L&T IDPL

# Traffic Advisory services for Krishnagiri – Walajapet section of NH-46 in the state of Tamil Nadu

Final Traffic Report

September 2017

A Joint Venture of The Government of National
Capital Territory of Delhi & The IDFC Foundation.
An ISO Certified Company

DIMTS

1st Floor, ISBT Building, Kashmere Gate
Delhi - 110006 | Tel.: +91-11-43090100
E-mail: info@dimts.in | Website : www.dimts.in

We help people move

Disclaimer:

This report is prepared based upon work engaged by L&T IDPL Limited. Any opinions, findings, conclusions, or recommendations are based on the data collection exercise during the period of the engagement and do not reflect the views of DIMTS Ltd, its employees or its administration in general.

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

Table of Contents

List of Figures

L&T IDPL

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

List of Tables

L&T IDPL

Appendix A

L&T IDPL

CHAPTER 1

Introduction

1. Introduction

1.1   Background

The Govt. of India (GoI) through the National Highways Authority of India (NHAI) has embarked on a program of upgrading existing National Highways to provide a safer, more comfortable and faster journey on the national road network. The NHAI has launched seven phases of National Highways Development Projects (NHDP), of which Phase V consists of the widening of some of the existing 2-lane highway corridors to 4/6-lane.

NH-46 is an important highway of Tamil Nadu which passes through Krishnagiri to Walajapet. The section of project road which is the subject of this study starts at Krishnagiri and ends at Walajapet. This is an important section as it is the only major link connecting two important cities of Chennai and Bengaluru.

The project road is upgraded as a part of NHDP Phase V. The up gradation of this section is done by L&T IDPL and the project is operational since June 2011. As part of Traffic updating exercise for the project of L&T IDPL and its assets, L&T IDPL Limited has appointed Delhi Integrated Multi Modal Transit System Limited (DIMTS) as consultant for conducting Traffic Assessment Studies for four portfolio projects including the section of NH-46, Krishnagiri to Walajapet.

1.2   Description of Project Road

The Project Highway takes off from Krishnagiri which is on the outskirts of the town at Km 0 of NH-46 and ends at Walajapet junction at Km 148.35; it is as presented in the Figure 1.1.
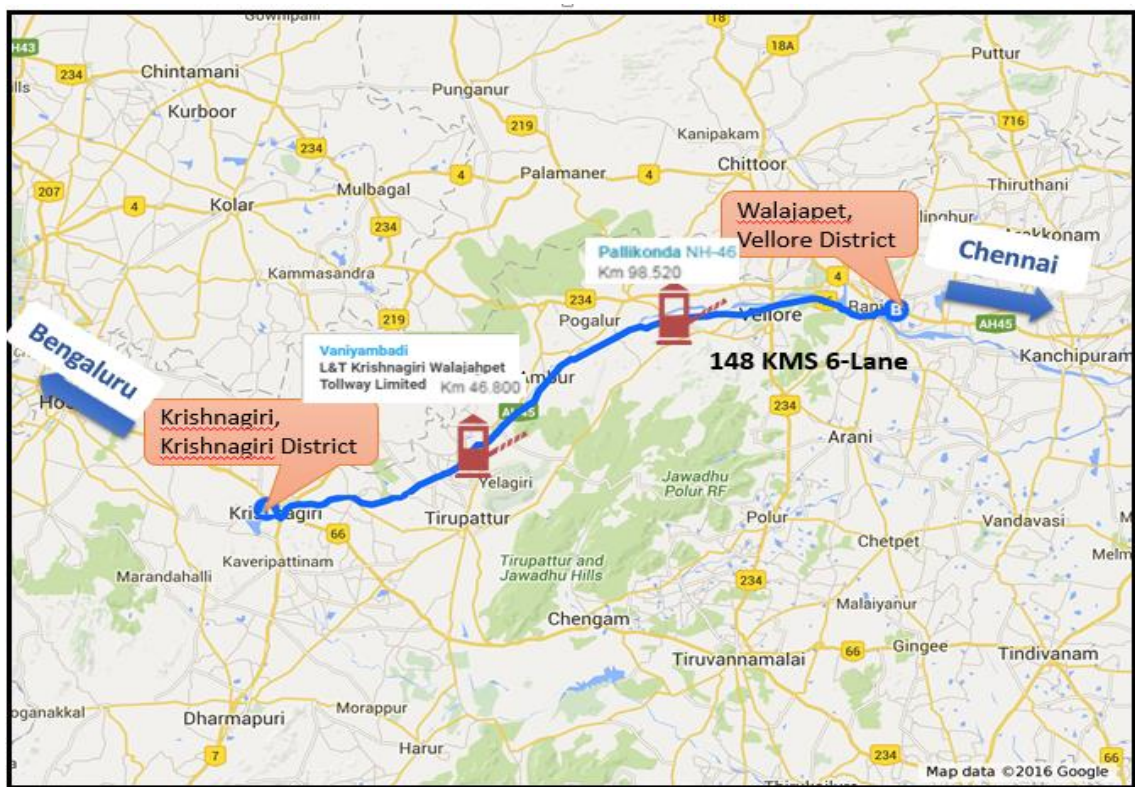
Figure 1-1: Project Road

L&T IDPL

Krishnagiri district which is an important agricultural and mining based centre. At the other end, Walajapet is a town of Tamil Nadu. There are many small & medium scale industries along the project road. The project road places an important role in connecting these industries to state capital and other region of India.

1.3   Objective and Scope of Work

The objective and scope of services are as follows:

- To understand the travel pattern of the road users along the project road through the secondary data analysis.
- To collect and compile relevant secondary information pertaining to the project and project influence area.
- To understand the prevailing traffic nature of the area by analyzing the past studies/traffic data
- To study the competitive route and to highlight the opportunities and threat
- Forecast the drivers of revenue during the life of concession
- To recommend the growth rates based on the potential of the project corridor
- Impact of modal shift between different vehicle categories
- Category wise Traffic and Revenue forecast for entire concession period

1.4   Structure of Report

The report is divided into six chapters, including this introduction chapter. **Chapter 2** contains details pertaining to Project Influence Area characteristics. **Chapter 3** presents the primary and secondary data collected to complete the task. **Chapter 4** covers the particulars regarding the developmental and diverted traffic. **Chapter 5** contains the details on the derivation of traffic growth rates used for traffic forecasting and **Chapter 6** presents the forecasted traffic & revenue.

CHAPTER 2

Project Influence Area Characteristics

2. Project Influence Area Characteristics

2.1 Project Road

National Highway NH-46 is a prime arterial of the state. It is a part of an important link which connects Chennai and Bengaluru. The Project Corridor passes through Krishnagiri, Vaniyambadi, Ambur, Pallikonda, Vellore and Walajapet.

The Project Corridor takes off from a "T" intersection (Thiruvalluvar Nagar) with NH-7. Thereafter, it traverses towards Walajapet. The Project Corridor ends at Walajapet town outskirts at 148.35Km.

Generally the area which contributes to the total traffic plying on project road is called the project influence area (PIA). PIA is further classified into broad and immediate influence area depending on its distance from the project road. The immediate influence area for the project corridor is Krishnagiri and Salem district through which it passes, whereas entire state of Tamil Nadu, Karnataka and Kerala falls under the broad influence area of the project road. The project road with immediate influence area is presented in the figure below.
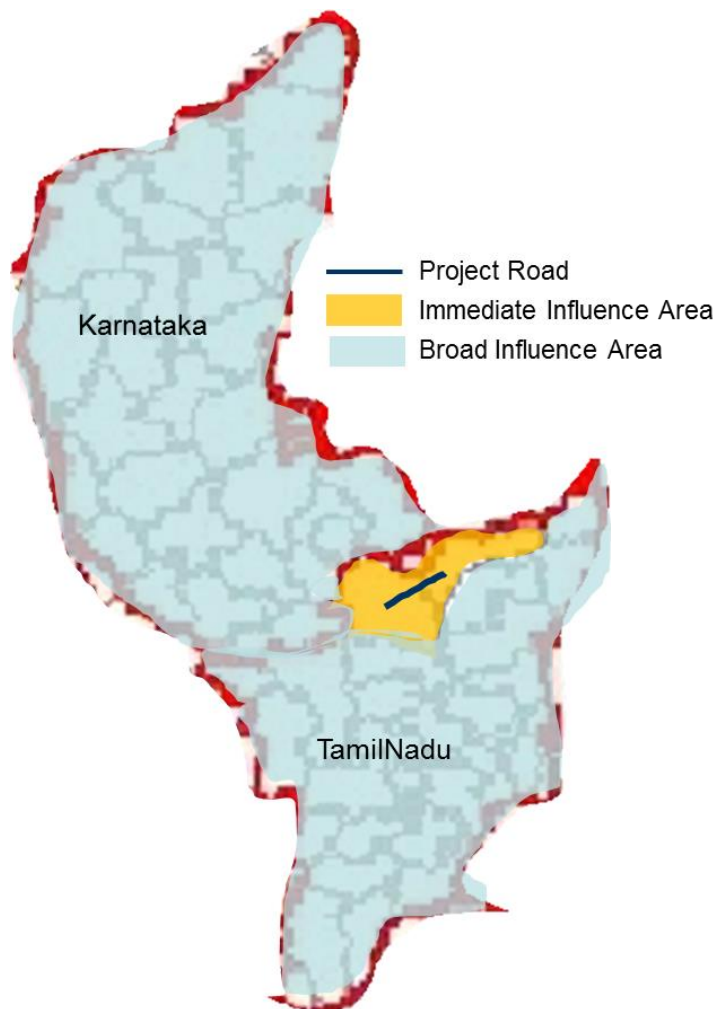
Figure 2-1: Project Corridor Influence Area

L&T IDPL

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS

We help people move

Table 2-1: Summary of Project Road

Details of Project Road	
Project road length	147
No of Toll Plaza's	2
No of Lanes	6 lane divided
No. of districts along the project road	2
Project Starting Year	2011 June

2.2 Tamil Nadu State

Tamil Nadu, the South Indian State of India nestles in the southernmost tip of peninsular India. The State is bounded by Andhra Pradesh, Karnataka in the north and Kerala in the west. The waters of the Bay of Bengal and the Indian Ocean wash the coastal eastern and southern boundaries respectively. The total geographical area of the State is 1,30,060 square kilometres divided into 5 major physiographic divisions of the Kurinji or mountainous region, the Mullai or forest region, the Palai or arid region, the Marudham or the fertile plains and the Neidhal or coastal region. The densely forested and wild life filled mountain chains of the Western Ghats, plateaus, intensively cultivated farmlands, fertile coastal plains are the geographical features of Tamil Nadu.

The State is divided into 30 Districts, 2001 Talukas and 385 Blocks. There are 16,317 Villages in the State, out of which 917 are uninhabited. According to the 2011 census of India, the total population of Tamil Nadu is 72.1 million of which 36.1 million (50.13%) are male and 36.0 million (49.87%) are female, or 996 females per 1000 males.

Table 2-2: Demographic Profile of the State of Tamil Nadu

Parameters	Tamil Nadu
Capital	Chennai
Principal Language	Tamil
Geographical Area (sq km)	130060 (11th Largest in India)
Administrative Districts (No)	30
Population Density (Persons/sq km)*	555
Total Population (Million)*	72.1
Male Population (Million)*	36.1
Female Population (Million)*	36.0
Literacy Rate (%)*	80.09%

Source: Census of India 2011

There are 30 districts in the State of Tamil Nadu and the figure below provides the sex ratio in the state of Tamil Nadu.

L&T IDPL
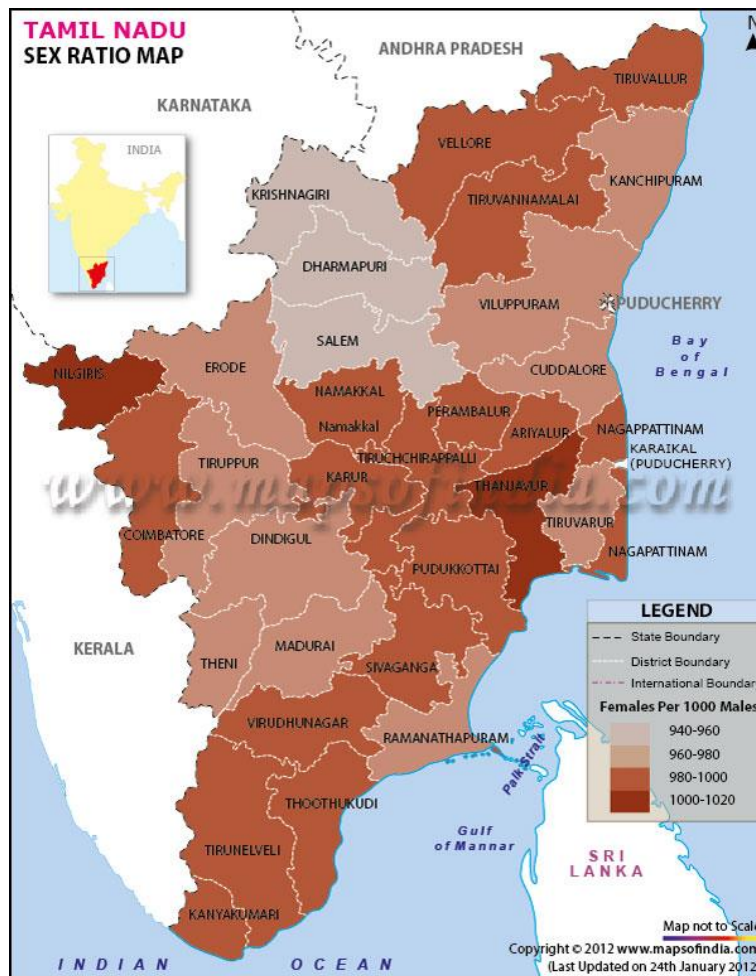
Figure 2-2: Sex Ratio in Tamil Nadu (District wise)

L&T IDPL

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move
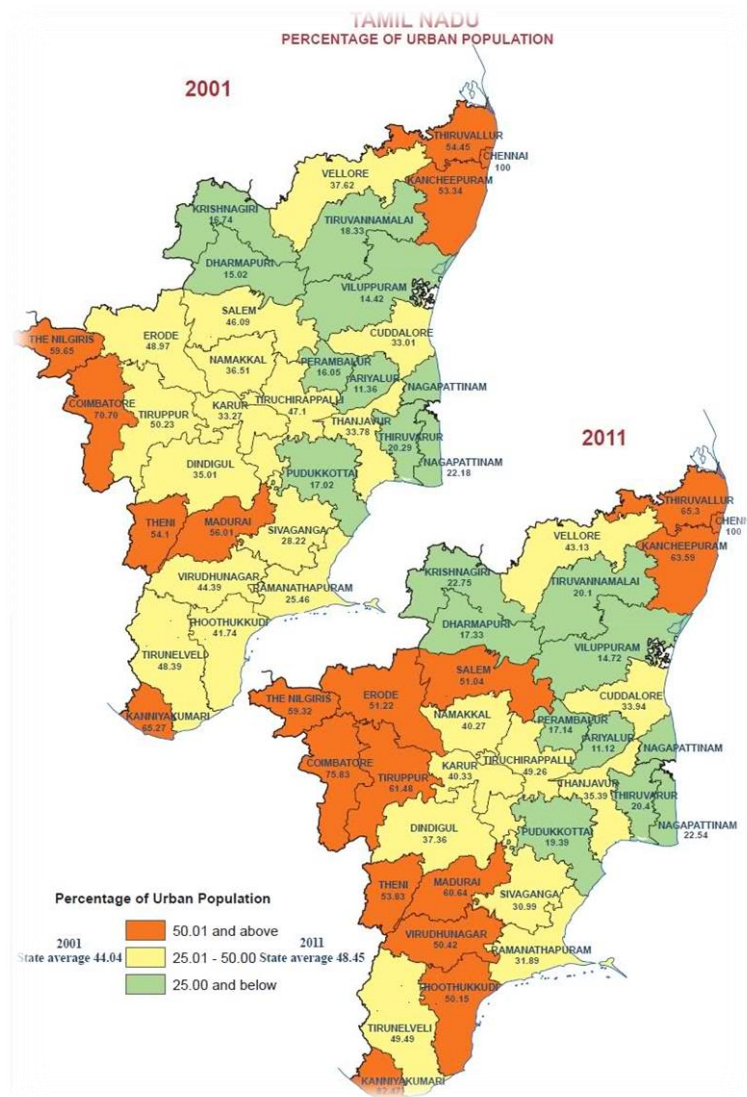
Figure 2-3: Urban Map of Tamil Nadu

Table 2-3: Profile of Districts & Cities in Project Influence Area

Sr. No	District	Headquarter	Population (2011)	Density (Persons/Sq.Km)	Literacy (%)
1	Krishnagiri	Krishnagiri	1879809	367	71.46
2	Vellore	Vellore	3936331	648	79.17
3	Bangalore	Bangalore	9621551	4381	87.67

Source: Census of India 2011

2.2.1 Road Network in Tamil Nadu

The state is well connected to neighbouring states and other parts of India by road network of
length 146944 Km. The road density in state is 53.42 Km per 100 sq.km of area. In recent

L&T IDPL

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

years participation of private sector is being encouraged in the construction of highways. The road lengths of different categories of roads are as presented in table below

Table 2-4: Different type of Roads in Tamil Nadu

Road Type	Road Length (Km)
National Highways	4873
State Highways	9384
Major District Roads	11288
Other District Roads	36096
Village Roads	137399

Source: Directorate of economical and statistical office

2.2.2 Industry in Tamil Nadu

With a view to promote the industrial activities, Tamil Nadu is creating a favourable industrial climate in the state by announcing pro-active industrial policies. During 2008-09, the government has signed 12 memorandums of understandings with an investment of Rs.25050 crore and issued structured package sanctioning orders for 7 other projects with an investment of Rs.5462 crore.

The manufacturing sub-sectors of the State economy viz. textiles, wearing apparels, leather, wood products, chemicals, non-metallic minerals, basic metals, software and hardware of IT industries, transport equipment, automobiles have experienced lower production compared to that of the previous year's level due to lower demand and power shortages. The income originated from the manufacturing sector to GSDP increased from Rs.43874 crore in 2007-08 to Rs.44758 crore in 2008-09 and thereby registered a growth of 1.77 per cent but at a decelerated rate when compared to 2006-2007.

At the national level, the industrial scenario of Tamil Nadu continues to retain its position as in the previous year. As per the ASI data 2005-06, Tamil Nadu occupies the first position in having the number of factories and the total number of persons engaged in the industrial process. In respect of all the other principal characteristics, viz. fixed capital, productive capital, gross value of output and net value added, the State retains its third position as in the previous year. At the national level, the State is sharing 15.17 per cent of factories, 9.94 per cent in fixed capital, 14.88 per cent in persons engaged. 9.76 per cent in gross value of output and 8.97 per cent in net value added. The Growth of Industrial Sector, measured by the Index of Industrial production for the year 2008-09 showed a decelerated growth of 1.7 per cent compared to 5.0 per cent in 2007-08. The manufacturing sub–group also achieved a sub-dued growth of 2.4 per cent as against 5.0 per cent in the previous year. The other two sub-groups viz. mining and electricity had registered a negative growth of 1.2 per cent and 2.3 per cent respectively. At the national level also, the overall growth of industrial production decelerated to 2.4 per cent in the review year from 8.5 per cent achieved in the previous year. A detailed analysis of the rate of growth, investments, employment and projected growth in each segment are given below.
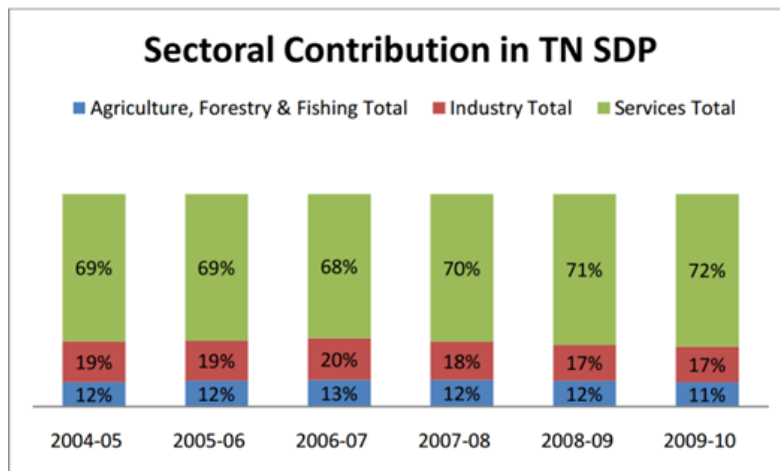
Source: CMIE

Figure 2-4: Average annual growth rate (%) of GSDP from Industry for Tamil Nadu during 10th and 11th five year plans (2004-05 Prices)

2.2.3 Economy of Tamil Nadu

Tamil Nadu is the second largest contributor to India's GDP. Tamil Nadu's gross state domestic product for the year 2011–2012 is a predominantly services economy.

