



भारतीय प्रौद्योगिकी संस्थान मद्रास

Indian Institute of Technology Madras

CONSULTANCY SERVICES FOR AFTER STUDY-TRAFFIC DATA COLLECTION AND ANALYSIS FOR THE RESEARCH STUDY ON ADVANCED TRAVELER INFORMATION SYSTEM (ATIS) FOR INDIAN CITIES

AFTER STUDY REPORT

September 2014



TRANSLINK

INFRASTRUCTURE CONSULTANTS (P) LTD.
Bridging Channels for Growth

210 - Atlantis Enclave, Opp. Maruti rowhouse
Subhash Chowk, Memnagar
Ahmedabad – 380052
Phone:+91 79 40307308 Fax: +91 79 40098694
Email: info@translinkinfra.com
Web: www.translinkinfra.com

Table of Contents



Table of Contents

Chapter 1: Introduction

1.1	General	1
1.1.1	Need Of Intelligent Transport System (ITS)	2
1.1.2	Advance Travellers Information System (ATIS)	3
1.1.3	ATIS Process & Focus	4
1.1.4	Challenges	5
1.1.5	Key Drivers for Sector Growth	5
1.2	Need For Study	5
1.3	Study Area	6
1.4	Study Objectives	6
1.5	Scope of Services	7
1.5.1	GPS based Vehicle Tracking Surveys	7
1.5.2	Video data Extraction Surveys	8
1.5.3	User Perception Survey (Web Based & VMS)	8
1.6	Consultants Approach & Methodology	10
1.7	Work Plan and Manning Schedule	10
1.8	Organization of Report	10

Chapter 2: Primary Data Collection and Analysis

2.1	Primary Data Collection	1
2.2	GPS Based Vehicle Tracking Surveys	1
2.2.1	GPS based Vehicle Tracking Surveys & Analysis - Conceptual Framework	2
2.2.2	GPS based Vehicle Tracking Surveys Field Execution	3
2.2.3	Link node and O/D Pairs Network Map Preparation	5
2.2.4	GPS Data Extraction/Processing	7
2.3	GPS based Vehicle Tracking Surveys Analysis	8
2.3.1	Travel Times, Delay and Speed Analysis – 4W/Car	9
2.3.2	Travel Times, Delay and Speed Analysis – 3W/Auto	18
2.3.3	Travel Times, Delay and Speed Analysis – 2W/Bike	28
2.4	Video data Extraction Surveys	37
2.5	User Perception Survey	41
2.5.1	Training & Awareness	41
2.5.2	VMS Feedback Survey	42
2.5.2.1	Methodology	42
2.5.2.2	Inference	43
2.5.2.3	Demography and Category of Survey	43
2.5.2.4	Age Profile	44
2.5.2.5	Monthly Household Income	44
2.5.2.6	Purpose of trip	45
2.5.2.7	Vehicles owned by household	45
2.5.2.8	Number of years in Chennai	46
2.5.2.9	Driving Experience	46
2.5.2.10	Field of Work	47



2.5.2.11	Mode of Travel	47
2.5.2.12	Point of entry into Study Corridor	49
2.5.2.13	Point of exit from Study Corridor	49
2.5.2.14	Beneficial effects of VMS	49
2.5.2.15	Attributes of information displayed on VMS	50
2.5.2.16	Attributes of VMS Boards	50
2.5.2.17	User Satisfaction	51
2.5.2.18	Travel frequency on individual corridor roads	52
2.5.2.19	VMS usage frequency	52
2.5.3	Web Based Survey	52
2.5.3.1	Methodology	53
2.5.3.2	Inference	53
2.5.3.3	Demography and Category of Survey	54
2.5.3.4	Age Profile	54
2.5.3.5	Monthly Household Income	55
2.5.3.6	Vehicles owned by household	55
2.5.3.7	Number of years in Chennai	56
2.5.3.8	Field of Work	56
2.5.3.9	Mode of Travel	56
2.5.3.10	Point of entry into Study Corridor	57
2.5.3.11	Point of exit from Study Corridor	58
2.5.3.12	Beneficial effects of ATIS	58
2.5.3.13	Attributes of information displayed on website	59
2.5.3.14	Internet usage frequency	60
2.5.3.15	User Satisfaction	61
2.5.3.16	Travel frequency on individual corridor roads	61
2.5.3.17	Helpful information	61
2.5.3.18	Frequency of internet usage for planning future trips	62

Chapter 3: Key Conclusions

3.1	General	1
3.1.1	Weekend Travel Time Comparison for 2W- Different OD pairs	1
3.1.2	Weekday Travel Time Comparison for 2W - Different OD pairs	2
3.1.3	Weekend Delay Time Comparison 2W	4
3.1.4	Weekday Delay Time Comparison 2W	5
3.1.5	Weekend Travel Time Comparison for 4W - Different OD pairs	6
3.1.6	Weekday Travel Time Comparison for 4W - Different OD pairs	7
3.1.7	Weekend Delay Time Comparison 4W	9
3.1.8	Weekday Delay Time Comparison 4W	10
3.1.9	Weekend Travel Time Comparison for 3W - Different OD pairs	11
3.1.10	Weekday Travel Time Comparison for 3W Different OD pairs	12
3.1.11	Weekend Delay Time Comparison 3W	13
3.1.12	Weekday Delay Time Comparison 3W	14
3.1.13	Speed Profile Comparison	15
3.2	Traffic Data Comparison	17
3.3	User Perception Survey Findings	17

**List of Figures**

1.1	Study Area Network	6
1.2	Study Approach & Methodology	10
1.3	Work plan and Manning schedule	10
2.1	GPS Based vehicle Tracking Surveys & Analysis - Conceptual Framework	2
2.2	GPS surveys schedule, equipment and route details	3
2.3	Total No. Of Runs By Session & Vehicle Type	5
2.4	Link node and O/D Pairs Network Map	5
2.5	Travel Time for Car (Morning) - Weekend	11
2.6	Travel Time for Car (Afternoon) - Weekend	11
2.7	Travel Time for Car (Evening) - Weekend	11
2.8	Travel Time for Car (Morning) - Weekdays	13
2.9	Travel Time for Car (Afternoon) - Weekdays	14
2.10	Travel Time for Car (Evening) - Weekdays	14
2.11.(a)	Little Mount - SRP Travel Time - Weekend (4W)	14
2.11.(b)	SRP - Little Mount Travel Time - Weekend (4W)	15
2.12.(a)	Little Mount - SRP Travel Time - Weekdays (4W)	15
2.12.(b)	SRP - Little Mount Travel Time - Weekdays (4W)	15
2.13.(a)	Little Mount - SRP Delay - Weekend (4W)	16
2.13.(b)	SRP - Little Mount Delay - Weekend (4W)	16
2.14.(a)	Little Mount - SRP Delay - Weekdays (4W)	17
2.14.(b)	SRP - Little Mount Delay - Weekdays (4W)	17
2.15.(a)	Speed profile during weekday morning	18
2.15.(b)	Speed profile during weekday evening	18
2.16	Travel Time for 3W (Morning) - Weekend	20
2.17	Travel Time for 3W (Afternoon) - Weekend	20
2.18	Travel Time for 3W (Evening) - Weekend	21
2.19	Travel Time for 3W (Morning) - Weekdays	22
2.20	Travel Time for 3W (Afternoon) - Weekdays	23
2.21	Travel Time for 3W (Evening) - Weekdays	23
2.22.(a)	Little Mount - SRP Travel Time - Weekend (3W)	23
2.22.(b)	SRP - Little Mount Travel Time - Weekend (3W)	24
2.23.(a)	Little Mount - SRP Travel Time - Weekdays (3W)	24
2.23.(b)	SRP - Little Mount Travel Time - Weekdays (3W)	25
2.24.(a)	Little Mount - SRP Delay - Weekend (3W)	25
2.24.(b)	SRP - Little Mount Delay - Weekend (3W)	26
2.25.(a)	Little Mount - SRP Delay - Weekdays (3W)	26
2.25.(b)	SRP - Little Mount Delay - Weekdays (3W)	26
2.26.(a)	Speed profile during weekday Morning (3W)	27
2.26.(b)	Speed profile during weekday Evening (3W)	27
2.27	Travel Time for 2W (Morning) - Weekend	29
2.28	Travel Time for 2W (Afternoon) - Weekend	30
2.29	Travel Time for 2W (Evening) - Weekend	30
2.30	Travel Time for 2W (Morning) - Weekdays	32
2.31	Travel Time for 2W (Afternoon) - Weekdays	32



2.32	Travel Time for 2W (Evening) - Weekdays	32
2.33.(a)	Little Mount - SRP Travel Time - Weekend (2W)	33
2.33.(b)	SRP - Little Mount Travel Time - Weekend (2W)	33
2.34.(a)	Little Mount - SRP Delay - Weekdays (2W)	33
2.34.(b)	SRP - Little Mount Delay - Weekdays (2W)	34
2.35.(a)	Little Mount - SRP Delay - Weekend (2W)	34
2.35.(b)	SRP - Little Mount Delay - Weekend (2W)	34
2.36.(a)	Little Mount - SRP Delay - Weekdays (2W)	35
2.36.(b)	SRP - Little Mount Delay - Weekdays (2W)	35
2.37.(a)	Speed profile during weekday Morning (2W)	36
2.37.(b)	Speed profile during weekday Evening (2W)	36
2.38	Intersection Locations	38
2.39	Mid-Block Locations	39
2.40	Traffic Flow Diagram at each mid-block – 27th August 2014 Evening Peak	40
2.41	Traffic Flow Variation at each mid-block – 27th August 2014 Evening Peak	40
2.42	Approach Traffic Flow Variation at each Intersection	41
2.43	Demographic details and category of survey	44
2.44	Age Profile	44
2.45	Monthly Household income	45
2.46	Purpose of trip	45
2.47	No of Vehicles owned by household	46
2.48	No of years in Chennai	46
2.49	Driving Experience in Years	47
2.50	Field of work	47
2.51	Mode of travel	48
2.52	Travellers with co passenger	48
2.53	Travellers doing multi stop activities	48
2.54	Point of entry into study corridor	49
2.55	Point of exit from study corridor	49
2.56	Benefits of VMS	50
2.57	Attributes of VMS Information	50
2.58	Attributes of VMS Information	51
2.59	New routes taken based on VMS info	51
2.60	User satisfaction level	51
2.61	Travel frequency on individual corridor roads	52
2.62	VMS Usage Frequency	52
2.63	VMS Usage Frequency	53
2.64	Gender and Education Profile	54
2.65	Age Profile	54
2.66	Monthly Household Income	55
2.67	No of Vehicles Owned by household	55
2.68	No of Years in Chennai	56
2.69	Field of Work	56
2.70	Mode of travel	57
2.71	Travellers with multiple activities	57
2.72	Point of entry into study corridor	58



2.73	Point of exit from study corridor	58
2.74	Benefits of ATIS	59
2.75	Benefits of ATIS in percentage	59
2.76	Attributes of information shown on website	60
2.77	Internet usage frequency	60
2.78	User Satisfaction	61
2.79	Frequency of travel on different roads	61
2.80	Information most useful to user	62
2.81	Use of ATIS for future travel trips	62
3.1	Figure 3.1: Before & After Study Comparison for 2W Morning Session	1
3.2	Before & After Study Comparison for 2W Noon Session	1
3.3	Before & After Study Comparison for 2W Evening Session	2
3.4	Before & After Study Comparison for 2W Morning Session	2
3.5	Before & After Study Comparison for 2W Noon Session	3
3.6	Before & After Study Comparison for 2W Evening Session	3
3.7	LM-SRP Delay Time Comparison Across Sessions	4
3.8	SRP-LM Delay Time Comparison across Sessions	4
3.9	LM-SRP Delay Time Comparison across Sessions	5
3.10	SRP-LM Delay Time Comparison across Sessions	5
3.11	Before & After Study Comparison for 4W Morning Session	6
3.12	Before & After Study Comparison for 4W Noon Session	6
3.13	Before & After Study Comparison for 4W Evening Session	7
3.14	Before & After Study Comparison for 4W Morning Session	7
3.15	Before & After Study Comparison for 4W Noon Session	8
3.16	Before & After Study Comparison for 4W Evening Session	8
3.17	LM-SRP Delay Time Comparison across Sessions	9
3.18	SRP-LM Delay Time Comparison across Sessions	9
3.19	LM-SRP Delay Time Comparison across Sessions	20
3.20	SRP-LM Delay Time Comparison across Sessions	20
3.21	Before & After Study Comparison for 4W Morning Session	11
3.22	Before & After Study Comparison for 4W Afternoon Session	11
3.23	Before & After Study Comparison for 4W Evening Session	11
3.24	Before & After Study Comparison for 3W Morning Session	12
3.25	Before & After Study Comparison for 3W Afternoon Session	12
3.26	Before & After Study Comparison for 3W Evening Session	13
3.27	LM-SRP Delay Time Comparison across Sessions	13
3.28	SRP-LM Delay Time Comparison across Sessions	14
3.29	LM-SRP Delay Time Comparison across Sessions	14
3.30	SRP-LM Delay Time Comparison across Sessions	15
3.31	2W Speed Profile comparison for Morning and Evening Sessions	15
3.32	3W Speed Profile Comparison for Morning and Evening Sessions	16
3.33	4W Speed Profile Comparison for Morning and Evening Sessions	16
3.34	Traffic Variation at Compared Intersections	17



List of Tables

2.1	Schedule, Equipments and Route Details for GPS Vehicle Tracking Surveys	4
2.2.(a)	Clock wise Traffic Movement – Node Links	6
2.2.(b)	Anti-Clock wise Traffic Movement – Node Links	7
2.3	Origin Destination Pairs	8
2.4.(a)	Session wise Travel Times for different OD Pairs – Car (Weekend)	9
2.4.(b)	Session wise Travel Times for different OD Pairs – Car (Weekday)	12
2.5.(a)	Session wise Travel Times for different OD Pairs – 3W (Weekend)	19
2.5.(b)	Session wise Travel Times for different OD Pairs – 3W (Weekday)	21
2.6.(a)	Session wise Travel Times for different OD Pairs – 2W (Weekend)	28
2.8.(b)	Session wise Travel Times for different OD Pairs – 2W (Weekday)	30
2.7	Schedule, Equipment and Vehicle Cat. for video data extraction surveys	37
2.8	Intersection Locations	38
2.9	Mid block Locations	39
2.10	VMS Feedback Survey Locations	43
2.11	Daily Survey Progress - VMS Feedback Survey	43

List of Annexure

2.1.(a to i)	Traffic data summary 9 intersections
2.2.(a to i)	Traffic Flow diagrams 9 intersections
2.3.(a to k)	Traffic data summary 11 midblock
2.4.(a to k)	Traffic Flow diagrams 11 midblock

Chapter 1: Introduction



CHAPTER 1

INTRODUCTION

1.1 General

The urban population in India has increased significantly from 62 million in 1951 to 377 million in 2011 and is estimated to grow to around 540 million by the year 2021 and to 650 million in 2031. In terms of percentage of total population, the urban population has gone up from 17% in 1951 to 31.16% in 2011 and is expected to increase up to around 37% by the year 2021 and by 2039 the urban population will reach to 50 %. In 2010, India accounted for 11 % of the world's urban population; the United Nations projects it to be 15 per cent by 2030. The top 10 cities of India had a population of 93 million in 2011. Consequently; the number and size of cities have also increased considerably. With such rapid urbanisation, there has been a widening gap between demand and supply of urban infrastructure of which urban transportation is the most important component.

The Urban transport problems in India are growing acutely mainly because of rapid motorization. The major challenge for urban transport agencies in India is how to improve the current urban transport situation, or at least prevent it from deteriorating further. Transport systems are among the various factors affecting the quality of life and safety in a city. The urban transport situation in large cities in India is deteriorating due to a number of factors viz indiscipline of citizens, improper planning in the expansion of cities, poor traffic enforcement laws and its execution. The deterioration is more prevalent in metropolitan cities where there is an excessive concentration of vehicles. Commuters in these cities are faced with acute road congestion, rising air pollution, and a high level of accident risk. Efficient and reliable urban transport systems and its policy are crucial for India to sustain a high growth rate. In India, a fast growing economy, the problem is acutely felt in almost all major cities. This is primarily because infrastructure growth is slow compared to growth in number of vehicles, due to space and cost constraints. Secondly, Indian traffic being non-lane based and chaotic is largely different from the western traffic.

Medium sized Indian cities are now also facing crisis of urban transport. Despite investments in road infrastructure and plans for land use and transportation, problems of congestion, traffic accidents, and air / noise pollution is displaying alarming trends. In medium and small sized cities, different forms of intermediate public transport provided by the informal sector, are struggling to cope with the mobility requirements of the public. India's transport scenario is further aggravated by extremely rapid growth of India's largest cities in a context of low incomes, limited transport infrastructure, rampant suburban sprawl, rising motor vehicle population, deteriorating bus service, mix-traffic condition in sharing roadways coupled with uncoordinated land use and transport planning.

In the 2nd decade of 21st century when we have a colossal technological boom, it is high time that we utilize the revolutions of technology in the field of engineering and by synergizing the two create a better transportation system.

So, concerned with the alarming trends and visualizing the future problems, the Indian Government has also begun to realize the potential and reach of the technology to solve the traffic problems. Thus a research project on 'Advanced Traveller Information System – ATIS for Indian cities' had been carried out by the Transportation Engineering Division, Dept. of Civil Engineering., Indian Institute of Technology (IIT) Madras sponsored by the Department of Electronics and Information Technology (DeitY), Government of India.

Chennai, the capital city of the state of Tamil-Nadu is located on the Coromandel Coast off Bay of Bengal. It is the biggest commercial and industrial centre in South-India and a major



economic, cultural and educational centre. It is also known as ‘Detroit of India’ for its Automobile industry. Chennai is one of the top 10 cities of India under:

1. Top 10 most advanced/modern cities of India.
2. Top 10 most populated cities of India.
3. Top 10 most developed cities of India based on GDP.

The present population of Chennai is about 5 million, In 2011, the area of Chennai expanded from 176 Sq Km to 426 Sq Km. The urban agglomeration, which comprises the city and its suburbs, is home to approximately 8.9 million, making it the 4th most populous metropolitan area in the country and 31st largest urban area in the world. Chennai is the only city in South Asia and India to figure in the "52 places to go around the world" by the New York Times.

The development of effective traffic and transportation will be an essential component to support future physical and economic growth. Short, medium and long term transport infrastructure will need up-gradation and development in view of expected demand in the city. The usage of personalized modes of transport is growing unabatedly mainly due to poor public transport facilities. The traffic problems are bound to grow in magnitude unless advanced actions are taken now. There is a need in addressing effective and efficient urban transport system as the transport demand is likely to grow immensely in the coming years.

1.1.1 Need of Intelligent Transport System (ITS)

Intelligent Transportation Systems have been defined in many different ways. While some definitions focus on technology, others capture the functional aspects of ITS and the relationships that exist between advanced technology and the various components of the transportation system.

Some definitions highlight the technologies intrinsic to ITS, and the various transportation system components that interact with these technologies. Other definitions focus on how the technology is applied, and the system operators and users impacted by it. Indeed, ITS is often defined in terms of the user services it provides, which range from traffic control and incident management to the application of advanced technology in the transit and freight sectors.

Clearly, technology and technology integration are key aspects of ITS. However, ITS is more than just technology, it is an institutional arrangement for applying technology to solve transportation problems. ITS can also be defined in terms of objectives; ITS facilitates many activities related to the operation, management, and use of the transportation system, enhancing safety and efficiency, and reducing environmental impacts.

Taken together, the above definitions imply the following:

- ITS is concerned with the mobility of people and goods, and more specifically the delivery and management of multimodal transportation services.
- ITS exists as a system, with a web of interactions that both complicate service delivery and lead to important synergistic benefits.
- ITS involves the use of “smart” technology which is capable of dynamic, real-time interaction between various Performance Analysis of the Intelligent Transportation Systems Intelligence requires information; ITS facilitates information exchange, so that intelligent, informed decisions can be made on the part of both system users and operators.

With this definition in mind, it is insightful to consider the main components of ITS. Intelligent transportation systems are comprised of four key elements: The Vehicle, the user, the



Infrastructure, and the Communications system, each associated with a range of advanced technologies to support system interaction.

An Intelligent Transportation System (ITS) improves transportation safety and mobility and enhances productivity through the use of advanced communications technologies. It encompasses a broad range of wireless and wire line communications-based information and electronics technologies. When integrated into the transportation system's infrastructure, and in vehicles themselves, these technologies relieve congestion, improve safety and enhance transport productivity.

The system is made up of 16 types of technology based systems. These systems are divided into: Intelligent infrastructure systems and intelligent vehicle systems.

Functional areas of ITS:

1. Advanced Traffic Management Systems (ATMS),
2. Advanced Traveller Information Systems (ATIS),
3. Advanced Vehicle Control Systems (AVCS),
4. Commercial Vehicle Operations (CVO),
5. Advanced Public Transportation Systems (APTS), and
6. Advanced Rural Transportation Systems (ARTS).

1.1.2 Advanced Traveller Information Systems (ATIS)

Considering the challenges that urban commuters are facing, the urban transportation department is eyeing to take appropriate involvement of technology viz 'Advanced Traveller Information System – ATIS' for solving various traffic related problems. An Advanced Traveller Information System (ATIS) is a system that acquires, analyzes, and presents information to assist travellers in moving from a starting location (origin) to their desired destination. Advanced Traveller information system (ATIS) are a subset of Intelligent Transportation Systems (ITS) that provides travellers with travel related information using advanced techniques in traffic sensing, information processing, system control and modern communication media to provide personalized, reliable and timely information to the service users. Advanced Traveller Information Systems (ATIS) are an integral component of the concept of Intelligent Transportation Systems (ITS). ATIS are envisioned to enhance personal mobility, safety and the productivity of transportation. The primary services of ATIS include pre-trip and/or en-route traveller information concerning traffic conditions and route guidance. In addition, "yellow page-type" information related to travelling as well as entertainment, dining and other services may be included.

Any ATIS implementation is expected to reduce the travel time and delays, improve stream speed and reduce congestion. For the evaluation of the success of any ATIS implementation, a thorough impact analysis needs to be carried out. For such an analysis, before and after data on traffic parameters such as stream speed, travel time, delays, volume etc. need to be collected.

An ATIS may operate through information supplied entirely within the vehicle or it can also use data supplied by the traffic management centres. Relevant information may include locations of incidents, weather and road conditions, optimal routes, recommended speeds, and lane restrictions.

1.1.3 ATIS Process & Focus

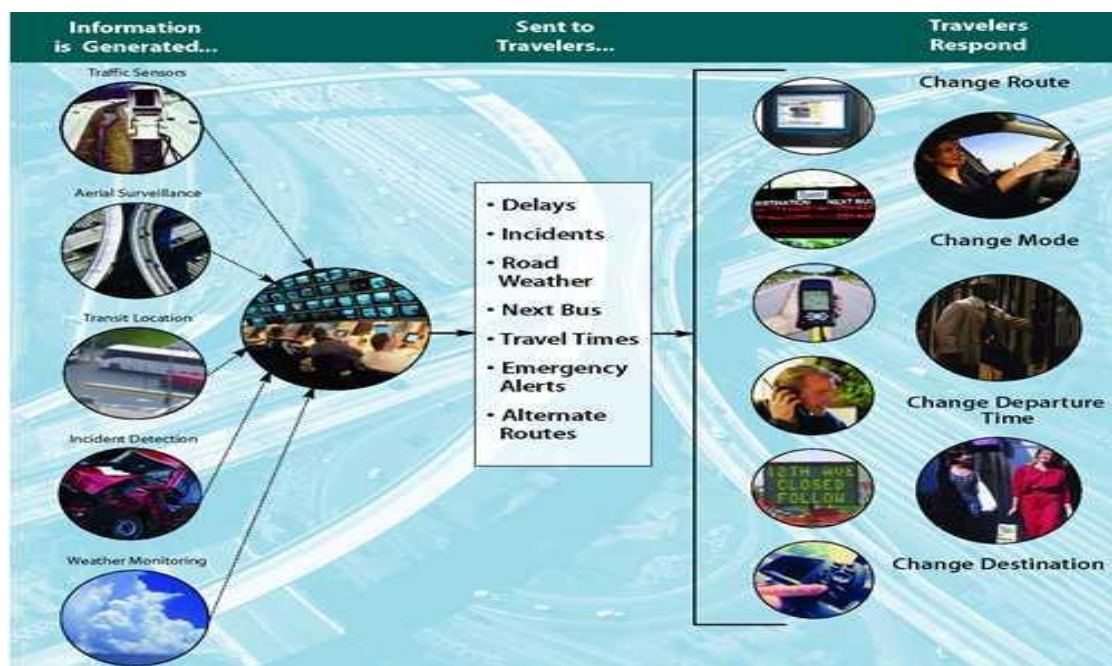
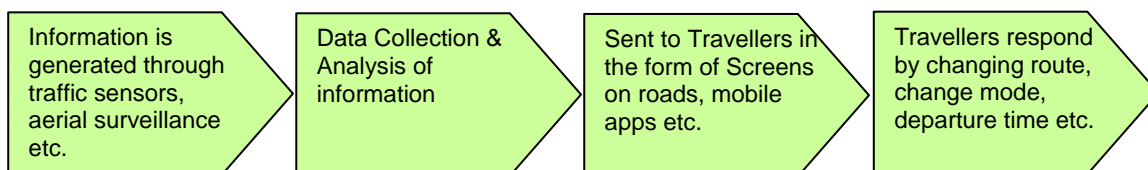
Advanced Travel Information Systems (ATIS) are designed to provide users with information about the state of the transportation network. ATIS include a technological infrastructure that collects data, processes them to generate traveller information and guidance and disseminates the information to users. A wide array of sensor technologies that monitor traffic conditions, such as inductive loops or video cameras are used for data collection. This data are transmitted to a central management centre, where it is automatically processed and analyzed to extract the information of interest, which may include not only route guidance and travel times but also details of incidents, weather and road conditions, speed recommendations and lane-use restrictions. The information is then disseminated to users using various media, such as specialized web sites, variable message signs (VMS) or wireless communication directly to in-vehicle navigation

Advanced Traveller Information System will focus to reduce the travel time and delays, improve stream speed and reduce congestion with improved accessibility and create a good travel experience to the users. Both pre-trip and en-route traveller information have generally positive impacts. The prime focus/features of ATIS are outlined below:

The availability of pre-trip information would increase driver confidence to use freeways and allow commuters to make better informed transit choices.

En-route information and guidance saves travel time, helps a traveller avoid congestion, can improve traffic network performance, and is more efficient than paper maps or written instructions.

The process of ATIS is epitomised as below:





1.1.4 Challenges

The ITS market is nascent in India. Even though most of the technologies have been successfully implemented in developed nations, there are major challenges in implementing such state-of-the-art technologies in India, as listed below:

- Lack of definite guidelines and regulations and difficulties in physical implementation
- Developing a nation-wide ITS data archive
- India's ITS can't be entirely modelled on the existing successful ITS of other nations due to basic cultural, geographic & practical differences among the countries
- High cost for ITS safety systems does not allow high penetration. Few people are willing to pay extra for safety systems and only few technologies are sufficient to ensure safety.

1.1.5 Key Drivers for Sector Growth

The prominent growth drivers, for the ITS market in India, are:

Increase in number of vehicles has added to existing traffic congestion, especially in urban areas. Delhi, Mumbai, Kolkata and Bangalore have 5% of India's population, but 14% of the total registered vehicles which leads to traffic congestion, deterioration in air quality, and increase in noise levels in the metropolitan cities.

€ 60bn of transport-related investment expected over the next five years and a massive € 390bn anticipated over the next two decades. (News Report, ITS International)

Under Government of India (GoI) support, many cities are implementing: Metro rail, BRT, monorail and other forms of public transport. Thus, opening up opportunities in passenger information systems, smart cards and integrated ticketing, and parking management. These technologies also have application in the long-distance rail industry.

Freight is a disorganised sector in India and has huge potential for development. Use of ITS for proper vehicle tracking, vehicle emissions and fuel costs, can help reduce carbon footprint and introduce several degrees of efficiency.

1.2 Need of the Study

As per major issues like lack of sufficient supply of transportation infrastructure with respect to demand, land use and transportation integration, chaotic traffic and deficiency in financial and institutional arrangements, there is definite need of using Intelligence Transport System. The Government of India and various transport agencies both public and private have carried out several transportation studies to improve the urban transport situation in Indian cities. With a view of developing effective, efficient, safe urban transport system, IIT Madras has rightly stepped forward to go for a research project Advanced Traveller Information System (ATIS) for Indian Cities.

Any ATIS implementation is expected to reduce the travel time and delays, improve stream speed and reduce congestion. For the evaluation of the success of any ATIS implementation, a thorough impact analysis needs to be carried out. For such an analysis, before and after data on traffic parameters such as travel time, stream speed, delays, traffic volume etc needs to be collected and analysed. Translink Infrastructure Consultants Pvt. Ltd. as Consultants' were appointed to carry out the after study evaluation of implemented ATIS in the study area.

1.3 Study Area

The site selected for implementation of the project is near IIT Madras located on Chennai's Sardar Patel Road, flanked by the residential districts of Adyar and Velachery. The corridor travels through Little Mount, Madhya Kailash, SRP tools, Vijaya nagar, race course and Ashok Leyland intersection. The study corridor is primarily a four-lane / two lane urban road with and without median. The land use is primarily mix land use institutional, commercial retail, office use and residential. The corridor has many signalized intersections. The study area comprises two alternative corridors as detailed below.

- First corridor includes Sardar Patel road and IT corridor (Approx. 6 km)
- Second corridor includes Velachery road and Tharamani road (Approx. 9 km)

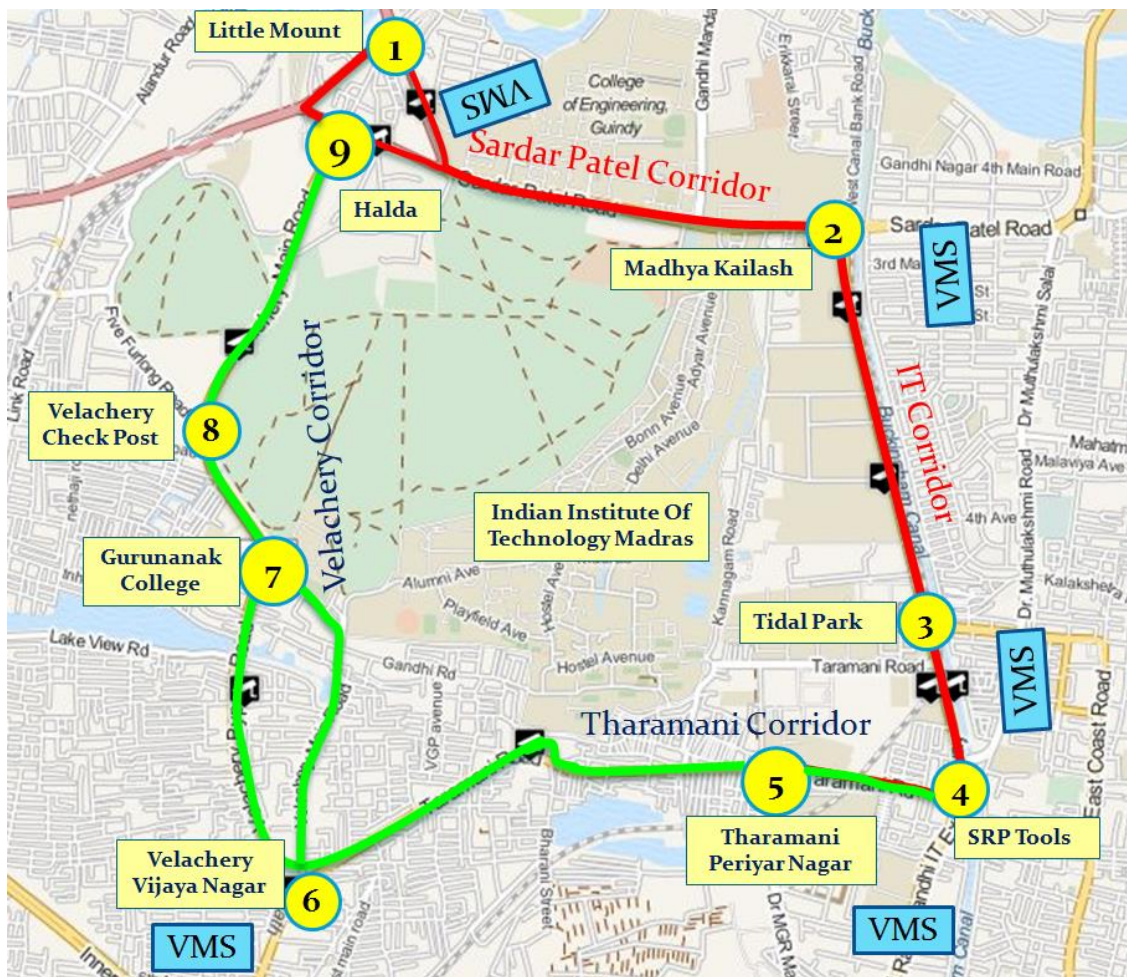


Figure 1.1: Study Area Network

1.4 Study Objectives

The study aims to evaluate the success of installed Advanced Traveller Information System (ATIS) through impact analysis of after traffic data on parameters such as stream speed, travel time, delays, volume etc.



1.5 Scope of Services

The broad scope of work for project is listed below.

- I: GPS based Vehicle Tracking Surveys
- II: Video Data Extraction Surveys
- III: User Perception Survey (Web-based and VMS)
- IV: Analysis of various data.
- V: After Study Project Report

1.5.1 GPS based Vehicle Tracking Surveys

Use of high accuracy (10m or less) GPS units provided by IIT Madras for collecting the GPS data recorded at one second intervals. Three types of vehicles for the GPS survey - Two Wheeler, Car, and Auto-rickshaw. The consultant had to arrange vehicles for mounting GPS units

The vehicles had to collect data on four routes mentioned below

- One set of vehicles refers to one two wheeler, one car, and one auto-rickshaw.
- On each of the four routes, the first set of vehicles had to start from the origin at the session start time for each session. Subsequent sets of vehicles had to depart from their origin every 10th minute thereafter for two wheeler and car where else auto-rickshaw had to depart from their origin every 20th minute
- The last set of vehicles on each of the routes should be departing from their origins at session end times

Deliverables - GPS Data

The consultant should submit the data (Latitude, longitude, time stamp and speed) from the GPS units in tabular form.

The output submitted should be in spreadsheet format (in CDs / DVDs) with the following additional information: route name, vehicle type and last four digits of registration number, start and end times

Analysis of GPS data: The following information has to be generated and presented using the GPS data

- Least Average Travel Times for selected OD pairs (see Annexure IV for selected OD pairs)
- Average Route Travel Times for Alternate Routes for selected O-D pairs
- Speed Profiles (number of links under the five speed range categories). A link is defined as road section between two consecutive intersections. The five speed range categories are: < 10 kmph, 10 – 20 kmph, 20 – 30 kmph, 30 – 40 kmph, and > 30 kmph.
- Delay times (when speeds < 5 km/h) for Alternate Routes for Selected O-D Pairs
- A comparative analysis of the above statistics in relation to “Before Study” data provided by IIT Madras.



1.5.2 Video Data Extraction Surveys

Classified volume count extracted from video data aggregated for every 1 minute interval had to be submitted in separate spreadsheet files for each midblock and intersection. The data had to be indexed by date, time, direction of flow, intersection/mid-block location names and numbers, and road names.

For each intersection, extraction of data should be done for straight/through, left turning and right turning traffic separately. If there are significant numbers of vehicles making U-turns, this must be recorded separately.

The following seven categories shall be counted separately from the video: Two Wheelers (all categories), Auto-rickshaws, Car/Van/Jeep, Light Commercial Vehicles (Goods Van, Tempo Travellers), and Heavy Motor Vehicles (Buses, Trucks, Multi Axle Vehicles and Tractors).

1.5.3 User Perception Survey (Web-based and VMS)

User perception survey was required to evaluate the perception of users to the two different mediums of information dissemination (web site and VMS).

1.5.3.1 Web-based Survey

Web-based survey questionnaire survey had to be done from following two samples from regular visitors to the site from new users

Web-based survey had to be based on the format given by IIT Madras and had to be approved by project team at IIT Madras. 400 valid responses (200 from regular visitors of the website and 200 from first-time visitors to the website) were required for web-based survey.

1.5.3.2 VMS Feedback Questionnaire

For VMS feedback, both intercept surveys (respondents were travellers intercepted when travelling along the study corridor) and surveys at residences / office areas needed to be done 200 was the required sample size for both intercept survey and surveys at residences/office areas (therefore 400 total valid responses were required). Questionnaire had to be approved by project team at IIT Madras

Deliverables – User Perception Survey Data

For the web-based survey the data (in database and spreadsheet format) containing all the responses including data on whether the survey was completed by regular or new user, the name and contact phone number of respondent, the IP address of the machine on which the survey was completed, and the date and time of starting and completing the survey.

For the VMS survey, the hard copy of the survey forms, a database of the responses compiled including the data on the name and contact phone number of respondent, whether survey was intercept survey or carried out at a residence/office, date and time of starting and completing the survey, location of conduct of the survey (nearest intersection roads/landmark) must be provided.

1.6 Consultant’s Approach and Methodology

For the purpose of preparation of Advance Traveller Intelligent System report for proposed railway line, it is very important to decide on a scientific and rational work sequence in the beginning itself. This sequence of course, had to undergo continuous monitoring and fine tuning during the course of the project. The first step in this process was proper task definition. **Figure 1.2** gives a thematic sequence of the steps followed by the Consultants to meet the vision and scope of work of the study.

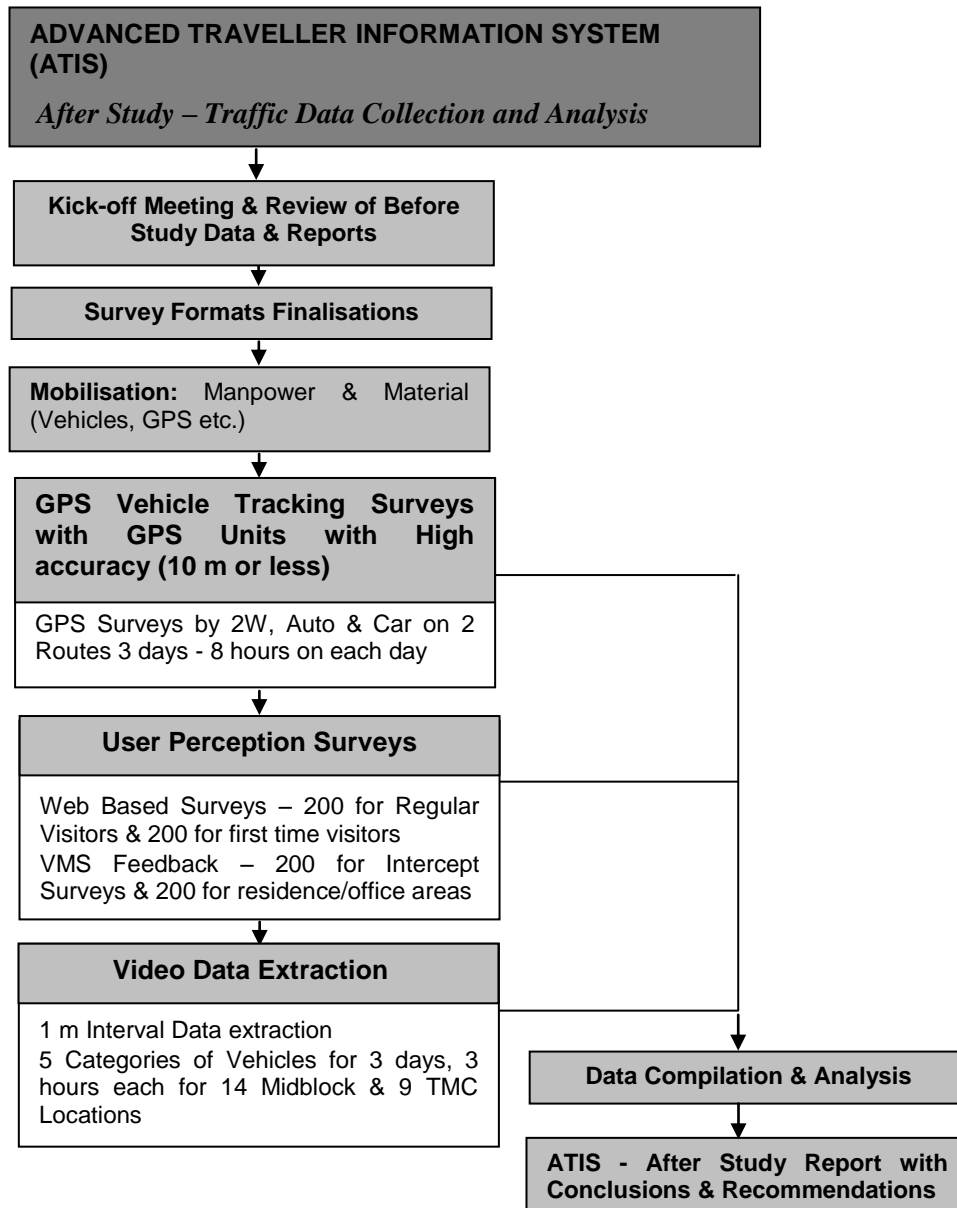


Figure 1.2: Study Approach & Methodology

1.7 Work Plan and Manning Schedule

Work plan and Manning schedule/Team composition for the study is illustrated in **Figure 1.3** at the end of this chapter.



1.8 Organisation of Report

In accordance with the scope of work enumerated in the ToR and all the subsequent interactions with the Client, the present report includes study methodology, GPS based vehicle tracking surveys, video data extraction and user perception surveys and its analysis, i.e. travel times, delay, speed, traffic and user perceptions and their feedback on the implemented ATIS. Various details are presented in following chapters:

Chapter 1 presents a concise write-up on the study area, objectives, study approach and methodology, work plan and manning schedule for the study.

Chapter 2 indicates the detailed GPS based vehicle tracking surveys, video data extraction and user perception surveys analysis and results interpretations.

Chapter 3 indicates the evaluation of installed Advanced Traveller Information System (ATIS) through impact analysis of after data parameters such as stream speed, travel time, delays, volume with before study report and key conclusions.

Chapter 2: Primary Data Collection & Analysis



CHAPTER 2 PRIMARY DATA COLLECTION & ANALYSIS

2.1 Primary Data Collection

GPS based vehicle tracking surveys, video based traffic data collection ,user perception surveys and analysis are important elements to evaluate the success of installed ATIS through impact analysis on parameters such as, stream speed, travel time, delays, traffic volume and user perception etc.

The consultant mobilized team on 20th August 2014 for site visit and on site survey arrangements. Kick off meeting presentation was held on 23rd August 2014 to review and assessment of consultant's approach and work plan prior to the commencement of field surveys. Survey formats were discussed and finalized the detailed methodology for the adequate quality control in primary data collection i.e.GPS based vehicle tracking surveys, Video based traffic data extraction and User Perception Surveys.

To satisfy the requirements of after study, following various types of surveys were carried out as part of primary data collection:

- GPS based vehicle tracking surveys
- Video data Extraction Surveys
- User Perception Surveys

All the above surveys were carried out as per the schedule finalized after considering requirements of TOR and prior consent of client. Primary data collection schedule is enclosed in **Figure 1.3** chapter 1.

2.2 GPS Based Vehicle Tracking Surveys

Travel time, a fundamental measure in transportation, is the total elapsed time necessary for a vehicle to travel from one point to another over a specified route under existing traffic conditions. Delay on the other hand is the time lost to travel because of traffic frictions and traffic control devices. Travel time, speed and delay studies are used to evaluate traffic conditions, determine levels of service, speed and delay characteristics in the transportation network. The speed and delay surveys of ATIS study area network has been carried out by an accurate and cost-effective data-gathering technique using GPS. The following part presents a GPS-based travel time and delay surveys, data extraction, data compilation and analysis.

The primary objective of this study was to measure mode (2W/3W/Car) and session (morning /Afternoon/Evening) wise travel time, speed and delays through a study area corridor after installation of Advanced Traveler Information System (ATIS).

Several key definitions for the GPS speed and delay surveys are defined as follows:

Travel Time is defined as the time it takes to move the distance between two points of interest. Travel time is made up of two basic components, running time and stopped delay time.

Running Time is the time period when the vehicle or person is in motion.

Stopped Delay Time is the time period when the object or person has stopped moving or has almost stopped moving. An example of Stopped Delay time is the time period when a vehicle is stopped at signalized intersections.

2.2.1 GPS based Vehicle Tracking Surveys & Analysis - Conceptual Framework

The methodological framework for the GPS based tracking surveys and analysis is given in the **Figure 2.1**.

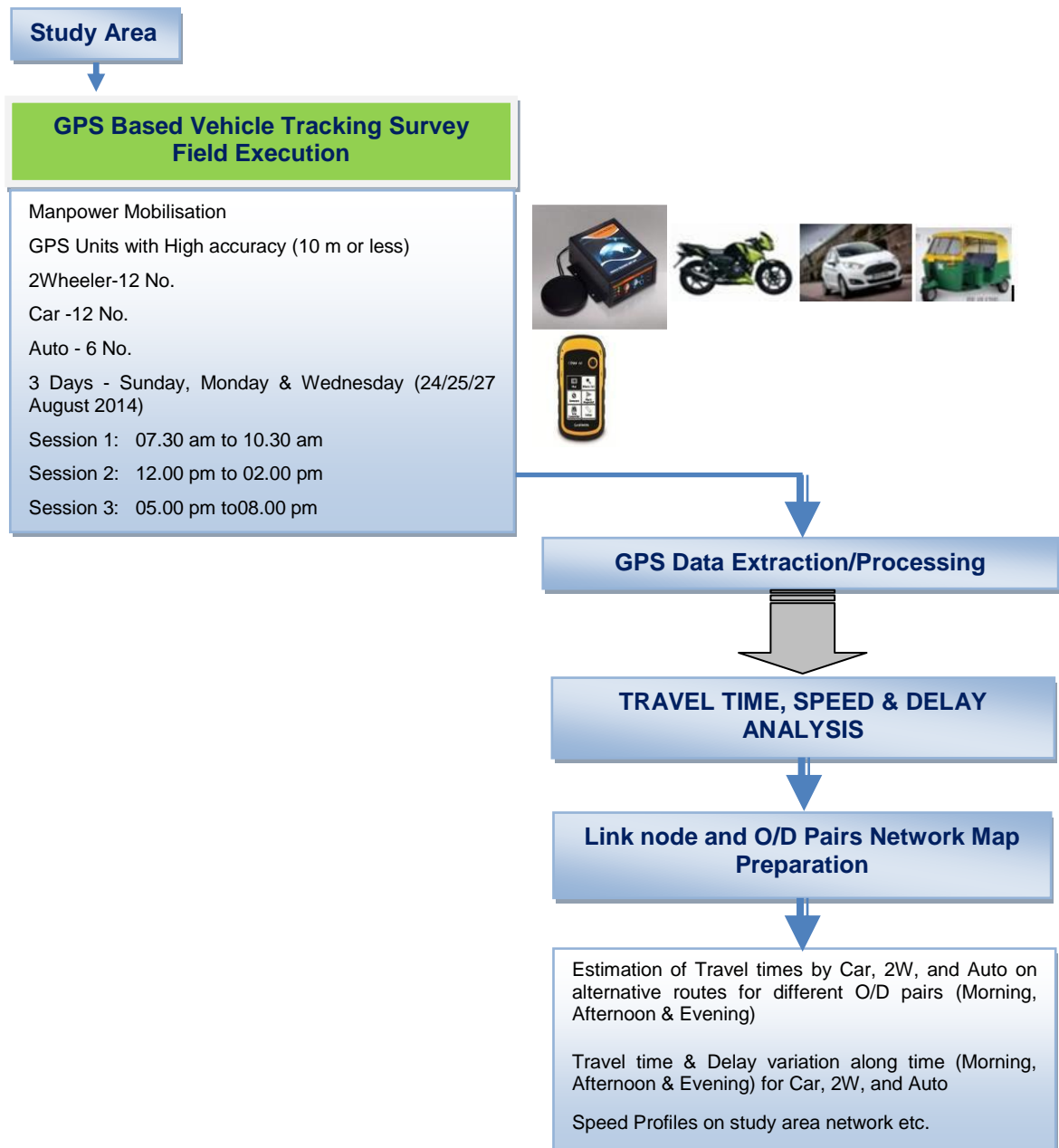


Figure 2.1 GPS Based Vehicle Tracking Surveys & Analysis - Conceptual Framework

2.2.2 GPS based Vehicle Tracking Surveys Field Execution

GPS based Vehicle tracking survey was conducted by 3 modes to collect the data on position (Latitude & Longitude) speed and time along the two alternative corridors in both directions. Three different types of vehicles were selected for the purpose of the GPS based vehicle tracking survey - Two Wheeler, Car and Auto rickshaws. A total of 12 two wheelers, 12 cars and 6 auto rickshaws were utilized for the survey. GPS devices were installed in all vehicles with high accuracy (10m or less) for collecting the GPS data at one second interval. Two O/D pairs (Raj Bhavan (2) and SRP Tools – (6)) were selected as the start point of the one set of GPS mounted vehicles for clockwise and anti clock wise movement for each session for 3 days. A set of vehicles consisted of one two wheeler, one car and one auto rickshaws. The GPS surveys schedule, equipments and route details are shown in **Figure 2.2** and **Table 2.1**.

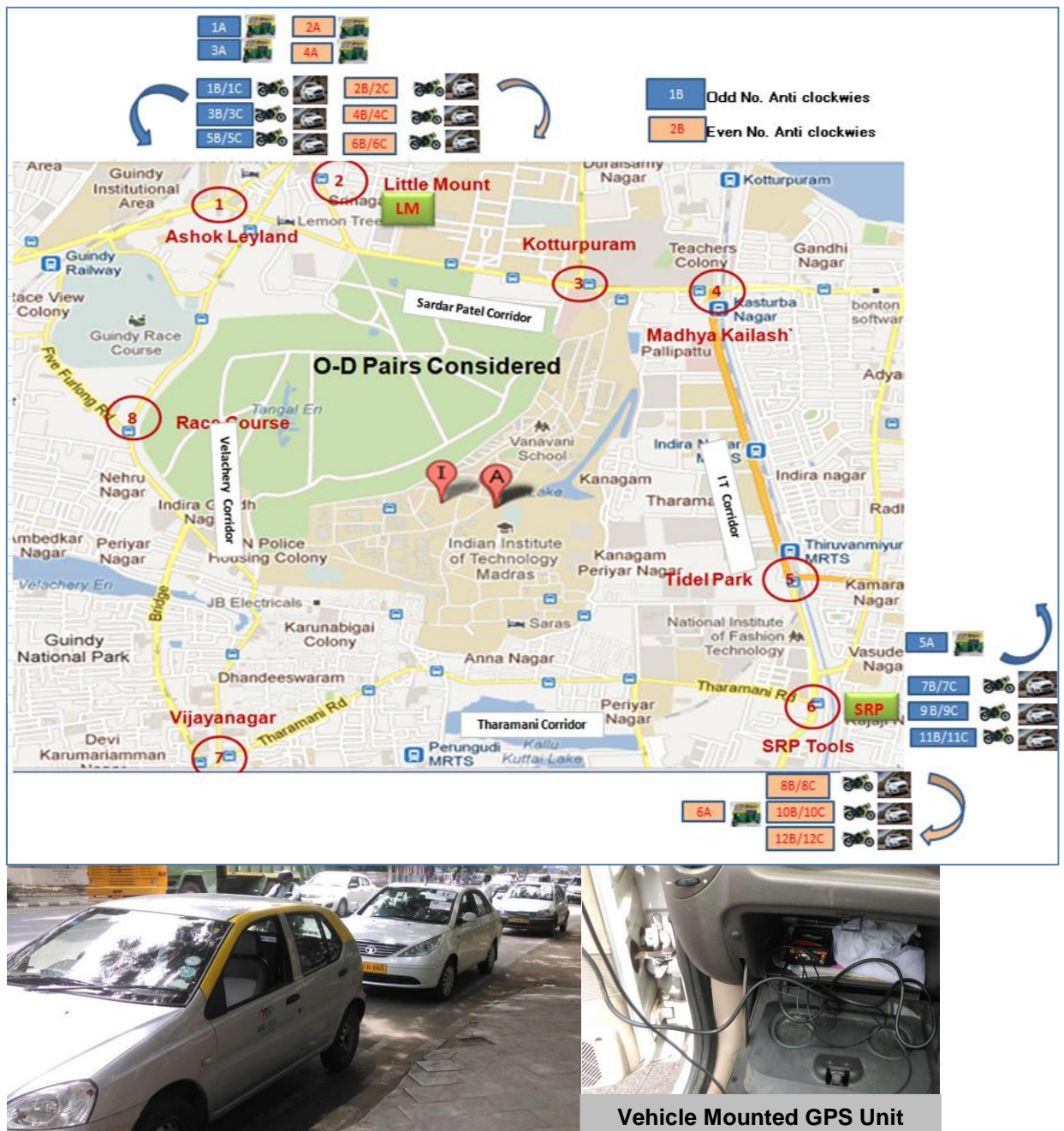


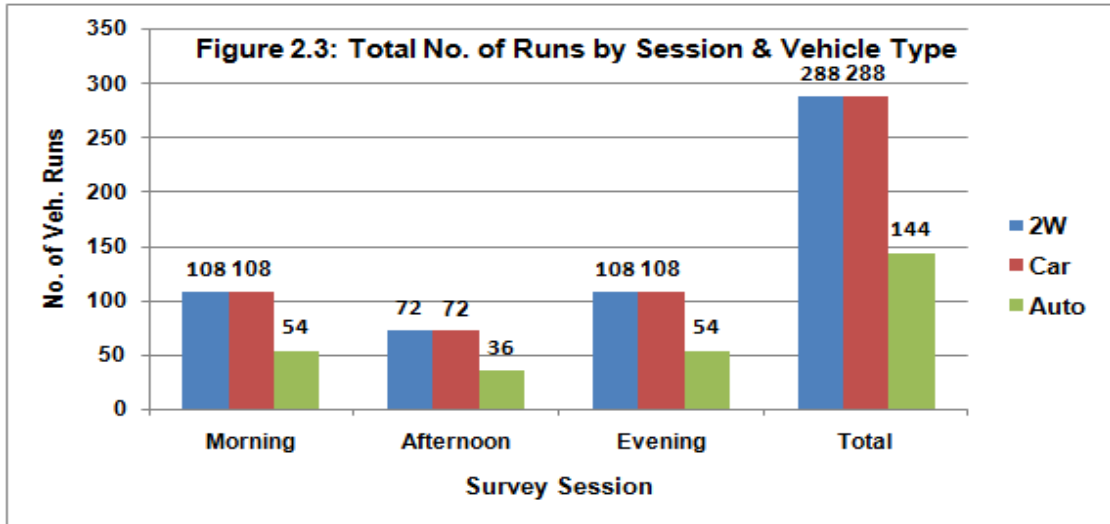
Figure 2.2: GPS Surveys Schedule, Equipments and Route Details



Table 2.1: Schedule, Equipments and Route Details for GPS Vehicle Tracking Surveys

24-25-27 August 2014	Equipments & Specifications (Make, Model)	Types & No. of Vehicles	Schedule Departure & Intervals	Movement & Route
Sunday/ Monday /Wednesday				
<p>Session 1: 07.30 am to 10.30 am (3 Hours)</p> <p>Session 2: 12.00 pm to 02.00 pm (2 Hours)</p> <p>Session 3: 05.00 pm to 08.00 pm (3 Hours)</p>	<p>High Accuracy GPS (10 m or less) GPS Units for collecting the data recorded at 1 second Intervals</p> <p>Garmin E Trax 10 (Hand Held) for 2W /Bike</p> <p>VISIONTEK 86VT Vehicle Tracking Unit (Vehicle Mounted) for Auto & Car</p>	<p>2W -12 No./day (1B,3B,5B,7B,9B,11B,2B,4B,6B,8B,10B,12B)</p> <p>Car -12 No. (1C,3C,5C,7C,9C,11C,2C,4C,6C,8C,10C,12C)</p> <p>Auto -6 No. (1A,3A,5A, 2A,4A,6A)</p>	<p>Departure time for first 2W on session start time & Subsequent 2W depart from their origin every 10th minute thereafter.</p> <p>Departure time for first Car on session start time & Subsequent Car depart from their origin every 10th minute thereafter.</p> <p>Departure time for first Auto on session start time & Subsequent Auto depart from their origin every 20th minute thereafter.</p> <p>The last set of vehicles on each of the routes departing from their origins at session end times.</p> <p>8 Rounds trips per vehicle per day</p>	<p>Clock Wise</p> <p>Route_7-4-1-16-14-33-10-34-28-25-22-20-49-55-7</p> <p>Anti Clock Wise</p> <p>Route_7-19-21-24-27-35-74-31-68-38-12-15-3-5-18-19-49-55-7</p>

Total of 720 vehicular runs (288 runs by 2W, 288 runs by Car and 144 runs by Auto) captured during the whole session of GPS data Collection.



