIC ZONING SYSTEM

Traffic Study for Jodhpur-Pali Section of NH-62 in the State of Rajasthan

Traffic Zoning System

Zone	Place/Region	District/ State	State
1	Jodhpur	Jodhpur District	Rajasthan
2	Jhalamand		
3	Mogra Kalan		
4	Kankani		
5	Brahaman	Pali District	
6	Nimbali(TP01)		
7	Rohat		
8	Kharda		
9	Gajangarh (TP02)		
10	Pali		
11	Luni,Jhanawar,Phinoh,Rohicha kalan,Dundara	West of PR in Jodhpur district	
12	Kakela,Palsni,Binawas,Dangiyawas,Bhawi	East of PR in Jodhpur district	
13	Saji,Mandavas,Garwara,Basi	West of PR in Pali district	
14	Bhanawar,Gurdai,Miniyari	West of PR in Pali district	
15	Sojat	East of PR in Pali district	
16	Khamal,Sardar Samand,Rajola,Rupawas,Jadan, Bagawas	East of PR in Pali district	
17	Phalodi,Kalra,Malar,Bap,Kanji Ki Sird,Khidrat,Kolu Paruji, Lohawat, Moriya, Sirdon, Baru	North West Jodhpur District	
18	Raimalwara, Khapuriya, Punasar, Denok, Au, Chadi,Bhojasar, Ghantiyali,Champasar	North East Jodhpur District	
19	Shergarh,Balesar,Shaitrawa,Dechhu, Chaba, Jhabra,Chanmu,Chiral	South West Jodhpur District	
20	Osivan, Bhopalgarh, Bilara, Mandor,Daijar,Kherpa,Solia, Narsar, Asop,Pipar,Bara Bara, Danwara	South East Jodhpur District	
21	Raipur,Jaitaran,Lototi,Lambia, Balara, Banja Kuri,Ras, Babna,Baranthia Khurd, Nimaj, Garnia,De	North Pali district	
22	Marwar,Sawrad,Kherwa,Awa,Gondoch,Busi,Digal,Chanod	Central Pali district	
23	Desuri, Bali, Sumerpur, Dhola ka Gaon, Sanderav, Erinpura, Rani, Falna, Kot, Ghanerao, Bijapur	South Pali district	
24	Sirohi City	Sirohi District	
25	Shivganj,Posaliya,Palri, UthmauPandiv,Kalandri,Jawal, Manadar, Las	North Sirohi District	
26	Pindwara,Jharoli, Revdar, Mandwara, Slidar,Karunti, Sanwara	South Sirohi District	
27	Abu Road, Mount Abu	South Sirohi District	
28	Jalor City	Jalor district	
29	Ahor, Bagora, Sayla, Bhadrajan, Ummedpur, Sirana	North Jalor district	
30	Bhinmal, Raniwara, Sanchor, Hadecha, Chitalwana, Keriya, Karara, Jaswantpura, Ramsin, Punas	South Jalor district	
31	Barmer City	Barmer District	
32	Balotra, Pachpadra, Baytoo, Shiv, Ramsar, Doli, Tilwara, Chhitar ka Par, Nimbla, Gunga, Khoral,	North Barmer District	
33	Siwana, Chaauhtan, Gudha Malani, Undhka, Dhorimanna, Kabuli, Borcharnav, Dakhan, Dhanau,	South Barmer District	
34	Jaisalmer City	Jaisalmer District	
35	Pokaran, Ramdevra, Khetolai, Sodakor, Chandan, Ramgarh, Sanu, Ranau, Asutar, Baramsar, Na	South Jaisalmer District	
36	Vinjorai(Fatehgarh), Devikot, Akal, Sankra, Bainsra, Baniyana, Phalsund, Megha, Khuri, Myajilar	South Jaisalmer District	