Economic Activity:
- Services- Manufacturing- 34%;
- Services- 45%;
- Agriculture - 21%

A list of the major contributors to the state economy and the leading industries of the state are:

- Agriculture and aquaculture
- Leather Industries
- Textile and Engg Industries
- Automobiles
- Heavy Industries
- Mineral based industries
- Power
- Information and Technology.
- Tourism

2.2.4 Agriculture

Tamil Nadu is gifted with 33 river basins, the largest one's being, Caurvery, Pennalaru, Vaigai and Tamaraparani. Of total area in the state, 59.2% is under cultivation (not including forest lands). Rice and various pulses are grown extensively here. The annual food grain exceeds 10 million tonnes; with rice alone contributing average 8 million tonnes. The main cash crops grown in the state are sugarcane, tobacco, chillies, and cotton, giving rich scope for the growth and development of the sugar, alcohol-based and textile industries. Other state-sponsored schemes include the large-scale cultivation of spices and oil seeds particularly groundnut,

Final Traffic
Report
Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

seasmum, castor and coconut. Sunflower has become increasingly popular in recent times. The diverse Agro-ecological conditions also make this land ideal for growing fruits and vegetables. The state ranks first in the yield of mangoes and fourth in bananas and grapes.

2.2.5 Industrial role in economy

Traditionally, Tamil Nadu is one of the well-developed states in terms of industrial development. In the post-liberalisation era, Tamil Nadu has emerged as one of the front-runners by attracting a large number of investment proposals particularly in recent times. Today, Tamil Nadu is the third largest economy in India and its 2010-2011 State Domestic Product is well over US $ 23 billion. The salient features of its economy are given hereunder:

Rank of Tamil Nadu among Indian States	
Industrial output	Third
Value addition	Second
No. of factories	Second
Total workers employed in factories	Second
Foreign Direct Investment Flow	Second

With the setting up of major automobile projects namely Ford-Mahindra, Hyundai Motors, Hindustan Motors, Mitsubishi, expansion plans of Ashok Leyland & TAFE, Chennai, emerges as the Detroit of south East Asia. Tamil Nadu has always been a fore-runner in the industrial process, both in terms of industrial output and in encouraging various new large scale products. Having recorded an impressive growth in industry in the post-reform span, it is poised for further industrial development and expansion. At present, the state accounts for over 11% of India's industrial output. Tamil Nadu's strength lies not only in its traditional industries, but also in several new emerging industries. In its efforts, to develop a strategy for industrial growth and development, the State Government is concentrating on promoting the development of industries in which the State already has a competitive edge and high impact industries in which advantages can easily be created.

2.2.6 Mineral based industries

The main mineral wealth of the state is granite, limestone and lignite. The availability of different varieties of granite in different parts of the State has resulted in a booming granite industry. Over the year, the granite industry has grown from strength to strength contributing more than 35% of the country's exports. During 1996-97, Tamil Nadu exported granite products valued at Rs.4.0 billion and other minerals; Rs.5.10 billion. The current annual production of cement is over 5 million tonnes. Lignite is being used to generate power. Graphite is yet another mineral offering opportunities for down-stream industries.

2.2.7 Leather – based Industries

Tamil Nadu has a dominant presence in the leather and leather based industries. The tanning industry in India has a total installed capacity of 225 million pieces of hide and skins of which Tamil Nadu alone contributes an inspiring 70%. The state accounts for more than 505 of the country's export of leather and leather-related products such as shoe uppers, shoes, garments, and so on. Leather exports by the end of the year 1996-97 was us $ 900 million

and the ambitious target of US $4 billion for leather related products exports by the year 2004 for the country seem well within each. This translates into exports worth nearly US $2.2 billion from Tamil Nadu – given the major share it has traditionally enjoyed. Rising to the occasion, the state government is geared up to provide attractive incentives and infrastructural support in the form of setting up industrial estates and common effluent treatment plants. Thus Tamil Nadu's substantial share of the leather market in the years to come is ensured.

2.2.8 Tourism

The tourism industry of Tamil Nadu is the second largest in India, with an annual growth rate of 16 per cent. Tourism in Tamil Nadu is promoted by Tamil Nadu Tourism Development Corporation (TTDC), a Government of Tamil Nadu undertaking. According to Ministry of Tourism statistics, 2,804,687 foreign and 111,637,104 domestic tourists visited the state in 2010. The state boasts some of the grand Hindu temples built in Dravidian architecture. The Brihadishwara Temple in Thanjavur and Gangaikonda Cholapuram built by the Cholas, the Airavateswara temple in Darasuram and the Shore Temple, along with the collection of other monuments inMahabalipuram (also called Mamallapuram) have been declared as UNESCO World Heritage Sites.

Madurai is home to the Madurai Meenakshi Amman Temple. Sri Ranganathaswamy Temple, Srirangam. Tiruchirappalli is the largest functioning temple in the Tamil Nadu, Tiruchirappalli where the famous Rockfort Temple is located, Rameshwaram whose temple walk-ways corridor (Praagarams) are the longest 1.2 km (0.75 mi) of all Indian temples in the world, Kanchipuram and Palani are important pilgrimage sites for Hindus. Other popular temples in Tamil Nadu include those in Chidambaram,Thiruvannaamalai, Tiruvarur, Kumbakonam, Sankarankovil, Srivilliputhur, Tiruttani, Namakkal, Vellore, Karur, Bhavani, Coimbatore, Kanniyakumari.

Tamil Nadu is also home to hill stations like Udhagamandalam (Ooty), Kodaikanal, Yercaud, Coonoor, Topslip, Valparai, Yelagiri and Manjolai. The Nilgiri hills, Palani hills, Shevaroy hills, Kolli Hills and Cardamom hills are all abodes of thick forests and wildlife. Tamil Nadu has many National Parks, Biosphere Reserves, Wildlife Sanctuaries, Elephant and Bird Sanctuaries, Reserved Forests, Zoos and Crocodile farms. Prominent among them are Mudumalai National Park, The Gulf of Mannar Biosphere Reserve, Anaimalai Wildlife Sanctuary, Vedanthangal Bird Sanctuary and Arignar Anna Zoological Park. The mangrove forests at Pichavaram are also eco-tourism spots of importance.The prominent waterfalls in the state are Courtallam, Hogenakkal, Papanasam, Manimuthar, Thirparappu, Pykara and Silver Cascade. The Chettinad region of the state is renowned for its palatial houses and cuisine. With medical care in Chennai, Vellore, Coimbatore and Madurai, Tamil Nadu has the largest numbers in Medical tourism in India.

Kanyakumari, the southernmost tip of peninsular India, is famous for its beautiful sunrise, Vivekananda Rock Memorial and Thiruvalluvar's statue built off the coastline.Marina Beach in Chennai is one of the longest beaches in the world. The stretches of beaches from Chennai to Mahabalipuram are home to many resorts, theme parks and eateries.

In terms of value of output of minerals, Tamil Nadu ranks 7th in India in recent years and its share has been increasing. The above figure compares Tamil Nadu with other major states in 2009-10 in terms of percentage share of total value of mineral output in India.
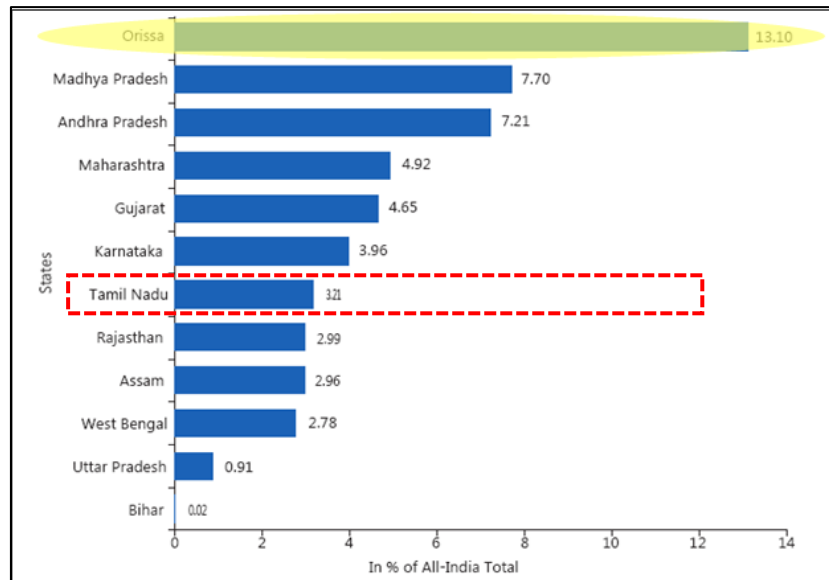
Figure 2-5: Total Value of Mineral Production of Major States, 2009-10

Figure below presents the growth in the state GSDP.
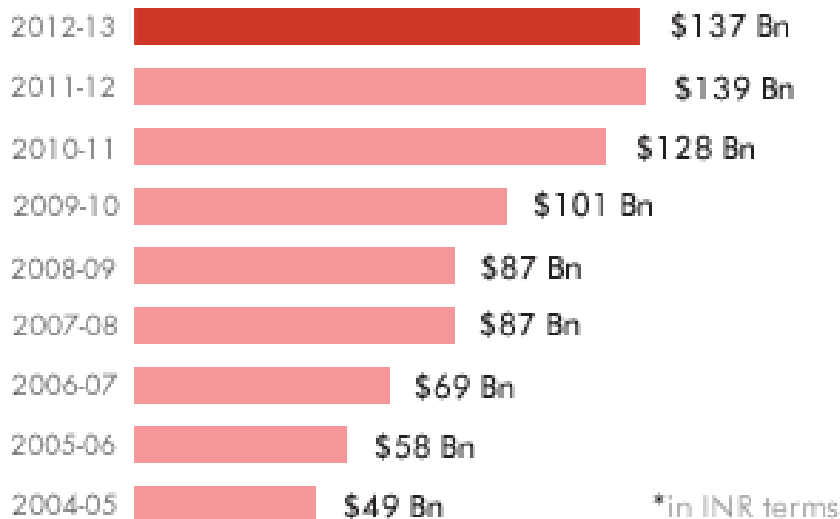
Source: Planning Commission of India, 2013

Figure 2-6: GSDP of Tamil Nadu

L&T IDPL

2.3 Profile of Districts along Project Road

2.3.1 Krishnagiri District

Krishnagiri district is bounded by Vellore and Thiruvannamalai districts in the East, Karnataka state in the west, State of Andhra Pradesh in the North Dharmapuri District in the south. Its area is 5143 Sq. Kms. Tribal like 'Irular' live in the forest of Denkanikottai. As they are away from towns they do not lose their identity and individuality. There people are skilled in tree climbing, honey collection and protecting themselves from wild animals.

This district is connected by Prime Minister's Golden Rectangle Project executed by National Highways Authority of India. This district has a network of National Highways converging.

- NH-7 (Kanyakumari-Varanasi)
- NH-46 (Krishnagiri-Ranipet)
- NH-66 (Pondicherry- Krishnagiri)
- NH-207 (Hosur-Surjapur-Devanhalli-Nelamangla)
- NH-219 (Madnapalli- Kuppam- Krishnagir)

Apart from this state highways and district highways are linking almost all the towns and villages of the district. Four National highways converge at the Head Quarters of this district is unique.

People of Krishnagiri District belong to various racial groups. People from Kashmir, Maharashtra, Karnataka and Andhra have settled in this District. Hence it can be rightly called a Cosmopolitan society. Ancient Art & Culture is preserved and maintained by inhabitants.

"Paradise" is the most popular multi coloured granite available in Krishnagiri. Black granite is available in Hosur and Denkanikottai. Granite processing units, which make slabs of granite, finished and decorated beautifully is located mainly in Hosur surroundings. The multi coloured paradise slabs are being exported to America, England, Australia and some other European countries in large quantities. This industry is flourishing with the uninterrupted supply of electricity and availability of raw material and land at cheaper rates. A variety of quartz stones from Denkanikottai and White metal called Limestone from Uthangarai are mined.

Krishnagiri Reservoir Project, Shoolagiri-Chinnar Reservoir, Thangarai Reservoir, Pambar Reservoir, Kelevarapalli Reservoir Project and Baarur Tank are the sources of irrigation for our district. By all these water reservoirs 18,965 Hec. Of land is irrigated.

Table 2-5: Demographic Profile of Krishnagiri District

Sr. No.	Demographic Profile	
1	Share of Land area (%)	3.94%
2	Total Population (No)	1879809
	Rural (No)	1451446
	Urban (No)	428363
3	Literacy (%)	71.46
4	Area (Sq.km)	5129
5	Density (Per Sq.km)	367

Source: Census of India 2011

L&T IDPL

Final Traffic
Report | Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu | DIMTS
We help people move

2.3.2 Vellore District

Vellore had the privilege of being the seat of the Pallava, Chola, Nayak, Maratha, Arcot Nawabs and Bijapur Sultan Kindoms. It was described as the best and the strongest fortress in the Carnatic War in the 17th Century. The geographical area of this district is 6077 sq. k.m. The total population as per 2011 Census is 3936331.

The cultural impact in the society is also very significant same of the traditional arts of the District like the Therukoothu., an art form folk theaters, Kokkalikottai, a famous traditional dance in the district are gradually vanishing. But it is also a matter of solace to note that some of the handicrafts for which the Vellore district are renowned, are still flourishing. Mats making in Walajapet, silk weaving in Arni and the traditional art of pot making in Vellore and places around, are some of the handicrafts which are enable to successfully withstand challenges through ages. The poomalai scheme that has been introduced by the govt. will not only preserve the traditional handicrafts, but also promote their growth.

Two National Highways - NH 4 (Mumbai - Chennai) and NH 46 (Krishnagiri - Ranipet) connect parts of the district to other parts of the country. NH 46 passes through Vaniyambadi, Ambur, Vellore and Arcot before joining NH 4 at Ranipet. Both these highways are important connecting roads for vehicles especially travelling to Chennai from Bangalore and Coimbatore. Both these highways run for a length of 226 km in the district.

Table 2-6: Demographic Profile of Vellore District

Sr. No.	Demographic Profile	
1	Distribution of Land area (%)	4.67%
2	Total Population (No)	3936331
	Rural (No)	2234344
	Urban (No)	1701987
3	Literacy (%)	79.17
4	Area (Sq.km)	6075
5	Density (Per Sq.km)	648

Source: Census of India 2011

2.3.3 Bangalore District

Bangalore district in its present shape has come into existence in August, 1986 consequent on formation of a new District. It is located in south eastern part of Karnataka. It is spread across four taluks Bangalore north, Bangalore east, south and Anekal. It is a hub for bio-technology, aerospace and key knowledge industries. It is also called as Silicon Valley.

Table 2-7: Demographic Profile of Bangalore District

Sr. No.	Demographic Profile	
1	Distribution of Land area (%)	0.08%
2	Total Population (No)	9621551
	Rural (No)	871607
	Urban (No)	8749944

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

Sr. No.	Demographic Profile	
3	Literacy (%)	87.67
4	Area (Sq.km)	2196
5	Density (Per Sq.km)	4381

Source: Census of India 2011

The District is ranked as one of the top Five Technology Clusters in the world. Bangalore, home to the biggest bio cluster 'Bangalore Helix', has 183 out of 340 Biotechnology companies existing in the country, making it 60% of the Biotechnology Units. Aviation has been the major sector for employment in the district since the 1940's. The country has 5 major research and development centers for Aerospace. The district has the potential to become a Research and Development Hub. The World Economic Forum classified Bangalore as the Innovation Cluster. Mercer's Index ranks Bangalore as the best place to 'live and work' by Expatriates. The District is also slowly becoming a 'Medical Hub' due to the presence of World's largest 'healing center' and 'telemedicine center'.

2.4   Chennai Port – Connectivity

Chennai Port, formerly known as Madras Port, is the second largest container port of India, behind the Nhava Sheva Port, and the largest port in the Bay of Bengal. Strategically located and well connected with major parts of the world, it is today the hub port on the Indian subcontinent.

Chennai Port is the third oldest and about 135 years old port among the twelve major ports of India. It has the strategic advantage of having the entire South India as its hinterland and is emerging as a hub port in East Coast of India. Port location is on the flat eastern coastal plain. The location advantage enables the port to handle variety of cargo comprising containers, liquid & break bulk cargo. The major commodities handled in the Port are Crude oil & POL products, Containers, Automobiles, Edible oil finished Fertilizers, Fertilizer Raw Materials, and general cargo.

It currently handles more than 50 MTPA (2015-16) of traffic and is situated strategically and well connected both by rail and road to serve the hinterlands of Tamil Nadu, Southern Andhra Pradesh and Southern Karnataka.

Road Connectivity: Chennai is well connected to other major cities through national highways. It is connected to Kolkata through NH 5, to Mumbai through NH 4 and to Kanyakumari through NH 45. In general traffic handled by road network is 66%.

CHAPTER 3

Primary and Secondary Data Collection

3. Primary and Secondary Data Collection

3.1   General

As a part of the Traffic forecast study for L&T IDPL Portfolio project of Krishnagiri- Walajapet, extensive data collection to develop base data was carried out. The main objective is to understand the present traffic situation based on few primary traffic surveys and the data provided by the client and to highlight the future threats (if any) based on our study and to finally recommend a suitable growth rates for traffic forecast. The data collection included the primary surveys in the field and the secondary data collection from various sources on site and the data available in public domain. This chapter presents the details of traffic surveys, the locations, schedule and the findings of the primary surveys carried out.

3.2   Site appreciation

To achieve the project objectives, site appreciation including the roads in the project area vicinity were carried out under the supervision of our senior traffic engineers.

A detailed reconnaissance survey was conducted to identify the potential threats and opportunities for the project road. The following points were taken into consideration, while carrying out the site appreciation:

- Major traffic generators and routes
- Interactions with truckers along the project road
- Interactions with truckers in the vicinity of project road
- Travel pattern of the road users at the toll plaza locations and
- Probable diversion routes based on site recon survey.

3.3   Past traffic trends

Past traffic trends were derived based on the past traffic data provided by the "Client" at the toll plaza location on the project road has been in presented in the table below. Also traffic count summary and composition from the traffic surveys carried out as part of this traffic study is also provided in the following sections.

Table 3-1: Traffic Volume Count (AADT) at Vaniyambadi (TP1) Toll Plaza – Km 46.80

Year	Car	Bus	LCV	2A	3A	MAV	AADT
FY 2007	2222	565	917	1035	838	207	5784
FY 2009	2503	647	1192	827	1087	273	6529
FY 2010	3204	703	1109	820	1332	300	7467
FY 2011	4894	977	1679	898	1510	588	10544
FY 2012	5283	870	1499	736	1212	682	10282
FY 2013	5602	841	1499	654	1143	644	10383
FY 2014	5608	805	1490	553	963	758	10177
FY 2015	5898	778	1552	583	1073	845	10729
FY 2016	7133	880	1580	816	996	1173	12577
FY 2017	7297	867	1618	866	1028	1211	12887
*FY 2017	7301	893	1627	913	1088	1282	13104
**FY 2018	8191	951	1728	762	1002	1273	13907

Source: Toll Plaza data, *FY 2017 adjusted for Demonetisation impact, **AADT estimated from Apr'17 to Aug'17 traffic data

L&T IDPL

It can be observed that overall the traffic is growing at this toll plaza, but after the toll operation (FY 2012) the traffic is reducing. In terms of mode wise growth only 2 Axle trucks is showing a negative trend.