2.2.3 Link node and O/D Pairs Network Map Preparation

A coded road network has been prepared covering study area alternative routes. Each junction has been numbered as a node and the road connecting any two nodes is defined as a link. The network coding diagram for the study area is shown in **Figure 2.4**.

The site chosen for GPS based vehicle tracking surveys located on Chennai's Sardar Patel Road, flanked by the residential districts of Adyar and Velachery. The corridor travels through Little Mount, Madhya Kailash, SRP tools, Vijaya nagar, race course and Ashok Leyland intersection. The study corridor is primarily a four-lane / two lane urban road with and without median. The land use is primarily mix land use institutional, commercial retail, office use and residential. The corridor has many signalized intersections. The study area comprises two alternative corridors as detailed below.

1. First corridor includes Sardar Patel road and IT corridor (Approx. 6 km)
2. Second corridor includes Velachery road and Tharamani road (Approx. 9 km)



Figure 2.4: Link Node and O/D Pairs Network Map



Clock wise and anti clock wise traffic movement (Node link) on study corridor is shown in **Table 2.2 (a)** & **Table 2.2 (b)** respectively.

Table 2.2 (a): Clock wise Traffic Movement – Node Links

Origin /Destination (O/D) Pair No.	Location	Clock wise Movement		Link_ID
		(2B,4B,6B & 8B,10B,12B)		
		(2C,4C,6C & 8C,10C,12C)		
		(2A,4A,6A)		
		t_node	h_node	
10	Little Mount	55	7	557
2	Raj Bhavan	7	4	74
3	Kottupuram	4	1	41
4	Madhya Kailash	1	41	141
		2	41	241
		41	16	4116
5	Tidal Park	16	77	1677
		77	14	7714
6	SRP Tools	14	33	1433
		13	33	1333
9	Tharamani Pillayar Koil	33	39	3339
		39	69	3969
7	Vivegam Institute of Yoga to Gurunanak College Jn. Via ICICI Bank ATM	69	70	6970
		70	72	7072
		72	34	7234
		34	29	3429
7	Vivegam Institute of Yoga to Gurunanak College Jn. Via Velachery Bypass	69	10	6910
7		10	30	1030
7		30	36	3036
		9	36	936
		36	28	3628
7	Vivegam Institute of Yoga to Gurunanak College Jn. Via Lenovo sales and Service Center	10	73	1073
7		73	34	7334
		28	25	2825
		29	25	2925
8	Velachery Check post	25	22	2522
		22	20	2220
		20	49	2049
1	Ashok Leyland	49	55	4955

IT Corridor

Tharamani - Velachery Corridor

B- Bike/2W

C- Car/4W

A- Auto/3W



Table 2.2 (b) : Anti Clock wise Traffic Movement – Node Links

Origin/ Destination (O/D) Pair No.	Location	Anti Clock wise Movement		Link_ID
		(1B,3B,5B & 7B,9B,11B)		
		(1C,3C,5C & 7C,9C,11C)		
		(1A,3A,5A)		
		t_node	h_node	
10	Little Mount	55	7	557
2	Raj Bhavan	7	19	719
		19	21	1921
		21	24	2124
8	Velachery Check post	24	27	2427
	Gurunanak College Jn. To	27	35	2735
	Vivegam Institute of Yoga Via	35	74	3574
	Lenovo sales and Service Center	74	31	7431
7		31	68	3168
	Gurunanak College Jn. To	74	71	7471
	Vivegam Institute of Yoga Via	74	68	7468
	ICICI Bank ATM			
	Gurunanak College Jn. To	27	37	2737
	Vivegam Institute of Yoga Via	37	8	378
7	Velachery Bypass	8	11	811
		11	31	1131
7		68	38	6838
		38	32	3832
9	Tharamani Pillayar Koil	32	12	3212
6	SRP Tools	12	75	1275
		13	75	1375
5	Tidal Park	75	15	7515
		15	40	1540
4	Madhya Kailash	40	3	403
3	Kottupuram	3	5	35
		5	18	518
		18	19	1819
1	Ashok Leyland	19	49	1949
		49	55	4955

■ IT Corridor

■ Tharamani - Velachery Corridor

B- Bike/2W

C- Car/4W

A- Auto/3W

2.2.4 GPS Data Extraction/Processing

Surveys carried out using GPS equipment produce a large amount of data. Day, mode and session (Morning, Afternoon, and evening) wise GPS data were extracted from the relevant GPS devices in excel formats. The GPS output spreadsheets with different attributes i.e. vehicle type, route name, date and day, vehicle code, last four digits of registration number, GPS serial no/ device ID, time stamp, date, t node, h node, segment travel, travel time, speed, stopped time, signal delay etc. are enclosed separately in CD.



2.3 GPS based Vehicle Tracking Surveys Data Analysis

Mode and session wise alternative travel times, speed and delay were estimated for following 15 Origin-Destination pairs by excel based network file/program.

Table 2.3 : Origin Destination Pairs

Origin/Destination Pair No.	Location
1-6	Ashok Leyland -SRP Tools Via IT & Velachery Corridors
6-1	SRP Tools - Ashok Leyland Via Velachery & IT Corridors
8-6	Velachery Check post - SRP Tools Via IT & Velachery Corridors
6-8	SRP Tools - Velachery Check post Via Velachery & IT Corridors
2-6	Raj Bhavan - SRP Tools Via IT & Velachery Corridors
6-2	SRP Tools – Raj Bhavan Via Velachery & IT Corridors
10-6	Little Mount - SRP Tools Via IT & Velachery Corridors
6-10	SRP Tools – Little Mount Via Velachery & IT Corridors
5-10	Tidal Park- Little Mount Via Velachery & IT Corridors
5-1	Tidal Park- Ashok Leyland Via Velachery & IT Corridors
5-8	Tidal Park- Velachery Check post Via Velachery & IT Corridors
7-4	Vijaya Nagar – Madhya Kailash Via Velachery & IT Corridors
7-3	Vijaya Nagar – Kottupuram Via Velachery & IT Corridors
2-9	Raj Bhavan – Tharamani Pillayar Koil Via IT & Velachery Corridors
4-7	Madhya Kailash - Vijaya Nagar Via IT & Velachery Corridors

Data Analysis Criteria

The following criteria were adopted for calculation of different parameters (travel time, delay and speed etc.) of GPS data analysis:

Travel times for different O-D pairs, link wise travel times are added to get the total travel time. Travel time for O-D pair is calculated as the difference between the time at which the trip ends at the destination and the time at which the trip begins at the origin.

Link and intersection travel times for two alternative routes for eleven O-D pairs were computed for different vehicle types and time periods using Excel based coding program.

Effective Travel Time at O/D (7-4, 7-19, 14-33, 13-33, 12-75) Links = Travel Time - Time at instances when speed is 0 kmph.

- Effective TT = TT-Time (When S=0 Kmph)

Effective Travel Time at non OD links (other than 7-4, 7-19, 14-33, 13-33, 12-75) = Travel Time

- Effective TT = TT

Effective Delay at OD (7-4, 7-19, 14-33, 13-33, 12-75) Links = Time at instances when speed is less than 5 Kmph - Time at Instances when speed is 0 Kmph.

- Effective Delay = Delay @ S<5 Kmph - Delay @ S=0 Kmph

Effective Delay at non OD (other than 7-4, 7-19, 14-33, 13-33, 12-75) links = Time at

instances when Speed is less than 5 Kmph


- Effective Delay = Delay @ S<5 Kmph

Speed profiles were plotted along the corridor using different colours. If the speed of the link/ intersection is less than 15 kmph, that link is indicated by red colour. If the speed is greater than 15kmph and less than 30 kmph, yellow colour is used. If speed is greater than 30 kmph, green colour is used.

2.3.1 Travel Times, Delay and Speed Analysis: 4W/Car

Day and session wise GPS raw files were analysed for 12 Car to estimate the different parameters i.e. travel times, speed and delay. Summary of weekend Car travel times for different OD pairs in the study area are shown in **Table 2.4 (a)**.

Table 2.4 (a): Session wise Travel Times for different OD Pairs – Car (Weekend)

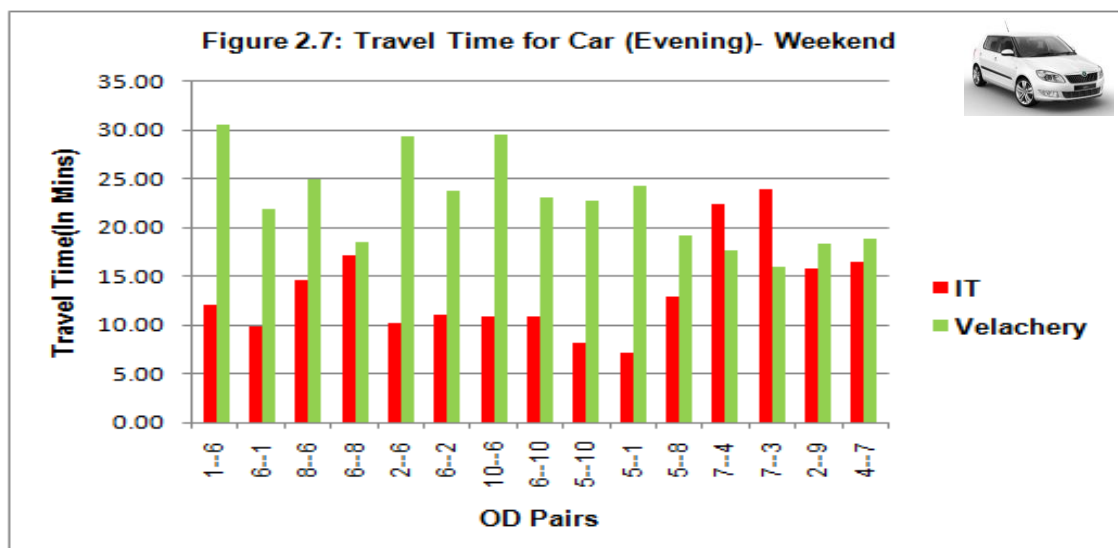
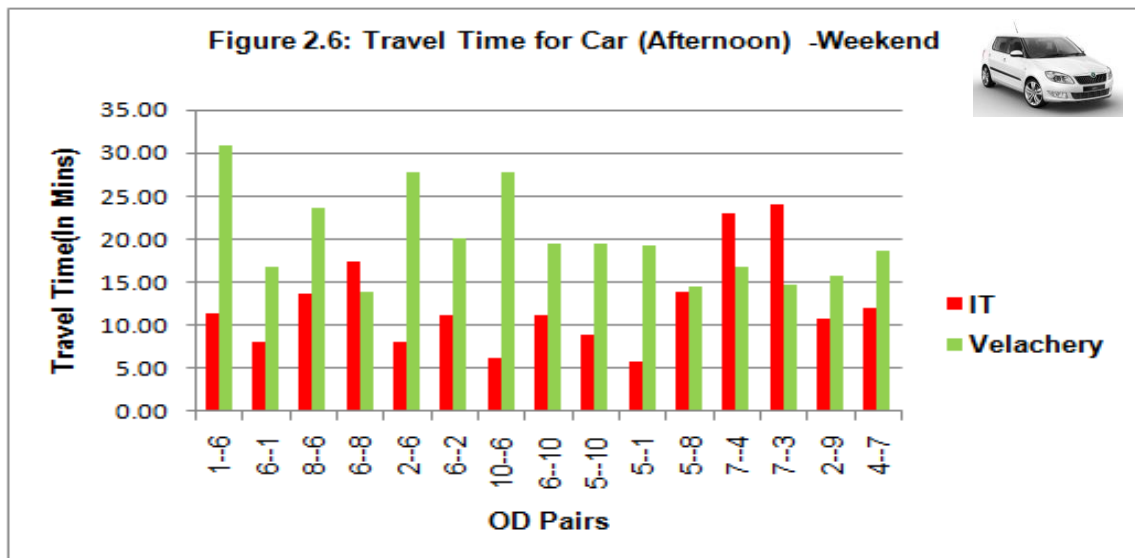
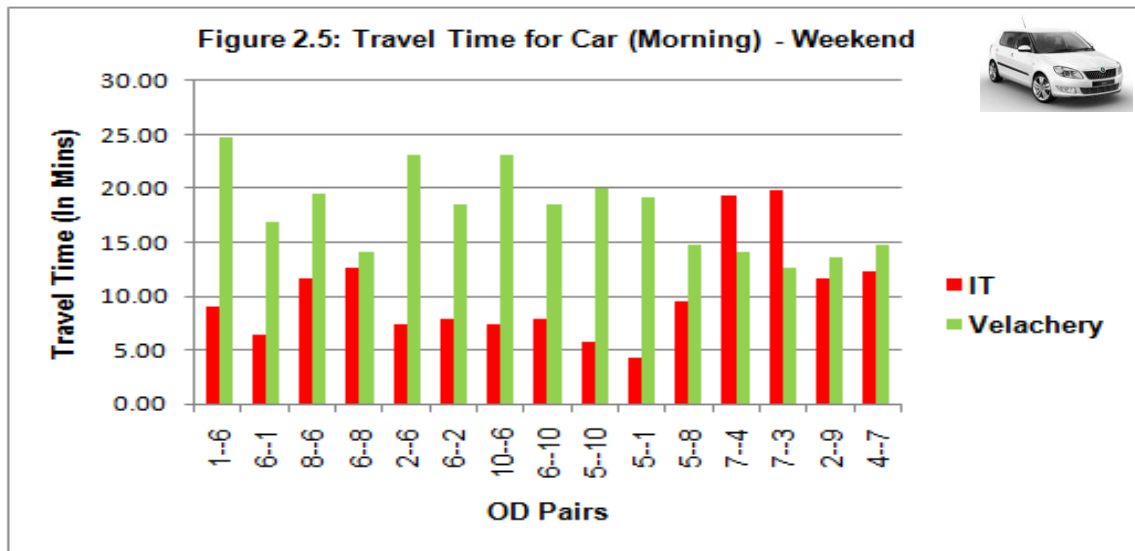
 OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
1-6 (Ashok Leyland -SRP Tools)	8.97	24.68	11.43	30.93	11.96	30.48
6-1 (SRP Tools - Ashok Leyland)	6.35	16.91	8.14	16.74	9.84	21.88
8-6 (Velachery Check post - SRP Tools)	11.69	19.56	13.64	23.54	14.54	24.81
6-8 (SRP Tools - Velachery Check post)	12.62	14.03	17.47	13.85	17.09	18.47
2-6 (Raj Bhavan- SRP Tools)	7.44	23.17	8.16	27.85	10.14	29.27
6-2 (SRP Tools – Raj Bhavan)	7.86	18.45	11.21	20.01	11.05	23.70
10-6 (Little Mount - SRP Tools)	7.44	23.17	6.26	27.85	10.82	29.45
6-10 (SRP Tools – Little Mount)	7.86	18.45	11.21	19.44	10.88	23.02
5-10 (Tidal Park- Little Mount)	5.77	20.02	8.93	19.49	8.14	22.61
5-1 (Tidal Park- Ashok Leyland)	4.26	19.24	5.85	19.29	7.10	24.17
5-8 (Tidal Park- Velachery Check post)	9.51	14.72	13.84	14.46	12.86	19.14
7-4 (Vijaya Nagar – Madhya Kailash)	19.33	14.15	22.90	16.72	22.28	17.57
7-3 (Vijaya Nagar – Kottupuram)	19.84	12.62	24.08	14.75	23.84	15.95
2- 9 (Raj Bhavan – Tharamani Pillayar Koil)	11.57	13.56	10.77	15.77	15.68	18.32
4-7 (Madhya Kailash - Vijaya Nagar)	12.36	14.76	11.95	18.73	16.39	18.77

Following are the salient findings for travel time on weekend:




- Average travel time for IT Corridor is less as compared to Velachery for all OD Pairs except 7-4, 7-3 pairs.
- Average travel time on IT Corridor for all OD pairs and for all sessions is 17 minutes, while the average travel time on Velachery Corridor for all OD pairs and for all sessions is 23 minutes.
- The general trend shows that the travel time in evening session on both corridors is more than the other two sessions.
- The maximum travel time in morning session is 29.73 minutes for 8-6 OD pair, in noon session it is 23.77 minutes for 7-3 OD pair and in evening session it is 28 minutes for 8-6 OD pair for IT corridor.
- The minimum travel time in morning session is 7.6 minutes for 5-1 OD pair, in noon session it is 7 minutes for 5-1 OD pair and in evening session it is 10.14 minutes for 5-1 OD pair for IT corridor.
- The maximum travel time in morning session is 28.06 minutes for 7-4 OD pair, in noon session it is 25.29 minutes for 1-6 OD pair and in evening session it is 32.32 minutes for 6-2 OD pair for Velachery corridor.
- The minimum travel time in morning session is 15.85 minutes for 5-8 OD pair, in noon session it is 12.30 minutes for 7-3 OD pair and in evening session it is 22.83 for 4-7 OD pair for Velachery corridor.
- Average travel time of Velachery corridor is about 8 minutes higher than IT Corridor for 1-6 and 6-1 OD pairs in all sessions (Morning/Afternoon/Evening) and the distance of Velachery corridor is also increased.
- Average travel time of IT corridor is about 3 minutes higher than Velachery Corridor for 8-6 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of IT corridor is 3.5 minutes higher than Velachery Corridor for 6-8 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 14-15 minutes higher than IT Corridor for 2-6 and 6-2 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 11-12 minutes higher than IT Corridor for 10-6 and 6-10 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is significantly higher about 16-17 minutes higher than IT Corridor for 5-2 and 5-1 OD pairs in all sessions (Morning/Afternoon/Evening) but there is a significant increase in distance of Velachery Corridor as well.
- Average travel time of Velachery corridor is about 8 minutes higher than IT Corridor for 5-8 OD pair in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 4 minutes higher than Velachery Corridor for 7-4, 7-3, 2-9, 4-7 OD pairs in all sessions (Morning/Afternoon/Evening).
- The increase in travel time in Velachery Corridor is due to increase in distance of OD pairs on the corridor and delays.

Weekend variation in travel time across 15 OD pairs on the study corridor is presented through **Figure 2.5 to 2.7**.



Summary of weekday Car travel times for different OD pairs in the study area are shown in **Table 2.4 (b)**.

Table 2.4 (b): Session wise Travel Times for different OD Pairs – Car (Weekday)

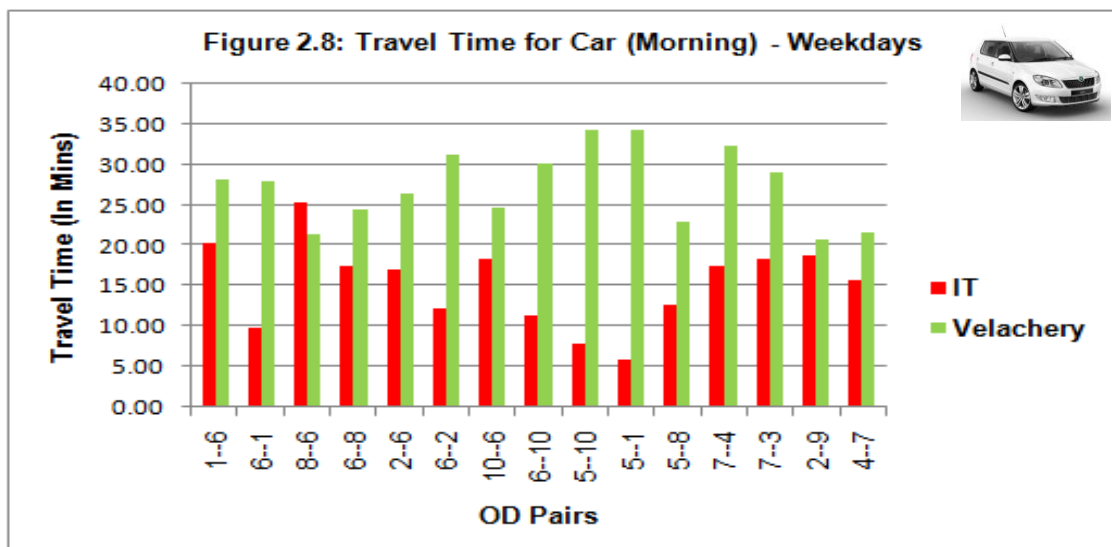
 OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
1-6 (Ashok Leyland -SRP Tools)	20.36	28.15	11.51	24.57	20.62	31.47
6-1 (SRP Tools - Ashok Leyland)	9.81	28.02	8.52	18.63	12.46	27.36
8-6 (Velachery Check post - SRP Tools)	25.38	21.53	12.92	19.10	25.04	21.54
6-8 (SRP Tools - Velachery Check post)	17.42	24.41	16.04	16.16	25.84	23.40
2-6 (Raj Bhavan- SRP Tools)	17.05	26.53	9.81	23.97	16.93	28.82
6-2 (SRP Tools – Raj Bhavan)	12.21	31.32	10.07	21.02	16.23	31.36
10-6 (Little Mount - SRP Tools)	18.27	24.79	10.73	24.19	18.54	27.81
6-10 (SRP Tools – Little Mount)	11.31	30.10	9.84	20.09	14.33	29.75
5-10 (Tidal Park- Little Mount)	7.82	34.42	6.19	21.22	11.17	30.87
5-1 (Tidal Park- Ashok Leyland)	5.92	34.27	5.22	16.44	8.66	32.18
5-8 (Tidal Park- Velachery Check post)	12.74	22.98	11.30	13.29	19.57	25.83
7-4 (Vijaya Nagar – Madhya Kailash)	17.56	32.29	17.93	15.81	18.46	25.26
7-3 (Vijaya Nagar – Kottupuram)	18.26	29.15	20.36	13.69	20.33	22.16
2- 9 (Raj Bhavan – Tharamani Pillayar Koil)	18.71	20.76	12.43	16.30	17.61	23.32
4-7 (Madhya Kailash - Vijaya Nagar)	15.64	21.71	13.71	16.84	21.59	27.96

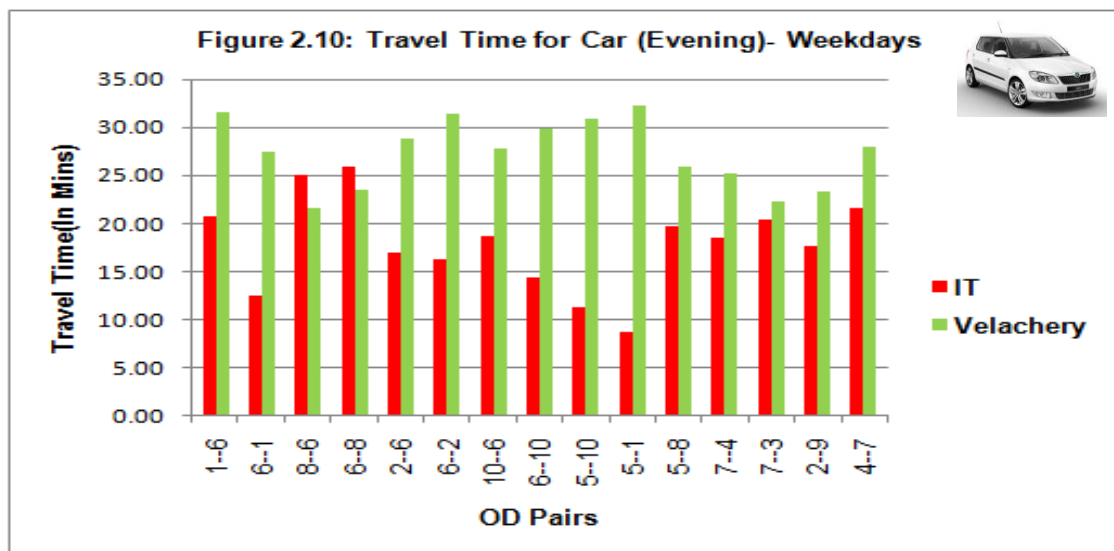
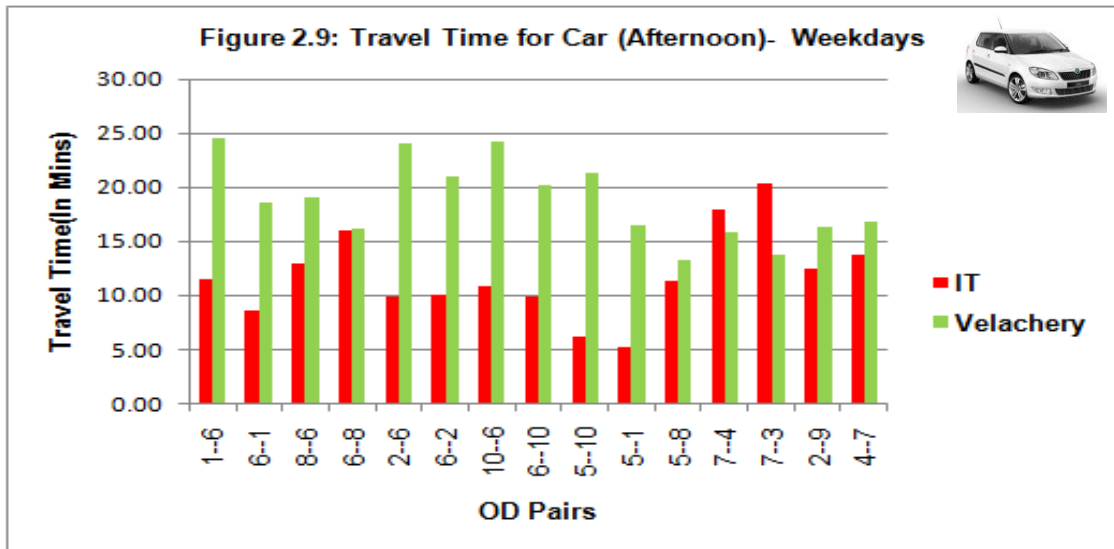
Following are the salient findings for travel time on weekday:

- Travel time is generally higher during week days in IT and Velachery corridors due to addition of work & education trips on weekdays.
- Average travel time for IT Corridor is less as compared to Velachery in morning session for all OD Pair except 8-6.
- Average travel time for IT Corridor is less as compared to Velachery in afternoon session for all OD Pairs except 7-4,7-3
- Average travel time for IT Corridor is less as compared to Velachery in evening session for all OD Pairs except 8-6, 6-8.
- Average travel time on IT Corridor for all OD pairs and for all sessions is 15 minutes, while the average travel time on Velachery Corridor for all OD pairs and for all sessions is 25 minutes.
- The maximum travel time in morning session is 25.38 minutes for 8-6 OD pair, in noon session it is 20.35 minutes for 7-3 OD pair and in evening session it is 25.84

- minutes for 6-8 OD pair for IT corridor.
- The minimum travel time in morning session is 6 minutes for 5-1 OD pair, in noon session it is 5.22 minutes for 5-1 OD pair and in evening session it is 8.66 minutes for 5-1 OD pair for IT corridor.
- The maximum travel time in morning session is 34.41 minutes for 5-10 OD pair, in noon session it is 24.56 minutes for 1-6 OD pair and in evening session it is 32.18 minutes for 5-1 OD pair for Velachery corridor.
- The minimum travel time in morning session is 20.75 minutes for 2-9 OD pair, in noon session it is 13.29 minutes for 5-8 OD pair and in evening session it is 21.53 for 8-6 OD pair for Velachery corridor.
- Average travel time of Velachery corridor is about 12-13 minutes higher than IT Corridor for 1-6 and 6-1 OD pairs in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 1 minutes higher than Velachery Corridor for 8-6 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is 1.5 minutes higher than Velachery Corridor for 6-8 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 13-14 minutes higher than IT Corridor for 2-6 and 6-2 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 12-13 minutes higher than IT Corridor for 10-6 and 6-10 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is significantly higher i.e. about 20 minutes higher than IT Corridor for 5-10 and 5-1 OD pairs in all sessions (Morning/Afternoon/Evening) but there is a significant increase in distance of Velachery Corridor as well.
- Average travel time of Velachery corridor is about 6 minutes higher than IT Corridor for 5-8 OD pair in all sessions (Morning/Afternoon/Evening).
- Average travel time of Velachery corridor is about 6-7 minutes higher than IT Corridor for 7-4, 4-7 OD pair in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 2-3 minute higher than Velachery Corridor for 7-3, 2-9, OD pairs in all sessions (Morning/Afternoon/Evening).
- The increase in travel time in Velachery Corridor is due to increase in distance of OD pairs on the corridor and delays.

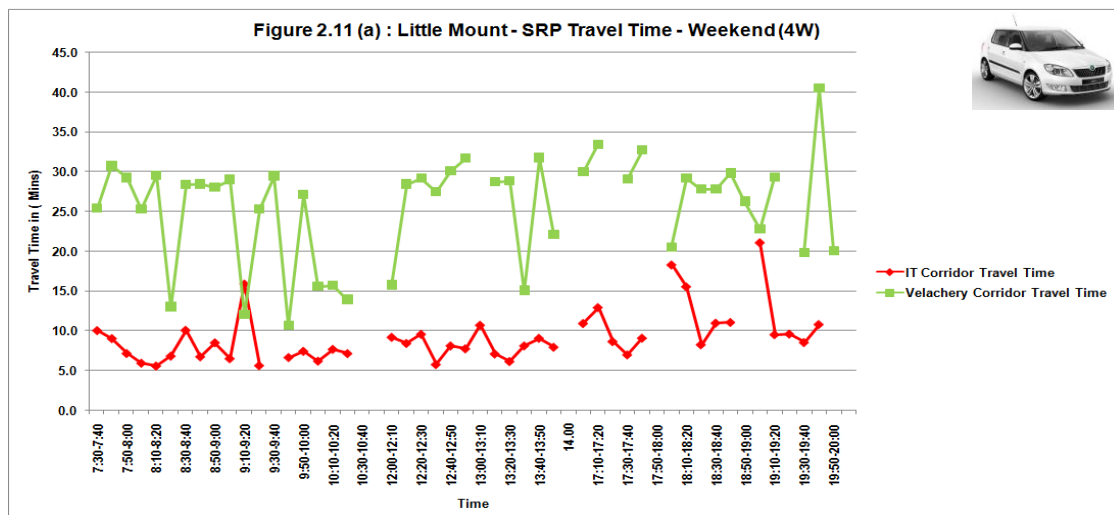
Weekday variation in travel time across 15 OD pairs on the study corridor is presented through **Figure 2.8 to 2.10**.

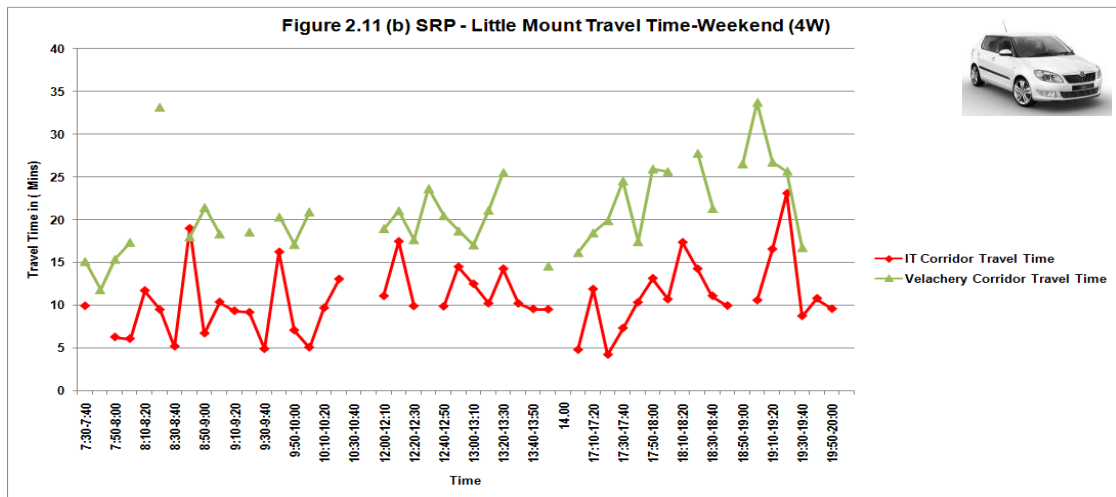




Travel Times - Weekends

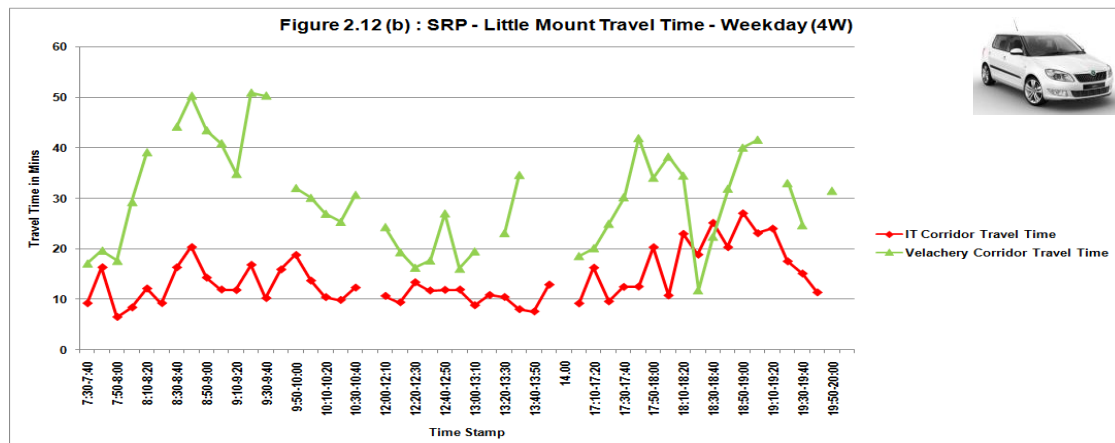
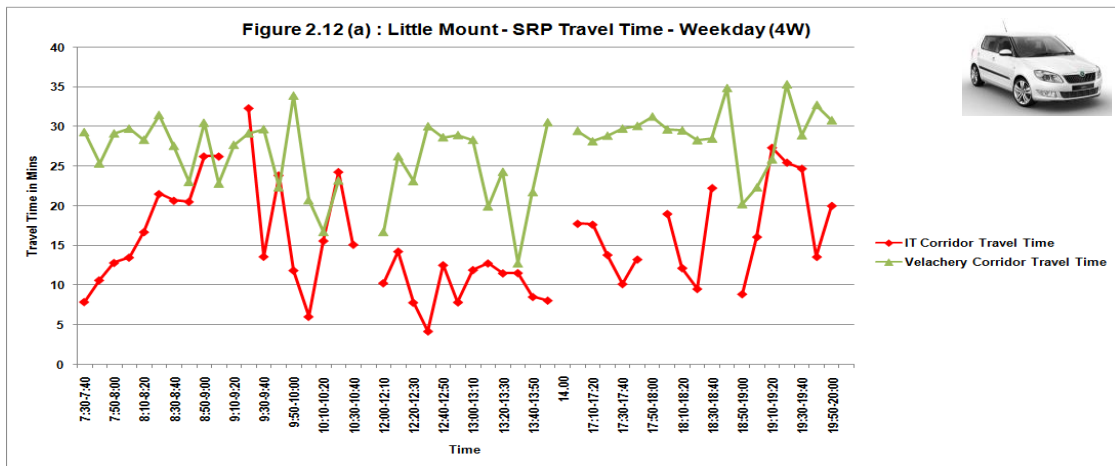
Travel times for the two alternative routes along the corridor were computed for different sessions (Morning, afternoon and Evening).





- Time periods versus travel time graphs shows that; IT corridor travel time is very less compared to Velachery with all three sessions (Morning/Afternoon/evening) in both OD pairs (2-6 & 6-2).
- Travel times are average 16 minutes higher in Velachery corridor for all the sessions in both OD pairs (2-6 & 6-2).
- Travel time increases in morning (9-10 am) and evening (6-7 pm) peak hours in both the corridors.

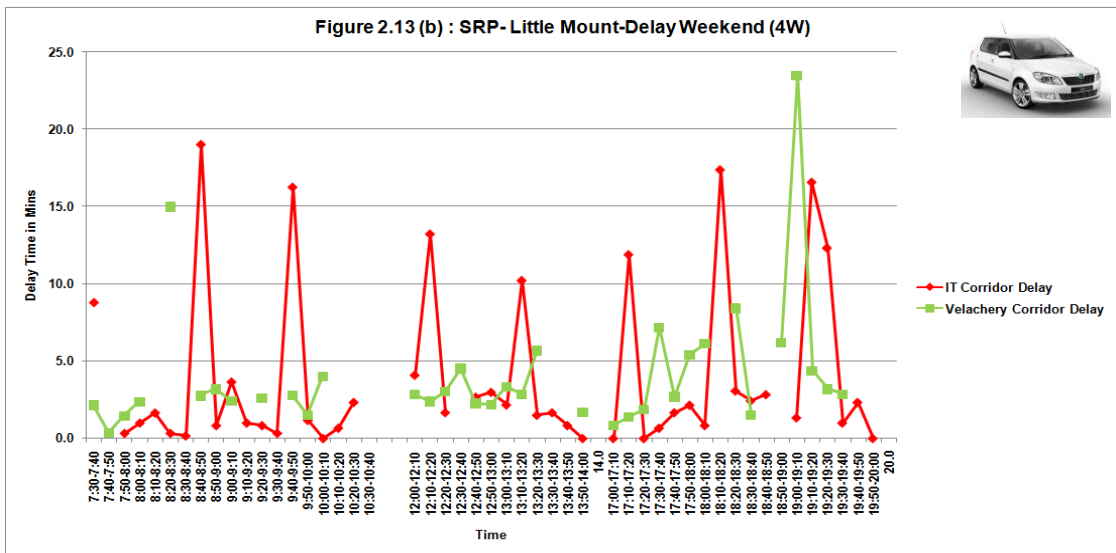
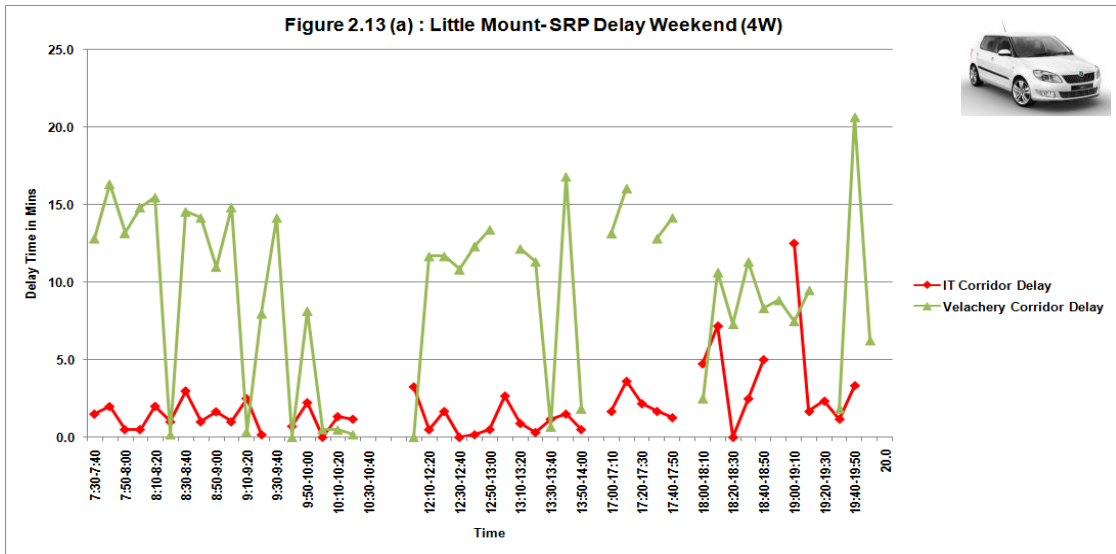
Travel Times - Weekdays



- On weekdays, travel time for cars is generally higher on Velachery road compared to IT Corridor for both the routes. Highest travel time of 51 min is obtained during morning (09:20-09:30) on Velachery road from SRP to Little Mount.

Delay - Weekends

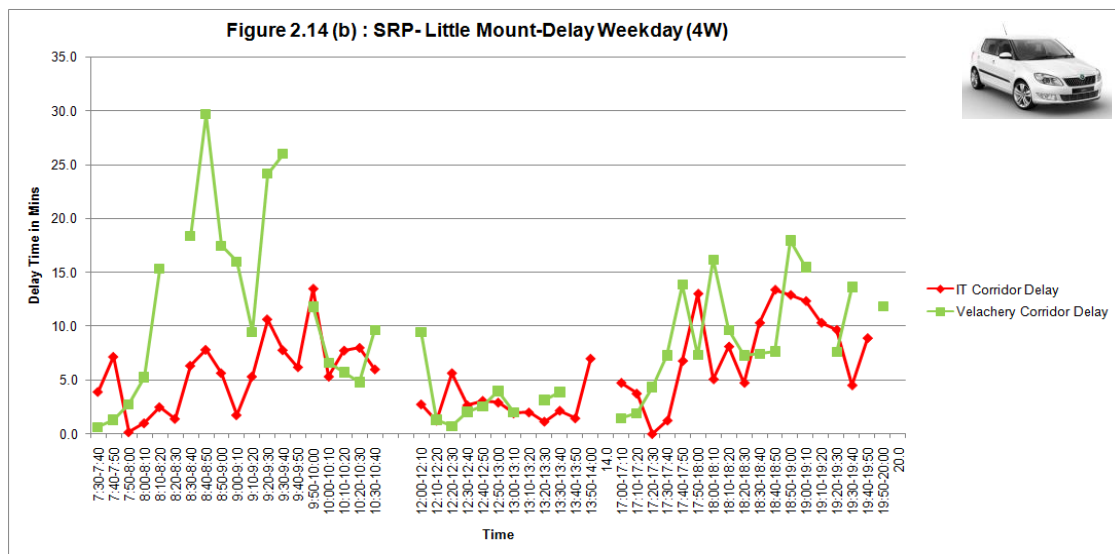
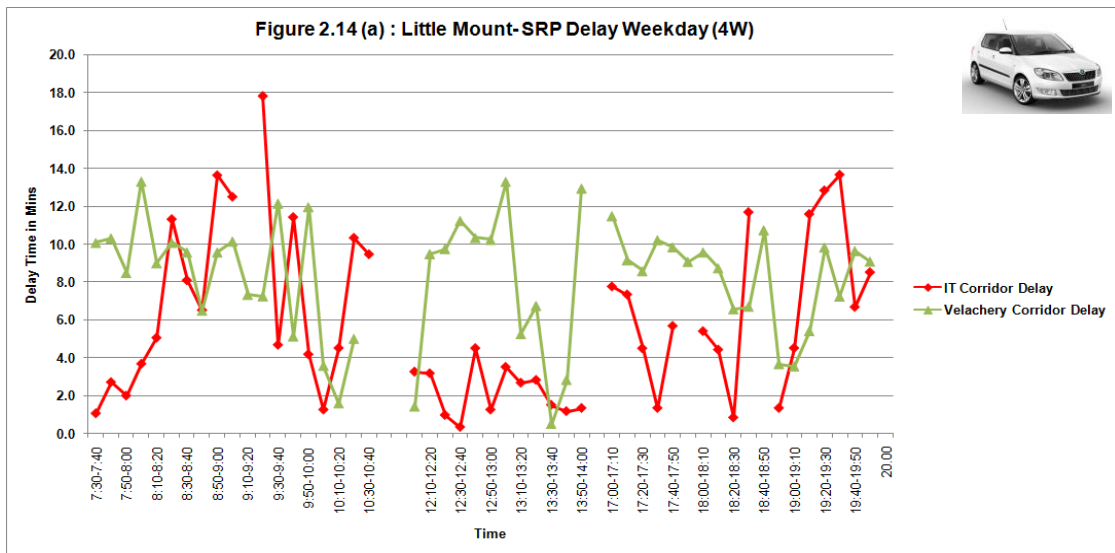
Delays for the two alternative routes along the corridor were computed for different sessions (Morning, afternoon and Evening).



From Little Mount to SRP, delay is generally more on Velachery corridor route compared to IT route during all three sessions. Highest delay of 20.7 min is observed in the Velachery Corridor during the interval 7.40-7.50 am.

From SRP to Little Mount, delays are competitive on both the corridors during sessions. Highest delay of 23.5 min is observed in the Velachery route during the interval 7:10-7:10 pm.

Delay - Weekdays



From Little Mount to SRP, delays are competitive on both the corridors during morning and evening sessions. Maximum delay of 17.8 min is observed in the IT Corridor during the interval 9:20-9:30 am. Delays at Madhya Kailash and Tidal park intersections are more in weekdays.

From SRP to Little Mount, delay is generally more on Velachery corridor route compared to IT route during all three sessions. Highest delay of 29.6 min is observed in the Velachery Corridor during the interval 8:40-8:50 am.

Speed Profiles

Speed profiles were obtained along the study corridor for the two alternative routes during weekday mornings and evenings on 25th and 27th August 2014 for cars. Mount and SRP Tools location were taken as the origin-destination pair.



Speed – Weekday Morning

Little Mount – SRP (IT Corridor): Speeds are between 15-30 kmph from Little Mount to Kottupuram, less than 15 kmph between Kottupuram to Madhya Kailash, greater than 30 kmph from Madhya Kailash to Indira nagar and 15-30 kmph from Tidal Park to SRP Tools. Speeds at Madhya Kailash and Tidel park intersections are lesser than 15 kmph.

SRP - Little Mount (IT Corridor): Speeds are between 15- 30 kmph from SRP to Tidel Park, greater than 30 kmph from Tidel Park to Madhya Kailash, between 15-30 kmph from Madhya Kailash to Kottupuram, greater than 30 kmph from Kottupuram to Raj Bhavan, between 15-30 kmph from Raj Bhavan Junction to Little Mount.

Overall, the weakest sections are Madhya Kailash and Tidal Park, where speed is reduced significantly for Car.

Little Mount – SRP (Velachery Corridor): Speeds are between 15-30 kmph from Little Mount to Halda, Gurunanak, Vijay nagar, Tharamani Periyar Koil junction, less than 15 kmph between Tharamani Periyar Koil junctions to SRP Tools.

SRP - Little Mount (Velachery Corridor): Speeds are between 15- 30 kmph from SRP to Vijay Nagar, less than 15 kmph on Velachery main road, and up to Velachery check post, between 15-30 kmph from Velachery Check post to Little Mount.

Speed – Weekday Evening

Little Mount – SRP (IT Corridor): Speeds are between 15-30 kmph from Little Mount to Madhya Kailash, greater than 30 kmph from Madhya Kailash to Indira nagar and 15-30 kmph from Tidal Park to SRP Tools. Speeds at Tidel park intersection is lesser than 15 kmph.

SRP - Little Mount (IT Corridor): Speeds are less than 15 kmph from SRP to CSIR Road Junction, greater than 30 kmph from Tidel Park to Madhya Kailash, less than 15 kmph from Madhya Kailash to Kottupuram, 15-30 kmph from Little Mount Via Ashok Leyland.

Little Mount – SRP (Velachery Corridor): Speeds are between 15-30 kmph from Little Mount- Halda -Gurunanak, less than 15 kmph from Gurunanak to Vijay nagar, 15-30 kmph Vijay nagar-Tharamani Periyar Koil junction-SRP Tools.

SRP - Little Mount (Velachery Corridor): Speeds are between 15- 30 kmph from SRP to Vijay Nagar, less than 15 kmph on Velachery main road, up to Gurunanak , more than 30 kmph from Gurunanak to Halda and 15-30 kmph from Halda to Little Mount.


Overall, the weakest section is Velachery main road, where speed is reduced significantly in evening for Car.

The speed profile during weekday morning and evening for Car are presented through **Figure 2.15 (a) to 2.15 (b)**.

2.3.2 Travel Times, Delay and Speed Analysis: 3W/Auto

Day and session wise GPS raw files were analysed for 6 Auto to estimate the different parameters i.e. travel times, speed and delay. Summary of weekend auto travel times for different OD pairs in the study area are shown in **Table 2.5 (a)**.

Table 2.5 (a) : Session wise Travel Times for different OD Pairs – Auto (Weekend)

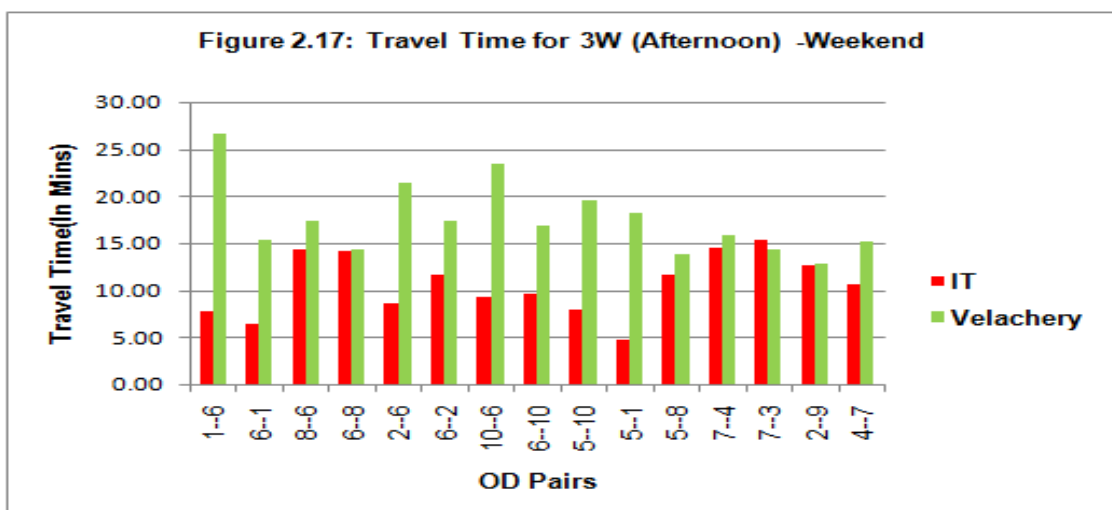
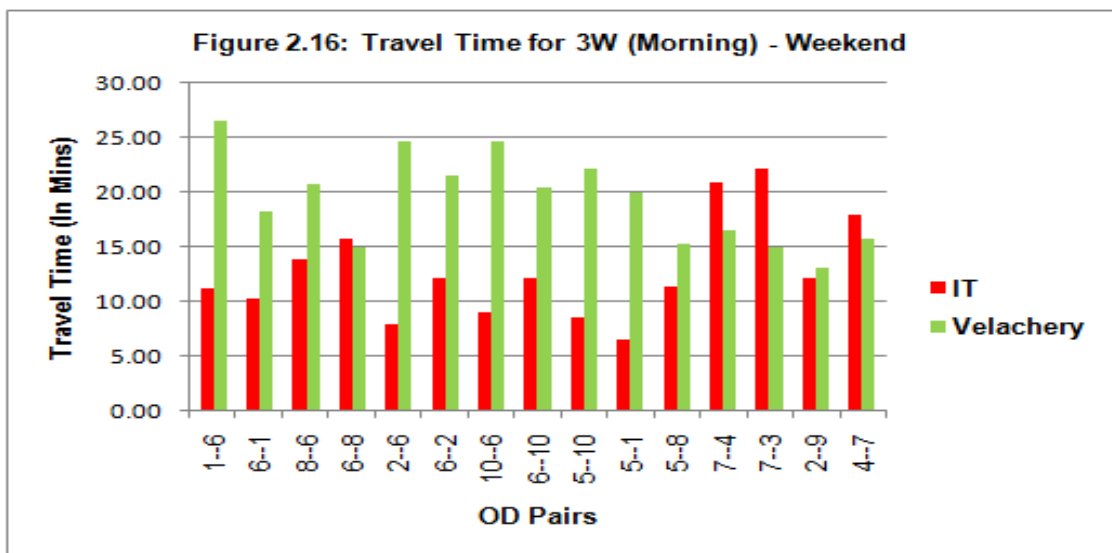
 OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
1-6 (Ashok Leyland -SRP Tools)	11.24	26.57	7.80	26.60	12.69	25.32
6-1 (SRP Tools - Ashok Leyland)	10.34	18.29	6.43	15.26	7.58	21.29
8-6 (Velachery Check post - SRP Tools)	13.97	20.72	14.39	17.40	16.67	22.48
6-8 (SRP Tools - Velachery Check post)	15.79	15.03	14.14	14.40	13.31	17.54
2-6 (Raj Bhavan- SRP Tools)	7.94	24.66	8.67	21.47	11.15	27.64
6-2 (SRP Tools – Raj Bhavan)	12.25	21.58	11.57	17.29	8.44	22.84
10-6 (Little Mount - SRP Tools)	9.13	24.66	9.29	23.43	11.37	27.64
6-10 (SRP Tools – Little Mount)	12.25	20.40	9.61	16.87	8.44	22.61
5-10 (Tidal Park- Little Mount)	8.54	22.25	7.85	19.52	6.45	24.38
5-1 (Tidal Park- Ashok Leyland)	6.63	19.98	4.68	18.25	5.75	23.88
5-8 (Tidal Park- Velachery Check post)	11.39	15.26	11.56	13.76	9.96	17.39
7-4 (Vijaya Nagar – Madhya Kailash)	20.90	16.54	14.54	15.80	17.22	19.86
7-3 (Vijaya Nagar – Kottupuram)	22.22	15.06	15.32	14.25	17.80	18.15
2- 9 (Raj Bhavan – Tharamani Pillayar Koil)	12.13	13.18	12.60	12.74	13.64	18.16
4-7 (Madhya Kailash - Vijaya Nagar)	17.96	15.79	10.55	15.18	14.67	16.59

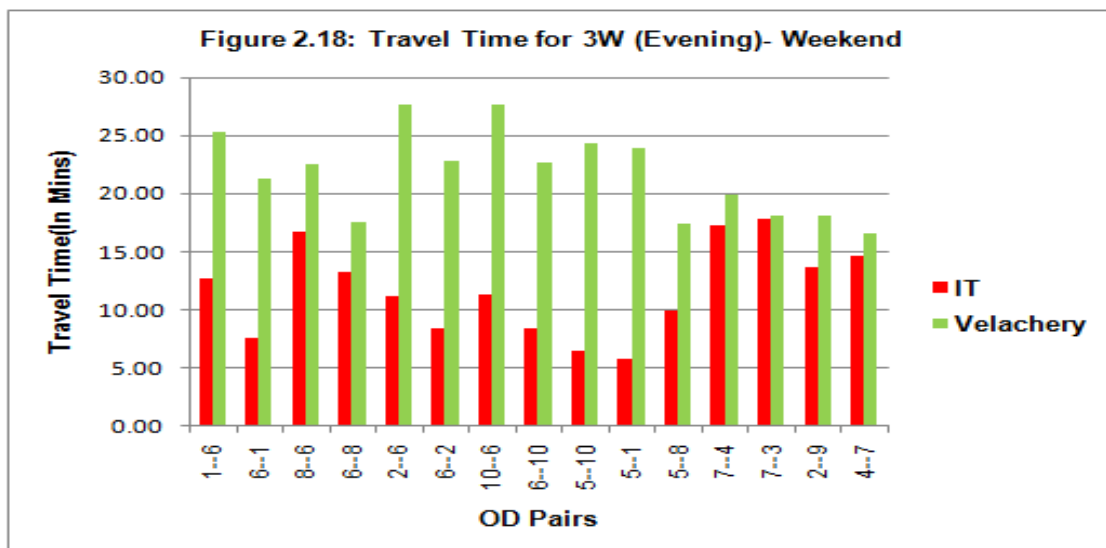
Following are the salient findings for travel time on weekend:

- Average travel time for IT Corridor is less as compared to Velachery in morning session for all OD Pairs except 7-4,7-3,4-7.
- Average travel time for IT Corridor is less as compared to Velachery in afternoon session for all OD Pairs except 7-4.
- Average travel time for IT Corridor is less as compared to Velachery in evening session for all OD Pairs .
- Average travel time on IT Corridor for all OD pairs and for all sessions is 11.7 minutes, while the average travel time on Velachery Corridor for all OD pairs and for all sessions is 19.5 minutes.
- The maximum travel time in morning session is 22.22 minutes for 7-3 OD pair, in noon session it is 15.31 minutes for 7-3 OD pair and in evening session it is 17.80 minutes for 7-3 OD pair for IT corridor.
- The minimum travel time in morning session is 6.63 minutes for 5-1 OD pair, in noon session it is 4.67 minutes for 5-1 OD pair and in evening session it is 5.74 minutes for 5-1 OD pair for IT corridor.
- The maximum travel time in morning session is 26.56 minutes for 1-6 OD pair, in noon session it is 26.6 minutes for 1-6 OD pair and in evening session it is 27.63 minutes for 10-6 OD pair for Velachery corridor.
- The minimum travel time in morning session is 16.59 minutes for 4-7 OD pair, in noon session it is 12.73 minutes for 2-9 OD pair and in evening session it is 13.17 for 2-9 OD pair for Velachery corridor.