37	Bikaner City	Bikaner District	
38	Kolayat, Nokha Mandi, Parwa, Deshnok, Nokhra, Gajner, Jasrasar, Bithnok, Jajhu, Kaku	South Bikaner District	
39	Jamsar, Poogal, Chhatargarh, Lunkaransar, Sobhasar,Motigarh, Kalu	North Bikaner District	
40	Nagaur City	Nagaur District	
41	Jayal, Didwana, Ladnun, Singar, Bhagu, Gurha, Panchori, Kerap, Daulatpura, Kuchaman	North Nagaur District	
42	Kheenvsar, Merta City, Degana, Parvatsar, Makrana, Nawan, Marot, Run	South Nagaur District	
43	Ajmer City	Ajmer District	
44	Kishangarh, Nasirabad, Pushkar, Rupnagar	North Ajmer District	
45	Beawar, Masooda, Bhinay, Sarwar, Kokri, Lumana, Bandanwara, Goela	South Ajmer District	
46	Bhilwara City	Bhilwara District	
47	Asind, Raipur, Mandal, Sahara	West Bhilwara District	
48	Hurra, Banera, Kotri, Shahpura, Jahazpur,Mandalgarh, Bijolia, Piplod	East Bhilwara District	
49	Rajsamand City	Rajsamand District	
50	Bhim, Devgarh, Amet, Kumbhalgarh, Dewair	North Rajsamand District	
51	Nathdwara,Relmagra, Sinya, Haldi Ghat, Galund	South Rajsamand District	
52	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	South Rajastan	
53	Jhalawar, Baran, Bundi Districts	South Rajastan	
54	Kota	South Rajastan	
55	Japiur, Rest of Jaipur district	Jaipur District	
56	Tonk,Sawai Madohpur,Karauli, Dhaulpur,Bharatpur,Dausa, Alwar Districts	Central Rajastan	
57	Sikar,Jhunjhunu, churu, Hanumangarh, Sri Ganganagar Districts	North Rajastan	
58	Punjab	Punjab	North India
59	Gurugram, Manesar	Haryana	
60	Panipat, Sonipat, Karnal, Rest of Haryana		
61	Delhi	Delhi	
62	Agra	Uttar Pradesh	
63	Kanpur, Lucknow		
64	Rest of Uttar Pradesh		
65	Uttarakhand, Himachal Pradesh, Jammu & Kashmir	Northern Indian states	
66	Indore, Ujjain, Bhopal, Dewas	Madhya Pradesh	Central India
67	Gwalior, Jhansi		
68	Rest of Madhya Pradesh		
69	Palanpur, Deesa, Patan, Mehsana	Gujarat	Western India
70	Ahmedabad, Vadodara, Surat		
71	Bhuj, Gndhidham, Kandla, Mudra port		
72	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman		
73	Mumbai, Pune, Dadar & Nagar Haveli	Maharashtra	
74	Nagpur, Wardha, Akola		
75	Rest of Maharashtra		
76	Hyderabad, Rest of Telangana, Andhra Pradesh	Southern Indian States	Southern India
77	Karnataka, Tamil Nadu, Kerala, Goa, Pondicherry		
78	Chattisgarh, Orissa, Jharkhand, Bihar, West Bengal	Eastern Indian states	Eastern India
79	North Eastern States(Assam, Nagaland, Meghalaya, Manipur, Arunachal Pradesh, Mizoram, Tripu	North East India	