Traffic Composition

The composition of different modes (latest data) at toll plaza location is as presented below.
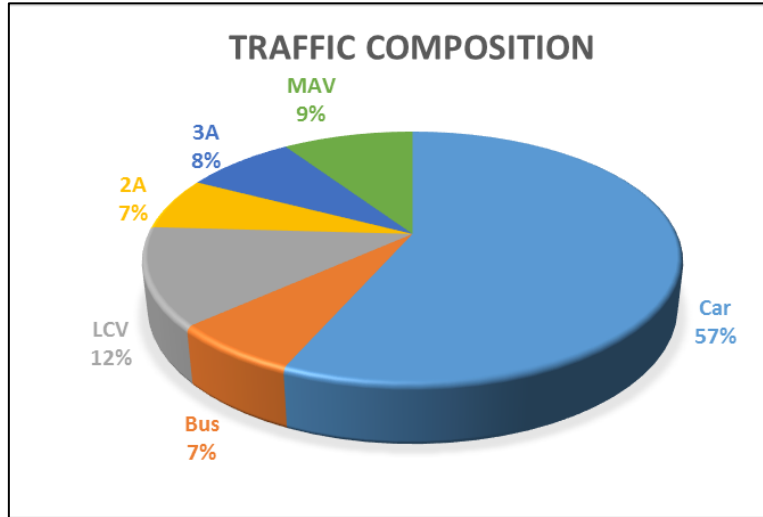
Figure 3-1 Traffic Composition at Vaniyambadi Toll Plaza in FY 2017

Table 3-2: Traffic Volume Count (AADT) at Pallikonda (TP2) Toll Plaza– Km 98.52

Year	Car	Bus	LCV	2A	3A	MAV	AADT
FY 2007	4777	1967	2258	2234	1148	368	12752
FY 2009	4208	1825	1766	1719	1607	311	11436
FY 2010	5250	1809	1797	1427	1775	396	12453
FY 2011	7349	2343	2211	1575	2016	692	16186
FY 2012	7629	1812	1827	1154	1629	768	14820
FY 2013	8656	1974	2017	1104	1562	736	16049
FY 2014	8952	1910	1994	966	1378	862	16063
FY 2015	9279	1883	1971	888	1306	817	16143
FY 2016	10620	1984	2058	1068	1113	1213	18056
FY 2017	10847	2001	2006	1193	1197	1305	18548
*FY 2017	10979	1992	1977	1307	1179	1285	18719
**FY 2018	12226	2101	2097	972	1167	1413	19977

Source: Toll Plaza data, *FY 2017 adjusted for Demonetisation impact, **AADT estimated from Apr'17 to Aug'17 traffic data

It can be observed that overall the traffic is growing at this toll plaza, but after the toll operation (FY 2012) the traffic is not growing. In terms of mode wise growth LCV and 2 Axle trucks is showing a negative trend.

Traffic Composition

The composition of different modes (latest data) at toll plaza location is as presented below.
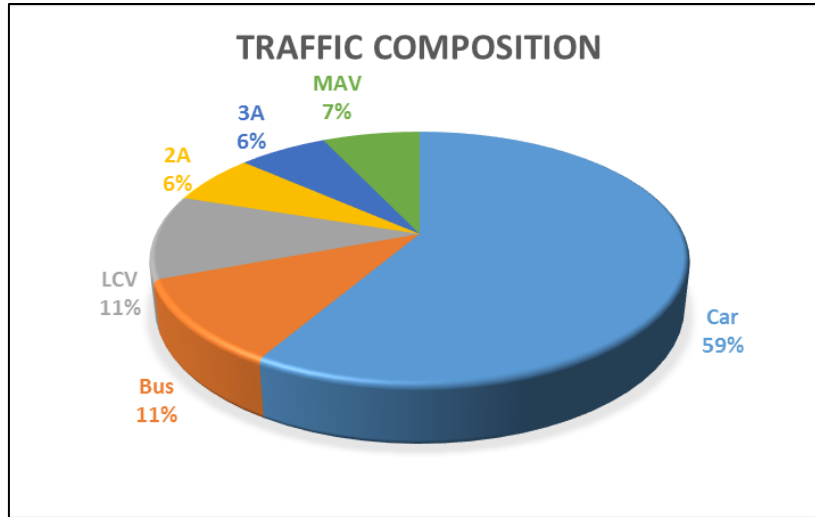
Figure 3-2 Traffic Composition at Pallikonda Toll Plaza in FY 2015

3.4 Secondary Traffic Data and Analysis

As part of the study DIMTS had conducted OD surveys at the Toll Plaza Locations in the month of June 2016. Analysis for the same is presented in the below sections.

The major contributing zones at Vaniyambadi toll plaza are as shown below.

Table 3-3: Region wise zone contribution at Vaniyambadi Toll Plaza

Zone Name	Passengers	Goods
Krishnagiri	11.2%	12.9%
Vellore	17.0%	7.1%
Salem	3.9%	2.2%
Dharampuri	1.3%	0.7%
Coimbatore	1.5%	2.3%
Kanchipuram	1.1%	0.4%
Chennai	29.7%	38.7%
Bangalore	27.0%	19.9%
Andhra Pradesh	2.2%	3.3%
Kerala	1.1%	2.0%
Maharashtra	0.3%	4.0%

It can be observed from the above table that mainly the traffic is from the Krishnagiri & Vellore district along the project corridor at the toll plaza location. More than 90% of traffic is from Tamil Nadu and Karnataka state. Thus, the main project influence region are Tamil Nadu and Karnataka state.

The distribution of commodity at Vaniyambadi toll plaza location is as presented below.

Table 3-4 Commodity share of Freight Traffic Both Direction at Vaniyambadi Toll Plaza

Commodity	Both Directions				
	Mini LCV	LCV	2-Axle	3-Axle	MAV
Empty	39.65%	20.85%	26.20%	17.31%	22.40%
Vegetables/Fruits/Milk	7.05%	4.12%	3.41%	2.30%	1.96%
Fish/chicken/meat/eggs	3.08%	2.36%	1.60%	0.55%	0.35%
Food Grains like Pulses etc	5.29%	3.77%	6.71%	8.54%	4.39%
Sand/Aggregate/Steel/Aluminium/Husk	1.32%	2.12%	4.05%	3.18%	3.93%
Leather/Textile Materials	1.32%	1.30%	0.96%	0.33%	0.69%
Cotton/silk/clothes	2.20%	2.47%	1.60%	1.97%	1.85%
Rubber/Plywood/Timber/bamboo sticks/Furniture	2.64%	2.83%	1.38%	2.19%	0.81%
Marbles/tiles/lime stone	2.64%	1.53%	2.66%	3.83%	2.66%
Iron coils/Steel bars/iron Pipes	0.88%	1.77%	2.13%	4.71%	2.66%
Petroleum Products (Diesel, Gas etc.)	2.20%	1.41%	2.88%	4.16%	4.39%
Machines/mechanical parts	1.76%	2.00%	1.17%	1.31%	2.54%
Cement	0.88%	0.24%	1.92%	4.71%	6.70%
Coal	0.00%	0.24%	0.21%	0.55%	0.46%
Paper	1.76%	1.41%	2.56%	2.19%	1.73%
Courier/Parcel	14.54%	34.04%	25.13%	23.66%	15.59%
Automobiles	4.85%	6.71%	6.18%	10.62%	20.44%

Observations:

- The analysis shows that majority of the trucks carry Parcels, food grains and building materials.
- LCVs are being used principally for transporting parcels and vegetables.
- 2-axle & 3-axle trucks are being used principally for transporting parcels, food grains and building materials.
- 4-6 axle trucks are used to carry mainly manufacturing goods, parcels, Automobiles and building materials.

The major contributing of zones at Pallikonda toll plaza are as shown below.

Table 3-5: Region wise zone contribution at Pallikonda Toll Plaza

Zone Name	Passengers	Goods
Krishnagiri	9.94%	11.01%
Vellore	21.50%	12.09%
Salem	5.48%	3.51%
Dharampuri	1.00%	0.54%
Erode	2.52%	1.53%
Chennai	28.85%	38.28%
Bangalore	22.28%	18.81%
Rest of Karnataka	0.78%	1.60%
Andhra Pradesh	2.11%	2.06%
Maharashtra	0.19%	2.53%

L&T IDPL

It can be observed from the above table that mainly the traffic is from the Krishnagiri and other districts of Tamil Nadu at the toll plaza location. More than 90% of traffic is from Tamil Nadu and Karnataka state. Thus, the main project influence region are Tamil Nadu and Karnataka state.

The distribution of commodity at Pallikonda toll plaza location is as presented below.

Table 3-6 Commodity share of Freight Traffic Both Direction at Pallikonda Toll Plaza

Commodity	Both Directions				
	Mini LCV	LCV	2-Axle	3-Axle	MAV
Empty	39.18%	26.69%	30.82%	25.59%	23.14%
Vegetables/Fruits/Milk	8.57%	7.86%	4.76%	3.72%	3.09%
Fish/chicken/meat/eggs	4.49%	0.95%	0.63%	0.16%	0.09%
Food Grains like Pulses etc	4.90%	4.34%	5.84%	7.77%	5.54%
Sand/Aggregate/Steel/Aluminium/Husk	1.63%	1.22%	3.23%	2.35%	2.90%
Leather/Textile Materials	0.00%	1.76%	0.72%	1.13%	1.91%
Cotton/silk/clothes	2.04%	2.30%	1.71%	2.27%	1.72%
Rubber/Plywood/Timber/Furniture	6.53%	2.71%	0.81%	1.46%	1.09%
Cement	0.41%	0.41%	2.07%	5.43%	5.35%
Courier/Parcel	16.73%	34.96%	24.08%	23.81%	17.51%
Automobiles	3.67%	4.74%	9.52%	8.66%	19.15%

Observations:

- The analysis shows that majority of the trucks carry manufacturing goods, industrial goods, machines and vegetables.
- LCVs are being used principally for transporting vegetables and manufacturing goods.
- 2-axle & 3-axle trucks are being used principally for transporting manufacturing goods, machines and vegetables.
- 4-6 axle trucks are used to carry mainly industrial goods, machines, Automobiles and manufacturing goods.

3.5 Primary Surveys and Data Collection

Primary data pertaining to the project corridor is provide by the client from their past studies. This include the classified volume count data and the travel pattern data for different modes of vehicles on the project corridor. In addition to this DIMTS have carried out 1-Day Origin and destination (O-D) survey and 3-DayTraffic Volume Count (TVC) on alternative road network (SH18) to understand the traffic pattern and possible diversions. The findings from the data are summarized in the following sub sections.

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move
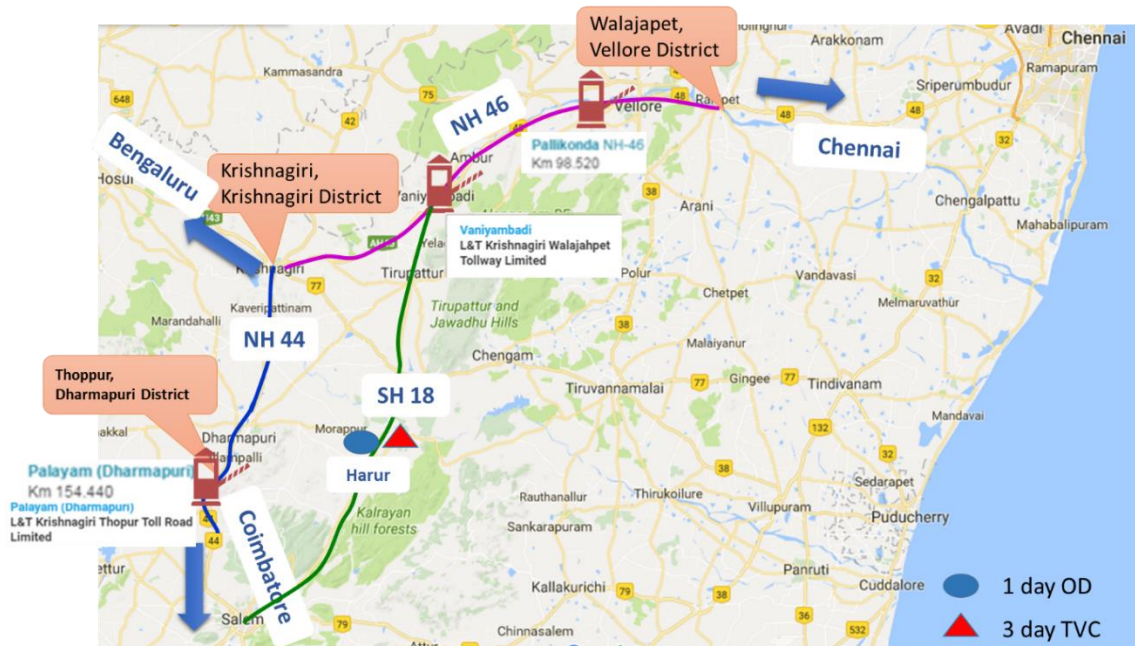
Figure 3-3: Map indicating Surveyed location

3.5.1   Classified Traffic Volume count on Alternative Roads

Traffic Volume counts have been conducted on alternative routes which may be future threats to the project road. 3 days (24*7) Traffic counts have been conducted on SH18 between Harur and Salem. The details of the traffic characteristics have been given below.

SH-18 (b/w Harur & Salem)

SH-18 is one of the main corridor traversing parallel to the project corridor. TVC and OD has been conducted on this road. The average daily traffic plying on this road was 11160 vehicles (14,645 PCU).Directional split at this location was 5733 Veh (Salem to Harur) and 5427 Veh (Harur to Salem). The hourly variation of traffic at this location is shown in the following figure.
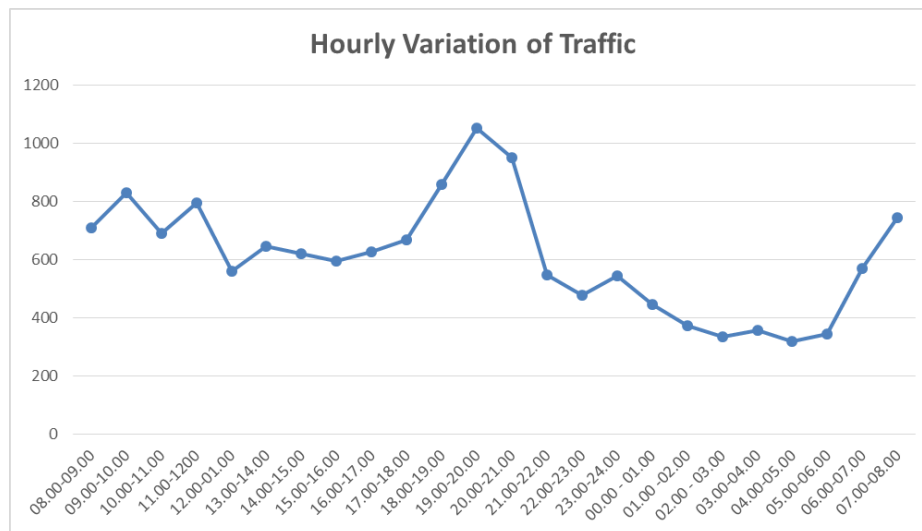
Figure 3-4: Hourly Variation of traffic on SH-18

L&T IDPL

The major mode observed at this location is Two wheelers (52%) followed by Car (13%). Goods vehicles accounts to 28% of the total traffic. The details of traffic composition on SH-18 (b/w Salem & Harur) is given below.
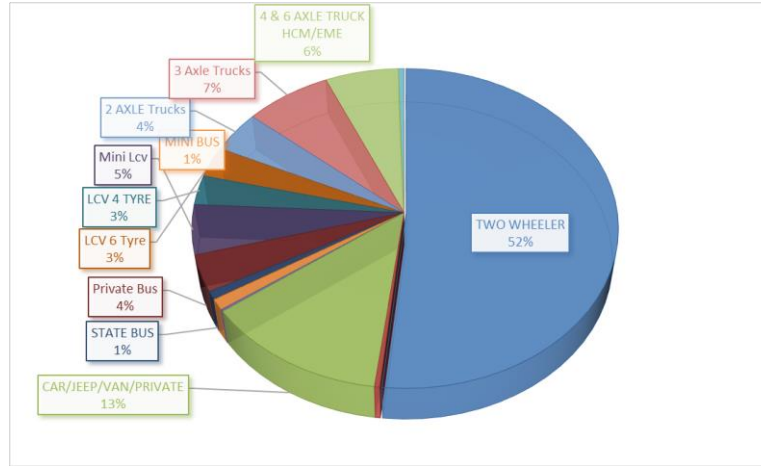
Figure 3-5: Traffic composition on SH-18 (b/w Salem & Harur)

3.5.2 Origin and Destination Survey on SH18

The travel characteristics of the road users is one of the main inputs in the traffic growth rate estimation as it helps in demarcating the project influence area of the project corridor. The origin-destination survey conducted in June 2016 at toll plaza locations (TP1 & TP2) for all modes had taken as the basis for the analysis. Apart from that, as part of the study have conducted the OD survey on SH18 at Harur – Salem Section to know the any potential diversion from the project corridor.

Zonal Influence of the traffic on the Project road

The travel characteristics of the road users is one of the main inputs in the traffic growth rate estimation as it helps in demarcating the project influence area of the project corridor.

The major contributing zones on SH18 at Harur are as shown below.

Table 3-7: Region wise zone contribution

Zone Name	Passengers	Goods
Krishnagiri	3.0%	4.0%
Vellore	4.5%	2.9%
Salem	1.4%	2.4%
Dharampuri	27.6%	17.5%
Namakkal	1.8%	2.8%
Erode	2.6%	2.8%
Coimbatore	8.0%	7.1%
Villipuram	25.5%	13.9%
Thiruvanmalai	6.6%	5.7%
Kanchipuram	1.5%	1.6%

Zone Name	Passengers	Goods
Dindigul	2.2%	1.2%
Chennai	4.6%	16.0%
Rest of Tamil Nadu	2.9%	0.1%
Bangalore	0.5%	1.7%
Andhra Pradesh	4.5%	12.4%
Kerala	2.2%	4.9%

State	Passenger	Goods
	% Share	% Share
Tamil Nadu	92.09%	78.18%
Karnataka	0.79%	1.91%
Kerala	2.21%	4.93%
Andhra Pradesh	4.50%	12.37%

It can be observed from the above table that mainly the traffic is from the Dharampuri & Vellore district along the project corridor at surveyed (Harur) location. More than 90% of traffic is from Tamil Nadu and only **0.5% of passenger vehicles and 1.7% of the goods vehicles** are observed from Bangalore side.

CHAPTER 4

Network Impact Assessment of PIA

4. Network Impact Assessment of Project Influence Area

4.1 Background

This chapter presents the details of diverted and developmental traffic on the project road. The diverted traffic section covers the details of the diversion to alternate routes as well as modes. The opinion survey carried out on site along with our route reconnaissance surveys (condition of roads, travel time, facilities on route etc.) by travelling on that particular route has been used to evaluate whether the particular route is a potential alternate route to avoid the toll plaza on project road. All potential competing routes and modes were identified and risk assessment has been done to determine traffic likely to be diverted on various routes and modes after toll imposition. The developmental traffic likely to occur over the years on project road has been estimated using the details of upcoming projects in PIA.

4.2 Traffic Diversion

Methodology Adopted for Diversion Analysis

The possible diversion percentages for the various possible routes have been calculated as follows:-

- To analyze traffic shift on competing routes, potential divertible traffic is estimated based on the OD expanded sample and secondary data collected for alternate routes. The potential divertible traffic included all through traffic for which various facilities are competing.
- In order to assess the potential amount of traffic diversion from the project road, a generalized cost analysis comparing the competing routes was conducted. This analysis is based on the guidance provided by the Road User Cost Study 2000 for India, and the diversion curve equations derived under the Technical Assistance Programme funded by ADB for Ministry of Transport. These equations are recalibrated based on diversion experience of projects and moderations applied while finalizing analysis. These equations are reproduced below:-

Vehicle	Cost Ratio (CR) Interval	Equations
Car	<= 0.634	%Div = 98.750 - (CR/0.634) * 8.125
	0.634 <= CR <= 1.465	%Div = 90.625 - ((CR-0.634)/0.831) * 84.375
	1.465 <= CR <= 2.0	%Div = 6.25 - ((CR-1.465)/0.535) * 5.25
Truck & Bus	<= 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

Where,

CR = (Total Cost of Alternate Route)/ (Total Cost of Project Route)

Total Cost (Rs.) = Vehicle Operating Cost (Rs.) + Toll Charges (Rs.) if any + VOT

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

The generalized cost function used relates the various time and cost element into one value. The values of time for various vehicle types were derived from past study done by the Consultant. Vehicle Operating Costs for different vehicle classes under various speeds were calculated based on Road User Cost Study equations and latest data on fuel prices, vehicle prices and other components.

Vehicle operating cost comprises of fixed and variable costs; fuel, tyres, maintenance, lubricants etc. which vary with the distance travelled forming the variable cost component and insurance, taxes and depreciation forming the fixed component.

The value of time for various vehicles determined based on Consultants experience on working for similar assignment.