- Average travel time of Velachery corridor is about 10 minutes higher than IT Corridor for 1-6 and 6-1 OD pairs in all sessions (Morning/Afternoon/Evening).
- Average travel time of Velachery corridor is about 5 minutes higher than IT Corridor for 8-6 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of IT corridor is 1.5 minutes higher than Velachery Corridor for 6-8 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 12-13 minutes higher than IT Corridor for 2-6 and 6-2 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 12-13 minutes higher than IT Corridor for 10-6 and 6-10 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is significantly higher about 16-17 minutes higher than IT Corridor for 5-2 and 5-1 OD pairs in all sessions (Morning/Afternoon/Evening) but there is a significant increase in distance of Velachery Corridor as well.
- Average travel time of Velachery corridor is about 6 minutes higher than IT Corridor for 5-8 OD pair in all sessions (Morning/Afternoon/Evening).
- The increase in travel time in Velachery Corridor is due to increase in distance of OD pairs on the corridor and delays.


Weekend variation in travel time across 15 OD pairs on the study corridor is presented through **Figure 2.16 to 2.18**.





Summary of weekday Car travel times for different OD pairs in the study area are shown in Table 2.5 (b).

Table 2.5 (b): Session wise Travel Times for different OD Pairs – Auto (Weekday)

 OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
1-6 (Ashok Leyland -SRP Tools)	23.27	26.14	13.23	25.29	21.06	29.10
6-1 (SRP Tools - Ashok Leyland)	12.06	21.27	11.26	17.10	15.47	26.92
8-6 (Velachery Check post - SRP Tools)	29.74	20.15	14.92	19.89	28.03	23.23
6-8 (SRP Tools - Velachery Check post)	18.73	18.30	18.34	14.28	27.17	23.96
2-6 (Raj Bhavan- SRP Tools)	18.67	23.62	10.31	22.62	18.35	30.03
6-2 (SRP Tools – Raj Bhavan)	14.59	25.86	12.18	18.80	20.10	32.33
10-6 (Little Mount - SRP Tools)	20.48	23.62	11.07	23.29	20.00	31.43
6-10 (SRP Tools – Little Mount)	14.59	24.06	11.51	18.04	18.77	30.67
5-10 (Tidal Park- Little Mount)	9.11	26.12	8.34	20.48	12.48	32.64
5-1 (Tidal Park- Ashok Leyland)	7.67	23.50	7.02	19.61	10.15	30.22
5-8 (Tidal Park- Velachery Check post)	13.71	15.85	13.09	15.36	19.07	23.90
7-4 (Vijaya Nagar – Madhya Kailash)	16.33	28.06	22.10	14.72	23.62	27.26
7-3 (Vijaya Nagar – Kottupuram)	20.48	25.95	23.78	12.31	27.02	24.22
2- 9 (Raj Bhavan – Tharamani Pillayar Koil)	18.46	20.36	18.00	15.52	19.67	22.84
4-7 (Madhya Kailash - Vijaya Nagar)	16.41	21.73	14.15	18.34	25.43	24.97

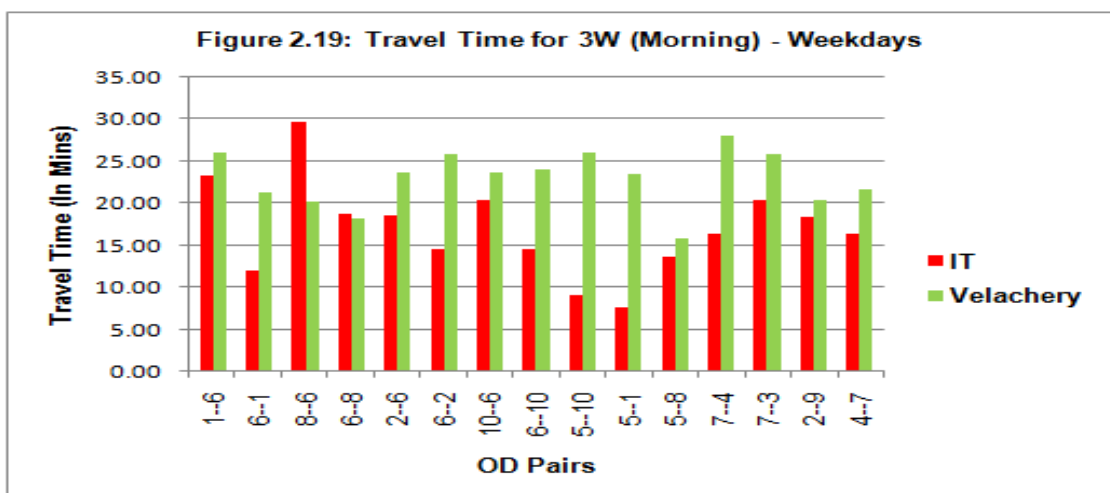
Following are the salient findings for travel time on weekday:

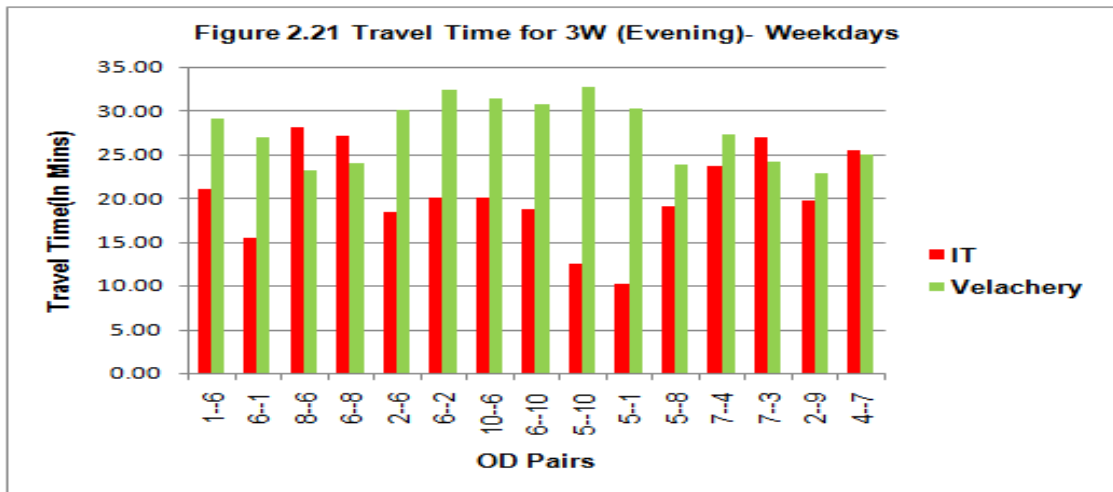
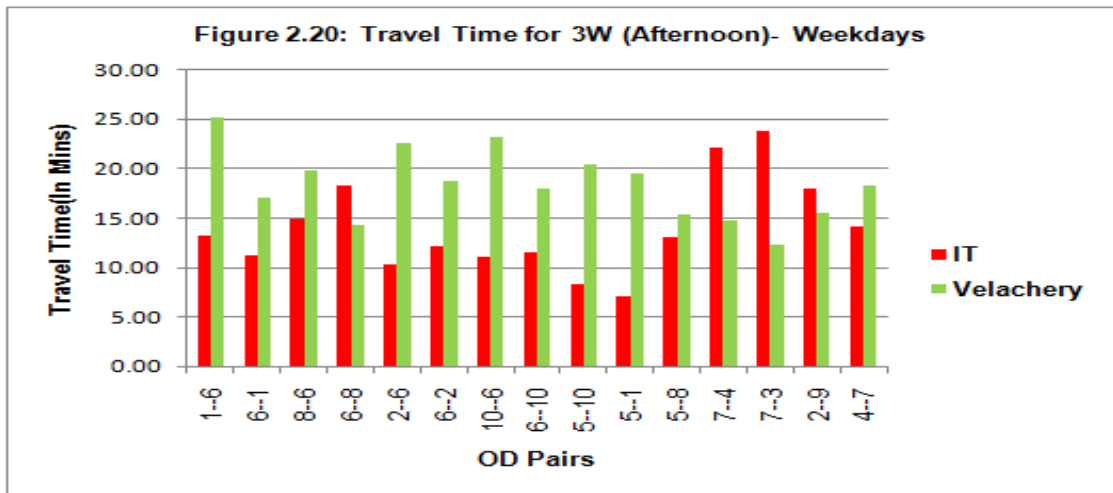
- Average travel time for IT Corridor is less as compared to Velachery in morning session for all OD Pairs except 8-6, 6-8.
- Average travel time for IT Corridor is less as compared to Velachery in afternoon session for all OD Pairs except 6-8, 7-4,7-3,2-9.
- Average travel time for IT Corridor is less as compared to Velachery in evening session for all OD pairs except 8-6, 6-8, 7-4.



- Average travel time on IT Corridor for all OD pairs and for all sessions is 17 minutes, while the average travel time on Velachery Corridor for all OD pairs and for all sessions is 23 minutes.
- The maximum travel time in morning session is 29.73 minutes for 8-6 OD pair, in noon session it is 23.77 minutes for 7-3 OD pair and in evening session it is 28 minutes for 7-3 OD pair for IT corridor.
- The minimum travel time in morning session is 7.66 minutes for 5-1 OD pair, in noon session it is 7.01 minutes for 5-1 OD pair and in evening session it is 10.14 minutes for 5-1 OD pair for IT corridor.
- The maximum travel time in morning session is 28.06 minutes for 7-4 OD pair, in noon session it is 25.29 minutes for 1-6 OD pair and in evening session it is 32.63 minutes for 5-1 OD pair for Velachery corridor.
- The minimum travel time in morning session is 15.85 minutes for 5-8 OD pair, in noon session it is 12.30 minutes for 7-3 OD pair and in evening session it is 22.83 for 2-9 OD pair for Velachery corridor.
- Average travel time of Velachery corridor is about 8 minutes higher than IT Corridor for 1-6 and 6-1 OD pairs in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 3 minutes higher than Velachery Corridor for 8-6 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of IT corridor is 2.5 minutes higher than Velachery Corridor for 6-8 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 10 minutes higher than IT Corridor for 2-6 and 6-2 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 9 minutes higher than IT Corridor for 10-6 and 6-10 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is significantly higher about 16-17 minutes higher than IT Corridor for 5-10 and 5-1 OD pairs in all sessions (Morning/Afternoon/Evening) but there is a significant increase in distance of Velachery Corridor as well.
- Average travel time of Velachery corridor is about 3 minutes higher than IT Corridor for 5-8 OD pair in all sessions (Morning/Afternoon/Evening).
- Average travel time of Velachery corridor is about 3 minutes higher than IT Corridor for 7-4,4-7 OD pair in all sessions (Morning/Afternoon/Evening).
- The increase in travel time in Velachery Corridor is due to increase in distance of OD pairs on the corridor and delays.

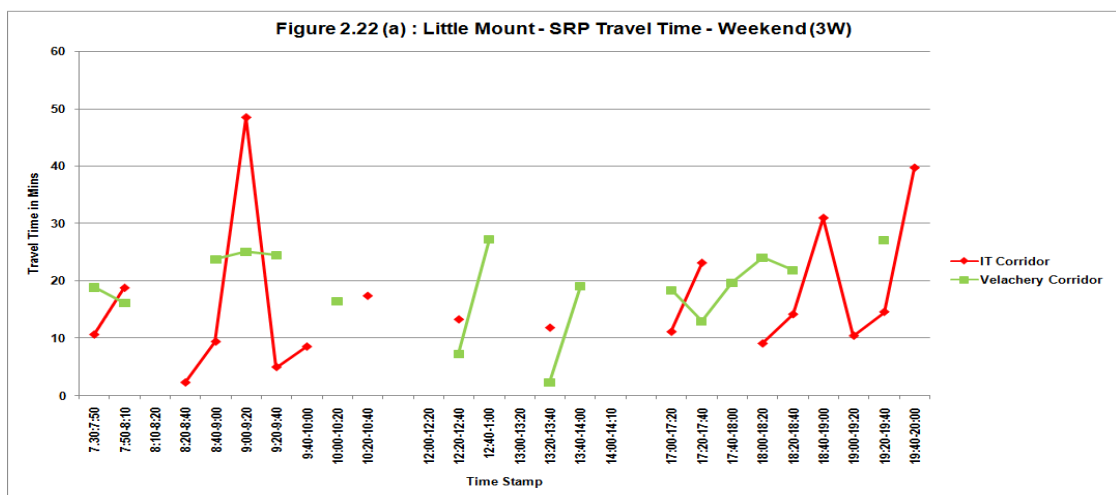
Weekday variation in travel time across 15 OD pairs on the study corridor is presented through **Figure 2.19** to **2.21**.

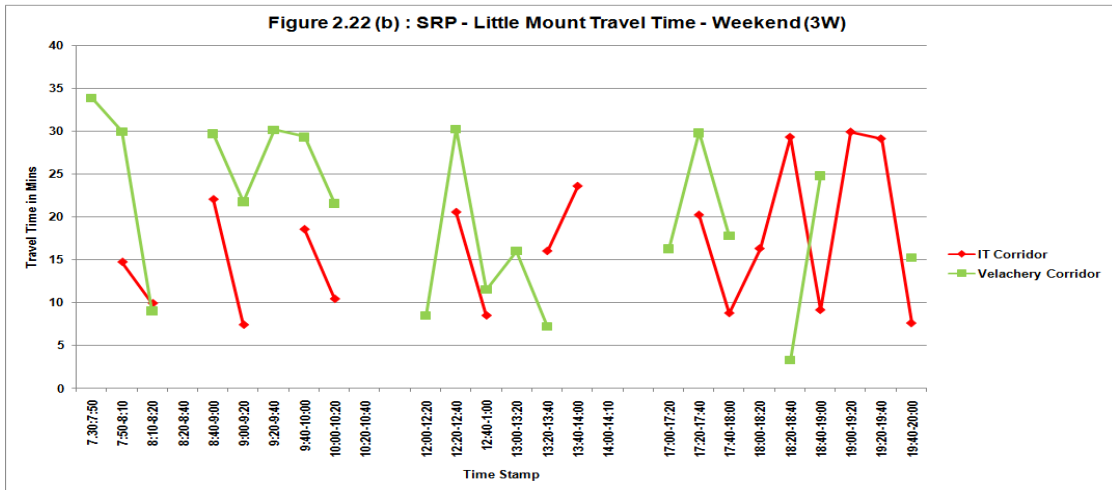




Travel Times - Weekends

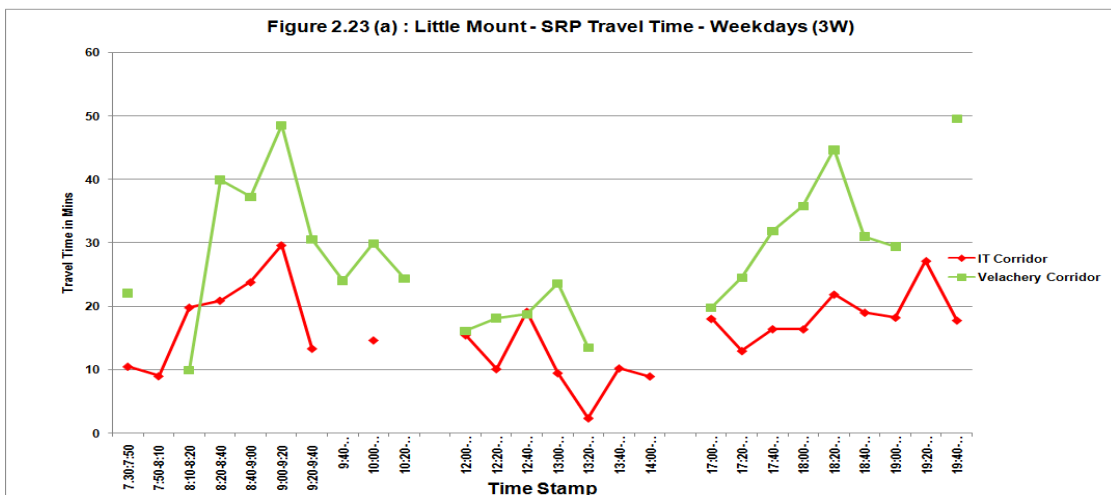
Travel times for the two alternative routes along the corridor were computed for different sessions (Morning, afternoon and Evening).

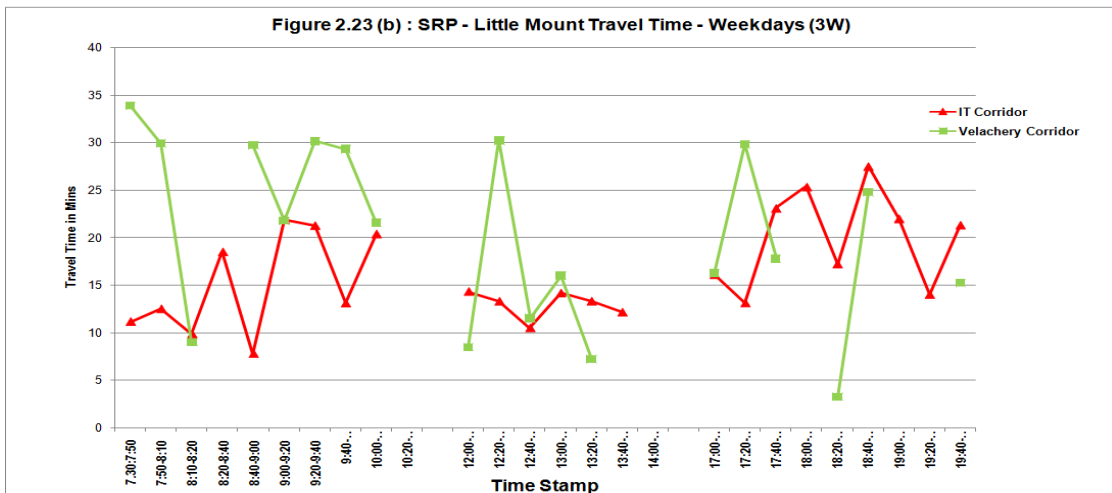




- Time periods versus travel time graphs shows that; IT corridor travel time is higher compared to Velachery corridor during few intervals in Little Mount – SRP OD pair.
- For Little Mount – SRP OD pair, there are significant changes in travel time at different intervals ranging from 2 minutes to 48 minutes on IT corridor with the average travel time throughout the day being 17 minutes, while on Velachery corridor the travel time is pretty consistent throughout the day with the average travel time throughout the day being 19 minutes.
- For SRP – Little Mount OD pair, the average travel time through Velachery corridor is higher than IT corridor. The travel time is higher in evening session through IT corridor as compared to other sessions.

Travel Times – Weekdays

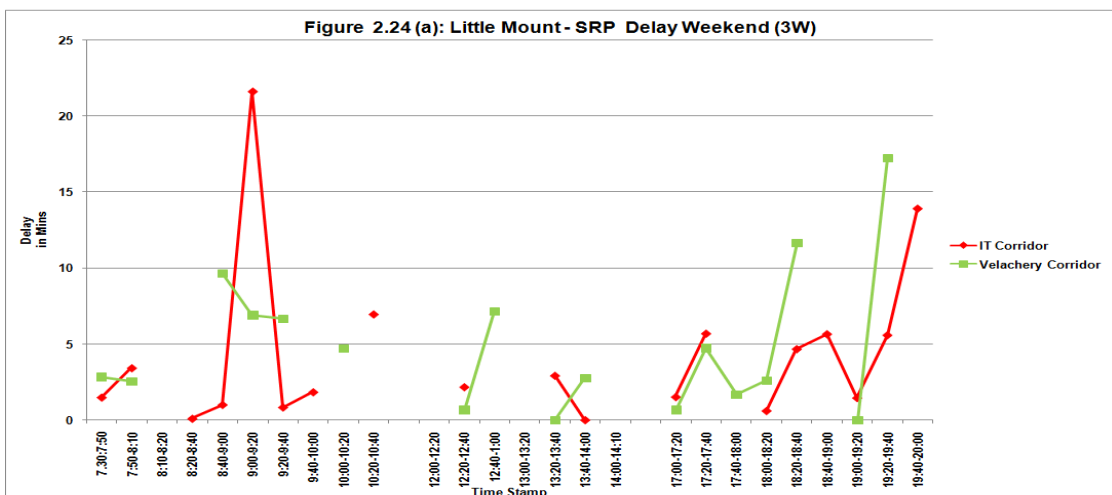




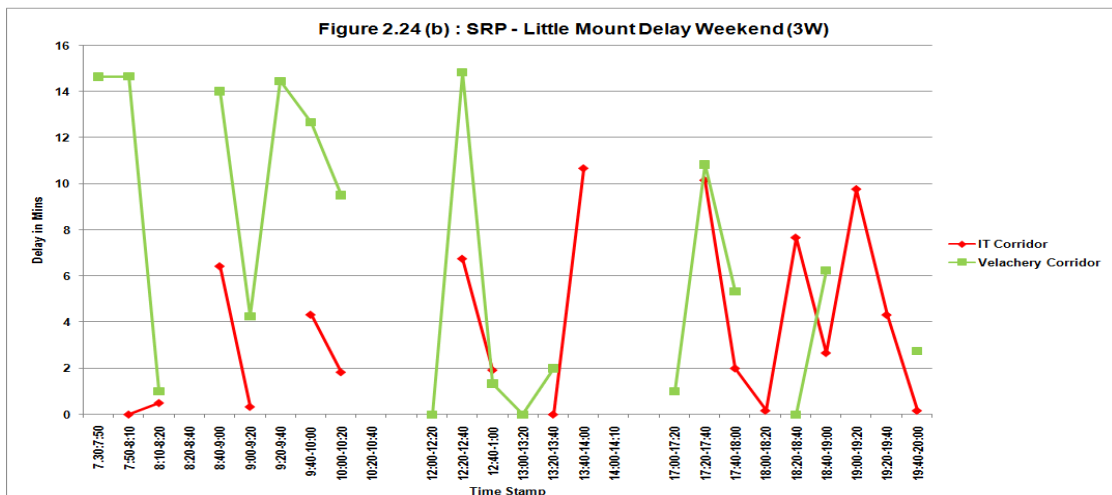
- Time periods versus travel time graphs indicates that the average travel time experienced by 3W/Autos is generally higher on Velachery Corridor than IT Corridor on both routes (2-6,6-2).
- The average travel time in noon session is less than other sessions for both corridors and both routes.

Delay - Weekends

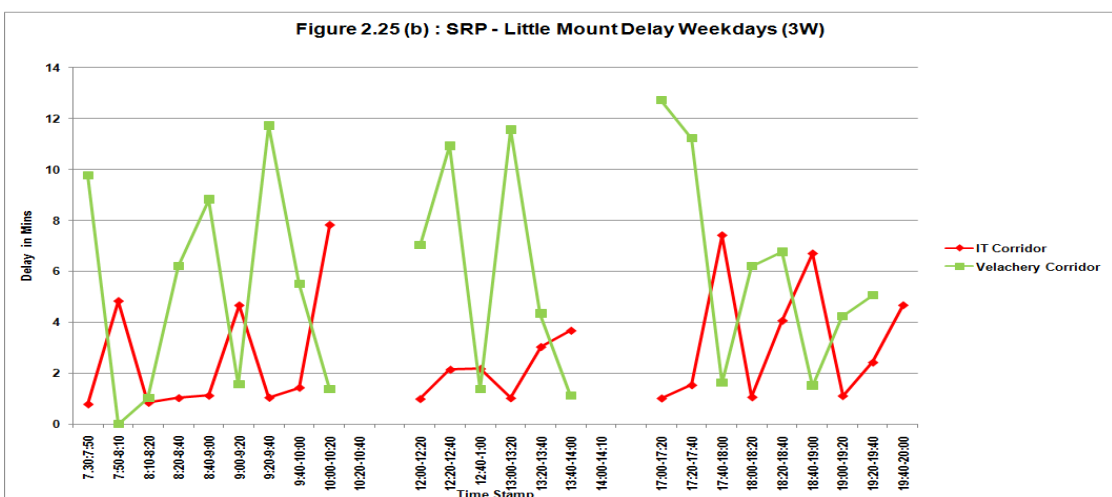
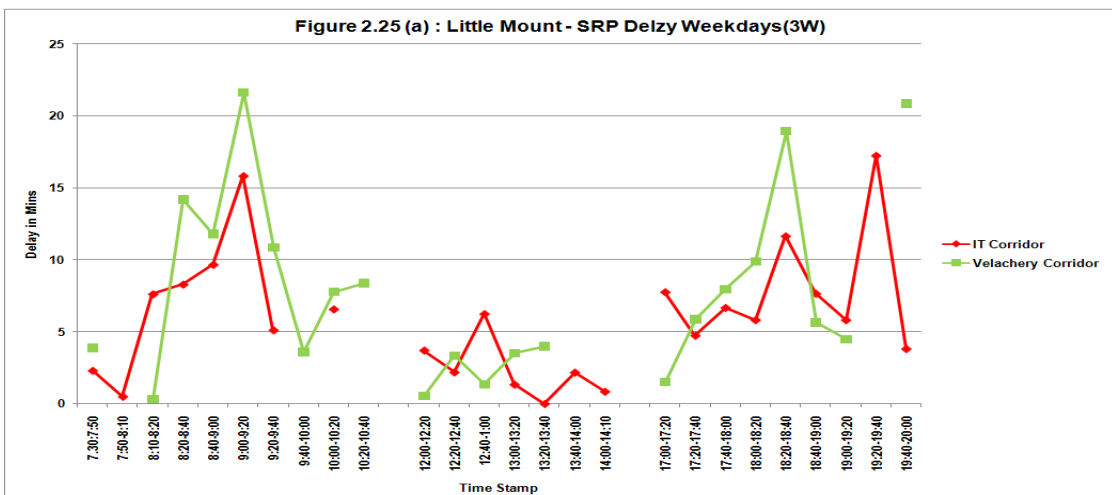
Delays for the two alternative routes along the corridor were computed for different sessions (Morning, afternoon and Evening).



- From Little Mount to SRP, delay is generally more on Velachery corridor route compared to IT route during all three sessions.
- But a delay of 22 min is observed on IT corridor in morning session. Highest delay is observed during the interval 9:00 – 9:20 am.
- From SRP to Little Mount, delay is generally more on Velachery corridor route compared to IT route during all three sessions.



Delay - Weekdays



- From Little Mount to SRP, delays are competitive on both the corridors during morning and evening sessions. Maximum delay of 22 min is observed in the Velachery Corridor during the interval 9:00-9:20 am.



- From SRP to Little Mount, delay is generally more on Velachery corridor route compared to IT route during all morning and noon sessions, but delays are competitive for both routes in evening session.

Speed Profile - Auto

Speed profiles were obtained along the study corridor for the two alternative routes during weekday mornings and evenings on 25th and 27th August 2014 for Auto. Mount and SRP Tools location were taken as the origin-destination pair.

Speed – Weekday Morning

Little Mount – SRP (IT Corridor): Speed below 15 kmph from Little Mount to Rajbhavan, 15-30 kmph from Raj Bhavan to Kottupuram, less than 15 kmph from Kottupuram to Madhya Kailash, greater than 30 kmph from Madhya Kailash to Indira nagar, less than 15 kmph from Indira nagar to Tidal Park and 15-30 kmph from Tidal Park to SRP Tools. Speeds at Little Mount, Madhya Kailash and Tidel park intersections are lesser than 15 kmph.

SRP - Little Mount (IT Corridor): Speeds are less than 15 kmph from SRP to CSIR Road Junction, greater than 30 kmph from Tidel Park to Madhya Kailash, 15-30 kmph from Madhya Kailash to Kottupuram, greater than 30 kmph from Kottupuram to Ashok Leyland and less than 15 kmph from Ashok Leyland to Little Mount.

Overall, the weakest sections are SRP Tools, Madhya Kailash and Ashok Leyland, where speed is reduced significantly for Auto.

Little Mount – SRP (Velachery Corridor): Speed below 15 kmph from Little Mount to Rajbhavan, Speeds greater than 30 kmph from Raj Bhavan to Velachery Check post, 15-30 kmph Velachery Check post to Tharamani Periyar junction via Vijay nagar and less than 15 kmph between Tharamani Periyar Koil junctions to SRP Tools.

SRP - Little Mount (Velachery Corridor): Speeds are between 15- 30 kmph from SRP to Vijay Nagar, less than 15 kmph on Velachery main road, and up to Velachery check post, greater than 30 kmph up to Halda and less than 15 kmph from Ashok Leyland to Little Mount.

Speed – Weekday Evening

Little Mount – SRP (IT Corridor): Speeds are between 15-30 kmph from Little Mount to Madhya Kailash, greater than 30 kmph from Madhya Kailash to Indira nagar and 15-30 kmph from Tidal Park to SRP Tools. Speeds at Tidel park intersection is lesser than 15 kmph.

SRP - Little Mount (IT Corridor): Speeds are less than 15 kmph from SRP to CSIR Road Junction, greater than 30 kmph from Tidel Park to Madhya Kailash, less than 15 kmph from Madhya Kailash to Kottupuram, 15-30 kmph from Little Mount Via Ashok Leyland.

Little Mount – SRP (Velachery Corridor): Speeds are between 15-30 kmph from Little Mount- Halda -Gurunanak, Tharamani via Vijay nagar and less than 15 kmph from Tharamani Periyar Koil junction-SRP Tools.

SRP - Little Mount (Velachery Corridor): Speeds are between 15- 30 kmph from SRP to Tharamani Periyar ,less than 15 kmph from Tharamani to Velachery main road, and 15-30 kmph from Gurunanak to Little Mount via Halda.


The speed profile during weekday morning and evening for Auto are presented through **Figure 2.26 (a) to 2.26 (b).**

2.3.3 Travel Times, Delay and Speed Analysis: 2W/Bikes

Day and session wise GPS raw files were analysed for 12 Bikes to estimate the different parameters i.e. travel times, speed and delay.

Summary of weekend travel times for different OD pairs in the study area are shown in **Table 2.6 (a)**.

Table 2.6 (a) : Session wise Travel Times for different OD Pairs – 2W/Bikes (Weekend)

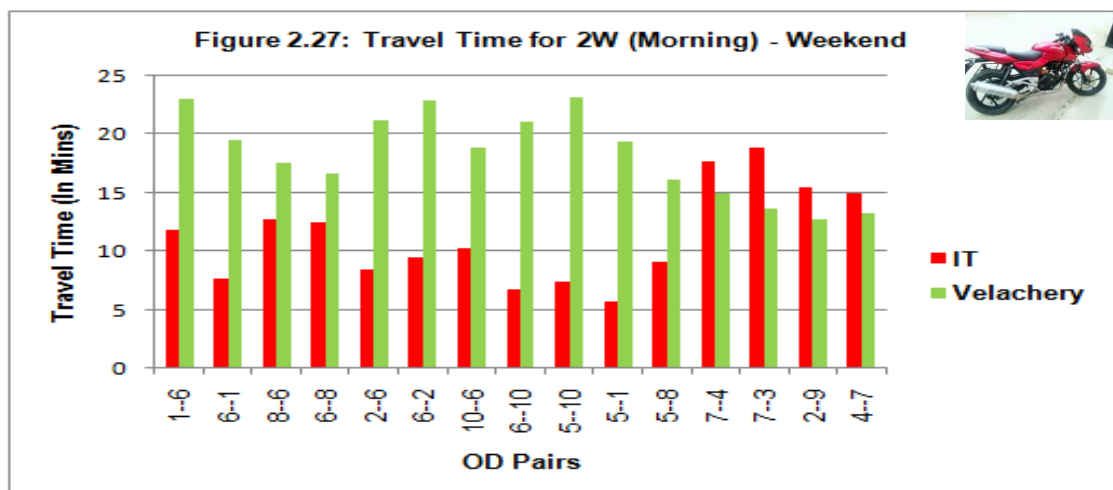
 OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
1-6 (Ashok Leyland -SRP Tools)	11.78	23.06	13.87	27.02	15.83	24.95
6-1 (SRP Tools - Ashok Leyland)	7.63	19.57	8.46	18.01	11.79	24.54
8-6 (Velachery Check post - SRP Tools)	12.70	17.55	17.90	22.01	19.61	20.37
6-8 (SRP Tools - Velachery Check post)	12.45	16.60	13.62	14.65	15.60	21.05
2-6 (Raj Bhavan- SRP Tools)	8.40	21.24	8.14	25.46	10.22	24.27
6-2 (SRP Tools – Raj Bhavan)	9.48	22.96	10.02	23.74	12.39	30.15
10-6 (Little Mount - SRP Tools)	10.23	18.86	8.41	25.46	15.15	24.27
6-10 (SRP Tools – Little Mount)	6.73	21.13	10.02	19.26	12.39	25.22
5-10 (Tidal Park- Little Mount)	7.45	23.19	7.60	22.24	8.67	28.56
5-1 (Tidal Park- Ashok Leyland)	5.79	19.37	6.04	21.12	7.98	27.87
5-8 (Tidal Park- Velachery Check post)	9.11	16.08	10.45	16.64	10.68	22.45
7-4 (Vijaya Nagar – Madhya Kailash)	17.73	14.91	21.27	18.61	20.41	20.26
7-3 (Vijaya Nagar – Kottupuram)	18.90	13.71	22.30	17.17	22.23	18.18
2- 9 (Raj Bhavan – Tharamani Pillayar Koil)	15.51	12.77	15.42	13.07	22.17	14.85
4-7 (Madhya Kailash - Vijaya Nagar)	14.94	13.32	17.39	14.21	22.66	13.70

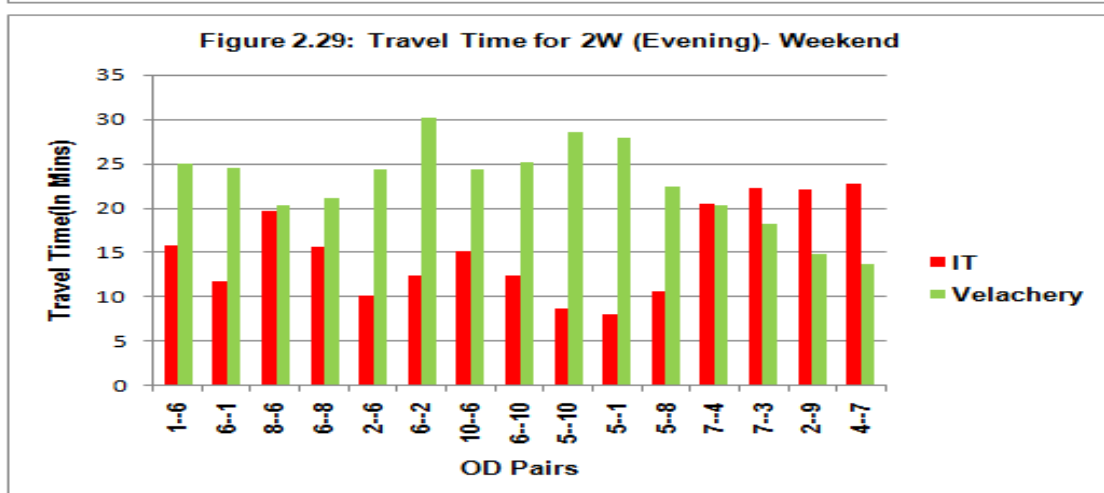
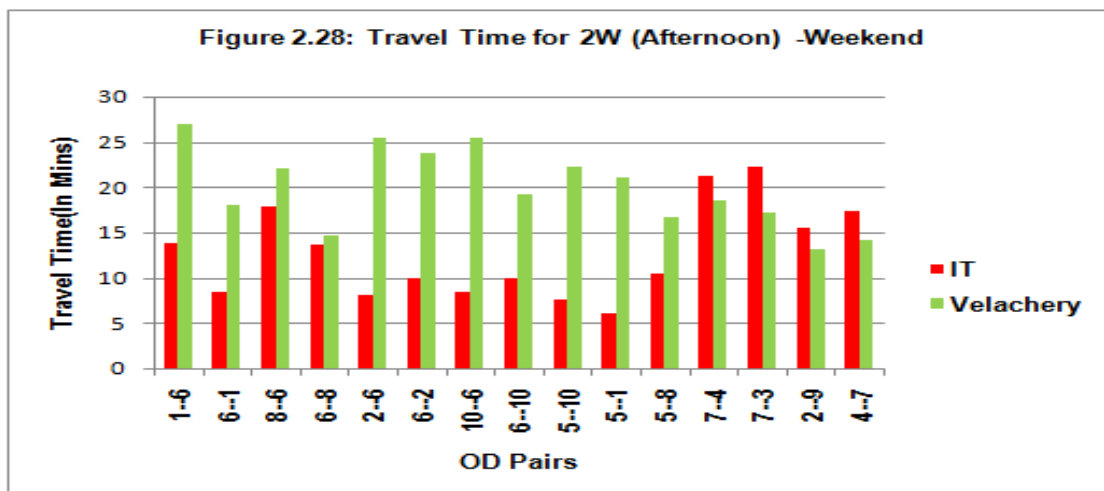
Following are the salient findings for travel time on weekend:

- Average travel time for IT Corridor is less as compared to Velachery for all OD Pairs except 7-4, 7-3, 2-9, 4-7 OD pairs.
- Average travel time on IT Corridor for all OD pairs and for all sessions is 13.05 minutes, while the average travel time on Velachery Corridor for all OD pairs and for all sessions is 20.3 minutes.
- The general trend shows that the travel time in evening session on both corridors is more than the other two sessions.
- The maximum travel time in morning session is 18.9 minutes for 7-4 OD pair, in noon session it is 22.3 minutes for 7-4 OD pair and in evening session it is 22.66 minutes for 4-7 OD pair for IT corridor.

- The minimum travel time in morning session is 5.79 minutes for 5-1 OD pair, in noon session it is 6.04 minutes for 5-1 OD pair and in evening session it is 7.9 minutes for 5-1 OD pair for IT corridor.
- The maximum travel time in morning session is 23.19 minutes for 5-10 OD pair, in noon session it is 27.02 minutes for 1-6 OD pair and in evening session it is 30.02 minutes for 6-2 OD pair for Velachery corridor.
- The minimum travel time in morning session is 12.77 minutes for 2-9 OD pair, in noon session it is 13.07 minutes for 2-9 OD pair and in evening session it is 13.7 for 4-7 OD pair for Velachery corridor.
- Average travel time of Velachery corridor is about 12 minutes higher than IT Corridor for 1-6 and 6-1 OD pairs in all sessions (Morning/Afternoon/Evening) and the distance of Velachery corridor is also increased.
- Average travel time of Velachery corridor is about 3 minutes higher than IT Corridor for 8-6 OD pair in all sessions (Morning/Afternoon/Evening) even though the distance of IT Corridor is 4 km more than that of Velachery Corridor.
- Average travel time of IT corridor is 3.5 minutes higher than Velachery Corridor for 6-8 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 14-15 minutes higher than IT Corridor for 2-6 and 6-2 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 11-12 minutes higher than IT Corridor for 10-6 and 6-10 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is significantly higher about 16-17 minutes higher than IT Corridor for 5-2 and 5-1 OD pairs in all sessions (Morning/Afternoon/Evening) but there is a significant increase in distance of Velachery Corridor as well.
- Average travel time of Velachery corridor is about 8 minutes higher than IT Corridor for 5-8 OD pair in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 4 minutes higher than Velachery Corridor for 7-4, 7-3, 2-9, 4-7 OD pairs in all sessions (Morning/Afternoon/Evening).
- The increase in travel time in Velachery Corridor is due to increase in distance of OD pairs on the corridor and delays.

Weekend variation in travel time across 15 OD pairs on the study corridor is presented through **Figure 2.27 to 2.29**.





Summary of weekday travel times for different OD pairs in the study area are shown in **Table 2.6 (b)**.

Table 2.6 (b): Session wise Travel Times for different OD Pairs – 2W/Bikes (Weekday)

OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
1-6 (Ashok Leyland -SRP Tools)	23.06	29.07	16.58	26.70	20.93	31.10
6-1 (SRP Tools - Ashok Leyland)	11.72	25.96	11.52	22.56	14.50	24.27
8-6 (Velachery Check post - SRP Tools)	27.79	21.65	19.92	18.70	25.73	22.26
6-8 (SRP Tools - Velachery Check post)	18.57	22.53	21.24	19.38	26.30	20.50
2-6 (Raj Bhavan- SRP Tools)	18.34	25.26	11.60	19.14	15.39	27.08
6-2 (SRP Tools – Raj Bhavan)	16.625	30.69	16.04	28.10	18.51	30.04
10-6 (Little Mount - SRP Tools)	21.47	27.21	15.58	23.98	19.24	28.79
6-10 (SRP Tools – Little Mount)	13.06	27.56	11.20	24.12	16.81	26.20
5-10 (Tidal Park- Little Mount)	8.34	32.77	8.22	28.71	10.92	30.43
5-1 (Tidal Park- Ashok Leyland)	6.73	31.02	7.23	27.75	8.61	28.26



CHAPTER 2 PRIMARY DATA COLLECTION & ANALYSIS

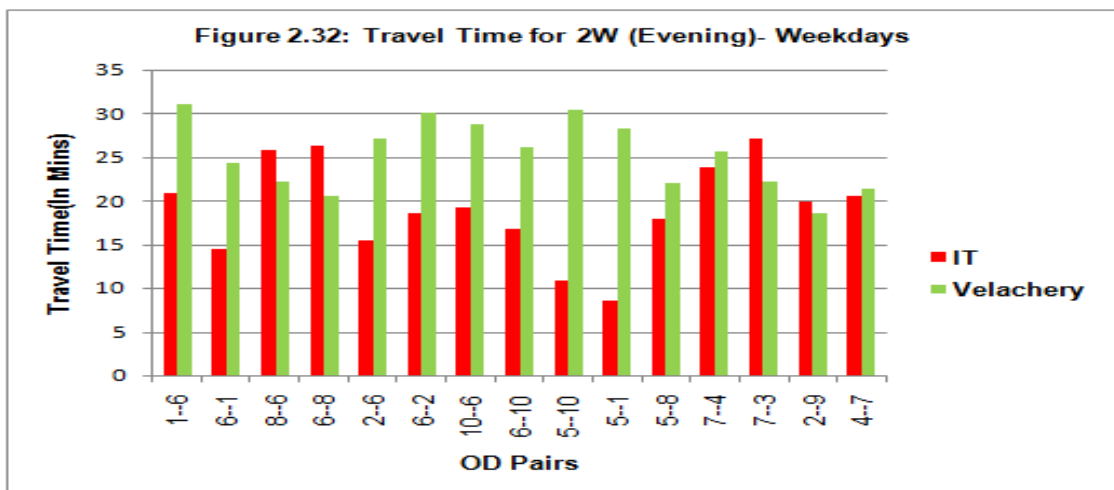
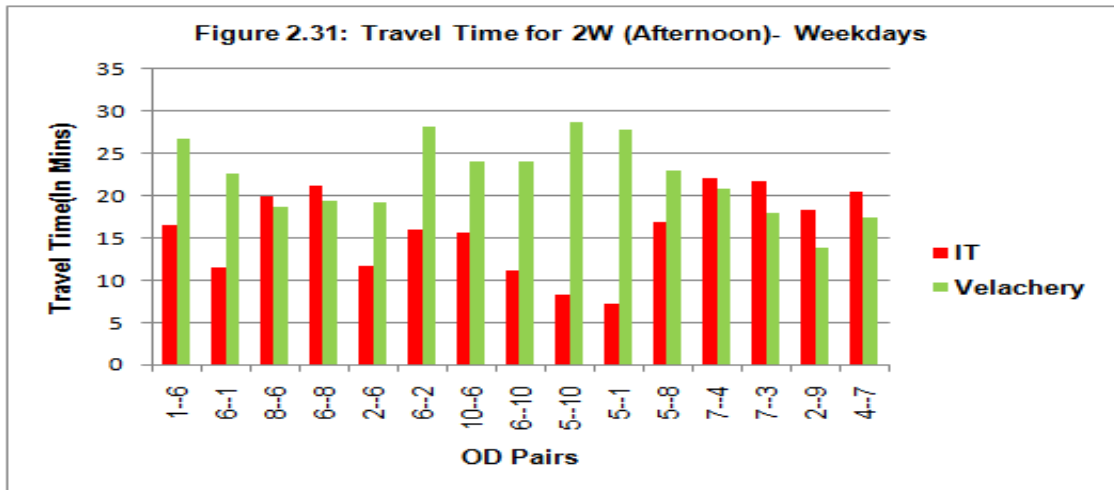
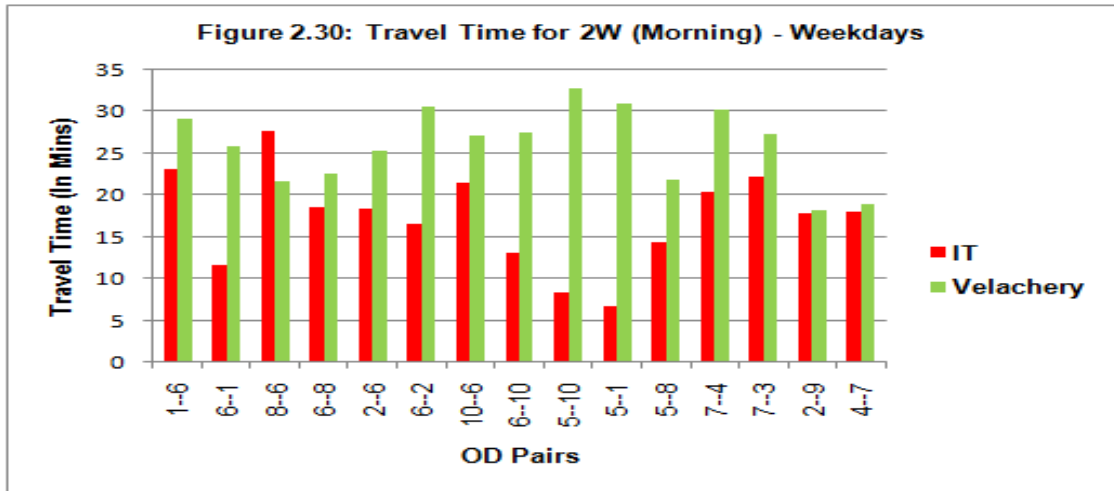
OD Pairs	Travel Times (Min.)		Travel Times (Min.)		Travel Times (Min.)	
	Morning		Noon		Evening	
	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor	IT Corridor	Velachery Corridor
5-8 (Tidal Park- Velachery Check post)	14.32	21.78	16.91	23.05	17.86	21.95
7-4 (Vijaya Nagar – Madhya Kailash)	20.45	30.30	22.14	20.82	23.88	25.71
7-3 (Vijaya Nagar – Kottupuram)	22.24	27.27	21.68	18.02	27.08	22.24
2- 9 (Raj Bhavan – Tharamani Pillayar Koil)	17.88	18.17	18.23	13.79	19.88	18.62
4-7 (Madhya Kailash - Vijaya Nagar)	17.96	18.95	20.54	17.43	20.54	21.35

Following are the salient findings for travel time on weekday:

- Average travel time for IT Corridor is less as compared to Velachery in morning session for all OD Pairs except 7-4,7-3,2-9,4-7.
- Average travel time for IT Corridor is less as compared to Velachery in afternoon session for all OD Pairs except 8-6, 8, 7-4,7-3,2-9,4-7.
- Average travel time for IT Corridor is less as compared to Velachery in evening session for all OD Pairs except 8-6, 6-8, 7-3, 2-9.
- Average travel time on IT Corridor for all OD pairs and for all sessions is 17.41 minutes, while the average travel time on Velachery Corridor for all OD pairs and for all sessions is 24.47 minutes.
- The maximum travel time in morning session is 27.79 minutes for 8-6 OD pair, in noon session it is 22.14 minutes for 7-4 OD pair and in evening session it is 27.08 minutes for 7-3 OD pair for IT corridor.
- The minimum travel time in morning session is 6.79 minutes for 5-1 OD pair, in noon session it is 7.23 minutes for 5-1 OD pair and in evening session it is 8.61 minutes for 5-1 OD pair for IT corridor.
- The maximum travel time in morning session is 32.77 minutes for 5-10 OD pair, in noon session it is 28.71 minutes for 5-10 OD pair and in evening session it is 31.10 minutes for 1-6 OD pair for Velachery corridor.
- The minimum travel time in morning session is 18.17 minutes for 2-9 OD pair, in noon session it is 13.79 minutes for 2-9 OD pair and in evening session it is 18.62 for 2-9 OD pair for Velachery corridor.
- Average travel time of Velachery corridor is about 10 minutes higher than IT Corridor for 1-6 and 6-1 OD pairs in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 3 minutes higher than Velachery Corridor for 8-6 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of IT corridor is 2.5 minutes higher than Velachery Corridor for 6-8 OD pair in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 9-10 minutes higher than IT Corridor for 2-6 and 6-2 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is about 8-9 minutes higher than IT Corridor for 10-6 and 6-10 OD pairs in all sessions (Morning/Afternoon/Evening)
- Average travel time of Velachery corridor is significantly higher about 16-17 minutes higher than IT Corridor for 5-10 and 5-1 OD pairs in all sessions (Morning/Afternoon/Evening) but there is a significant increase in distance of Velachery Corridor as well.
- Average travel time of Velachery corridor is about 3 minutes higher than IT Corridor for 5-8 OD pair in all sessions (Morning/Afternoon/Evening).

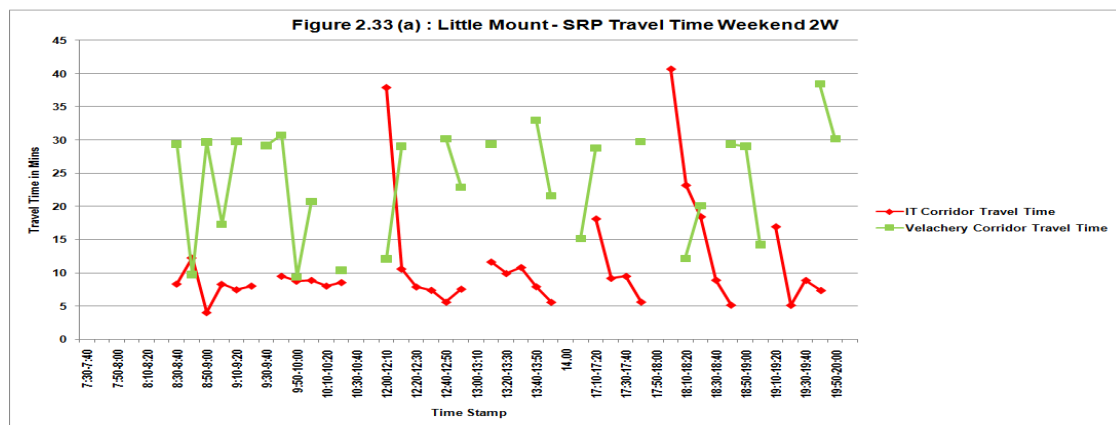
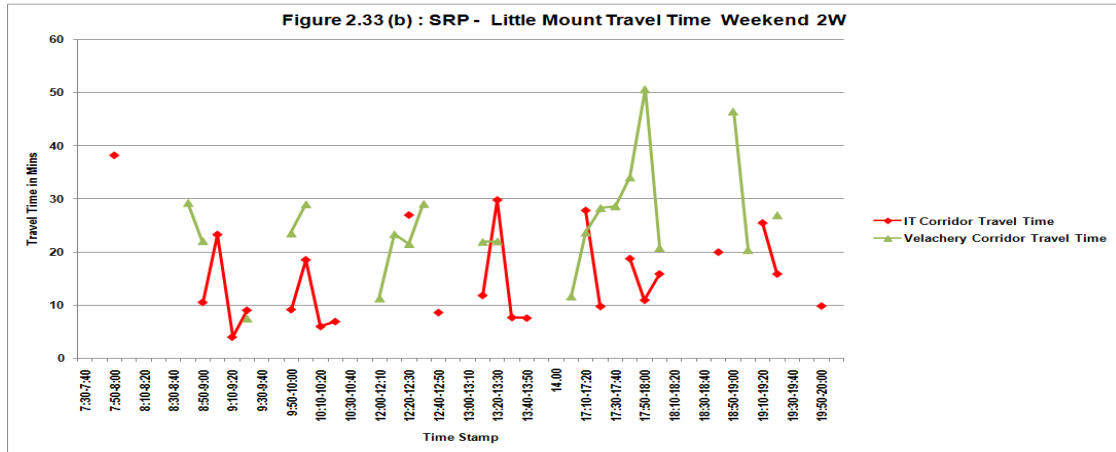
- Average travel time of Velachery corridor is about 3minutes higher than IT Corridor for 7-4,4-7 OD pair in all sessions (Morning/Afternoon/Evening).
- Average travel time of IT corridor is about 3 minute higher than Velachery Corridor for 7-3 OD pair in all sessions (Morning/Afternoon/Evening).
- The increase in travel time in Velachery Corridor is due to increase in distance of OD pairs on the corridor and delays.

Weekday variation in travel time across 15 OD pairs on the study corridor is presented through **Figure 2.30 to 2.32**.



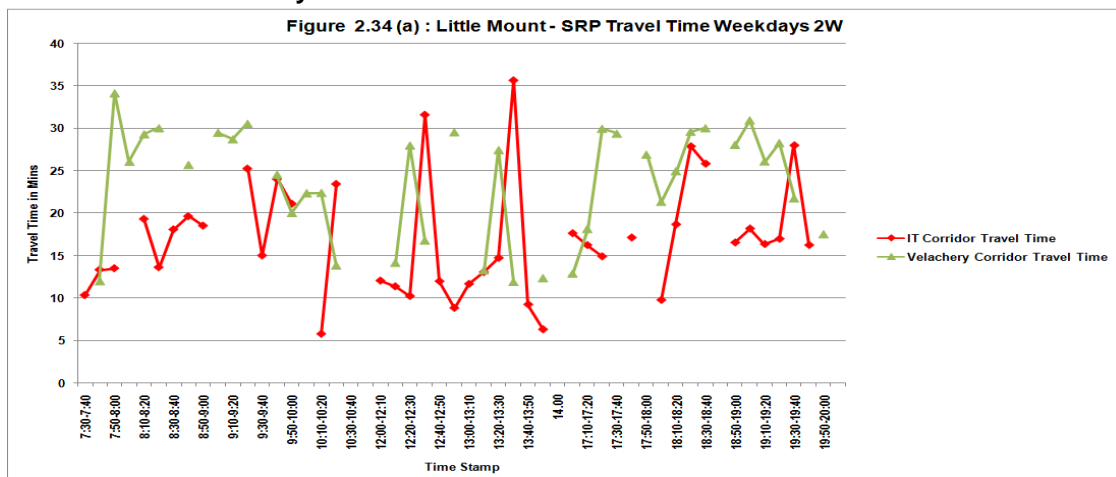
Travel Times - Weekends

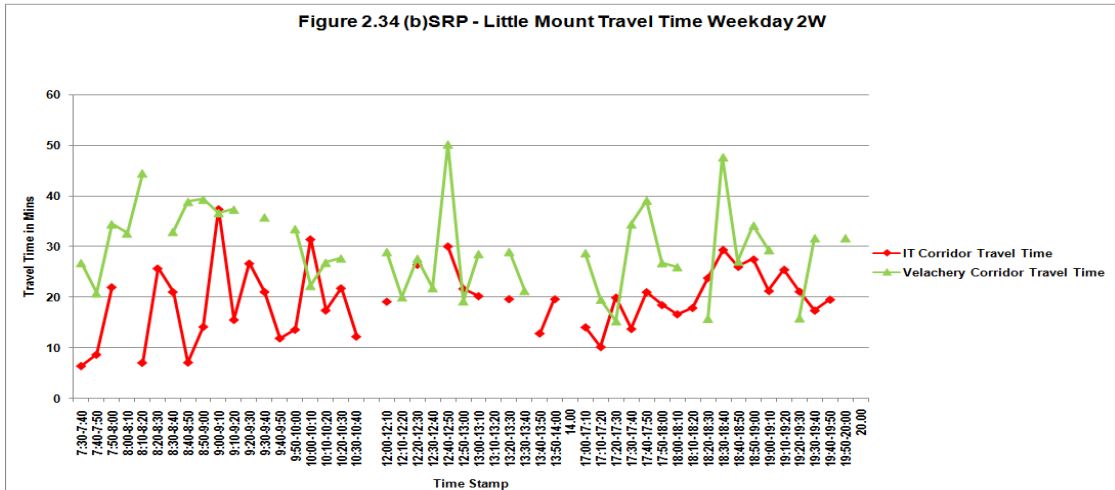
Travel times for the two alternative routes along the corridor were computed for different sessions (Morning, afternoon and Evening).