APPENDIX 2.2
MODE WISE TOP 20 OD PAIRS

Traffic Study for Jodhpur–Pali section of NH-65 in the state of Rajasthan

Top 20 Origin Destination Pairs at TP01-Nimbali Toll Plaza

Car

S.No.	Origin	Destination	% of total
1	Jodhpur	Pali	31%
2	Mogra Kalan	Rohat	14%
3	Jodhpur	Rohat	8%
4	Jodhpur	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	3%
5	Jodhpur	Jalor City	3%
6	Kankani	Rohat	3%
7	Jodhpur	Desuri, Bali, Sumerpur, Dhola ka Gaon, Sanderav, Erinpura, Rani, Falna, Kot, Ghanerao, Bijapur, Bera,Nana, Nadol, Pratabgarh, Khinwara	3%
8	Jodhpur	Sirohi City	3%
9	Jodhpur	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	2%
10	Jodhpur	Ahmedabad, Vadodara, Surat	2%
11	Jodhpur	Sojat	1%
12	Jodhpur	Jaipur, Rest of Jaipur district	1%
13	Jodhpur	Abu Road, Mount Abu	1%
14	Pali	Luni,Jhanawar,Phinoh,Rohicha kalan,Dundara	1%
15	Rohat	Luni,Jhanawar,Phinoh,Rohicha kalan,Dundara	1%
16	Kankani	Pali	1%
17	Jhalamand	Rohat	1%
18	Mogra Kalan	Pali	1%
19	Pali	Pokaran, Ramdevra, Khetolai, Sodakor, Chandan, Ramgarh, Sanu, Ranau, Asutar, Baramsar, Nachna, Sam	1%
20	Jodhpur	Ahor, Bagora, Sayla, Bhadrajan, Ummedpur, Sirana	1%
		Total	**80%**

Bus

S.No.	Origin	Destination	% of total
1	Jodhpur	Pali	21%
2	Kankani	Rohat	15%
3	Jodhpur	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	5%
4	Jodhpur	Jalor City	5%
5	Jodhpur	Rohat	4%
6	Jodhpur	Desuri, Bali, Sumerpur, Dhola ka Gaon, Sanderav, Erinpura, Rani, Falna, Kot, Ghanerao, Bijapur, Bera,Nana, Nadol, Pratabgarh, Khinwara	4%
7	Jodhpur	Sirohi City	3%
8	Jodhpur	Abu Road, Mount Abu	3%
9	Jodhpur	Ahmedabad, Vadodara, Surat	3%
10	Jodhpur	Sojat	2%
11	Jodhpur	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	2%
12	Jodhpur	Mumbai, Pune, Dadar & Nagar Haveli	2%
13	Mogra Kalan	Pali	1%
14	Kankani	Pali	1%
15	Jodhpur	Indore, Ujjain, Bhopal, Dewas	1%
16	Pali	Pokaran, Ramdevra, Khetolai, Sodakor, Chandan, Ramgarh, Sanu, Ranau, Asutar, Baramsar, Nachna, Sam	1%
17	Desuri, Bali, Sumerpur, Dhola ka Gaon, Sanderav, Erinpura, Rani, Falna, Kot, Ghanerao, Bijapur, Bera,Nana, Nadol, Pratabgarh, Khinwara	Bikaner City	1%
18	Jodhpur	Nathdwara,Relmagra, Sinya, Haldi Ghat, Galund	1%
19	Jalor City	Bikaner City	1%
20	Bikaner City	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	1%
		Total	**77%**

Traffic Study for Jodhpur–Pali section of NH-65 in the state of Rajasthan

Top 20 Origin Destination Pairs at TP01-Nimbali Toll Plaza

LCV

S.No.	Origin	Destination	% of total
1	Jodhpur	Pali	33%
2	Jodhpur	Rohat	7%
3	Jodhpur	Ahmedabad, Vadodara, Surat	7%
4	Jodhpur	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	5%
5	Punjab	Ahmedabad, Vadodara, Surat	4%
6	Jodhpur	Mumbai, Pune, Dadar & Nagar Haveli	3%
7	Mogra Kalan	Sirohi City	3%
8	Jodhpur	Sirohi City	3%
9	Jodhpur	Jalor City	3%
10	Mogra Kalan	Pali	2%
11	Pali	Punjab	2%
12	Jodhpur	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	2%
13	Pali	Nagaur City	2%
14	Kankani	Pali	2%
15	Jodhpur	Sojat	1%
16	Mogra Kalan	Jalor City	1%
17	Jodhpur	Palanpur, Deesa, Patan, Mehsana	1%
18	Kankani	Rohat	1%
19	Panipat, Sonipat, Karnal, Rest of Haryana	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	1%
20	Jodhpur	Japiur, Rest of Jaipur district	1%
		Total	**81%**