The percentage diversion calculated is the diversion of total traffic on to the alternate route and the remaining percentage is diverted on to the project route. The analysis conducted for Alternate Routes identified are discussed below:

4.3 Alternate Routes

The routes which appear to be a potential alternate route that can be used to avoid the toll plaza on project road is as presented below.
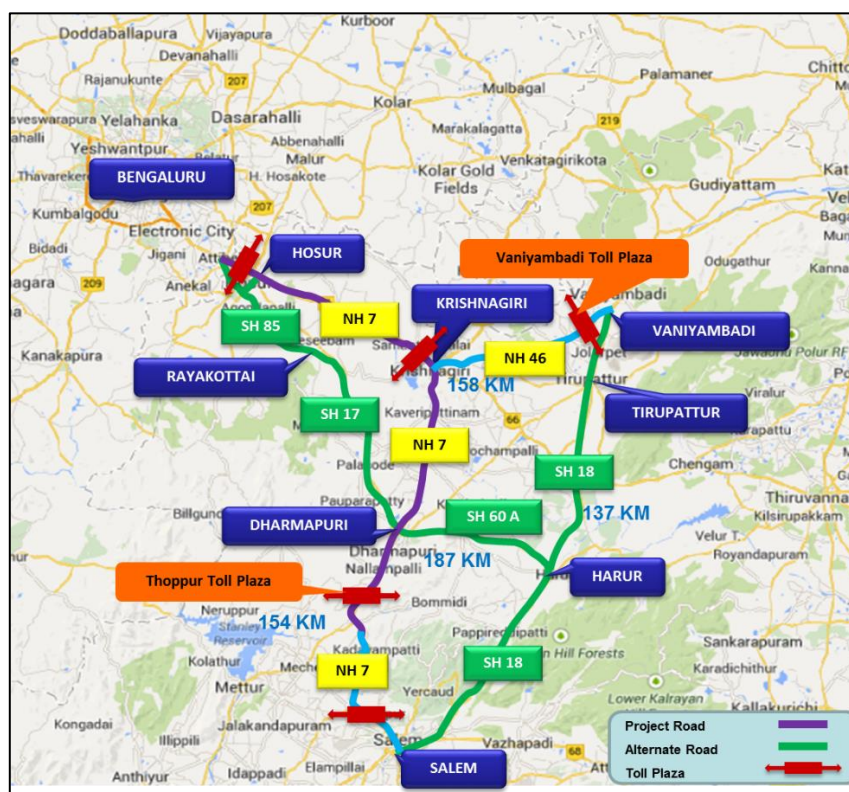
Figure 4-1: Map Showing Alternate routes

The traffic from Salem and down south to Dharampuri, Krishnagiri, Hosur, and Bengaluru and beyond can use either NH-7 or (SH-18+SH-60A). Similarly traffic from Salem and down south to Vellore and Chennai can use either (NH-7+NH-46) or SH-18.

L&T IDPL

a. SH 18 present status and improvement proposals

For the current study three day volume count was conducted on SH-18. The summary of volume count is as presented in the Table below.

Table 4-1 Summary of Traffic Volume Count on SH-18

Mode	ADT				
	*Dec 2014	*July 2015	#June 2016	*Aug 2016	$May 2017
Car	1170	2186	1664	2550	1471
Bus	880	497	729	767	625
LCV	1015	728	599	430	1243
2A	747	605	535	354	472
3A	1411	858	756	744	805
MAV	413	466	559	537	685
Total	5636	5340	4842	5382	5301

Vaniyambadi to Tirupattur section; # Tirupattur to Uttangarai section, $ Harur to Salem section

The Average daily Traffic using this corridor is about 15000 PCU. As this is a two lane road the capacity of this corridor is 15000 PCU/day. (*Source: IRC: 64-1990*). It is already reached its capacity, and so there is no scope for diversion of traffic from project road onto this road. Diversion on SH-18 is possible only if there is any up gradation of SH-18 (or any other changes from the existing condition).

SH 18 (125 kms) road network falls under Salem, Dharmapuri, Krishnagiri, Vaniyambadi PWD divisions as lengths mentioned in the below table. Though stretch of SH18 (Salem to Uttangarai) is part of Six/Eight Lane Triangular Corridor : Coimbatore - Chengalpet Alignment as per Tamil Nadu Vision document 2023, consultant's understands that there is a scope of widening the SH18 to 4 lanes by 2027 and toll will be collected.

Road Number	Name of Road	Division	Start	End	Length in km
SH18	Salem-Thirupathur-Vaniyambadi Road	Salem	0	16.16	16.16
		Dharmapuri	16/160	69/0	52.84
		Krishnagiri	69/0	93/6	24.6
		Vaniyambadi	93/6	125/0	31.4

By considering the SH18 improvement, divertible traffic from Project Corridor Vaniyambadi Toll Plaza TP1 from SH -18 are analysed.

Table 4.2 Generalised Cost via project road & Alt. Route

Vehicle Type	Generalised Cost	
	Alt. Route	Project Road
Car	1615	1798
Pvt Bus	8334	9388
LCV	2892	3478
2Axle	3834	4575
3Axle	4244	5374
MAV	7071	8521

Based on the OD surveys conducted (in past by L&T IDPL) on project road at toll plaza locations and OD surveys conducted by DIMTS, the total potential trips between zones of project influence is as presented in the Table below.

Table 4.3 Mode wise trips Project influence area

Mode	Bengaluru – Chennai OD Trips
Car	1928
LCV	939
2 Axle	609
3 Axle	1102
MAV	566

As described above sections, the calibrated diversion equations are used to estimate the future diversion onto project corridor Vaniyambadi Toll Plaza to SH18. The number of vehicles getting diverted to project road are as presented below.

Table 4.4 Diversion from Project corridor to SH18

Mode	Numbers
Car	250
LCV	377
2 Axle	443
3 Axle	773
MAV	286

These numbers are for the base year, the same is forecasted using the adopted growth rates and from FY 2030 these forecasted numbers will be removed from the traffic at Vaniyambadi toll plaza. Estimated % diversion share towards SH18 is presented in below table.

Table 4.5 % Diversion Share towards SH18

Mode	Cars	Pvt Bus	LCV	2axle	3-Axle	MAV
% Shift	12.95	70.22	40.17	72.80	70.10	50.56
2027	3.88	21.07	12.05	21.84	21.03	15.17
2028	7.77	42.13	24.10	43.68	42.06	30.33
2029	10.36	56.18	32.13	58.24	56.08	40.45
2030	12.95	70.22	40.17	72.80	70.10	50.56

Estimated divertible Traffic towards on to SH18 (Most likely) are presented in below table.

Table 4.6 Divertible Traffic towards SH18 at Vaniyambadi Toll Plaza TP1

Year	Car	LCV	2A	3A	MAV
2027	176	147	121	240	180
2028	381	298	238	477	383
2029	549	403	312	632	542
2030	742	512	384	785	720

b. Potential divertible traffic onto Vaniyambadi Toll plaza due to Traffic restrictions on SH18

As informed by the Client (L&T IDPL) on the truck traffic entry time restrictions on the SH18 road near Salem by the local administration in the near future (refer annexure for the draft/ order), consultant assumed that there are operational restrictions for the commercial vehicles in the hours from 8 am to 8 pm. These restrictions are yet to be notified, once notified, it has been assumed that the divertible traffic on to the KWTL TP1 Vaniyambadi Toll Plaza from SH18 road will be 2/3 of the potential divertible traffic (potential divertible traffic is 32.9% arrived from present OD survey on SH18 analysis).

Table 4-7: Potential divertible traffic on to Vaniyambadi TP due to Traffic restrictions on SH18

LCV	2 AXLE	3 Axle	MAV	Total
79	59	99	83	320

c. Diversion Analysis for Salem-Chennai

As can be observed from the below figure that in addition to project road (i.e. via Krishnagiri and Vellore) and SH-18 there is one more route NH-68 and NH-45 (via Attur and Thinddivanam). The total length of route via project road is 360 Km and via NH-68 and NH-45 is 339 Km. Generalized cost of travel for the routes has been estimated using the procedure described before. The total cost of toll on both the routes are as presented below.

Table 4.8 Toll Rates (FY2017) via different routes

Mode	Via Project Road	Via NH-68 and NH-45
Car	415	390
LCV	685	675
Bus/Truck	1405	1370
3 Axle	2075	1965
(4-6) Axle	2225	1885
> 6 Axle	2470	-
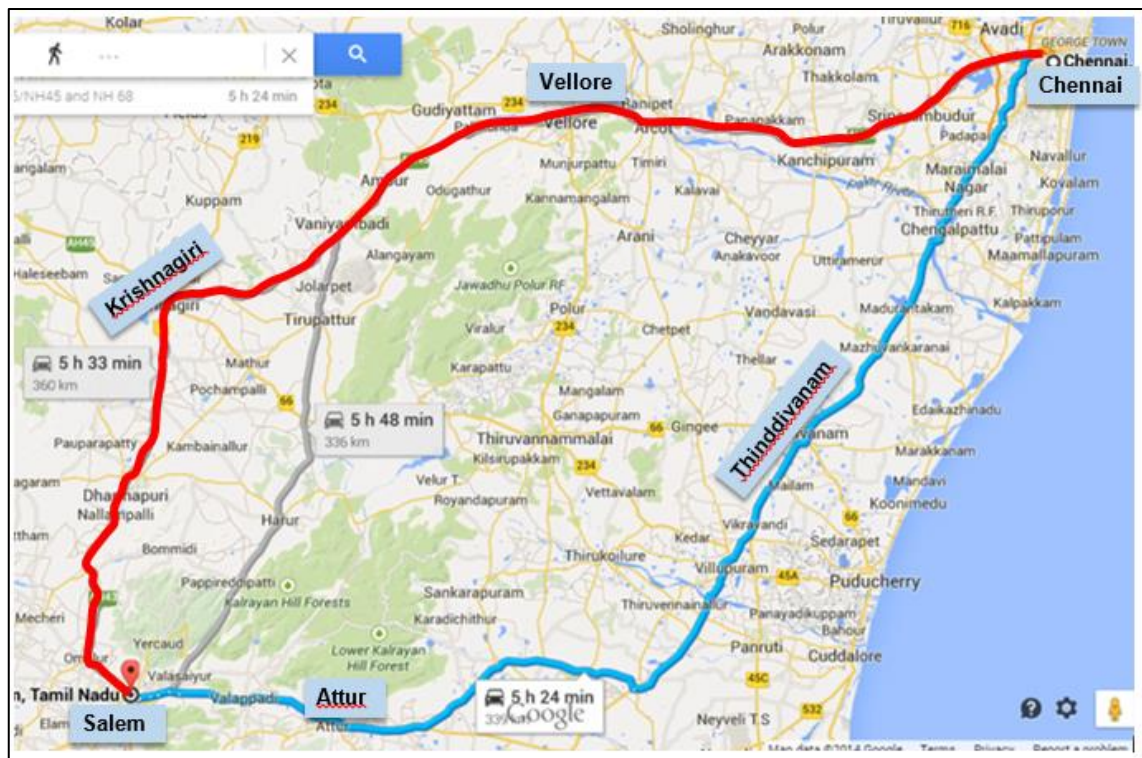
Figure 4-2: Map Showing Alternate routes between Salem and Chennai

Based on the OD surveys conducted (in FY 2014 by L&T IDPL) on project road at toll plaza location and on NH-68 the total trips between zones Salem (and down south) to Chennai is as presented in the Table below.

Table 4.9: Mode wise trips between Salem – Chennai on NH-46 and NH-68/NH-45

Mode	Vaniyambadi	Pallikonda	NH-68/NH-45
Car	659	1055	1662
LCV	648	754	627
2 Axle	170	276	414
3 Axle	282	427	365
MAV	239	221	214

It can be observed that significant amount of traffic (between Salem and Chennai) are using both the routes. Also the existing conditions are expected to remain same and there are no up gradation proposed on either of the routes. Thus, the amount of diversion which was likely to happen would already have happened and the traffic currently using the project road section is not likely to shift to this alternate route (if there is no change in existing conditions).

d. Diversion Analysis for Bengaluru-Chennai

It can be observed from the below figure that there are two routes available between Bengaluru and Chennai. Generalized cost of travel on both the routes is estimated using the method described earlier.

Figure 4-3: Map Showing Alternate routes between Bengaluru and Chennai

The total cost of toll on both the routes are as presented below.

Table 4.10 Toll rates (FY 2017) between Bengaluru – Chennai on NH-7 and NH-4

Mode	Via NH-7	Via NH-4
Car	350	205
LCV	570	350
Bus/Truck	1185	700
3 Axle	1645	935
(4-6) Axle	1810	1140

Source: nhai.org

Based on the OD surveys conducted (in past by L&T IDPL) on project road at toll plaza location and on NH-4 the total trips between zones Bengaluru to Chennai is as presented in the Table below.

Table 4.11 Mode wise trips between Bengaluru – Chennai on NH-7 and NH-4

Mode	Vaniyambadi	Palikonda	NH-4
Car	1354	1409	233
LCV	515	623	331
2 Axle	155	261	207
3 Axle	216	356	234
MAV	229	330	140

It can be observed that significant amount of traffic (between Bengaluru and Chennai) are using both the routes. Also the existing conditions are expected to remain same and there are no up gradation proposed on either of the routes. Thus, the amount of diversion which was likely to happen would already have happened and the traffic currently using the project road section is not likely to shift to this alternate route (if there is no change in existing conditions).

e. Diversion Analysis for Bengaluru-Chennai Expressway (BCE)

Bangalore is widely known as the 'silicon valley of India' as it houses many Information Technology companies both national and international. It houses many public sector industries and has advanced industrially due to the diligent efforts of the state government. Chennai is known as 'Detroit of India' as it houses many four wheeler manufacturing plants. Also it houses many industries and Tamil Nadu is in the forefront of industrial development. These two cities are separated by a distance of about 326 km and there is lot of interaction between these two cities. Presently NH-4, NH-46 & NH-7 are providing the connectivity between these two cities. To further improve the interaction and development, NHAI proposes to develop a6 lane expressway between these two cities.

The final alignment of the proposed Expressway will have one main section and two spurs as given below:

- The main section starting from the NH-4, east of Hoskote town and terminates on NH-4 near Sriperumbudur.
- Spur - 3 from Expressway to Kolar Gold Fields
- Spur - 4 from Expressway to Katpadi/Vellore – Existing road shall act as Spur-4

It can be observed from the below figure that BCE is almost parallel to NH-4 alignment. Generalized cost of travel on BCE and Project road is estimated using the method described earlier.
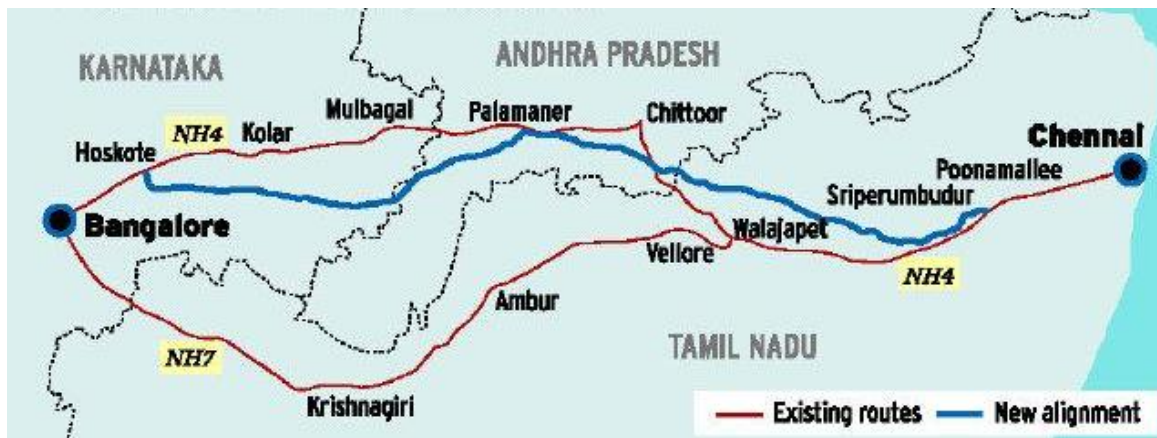
Figure 4-4: Map Showing BCE and routes between Bengaluru and Chennai

The total cost of toll on both the routes are as presented below.

Table 4.12 Proposed toll rates (FY 2018) on Bengaluru – Chennai Expressway

Bengaluru-Chennai Expressway (BCE)							
Mode	Tolling Section - 1	Tolling Section - 2	Tolling Section - 3	Tolling Section - 4	Tolling Section - 5	Tolling Section - Spur	Total
Car/ Jeep/ Van	85	110	65	140	90	5	495
Mini Bus	140	175	105	225	140	5	790
Bus	290	370	215	465	290	15	1645
LCV	140	175	105	225	140	5	790
2 Axle Truck	290	370	215	465	290	15	1645
3 Axle Truck	320	405	235	510	315	15	1800

L&T IDPL

Bengaluru-Chennai Expressway (BCE)							
Mode	Tolling Section - 1	Tolling Section - 2	Tolling Section - 3	Tolling Section - 4	Tolling Section - 5	Tolling Section - Spur	Total
MAV up to 6 Axle	455	585	340	725	445	20	2570
MAV >6 Axles	555	710	415	900	555	25	3160
HCM/EME	455	585	340	725	445	20	2570

(Source: Final Feasibility Report by NHAI for Bengaluru- Chennai Expressway)

As per the Feasibility report submitted to NHAI, the Project is not viable with the proposed toll rates, hence 1.25 times the normal toll (NH toll) rates are adopted for the diversion analysis.

Table 4.13 Generalised Cost Bengaluru – Chennai via project road & Alt. Route

Vehicle Type	Generalised Cost	
	Alt. Route	Project Road
Car	3950	3866
Pvt Bus	18706	18714
LCV	7564	7303
2Axle	9446	8897
3Axle	9855	10176
MAV	18238	17649

Based on the OD surveys conducted (in past by L&T IDPL) on project road at toll plaza locations and OD surveys conducted by DIMTS, the total potential trips between zones Bengaluru to Chennai is as presented in the Table below.

Table 4.14 Mode wise trips between Bengaluru – Chennai

Mode	Bengaluru – Chennai OD Trips
Car	2952
LCV	660
2 Axle	368
3 Axle	414
MAV	548

As described above sections, the calibrated diversion equations are used to estimate the future diversion onto BCE gets operational. The number of vehicles getting diverted to BCE from project road are as presented below.

Table 4.15 Diversion from Project Road to BCE

Mode	Numbers
Car	756
Bus	138
LCV	144
2 Axle	72
3 Axle	115

MAV	121

These numbers are for the base year, the same is forecasted using the adopted growth rates and from FY 2030 these forecasted numbers will be removed from the traffic at Vaniyambadi & Pallikonda toll plazas. Estimated % diversion share towards BC Expressway is presented in below table.

Table 4.16 % Diversion Share towards BC Expressway

Mode	Cars	Pvt Bus	LCV	2axle	3-Axle	MAV
% Shift	25.62	25.04	21.79	19.45	27.85	21.99
2030	7.69	7.51	6.54	5.83	8.35	6.60
2031	15.37	15.02	13.07	11.67	16.71	13.20
2032	20.49	20.03	17.43	15.56	22.28	17.60
2033	25.62	25.04	21.79	19.45	27.85	21.99

Estimated divertible Traffic towards BCE at TP1 & 2 (Most likely) are presented in below table.

Table 4.17 Divertible Traffic towards BCE at TP1 & TP2

Year	Car	LCV	2A	3A	MAV
2030	788	60	18	35	103
2031	1696	122	35	69	216
2032	2435	165	46	90	303
2033	3276	209	56	112	399

4.4 Developmental Traffic

State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT) was established in the year 1971 to develop industrial growth in Tamil Nadu.

To give main thrust to area development activities, the organization involves in the formation of industrial complexes by providing basic and comprehensive infrastructure facilities for the industries to set up their units. SIPCOT has so far developed 20 Industrial Complexes in 12 districts and Six Sector Specific Special Economic Zones (SEZs) across Tamil Nadu. SIPCOT also acts as a Nodal Agency of Government of Tamil Nadu in the sanction / disbursement of Structured Package of Assistance to large industrial units.