- For Little Mount – SRP OD pair, the average travel time through Velachery corridor is higher than IT corridor. The maximum travel time is 41 minutes on IT corridor during time interval of 06:00-06:10 pm
- For SRP – Little Mount OD pair, the maximum travel time is 50 minutes through Velachery corridor at 05:50-06:00 pm, and the average travel time through Velachery corridor is higher than IT corridor

Travel Times – Weekdays

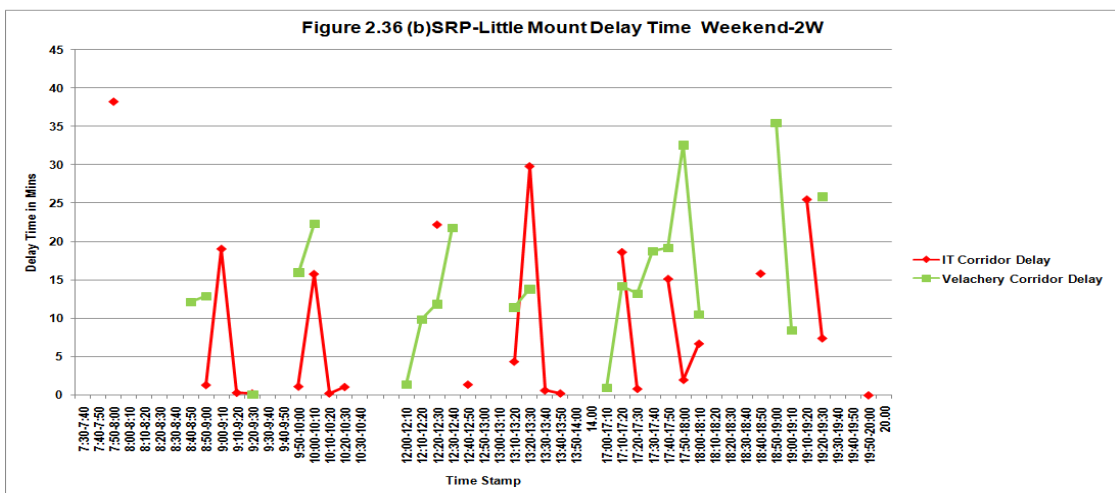
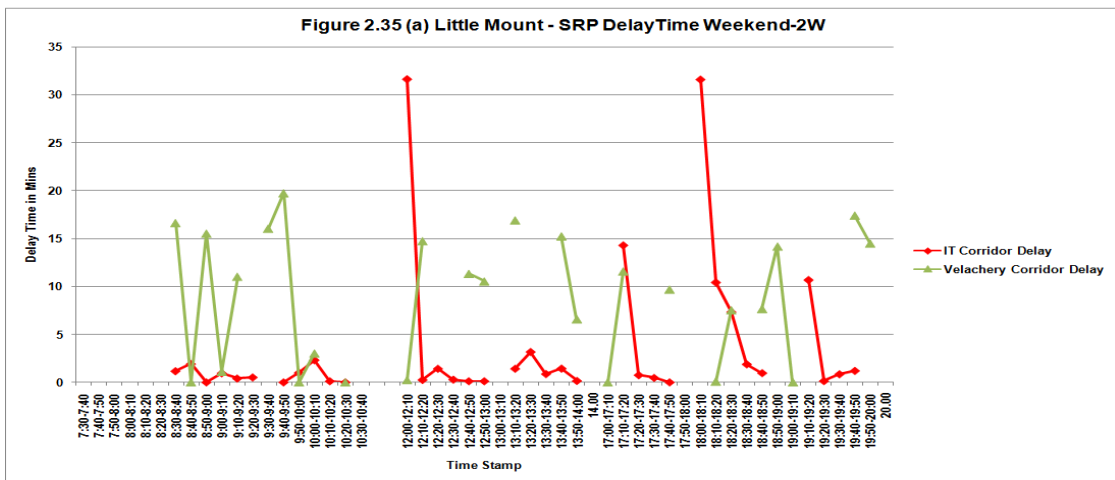




- Time periods versus travel time graphs indicates that the average travel time experienced by 2W/Bikes is generally higher on Velachery Corridor than IT Corridor for Little Mount – SRP route except for some intervals in noon session.
- For SRP – Little Mount OD pair, the average travel time through Velachery corridor is higher than IT corridor in all sessions. The maximum travel time is 50 minutes in Velachery Corridor in noon session.

Delay - Weekends

Delays for the two alternative routes along the corridor were computed for different sessions (Morning, afternoon and Evening).

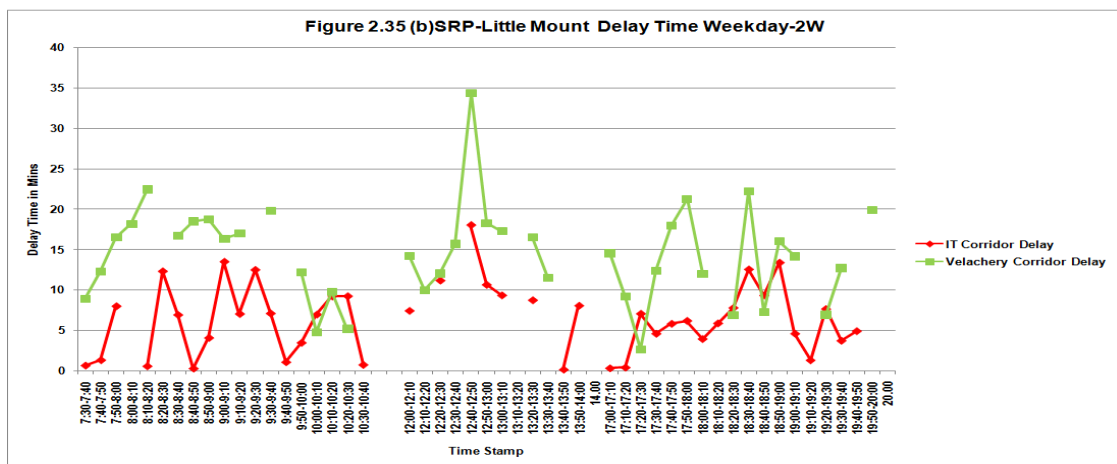
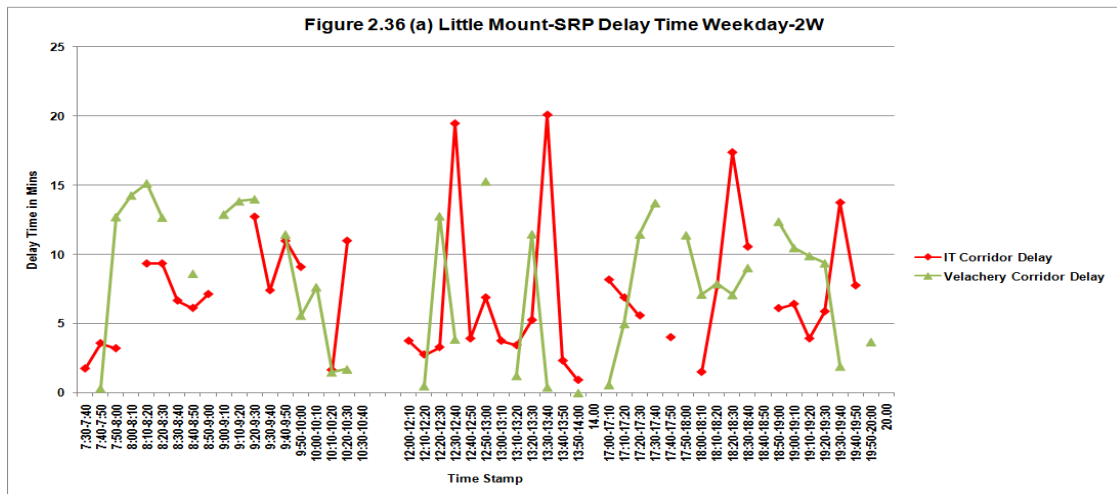


For Little Mount – SRP, the average delays on Velachery Corridor are higher than IT Corridor in all sessions, the delays in IT corridor is more in evening.

- For SRP – Little Mount, the delays on IT corridors is more than 15 minutes at some time intervals.

Delay - Weekdays

- For Little Mount – SRP, the delays are competitive on both corridors for all the three sessions. The maximum delay observed is 20 minutes in noon session for time interval 01:30-01:40 pm for IT Corridor.
- For SRP – Little Mount, the delays are higher on Velachery corridor than IT Corridor. The maximum delay observed is 35 minutes in noon session for Velachery corridor.



Speed Profiles – 2W

Speed profiles were obtained along the study corridor for the two alternative routes during weekday mornings and evenings on 25th and 27th August 2014 for 2W. Mount and SRP Tools location were taken as the origin-destination pair.



Speed – Weekday Morning

Little Mount – SRP (IT Corridor): Speed below 15 kmph from Little Mount to Rajbhavan, 15-30 kmph from Raj Bhavan to Kottupuram, less than 15 kmph from Kottupuram to Madhya Kailash, greater than 30 kmph from Madhya Kailash to Indira nagar, 15-30 kmph from Indira nagar to SRP Tools. Speeds at Little Mount, and Madhya Kailash intersections are lesser than 15 kmph.

SRP - Little Mount (IT Corridor): Speeds are less than 15 kmph from SRP to CSIR Road Junction, greater than 30 kmph from Tidel Park to Madhya Kailash, 15-30 kmph from Madhya Kailash to Kottupuram, greater than 30 kmph from Kottupuram to Ashok Leyland and less than 15-30 kmph from Ashok Leyland to Little Mount.

Little Mount – SRP (Velachery Corridor): Speed below 15 kmph from Little Mount to Rajbhavan, Speeds greater than 30 kmph from Raj Bhavan to Velachery Check post, 15-30 kmph Velachery Check post to Tharamani Periyar junction via Vijay nagar and less than 15 kmph between Tharamani Periyar Koil junctions to SRP Tools.

SRP - Little Mount (Velachery Corridor): Speed below 15 kmph from Little Mount to Tharamani junction, 15-30 kmph from Tharamani junction to Gurunanak, less than 15 kmph from Gurunanak to Velachery Check post , greater than 30 kmph from Velachery check post to Little mount via Halda.

Speed – Weekday Evening

Little Mount – SRP (IT Corridor): Speed below 15 kmph from Little Mount to Rajbhavan, 15-30 kmph from Raj Bhavan to Madhya Kailash, greater than 30 kmph from Madhya Kailash to Indira nagar, 15-30 kmph from Indira nagar to Tidal Park and greater than 30 kmph from Tidel Park to SRP tools.

SRP - Little Mount (IT Corridor): Speeds are less than 15 kmph from SRP to CSIR Road Junction, greater than 30 kmph from Tidel Park to Madhya Kailash, 15 - 30 kmph from Madhya Kailash to Little Mount via Ashok Leyland.

Little Mount – SRP (Velachery Corridor): Speed below 15 kmph from Little Mount to Rajbhavan, 15-30 kmph Rajbhavan to Tharamani Junction and less than 15 kmph from Tharamani Periyar Koil junction-SRP Tools.

SRP - Little Mount (Velachery Corridor): Speeds are less than 15 kmph from SRP Tools to Tharamani Junction, 15-30 kmph from Tharamani Junction to Velachery check post via Vijay nagar and greater than 30 kmph from Velachery check post to Little Mount via Ashok Leyland.


The speed profile during weekday morning and evening for 2W/Bike are presented through **Figure 2.37 (a) to 2.37 (b)**.

2.4 Video Data Extraction Surveys

The primary objective of the video data extraction survey is to measure the classified (by vehicle type) volume of turning traffic at the specified intersection and classified volume on the midblock sections. Traffic data collections at specified intersections and midblock locations by video camera were carried out by IIT Madras with the concurrent schedule of GPS based tracking surveys. Traffic data extraction surveys schedule, equipments, midblock/junctions and vehicle category details are shown in **Table 2.7**.



Table 2.7: Schedule, Equipments and Vehicle Cat. for video data extraction surveys

24-25-27 August 2014	Equipments	No. Of Mid Blocks and Junctions	Vehicle Categories
Sunday/ Monday/ Wednesday			
Session 1: 09:00 am to 10:00 am (1 Hour) Session 2: 01:00 pm to 02:00 pm (1 Hour) Session 3: 05.00 pm to 06.00 pm (1 Hour)	High Definition Video camera 	Total 14 Mid blocks One way -3 No. Two Way -11 No. Total 9 Intersections 3 Arms -7 No. 4 Arms-2 Nos.	Two Wheelers (all categories), Auto-rickshaws, Car/Van/Jeep, Light Commercial Vehicles (Goods Van, Tempo Travellers), Heavy Motor Vehicles (Buses, Trucks, Multi Axle Vehicles and Tractors).

The section of roadway that is 100 m before and after an access controlled approach is considered an intersection. The section of roadway between two intersections is considered a midblock section.

Figure 2.38 and **Table 2.8** shows the Intersections in study area corridor under video data extraction scope.

Table 2.8: Intersection Locations

Sr. No.	Intersection Survey Locations	No. of Approaches	Name of Approach Arms
1	Little Mount	3	1. Nagapattiam Chennai Highway 2. Taluk Office Road 3. Anna Salai Mount Road
2	Madhya Kailash	3	1. Adyar 2. Sardar Patel Road 3. M.A Chidambaram College
3	Tidal Park	4	1. Madhya Kailash 2. E-Cost Road 3. Ramanujan IT City 4. Einet Software
4	SRP Tools	3	1. Tidel Park 2. Tharamani Road 3. Rajiv Gandhi Expressway
5	Tharamani Periyar Road	3	1. FOB 2. MGR Main Road 3. SRP Tools
6	Velachery Vijaya Nagar	3	1. Velachery Bypass 2. Tharamani Road 3. Velachery Main Road
7	Gurunanak College	3	1. Velachery Check Post 2. Velachery Main Road 3. Velachery Bypass
8	Velachery Check Post	3	1. Halda 2. Gurunanak College 3. Madarin Karai
9	Halda	3	1. Little Mount 2. Velachery Main Road 3. Anna Salai

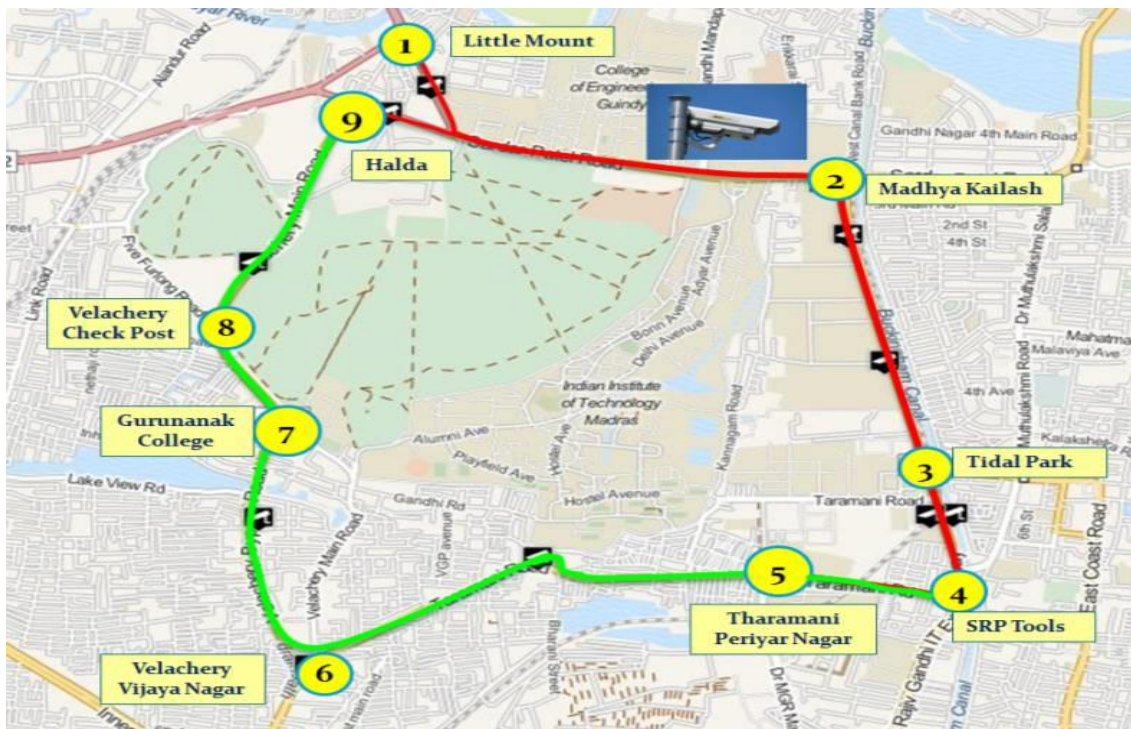


Figure 2.38: Intersection Locations

Figure 2.39 and Table 2.10 shows the mid blocks in study area corridor under video data extraction scope.

Table 2.9 Mid block Locations

Sr. No.	Mid Block Locations	Type Of Midblock
1	Taluk Office Road / Little Mount Axis	One Way
2	Sardar Patel Road/Dote Axis	Two Way
3	Sardar Patel Road/Hot Chips	Two Way
4	Canal Bank Road (West)/Indra Nagar_Axis	Two Way
5	Canal Bank Road (West)/NIFT_Axis	Two Way
6	Canal Bank Road (West)	Two Way
7	Tharamani Road	Two Way
8	Tharamani Road/TCS_Axis	Two Way
9	Velachery Main Road/Mc Rennett_Axis	Two Way
10	Velachery Main Road / Pheonixmall	Two Way
11	Velachery Main Road / Blue Cross Axis	Two Way
12	Sardar Patel Road	One Way
13	Velachery Bypass Road / Velachery Bypass Axis	Two Way
14	Sardar Patel Road / Lemon Tree_Axis	One Way
Total No. of Mid blocks		14
Total No. of Mid blocks videos provided by IIT for after study		11

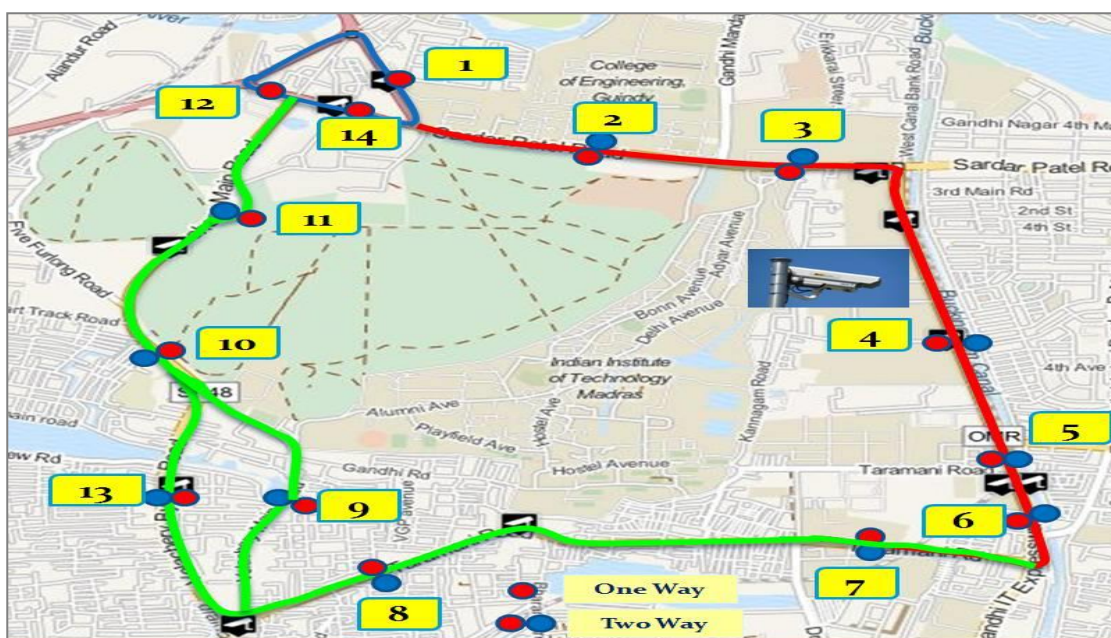


Figure 2.39: Mid Block Locations

Direction wise Classified volume count were extracted by the Manual Count Made Easy (MCME) Software from video data aggregated for every second interval with five vehicle categories in separate spreadsheet files for each midblock and intersection.

The traffic data are indexed by date, time, direction of flow, intersection/mid-block location names and numbers, and road names. For each intersection, extraction of data has been done for straight/through, left turning and right turning traffic separately.

Traffic volume on each location is higher in evening Peak Hour. **Figure 2.40 & 2.41** shows the comparative traffic volume on each midblock for 27th August 2014 Evening Peak.

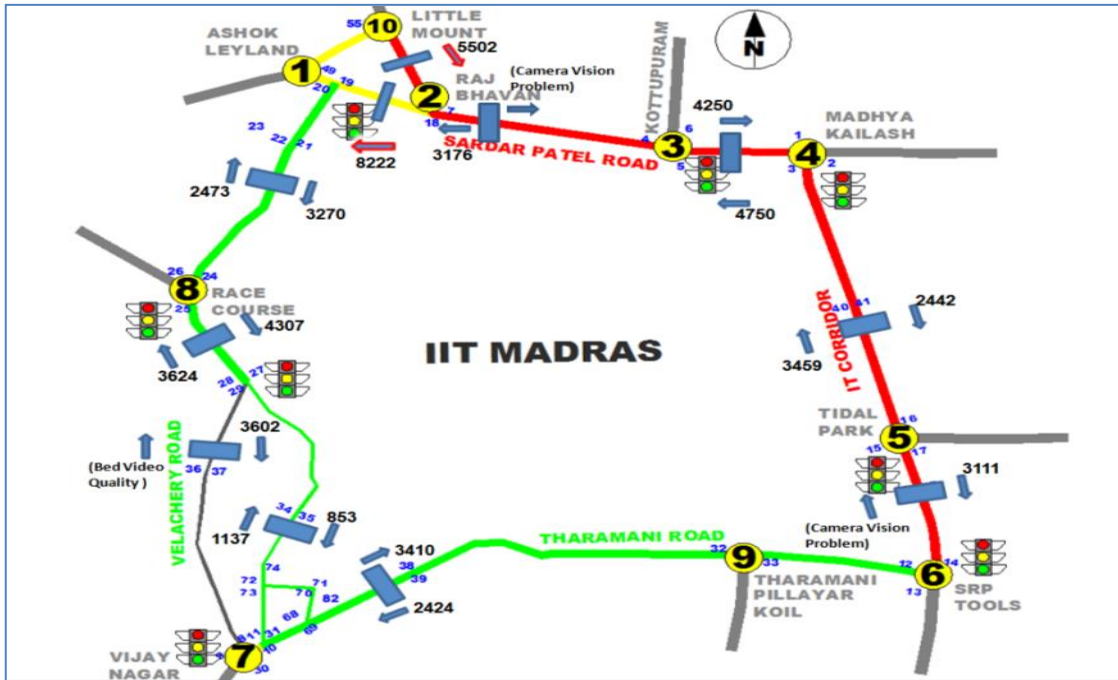


Figure 2.40: Traffic Flow Diagram at each Mid Block – 27th August 2014 Evening Peak

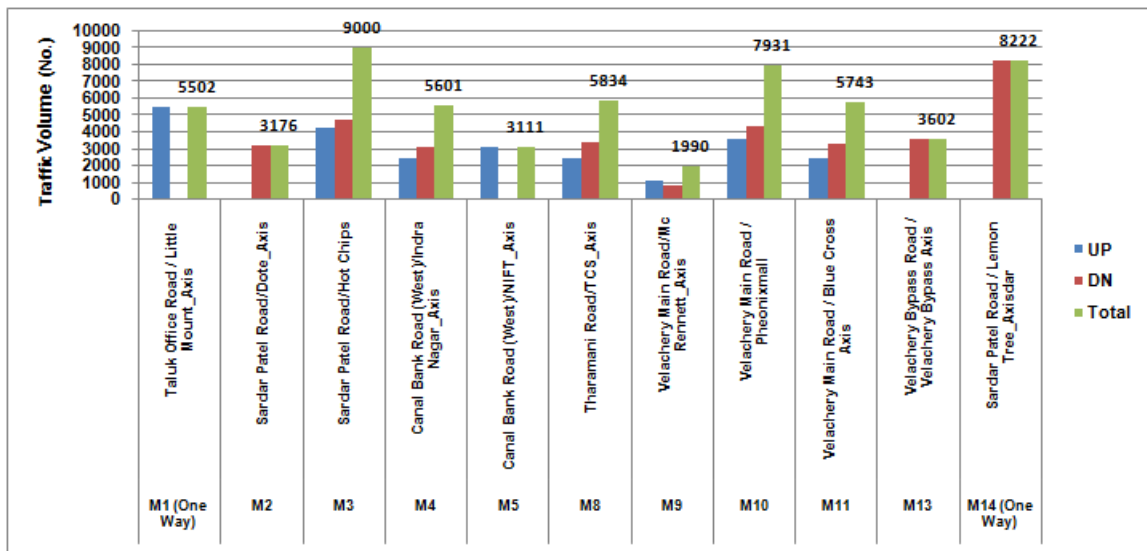


Figure 2.41: Traffic Flow Variation at each Mid Block – 27th August 2014 Evening Peak

Maximum traffic volume 9000 no. and minimum 1990 no. has observed at M3- Sardar Patel Road/Hot Chips & M9 Velachery Main Road/Mc Rennett_Axis respectively.

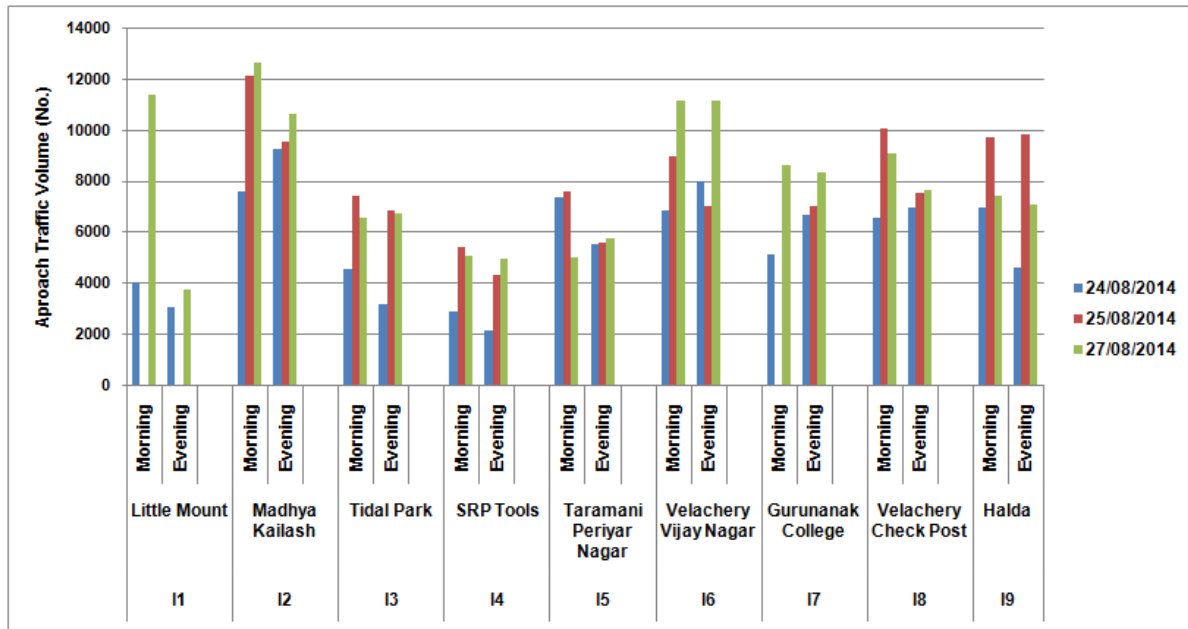


Figure 2.42: Approach Traffic Flow Variation at each Intersection

Maximum approach traffic volume 12363 no. and minimum 4660 no. has observed at I2- Madhya Kailash & I4 – SRP Tools respectively.

Traffic data summary and flow diagrams for 9 intersections are enclosed in **Annexure 2.1 (a) to (i) & 2.2 (a) to (i)**. Traffic data summary and flow diagrams for 11 midblocks are enclosed in **Annexure 2.3 (a) to (k) & 2.4 (a) to (k)**. The date and session wise video data extraction files for midblock and intersections are enclosed in CD separately.

2.5 User Perception Survey

Safety, mobility, efficiency, productivity & user satisfaction are final goals for deploying intelligent transport system in the transportation network. User of the transportation network is the ultimate stake holder for any of these said goals. Hence final review of the implemented system should factor in the perception of user about the system irrespective of the reality.

Hence in this after study, significant importance is given to the perception developed by the user after the implementation of Advanced Traveller Information System along the study corridor. User perception is recorded via two types of surveys, feedback surveys (offline) and web based surveys (online). In the following section of this report detailed methodology, execution and analysis is given for both the modes of User Perception Survey.

2.5.1 Training & Awareness

Considering the importance of feedback survey, accuracy of data was given the most preference even at the cost of time. Due to the language issues we had developed a team of local educated people to assist us in carrying the field surveys. Based on our practical experience of conducting such surveys we had developed a training manual and trained the whole team for a day which included pilot field survey.



As quality of responses was directly related to the awareness of the system, before carrying out the survey an awareness campaign was executed in which flyers were distributed at strategic locations like Toll Plaza and Food Courts.

2.5.2 VMS Feedback Survey

VMS (Variable Message Sign) feedback survey was designed to get feedback from those users of the study corridor who do not pre plan their trip by using information available online but use real time information available on VMS. As absolute accessibility of internet is very low in India, these users of corridor make for the significant proportion of overall users of the study corridor.



2.5.2.1 Methodology

Respondents for this survey were classified into two categories.

- 1) Intercept
- 2) Office/Residence

Intercept respondents are those from whom responses have been recorded while they are travelling along the corridor. In the other category respondents were taken from the residences and office areas around and/or the study corridor. 224 sample responses were taken from Intercept category and 178 responses were taken from office/residence category. In total 402 sample responses were recorded. Locations for both these categories were strategically identified so that minimum sampling error occurs and respondents are evenly distributed. Following are the locations which were finalized by us and approved by IIT for collecting responses for both the categories.

**Table 2.10 : VMS Feedback Survey Locations**

Sr. No	Office/Residence	Intercept
1	Anna Uni.	SRP Tools
2	CLRI	Vijaynagar
3	Cancer Inst.	Halda
4	RMZ	Little Mount
5	ACT Camp.	Madhya Kailash
6	Gurunanak Collage	Phoenix
7	Shops Velachery	Hot Chips
8	Ramco	Sangeetha
9	Tidel Park	Krishna Sweets
10	Gurunanak School	CCD
11	CBS/SMOT	Talapakkati
12	TCS-Tharamani	Flamingo
13	Ascenday	
14	SP Infocity	

Table 2.11: Daily Survey Progress - VMS Feedback Survey

Day No.	Intercept	Office/Resident
1	48	39
2	10	40
3	40	5
4	33	2
5	21	0
6	23	5
7	14	19
8	11	12
9	12	20
10	12	36
Total	224	178

Considering the medium awareness level and less time gap between before study and after study, it took a week to collect the responses. Following table shows the daily status of responses in each category.

2.5.2.2 Inference

The questionnaire was designed to get socioeconomic parameters and effectiveness of already installed VMS. In the following section inferences are drawn out of the data compiled from the feedback survey.

2.5.2.3 Demography and Category of Survey

In the survey respondents were asked about their education level, whether they have been either only to High School or Less or are they graduates or are they post graduates. It was found out that 95% of the respondents had education level of Graduate and above. It is to be noted that 67% of total respondents were male. Above graph classifies the type of survey with information on respondents' gender and education level.

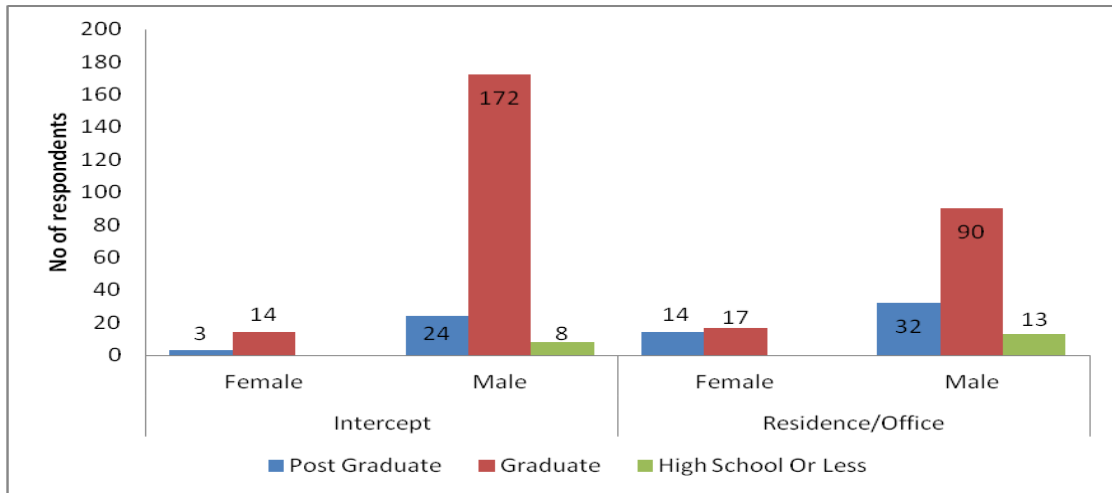


Figure 2.43: Demographic Details and Category of Survey

2.5.2.4 Age Profile

Acceptances of technology oriented systems are dependent on age profile of users and hence respondents were asked about their age and it was classified in to bins. It showed that 73% of the respondents who use study corridor were between ages of 21 to 30. Hence we can assume acceptance of technology oriented systems shall not be a difficult task.

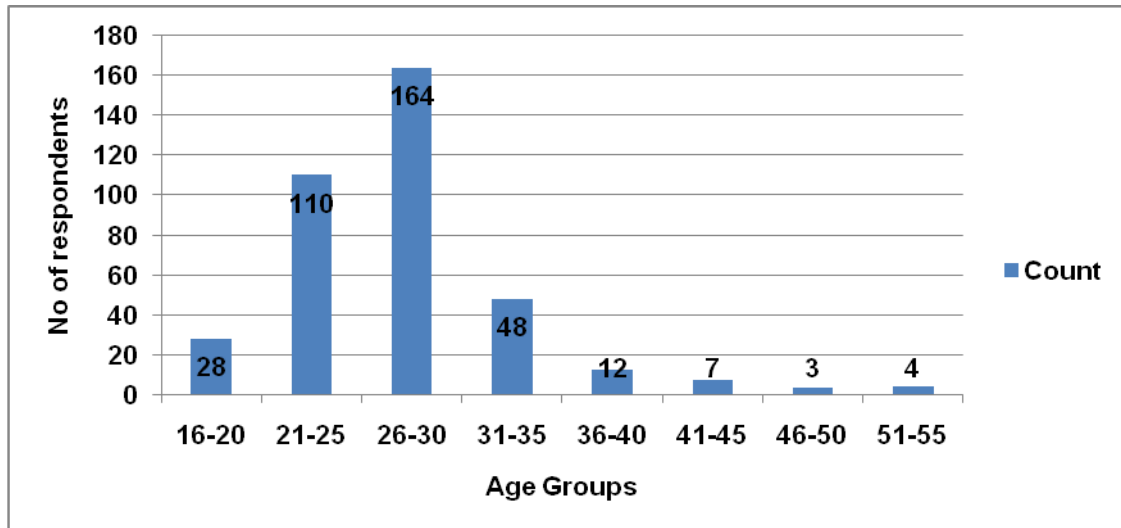


Figure 2.44: Age Profile

2.5.2.5 Monthly Household Income

Respondents were asked about their income group. 72% of the respondents fell into INR 10000/- to INR 30000/- category.

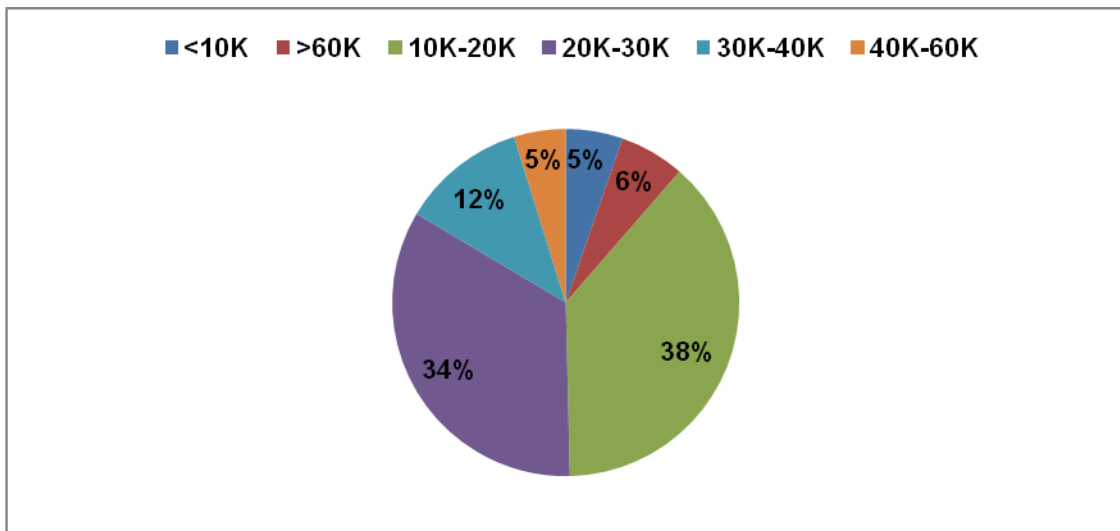


Figure 2.45: Monthly Household Income

2.5.2.6 Purpose of trip

It was important to know the purpose of trip of the respondents as the developed perception in users mind is dependent on the purpose of trip. Daily travellers who commute for work on the study corridor are the user who may pay regular attention to the system and give genuine feedback. 83% of the respondents used the study corridor for work related purposes.

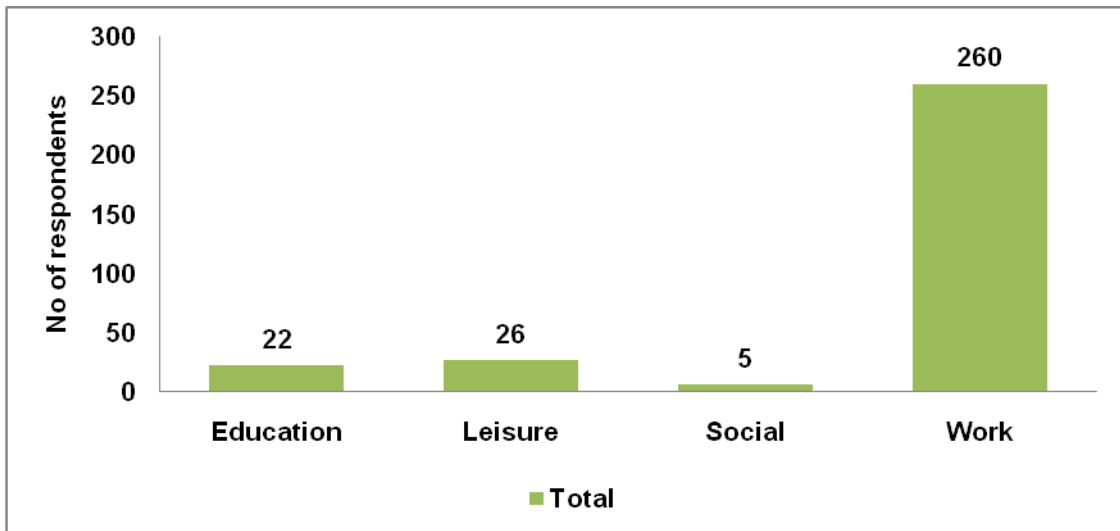


Figure 2.46: Purpose of Trip

2.5.2.7 Vehicles owned by household

To the question that how many vehicles a particular respondent owns in the household, 75% of the respondents replied stating that they own a single vehicle.

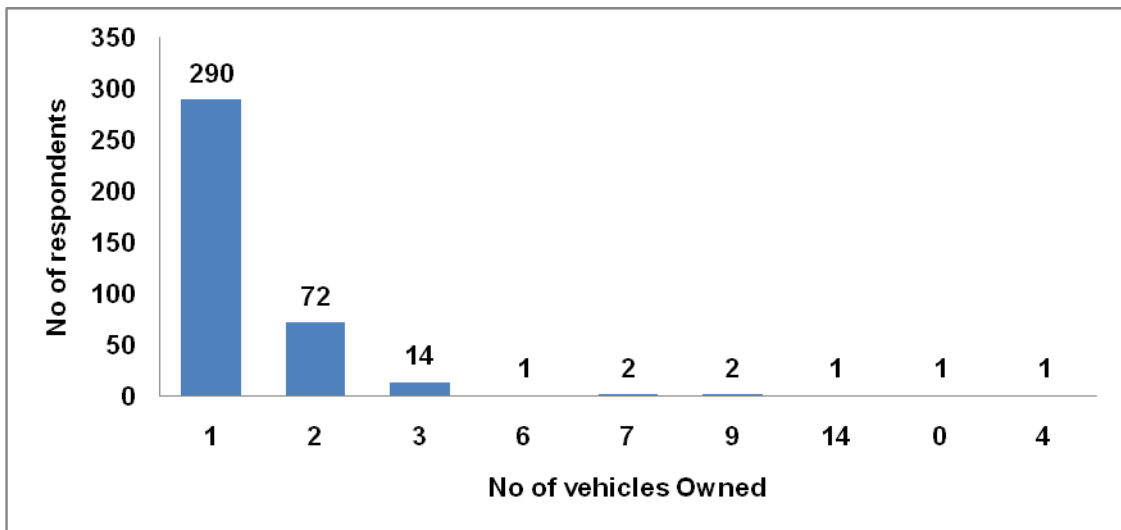


Figure 2.47: No of Vehicles Owned by Household

2.5.2.8 Number of years in Chennai

Out of all the respondents 95% of the respondents had been staying in Chennai for more than 3 years. Hence these users can effectively judge the traffic condition before and after the implementation of system.

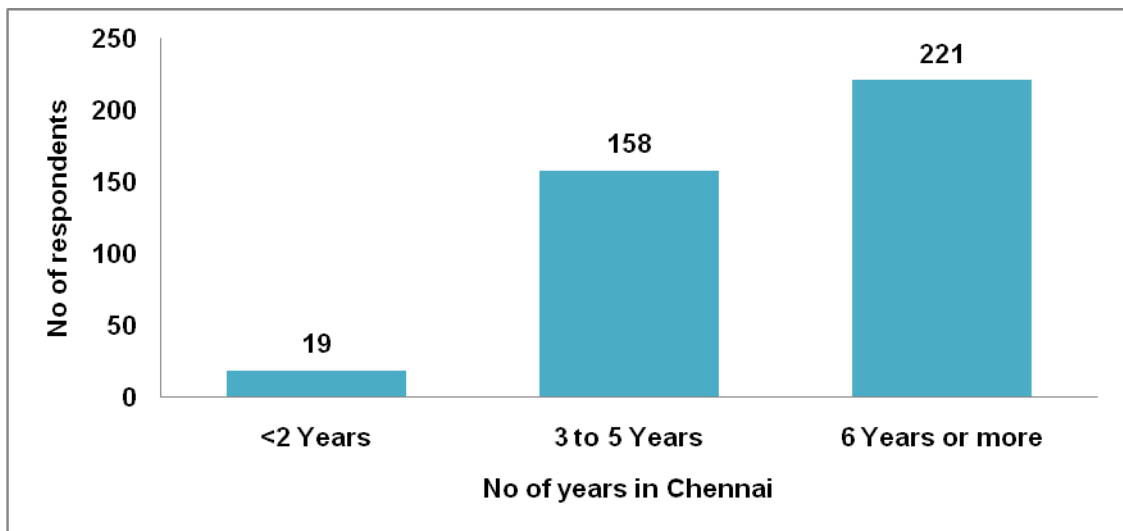


Figure 2.48: No of Years in Chennai

2.5.2.9 Driving Experience

When information were sought about driving experience of respondents, 30% of respondents had driving experience between 6-10 years and 51% of the respondents had driving experience more than a year.

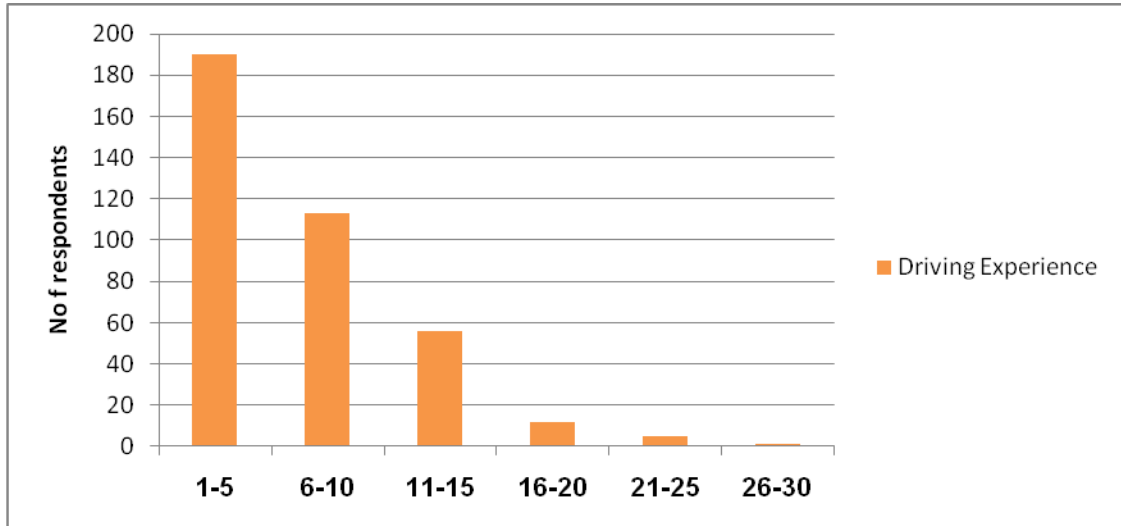


Figure 2.49: Driving Experience in Years

2.5.2.10 Field of Work

When the respondents were asked about their field of work, it was found that 38% of respondents were employed in the field of IT and another big class was of those who were self-employed, 25% of total respondents. This data seemed to be obvious as IT corridor was the part of the study corridor, naturally the majority of the users will be in the field of IT.

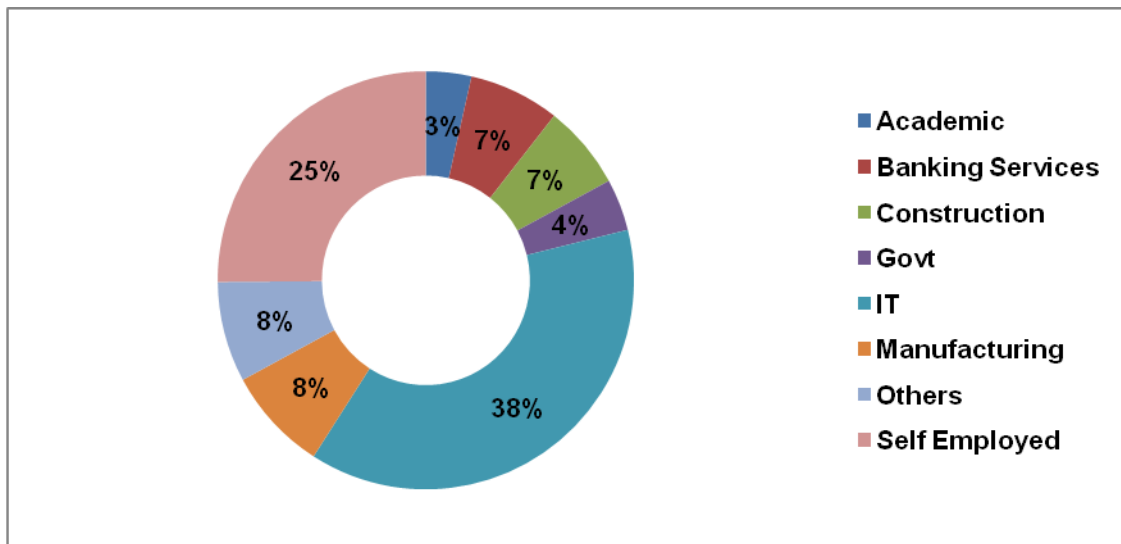


Figure 2.50: Field of Work

2.5.2.11 Mode of Travel

When the users of study corridor were asked about their mode of travel, it was found that 56% of the users had two wheelers as their mode of travel, 14% of the users had four wheelers as their mode of travel and while 4% of users had both four wheelers and two wheeler as their mode of travel.

It was also found out that 18% of two wheeler travellers had a co passenger and 14% of four wheeler travellers had a co passenger/co passengers.

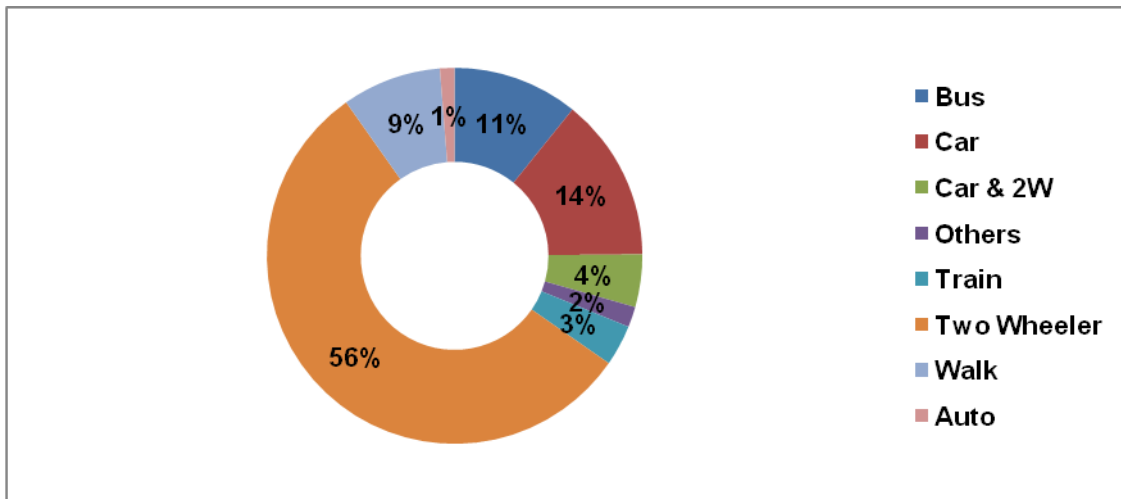


Figure 2.51: Mode of Travel

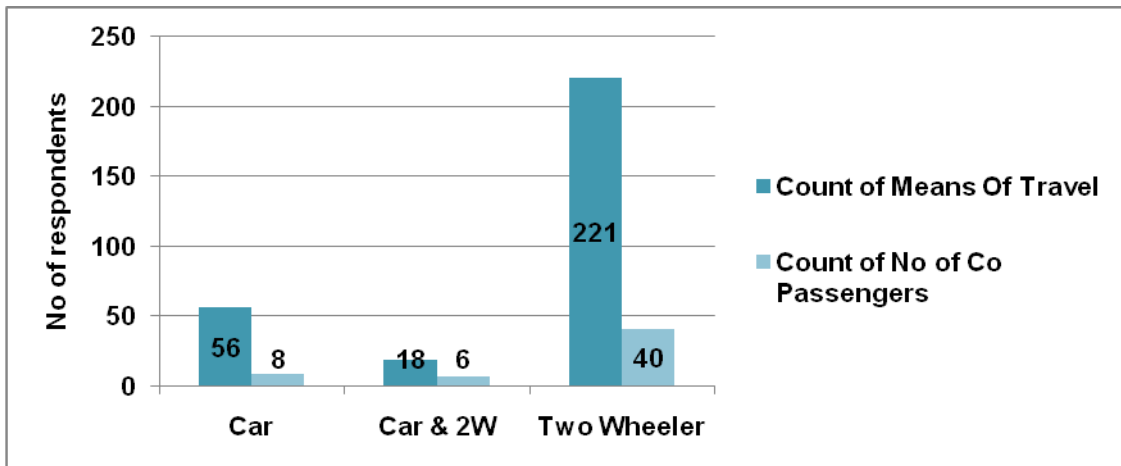


Figure 2.52: Travelers with Co Passenger

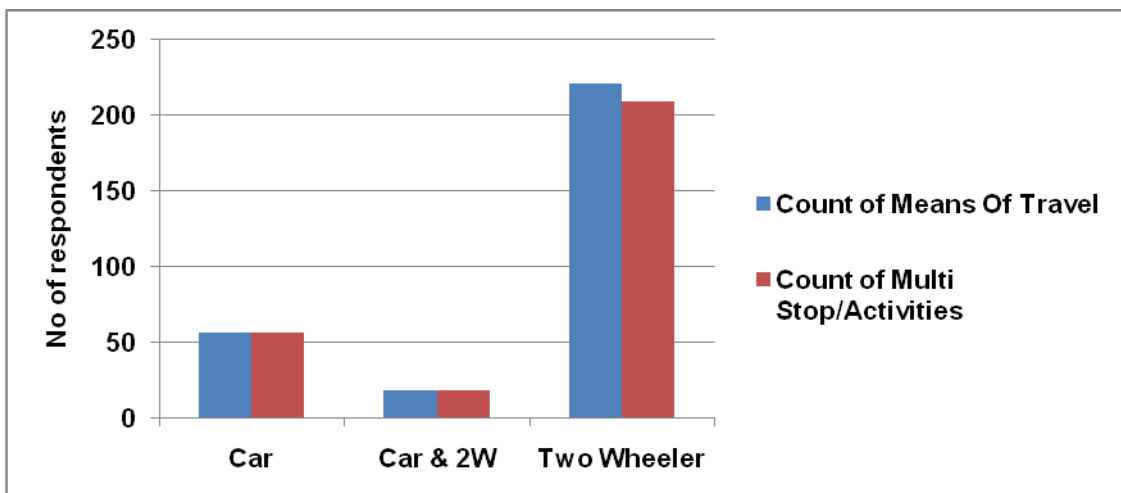


Figure 2.53: Travellers Doing Multi Stop Activities

It was also to be noticed that all those who travelled by four wheeler regularly combined multiple activities during trip 94% of those who travelled by two wheeler regularly combined multiple activities during trip point of entry into Study Corridor

2.5.2.12 Point of entry into Study Corridor

Madhya Kailash, SRP Tools, Saidapet and Vijaynagar were the key entry zones with percentage of entries being 15%, 13%, 15% and 18% respectively.

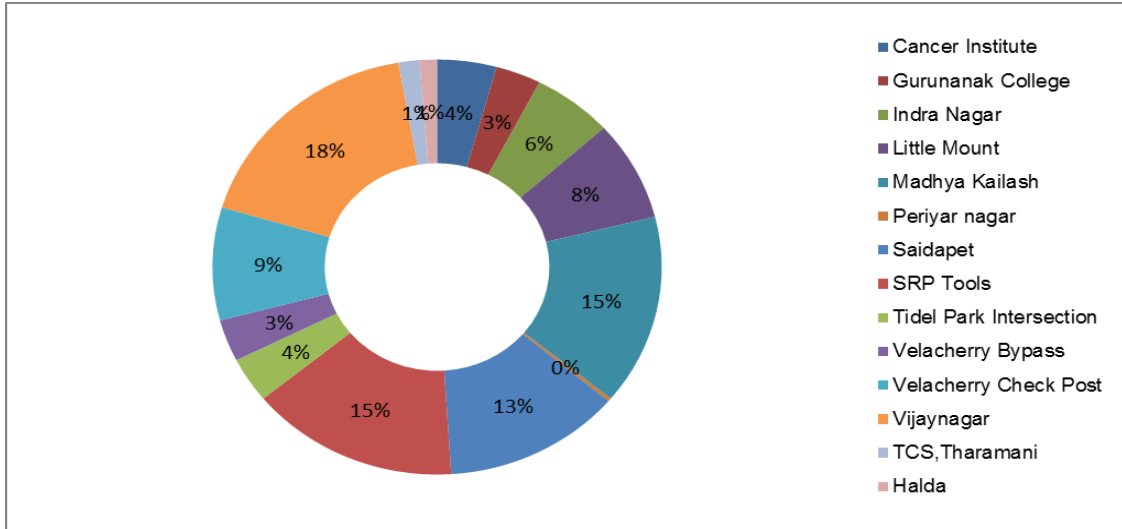


Figure 2.54: Point of Entry into Study Corridor

2.5.2.13 Point of exit from Study Corridor

Madhya Kailash and SRP Tools were key exit zones with percentage of exits being 15% and 24% respectively.