2A

S.No.	Origin	Destination	% of total
1	Jodhpur	Pali	28%
2	Kankani	Rohat	8%
3	Jodhpur	Ahmedabad, Vadodara, Surat	7%
4	Jodhpur	Rohat	6%
5	Punjab	Ahmedabad, Vadodara, Surat	4%
6	Mogra Kalan	Jalor City	4%
7	Jodhpur	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	3%
8	Jodhpur	Desuri, Bali, Sumerpur, Dhola ka Gaon, Sanderav, Erinpura, Rani, Falna, Kot, Ghanerao, Bijapur, Bera,Nana, Nadol, Pratabgarh, Khinwara	2%
9	Mogra Kalan	Pali	2%
10	Pali	Bikaner City	2%
11	Jodhpur	Jalor City	2%
12	Jodhpur	Mumbai, Pune, Dadar & Nagar Haveli	1%
13	Jodhpur	Palanpur, Deesa, Patan, Mehsana	1%
14	Kankani	Pali	1%
15	Bikaner City	Ahmedabad, Vadodara, Surat	1%
16	Jodhpur	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	1%
17	Mogra Kalan	Sirohi City	1%
18	Mogra Kalan	Pindwara,Jharoli, Revdar, Mandwara, Slidar,Karunti, Sanwara	1%
19	Kankani	Jalor City	1%
20	Nagaur City	Mumbai, Pune, Dadar & Nagar Haveli	1%
		Total	**78%**

3A

S.No.	Origin	Destination	% of total
1	Kankani	Rohat	10%
2	Jodhpur	Pali	7%
3	Punjab	Ahmedabad, Vadodara, Surat	6%
4	Punjab	Mumbai, Pune, Dadar & Nagar Haveli	5%
5	Jodhpur	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	4%
6	Punjab	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	4%
7	Jodhpur	Ahmedabad, Vadodara, Surat	3%
8	Jodhpur	Mumbai, Pune, Dadar & Nagar Haveli	3%
9	Jodhpur	Sirohi City	3%
10	Mogra Kalan	Sirohi City	2%
11	Jodhpur	Jalor City	2%
12	Jodhpur	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	2%
13	Mogra Kalan	Pali	2%
14	Jodhpur	Palanpur, Deesa, Patan, Mehsana	2%
15	Nagaur City	Ahmedabad, Vadodara, Surat	2%
16	Pali	Punjab	1%
17	Bikaner City	Ahmedabad, Vadodara, Surat	1%
18	Mogra Kalan	Jalor City	1%
19	Bikaner City	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	1%
20	Punjab	Karnataka, Tamil Nadu, Kerala, Goa, Pondicherry	1%
		Total	**65%**

MAV

S.No.	Origin	Destination	% of total
1	Jodhpur	Pali	9%
2	Jodhpur	Ahmedabad, Vadodara, Surat	8%
3	Punjab	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	7%
4	Punjab	Ahmedabad, Vadodara, Surat	6%
5	Jodhpur	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	5%
6	Jodhpur	Karnataka, Tamil Nadu, Kerala, Goa, Pondicherry	5%
7	Punjab	Mumbai, Pune, Dadar & Nagar Haveli	4%
8	Punjab	Karnataka, Tamil Nadu, Kerala, Goa, Pondicherry	4%
9	Jodhpur	Mumbai, Pune, Dadar & Nagar Haveli	3%
10	Jodhpur	Sirohi City	2%
11	Pali	Punjab	2%
12	Jodhpur	Palanpur, Deesa, Patan, Mehsana	2%
13	Bikaner City	Ahmedabad, Vadodara, Surat	2%
14	Jodhpur	Jalor City	1%
15	Bikaner City	Mumbai, Pune, Dadar & Nagar Haveli	1%
16	Jodhpur	Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh Districts	1%
17	Panipat, Sonipat, Karnal, Rest of Haryana	Ahmedabad, Vadodara, Surat	1%
18	Jalor City	Punjab	1%
19	Bikaner City	Rajkot, Porbandar, Jamnagar, Rest of Gujarat, Diu & Daman	1%
20	Panipat, Sonipat, Karnal, Rest of Haryana	Mumbai, Pune, Dadar & Nagar Haveli	1%
		Total	**67%**