To ensure a good impact with the available limited resources, SIPCOT has created Industrial Complexes and Parks, strategically located in Twenty places and Twelve Districts, which occupy a place of pride in the State's industrial map. Industrial Complex Locations in the Project Influence Area are Bargur, Hosur, Ranipet

4.4.1 Bangalore – Chennai Industrial Corridor

Government of Tamil Nadu mandated State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT) to prepare a Corridor Development Plan for the Chennai – Sriperumbudur -Ranipet -

L&T IDPL

Hosur Region. SIPCOT planning Corridor Development Plan in two phases. First phase covers Chennai – Sriperumbudur – Ranipet and second phase covers Ranipet – Hosur region.
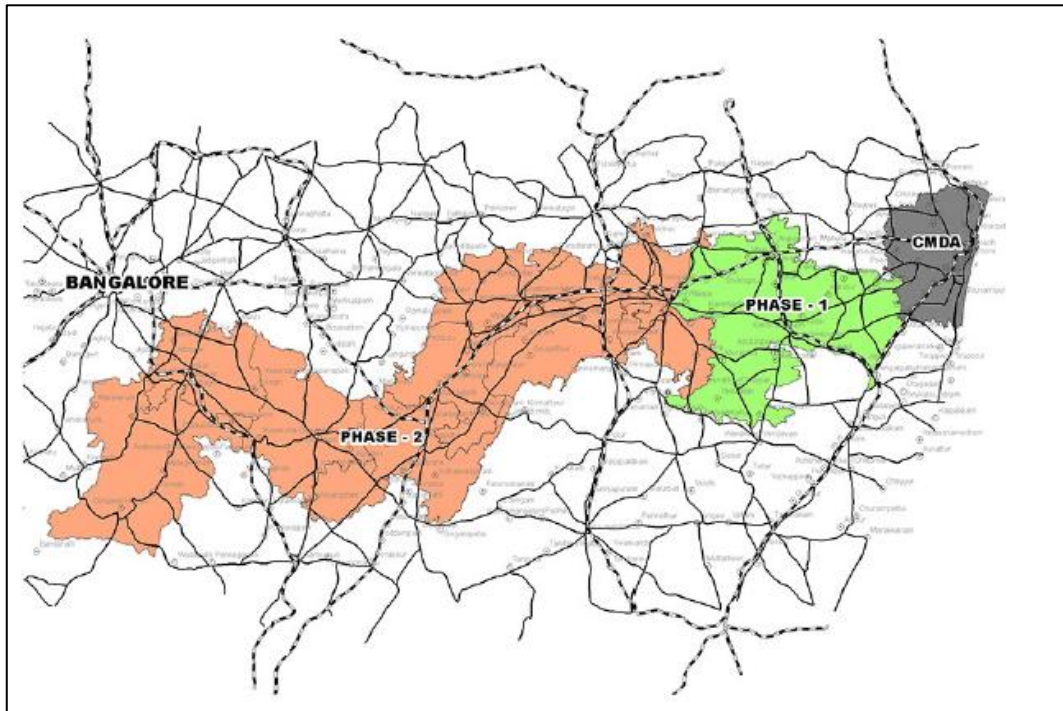
Figure 4-5: Map Showing Bangalore – Chennai Industrial Corridor Phases

a.   Chennai - Ranipet Industrial Corridor Phase 1

The Chennai - Ranipet corridor is proposed to be developed as an industrial corridor. The corridor will cover 6 municipalities, 10 town panchayat and 5 census towns which together have a population of about 17 lakh (2001 census) and covers an area of about 20,000 hectares. It is assumed that Chennai - Ranipet corridor will be developed during the years 2030-2033.

The corridor will have six major nodes namely, Chengalpattu, Kanchipuram, Walajapet, Arakonam, Sriperumbudur and Tiruvathipuram. Automobile and auto components, light engineering, logistics and agro processing are the main industries that are expected to come up in this corridor. A total of 26 industrial estates will be developed along the corridor.

Manufacturing zones, industrial parks, warehouses and logistics hubs would be the key development areas. Internal infrastructure for residential development would include roads, site grading, drainage system, water supply, sewerage &effluent network, STP, ETP, SWM, communication network, utilities and common amenities. Specialized infrastructure for the region manufacturing hub would include testing centre, QC Lab, Product display centre, administration buildings, training centre, etc.

The project will build on the existing industrial development in this belt. Currently, the development is around the Sriperumbudur, Walajapet nodes and to some extent around Arakonam and Chengalpattu nodes. The focus of the corridor development will be to provide a holistic development around the nodes in the region.

The development of the corridor will help in spreading the industrial development which is at present concentrated in areas closer to the Chennai city. The development will also derive benefit from the development along the Chennai - Bangalore highway. The agricultural belt adjoining the corridor will benefit on account of the agro processing units that will come up in the corridor.
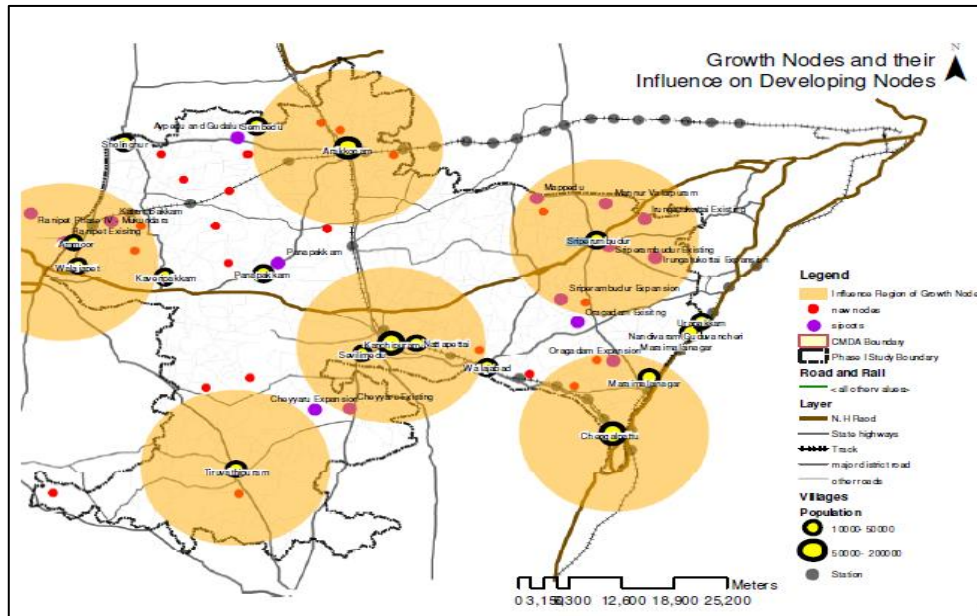
Figure 4-6: Map Showing Chennai - Ranipet Industrial Corridor developable nodes

b.   Ranipet - Hosur Industrial Corridor Phase 2

The Ranipet - Hosur corridor is proposed to be developed as an industrial corridor. The corridor will cover 9 municipalities and 23 town panchayat which together have a population of about 12.5 lakh (2001 census) and cover an area of about 30,000 hectares. Vellore, Hosur, Krishnagiri, Tirupattur, Vaniyambaidi and Gudiyatham are the major towns in the corridor and are expected to be the growth nodes. As compared to the Chennai - Ranipet belt, this corridor is relatively less developed in terms of industrial development and investment in industrial infrastructure is likely to be higher as compared to the Chennai - Ranipet corridor. It is assumed that Ranipet - Hosur corridor will be developed during the years 2033-2036.

SEZs, DTAs, industrial parks, warehouses and logistics hub would be the key development areas. Internal infrastructure for residential development would include roads, site grading, drainage system, water supply, sewerage & effluent network, STP, ETP, SWM, communication network, utilities and common amenities. Specialized infrastructure for the region manufacturing hub would include testing centre, QC labs, product display centre, administration buildings, training centre, etc.

L&T IDPL
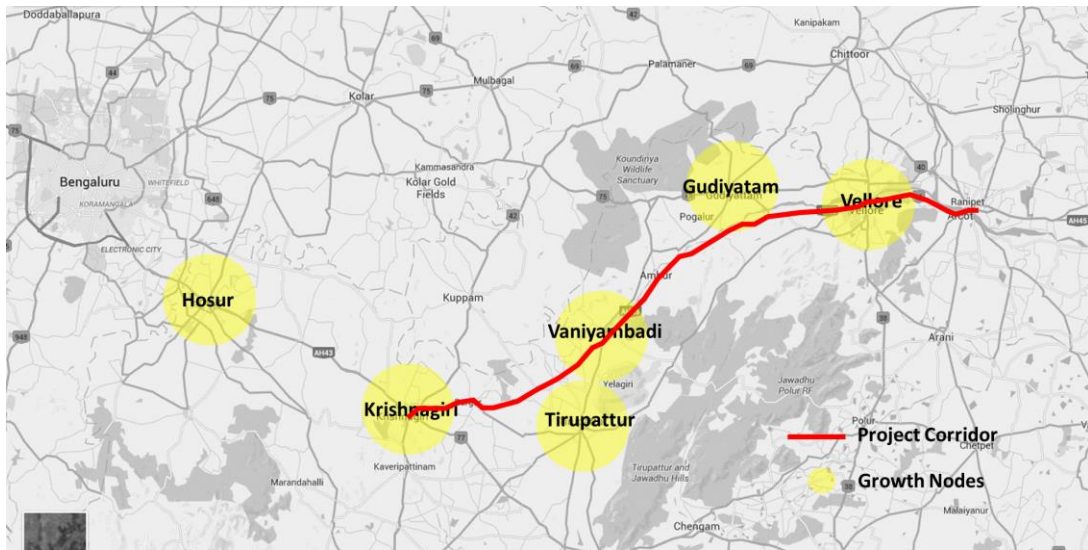
Figure 4-7: Map Showing Ranipet - Hosur Industrial Corridor developable nodes

The focus of development in this belt will predominantly be agro based and engineering industries. Engineering industries are expected to be concentrated around the Vellore and Hosur nodes. An aerospace park is also proposed to be developed around the Vellore node and will attract a significant number of ancillary and downstream units. Tirupattur, Gudiyatham and Krishnagiri will have agro based industries.

The development will help in spreading the industrial development in the corridor which is presently agrarian in nature. The corridor will also help in utilising the produce of the agricultural belt adjoining the corridor. The development will also derive benefit from the development along the Chennai-Bangalore highway.

Assumptions to estimate the Travel Demand from BCIC

To estimate the travel demand from the Bangalore - Chennai Industrial Corridor , Trip rate for the Freight traffic has been taken as 20 tons/ha/day and for the passenger traffic 30-40 person trips/ha. It has been assumed that 60% is the developable area and the probable developable area is about 50%. Phase 1 Chennai to Ranipet is expected to be operational by 2030-2033 and Phase 2 Ranipet to Hosur is expected to be operational by 2033-2036.

Table 4.18 Assumptions to estimate the Travel Demand

Characteristic	Share
Intra-zonal trips	
Passenger	25%
Freight	10%
Road Share	
Passenger	80%
Freight	50%

Table 4.19 Year wise Expected Traffic on Project Road

Year	Car	Bus	LCV	2AT	3A	MAV
2030	486	65	78	29	49	38
2031	972	130	156	58	97	76
2032	1296	173	207	78	130	101
2033	2835	378	502	143	314	244
2034	4050	540	745	188	466	362
2035	4860	648	907	216	567	441
2036	5670	756	1069	243	668	520

4.5   Additional Truck Traffic due to restriction on Overloading

From the analysis of Axle load Survey conducted in the month of July 2017, additional truck traffic due to restriction of overloading has been estimated as follows

Table 4-20: % of Additional Truck Traffic due to restriction on Overloading

Vehicle type	LCV	2AT	3AT	MAV
Share	0.0%	1.4%	4.5%	11.6%

Consultant's opinion is that overload truckers will pay excess fee (i.e. 1 X toll fee in addition to normal fee) and there will be a readjustment of loading happens due to restriction on overloading over the time period. It has been assumed that the effect of readjustment happens over a period of time as per the following assumptions. And the balance of the overloaded trucks will get converted to additional trucks on the project road.

Table 4-21: Assumption on Overloaded Truckers

FY	
FY18 (Q4-FY18)	Overload Truckers will pay excess fee (i.e. 2X toll fee)
FY19	Overload Truckers will pay excess fee (i.e. 2X toll fee)
FY20	75% of Overload Truckers will pay excess fee (i.e. 2X toll fee)
FY21	50% of Overload Truckers will pay excess fee (i.e. 2X toll fee)
FY22	25% of Overload Truckers will pay excess fee (i.e. 2X toll fee)
FY23 onwards	25% of Overload Truckers will pay excess fee (i.e. 2X toll fee)

Additional truck traffic due to restriction on Overloading is estimated as follows

Table 4-22: Estimated Additional Truck Traffic due to Overloading

Year	LCV	2AT	3AT	MAV	AADT
FY 2018	0	0	0	0	**0**
FY 2019	0	0	0	0	**0**
FY 2020	0	3	12	47	**62**
FY 2021	0	6	25	103	**134**
FY 2022	0	9	37	171	**217**
FY 2023	0	8	37	183	**229**
FY 2024	0	8	38	197	**243**
FY 2025	0	8	38	212	**258**
FY 2026	0	8	38	228	**274**
FY 2027	0	8	38	245	**291**
FY 2028	0	8	38	260	**306**
FY 2029	0	8	38	277	**323**
FY 2030	0	8	38	294	**340**
FY 2031	0	8	38	313	**359**
FY 2032	0	8	38	333	**379**
FY 2033	0	7	38	351	**396**
FY 2034	0	7	38	370	**415**
FY 2035	0	7	38	391	**435**
FY 2036	0	7	37	412	**457**
FY 2037	0	7	37	435	**479**
FY 2038	0	7	37	455	**499**
FY 2039	0	6	37	476	**519**
FY 2040	0	6	37	497	**540**
FY 2041	0	6	36	520	**563**
FY 2042	0	6	36	544	**586**

The excess paying truck traffic due to overloading based on the above assumptions is estimated as follows

Table 4-23: Estimated Excess paying Truck Traffic due to Overloading

Year	LCV	2AT	3AT	MAV	AADT
FY 2018*	0	2	15	55	**72**
FY 2019	0	7	60	243	**310**
FY 2020	0	5	45	200	**251**
FY 2021	0	4	30	147	**181**
FY 2022	0	2	15	81	**98**
FY 2023	0	2	15	87	**104**
FY 2024	0	2	15	93	**110**
FY 2025	0	2	15	100	**117**

L&T IDPL

Year	LCV	2AT	3AT	MAV	AADT
FY 2026	0	2	15	108	**125**
FY 2027	0	2	15	116	**133**
FY 2028	0	2	15	123	**140**
FY 2029	0	2	15	131	**148**
FY 2030	0	2	15	139	**156**
FY 2031	0	2	15	148	**165**
FY 2032	0	2	15	158	**175**
FY 2033	0	1	15	166	**183**
FY 2034	0	1	15	175	**192**
FY 2035	0	1	15	185	**202**
FY 2036	0	1	15	195	**212**
FY 2037	0	1	15	206	**223**
FY 2038	0	1	15	215	**232**
FY 2039	0	1	15	225	**241**
FY 2040	0	1	15	236	**252**
FY 2041	0	1	15	246	**262**
FY 2042	0	1	15	258	**274**

* It is assumed that the excess paying tolling on account of overloading will start from 01st Jan-2018 i.e. Q4-FY2018 onwards.

4.6   Traffic risk due to Sand Mining regulation

Sand mining from rivers in the State could be curtailed in the wake of recent guidelines issued by the Union Ministry of Environment and Forests stipulating that mining in quarries with lease area of five to 25 hectares should be done only manually.

The stipulation forms part of the guidelines issued by the Ministry on December 24, 2013, for grant of environmental clearance and categorisation of Category B mining projects into B1 and B2. While projects under B1 category (with sand mining area of 25 hectares and above) will require an Environment Impact Assessment report after a public consultation process, B2 category projects will be appraised based on a pre-feasibility report and other documents.

Almost all sand quarries that are functioning now in Tamil Nadu with environmental clearance from the State Environment Impact Assessment Authority (SEIAA), including those on the Cauvery and Coleroon rivers in Tiruchy region, fall under the B2 category as they have mine lease areas between five and 25 hectares.

However, there is lack of clarity on whether the guidelines are applicable to existing quarries too. Environmental activists say that they are enforceable straightway. The latest guidelines, which are based on the recommendations of an expert committee headed by the director of National Environmental Engineering Research Institute, are applicable to existing quarries too and the State government should enforce them.

Impact of sand mining on the project corridor has been observed in **Q1–FY18**. Origin-Destination survey conducted in **June 2016** at toll plaza location indicates the Share of sand commodity including empty trucks is as follows.

Table 4-24: Sand Commodity share on project corridor

Vehicle type	2AT	3AT	MAV
Commodity Share	3.64%	2.77%	3.42%

Due to Sand mining regulations, it has been assumed that there is a 100% loss of sand carrying truck traffic in Q1 & Q2 of FY 2018 which was also observed in Q1-FY18 and 50% recovery from Q3 & Q4 of FY-18 onwards. Which means the AADT estimated for FY 2018 doesn't have any sand commodity traffic and also it is assumed that sand mining will recover and around 50% of the trucks will start playing on the project road from start of Q3-FY2018 onwards.

Future projections are based on the estimated traffic growth rates which is detailed in the next chapter "Traffic Growth Rate Estimation". Additional Truck traffic due to sand mining operations regulations is estimated as follows.

Table 4-25: Loss of Truck traffic due to sand mining operations regulations

Year	2AT	3AT	MAV	AADT
FY 2018	8	7	11	**27**
FY 2019	16	15	25	**56**
FY 2020	15	15	28	**58**
FY 2021	15	15	31	**61**
FY 2022	15	15	34	**64**
FY 2023	15	15	36	**66**
FY 2024	15	15	39	**69**
FY 2025	15	15	42	**72**
FY 2026	14	16	45	**75**
FY 2027	14	16	48	**78**
FY 2028	14	16	51	**81**
FY 2029	14	16	54	**84**
FY 2030	14	16	58	**87**
FY 2031	13	16	62	**91**
FY 2032	13	16	66	**94**
FY 2033	13	16	69	**98**
FY 2034	13	15	73	**101**
FY 2035	12	15	77	**105**
FY 2036	12	15	81	**109**
FY 2037	12	15	86	**113**
FY 2038	12	15	90	**116**
FY 2039	11	15	94	**120**
FY 2040	11	15	98	**124**
FY 2041	11	15	102	**128**
FY 2042	11	15	107	**132**

CHAPTER 5

Traffic Growth Rate Estimation

5. Traffic Growth Rates Estimation

5.1 Background

The investment priorities are governed by the traffic demand, assessed benefits and cost of the project. Demand plays the important role, which governs the type of facility / infrastructure to be created. This in turn determines likely benefits and costs to develop the same. A highway project of this nature calls for significant investment. Prediction of traffic demand becomes an important task and has to be carried out near accurately. The accurate estimation of traffic has direct bearing on the viability of project. Recognizing this, efforts are to be made to carefully assess all the parameters that help in predicting the traffic demand in future which necessitates realistic estimation of traffic growth rates. Traffic growth on a road facility is generally estimated on the basis of historical trends, in the present case traffic growth rates are estimated using Elasticity method as per IRC-108-1996.

5.2 Approach

Traffic forecasting for project road traffic was done considering past trend in growth and analysing future prospects of project influence area. Elasticity approach of growth rate estimation was used for long term traffic forecasting.

The flow chart presenting the approach and methodology adopted for growth rate estimation is as presented in the figure below.
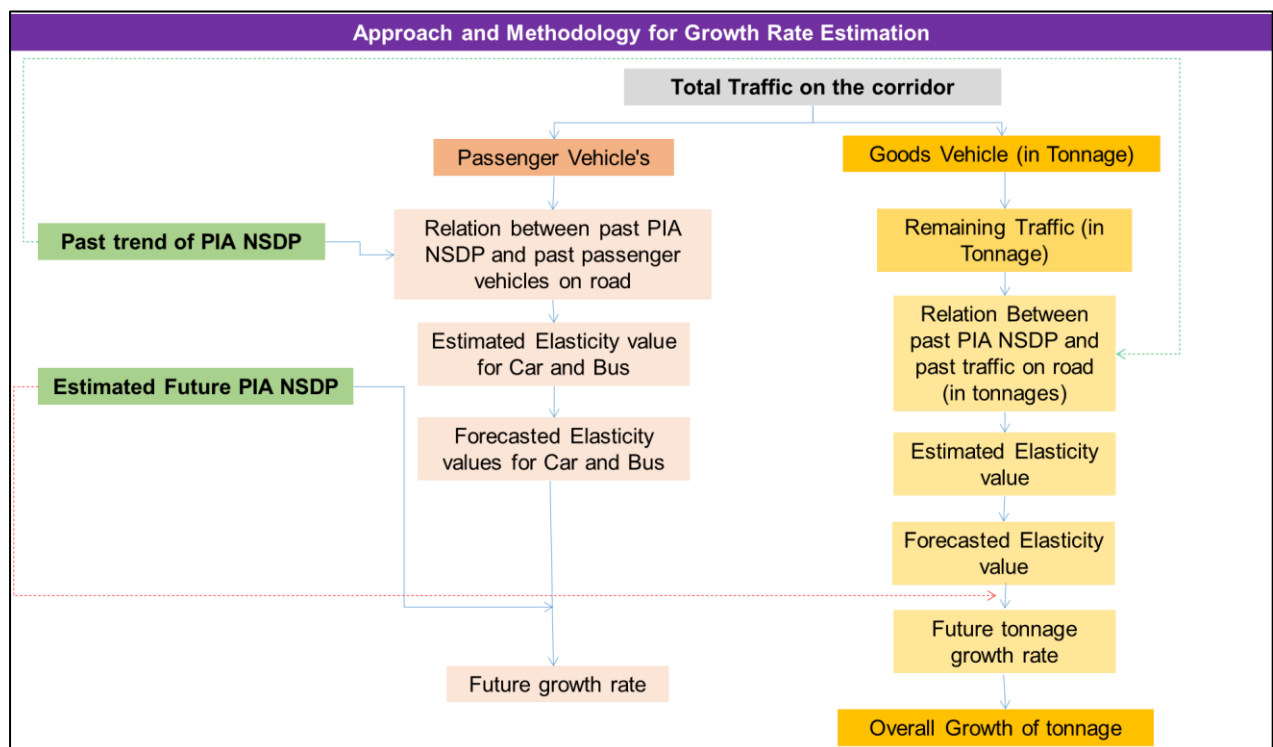
Figure 5-1 Flow Chart for Growth Rate Estimation

The approach included following steps

i) Various traffic streams using project road were differentiated in various categories as per their respective characteristics.
ii) Each stream was analyzed separately with respect to past trend of growth and development profile of its influence area.
iii) Potential of Growth of various vehicle categories were separately assessed based on its probable market share in expected multi-modal development.