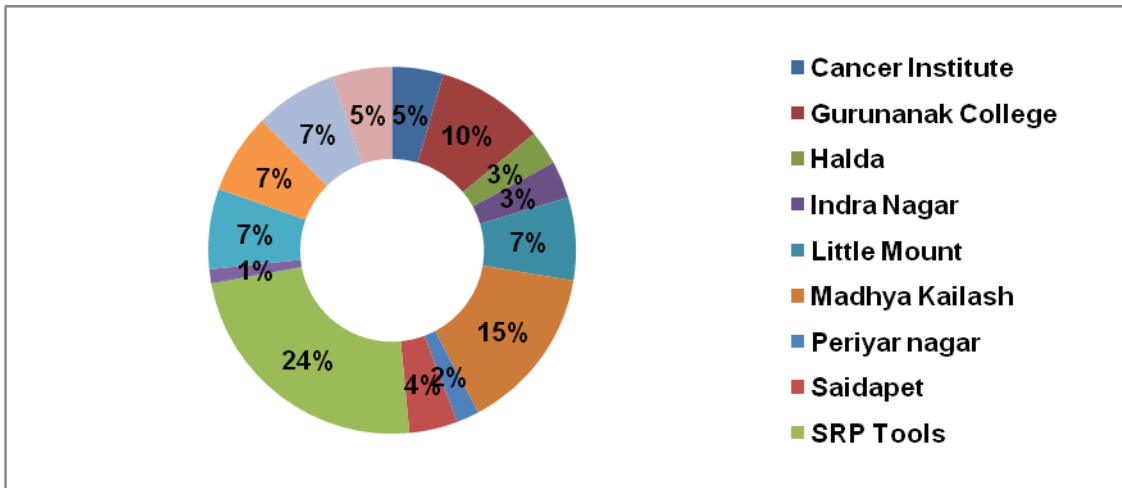


Figure 2.55: Point of Exit from Study Corridor

2.5.2.14 Beneficial effects of VMS

VMS are meant to reduce travel time, travel stress, traffic congestion and related uncertainties. From the following graph we shall infer the perceived benefits of VMS on said parameter if so.

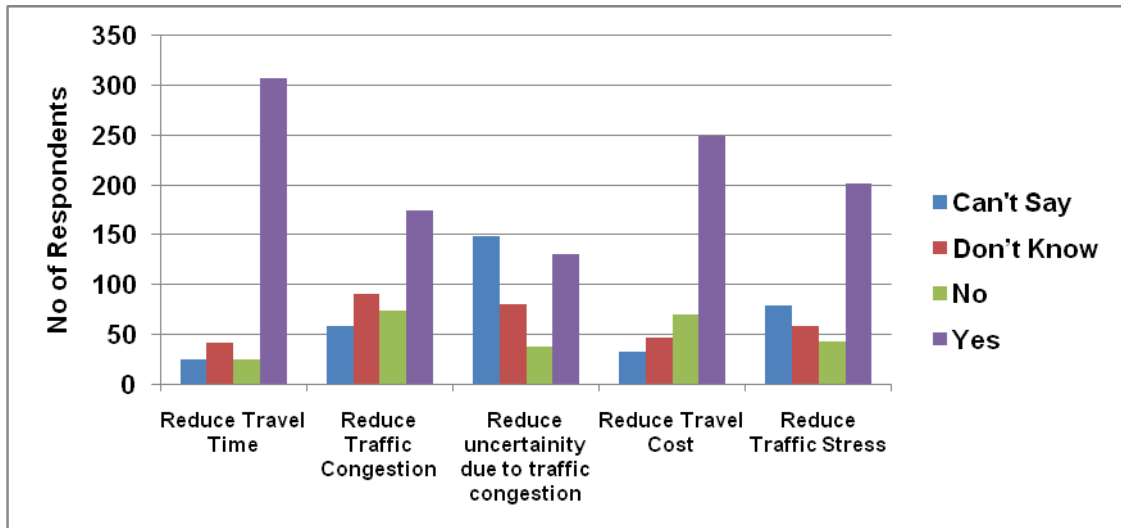


Figure 2.56: Benefits of VMS

2.5.2.15 Attributes of information displayed on VMS

Questions were asked to respondents to gauge their perception about the information displayed on the VMS and whether it helped them or not. Following graph depicts the user perceptions about VMS information.

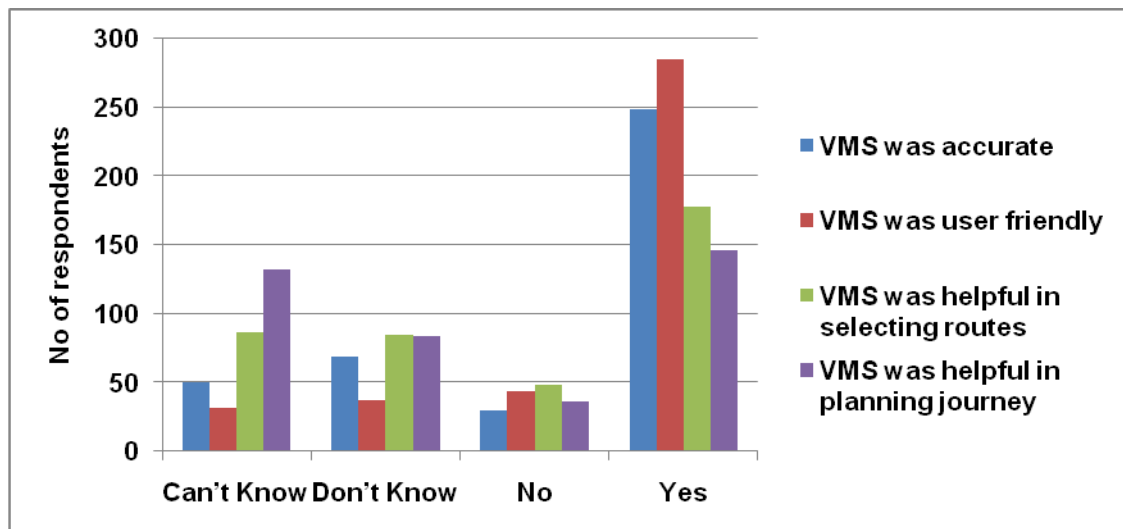


Figure 2.57: Attributes of VMS Information

2.5.2.16 Attributes of VMS Boards

Questions were asked to respondents to check if the locations where VMS boards were placed were fine enough or their needs some refinement. From the following graph we get the user perception about the location of VMS Boards and related attributes

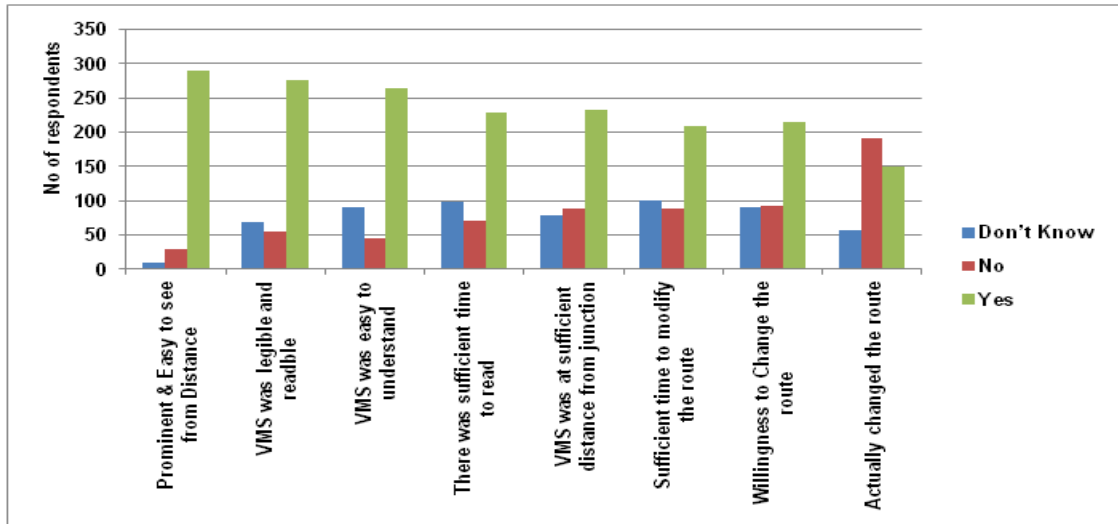


Figure 2.58: Attributes of VMS Information

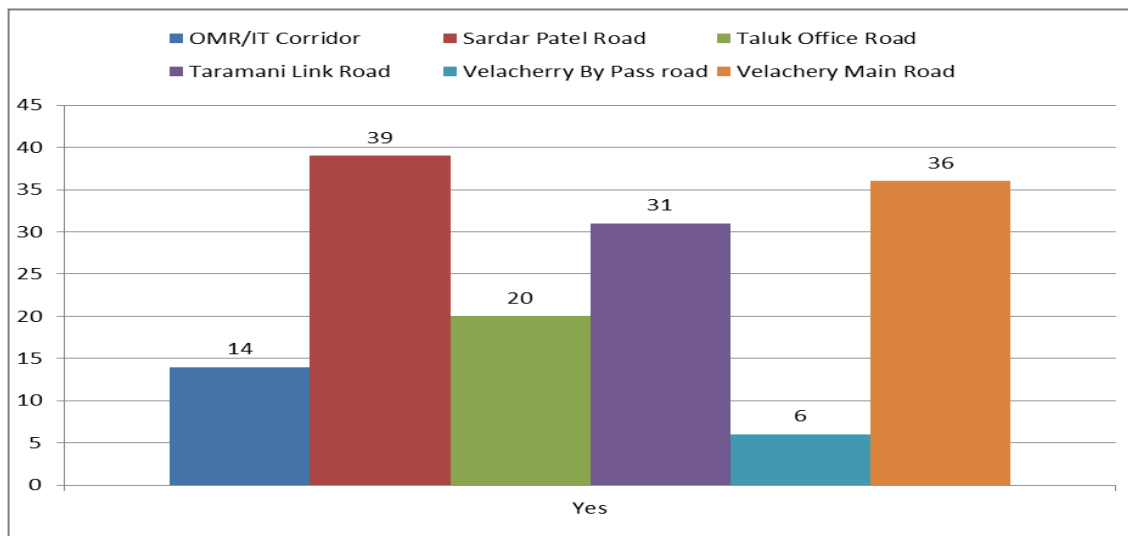


Figure 2.59: New Routes Taken Based on VMS info

2.5.2.17 User Satisfaction

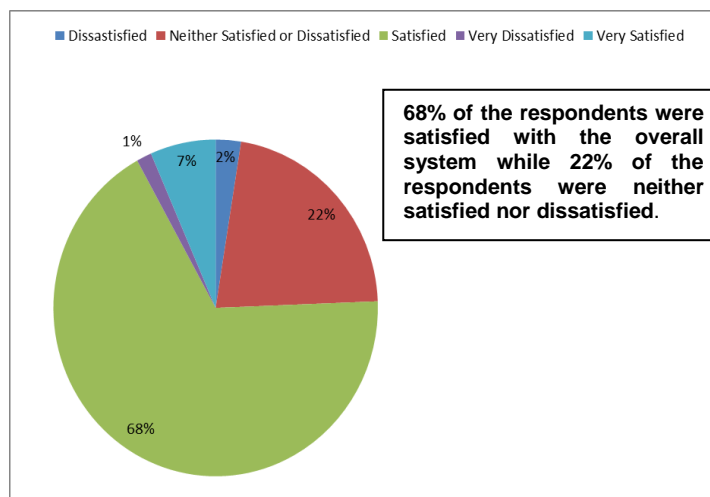


Figure 2.60: User Satisfaction Level

2.5.2.18 Travel frequency on individual corridor roads

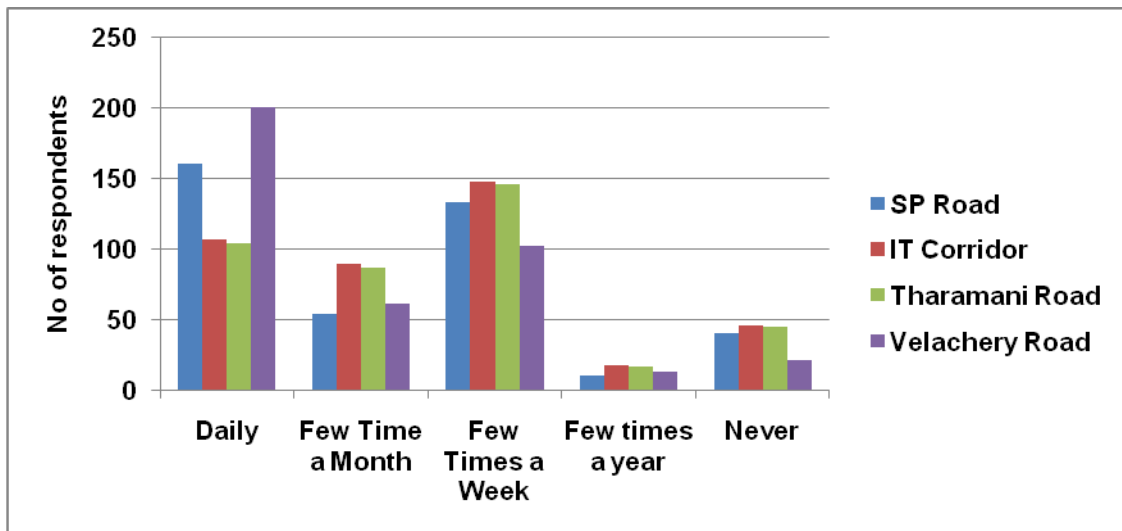


Figure 2.61: Travel Frequency on Individual Corridor Roads

When users were asked about the usage frequency of different roads which are part of study corridor, it was found out that SP Road and Velachery Road had the highest daily traffic.

2.5.2.19 VMS usage frequency

Respondents were asked about how often they plan to use the VMS information for travel planning, in reply 21% of respondents said that they will use the information on daily basis while 52% of the respondents said that they will use the information only few times a week.

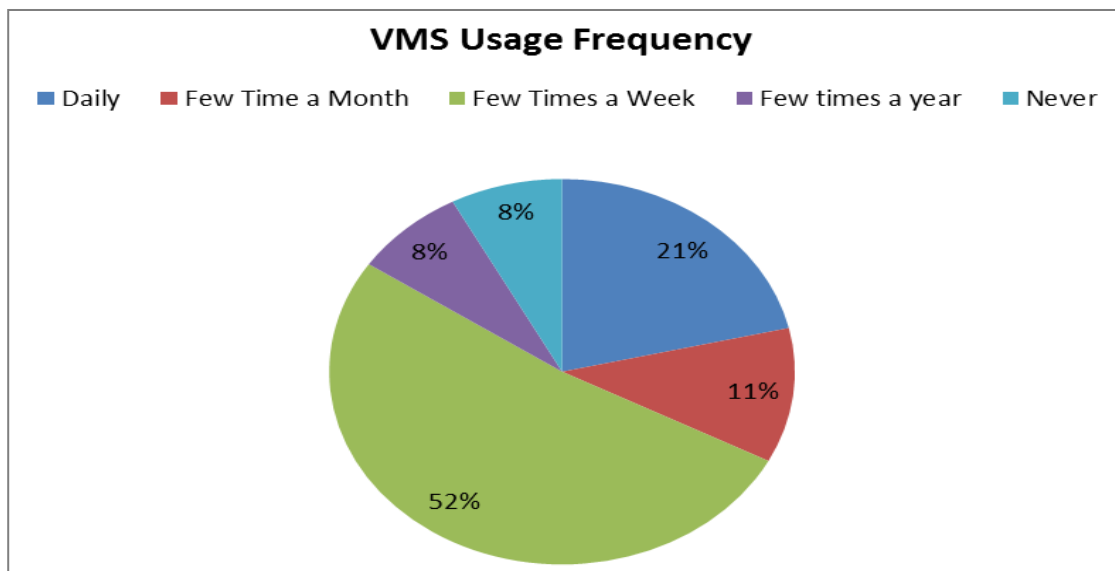


Figure 2.62: VMS Usage Frequency

2.5.3 Web Based Survey

Web based survey was designed to get feedback from those users of the study corridor who pre plan their trip by using information available online. With increase in mobile penetration and internet in India, web is significant medium of spreading information and hence it is important to gauge feedback of those users who use internet for planning their trips.

2.5.3.1 Methodology

Under this project an interactive website is designed by IIT which shows real time information about traffic condition along the corridor. The URL of the website is www.rtis.iitm.ac.in. On the home page of the website a FEEDBACK tab was put in for users to give their feedback about the website and information displayed on website. The feedback form was developed on Google Docs and was securely hosted on Google with dedicated account. The final feedback form was uploaded after the approval from IIT.

Respondents for this survey were classified into two categories.

- 1) New Users
- 2) Regular Users

New Users are those who have visited the website for the first time and regular users are those regularly visit the website for traffic information. As the system is running in the corridor since only a month and hence regular visitors were expected to be low. Following figure depicts the distribution of type of users.

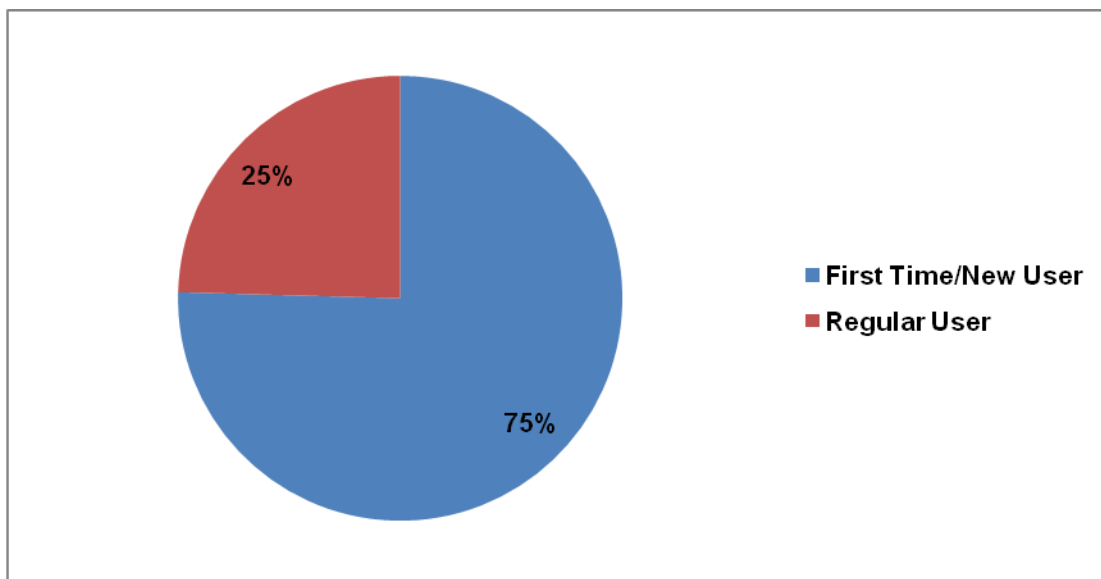


Figure 2.63: VMS Usage Frequency

Places where VMS feedback survey was conducted and at other locations, flyers were distributed to create awareness. While distributing the flyers, contact numbers of individuals who regularly used the corridor were noted. They were educated about the website and system in detail and were requested to give their feedback on website. After a day a follow up was done with all individuals who had not visited the website or not given the feedback.

Considering the low awareness level and less time gap between before study and after study, it took a week to collect the responses.

2.5.3.2 Inference

The questionnaire was designed to get socioeconomic parameters and effectiveness of website and information on website. In the following section inferences are drawn out of the data compiled from the feedback survey.

2.5.3.3 Demography and Category of Survey

In the survey respondents were asked about their education level, whether they have been either only to High School or Less or are they graduates or are they post graduates. It was found out that 94% of the respondents had education level of Graduate and above. It is to be noted that 77% of total respondents were male. Above graph provides information on respondents' gender and education level.

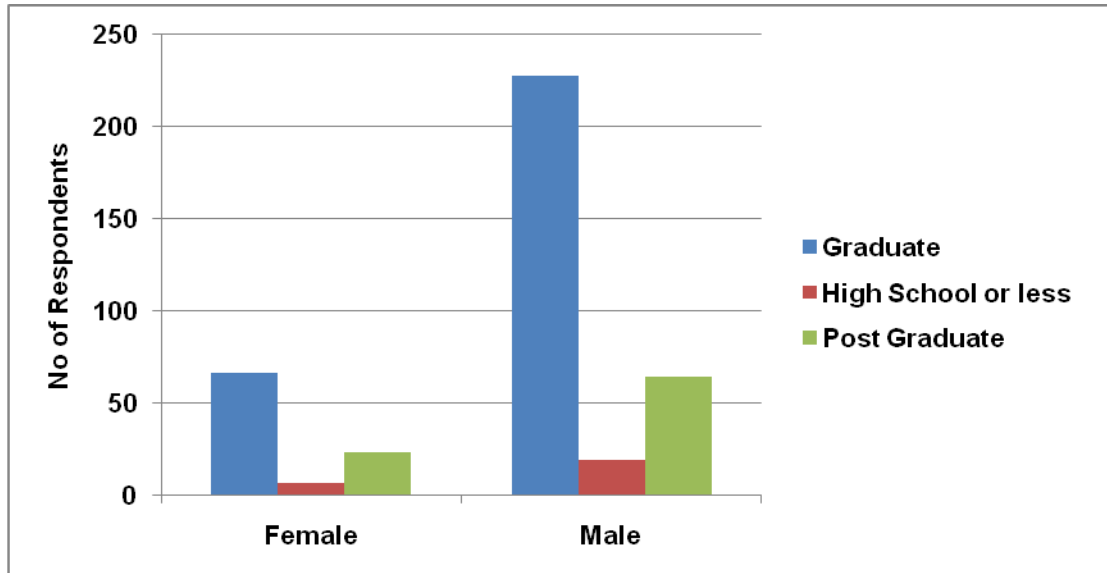


Figure 2.64: Gender and Education Profile

2.5.3.4 Age Profile

Acceptances of technology oriented systems are dependent on age profile of users and hence respondents were asked about their age and it was classified in to bins. It showed that 74% of the respondents who use study corridor were between ages of 21 to 30. Hence we can assume acceptance of technology oriented systems shall not be a difficult task.

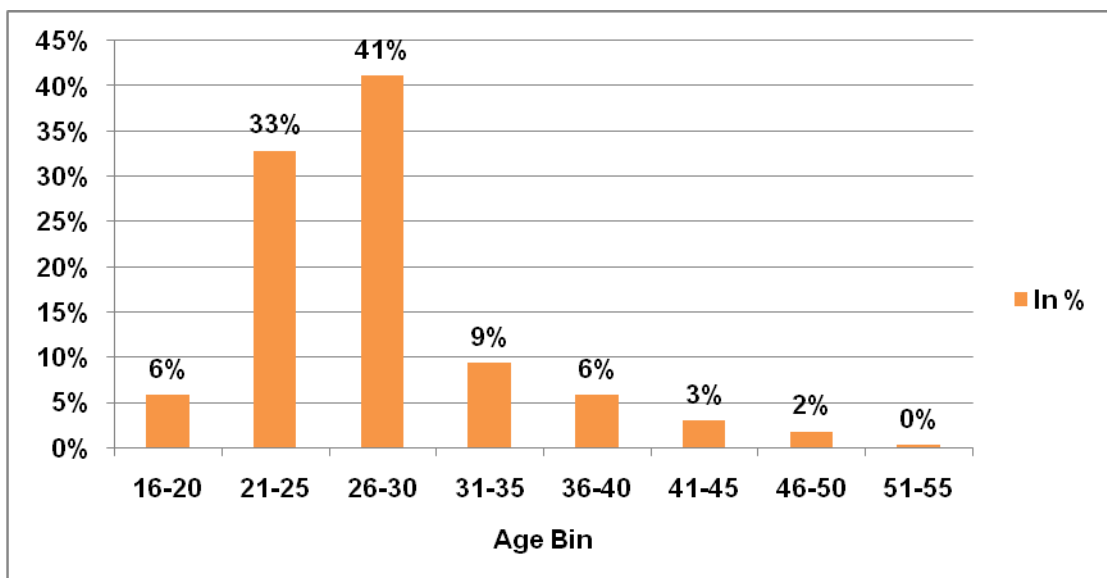


Figure 2.65: Age Profile

2.5.3.5 Monthly Household Income

Respondents were asked about their income group and 71% of the respondents fell into INR 10000/- to INR 30000/- category.

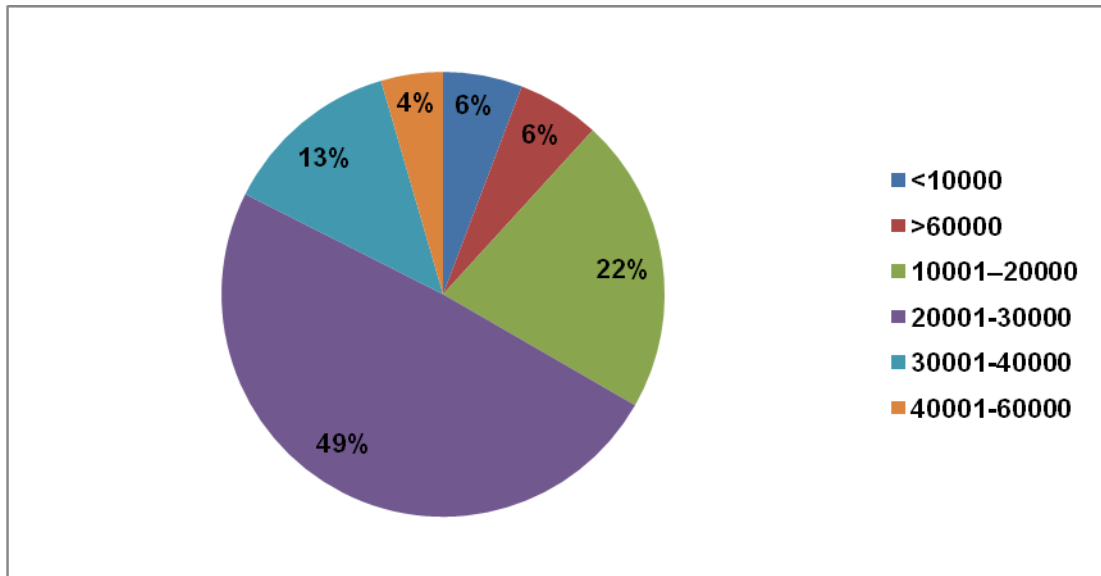


Figure 2.66: Monthly Household Income

2.5.3.6 Vehicles owned by household

To the question that how many vehicles a particular respondent owns in the household, 47% of the respondents replied stating that they own a single vehicle.

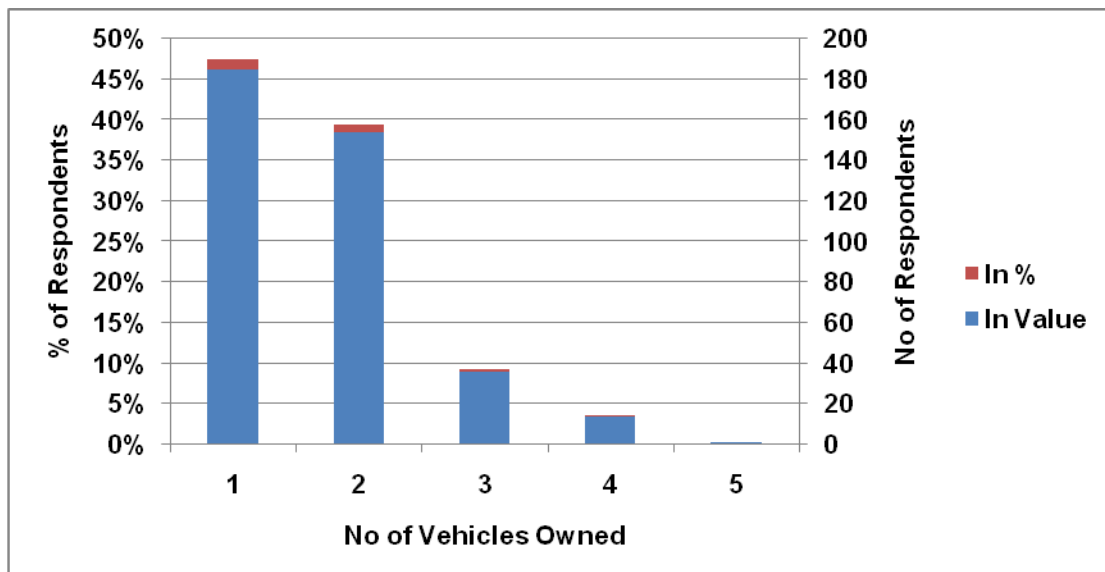


Figure 2.67: No of Vehicles Owned by Household

2.5.3.7 Number of years in Chennai

Out of all the respondents 95% of the respondents had been staying in Chennai for more than 3 years. Hence these users can effectively judge the traffic condition before and after the implementation of system.

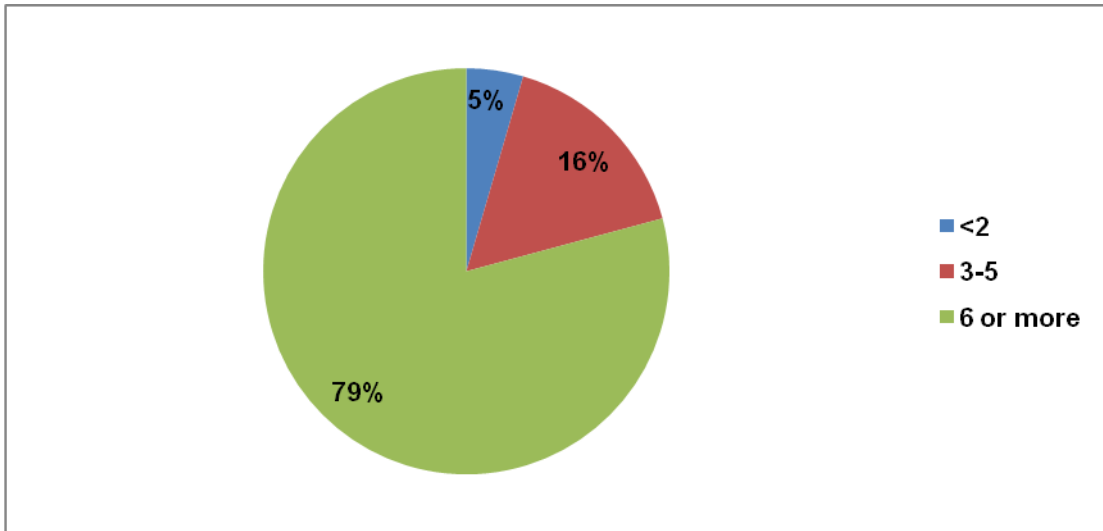


Figure 2.68: No of Years in Chennai

2.5.3.8 Field of Work

When the respondents were asked about their field of work, it was found that 41% of respondents were employed in the field of IT. This data seemed to be obvious as IT corridor was the part of the study corridor, naturally the majority of the users will be the in the field of IT.

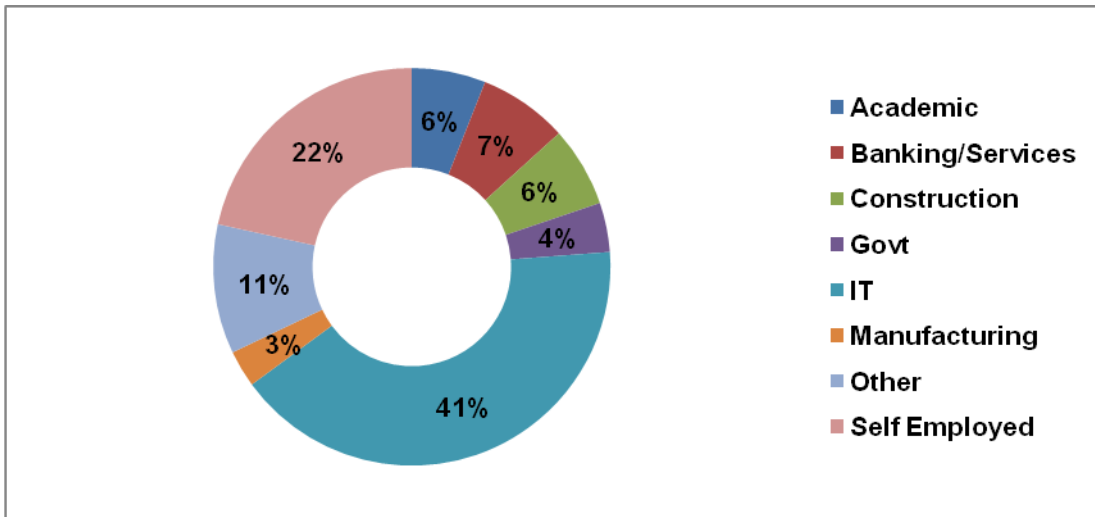


Figure 2.69: Field of Work

2.5.3.9 Mode of Travel

When the users of study corridor were asked about their mode of travel, it was found that 59% of the users had two wheelers as their mode of travel, 19% of the users had four wheelers as their mode of travel and while 17% of users had bus as their mode of travel.

It was also found out that 20% of two wheeler and or car travellers had single or multiple co passengers.

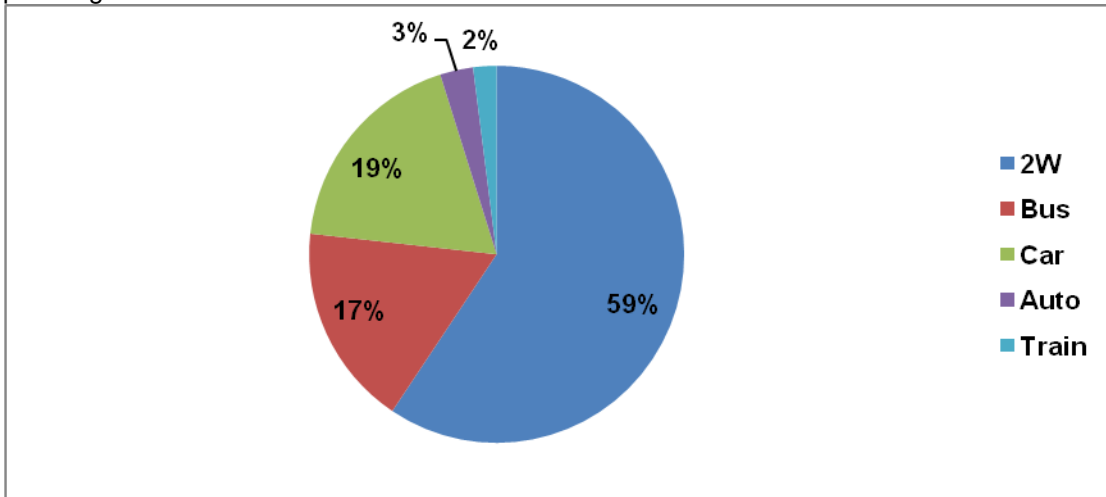


Figure 2.70: Mode of Travel

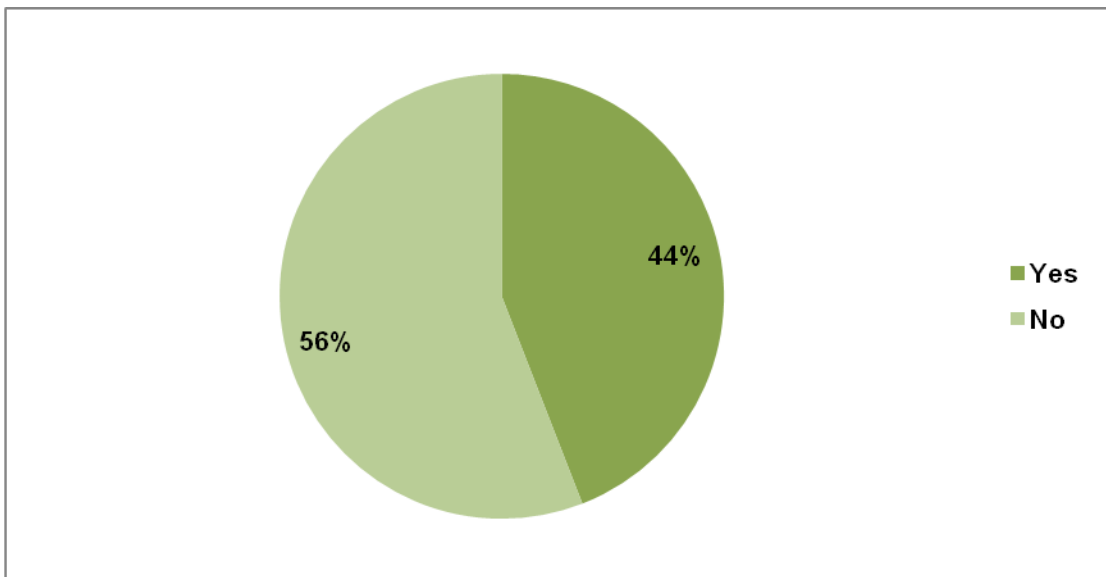


Figure 2.71: Travellers with Multiple Activities

It was also to be noticed that out of those who travelled by four wheeler and two wheeler, 56% regularly combined multiple activities during trip.

2.5.3.10 Point of entry into Study Corridor

Madhya Kailash, SRP Tools, Saidapet and Little Mount were the key entry zones with percentage of entries being 34%,9%,12% and 17% respectively.

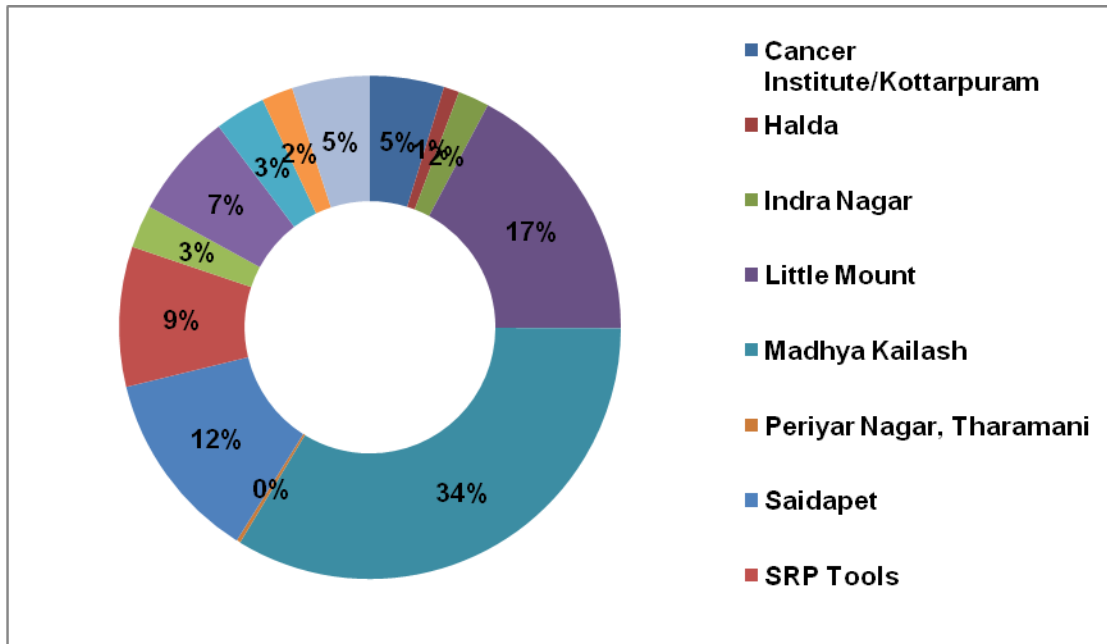


Figure 2.72: Point of Entry into Study Corridor

2.5.3.11 Point of exit from Study Corridor

SRP Tools was key exit zone with percentage of exits being 33%.

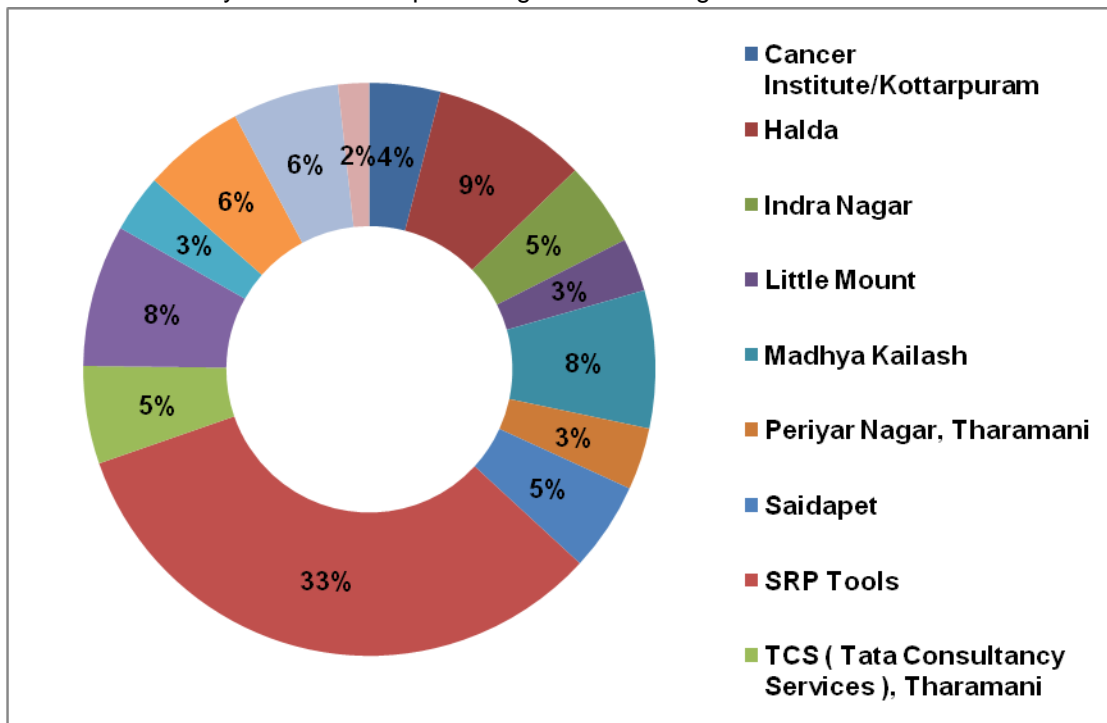


Figure 2.73: Point of Exit from Study Corridor

2.5.3.12 Beneficial effects of ATIS

ATIS was meant to reduce travel time, travel stress, traffic congestion and related uncertainties. From the following graphs we shall infer the perceived benefits of ATIS on said parameter if so.

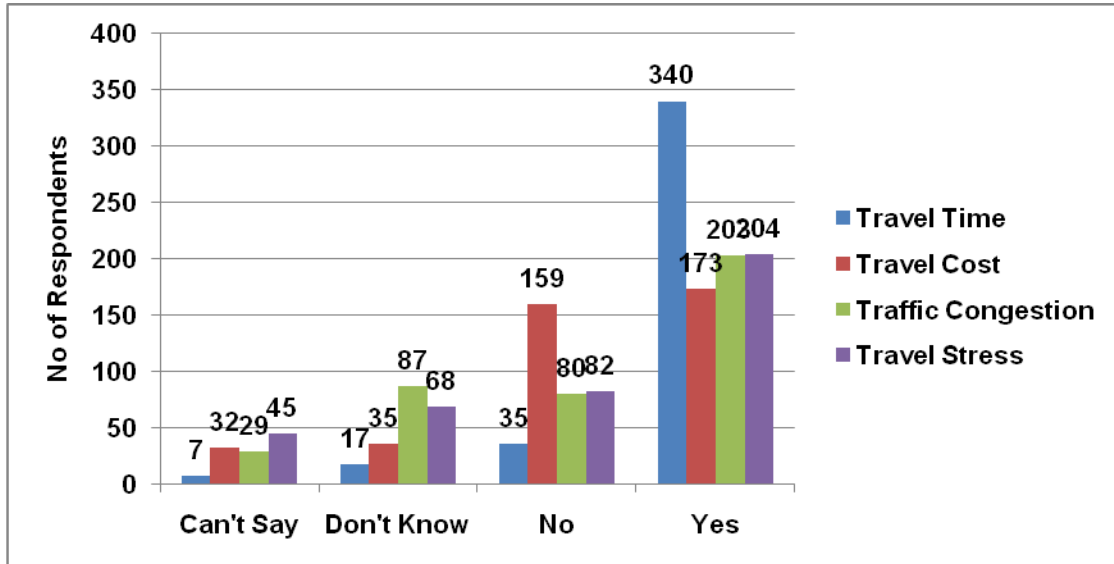


Figure 2.74: Benefits of ATIS

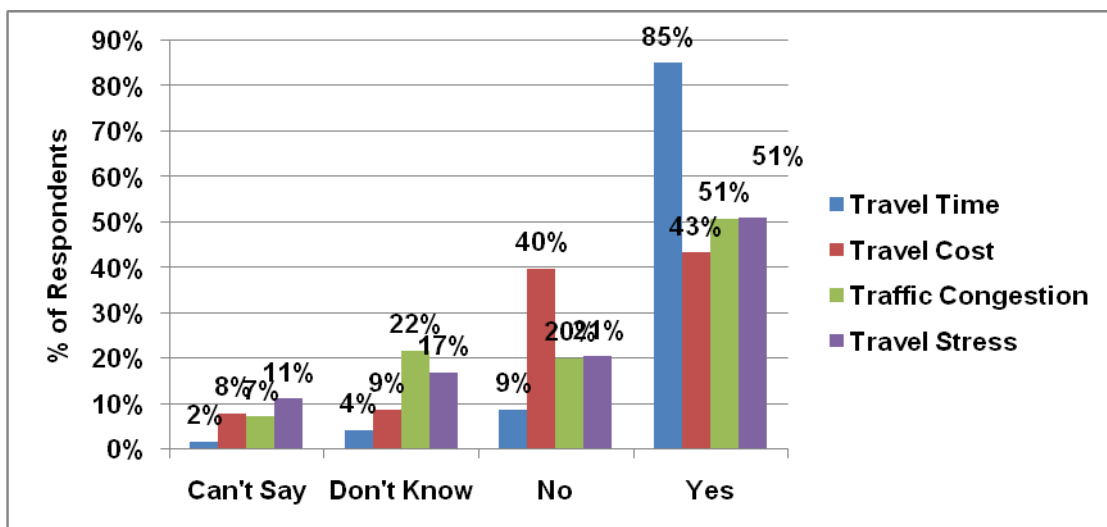


Figure 2.75: Benefits of ATIS in Percentage

2.5.3.13 Attributes of information displayed on website

Questions were asked to respondents to gauge their perception about the information displayed on the website and whether it helped them or not. Following graphs depict the user perceptions about information on web.

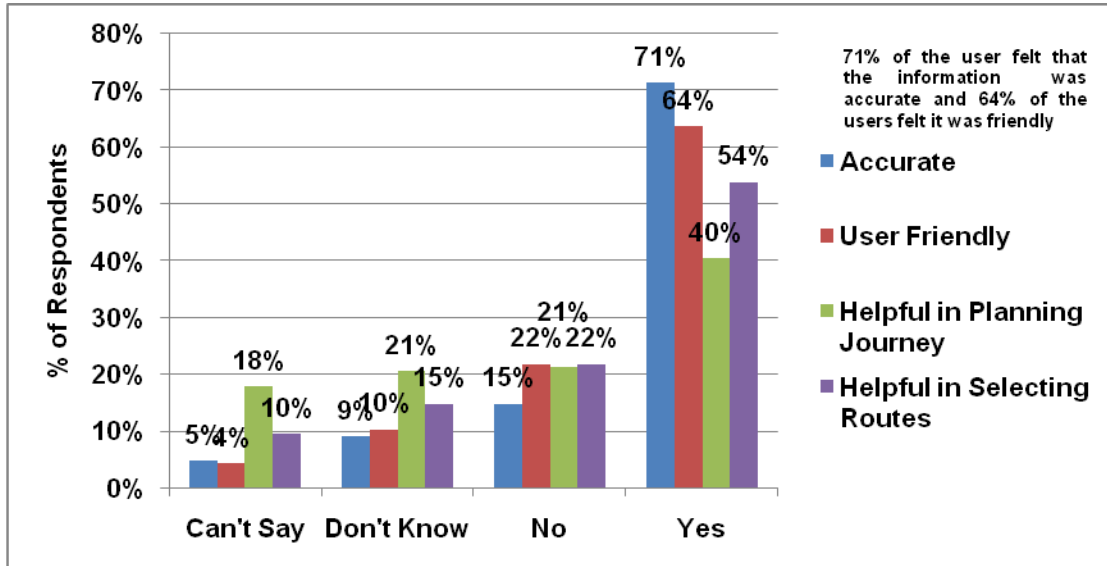


Figure 2.76: Attributes of Information Shown on Website

2.5.3.14 Internet Usage Frequency

Questions were asked to respondents to check how often they use internet and via which medium and for what purpose. Following graph describes the internet usage frequency by different modes for different purposes.

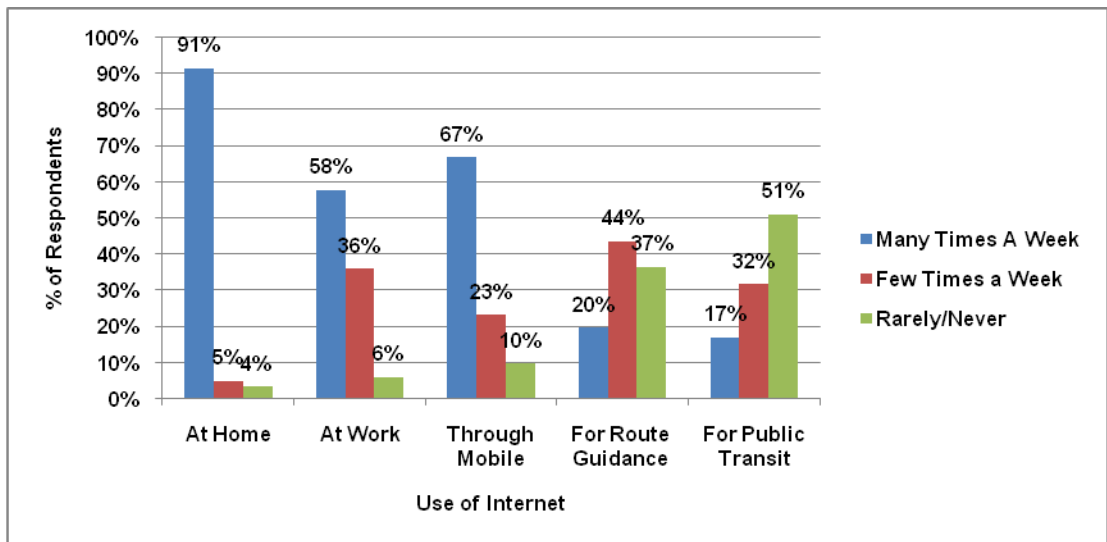


Figure 2.77: Internet Usage Frequency

2.5.3.15 User Satisfaction

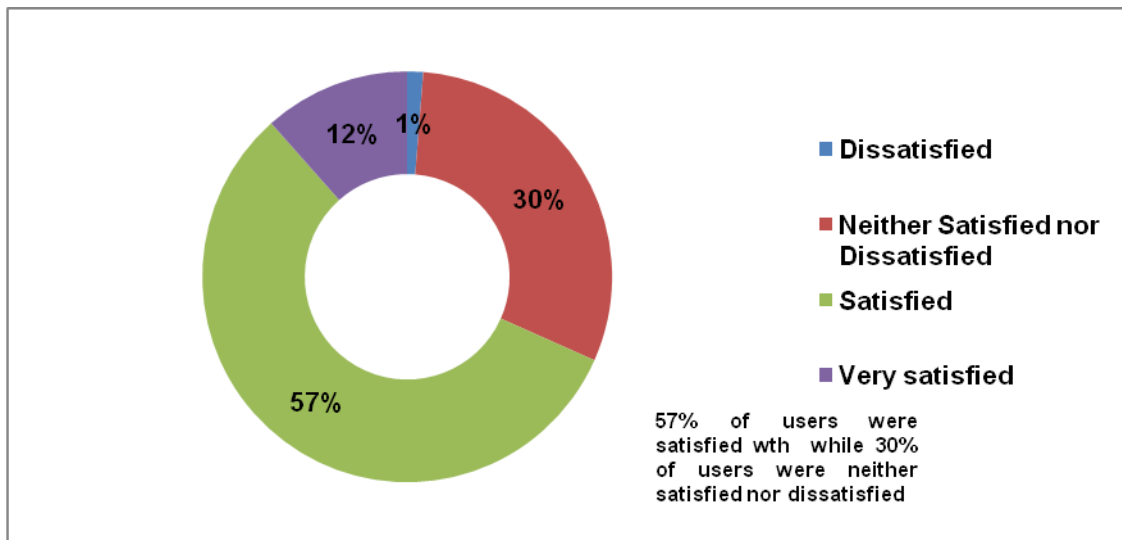


Figure 2.78: User Satisfaction

2.5.3.16 Travel Frequency on Individual Corridor Roads

When users were asked about the usage frequency of different roads which are part of study corridor, it was found out that SP Road and IT Road had the highest daily traffic.

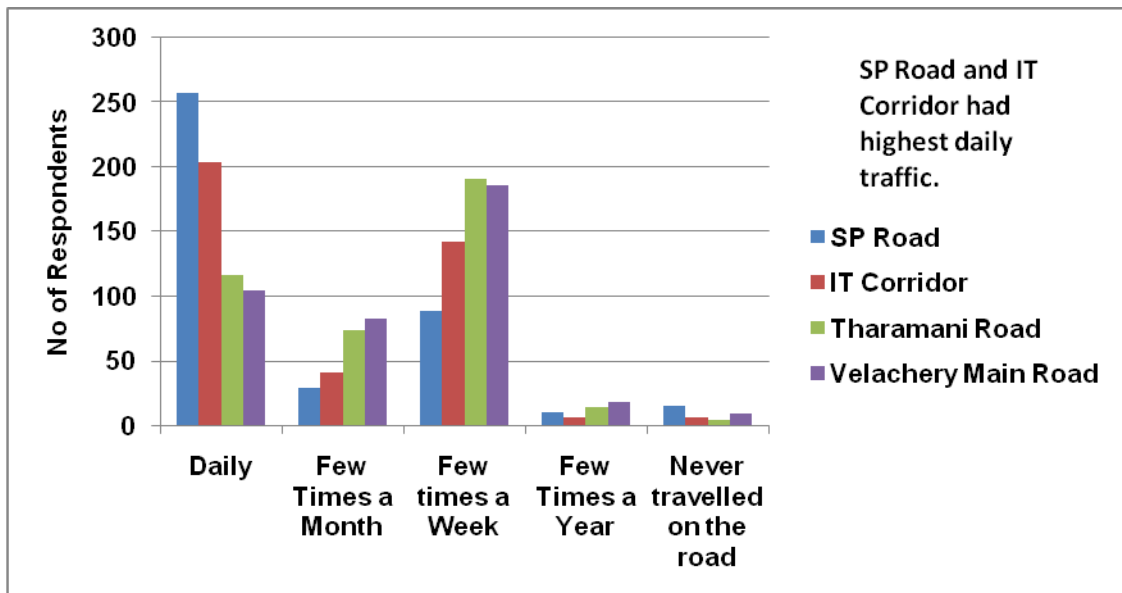


Figure 2.79: Frequency of Travel on Different Roads

2.5.3.17 Helpful Information

Website users were asked about which information they found most helpful out of the all available information on website. Following graph shows the percentage against all type of information. Users felt that traffic news, congestion maps and traffic delays are most helpful information.

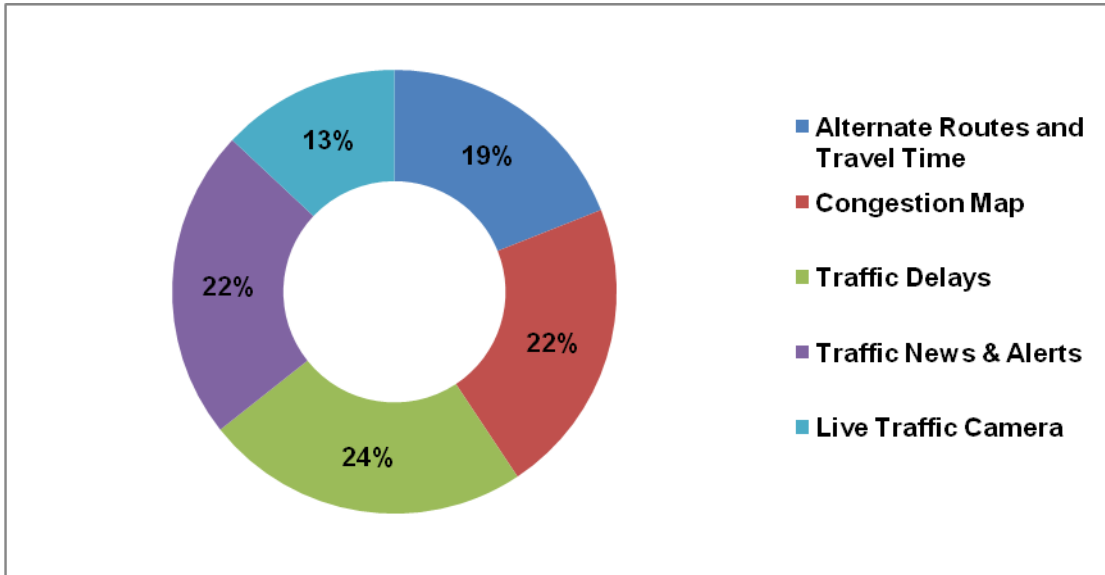


Figure 2.80: Information Most Useful to User

2.5.3.18 Frequency of internet usage for planning future trips

Following is the summary of responses to the question that how often users will use this information for planning their future trips.

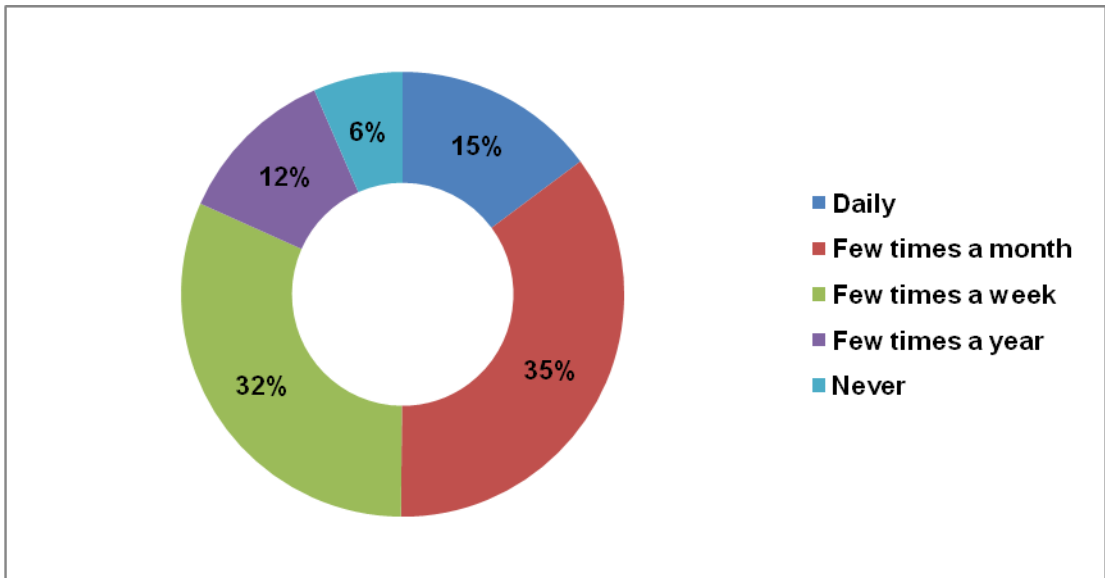


Figure 2.81: Use of ATIS for Future Travel Trips

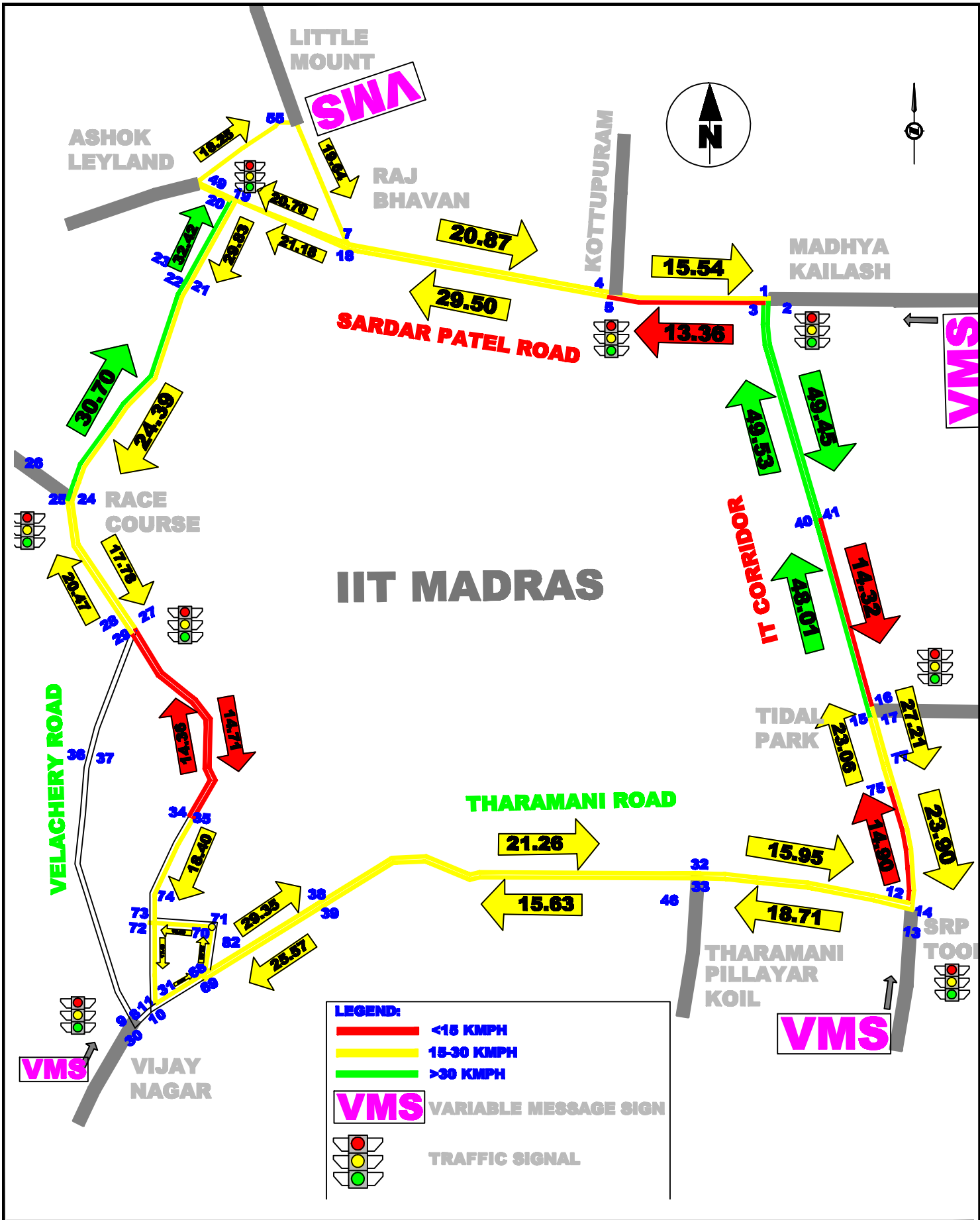


FIGURE :- 2.15 (b)

Speed Profile: Car Weekday Evening

After Study- Traffic data Collection and Analysis for Research Study on Advanced Traveler Information System (ATIS) for Indian Cities

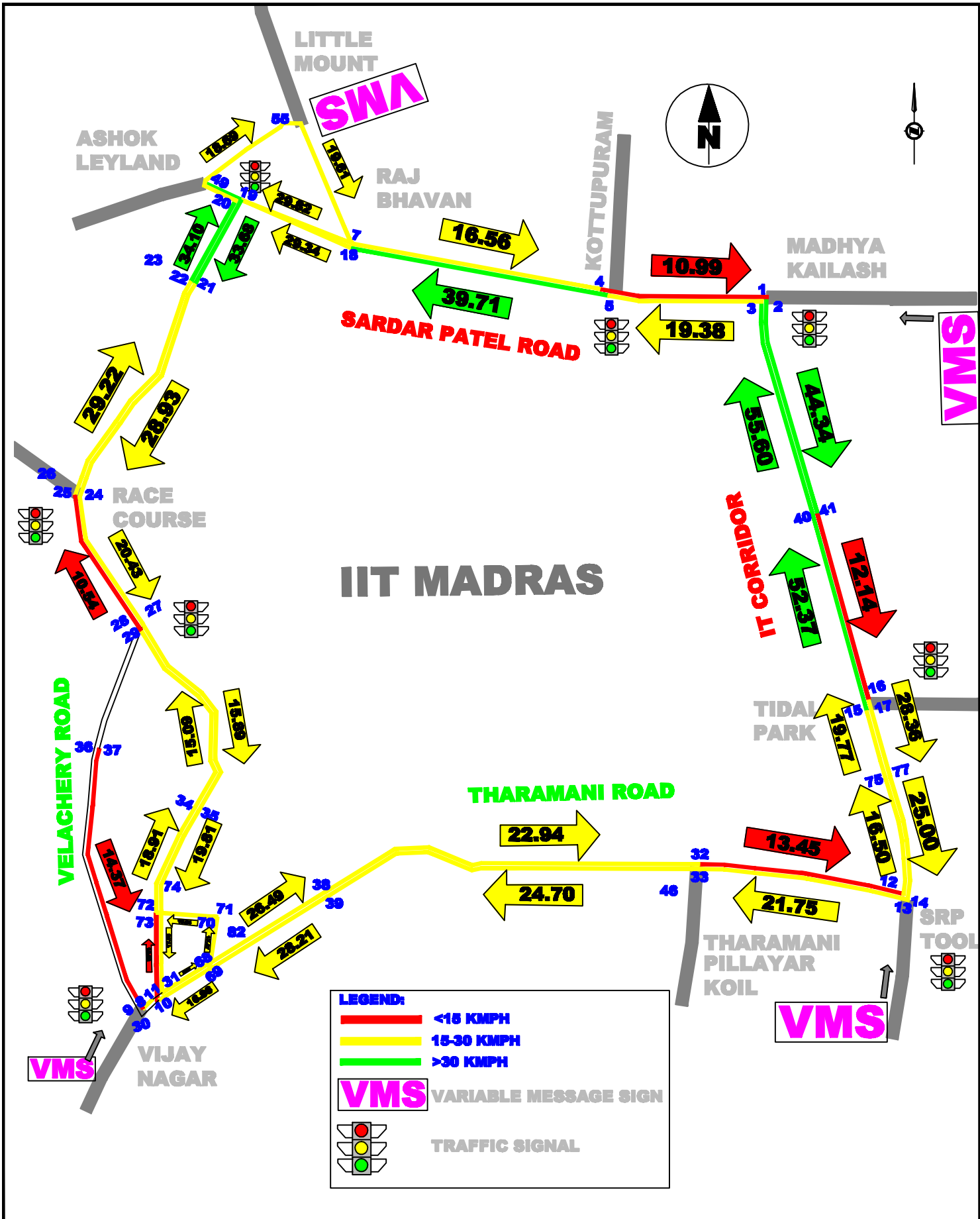


FIGURE :- 2.15 (a)

Speed Profile: Car Week day Morning

After Study- Traffic data Collection and Analysis for Research Study on Advanced Traveler Information System (ATIS) for Indian Cities

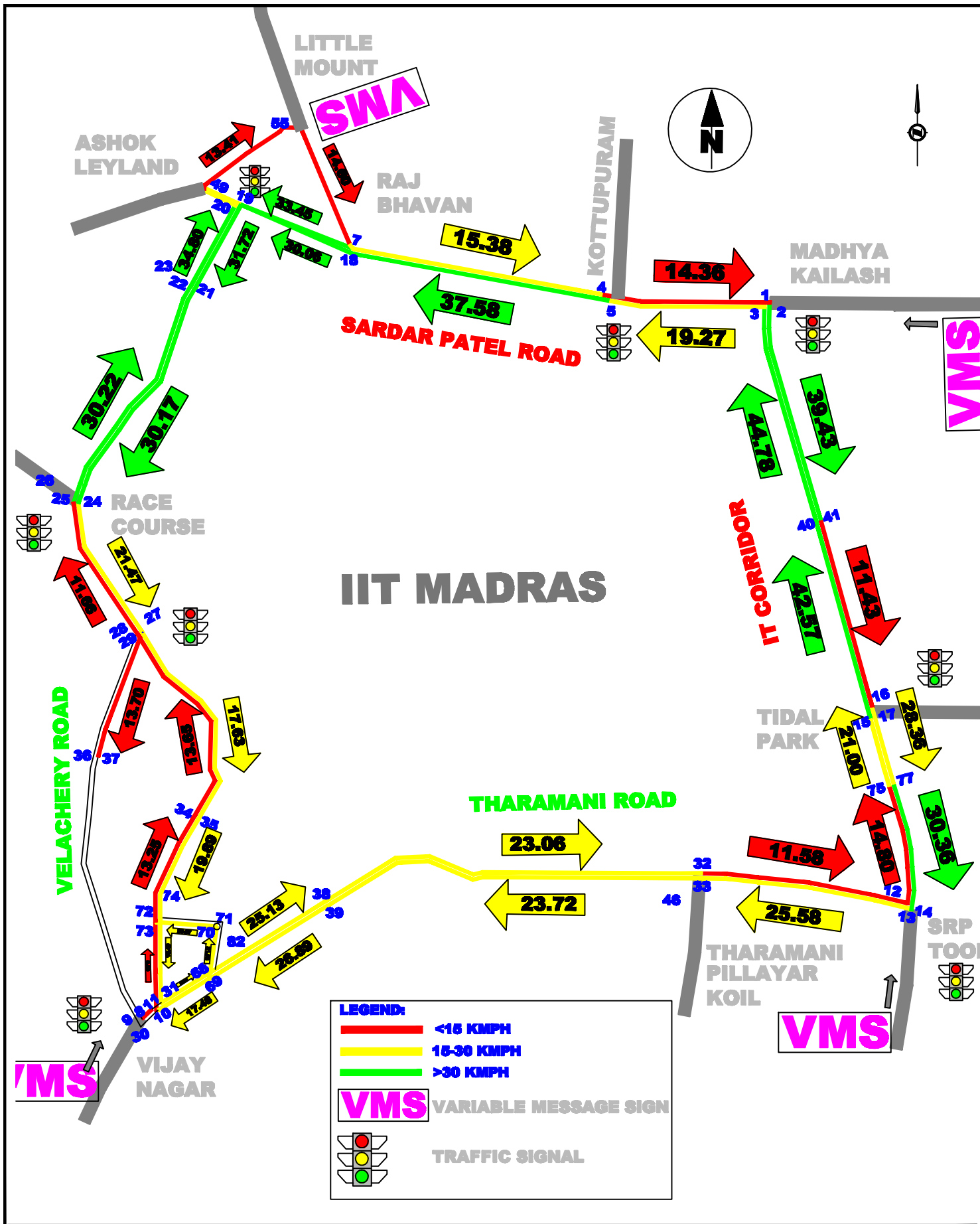


FIGURE :- 2.26 (a)

Speed Profile: Auto Weekday Morning

After Study- Traffic data Collection and Analysis for Research Study on Advanced Traveler Information System (ATIS) for Indian Cities

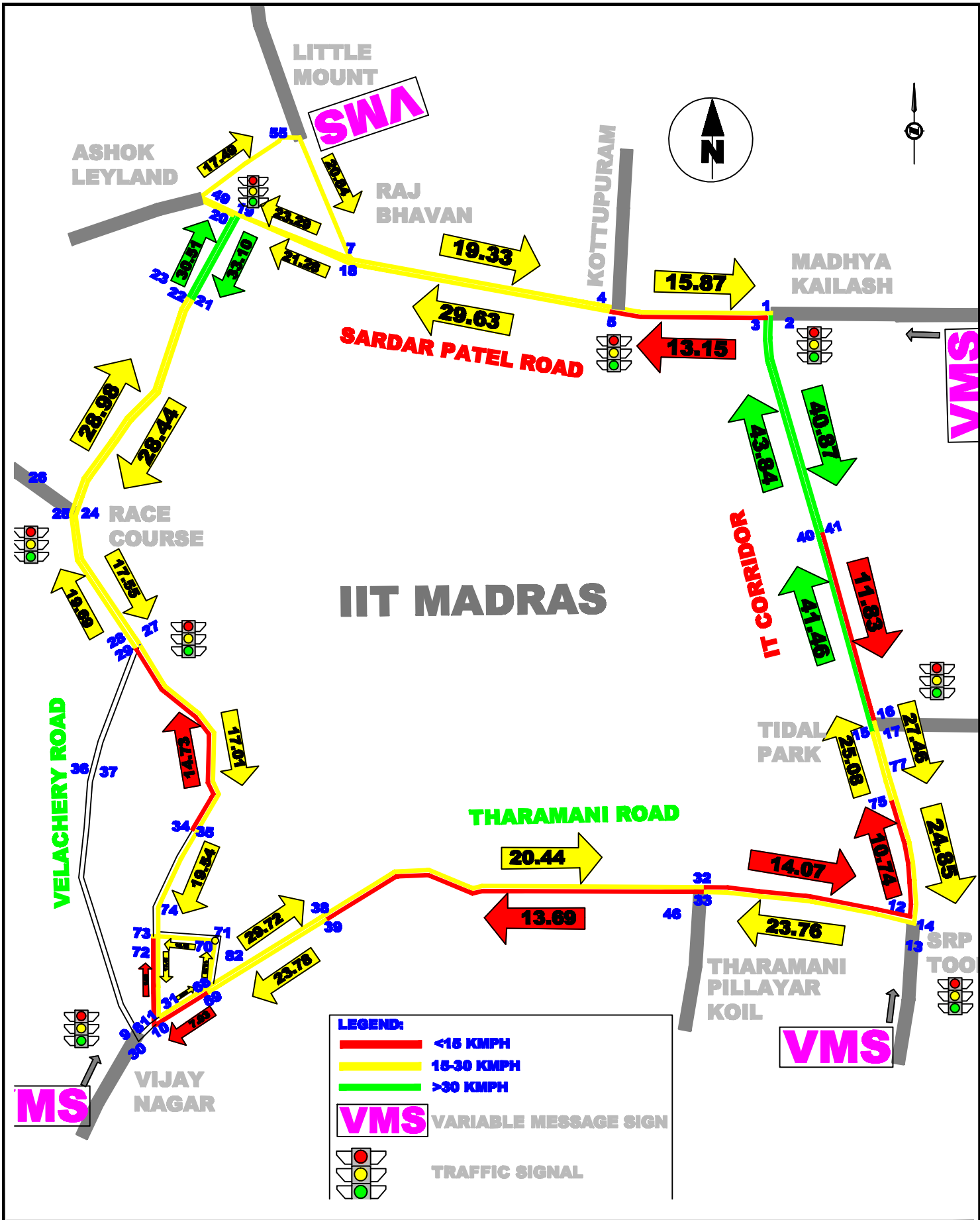


FIGURE :- 2.26 (b)

Speed Profile: Auto Weekday Evening

After Study- Traffic data Collection and Analysis for Research Study on Advanced Traveler Information System (ATIS) for Indian Cities

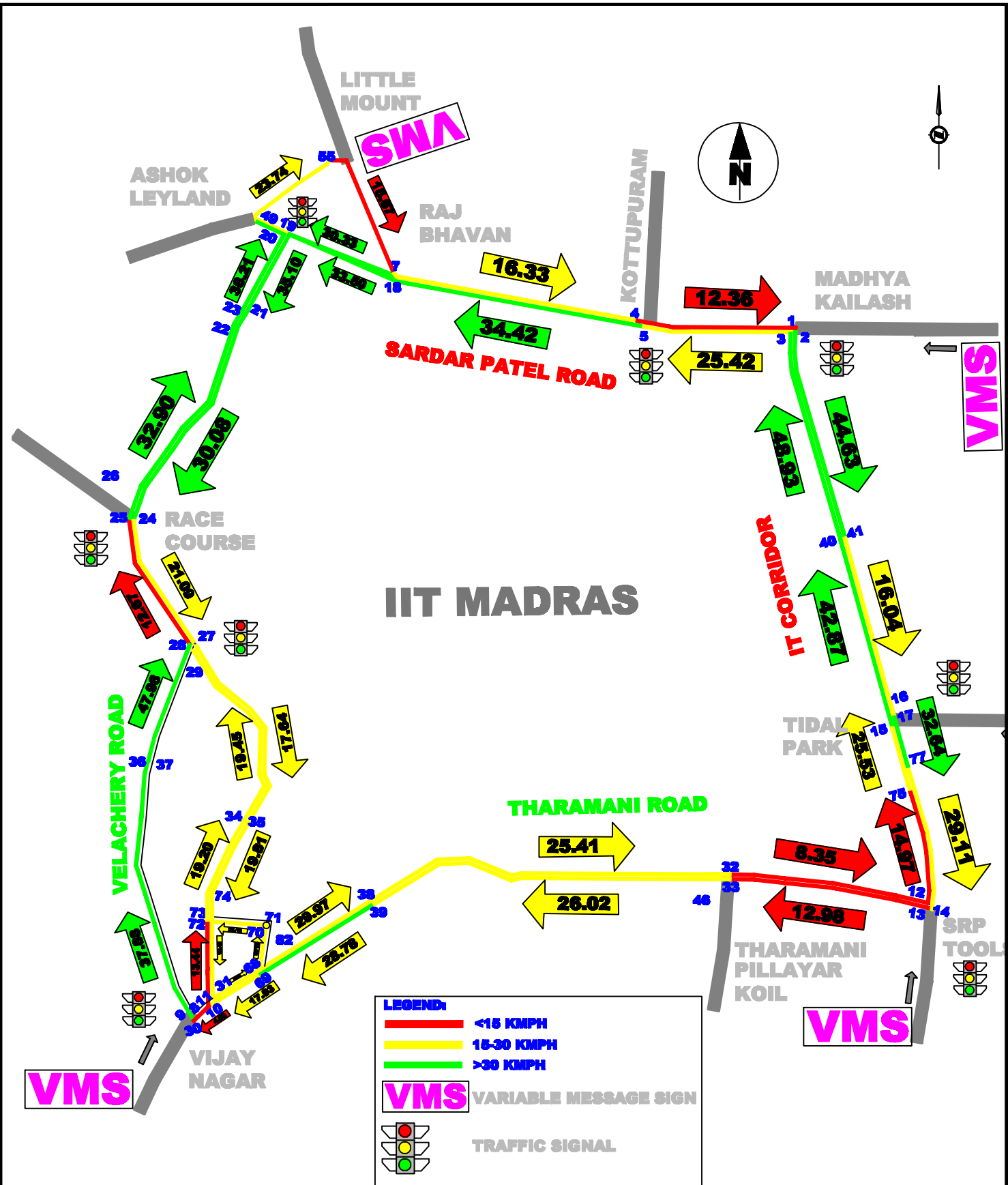


FIGURE :- 2.37 (a)

Speed Profile: 2Wheller Weekday - Morning

After Study- Traffic data Collection and Analysis for Research Study on Advanced Traveller Information System (ATIS) for Indian Cities

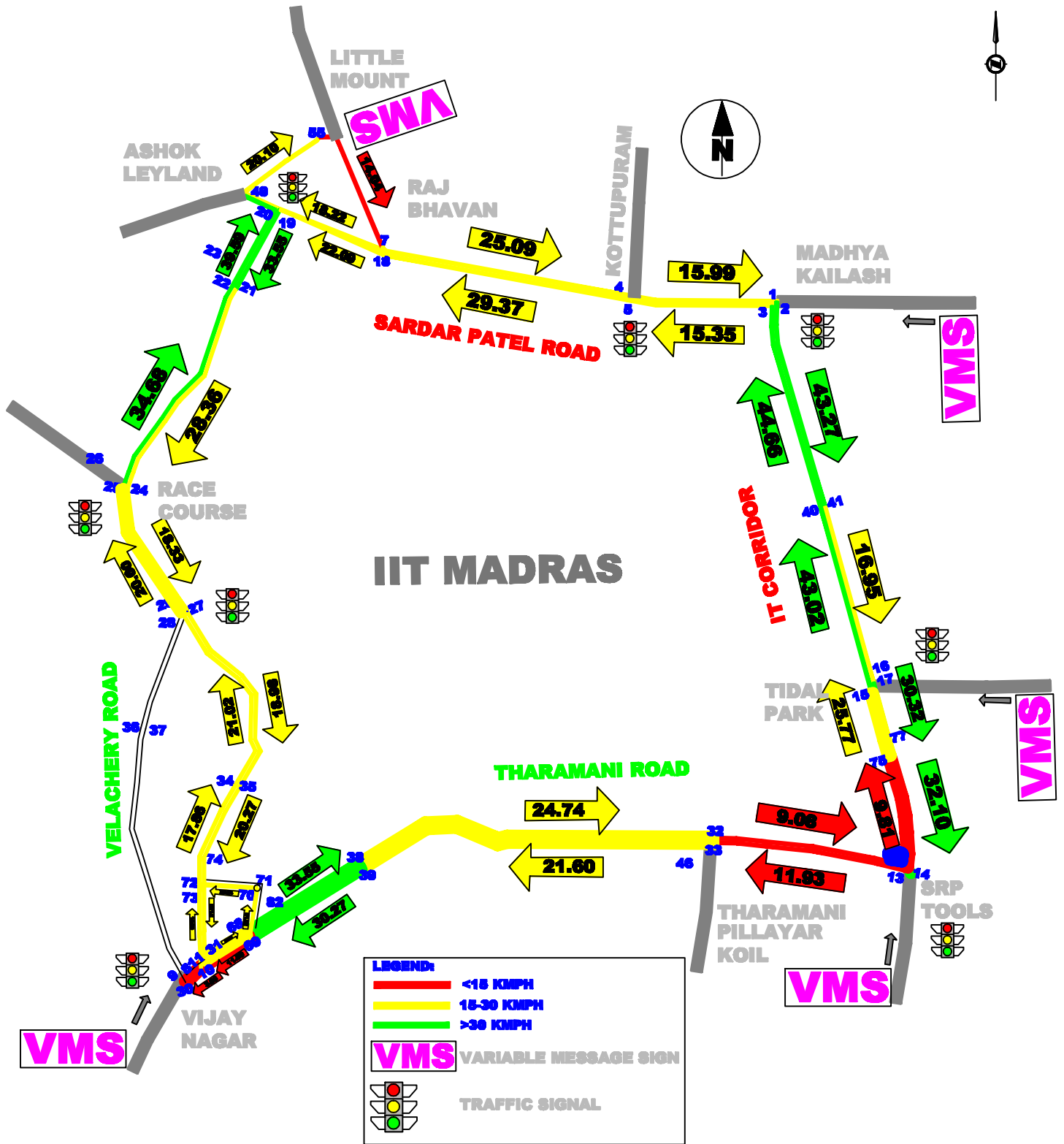


FIGURE :- 2.37 (b)

Speed Profile: 2Wheeler Weekday Evening

After Study- Traffic data Collection and Analysis for Research Study on Advanced Traveler Information System (ATIS) for Indian Cities

Chapter 3: Key Conclusion

CHAPTER 3

KEY CONCLUSIONS

3.1 General

Different key parameters i.e.travel times, delay, travel speed, traffic and user perception of before and after study was compared to evaluate the system.

3.1.1 Weekend Travel Time Comparison for 2W- Different OD pairs

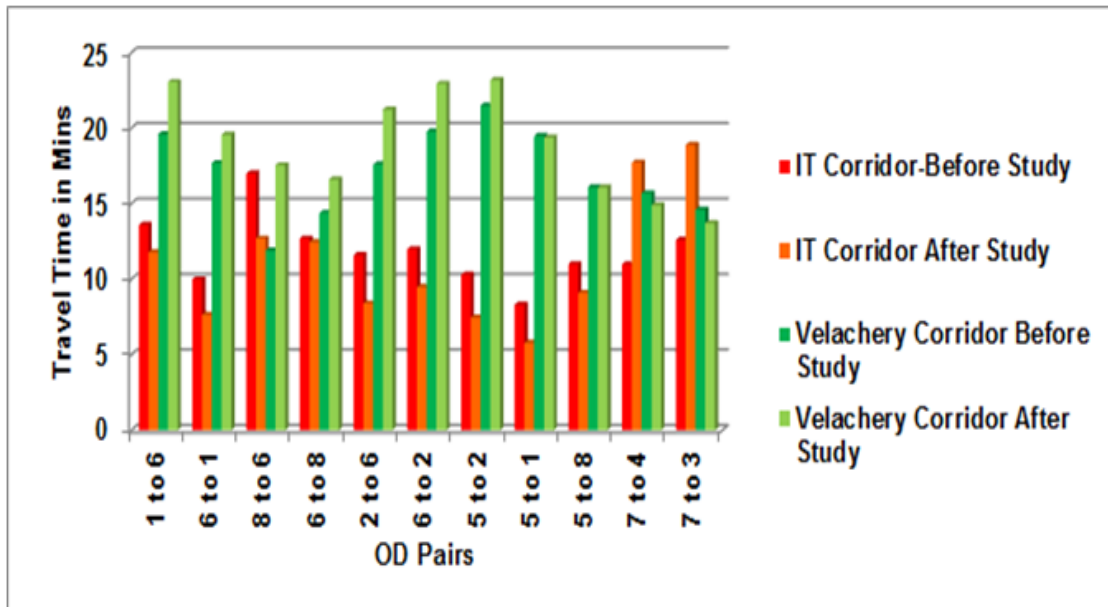


Figure 3.1: Before & After Study Comparison for 2W Morning Session

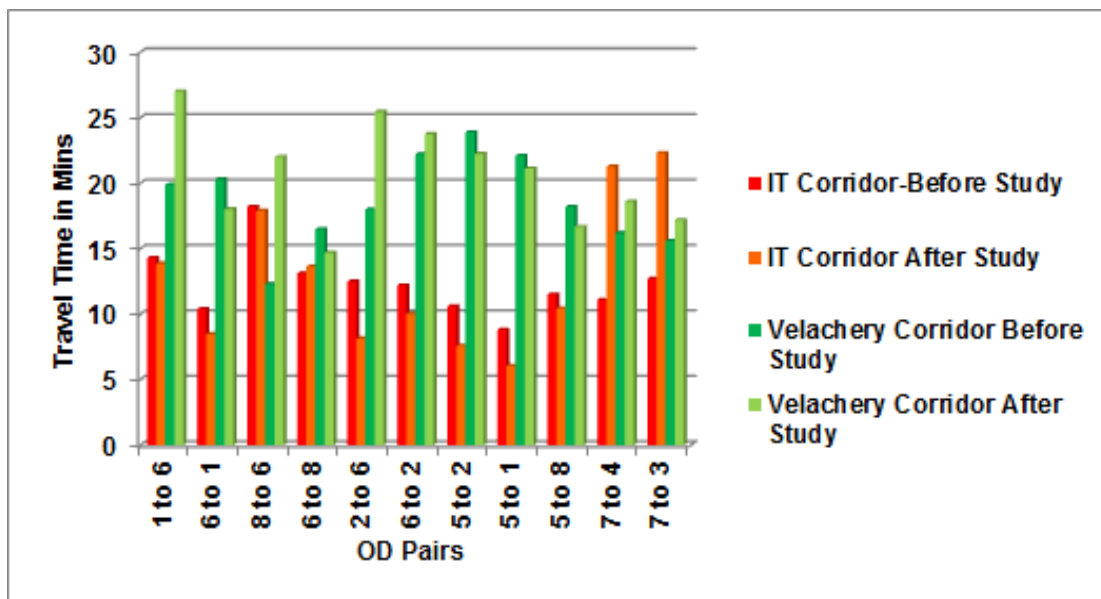


Figure 3.2: Before & After Study Comparison for 2W Noon Session

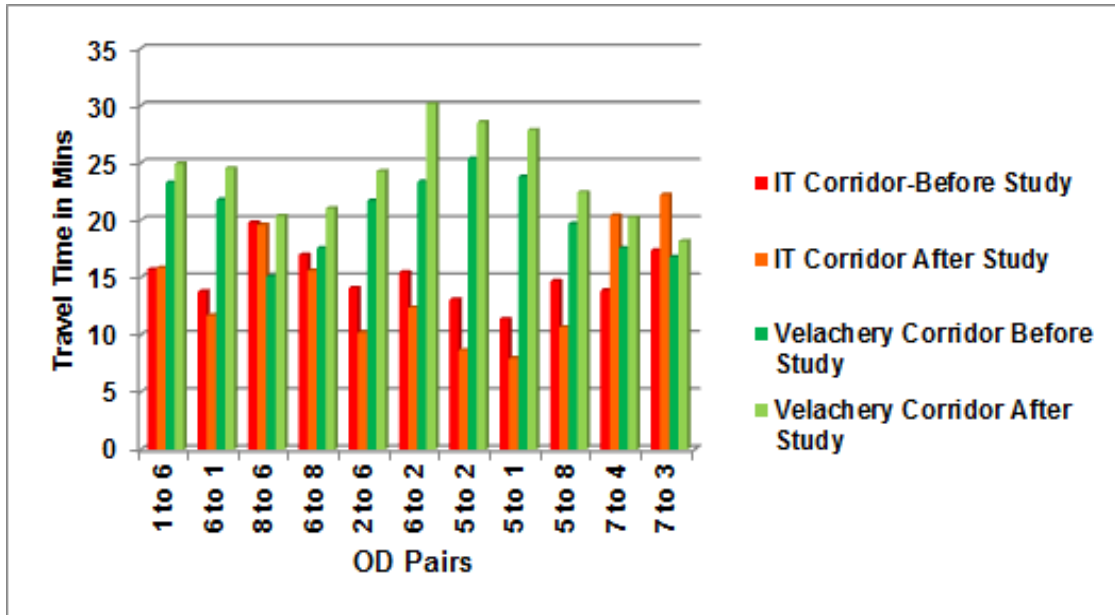


Figure 3.3: Before & After Study Comparison for 2W Evening Session

- Overall for all sessions and all OD pairs except 7-4 and 7-3, travel time reduced on IT corridor while it increased on Velachery corridor.
- Travel time significantly increased for OD pairs 2-6 and 6-8 on Velachery corridor.
- For OD pairs 7-4 and 7-3, travel time increased on both corridors but on IT corridor it increased significantly.

3.1.2 Weekday Travel Time Comparison for 2W - Different OD pairs

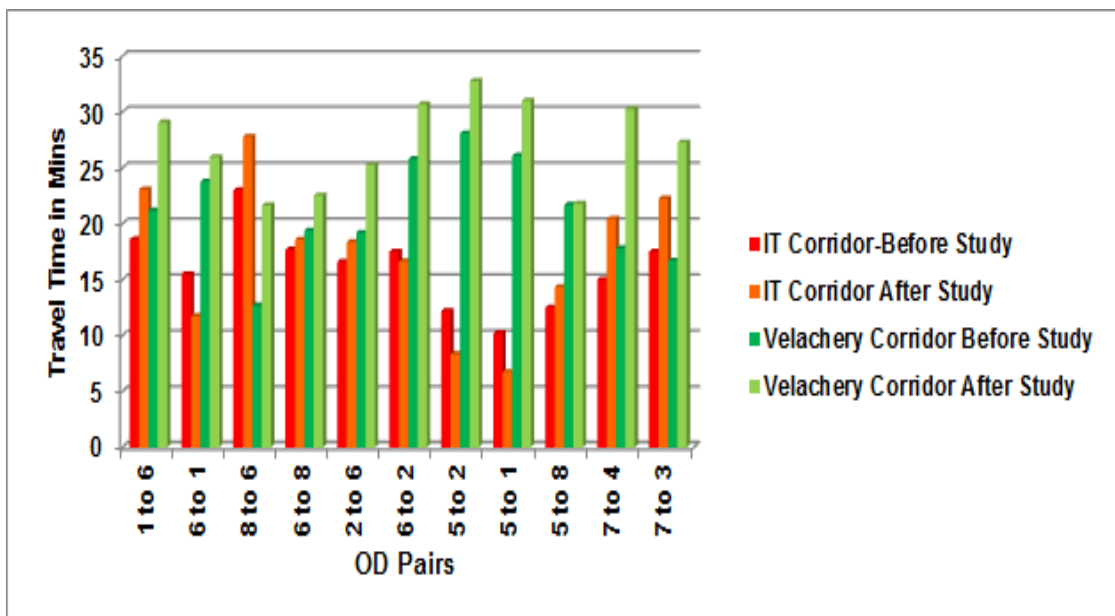


Figure 3.4: Before & After Study Comparison for 2W Morning Session

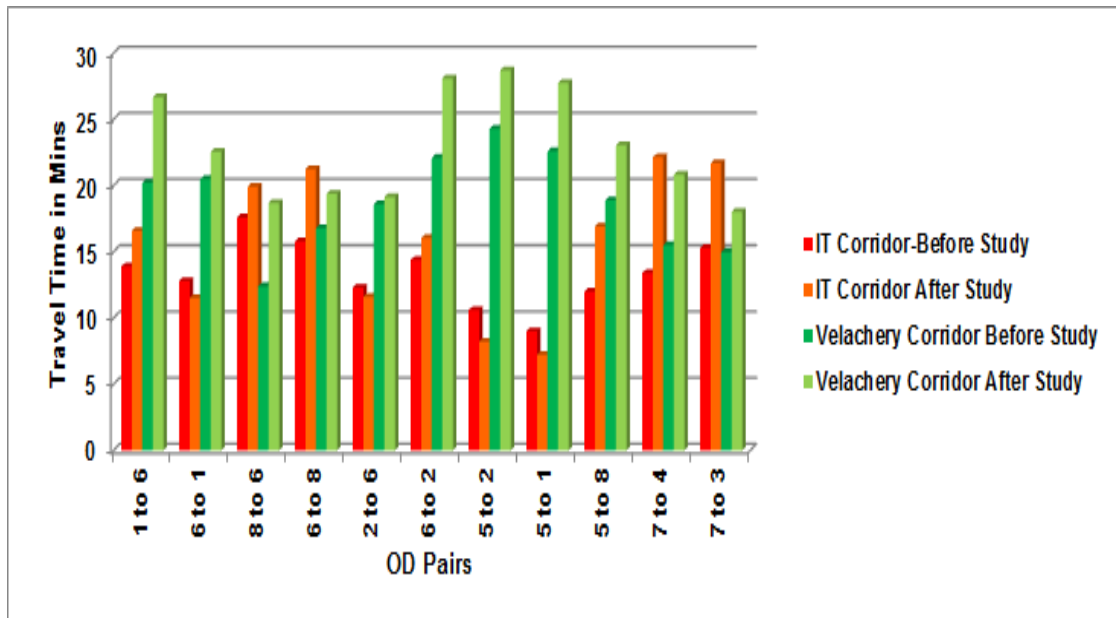


Figure 3.5: Before & After Study Comparison for 2W Noon Session

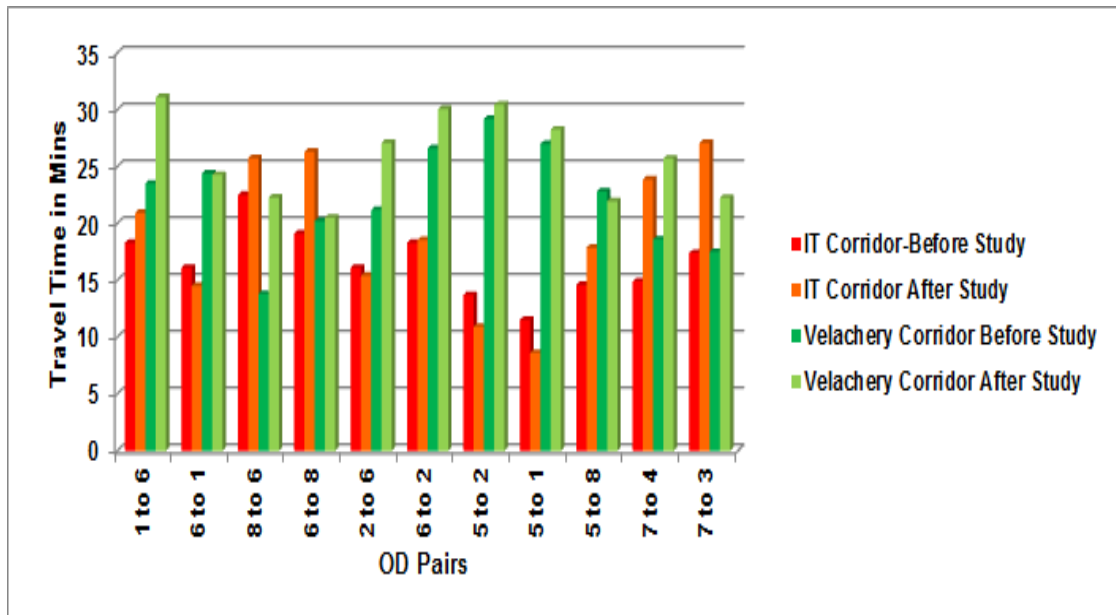


Figure 3.6: Before & After Study Comparison for 2W Evening Session

- Overall, travel time increased for all OD pairs on Velachery corridor. Significant increase was for OD pair 7-4, 7-3 and 8-6.
- Overall, travel time increased for OD pair on IT corridors, except 6-1, 5-2 and 5-1.

3.1.3 Weekend Delay Time Comparison 2W

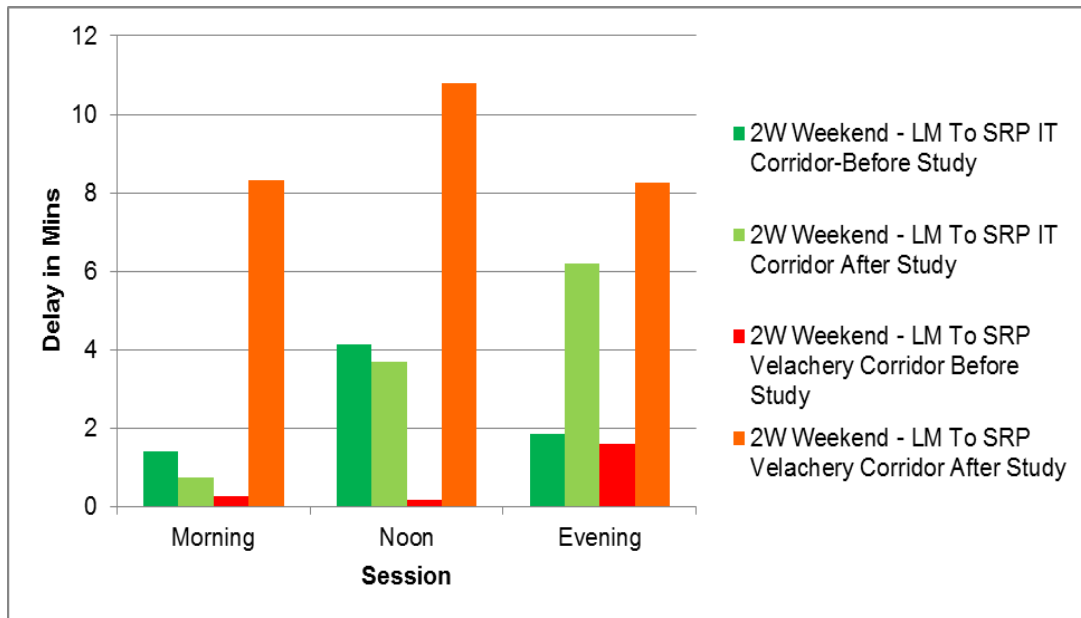


Figure 3.7: LM-SRP Delay Time Comparison Across Sessions

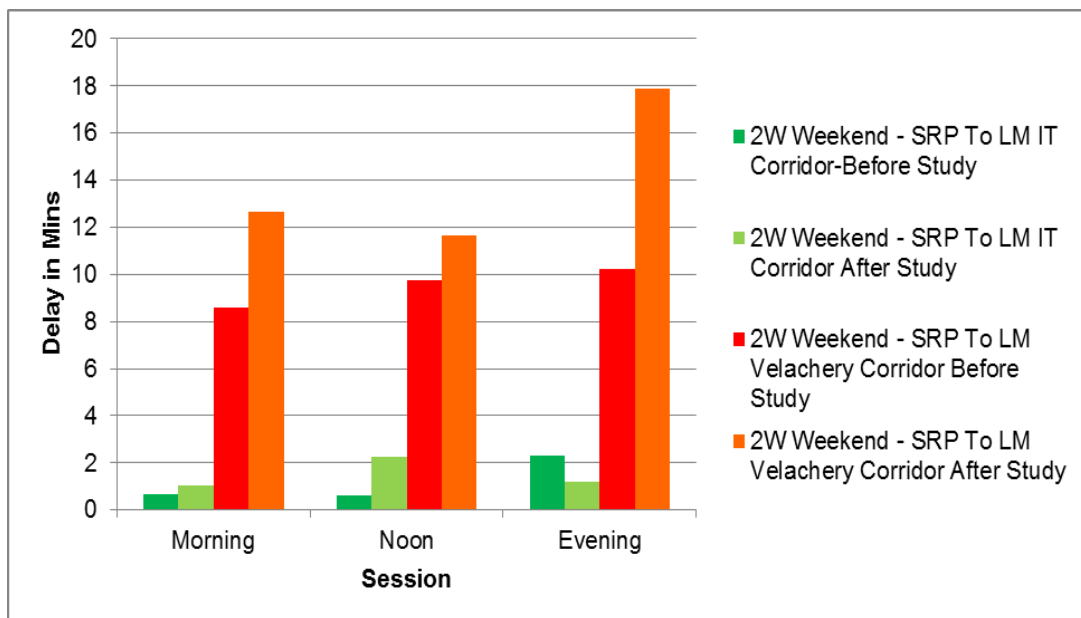


Figure 3.8: SRP-LM Delay Time Comparison across Sessions

- Delay on IT corridor increased on both OD pairs across sessions. While for Velachery corridor there was no pattern for delay time, it varied across sessions both OD pairs

3.1.4 Weekday Delay Time Comparison 2W

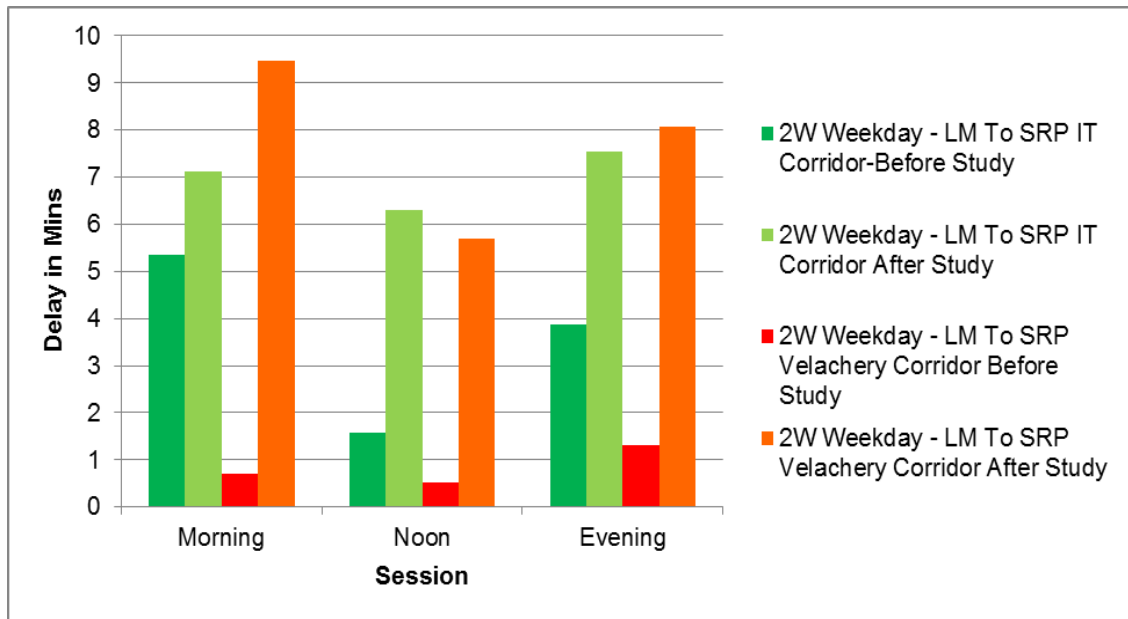


Figure 3.9: LM-SRP Delay Time Comparison across Sessions

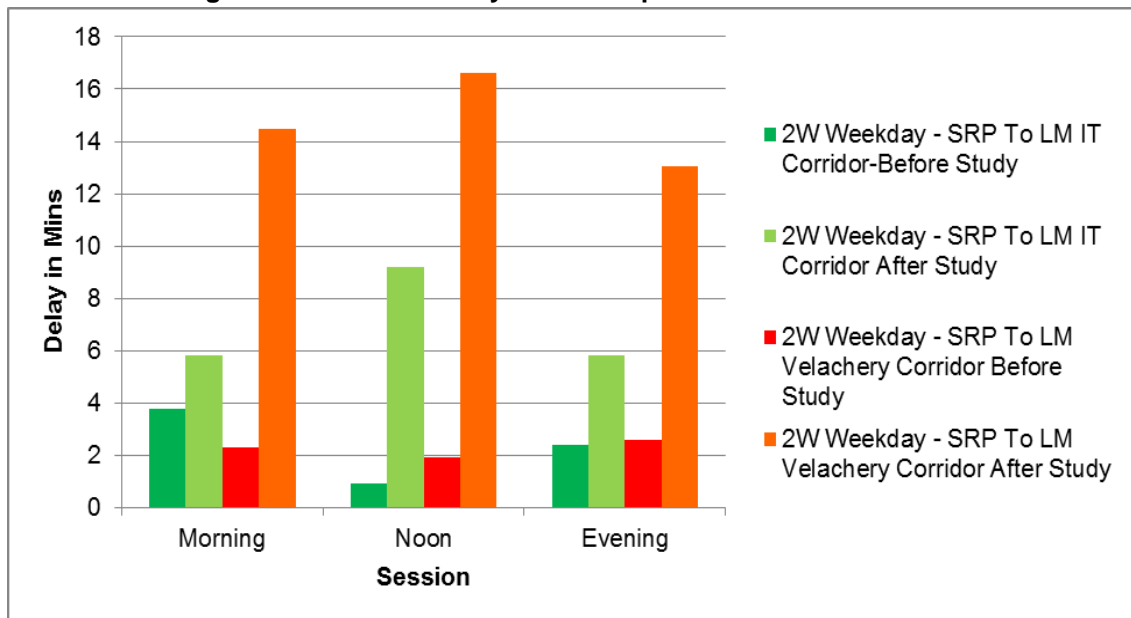


Figure 3.10: SRP-LM Delay Time Comparison across Sessions

- Delay time in both IT and Velachery corridor increased significantly for both OD pairs.



3.1.5 Weekend Travel Time Comparison for 4W - Different OD pairs

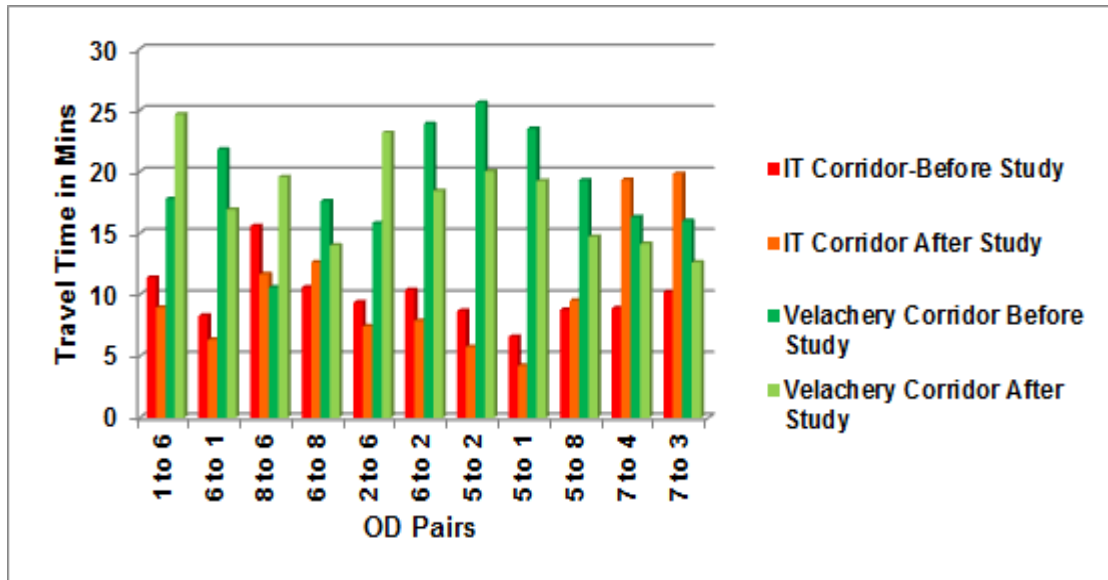


Figure 3.11: Before & After Study Comparison for 4W Morning Session

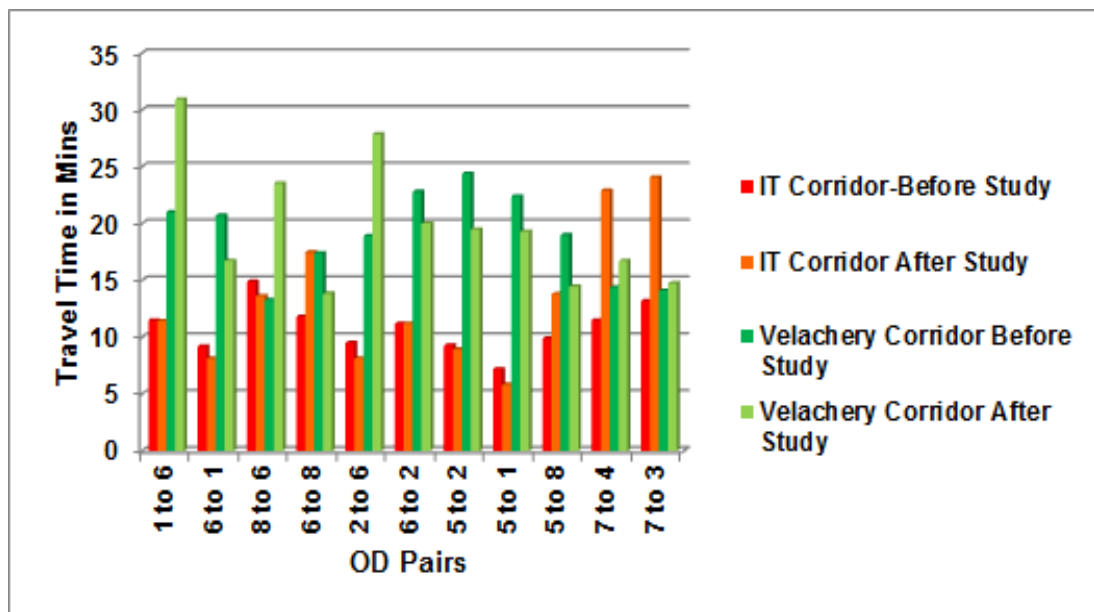


Figure 3.12: Before & After Study Comparison for 4W Noon Session

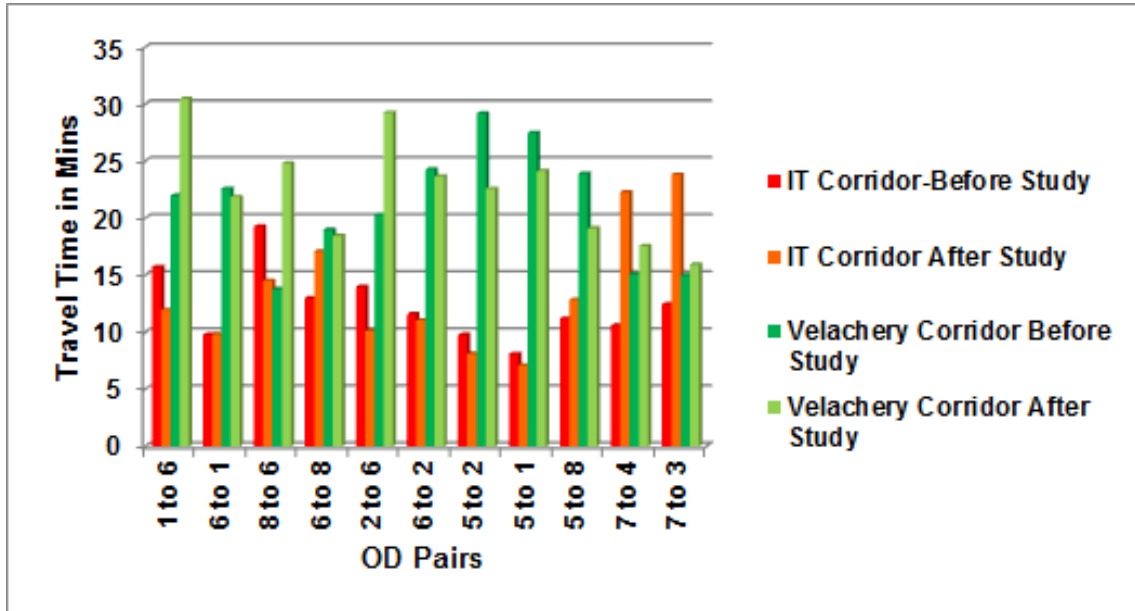


Figure 3.13: Before & After Study Comparison for 4W Evening Session

- Overall, for OD pairs 5-8, 7-4 and 7-3, travel time significantly increased on IT corridor.
- Where else OD pairs 1-6, 8-6 and 2-6 saw significant rise in travel time on Velachery corridor.