5.3 PIA and Traffic Streams

A study of the socio-economic profiles of the regions comprising the project influence area (PIA) provides an overview of the factors likely to influence the pattern of economic development and hence the flows and volumes of traffic on the proposed highway. The details include population, Per-capita Income, NSDP, GDP (India) and targeted growth rates of the economy. The profiles help to generate basic inputs for the estimation of future growth in transport demand on the basis of past scenarios, perspective changes in transport demand elasticity and economic growth rates.

The analysis of traffic pattern observed on the project road (at the toll plaza location) indicates that the vast majority (above 95 per cent) of traffic is originating from/ destined to A Tamil Nadu, Karnataka and Kerala. Hence, these states have been considered as PIA states for traffic.

Since drivers of growth for all the traffic streams would be different, these were analysed separately. In addition, truck traffic was analysed considering LCV, 2 Axle and 3 Axle rigid trucks/ Trailer - MAV separately to take into account the expected changes in freight vehicle market share in future years.

5.4 Growth Trends

To analyse growth potential for this traffic stream, past trend of growth of traffic on NH-46 at toll plaza locations was analysed. The traffic counts which are considered for analysis are from FY 2007 to FY 2014. To reflect the actual scenario, state highway 18 volume was added to NH 7 because all the vehicles heading towards Chennai takes SH 18 instead of NH 7. Hence, FY 2014 total includes the FY 2014 volume count and volume on SH 18. The growth at all the locations is as presented in the table below.

Table 5-1: Past Traffic Growth at Toll Plaza 1 (Vaniyambadi)

Year	Car	Bus	LCV	2A	3A	MAV	Total
FY 2007	2222	565	917	1035	838	207	5784
FY 2008	2503	647	1192	827	1087	273	6529
FY 2009	2503	647	1192	827	1087	273	6529
FY 2010	3204	703	1109	820	1332	300	7466
FY 2011	4894	977	1679	898	1510	588	10543
FY 2012	5283	870	1499	736	1212	682	10281
FY 2013	5602	841	1499	654	1143	644	10383
FY 2014	5608	805	1490	553	963	758	10177
FY 2015	5898	778	1552	583	1073	845	10729

Final Traffic
Report | Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu | DIMTS
We help people move

Year	Car	Bus	LCV	2A	3A	MAV	Total
FY 2016	7133	880	1580	816	996	1173	12577
*FY 2017	7301	893	1627	913	1088	1282	13104
CAGR (07 - 17)	12.63%	4.68%	5.90%	-1.25%	2.65%	20.00%	8.52%

* Demonetization impact correction

The analysis of past growth at the toll plaza location indicates following:-

- There has been a significant growth for Cars and MAV's
- 2 Axle and 3 Axle Trucks are showing negative trend
- Overall the traffic is growing

Table 5-2: Past Traffic Growth at Toll Plaza 2 (Pallikonda)

Year	Car	Bus	LCV	2A	3A	MAV	Total
FY 2007	4777	1967	2258	2234	1148	368	12752
FY 2008	4903	1814	1786	1524	1607	311	11945
FY 2009	4208	1825	1766	1719	1607	311	11436
FY 2010	5250	1809	1797	1427	1775	396	12453
FY 2011	7349	2343	2211	1575	2016	692	16186
FY 2012	7629	1812	1827	1154	1629	768	14820
FY 2013	8656	1974	2017	1104	1562	736	16049
FY 2014	8952	1910	1994	966	1378	862	16063
FY 2015	9279	1883	1971	888	1306	817	16143
FY 2016	10620	1984	2058	1068	1113	1213	18056
*FY 2017	10979	1992	1,977	1,307	1,179	1285	18719
CAGR (07 - 17)	8.68%	0.13%	-1.32%	-5.22%	0.27%	3.91%	8.68%

* Demonetization impact correction

The analysis of past growth at the toll plaza location indicates following:-

- There has been a significant growth for Cars and MAV's
- 2 Axle and 3 Axle Trucks are showing negative trend
- Overall the traffic is growing

5.4.1 Growth in Tonnage

As observed that the growth of goods vehicles at some locations is showing a negative trend. Also at a national level the trend shows that the sale of 2 Axle (even to an extent now 3 Axle) category of goods vehicles are decreasing, and on the other hand the growth in the sale of multi axle vehicles is significant. To accommodate this dynamic changes within the sale of goods vehicles of different categories in growth rate estimates, it is pragmatic to consider the overall growth of tonnage on project road at different locations. Once the growth of tonnage is established the tonnage share of different categories of vehicles shall be assumed based on the past trend at each locations. Using this growth in tonnage and assumed future tonnage share of different categories of goods vehicles the growth rate of each category will be back calculated.

To determine, growth of tonnage, vehicular traffic was converted into total tonnage considering payload of 4 ton, 9 ton, 15 ton and 25 ton for LCV, 2 Axle, 3 axle and MAV- Trailer respectively. This payload is in line with applicable GVW limits imposed by Government on various truck categories. The tonnage at the toll plaza locations was estimated and analysed with data available from FY 2009 to FY 2017 and is provided in the tables provided below.

Table 5-3: Tonnage Growth at Vaniyambadi Toll Plaza

Year	LCV	2A	3A	MAV	Total
FY 2009	4768	7443	16305	6825	35341
FY 2010	4434	7380	19980	7488	39282
FY 2011	6716	8078	22643	14688	52124
FY 2012	5997	6628	18175	17059	47858
FY 2013	5997	5883	17150	16097	45128
FY 2014	5961	4974	14442	18942	44319
FY 2015	6209	5246	16100	21117	48671
FY 2016	6321	7345	14940	29325	57931
*FY 2017	6508	8217	16320	32050	63095
CAGR (2009 – *2017)					7.51%

* Demonetization impact and correction

In terms of growth of total tonnage, Vaniyambadi Toll plaza indicates a positive growth of 7.51%.

Table 5-4: Tonnage Growth at Pallikonda Toll Plaza

Year	LCV	2A	3A	MAV	Total
FY 2009	7144	13716	24105	7775	52740
FY 2010	8512	15588	26625	9888	60613
FY 2011	9176	12762	30240	17288	69466
FY 2012	7308	10386	24442	19188	61324
FY 2013	8068	9940	23433	18395	59836
FY 2014	7978	8695	20664	21560	58896
FY 2015	8027	8195	19585	20434	56240
FY 2016	8231	9614	16690	30334	64869
*FY 2017	7908	11763	17685	32125	69481
CAGR (2009 – *2017)					3.51%

* Demonetization impact and correction

In terms of growth of total tonnage, Pallikonda Toll plaza indicates a positive growth of 3.51%.

5.4.2 Growth in Registered Vehicles

The growth in vehicle registrations in the project road influence region is generally a good indicator, as it is found to correlate reasonably well with traffic growth. Thus, it is possible to establish a definite trend and correlation between traffic growth and vehicle registration. To establish future traffic on the project corridor, the trend in vehicle registrations of the neighbouring states, which are significantly contributing traffic to the corridor (for this project 95% of the traffic is from Tamil

Nadu, Karnataka and Kerala), is also studied. The vehicle registration data for the state of Tamil Nadu, Karnataka and Kerala is as presented below. These figures are taken from the Road Transport year book published by MORTH from time to time.

Table 5-5: Vehicle Registration Data for the State of Tamil Nadu

Category	Car	Truck	Bus
2000-01	543491	218036	34207
2001-02	584912	220408	35720
2002-03	865988	458290	71111
2003-04	914590	480549	76907
2004-05	9,76,155	509942	82547
2005-06	10,44,559	547055	89991
2006-07	11,32,442	584854	97396
2007-08	12,38,712	620979	105897
2008-09	13,53,150	649136	114671
2009-10	14,88,336	685040	123999
2010-11	16,71,947	744663	134887
2011-12	18,65,435	821108	1,44,251
2012-13	20,35,311	896985	1,56,470
CAGR (2005-13)	9.62%	7.31%	8.32%

Source: India Stat.com/ State wise/ Transport

Table 5-6: Vehicle Registration Data for the State of Karnataka

Category	Car	Truck	Bus
2000-01	465219	166431	25047
2001-02	491220	173903	26884
2002-03	503822	183509	29239
2003-04	520462	192351	29710
2004-05	6,39,548	221913	38052
2005-06	7,44,579	276013	40819
2006-07	8,66,280	312272	45211
2007-08	10,24,348	344764	49586
2008-09	11,41,532	366597	44308
2009-10	11,90,933	377495	53874
2010-11	13,33,589	415491	58012
2011-12	14,54,309	454582	62,501
2012-13	16,26,924	506340	69718
CAGR (2005-13)	12.38%	10.86%	7.86%

Source: India Stat.com/ State wise/ Transport

Table 5-7: Vehicle Registration Data for the State of Kerala

Category	Car	Truck	Bus
2006-07	717786	64454	396980
2007-08	801187	65707	414678
2008-09	905488	66868	430162
2009-10	1048877	68777	383229
2010-11	1219949	72534	390430

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

Category	Car	Truck	Bus
2011-12	1397990	76330	396826
2012-13	1590625	78796	404153
CAGR (2007-13)	**14.18%**	**3.41%**	**0.30%**

Source: India Stat.com/ State wise/ Transport

Table 5-8: Vehicle Registration Data for PIA of TP1 Vaniyambadi

Category	Car	Truck	Bus
2004-05	878038	423043	70554
2005-06	956830	464233	77100
2006-07	1053023	502026	87767
2007-08	1173133	536611	95280
2008-09	1288166	562614	100308
2009-10	1399968	591134	108823
2010-11	1572158	643958	117804
2011-12	1745461	709031	125785
CAGR (2005-12)	**10.31%**	**7.66%**	**8.61%**

It can be observed from the above table that the CAGR for Car, Truck and Bus are 10.31%, 7.66% and 8.61% respectively.

Table 5-9: Vehicle Registration Data for PIA of TP2 Pallikonda

Category	Car	Truck	Bus
2004-05	889019	433271	71729
2005-06	966698	474154	78297
2006-07	1062225	511872	87892
2007-08	1181001	546711	95479
2008-09	1296002	573008	100866
2009-10	1410144	602371	109623
2010-11	1583524	656040	118807
2011-12	1758911	722469	126936
CAGR (2005-12)	**10.24%**	**7.58%**	**8.50%**

It can be observed from the above table that the CAGR for Car, Truck and Bus are 10.24%, 7.58% and 8.50% respectively.

5.4.3 Past Growth in Regional Economies

Growth of traffic on the project road depends on existing development and future growth prospects of the connecting regions. The time series data of economic indicators at constant (2004-05) prices for Tamil Nadu, Karnataka and Kerala as published by Central Statistical Organisation are presented below.

L&T IDPL

Table 5-10: Economic Indicators for Tamil Nadu

Year	Gross State Domestic Product (Rupee in lakhs) @ 2004-05 prices	Net State Domestic Product (Rs. lakhs) @ 2004-05 prices	Population	PCI (Rs.)
2004-05	21900322	19364503	64416000	30062
2005-06	24956705	22158791	64933000	34126
2006-07	28752968	25628576	65435000	39166
2007-08	30515680	27233984	65919000	41314
2008-09	32179336	28674358	66386000	43193
2009-10	35663186	31675986	66836000	47394
2010-11	40341573	35996050	67273000	53507
2011-12	43323803	38650813	67698000	57093
2012-13	44794362	39747091	68107000	58360
2013-14	48061805	42718219	68501000	62361
2014-15	51545756	45898663	68881000	66635
2015-16	54142331	48199880	69438163.6	70033
CAGR (2005-16)	**8.58%**	**8.64%**	**0.68%**	**7.99%**

Source: India Stat.com/ State wise/ Transport

Table 5-11: Economic Indicators for Karnataka

Year	Gross State Domestic Product (Rupee in lakhs) @ 2004-05 prices	Net State Domestic Product (Rs. lakhs) @ 2004-05 prices	Population	PCI (Rs.)
2004-05	16674713	14872898	55327000	26882
2005-06	18427703	16403065	55992000	29295
2006-07	20266010	18108596	56647000	31967
2007-08	22820215	20380990	57292000	35574
2008-09	24442138	21830924	57927000	37687
2009-10	24759029	21836349	58552000	37294
2010-11	27272131	24081677	59170000	40699
2011-12	28278400	24804028	59780000	41492
2012-13	29824104	25950050	60382000	42976
2013-14	31435555	27453093	60975000	45024
2014-15	34410571	30107076	61560000	48907
2015-16	35581198	30802187	62246964	50032
CAGR (2005-16)	**7.13%**	**6.84%**	**1.08%**	**5.81%**

Source: India Stat.com/ State wise/ Transport

Table 5-12: Economic Indicators for Kerala

Year	Gross State Domestic Product (Rupee in lakhs) @ 2004-05 prices	Net State Domestic Product (Rs. lakhs) @ 2004-05 prices	Population	PCI (Rs.)
2004-05	11926400	10477605	32875000	31871
2005-06	13129393	11549986	33154000	34837
2006-07	14166669	12462466	33426000	37284
2007-08	15409268	13574746	33694000	40288
2008-09	16265920	14409392	33958000	42433
2009-10	17757135	15712270	34216000	45921
2010-11	18985071	16717844	34467000	48504
2011-12	20095773	17691461	34708000	52095
2012-13	21285953	18732729	34942000	56115
2013-14	22620850	19947798	33832269	58961
2014-15	23671247	20873899	34931174	61329
2015-16	24854339	21918675	35113710	64329
CAGR (2005-16)	6.90%	6.94%	0.60%	6.59%

Source: India Stat.com/ State wise/ Transport

Table 5-13: Economic Indicators for PIA of TP1 Vaniyambadi

Year	Gross State Domestic Product @ 2004-05 prices	Net State Domestic Product @ 2004-05 prices	Population	PCI (Rs.)
2006-07	26199302	23362096	62527023	37164
2007-08	28170833	25142619	63051780	39725
2008-09	29810461	26576164	63561659	41672
2009-10	32395222	28730088	64056628	44603
2010-11	36426317	32429799	64540335	49919
2011-12	38837777	34528698	65013169	52739
2012-13	40372512	35637752	65472337	54109
2013-14	43302567	38179110	65897420	57556
2014-15	46414474	41180093	66344822	61693
2015-16	48598173	43021506	66931717	64462
CAGR (2007-16)	7.11%	7.02%	0.76%	6.31%

L&T IDPL

Table 5-14: Economic Indicators for PIA of TP2 Pallikonda

Year	Gross State Domestic Product @ 2004-05 prices	Net State Domestic Product @ 2004-05 prices	Population	PCI (Rs.)
2006-07	26498726	23628470	62911602	37371
2007-08	28450623	25392690	63432851	39888
2008-09	30094966	26828640	63938971	41828
2009-10	32776246	29073058	64429938	44889
2010-11	36882538	32844858	64909451	50295
2011-12	39356990	35004703	65377972	53193
2012-13	40886032	36112621	65832564	54545
2013-14	43855662	38702392	66258764	58051
2014-15	47012065	41727898	66697318	62208
2015-16	49241499	43619345	67282268	65041
CAGR (2007-16)	**7.13%**	**7.05%**	**0.75%**	**6.35%**

5.5   Transport Demand Elasticity

While the past traffic growth trend are generally helpful to indicate growth pattern likely to extend in near future, it is not appropriate to use it for long term forecasts as demand changes are usually because of shifts in the pattern of economic activities in the influence area. Therefore, future traffic forecasting was done using elasticity approach which takes into account the elasticity of transport demand and probable pattern of future growth of the economy.

The Elasticity Method relates traffic growth to changes in the related economic parameters. This method studies, in an appropriate perspective, the changes in observed past traffic volumes in the context of changes in relevant economic indicators in the Project Influence Area (PIA), to which it was closely related in the past. Such parameters include Net State Domestic Product (NSDP), income accruing to the major sectors of the economy, etc. This method takes into account not only the past growth of the major economic indicators, but also the future perspective. According to IRC-108, 1996, elasticity based econometric model for highway projects could 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).

Elasticity values for each mode is estimated using the past vehicle registration data with the growth of PIA NSDP. The elasticity's obtained are as presented below.

Table 5-15: Elasticity value based on Vehicle Registration data and Growth of PIA NSDP

Vehicle Type	Elasticity	
	TP1	TP2
Car	1.08	1.06
Bus	0.91	0.89
Trucks	0.76	0.75

Vehicle registration data represents all vehicles registered in the PIA region, but does not indicate actual number of vehicles plying on the road owing to vehicles taken off the road due to lack of fitness certificate as well as preference of owners of personalized modes (cars and two-wheelers) for registering their vehicles in neighbouring states, where taxes are lower, thereby giving an inflated picture of the vehicles in the state. Hence, there is a need to moderate values obtained from registration data to reflect traffic demand situation on highway. In addition, significant change in fleet mix of goods vehicle has been observed and this trend is likely to continue in truck trailer segment. It is also important to take into account the impact of this trend while traffic forecasting. This has been done as follows;

- The elasticity values determined in earlier section based on vehicle registration data were re-examined by relating growth of cargo on road with NSDP.
- To determine the elasticity of demand with respect to freight cargo, average growth of freight (tonnage) was estimated at all the toll plaza locations. The growth in tonnage at TP 1 is 7.3% and TP 2 is 1.74%. This growth was compared with NSDP growth of freight traffic influence area which was observed as 7.02%. The elasticity of demand worked out based on tonnage was 1.04 for TP 1 and 0.25 for TP 2. This has been adopted as basis for future forecasting of elasticity.
- High elasticity of cars being witnessed now is because of large demand facilitated by financing schemes and loans. Factors like growth of Per Capita Incomes, reduction in the prices of entry-level cars, growth of the used car market, changes in life style etc., have all contributed to the rapid growth in ownership of cars. However, such trend would slow down and elasticity can be expected to decline. In view of all this, combined with the travel pattern of vehicles moving on the road, elasticity value obtained by using registration data has been moderated.

Keeping in view the above points, elasticity values were estimated using the past trend of growth in vehicles and tonnage on the project corridor and the growth in the NSDP value of the PIA area.

Table 5-16: Elasticity value based on past traffic trend and Growth of PIA NSDP

Elasticity	TP 1	TP 2
Cars	2.00	1.34
Tonnage	0.89	0.20
Bus	0.67	0.01

Projected elasticity values for various vehicle types are given below. Elasticity values in the initial period are related to past elasticity values. Generally the spread of economic development induces changes in the spatial distribution of activities and corresponding changes in transport demand elasticity. As regions become more and more self-sufficient, the need for long-distance transport diminishes. Accordingly, it was assumed that transport demand elasticity, for both freight and passenger traffic, would tend to decline over time, despite growth in per capita income.

Table 5-17: Projected Elasticity Values for Car, Bus and Tonnages at TP1 & TP2

Elasticity Values						
Year	Car		Bus		Tonnage	
	TP 1	TP 2	TP 1	TP 2	TP 1	TP 2
2019-2022	1.70	1.35	0.65	0.15	1.05	0.50
2023-2027	1.60	1.30	0.60	0.14	1.05	0.50
2028-2032	1.50	1.25	0.55	0.13	1.00	0.45
2033-2037	1.40	1.20	0.50	0.12	0.90	0.40
Beyond 2037	1.30	1.15	0.45	0.10	0.80	0.35

Multi-axle vehicle are likely to achieve higher market share due to economic operations, causing lesser pavement damage and more strict enforcement on overloading. Govt. is also likely to promote the usage of Trailers by providing certain incentives.