3.1.6 Weekday Travel Time Comparison for 4W - Different OD pairs

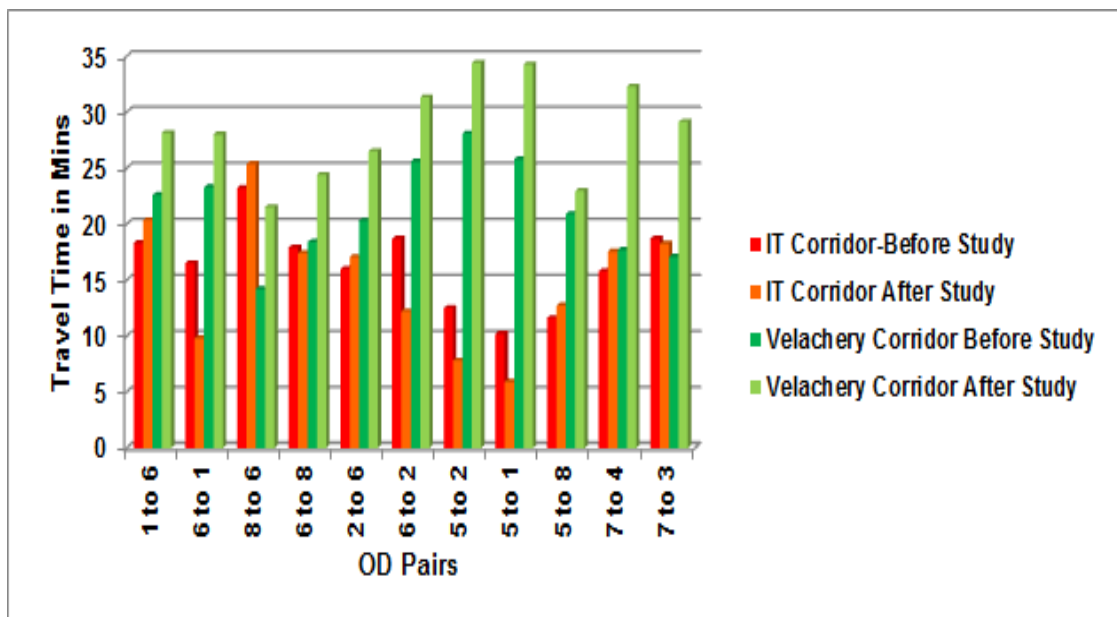


Figure 3.14: Before & After Study Comparison for 4W Morning Session

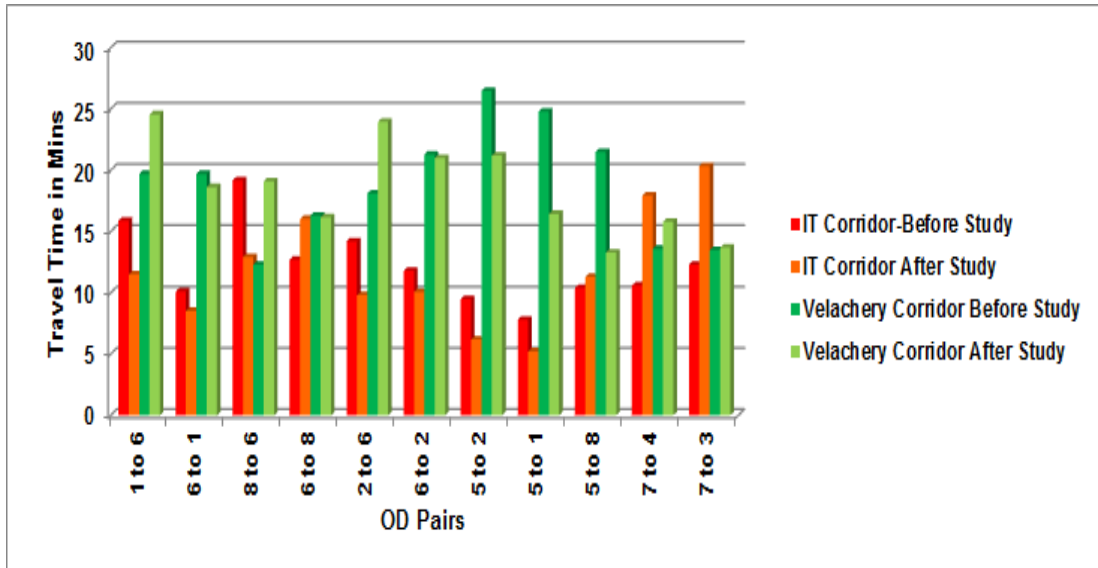


Figure 3.15: Before & After Study Comparison for 4W Noon Session

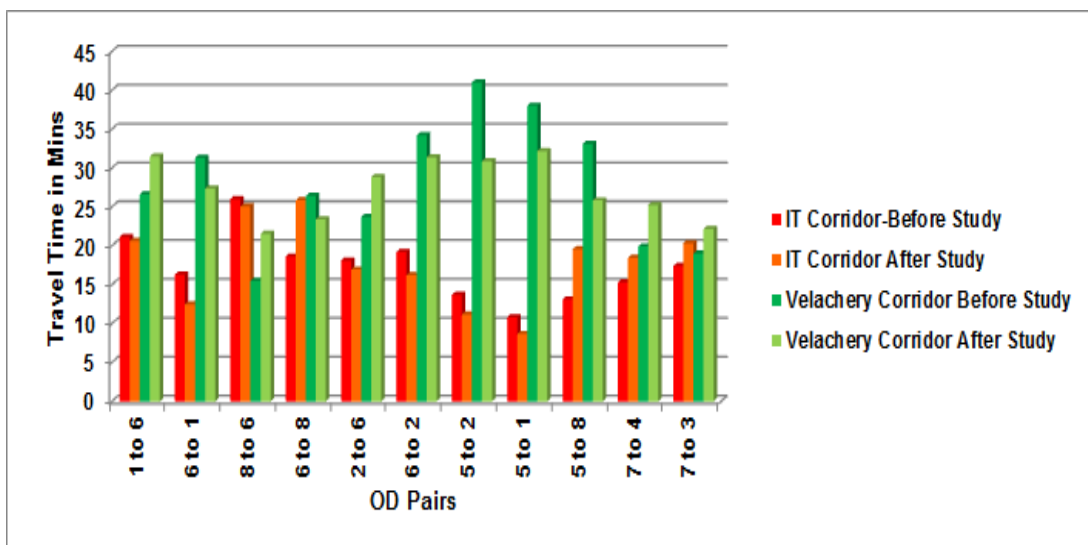


Figure 3.16: Before & After Study Comparison for 4W Evening Session

- For OD pairs 7-3 and 7-4, travel time significantly increased on both IT and Velachery corridors.

3.1.7 Weekend Delay Time Comparison 4W

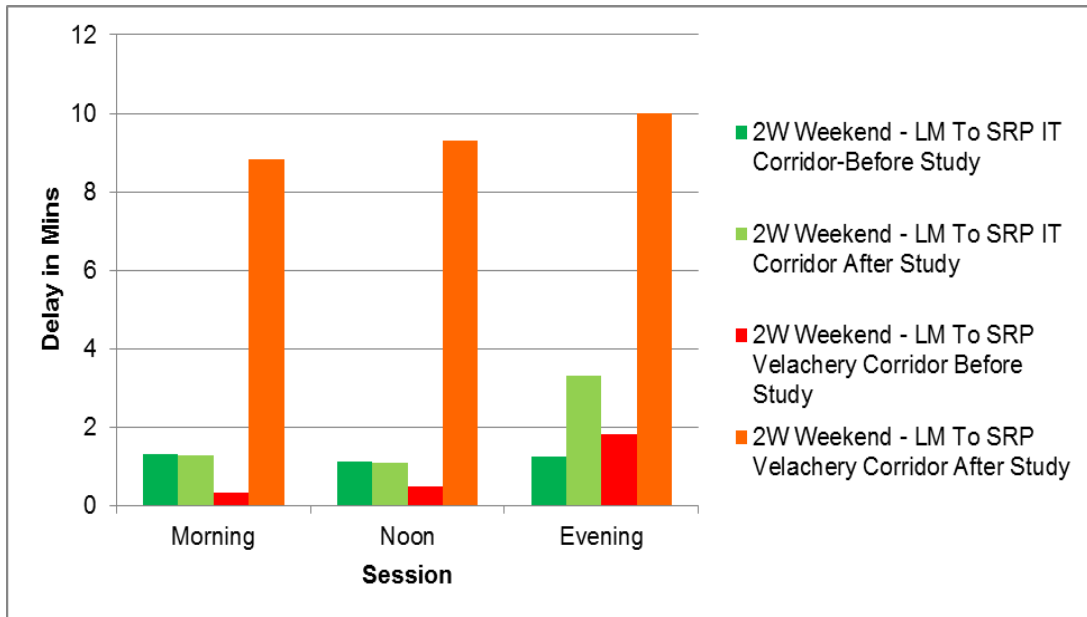


Figure 3.17: LM-SRP Delay Time Comparison across Sessions

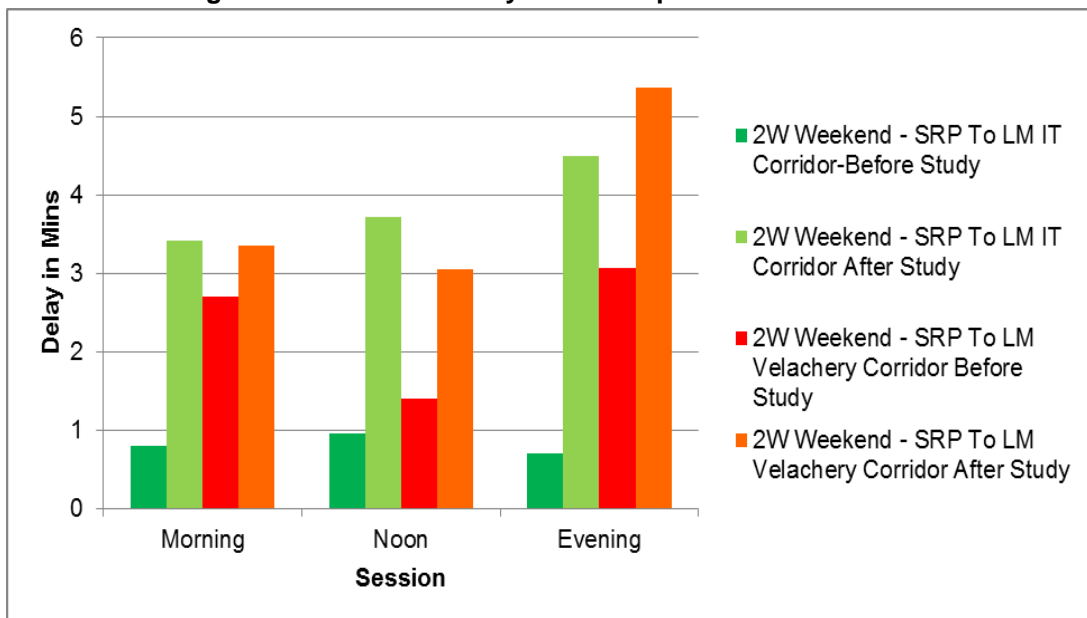


Figure 3.18: SRP-LM Delay Time Comparison across Sessions

- Delay time has significantly increased on both corridors and both OD pairs.

3.1.8 Weekday Delay Time Comparison 4W

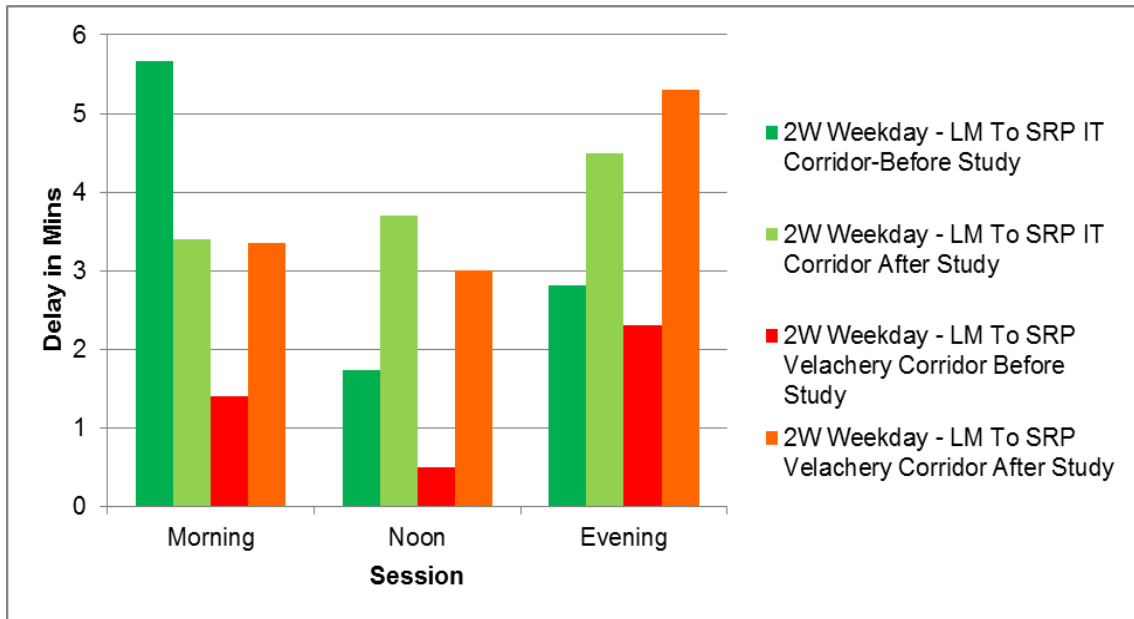


Figure 3.19: LM-SRP Delay Time Comparison across Sessions

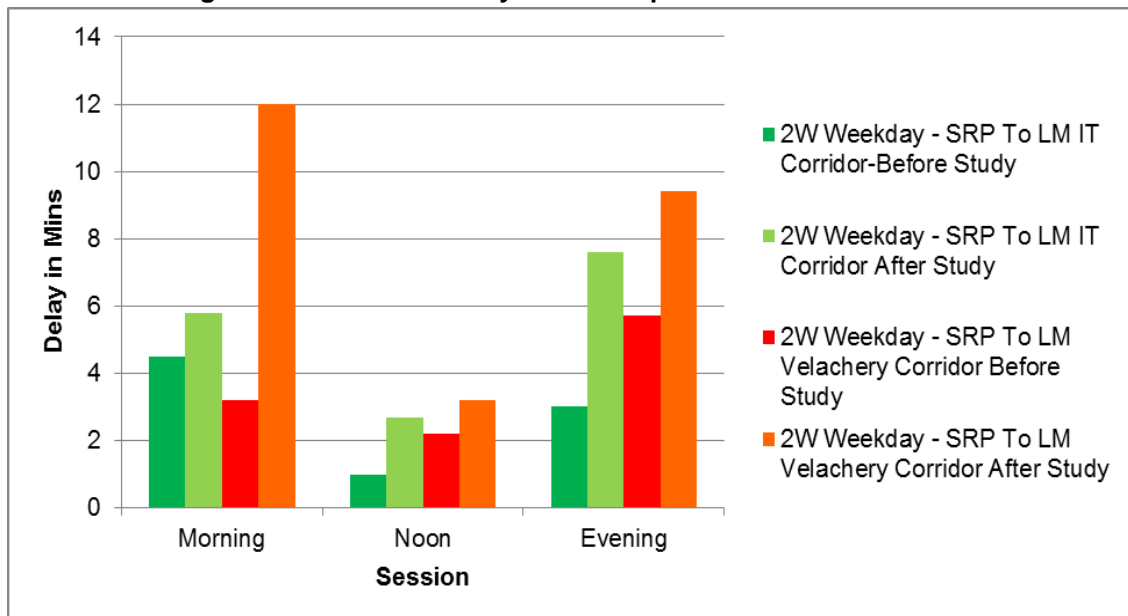


Figure 3.20: SRP-LM Delay Time Comparison across Sessions

- On IT corridor for both OD pairs and all sessions, delay has significantly increased. This stands true for Velachery corridor except for LM-SRP in morning.

3.1.9 Weekend Travel Time Comparison for 3W - Different OD pairs

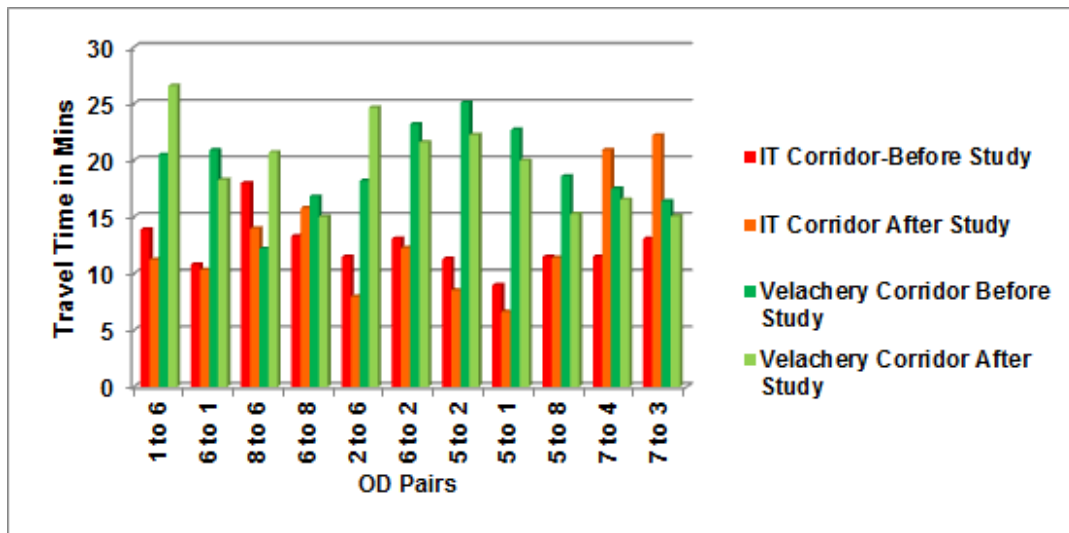


Figure 3.21: Before & After Study Comparison for 4W Morning Session

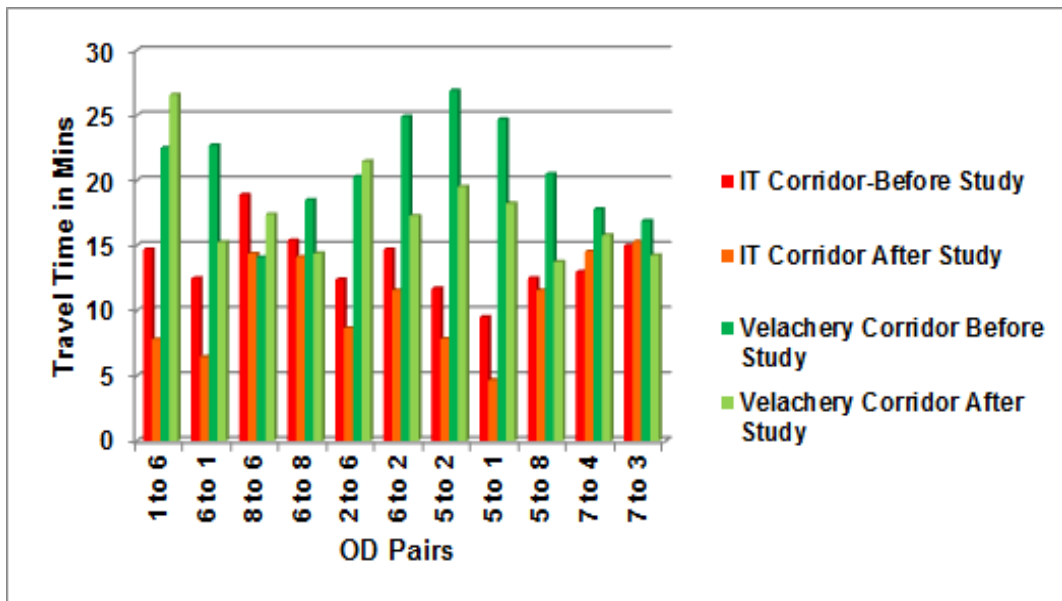


Figure 3.22: Before & After Study Comparison for 4W Afternoon Session

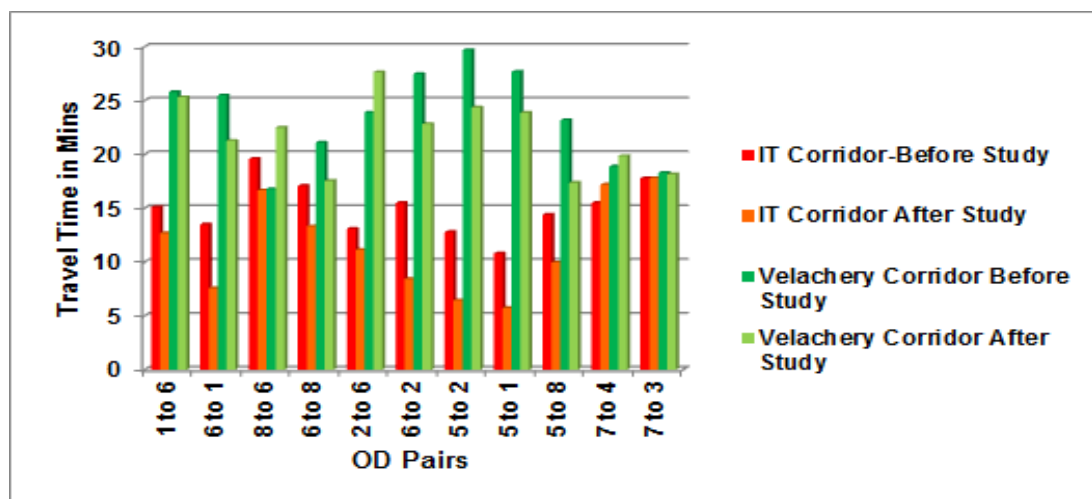


Figure 3.23: Before & After Study Comparison for 4W Evening Session

- On IT corridor travel time has significantly increased for OD pairs 7-4 and 7-3.
- On Velachery corridor travel time has significantly increased for OD pairs 1-6, 8-6 and 2-6

3.1.10 Weekday Travel Time Comparison for 3W Different OD pairs

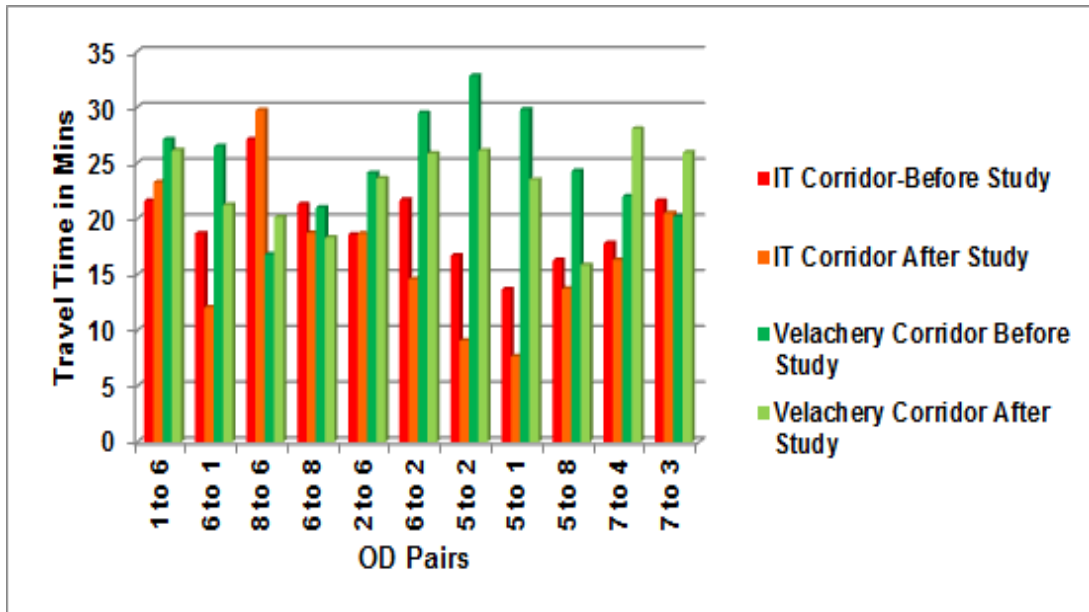


Figure 3.24: Before & After Study Comparison for 3W Morning Session

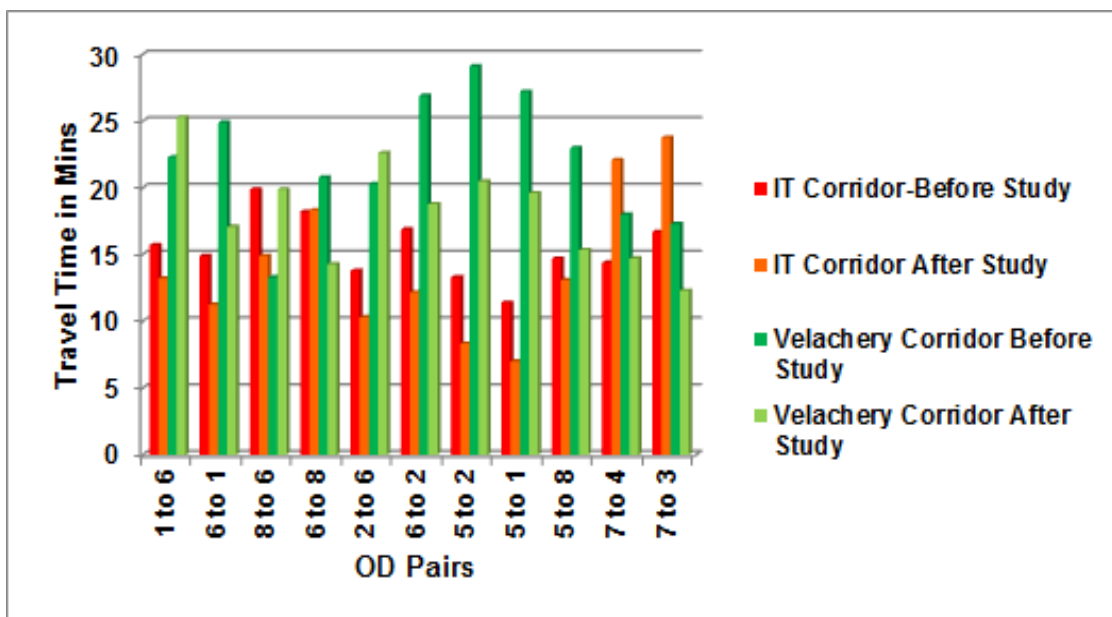


Figure 3.25: Before & After Study Comparison for 3W Afternoon Session

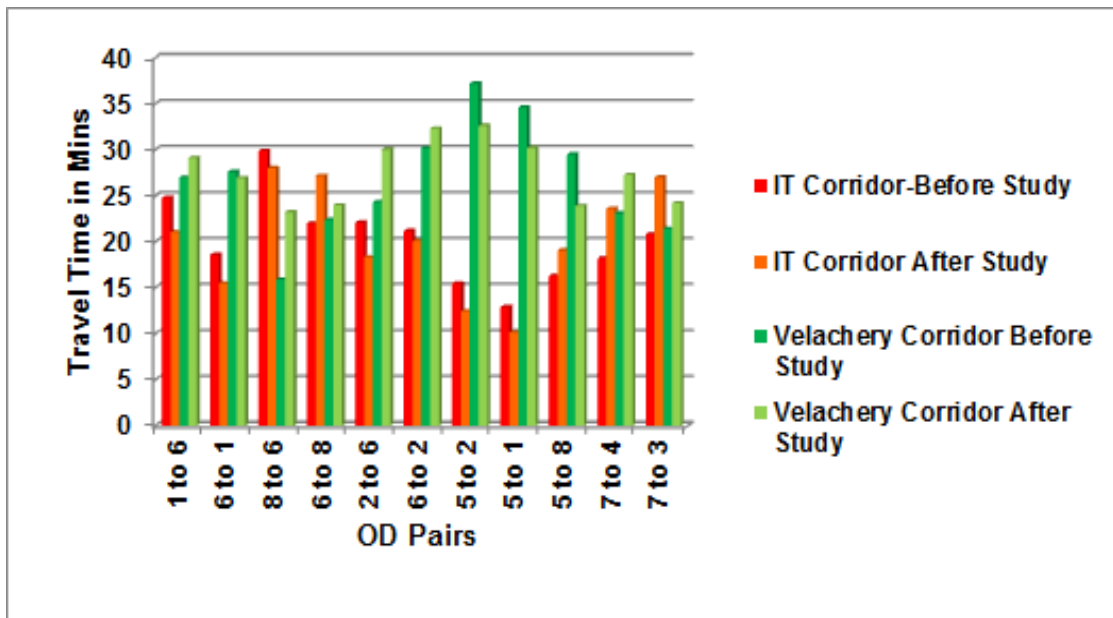


Figure 3.26: Before & After Study Comparison for 3W Evening Session

- On IT corridor travel time has significantly increased for OD pairs 7-4 and 7-3.
- On Velachery corridor travel time has significantly increased for OD pairs 1-6, 8-6 and 2-6

3.1.11 Weekend Delay Time Comparison 3W

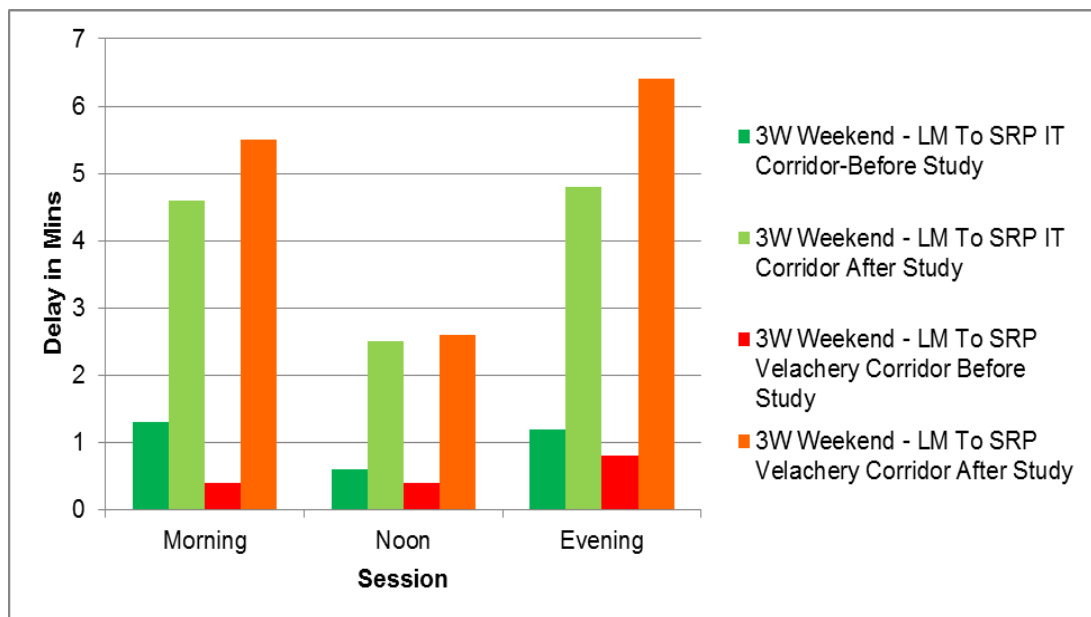


Figure 3.27: LM-SRP Delay Time Comparison across Sessions

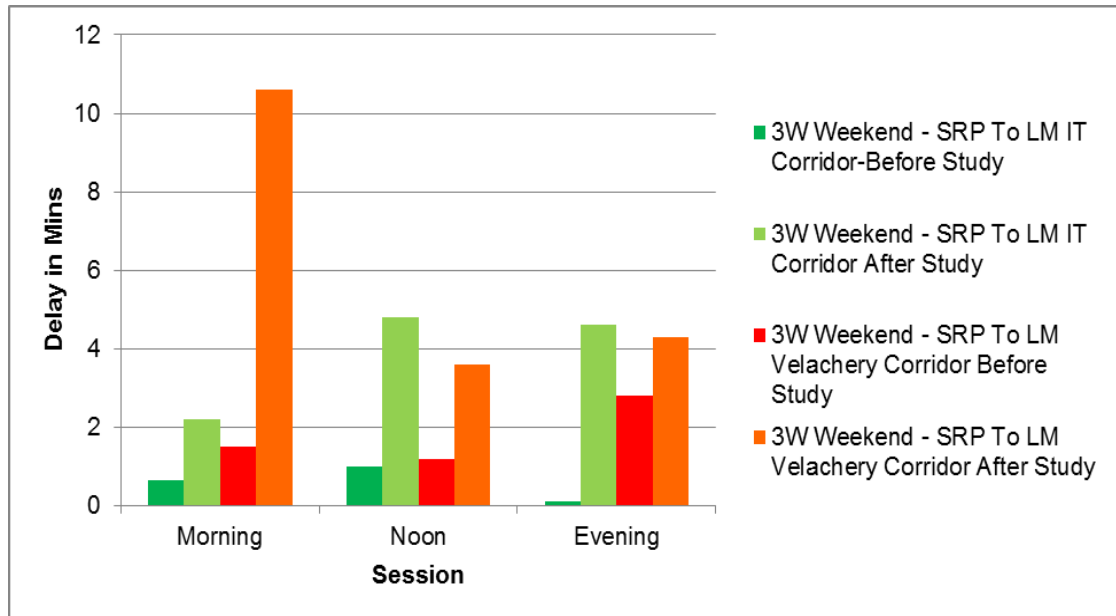


Figure 3.28: SRP-LM Delay Time Comparison across Sessions

- Delay time has significantly increased on both corridors and both OD pairs.

3.1.12 Weekday Delay Time Comparison 3W

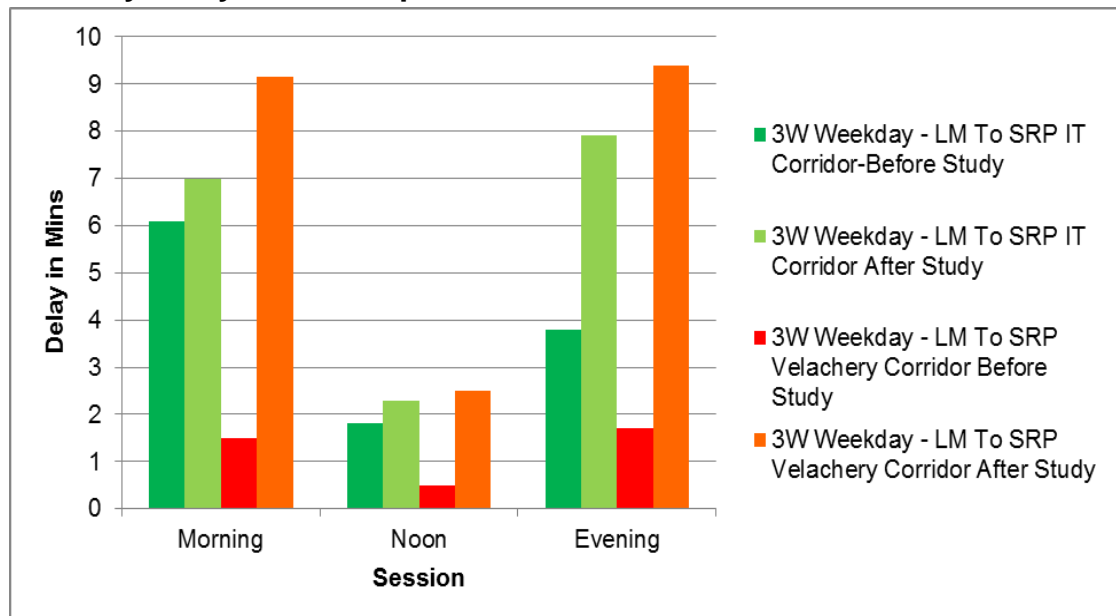


Figure 3.29: LM-SRP Delay Time Comparison across Sessions

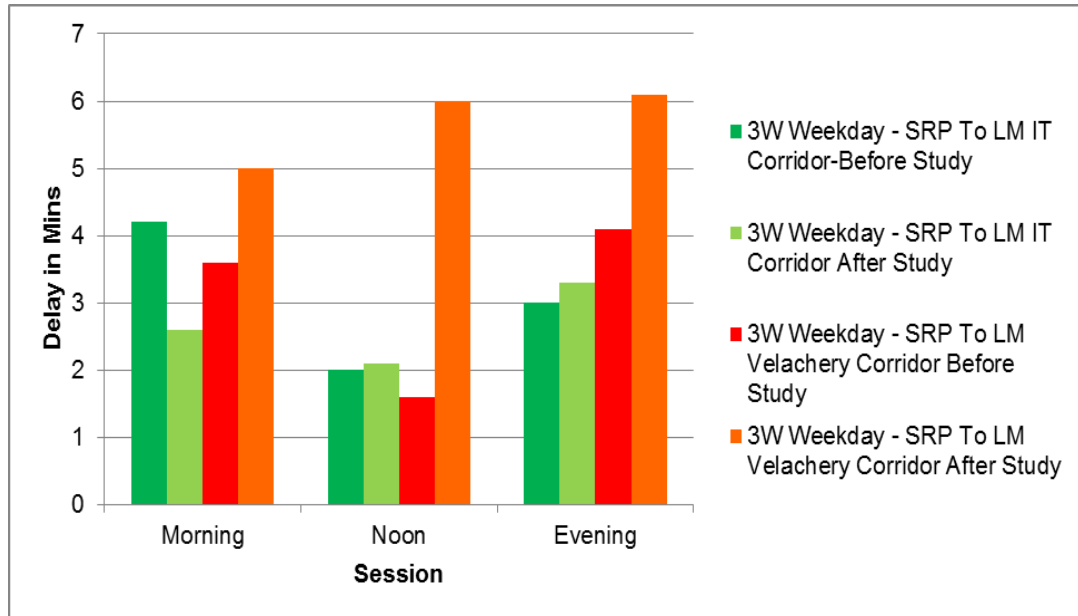


Figure 3.30: SRP-LM Delay Time Comparison across Sessions

- On IT corridor for both OD pairs and all sessions, delay has significantly increased. This stands true for Velachery corridor except for SRP-LM in morning.

3.1.13 Speed Profile Comparison

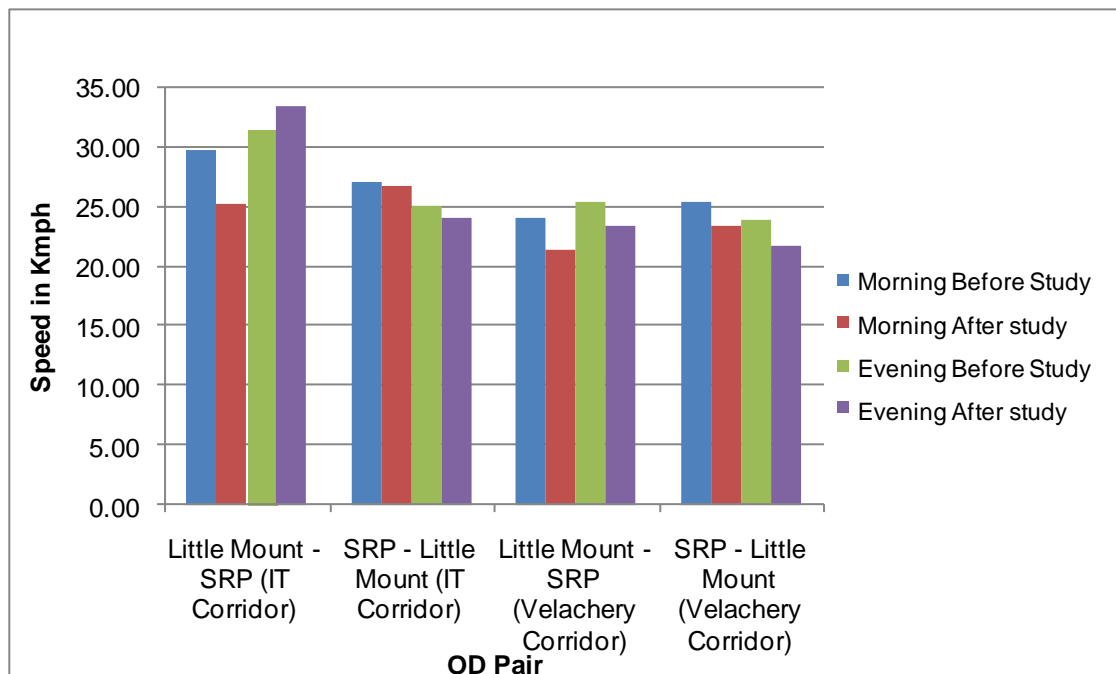


Figure 3.31: 2W Speed Profile comparison for Morning and Evening Sessions

- In 2w speeds have reduced across both corridors in morning session. This also stays true for evening session except LM-SRP via IT corridor

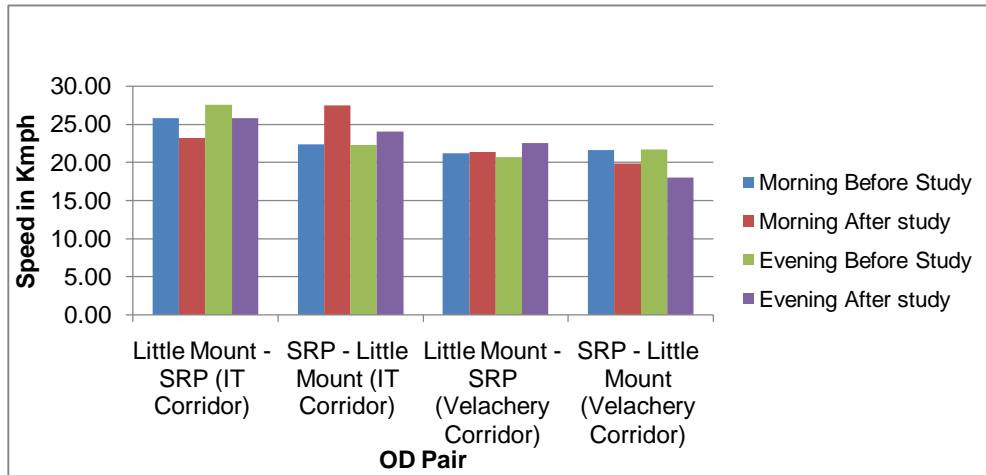


Figure 3.32: 3W Speed Profile Comparison for Morning and Evening Sessions

- For 3W speeds have not shown any pattern of increase of decrease across the sessions

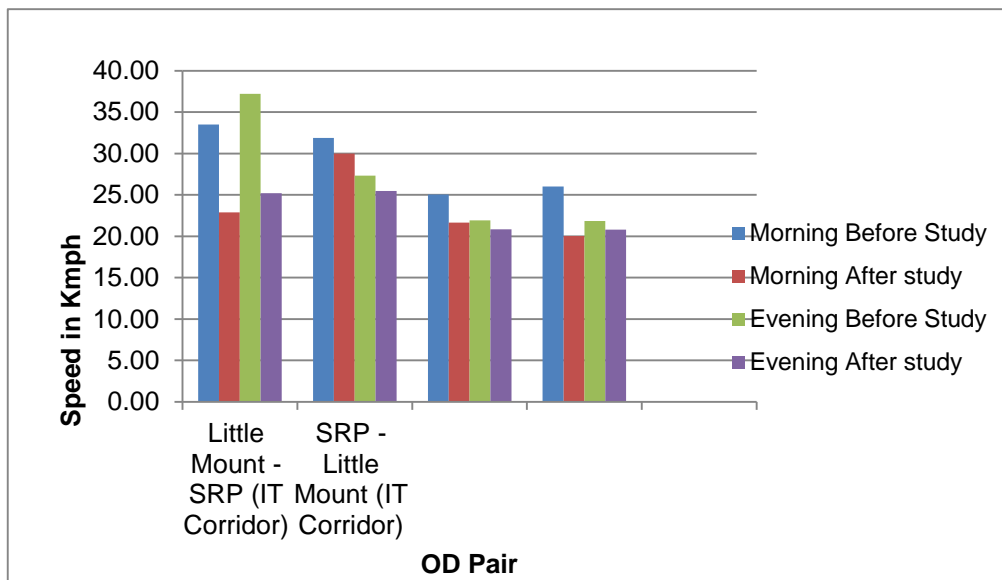


Figure 3.33: 4W Speed Profile Comparison for Morning and Evening Sessions

- In 4w speeds have reduced across both corridors in morning session. This also stays true for evening session

3.2 Traffic Data Comparison

Due to lack of complete traffic movement data of before and after study report, only 3 intersections traffic was compared to measure change in traffic volume.

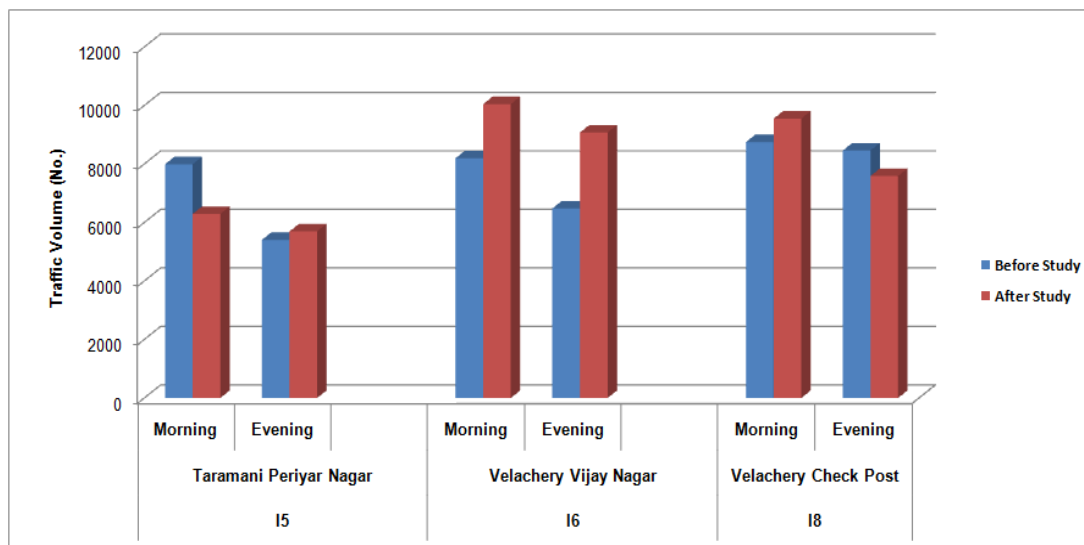


Figure 3.34: Traffic Variation at Compared Intersections

- Overall increase in traffic at all the intersections except Periyar nagar morning and Velachery check post evening in after study.

After over all comparisons of different parameters i.e. travel time, delay, speed and traffic; we found out that traffic, travel time and delay increased significantly on both corridors ; hence speed has decreased in the after study comparison. However we should not consider ATIS implementation for this change. There can be several other factors for the change in current scenario i.e. change in land use around the study corridor, increase in vehicle ownership etc. Hence to measure the impact of implemented ATIS, user perception surveys results were looked upon. Final review of the implemented system should factor in the perception of user about the system irrespective of the reality.

3.3 User Perception Survey Findings

- Reduced travel time & cost came out as the significant benefits in VMS Feedback survey where else in Web based survey only travel time came out as significant benefit to users. 40% of the web based users felt that the system will not help in reducing travel cost.
- In both type of surveys, significant percentage of users felt that the information displayed on web and VMS was accurate and friendly. But on other parameters like information being helpful in trip planning and selecting routes, the users were not sure.
- 57% of web users and 68% of VMS users were satisfied with overall system in place while 30% of web users and 22% of VMS users were neither satisfied nor dissatisfied.








- Among the information like Alternate routes & Travel time, Congestion Maps, Traffic Delays, New & Alerts which are helpful to web users, opinions of web users were equally divided.
- Only 21% of VMS users said that they will use the information displayed on daily basis and only 15% of web based users said that they will use information on web on daily basis.
- Most of the VMS users gave positive response to questions on placement of VMS board, its ease of understanding and legibility.
- In both surveys the fact came out that Velachery Road, Sardar Patel Road and IT Corridor had highest daily traffic and Madhya Kailash, SRP Tools and Saidapet were key entry and exit zones for the corridor.
- 51% & 37% of web users rarely/never used internet for public transit information and route guidance. 67% and 91% of web users used internet many times a week from mobile and home respectively.











Overall opinions of the respondent were positive about the implemented ATIS in the study corridors. However while gauging the utility of the system in the daily life of user; it was found that due to low awareness about the importance of the system user did not use the system to its full potential.