5.6 Future Growth of PIA

We had sourced the historical data for state GSDPs and national GDP from the NITI Aayog website (http://niti.gov.in/content/gsdp-constant2004-05prices-percent-growth-2004-05-2014-15) and computed the linear correlation between the growth rate of state GSDPs with the national GDP growth in the historical period (From 2005-06 to 2013-14). This linear correlation for individual states was then applied on the forecast national GDP growth rate to arrive at the forecast growth rates for the state GSDPs. State GSDPs and national GDP of 2014-15 can't be used as the same is computed considering 2011-12 prices as base.

The Future India–GDP are arrived based on estimates projected by different renowned agencies like WB, ADB, Rating agencies and CSO, India and the same are provided in the table below.

Table 5-18: NSDP / GDP forecast provided by L&T IDPL

State	Forecast - NSDP / GDP				
	2019-22	2023-27	2028-32	2033-37	Beyond 2036
Tamil Nadu	8.24	6.77	6.40	6.40	6.40
Karnataka	7.13	6.38	6.19	6.19	6.19
Kerala	7.00	6.41	6.26	6.26	6.26
India	7.00	6.05	5.81	5.81	5.81

Table 5-19: NSDP / GDP forecast of PIA

Year	India GDP	PIA NSDP - TP1	PIA NSDP - TP2
2018-22	7.00%	7.92%	7.95%
2023-27	6.05%	6.66%	6.67%
2028-32	5.81%	6.34%	6.35%
2033-37	5.81%	6.34%	6.35%
Beyond 2037	5.81%	6.34%	6.35%

5.7 Projected Traffic Growth Rates

Based on the projected elasticity values for TP 1 and TP 2 the growth of PIA, the future average annual compound traffic growth rates by vehicle type have been estimated by using the following relationship:

TGR   = (NSDPgr) x E

Where,

TGR   – Traffic growth rate for mode

NSDPgr   – growth rate of NSDP in PIA

E   – Elasticity value for mode

For freight vehicle, the tonnages on the corridors are projected. The existing market share of different category of goods vehicles are then adjusted for the future years based on the past trend observed (share of 2 Axle trucks are reduced and the share of MAV are increased). Using the future market share of different categories of goods vehicles and the projected tonnage value, the number of goods vehicles in future years are calculated. Effective Growth rates

Year on Year effective growth rates are arrived considering all the developmental traffic and divertible traffic from the corridor.

Table 5-20: Effective Traffic Growth Rates at Toll Plaza 1

Year	Car	Bus	LCV	2AT	3AT	MAV
FY 2019	12.48%	4.79%	6.91%	5.68%	7.92%	15.42%
FY 2020	12.48%	4.79%	4.93%	1.86%	4.20%	14.57%
FY 2021	12.48%	4.79%	4.93%	1.85%	4.14%	14.41%
FY 2022	12.48%	4.79%	4.94%	1.83%	4.08%	14.26%
FY 2023	9.88%	3.72%	3.21%	0.55%	2.58%	8.78%
FY 2024	9.88%	3.72%	3.21%	0.56%	2.59%	8.78%
FY 2025	9.88%	3.72%	3.22%	0.56%	2.61%	8.79%
FY 2026	9.88%	3.72%	3.22%	0.57%	2.62%	8.79%
FY 2027	8.96%	3.72%	-6.49%	-18.80%	-21.02%	-3.47%
FY 2028	7.91%	3.24%	-3.82%	-15.23%	-18.70%	1.55%
FY 2029	8.22%	3.24%	-1.86%	-11.20%	-14.11%	3.50%
FY 2030	6.99%	7.68%	-1.16%	-10.22%	-14.33%	1.48%

Year	Car	Bus	LCV	2AT	3AT	MAV
FY 2031	7.32%	7.23%	3.47%	4.28%	6.52%	5.81%
FY 2032	7.59%	5.53%	3.07%	3.64%	5.78%	6.47%
FY 2033	10.88%	14.14%	13.17%	10.14%	24.50%	8.55%
FY 2034	11.25%	10.35%	11.27%	7.74%	18.70%	9.57%
FY 2035	9.59%	7.04%	7.39%	4.53%	11.27%	8.28%
FY 2036	9.35%	6.64%	6.94%	4.19%	10.18%	8.16%
FY 2037	7.29%	2.08%	1.69%	0.16%	1.98%	6.45%
FY 2038	6.79%	1.89%	1.47%	-0.23%	1.82%	5.35%
FY 2039	6.84%	1.90%	1.48%	-0.25%	1.78%	5.38%
FY 2040	6.90%	1.92%	1.48%	-0.27%	1.74%	5.40%
FY 2041	6.95%	1.93%	1.49%	-0.28%	1.70%	5.42%
FY 2042	7.00%	1.94%	1.50%	-0.30%	1.67%	5.45%

Table 5-21: Effective Traffic Growth Rates at Toll Plaza 2

Year	Car	Bus	LCV	2AT	3AT	MAV
FY 2019	9.98%	1.11%	2.38%	-2.45%	-1.54%	9.54%
FY 2020	9.98%	1.11%	2.38%	-2.93%	-1.10%	11.68%
FY 2021	9.98%	1.11%	2.38%	-2.91%	-1.05%	11.67%
FY 2022	9.98%	1.11%	2.38%	-2.90%	-1.00%	11.66%
FY 2023	8.06%	0.87%	1.31%	-3.18%	-2.42%	6.17%
FY 2024	8.06%	0.87%	1.31%	-3.18%	-2.41%	6.18%
FY 2025	8.06%	0.87%	1.31%	-3.18%	-2.40%	6.18%
FY 2026	8.06%	0.87%	1.31%	-3.18%	-2.40%	6.18%
FY 2027	8.06%	0.87%	1.31%	-3.17%	-2.39%	6.19%
FY 2028	7.38%	0.77%	0.57%	-3.53%	-2.87%	4.84%
FY 2029	7.38%	0.77%	0.57%	-3.52%	-2.86%	4.84%
FY 2030	6.38%	3.56%	1.28%	-1.94%	-1.33%	2.84%
FY 2031	6.14%	3.44%	1.21%	-1.71%	-1.28%	2.67%
FY 2032	6.33%	2.45%	0.88%	-1.98%	-1.53%	3.23%
FY 2033	9.21%	8.68%	10.21%	4.64%	15.04%	5.52%
FY 2034	9.58%	6.45%	8.89%	3.32%	12.26%	6.74%
FY 2035	8.23%	4.23%	5.54%	0.94%	6.60%	5.46%
FY 2036	8.06%	4.06%	5.27%	0.94%	6.31%	5.41%
FY 2037	6.29%	0.54%	0.28%	-2.69%	-1.68%	3.47%
FY 2038	6.04%	0.45%	0.09%	-2.89%	-2.07%	2.65%
FY 2039	6.08%	0.45%	0.09%	-2.85%	-2.03%	2.66%
FY 2040	6.12%	0.45%	0.09%	-2.80%	-1.98%	2.67%
FY 2041	6.16%	0.45%	0.09%	-2.75%	-1.93%	2.69%
FY 2042	6.19%	0.45%	0.09%	-2.71%	-1.88%	2.70%

L&T IDPL

CHAPTER 6

Traffic and Toll Revenue Forecast

6. Traffic & Toll Revenue Forecast

6.1 General

This chapter presents estimates of total corridor traffic for various sections of Project Corridor. The traffic at different toll plaza location is forecasted using the respective growth rates at each location as presented in Chapter 5.

6.2 Forecasted Traffic

The traffic on the project corridor is forecasted using the Traffic Growth Rates for Vehicles is presented in **Table** & **Table** and the forecasted normal traffic on the project road , forecasted divertible traffic from project corridor, developmental traffic onto project corridor, estimated additional truck traffic due to overloading, estimated excess paying truck traffic due to overloading are presented in the **Appendix A.**

The effective traffic on the project corridor considering normal traffic, developmental traffic and divertible traffic from the corridor, additional truck traffic due to overloading, excess paying truck traffic due to overloading are presented in the **Table 6.1 & 6.2.**

Table 6-1: Effective Forecasted Traffic at TP 1 (Vaniyambadi Toll Plaza)

Year	Car	Bus	LCV	2A	3A	MAV	AADT
2018	8191	951	1774	804	1066	1333	14118
2019	9213	996	1896	850	1151	1538	15644
2020	10363	1044	1990	866	1199	1762	17223
2021	11657	1094	2088	882	1249	2016	18985
2022	13112	1146	2191	898	1300	2304	20950
2023	14407	1189	2262	903	1333	2506	22599
2024	15830	1233	2334	908	1368	2726	24399
2025	17395	1279	2409	913	1403	2965	26364
2026	19113	1326	2487	918	1440	3226	28510
2027	20825	1375	2325	745	1137	3114	29523
2028	22473	1420	2236	632	925	3162	30848
2029	24321	1466	2195	561	794	3273	32610
2030	26020	1579	2169	504	680	3321	34274
2031	27925	1693	2245	525	725	3514	36627
2032	30043	1786	2314	544	767	3742	39196
2033	33312	2039	2618	600	954	4062	43586
2034	37061	2250	2913	646	1133	4451	48454
2035	40614	2408	3129	675	1261	4819	52907
2036	44413	2568	3346	704	1389	5212	57632
2037	47651	2622	3402	705	1416	5549	61345
2038	50884	2671	3452	703	1442	5846	64999
2039	54366	2722	3503	701	1468	6160	68921
2040	58117	2774	3555	699	1493	6493	73132
2041	62156	2828	3608	698	1519	6845	77653
2042	66506	2883	3662	695	1544	7218	82508
2043	71190	2939	3717	693	1569	7612	87722

Table 6-2: Effective Forecasted Traffic at TP 2 (Pallikonda Toll Plaza)

Year	Car	Bus	LCV	2A	3A	MAV	AADT
2018	12226	2101	2097	980	1175	1425	20004
2019	13446	2124	2147	956	1157	1561	21391
2020	14789	2148	2198	928	1144	1743	22950
2021	16265	2172	2251	901	1132	1946	24667
2022	17889	2196	2304	875	1121	2173	26558
2023	19332	2215	2334	847	1094	2308	28129
2024	20890	2234	2365	820	1067	2450	29827
2025	22575	2254	2396	794	1041	2602	31661
2026	24395	2273	2427	769	1017	2762	33643
2027	26363	2293	2459	744	992	2933	35784
2028	28307	2311	2473	718	964	3075	37848
2029	30396	2328	2487	693	936	3224	40064
2030	32336	2411	2519	679	924	3316	42185
2031	34322	2494	2549	668	912	3404	44349
2032	36493	2555	2572	654	898	3514	46686
2033	39855	2777	2835	685	1033	3708	50893
2034	43673	2956	3087	708	1160	3958	55541
2035	47269	3081	3258	714	1236	4174	59732
2036	51077	3206	3429	721	1314	4400	64148
2037	54288	3224	3439	702	1292	4552	67496
2038	57569	3238	3442	681	1265	4673	70869
2039	61071	3253	3445	662	1240	4797	74468
2040	64810	3268	3448	643	1215	4926	78310
2041	68800	3283	3451	626	1192	5058	82410
2042	73060	3298	3455	609	1169	5194	86785
2043	77608	3313	3458	593	1148	5335	91454

6.3   Toll Revenue Forecasting

Toll revenue projections or forecasting will be calculated based on the projected traffic and projected toll rates. The future traffic was mentioned in detail in the previous sections of this chapter. Toll rates by vehicle and toll category depends on the tolling length, wholesale price index (WPI) and the base rates which are applicable by vehicle category are according to the NH Fee notification for the project.

6.3.1   Toll plaza details

The toll plaza location and length covered is tabulated in table below as per the CA (Schedule R).

L&T IDPL

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

Table 6-3: Toll plaza Details

Toll Locations	From Km	To Km	Length in Km	Length (in km) for which Fee is payable
46.800 (Toll Plaza 1) Vaniyambadi	000.000	148.300	73.000	73.000
98.520 (Toll Plaza 2) Pallikonda			75.350	75.350

6.3.2 Toll revenue estimation

i. Toll Fee Revision Methodology

Toll fee shall be computed based on the base rate fixed by NHAI and is revised annually as per the formula provided by NHAI in Schedule G of the Concession agreement and also as mentioned in the toll notification issued by the Government (Department of Road Transport and Highways) on 14th January, 2009. Below sections provide the summary of the same.

a) Base Rate

As per the National Highway Fee Rules, 2008 the rate of fee for use of a section of national highway, having regard to the expenditure involved in building, maintenance, management and operation of the said stretch of the said National highways for the base year 2007-08 are given as mentioned below in Table 6.12. Fee applicable shall be the rate multiplied by the length of the highway section for which toll is to be collected.

Project road as mentioned in the toll notification starts from Km 000.000 and ends at Km 148.300 thereby the total length of the project is 148.300 kms. Fees shall be calculated based on the rate of fee mentioned in the below table and shall be rounded off to nearest five rupees.

Table 6-4: Base rate fee by vehicle category

Type of Vehicle	Base Rate fee per Km (in rupees)
Car	0.65
LCV	1.05
Bus or Truck (2 Axle)	2.20
Multi Axle > 2 Axle Truck	3.45
Oversized	4.20
Monthly Pass	150

b) Annual Revision of Rate of Fee

The amount of fee and the revision thereof effective from 1st April every year shall be calculated as follows:

$$\text{Applicable Fee} = \text{Base Rate X} \left\{\frac{\text{WPI B}}{\text{WPI A}}\right\} X \ Length \ (in \ Km) of \ the \ said \ stretch$$

L&T IDPL

Where

WPI-A is the Wholesale Price Index on January, 2007.

WPI-B is the Wholesale Price Index on December 31st preceding the fee revision date.

The actual fees to be charged shall be rounded off to the nearest Five rupees.

ii. WPI Forecasts

a) Wholesale Price Index

Wholesale price index (WPI) tracks the price movement of key commodities of national relevance grouped under three main categories Primary Articles, Fuel & Power and Manufactured Products. Based on this individual movement, the WPI is determined through the averaging principle.

Till the year 2010 the index was computed with base year 1993-94 for about 435 commodities grouped as above. The index published by the Office of Economic Advisor, Prime Minister's Office on weekly basis.

In the recent past base series of WPI has been changed from 1993-94 to 2004-05. As mentioned elsewhere in the report the number of commodities also have been modified in the recent base year (2004-05) WPI. Consumer items widely used by the middle class like ice-cream, mineral water, flowers, microwave oven, washing machine, gold and silver shall be reflected in the new series of WPI. The below shows the difference in old and new WPI Series.

Table 6-5: Comparison of WPI 1993-94 Series and WPI 2004-05 Series

SI No	WPI 1993-94 Series(Old)	WPI 2004-05 Series(New)
1	Total No of Commodities considered is 435 items.	Total No of Commodities considered is 676 items.
2	The number of components considered and its weightage in this series are as follows; Primary Articles- 98 & 22.025% Fuel & Power- 19 & 14.226% Manufactured Products- 318 & 63.749% All Commodities-435 & 100%	The number of components considered and its weightage in this series are as follows; Primary Articles-102 & 20.118% Fuel & Power- 19 & 14.910% Manufactured Products- 555 & 64.972% All Commodities-676 & 100%
3	The number of price quotations as per this series are as follows; Primary Articles- 455 Fuel & Power- 72 Manufactured Products- 1391 All Commodities-1918	The number of price quotations as per this series are as follows; Primary Articles- 579 Fuel & Power- 72 Manufactured Products- 4831 All Commodities-5482

In order to maintain continuity in the time series data on wholesale price index, it is imperative to provide a linking factor so that the new series, when released, may be compared with the outgoing one. The linking factor with the old series (1993-94) for the three broad groups of commodities WPI are shown in below table WPI for December, 2015 as per new series is 176.80.

Table 6-6: Linking Factor with 1993-94 Series for three broad groups

Category	Average WPI in 2004-05	Linking Factor
All commodities	**187.3**	**1.873**
Primary articles	188.1	1.881
Fuel & Power	280.2	2.802
Manufactured products	166.3	1.663

b) Past trends of the Wholesale Price Index

Past data of WPI from 2010-16 is collected and analysed for its trends. WPI Trends with base year 1993-94 (new series values converted using the linking factor mentioned in the table above) for all the Commodities category over a period of 10 years and summarized in the Figure 6-1.
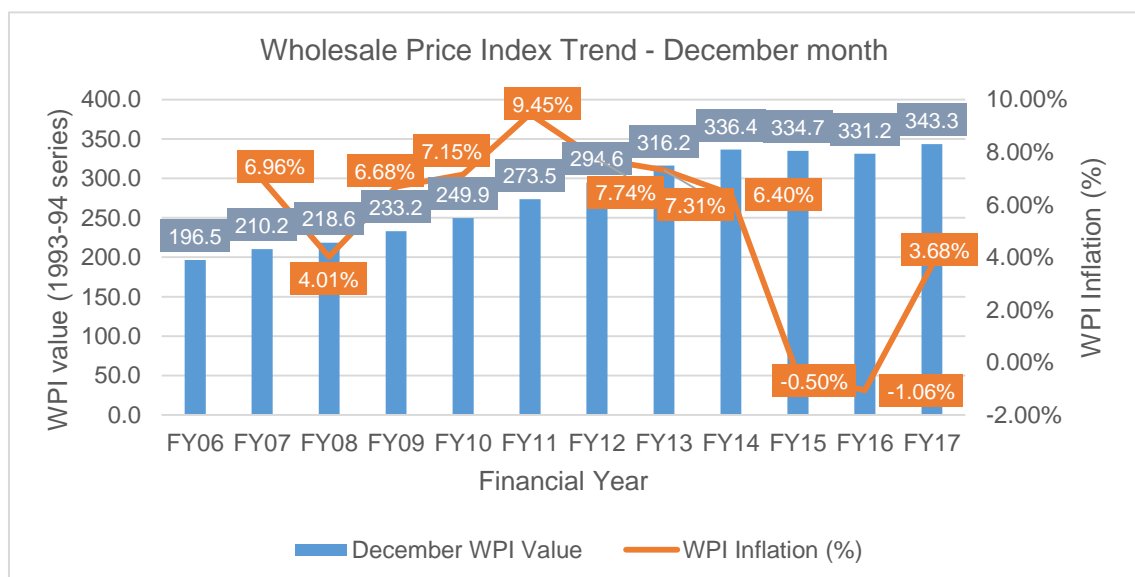
Figure 6-1: Past Trend of Whole Sale Price Index

The average WPI Inflation (%) for the last eleven (11) years was around 5.26%, whereas during the last three years (FY15, FY16 and FY17) the inflation range was between -1.06% to 3.68%

which is mainly due to the lower commodity prices like Oil, Metals etc. along with the drop in the prices of the primary articles like food products etc. The final inflation for the month of Dec 2016 (i.e. applicable inflation rate for the revision of toll rates from Apr'17 till Mar'18) is 3.68%.

a) Wholesale Price Index projections

Consultant assumed the future whole sale price inflation (WPI) based on the data procured from Oxford data and the same WPI inflation values are adopted and provided in the Table below.

Table 6-7: WPI Inflation Projections

Year	FY-19	FY-20	FY-21	FY-22	FY-23	FY-24	FY-25	FY-26	FY-27	FY-28 onwards
WPI Inflation	5.67%	6.02%	5.73%	5.36%	5.16%	4.99%	4.48%	4.11%	4.00%	3.93%

iii.   **Toll Fee Projections**

a) Current Year (FY18)

Toll fee for the base year FY17 has been arrived by considering project length distributed to each toll plaza (here in the present case it is only one toll plaza location) as mentioned in the toll notification. The toll fee calculated for the year 2017 - 2018 (from 01st April, 2017 to 31st March, 2018) for the toll plaza location by vehicle category is shown in **Table 6-9** below.

As per Schedule of User Fee (Schedule R) of concession agreement for the Project, the per km base fee/toll rates as applicable from 2009-10 are given in table 6-10. The escalated for 2017-18 rates are also given in **Table 6-8 & 6-9.**

Table 6-8: Unit Toll Rates Adopted for Year 2018 - 2019

S. No.	Category of Vehicle	Capping Rate of base fee per vehicle per one way trip For 2007-08(in rupees per km)	* Capping Rate of base fee per vehicle per one way trip For 2017-18(in rupees per km)
1	Car	0.65	1.11370
2	LCV	1.05	1.7990
3	Bus or Truck (2 Axle)	2.20	3.7693
4	Multi Axle > 2 Axle Truck	3.45	5.9110
5	Oversized (seven or more axles)	4.20	7.1960
6	Monthly Pass	150	256.9997

Revised as per rules given in CA using WPI.

Table 6-9: Toll Fees for the year FY-2018 (effective from 01st April, 2018 to 31st March 2019)

Category of Vehicle	Toll Fee category at Km 46.800 Vaniyambadi Toll Plaza (Rs.) (Length 73.000km)	Toll Fee category at Km 98.520 Pallikonda Toll Plaza (Rs.) (Length 75.350km)

	Fee for Single Journey	Fee for Return journey within a day	Fee for Monthly pass for 50 single journeys in a month	Fee for Single Journey	Fee for Return journey within a day	Fee for Monthly pass for 50 single journeys in a month
Car	80	120	2710	85	125	2795
LCV	130	195	4380	135	205	4520
Bus or Truck (2 Axle)	275	415	9170	285	425	9465
Multi Axle > 2 Axle Truck	430	645	14385	445	670	14845
Oversized (seven or more axles)	525	790	17510	540	815	18075

Note: w.e.f 01.04.2017- 31.03.2018

Toll fees are projected for the remaining future years balance in the concession period based on the assumed WPI Inflation values and the revision formula mentioned in the section 6.3.2.

6.3.3 Toll Concessions

The discounts allowed for local traffic/frequent users as per Schedule R of the Concession Agreement are given below.

Monthly pass applicable for local noncommercial vehicles is Rs.245 (FY18) at Radius of 20Km.

6.3.4 Vehicle wise Trip categories and Trip Rates

Toll revenue is estimated by considering different concessions provided to the road users by vehicle category and also eligible number of trips based on the toll category. The number of eligible trips in crossing toll plaza varies by the toll fee category i.e. trip category above mentioned fees by toll category which was mentioned in the table above. For example return journey allows unlimited trips (hypothetically) in 24 hours effective from issue of time of the ticket receipt whereas the actual trips will vary by vehicle category and toll fee category. **Table 6-10** - **Table 6-13** summarises the vehicle wise trip categories were arrived from the traffic data for the month of Apr'17 and trip rates which were arrived from the analysis of actual traffic & revenue data for the year FY 2017-18 for the month of Apr-2017.

Table 6-10: Vehicle wise Trip Categories at Km 46.800 Vaniyambadi Toll Plaza (TP1)

Mode	Single	Return	Monthly	Local Traffic (<20 Km)	Toll Exempt	Violation
Car	58%	38%	0%	1%	3%	0%
Bus	22%	22%	39%	0%	0%	16%
LCV	71%	28%	1%	0%	0%	0%
Truck (2 Axle)	83%	16%	0%	0%	0%	0%
Multi Axle > 2 Axle Truck	89%	10%	0%	0%	0%	0%

Table 6-11: Vehicle wise Trip Categories at Km 98.520 Pallikonda Toll Plaza (TP2)

Mode	Single	Return	Monthly	Local Traffic (<20 Km)	Toll Exempt	Violation
Car	45%	45%	1%	5%	4%	0%
Bus	12%	13%	42%	0%	0%	33%
LCV	62%	37%	1%	0%	1%	0%
Truck (2 Axle)	78%	22%	0%	0%	0%	0%
Multi Axle > 2 Axle Truck	89%	11%	0%	0%	0%	0%

Table 6-12: Vehicle wise Trip Rates at Vaniyambadi Toll Plaza (TP1) for all Toll categories

Vehicle Type	Single	Return	Monthly	Local Traffic (<20 Km)
Car	1.00	1.96	1.30	0.47
Bus	1.00	1.96	1.57	1.00
LCV	1.00	1.94	1.49	1.00
Trucks (2 - Axle)	1.00	1.94	1.63	1.00
MAVs (incl. 3AT)	1.00	1.93	1.56	1.00

Table 6-13: Vehicle wise Trip Rates at Pallikonda Toll Plaza (TP2) for all Toll categories

Vehicle Type	Single	Return	Monthly	Local Traffic (<20 Km)
Car	1.00	1.99	3.42	0.50
Bus	1.00	1.96	1.60	1.00
LCV	1.00	1.95	1.49	1.00
Trucks (2 - Axle)	1.00	1.96	1.59	1.00
MAVs (incl. 3AT)	1.00	1.92	1.55	1.00

6.3.5 Toll revenue projections

Toll revenue is projected based on the future traffic projections, toll fees by vehicle and toll category and trip rates. Traffic numbers and toll fee are projected by financial year i.e. FY19, FY20 etc till the end of Concession period. Toll revenues are projected based on the effective growth rates including revenues from overloading (both excess paying trucks and additional trucks) and without overloading are presented in the below Tables.

Table 6-14: Toll revenue projections (₹ in Millions) – Considering with Overloading

FY	Vaniyambadi Toll Plaza (TP1) at Km 46.800	Pallikonda Toll Plaza (TP2) at Km 98.520
2019	925.26	1112.65
2020	1060.50	1237.15
2021	1200.08	1358.63
2022	1370.13	1508.24
2023	1536.49	1648.35
2024	1726.43	1819.02
2025	1932.66	1983.70
2026	2163.02	2171.42
2027	2197.94	2383.58
2028	2316.11	2587.77

FY	Vaniyambadi Toll Plaza (TP1) at Km 46.800	Pallikonda Toll Plaza (TP2) at Km 98.520
2029	2503.66	2808.88
2030	2672.87	3072.57
2031	2956.85	3323.20
2032	3284.27	3606.32
2033	3837.45	4089.03
2034	4428.17	4614.11
2035	5027.98	5149.67
2036	5727.81	5733.19
2037	6316.20	6212.14
2038	6906.85	6738.35
2039	7621.88	7268.43
2040	8390.00	7883.62
2041	9228.98	8532.19
2042	10155.06	9260.48
2043	11176.35	10094.24

Table 6-15: Toll revenue projections (₹ in Millions) – Considering without Overloading

FY	Vaniyambadi Toll Plaza (TP1) at Km 46.800	Pallikonda Toll Plaza (TP2) at Km 98.520
2019	877.07	1062.77
2020	1019.09	1194.38
2021	1168.67	1326.24
2022	1352.23	1489.81
2023	1516.35	1627.64
2024	1703.96	1795.74
2025	1907.53	1957.72
2026	2135.13	2142.62
2027	2166.76	2351.43
2028	2281.59	2552.23
2029	2465.71	2769.86
2030	2631.08	3029.36
2031	2910.58	3275.43
2032	3233.29	3553.43
2033	3781.46	4031.38
2034	4366.97	4550.81
2035	4960.78	5080.27
2036	5653.95	5657.00
2037	6235.55	6128.65
2038	6819.04	6647.59
2039	7525.99	7169.46
2040	8285.64	7775.57
2041	9115.21	8415.06

FY	Vaniyambadi Toll Plaza (TP1) at Km 46.800	Pallikonda Toll Plaza (TP2) at Km 98.520
2042	10031.40	9132.83
2043	11041.61	9954.81

6.3.6 Modifications in Concession Period

For determination of effect of variation of traffic growth on the concession period, the clause 29.1.1 of the Concession Agreement reads as:

"The Authority and the Concessionaire acknowledge that the traffic as on April 1, 2020 (the "Target Date") is estimated to be 35852 PCUs per day (the "Target Traffic"), and hereby agree that for determining the modifications to the Concession Period under this Article 29, the actual traffic on the Target Date shall be derived by computing the average of the traffic as determined by traffic sampling to be undertaken, in accordance with Clause 22.3, on the date that falls one year prior to the Target Date, on the Target Date and on the first anniversary of the Target Date (the "Actual Average Traffic"). For the avoidance of doubt, it is agreed that traffic sampling shall be undertaken for a continuous period of 7 (seven) days during anytime within 15 (fifteen) days prior to the date specified herein and the average thereof shall be deemed to be the actual traffic. It is further agreed that if the Project Highway shall have two or more Toll Plazas in the same direction of travel, the average traffic thereof shall be computed for determining the Actual Average Traffic hereunder".

The actual traffic on the Target Date shall be derived by computing the average of the traffic as determined by traffic sampling to be undertaken, in accordance with **Clause 22.3** of Concession Agreement, on the date that falls one year prior to the Target Date, on the Target Date and on the first anniversary of the Target Date (the "**Actual Average Traffic of FY 2019, FY 2020 and FY 2021**"). The "**Actual Average Traffic**" forecasted is **36,954 PCU's**.

As per the clause 29.2, pertaining to inclusions/exclusions to PCUs for the purpose of Target traffic determination is that "while Genuine Exempted vehicles and Violators need to be included, there are sufficient grounds to exclude Local Users from the PCUs for the purpose of target traffic computation". After removing the **local users** but including the **genuine exempted and violations** traffic the estimated target traffic is **34,234 PCU's**. Corresponding to this traffic, the concession period will be increased by **1 year 9 months 18 days**. Based on this the toll collection for this project will extend up to **24th Mar, 2043.**

L&T IDPL

Appendix A

The forecasted normal traffic on the project road , forecasted divertible traffic from project corridor, developmental traffic onto project corridor, estimated additional truck traffic due to overloading, estimated excess paying truck traffic due to overloading are presented in the below tables.

Table A-1: Forecasted Normal Traffic at TP1

Year	Car	Bus	LCV	2A	3A	MAV	AADT
2018	8191	951	1728	762	1002	1273	13907
2019	9213	996	1816	774	1035	1419	15254
2020	10363	1044	1908	785	1070	1582	16752
2021	11657	1094	2004	797	1106	1764	18421
2022	13112	1146	2106	809	1142	1966	20281
2023	14407	1189	2175	816	1177	2139	21902
2024	15830	1233	2245	823	1212	2328	23672
2025	17395	1279	2319	830	1248	2534	25603
2026	19113	1326	2394	837	1285	2758	27713
2027	21002	1375	2472	844	1323	3001	30018
2028	22854	1420	2534	848	1348	3234	32238
2029	24870	1466	2598	852	1372	3484	34642
2030	27064	1514	2664	856	1397	3754	37248
2031	29451	1563	2731	860	1423	4045	40072
2032	32049	1613	2800	864	1449	4358	43132
2033	34687	1661	2860	855	1466	4651	46180
2034	37543	1710	2922	846	1483	4965	49469
2035	40634	1760	2985	838	1500	5299	53016
2036	43979	1812	3050	829	1517	5656	56844
2037	47600	1866	3116	821	1535	6038	60974
2038	51239	1915	3174	809	1546	6376	65059
2039	55156	1966	3233	797	1558	6734	69444
2040	59372	2018	3293	785	1571	7112	74151
2041	63911	2072	3355	773	1583	7511	79204
2042	68797	2127	3417	762	1595	7932	84630

Table A-2: Forecasted Normal Traffic at TP2

Year	Car	Bus	LCV	2A	3A	MAV	AADT
2018	12226	2101	2097	972	1167	1413	19977
2019	13446	2124	2147	940	1142	1536	21335
2020	14789	2148	2198	910	1117	1668	22830
2021	16265	2172	2251	880	1092	1812	24472
2022	17889	2196	2304	851	1068	1969	26278
2023	19332	2215	2334	824	1041	2088	27833
2024	20890	2234	2365	797	1014	2214	29515
2025	22575	2254	2396	771	988	2348	31332

Year	Car	Bus	LCV	2A	3A	MAV	AADT
2026	24395	2273	2427	746	963	2490	33295
2027	26363	2293	2459	722	938	2640	35415
2028	28307	2311	2473	696	910	2764	37460
2029	30396	2328	2487	671	883	2893	39657
2030	32638	2346	2501	647	856	3028	42016
2031	35046	2364	2516	624	830	3170	44549
2032	37631	2382	2530	601	805	3318	47267
2033	40296	2399	2542	577	778	3443	50035
2034	43150	2416	2554	554	751	3572	52998
2035	46206	2433	2565	532	726	3707	56169
2036	49479	2450	2577	510	701	3847	59565
2037	52983	2468	2589	490	677	3992	63199
2038	56579	2482	2595	469	649	4109	66883
2039	60419	2497	2600	448	622	4230	70817
2040	64520	2512	2605	429	596	4355	75017
2041	68899	2527	2611	410	571	4483	79501
2042	73575	2542	2616	392	548	4615	84288

Table A-3: Divertible Traffic from Project Corridor to Bangalore Chennai Expressway

Year	Car	LCV	2A	3A	MAV	AADT
2030	788	60	18	35	103	1003
2031	1696	122	35	69	216	2138
2032	2435	165	46	90	303	3039
2033	3276	209	56	112	399	4052
2034	3527	212	54	111	420	4324
2035	3797	215	53	109	442	4616
2036	4072	217	51	108	461	4908
2037	4365	219	50	106	480	5221
2038	4680	221	48	104	501	5555
2039	5018	224	47	102	522	5913
2040	5380	226	46	100	545	6297
2041	5768	228	44	99	568	6708
2042	6185	231	43	97	592	7148

Table A-4: Divertible Traffic onto SH18 from Vaniyambadi Toll Plaza

Year	Car	LCV	2A	3A	MAV	AADT
2027	176	147	121	240	180	864
2028	381	298	238	477	383	1776
2029	549	403	312	632	542	2439
2030	742	512	384	785	720	3143
2031	802	520	378	780	765	3245
2032	867	528	372	775	812	3355
2033	933	535	363	767	855	3453
2034	1005	542	354	758	900	3558
2035	1082	549	345	750	947	3672
2036	1165	556	336	741	997	3795
2037	1254	563	328	733	1049	3927
2038	1344	569	318	721	1094	4047
2039	1441	575	309	708	1141	4175
2040	1545	581	300	696	1190	4313
2041	1657	587	291	685	1241	4460
2042	1776	593	283	673	1294	4619

Table A-5: Divertible traffic to TP1 due to traffic restrictions on SH18

Year	LCV	2A	3A	MAV	AADT
2018	45	34	57	48	184
2019	80	60	100	93	335
2020	82	62	102	105	351
2021	84	63	103	118	368
2022	85	65	105	133	388
2023	87	63	104	147	401
2024	89	62	103	162	415
2025	91	60	102	178	431
2026	93	58	102	196	449

Table A-6: Developmental Traffic onto Project Corridor from Bangalore Chennai Industrial Corridor (BCIC)

Year	Car	Bus	LCV	2A	3A	MAV	AADT
2030	486	65	78	29	49	38	744
2031	972	130	156	58	97	76	1488
2032	1296	173	207	78	130	101	1984
2033	2835	378	502	143	314	244	4416
2034	4050	540	745	188	466	362	6352
2035	4860	648	907	216	567	441	7639
2036 & beyond	5670	756	1069	243	668	520	8926

Additional truck traffic due to restriction on Overloading is estimated as follows

Table A-7: Estimated Additional Truck Traffic due to Overloading at TP1 & TP2

Year	LCV	2AT	3AT	MAV	AADT
FY 2018	0	0	0	0	**0**
FY 2019	0	0	0	0	**0**
FY 2020	0	3	12	47	**62**
FY 2021	0	6	25	103	**134**
FY 2022	0	9	37	171	**217**
FY 2023	0	8	37	183	**229**
FY 2024	0	8	38	197	**243**
FY 2025	0	8	38	212	**258**
FY 2026	0	8	38	228	**274**
FY 2027	0	8	38	245	**291**
FY 2028	0	8	38	260	**306**
FY 2029	0	8	38	277	**323**
FY 2030	0	8	38	294	**340**
FY 2031	0	8	38	313	**359**
FY 2032	0	8	38	333	**379**
FY 2033	0	7	38	351	**396**
FY 2034	0	7	38	370	**415**
FY 2035	0	7	38	391	**435**
FY 2036	0	7	37	412	**457**
FY 2037	0	7	37	435	**479**
FY 2038	0	7	37	455	**499**
FY 2039	0	6	37	476	**519**
FY 2040	0	6	37	497	**540**
FY 2041	0	6	36	520	**563**
FY 2042	0	6	36	544	**586**

L&T IDPL

The excess paying truck traffic due to overloading based on the above assumptions is estimated as follows

Table A-8: Estimated Excess paying Truck Traffic due to Overloading at TP1 & TP2

Year	LCV	2AT	3AT	MAV	AADT
FY 2018*	0	2	15	55	**72**
FY 2019	0	7	60	243	**310**
FY 2020	0	5	45	200	**251**
FY 2021	0	4	30	147	**181**
FY 2022	0	2	15	81	**98**
FY 2023	0	2	15	87	**104**
FY 2024	0	2	15	93	**110**
FY 2025	0	2	15	100	**117**
FY 2026	0	2	15	108	**125**
FY 2027	0	2	15	116	**133**
FY 2028	0	2	15	123	**140**
FY 2029	0	2	15	131	**148**
FY 2030	0	2	15	139	**156**
FY 2031	0	2	15	148	**165**
FY 2032	0	2	15	158	**175**
FY 2033	0	1	15	166	**183**
FY 2034	0	1	15	175	**192**
FY 2035	0	1	15	185	**202**
FY 2036	0	1	15	195	**212**
FY 2037	0	1	15	206	**223**
FY 2038	0	1	15	215	**232**
FY 2039	0	1	15	225	**241**
FY 2040	0	1	15	236	**252**
FY 2041	0	1	15	246	**262**
FY 2042	0	1	15	258	**274**

* It is assumed that the excess paying tolling on account of overloading will start from 01st Jan-2018 i.e. Q4-FY2018 onwards.

The growth estimated for different vehicles are presented in the table below.

Table A-9: Traffic Growth Rates at Toll Plaza 1

Year	Car	Bus	LCV	2A	3A	MAV
2019-22	12.48%	4.79%	5.07%	1.51%	3.34%	11.47%
2023-27	9.88%	3.72%	3.26%	0.84%	2.98%	8.83%
2028-32	8.82%	3.24%	2.52%	0.46%	1.83%	7.74%
2033-37	8.23%	2.95%	2.16%	-1.01%	1.15%	6.74%
Beyond 2037	7.64%	2.65%	1.86%	-1.48%	0.78%	5.61%

L&T IDPL

Table A-10: Traffic Growth Rates at Toll Plaza 2

Year	Car	Bus	LCV	2A	3A	MAV
2019-22	9.98%	1.11%	2.38%	-3.27%	-2.20%	8.64%
2023-27	8.06%	0.87%	1.31%	-3.24%	-2.55%	6.04%
2028-32	7.38%	0.77%	0.57%	-3.59%	-3.03%	4.67%
2033-37	7.08%	0.71%	0.46%	-4.02%	-3.39%	3.77%
Beyond 2037	6.79%	0.59%	0.21%	-4.34%	-4.16%	2.94%

Revenue calculated on account of overload truckers which are paying excess fee (i.e. 1 X toll fee in addition to normal fee) is calculated as follows

Table A-11: Overloading Revenue - Truckers paying 1 X toll fee (₹ in Millions)

FY	Vaniyambadi Toll Plaza (TP1) at Km 46.800	Pallikonda Toll Plaza (TP2) at Km 98.520
2019	48.2	49.9
2020	41.4	42.8
2021	31.4	32.4
2022	17.9	18.4
2023	20.1	20.7
2024	22.5	23.3
2025	25.1	26.0
2026	27.9	28.8
2027	31.2	32.1
2028	34.5	35.5
2029	37.9	39.0
2030	41.8	43.2
2031	46.3	47.8
2032	51.0	52.9
2033	56.0	57.7
2034	61.2	63.3
2035	67.2	69.4
2036	73.9	76.2
2037	80.7	83.5
2038	87.8	90.8
2039	95.9	99.0
2040	104.4	108.0
2041	113.8	117.1
2042	123.7	127.6
2043	134.7	139.4

L&T IDPL

Final Traffic
Report

Krishnagiri-Walajapet section of NH-46 in the state of
Tamil Nadu

DIMTS
We help people move

Revenue calculated on account of overload truckers which are paying excess fee (i.e. 2 X toll fee in addition to normal fee) is calculated as follows

Table A-12: Overloading Revenue - Truckers paying 2 X toll fee (₹ in Millions)

FY	Vaniyambadi Toll Plaza (TP1) at Km 46.800	Pallikonda Toll Plaza (TP2) at Km 98.520
2019	96.4	99.8
2020	82.8	85.6
2021	62.8	64.8
2022	35.8	36.9
2023	40.3	41.4
2024	44.9	46.6
2025	50.3	52.0
2026	55.8	57.6
2027	62.4	64.3
2028	69.0	71.1
2029	75.9	78.1
2030	83.6	86.4
2031	92.5	95.5
2032	102.0	105.8
2033	112.0	115.3
2034	122.4	126.6
2035	134.4	138.8
2036	147.7	152.4
2037	161.3	167.0
2038	175.6	181.5
2039	191.8	197.9
2040	208.7	216.1
2041	227.6	234.2
2042	247.3	255.3
2043	269.5	278.9

L&T IDPL