Annexures






Annexure 2.1 (a):Traffic Summary - I1 Little Mount






Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I1: Little Mount Intersection	24/08/2014	Morning 09.00 am to 10.00 am	1--2	1007	103	938	66	79	2193	1881
				3--2	879	809	70	48	82	1888	1637
			Afternoon 01.00 pm to 02.00 pm	1--2	710	57	830	37	37	1671	1409
				3--2	851	71	938	44	51	1955	1654
			Evening 05.00 pm to 06.00 pm	1--2	928	108	629	50	72	1787	1492
				3--2	603	72	506	37	63	1281	1124
2	I1: Little Mount Intersection	25/08/2014	Morning 09.00 am to 10.00 am	Video Not Provide By IIT							
			Afternoon 01.00 pm to 02.00 pm								
			Evening 05.00 pm to 06.00 pm								
3	I1: Little Mount Intersection	27/08/2014	Morning 09.00 am to 10.00 am	1--2	3173	507	1620	220	208	5728	4668
				3--2	3100	500	1601	216	206	5623	4593
			Afternoon 01.00 pm to 02.00 pm	1--2	2190	474	1203	215	190	4272	3665
				3--2	2051	435	1122	206	177	3991	3423
			Evening 05.00 pm to 06.00 pm	1--2	851	71	938	44	51	1955	1654
				3--2	773	69	871	41	50	1804	1538






Annexure 2.1 (b):Traffic Summary - I2 Madhya Kailash

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)					
																
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses, Trucks, Army Truck, Multi Axle and Tractors)							
1	I2: Madhya Kailash Intersection	24/08/2014	Morning 09.00 am to 10.00 am	3-2	0.5	1	1	1.5	3	1787	1492					
				1-2	928	108	629	50	72							
				2-1	804	137	552	31	76							
				2-3	1120	174	635	37	72							
			Afternoon 01.00 pm to 02.00 pm	2-2	1158	113	683	110	66			20	15			
				3-2	11	1	8	0	0			2193	1881			
				1-2	1007	103	938	66	79			2171	1747			
				2-1	1133	176	761	40	61			2178	1776			
			Evening 05.00 pm to 06.00 pm	2-3	1118	150	798	45	67			2334	1884			
				2-2	1195	124	904	50	61			22	17			
				2-2	12	2	6	2	0			1955	1654			
				3-2	851	71	938	44	51			2431	1951			
			2	I2: Madhya Kailash Intersection	25/08/2014	Morning 09.00 am to 10.00 am	1-2	1238	139			947	50	57	2874	2325
							2-1	1449	214			1100	31	80		
							2-3	1017	194			695	30	64		
							2-2	6	4			7	0	0		
Afternoon 01.00 pm to 02.00 pm	3-2	851				71	938	44	51	2000	1635					
	1-2	1275				85	1184	44	53	17	14					
	1-2	1121				220	760	34	63	2641	2132					
	2-1	1824				235	679	38	72	2198	1781					
Evening 05.00 pm to 06.00 pm	2-3	2722				256	1263	82	81	4404	3246					
	2-2	1				1	0	0	0	2	2					
	3-2	1476				164	1390	151	113	3294	2858					
	1-2	1312				229	613	78	68	2300	1819					
Evening 05.00 pm to 06.00 pm	2-1	1438				247	698	85	77	2545	2023					
	2-3	1533				174	900	147	89	2843	2328					
	2-2	2				2	5	0	0	9	8					
	3-2	992				92	950	83	80	2197	1903					
	1-2	1325	205	659	86	69	2344	1863								
	2-1	1107	177	790	74	116	2264	1980								
	2-3	1367	171	969	131	105	2743	2335								
	2-2	6	2	4	0	0	12	9								
3	I2: Madhya Kailash Intersection	27/08/2014	Morning 09.00 am to 10.00 am	3-2	1450	138	1037	62	53	2740	2152					
				1-2	1336	231	865	38	88							
				2-1	1916	223	627	41	116							
				2-3	2669	253	1308	74	97							
			Afternoon 01.00 pm to 02.00 pm	2-2	5	4	2	0	0			11	9			
				3-2	836	120	867	132	64			2019	1795			
				1-2	736	152	374	46	62			1370	1149			
				2-1	886	120	602	38	74			1720	1444			
			Evening 05.00 pm to 06.00 pm	2-3	1000	130	714	80	98			2022	1758			
				2-2	4	2	3	0	0			9	7			
				3-2	1303	121	1157	141	87			2809	2402			
				1-2	1106	167	641	63	91			2068	1728.5			
			Evening 05.00 pm to 06.00 pm	2-1	1383	219	911	59	140			2712	2330			
				2-3	1586	184	1077	127	139			3113	2661.5			
				2-2	4	3	3	0	0			10	8			






Annexure 2.1 (c):Traffic Summary - I3 Tidal Park

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I3: Tidel Park Intersection	24/08/2014	Morning 09.00 am to 10.00 am	1--1	34	17	25	3	4	83	76
				1--3	368	61	278	32	30	769	661
				2--1	423	271	26	15	51	786	684
				3--1	361	366	43	42	40	852	773
				4--2	203	42	1	3	44	293	281
				1--4	Video Vision Problem						
				2--4	Video Vision Problem						
				3--2	886	451	107	68	199	1711	1700
				4--3	43	6	2	2	6	59	51
				3--3	3	6	0	0	0	9	8
			4--1						0	0	
			Afternoon 01.00 pm to 02.00 pm	1--1	58	14	46	1	3	122	100
				1--3	378	47	278	33	31	767	657
				2--1	478	54	378	25	33	968	808
				3--1	397	27	516	38	54	1032	961
				4--2	Video Vision Problem						
				1--4	Video Vision Problem						
				2--4	Video Vision Problem						
				3--2	455	90	323	42	59	969	881
				4--3	60	8	23	10	10	111	106
				3--3	0	2	1	0	0	3	3
			4--1	Video Vision Problem							
			Evening 05.00 pm to 06.00 pm	1--1	11	15	24	0	1	51	48
				1--3	401	59	339	21	22	842	696
				2--1	301	35	281	18	14	649	536
				3--1	221	26	329	18	22	616	559
				4--2	Video Vision Problem						
				1--4	Video Vision Problem						
2--4	Video Vision Problem										
3--2	288	133		521	18	56	1016	993			
4--3	24	3		7	1	3	38	33			
3--3	1	2		1	0	0	4	4			
4--1	Video Vision Problem										






Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)	
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)			
					0.5	1	1	1.5	3			
2	I3: Tidel Park Intersection	25/08/2014	Morning 09.00 am to 10.00 am	1--1	131	27	140	7	2	307	249	
				1--3	1010	159	802	52	55	2078	1709	
				2--1	692	83	414	20	28	1237	957	
				3--1	515	52	436	30	44	1077	923	
				4--2	Video Vision Problem							
				1--4	Video Vision Problem							
				2--4	185	45	41	9	1	281	195	
				3--2	1246	234	580	66	82	2208	1782	
				4--3	89	43	32	6	3	173	138	
				3--3	1	53	1	0	1	56	58	
				4--1	Video Vision Problem							
				Afternoon 01.00 pm to 02.00 pm	1--1	131	25	116	6	4	282	228
					1--3	533	122	576	123	84	1438	1401
					2--1	400	50	288	46	31	815	700
			3--1		545	52	481	64	77	1219	1133	
			4--2		Video Vision Problem							
			1--4		Video Vision Problem							
			2--4		128	21	48	6	10	213	172	
			3--2		857	168	512	104	102	1743	1571	
			4--3		185	17	181	12	2	397	315	
			3--3		1	22	1	0	0	24	24	
			Evening 05.00 pm to 06.00 pm	4--1	Video Vision Problem							
				1--1	86	21	107	7	1	222	185	
				1--3	494	116	614	130	71	1425	1385	
				2--1	384	60	341	58	41	884	803	
				3--1	801	71	743	50	122	1787	1656	
				4--2	Video Vision Problem							
				1--4	Video Vision Problem							
2--4	146	12		47	5	7	217	161				
3--2	832	168		748	94	148	1990	1917				
4--3	190	15		107	7	2	321	234				
3--3	2	17	0	0	1	20	21					
4--1	Video Vision Problem											






Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)		
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)				
					0.5	1	1	1.5	3				
3	I3: Tidel Park Intersection	27/08/2014	Morning 09.00 am to 10.00 am	1--1	Video Vision Problem								
				1--3	505	119	623	131	71	1449	1404		
				2--1	502	76	427	24	23	1052	859		
				3--1	984	95	494	45	46	1664	1287		
				4--2	30	3	14	0	0	47	32		
				1--4	Video Vision Problem								
				2--4	Video Vision Problem								
				3--2	1135	237	589	71	99	2131	1797		
				4--3	68	33	38	5	2	146	119		
				3--3	0	2	66	0	0	68	68		
				4--1	Video Vision Problem								
				Afternoon 01.00 pm to 02.00 pm	1--1	Video Vision Problem							
					1--3	1221	120	1232	123	60	2756	2327	
					2--1	320	51	297	43	29	740	660	
					3--1	563	66	432	61	51	1173	1024	
			4--2		45	5	8	0	0	58	36		
			1--4		Video Vision Problem								
			2--4		Video Vision Problem								
			3--2		524	147	388	53	65	1177	1072		
			4--3		71	7	52	4	0	134	101		
			3--3		0	6	0	1	0				
			4--1	Video Vision Problem									
			Evening 05.00 pm to 06.00 pm	1--1	92	22	91	9	1	215	176		
				1--3	647	100	527	61	47	1382	1183		
				2--1	362	75	343	52	46	878	815		
				3--1	888	49	738	92	98	1865	1663		
				4--2	3	3	3	1	0	10	9		
				1--4	Video Vision Problem								
				2--4	Video Vision Problem								
				3--2	931	140	719	89	131	2010	1851		
4--3	178	12		124	15	6	335	266					
3--3	3	21		0	1	0	25	24					
4--1	Video Vision Problem												






Annexure 2.1 (d):Traffic Summary - I4 SRP Tools

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I4: SRP Tools	24/08/2014	Morning 09.00 am to 10.00 am	3--2	275	31	76	30	59	471	467
				2--1	704	130	402	85	92	1413	1288
				1--3	675	51	204	80	45	1055	848
				1--2	Video Vision Problem						
			Afternoon 01.00 pm to 02.00 pm	3--2	163	26	67	6	41	303	307
				2--1	879	109	671	83	98	1840	1638
				1--3	629	69	343	59	43	1143	944
				1--2	Video Vision Problem						
			Evening 05.00 pm to 06.00 pm	3--2	126	11	24	8	19	188	167
				2--1	700	85	502	29	55	1371	1146
				1--3	346	32	203	20	25	626	513
				1--2	Video Vision Problem						
2	I4: SRP Tools	25/08/2014	Morning 09.00 am to 10.00 am	3--2	469	37	150	15	42	713	570
				2--1	1075	311	1449	110	140	3085	2883
				1--3	906	115	504	39	62	1626	1317
				1--2	Video Vision Problem						
			Afternoon 01.00 pm to 02.00 pm	3--2	133	15	41	12	23	224	210
				2--1	666	94	341	43	67	1211	1034
				1--3	700	93	374	80	51	1298	1090
				1--2	Video Vision Problem						
			Evening 05.00 pm to 06.00 pm	3--2	213	15	103	25	58	414	436
				2--1	1291	189	828	122	136	2566	2254
				1--3	667	92	405	105	81	1350	1231
				1--2	Video Vision Problem						
3	I4: SRP Tools	27/08/2014	Morning 09.00 am to 10.00 am	3--2	500	37	160	33	22	752	563
				2--1	1468	281	662	110	208	2729	2466
				1--3	935	110	479	51	37	1612	1244
				1--2	Video Vision Problem						
			Afternoon 01.00 pm to 02.00 pm	3--2	245	20	87	21	38	411	375
				2--1	1237	182	854	134	88	2495	2120
				1--3	810	105	393	100	63	1471	1242
				1--2	Video Vision Problem						
			Evening 05.00 pm to 06.00 pm	3--2	248	24	122	19	36	449	407
				2--1	1605	180	1071	123	128	3107	2622
				1--3	721	101	439	97	76	1434	1274
				1--2	Video Vision Problem						






Annexure 2.1 (e):Traffic Summary - I5 Tharamani Periyar Nagar Junction

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I5: Tharamani Periyar Nagar Intersection	24/08/2014	Morning 09.00 am to 10.00 am	1--2	648	59	359	65	52	1183	996
				1--3	327	101	200	31	48	707	655
				1--4	6	3	0	0	0	9	6
				2--1	726	62	510	38	53	1389	1151
				2--3	578	61	278	66	60	1043	907
				2--4	77	4	8	4	0	93	57
				3--1	859	95	429	55	61	1499	1219
				3--2	682	54	484	38	50	1308	1086
				3--4	48	3	5	0	0	56	32
				4--1	4	1	0	0	0	5	3
				4--2	36	2	3	3	0	44	28
				4--3	34	2	2	4	0	42	27
			Afternoon 01.00 pm to 02.00 pm	1--2	393	51	121	36	35	636	528
				1--3	332	72	247	56	65	772	764
				1--4	6	1	1	0	0	8	5
				2--1	734	76	325	53	31	1219	941
				2--3	595	117	374	113	70	1269	1168
				2--4	45	4	7	6	0	62	43
				3--1	803	140	555	136	82	1716	1547
				3--2	793	87	423	99	20	1422	1115
				3--4	50	9	7	3	3	72	55
				4--1	7	0	2	1	0	10	7
				4--2	21	4	3	5	0	33	25
				4--3	25	3	1	5	1	35	27
			Evening 05.00 pm to 06.00 pm	1--2	355	33	267	54	57	766	730
				1--3	396	62	291	63	85	897	901
				1--4	26	1	2	0	0	29	16
				2--1	66	7	32	6	2	113	87
				2--3	386	77	280	71	27	841	738
				2--4	17	3	8	1	0	29	21
				3--1	726	62	510	38	53	1389	1151
				3--2	687	57	481	34	49	1308	1080
				3--4	80	4	14	0	1	99	61
				4--1	7	0	2	1	0	10	7
				4--2	21	1	3	3	1	29	22
				4--3	23	5	3	3	0	34	24











Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
2	I5: Tharamani Periyar Nagar Intersection	25/08/2014	Morning 09.00 am to 10.00 am	1--2	441	77	306	82	40	946	847
				1--3	330	99	199	30	55	713	673
				1--4	62	18	32	2	2	116	90
				2--1	75	24	105	20	6	230	215
				2--3	338	102	150	48	6	644	511
				2--4	303	43	138	35	1	520	388
				3--1	766	75	387	23	40	1291	1000
				3--2	838	519	519	94	22	1992	1664
				3--4	572	57	285	13	30	957	738
				4--1	22	2	12	4	5	45	46
				4--2	68	6	12	3	5	94	72
				4--3	23	5	6	1	1	36	27
			Afternoon 01.00 pm to 02.00 pm	1--2	403	45	115	32	37	632	521
				1--3	332	72	247	56	65	772	764
				1--4	25	35	7	8	7	82	88
				2--1	66	27	122	20	5	240	227
				2--3	454	44	127	72	3	700	515
				2--4	91	6	44	11	3	155	121
				3--1	553	48	283	54	67	1005	890
				3--2	429	72	184	48	20	753	603
				3--4	220	28	81	7	2	338	236
				4--1	29	4	8	0	0	41	27
				4--2	51	6	8	8	1	74	55
				4--3	41	5	5	4	2	57	43
			Evening 05.00 pm to 06.00 pm	1--2	438	74	300	83	56	951	886
				1--3	396	62	291	63	85	897	901
				1--4	22	7	5	1	1	36	28
				2--1	86	7	118	37	13	261	263
				2--3	537	30	253	70	30	920	747
				2--4	160	12	138	28	2	340	278
3--1	298	39		236	51	87	711	762			
3--2	521	81		303	87	60	1052	955			
3--4	87	28		56	8	4	183	152			
4--1	53	10		18	10	0	91	70			
4--2	63	2		27	5	0	97	68			
4--3	32	5		13	2	2	54	43			

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
3	I5: Tharamani Periyar Nagar Intersection	27/08/2014	Morning 09.00 am to 10.00 am	1--2	373	48	227	20	8	676	516
				1--3	340	80	224	43	62	749	725
				1--4	88	7	14	2	2	113	74
				2--1	111	24	109	15	7	266	232
				2--3	509	60	175	44	39	827	673
				2--4	270	16	142	16	2	446	323
				3--1	448	27	167	38	36	716	583
				3--2	451	68	155	38	19	731	563
				3--4	209	27	101	9	4	350	258
				4--1	Video Vision Problem						
				4--2	46	12	8	3	2	71	54
				4--3	40	11	3	1	2	57	42
				Afternoon 01.00 pm to 02.00 pm	1--2	247	42	145	40	7	481
			1--3		285	99	199	30	55	668	651
			1--4		31	1	5	3	3	43	35
			2--1		52	24	69	11	17	173	187
			2--3		582	70	182	46	42	922	738
			2--4		98	8	47	8	0	161	116
			3--1		423	48	250	57	51	829	748
			3--2		415	54	101	19	26	615	469
			3--4		134	24	47	7	8	220	173
			4--1		29	1	4	2	0	36	23
			4--2		88	10	15	7	0	120	80
			4--3		27	6	19	2	0	54	42
			Evening 05.00 pm to 06.00 pm		1--2	417	65	303	62	68	915
				1--3	347	54	263	57	72	793	792
				1--4	27	2	11	1	0	41	28
				2--1	160	19	191	43	17	430	406
				2--3	554	69	175	45	40	883	709
				2--4	151	21	141	44	0	357	304
				3--1	418	46	292	64	80	900	883
				3--2	413	79	305	79	46	922	847
				3--4	161	37	110	12	4	324	258
4--1	48	5		25	3	1	82	62			
4--2	62	5		17	9	1	94	70			
4--3	32	4		18	2	1	57	44			






Annexure 2.1 (f):Traffic Summary - I6 Vijay Nagar Intersection






Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I6: Vijay NagarAxis/Vijay Nagar Cross Intersection	24/08/2014	Morning 09.00 am to 10.00 am	2-3	813	91	320	71	84	1379	1176
				1-3	818	58	283	40	13	1212	849
				1-2	358	46	77	27	53	561	502
				2-1	610	3	12	1	1	627	325
				3-1	884	118	362	80	52	1496	1198
			3-2	961	97	400	72	64	1594	1278	
			Afternoon 01.00 pm to 02.00 pm	2-3	1178	120	583	62	58	2001	1559
				1-3	981	95	492	61	19	1648	1226
				1-2	394	63	159	31	37	684	577
				2-1	576	62	248	28	25	939	715
				3-1	800	97	504	77	26	1504	1195
			3-2	1041	89	552	69	66	1817	1463	
			Evening 05.00 pm to 06.00 pm	2-3	892	89	471	52	68	1572	1288
				1-3	919	93	552	66	20	1650	1264
				1-2	390	51	143	23	29	636	511
2-1	417	69		189	20	9	704	524			
3-1	884	118		362	80	52	1496	1198			
3-2	1059	102	631	46	77	1915	1563				
2	I6: Vijay NagarAxis/Vijay Nagar Cross Intersection	25/08/2014	Morning 09.00 am to 10.00 am	2-3	997	143	498	67	72	1777	1456
				1-3	1042	96	333	71	23	1565	1126
				1-2	496	62	113	22	21	714	519
				2-1	419	83	142	37	30	711	580
				3-1	205	52	213	38	14	522	467
			3-2	2437	189	883	86	69	3664	2627	
			Afternoon 01.00 pm to 02.00 pm	2-3	981	60	443	60	66	1610	1282
				1-3	795	76	291	72	17	1251	924
				1-2	376	51	116	35	36	614	516
				2-1	484	71	149	52	19	775	597
				3-1	830	78	431	90	24	1453	1131
			3-2	1163	112	575	131	73	2054	1684	
			Evening 05.00 pm to 06.00 pm	2-3	1112	98	521	96	80	1907	1559
				1-3	945	94	373	72	38	1522	1162
				1-2	308	49	101	19	40	517	453
2-1	341	36		104	31	18	530	411			
3-1	345	43		300	60	75	823	831			
3-2	803	102	544	148	136	1733	1678				
3	I6: Vijay NagarAxis/Vijay Nagar Cross Intersection	27/08/2014	Morning 09.00 am to 10.00 am	2-3	1178	177	467	73	60	1955	1523
				1-3	1511	119	419	47	19	2115	1421
				1-2	1176	229	866	112	136	2519	2259
				2-1	457	75	162	39	33	766	623
				3-1	230	68	203	38	11	550	476
			3-2	2122	173	799	71	72	3237	2356	
			Afternoon 01.00 pm to 02.00 pm	2-3	996	120	451	112	82	1761	1483
				1-3	1077	110	477	101	30	1795	1367
				1-2	1439	251	1019	248	169	3126	2869
				2-1	500	75	200	62	27	864	699
				3-1	831	95	449	106	23	1504	1188
			3-2	1187	123	607	142	114	2173	1879	
			Evening 05.00 pm to 06.00 pm	2-3	1312	154	581	120	79	2246	1808
				1-3	1027	92	410	75	31	1635	1221
				1-2	1763	212	1311	108	135	3529	2972
2-1	511	54		157	44	20	786	593			
3-1	419	79		339	85	57	979	926			
3-2	969	129	574	163	115	1950	1777				

Annexure 2.1 (g):Traffic Summary - I7 Gurunanak College Intersection






Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
											
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I7: Guru Nanak College Intersection	24/08/2014	Morning 09.00 am to 10.00 am	1-2	458	72	137	83	68	818	767
				1-3	820	76	320	25	34	1275	946
				2-1	551	70	170	28	78	897	792
				3-1	1245	136	452	67	22	1922	1377
			Afternoon 01.00 pm to 02.00 pm	3-2	133	19	44	33	0	229	179
				1-2	598	132	223	74	85	1112	1020
				1-3	1158	151	515	42	38	1904	1422
				2-1	568	100	214	22	70	974	841
			Evening 05.00 pm to 06.00 pm	3-1	1229	172	910	103	18	2432	1905
				3-2	138	30	79	27	1	275	222
				1-2	538	120	207	71	62	998	889
				1-3	1136	146	532	27	28	1869	1371
				2-1	555	82	212	15	73	937	813
				3-1	1216	188	1110	58	17	2589	2044
				3-2	147	23	77	38	9	294	258
2	I7: Guru Nanak College Intersection	25/08/2014	Morning 09.00 am to 10.00 am	1-2	Video Not Provide By IIT						
				1-3							
				2-1							
				3-1							
			Afternoon 01.00 pm to 02.00 pm	3-2							
				1-2	827	97	285	132	74	1415	1216
				1-3	1311	159	480	110	63	2123	1649
				2-1	778	93	224	80	99	1274	1123
			Evening 05.00 pm to 06.00 pm	3-1	1437	167	748	132	27	2511	1913
				3-2	284	32	62	28	5	411	293
				1-2	654	101	246	149	73	1223	1117
				1-3	1314	158	534	71	52	2129	1612
				2-1	774	90	358	65	74	1361	1155
				3-1	1079	147	640	103	75	2044	1706
				3-2	145	25	60	28	8	266	224
3	I7: Guru Nanak College Intersection	27/08/2014	Morning 09.00 am to 10.00 am	1-2	1441	131	428	159	58	2217	1692
				1-3	1320	138	343	50	32	1883	1312
				2-1	733	106	241	66	81	1227	1056
				3-1	1760	202	657	97	22	2738	1951
			Afternoon 01.00 pm to 02.00 pm	3-2	310	23	86	103	16	538	467
				1-2	818	123	275	91	62	1369	1130
				1-3	1083	148	498	85	31	1845	1408
				2-1	745	118	221	66	72	1222	1027
			Evening 05.00 pm to 06.00 pm	3-1	1197	153	678	153	35	2216	1764
				3-2	194	24	53	26	1	298	216
				1-2	779	145	342	76	84	1426	1243
				1-3	1563	216	632	80	53	2544	1909
				2-1	826	129	379	66	78	1478	1254
				3-1	1363	220	795	152	68	2598	2129
				3-2	179	32	70	27	5	313	247

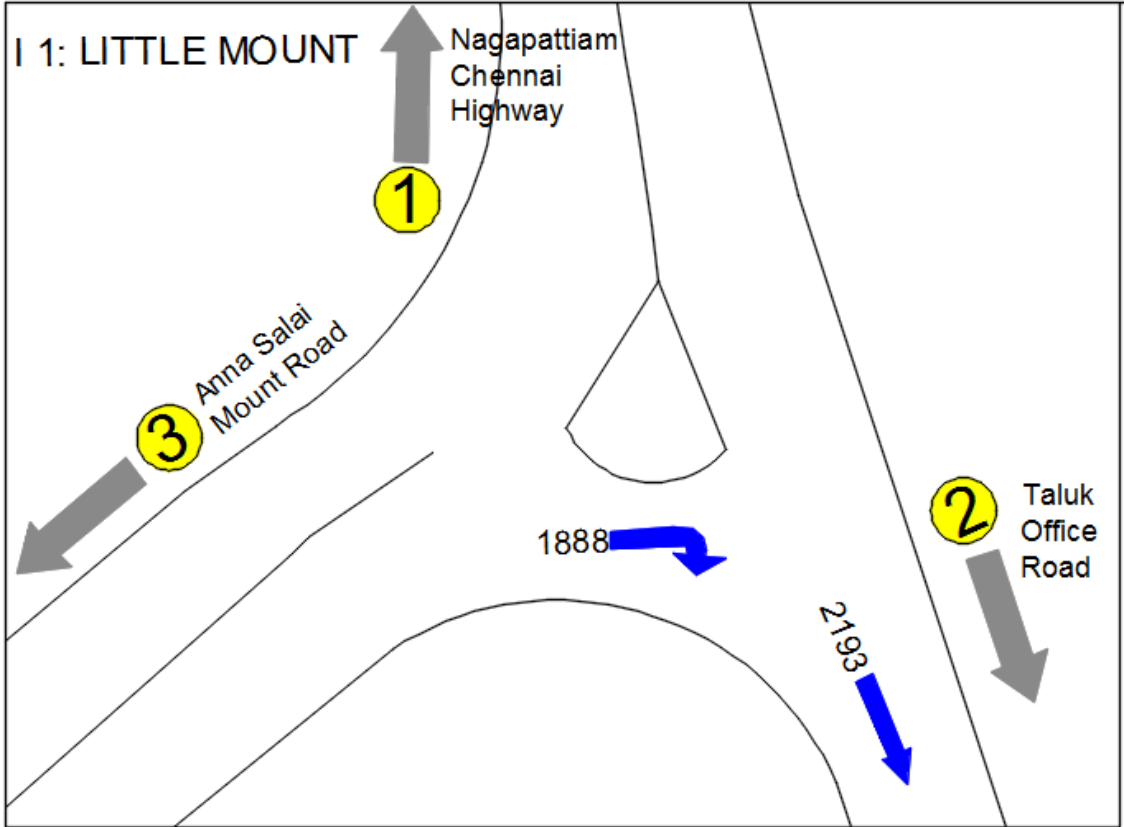
Annexure 2.1 (h):Traffic Summary - I8 Velachery Check Post Intersection

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I8: Velachery Check Post Intersection	24/08/2014	Morning 09.00 am to 10.00 am	1--2	1037	118	354	46	81	1636	1303
				1--3	31	11	7	0	0	49	34
				2--1	1247	234	404	44	19	1948	1385
				2--3	550	89	152	31	77	899	794
				3--1	30	18	10	1	9	68	72
			3--2	1094	210	594	36	24	1958	1477	
			Afternoon 01.00 pm to 02.00 pm	1--2	1541	265	580	46	78	2510	1919
				1--3	42	18	14	1	0	75	55
				2--1	165	34	91	9	3	302	230
				2--3	653	130	247	28	77	1135	977
				3--1	47	12	11	0	2	72	53
			3--2	458	128	187	15	29	817	654	
			Evening 05.00 pm to 06.00 pm	1--2	1388	218	756	27	82	2471	1955
				1--3	67	24	24	2	0	117	85
				2--1	1295	221	667	27	30	2240	1666
				2--3	669	129	323	7	78	1206	1031
				3--1	34	20	13	1	1	69	55
			3--2	552	113	172	13	15	865	626	
2	I8: Velachery Check Post Intersection	25/08/2014	Morning 09.00 am to 10.00 am	1--2	1320	196	485	81	53	2135	1622
				1--3	75	13	15	3	1	107	73
				2--1	3451	287	900	114	33	4785	3183
				2--3	1026	98	221	34	74	1453	1105
				3--1	98	18	27	0	9	152	121
			3--2	1055	90	205	37	21	1408	941	
			Afternoon 01.00 pm to 02.00 pm	1--2	1054	141	386	80	65	1726	1369
				1--3	47	6	8	3	0	64	42
				2--1	1048	139	410	46	31	1674	1235
				2--3	516	68	185	56	68	893	799
				3--1	39	5	12	2	1	59	43
			3--2	370	40	129	41	19	599	473	
			Evening 05.00 pm to 06.00 pm	1--2	1312	153	533	75	62	2135	1641
				1--3	81	7	23	6	2	119	86
				2--1	1595	176	684	75	101	2631	2073
				2--3	861	100	345	99	112	1517	1360
				3--1	44	4	9	1	0	58	37
			3--2	632	112	223	65	57	1089	920	

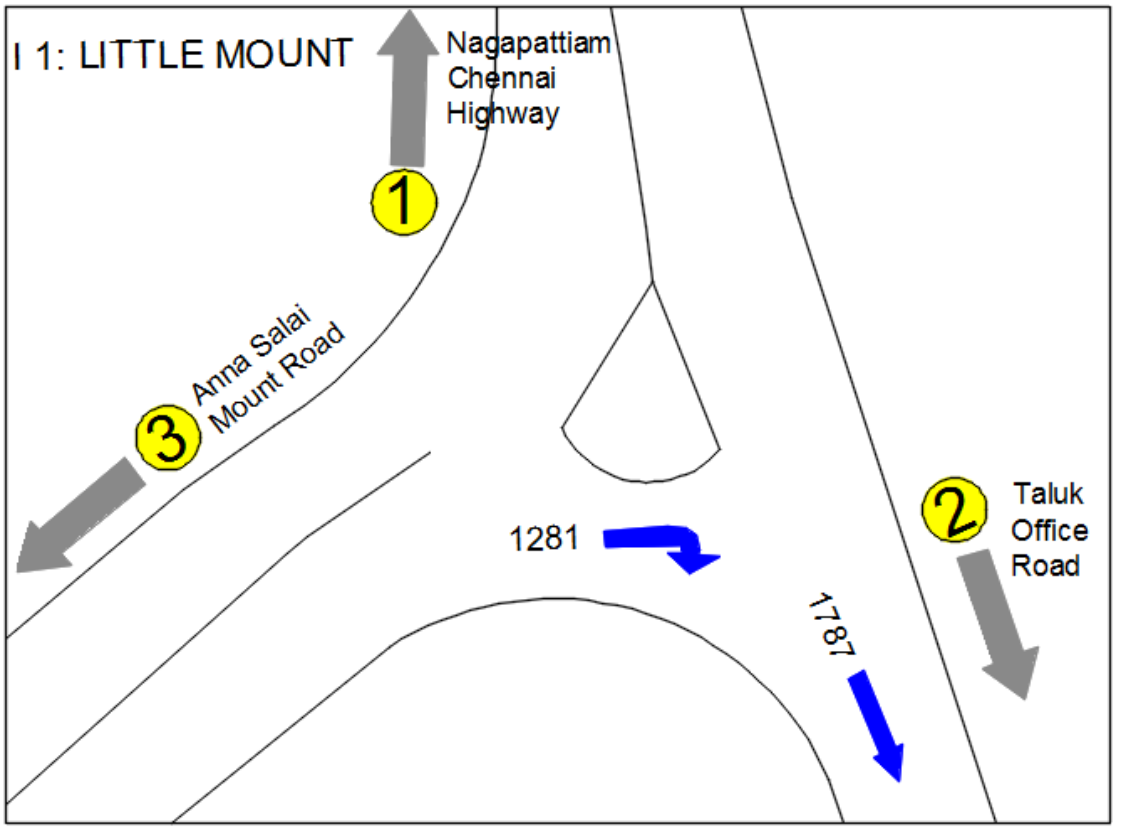
Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
3	I8: Velachery Check Post Intersection	27/08/2014	Morning 09.00 am to 10.00 am	1--2	1415	164	567	60	57	2263	1700
				1--3	84	18	24	4	2	132	96
				2--1	2552	245	796	67	28	3688	2502
				2--3	1046	106	274	54	86	1566	1242
				3--1	120	18	33	7	1	179	125
			3--2	936	80	163	37	20	1236	827	
			Afternoon 01.00 pm to 02.00 pm	1--2	1174	206	557	88	68	2093	1686
				1--3	72	9	22	4	1	108	76
				2--1	989	150	542	101	24	1806	1410
				2--3	703	95	261	98	82	1239	1101
				3--1	57	8	23	1	1	90	64
			3--2	432	62	190	49	21	754	605	
			Evening 05.00 pm to 06.00 pm	1--2	1601	230	706	64	94	2695	2115
				1--3	93	10	27	6	3	139	102
				2--1	1393	238	569	86	62	2348	1819
2--3	744	129		391	101	95	1460	1329			
3--1	56	7		19	9	1	92	71			
3--2	499	112	203	45	39	898	749				

Annexure 2.1 (i):Traffic Summary - I9 Halda Intersection

Sr. No.	Intersection Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveller) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	I9: Halda Intersection	24/08/2014	Morning 09.00 am to 10.00 am	3--4	339	71	177	14	12	613	475
				3--1	1028	132	388	38	5	1591	1106
				2--3	Video Vision Problem						
				2--4	2157	372	1757	182	294	4762	4363
			Afternoon 01.00 pm to 02.00 pm	3--4	295	71	203	12	11	592	473
				3--1	773	125	494	37	6	1435	1079
				2--3	Video Vision Problem						
				2--4	1153	260	1127	187	245	2972	2979
			Evening 05.00 pm to 06.00 pm	3--4	348	55	213	4	10	630	478
				3--1	879	139	515	20	9	1562	1151
				2--3	Video Vision Problem						
				2--4	1629	216	1419	147	241	3652	3393
2	I9: Halda Intersection	25/08/2014	Morning 09.00 am to 10.00 am	3--4	Video Vision Problem						
				3--1	2507	203	707	34	58	3509	2389
				2--3	800	137	414	54	54	1459	1194
				2--4	2157	374	1757	182	294	4764	4365
			Afternoon 01.00 pm to 02.00 pm	3--4	Video Vision Problem						
				3--1	1121	160	453	58	37	1829	1372
				2--3	460	422	341	54	71	1348	1287
				2--4	2209	536	2433	387	526	6091	6232
			Evening 05.00 pm to 06.00 pm	3--4	Video Vision Problem						
				3--1	649	583	563	30	66	1891	1714
				2--3	343	103	355	49	67	917	904
				2--4	3286	391	2674	249	426	7026	6360
3	I9: Halda Intersection	27/08/2014	Morning 09.00 am to 10.00 am	3--4	Video Vision Problem						
				3--1	1412	172	563	72	15	2234	1594
				2--3	477	107	421	37	53	1095	981
				2--4	1283	380	2029	204	201	4097	3960
			Afternoon 01.00 pm to 02.00 pm	3--4	Video Vision Problem						
				3--1	879	147	405	72	12	1515	1136
				2--3	334	104	355	32	44	869	806
				2--4	1443	379	2010	285	229	4346	4225
			Evening 05.00 pm to 06.00 pm	3--4	Video Vision Problem						
				3--1	776	143	415	99	33	1466	1194
				2--3	386	102	460	44	59	1051	998
				2--4	1577	289	2103	292	284	4545	4471

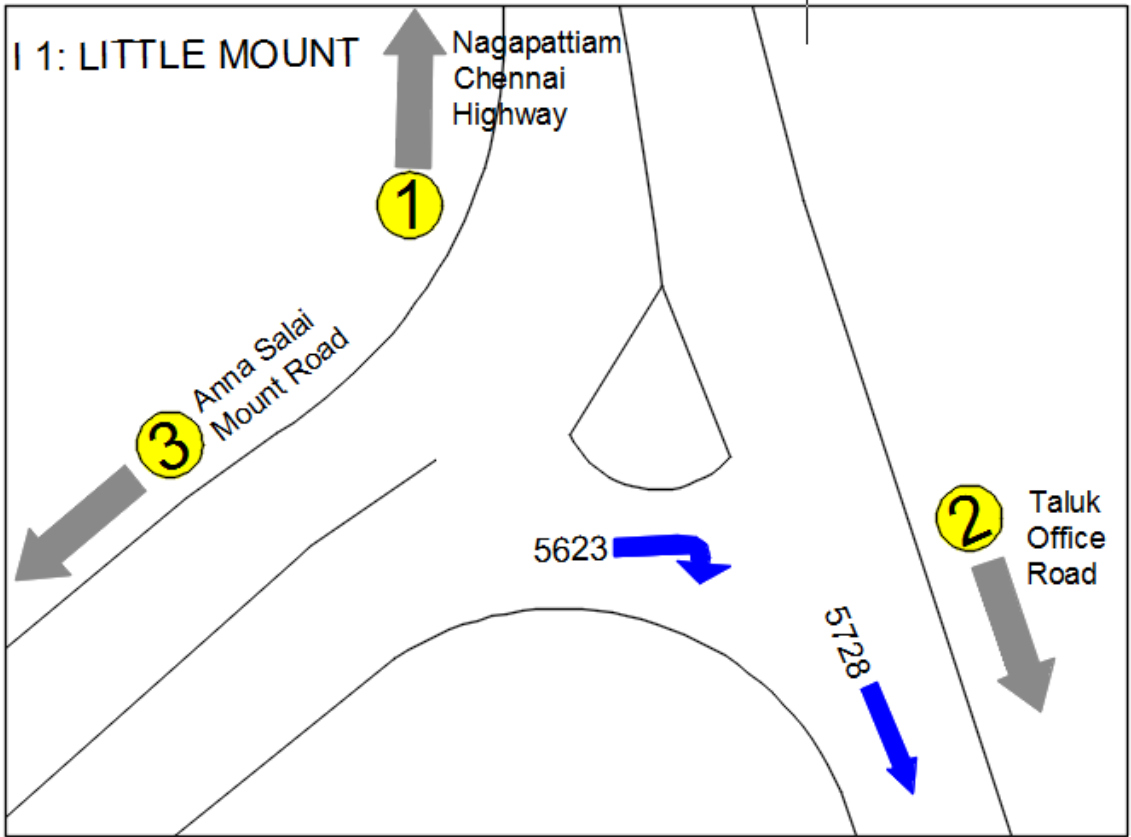


Little Mount Intersection: 24/08/2014 Morning 09.00 am to 10.00 am

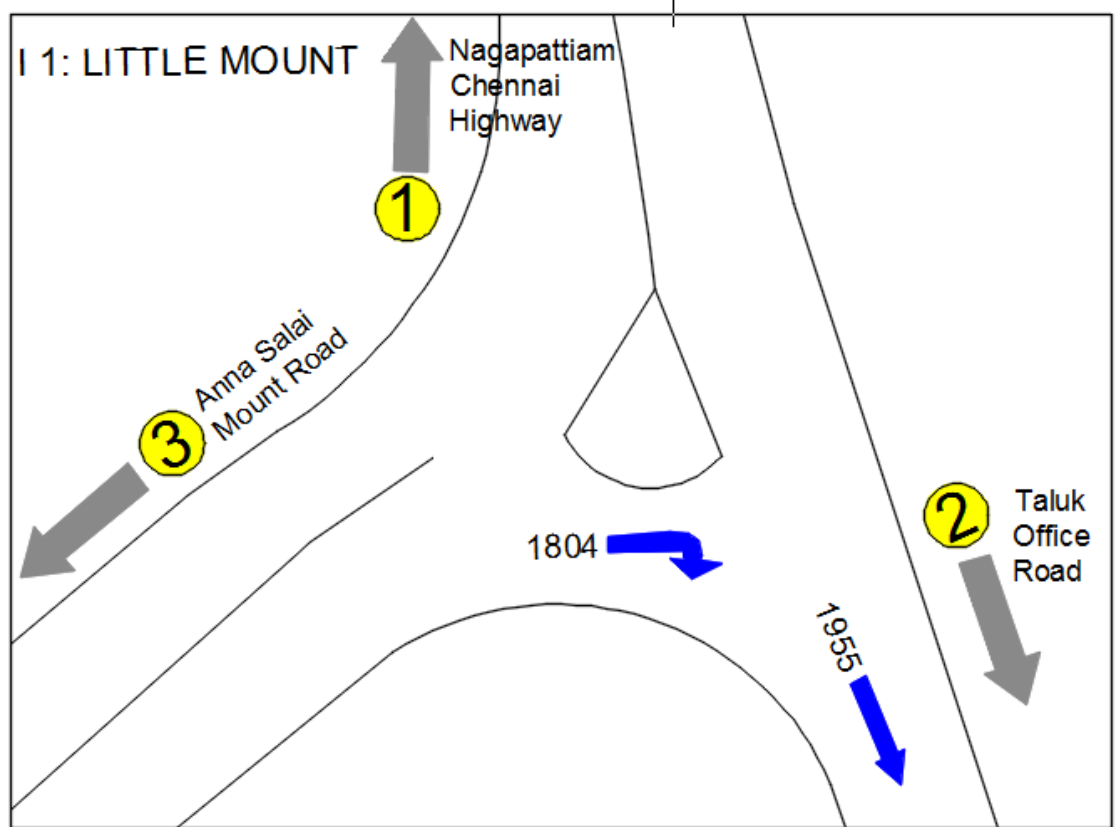


Little Mount Intersection: 24/08/2014 Evening 05.00 pm to 06.00 pm

Annexure 2.2 (a):Traffic Summary - I1 Little Mount

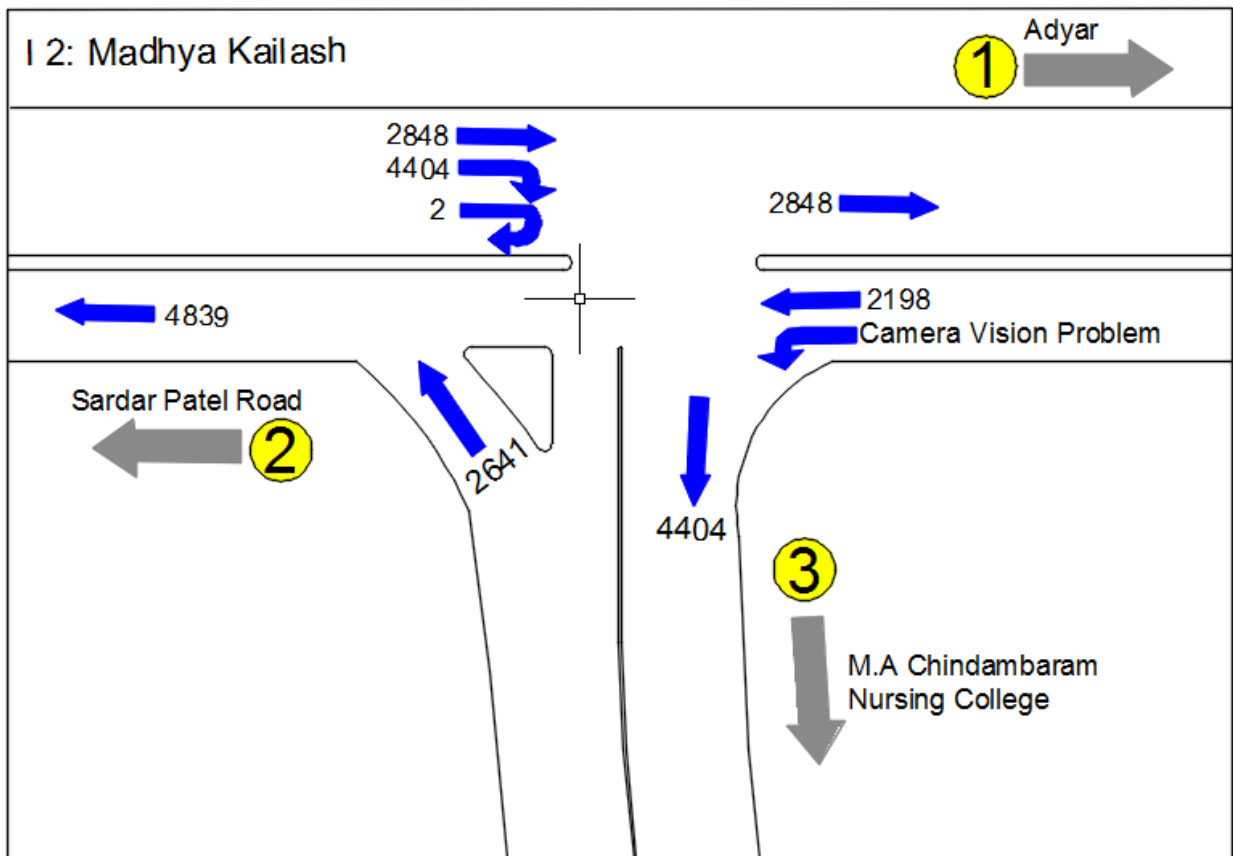


Little Mount Intersection: 27/08/2014 Morning 09.00 am to 10.00 am

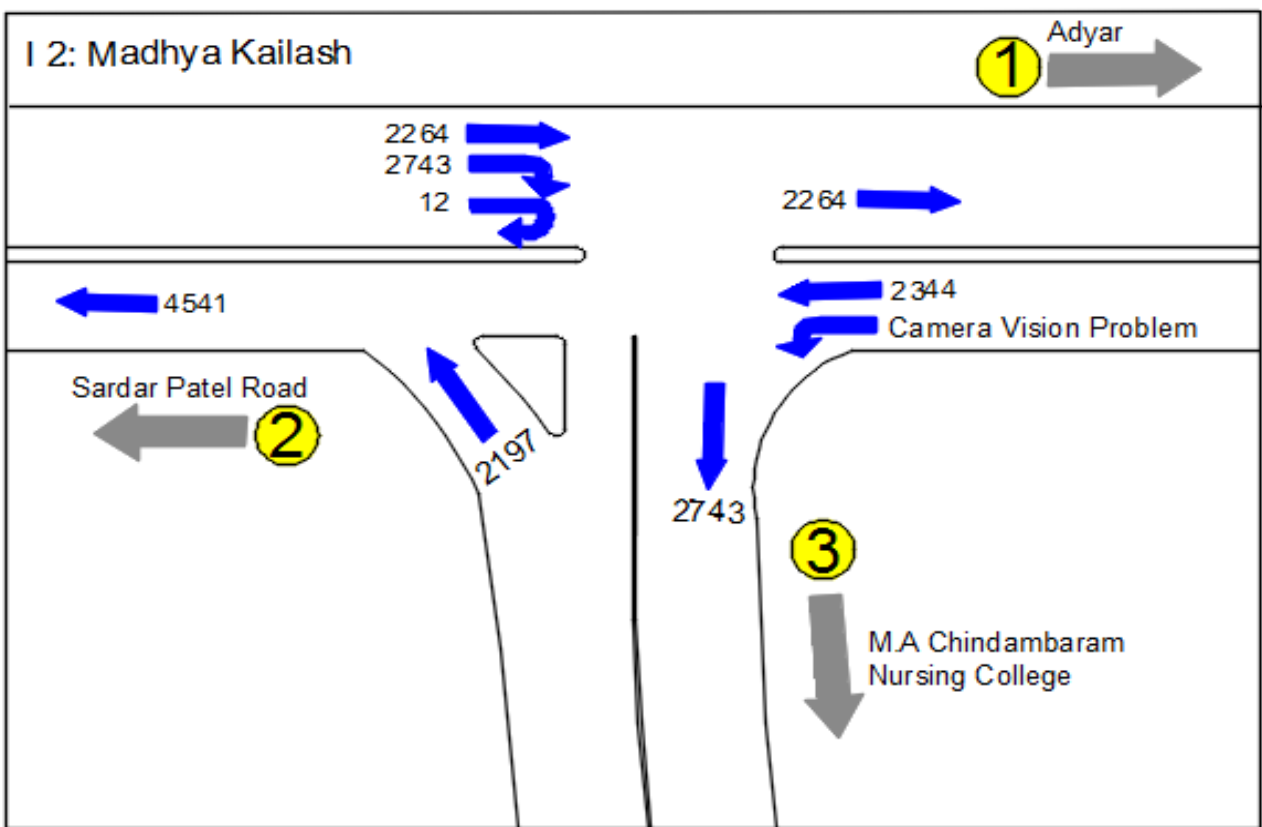


Little Mount Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm

Annexure 2.2 (b): Traffic Summary - I2 Madhya Kailash

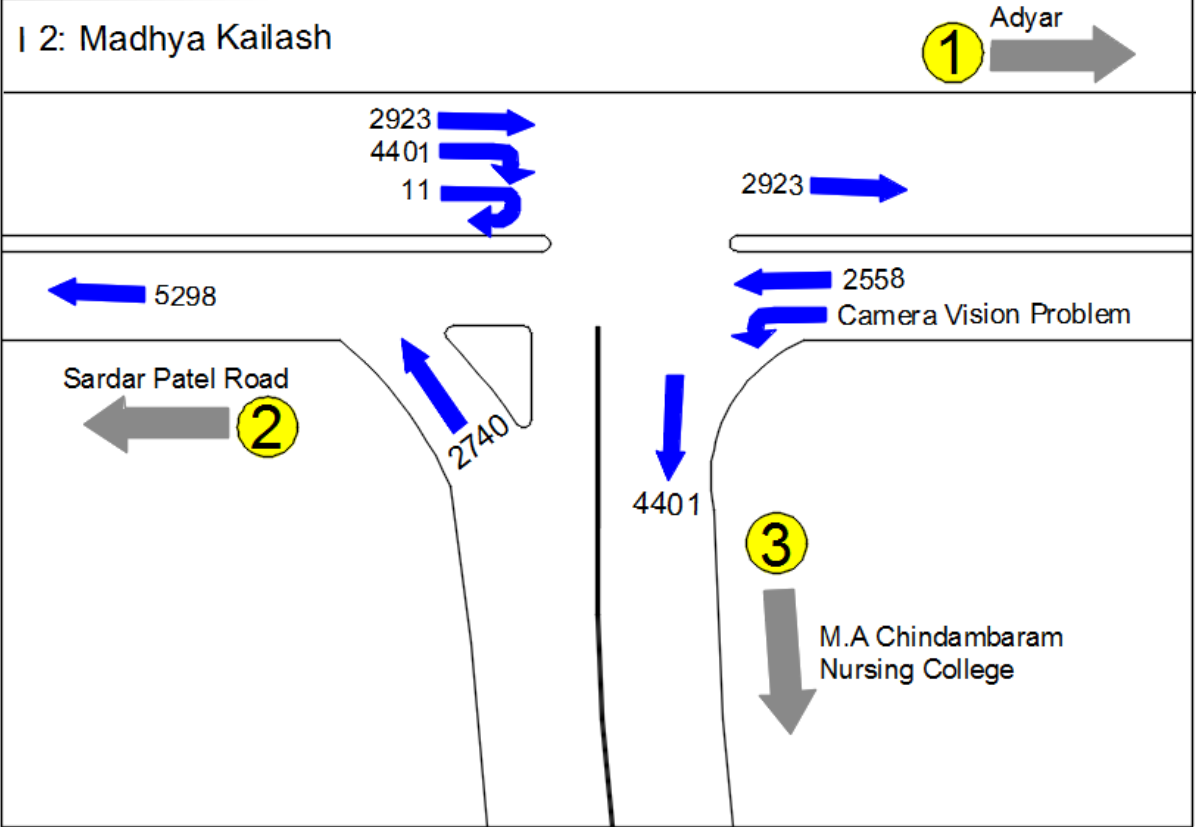


Madhya Kailash: 25/08/2014 Morning 09.00 am to 10.00 am

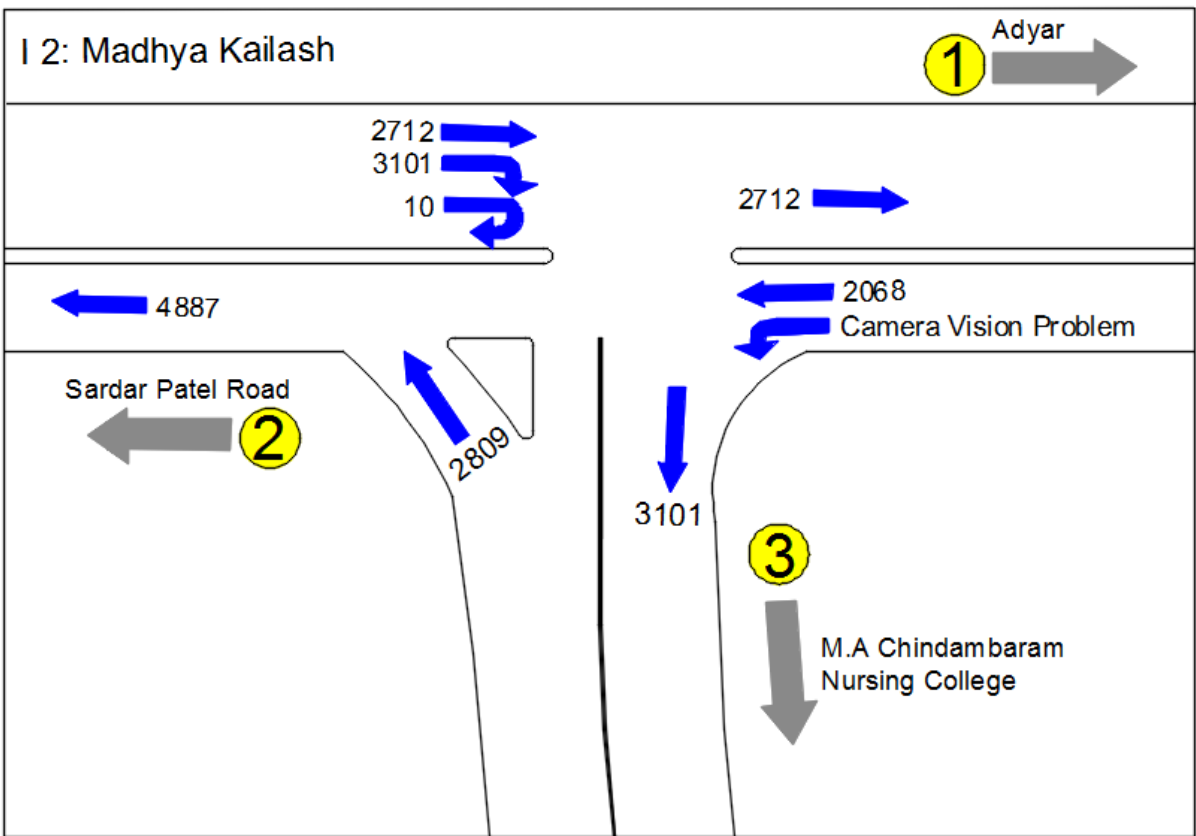


Madhya Kailash: 25/08/2014 Evening 05.00 pm to 06.00 pm

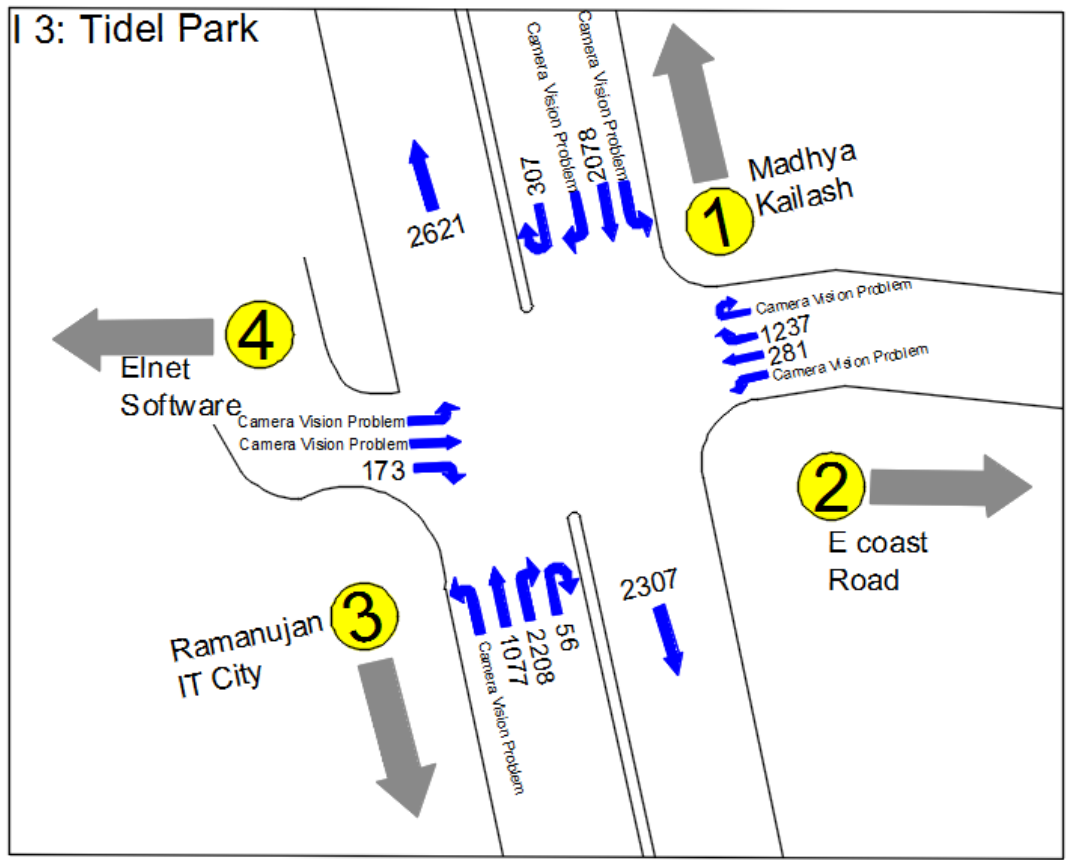
Annexure 2.2 (b):Traffic Summary - I2 Madhya Kailash



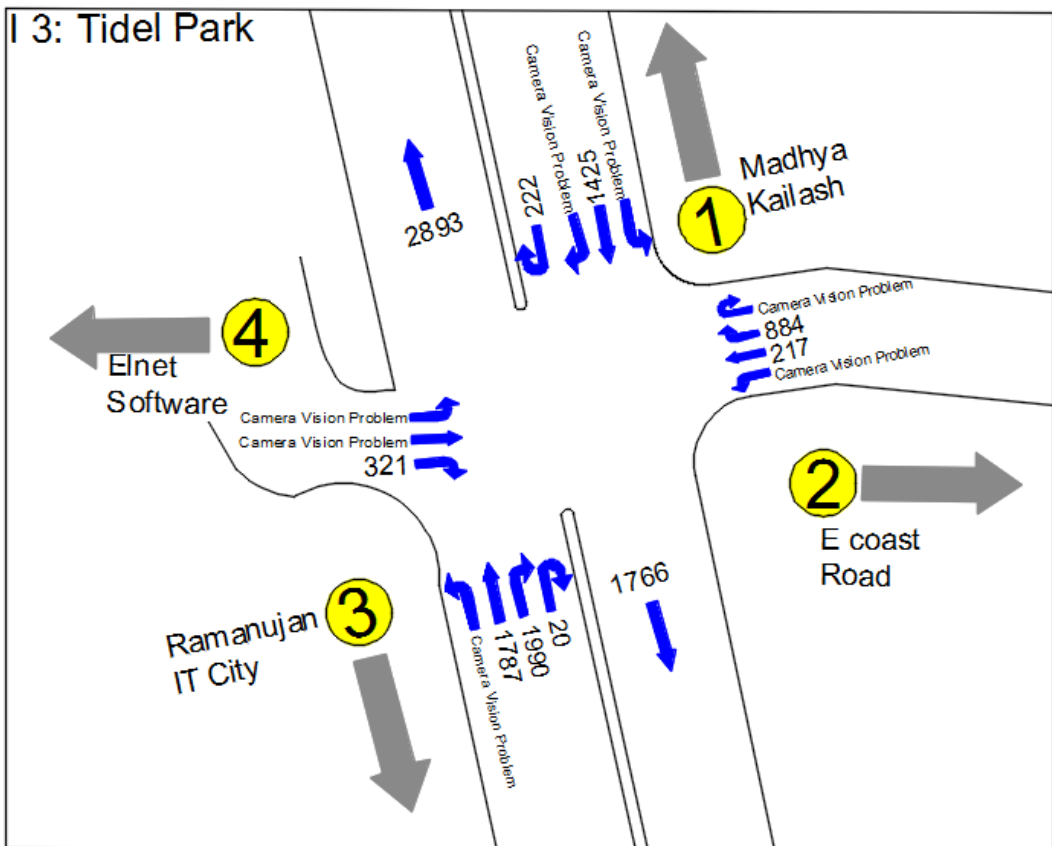
Madhya Kailash: 27/08/2014 Morning 09.00 am to 10.00 am



Madhya Kailash: 27/08/2014 Evening 05.00 pm to 06.00 pm

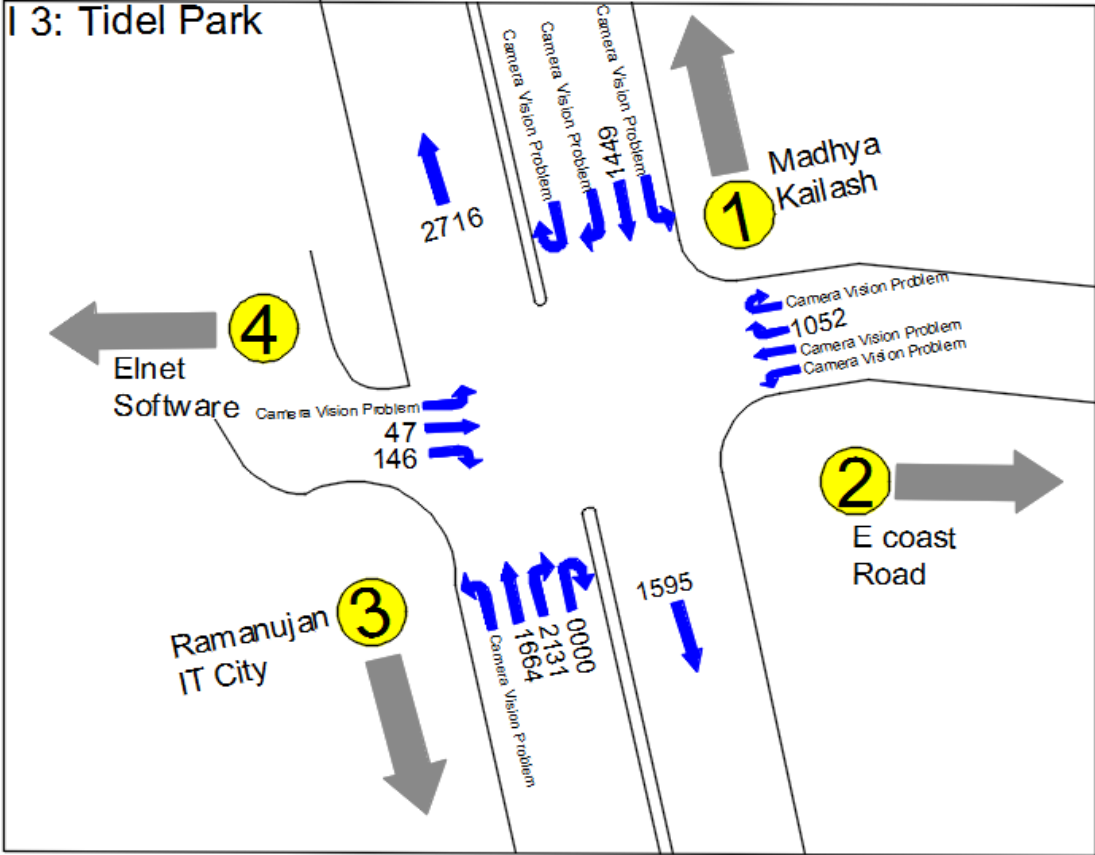


Tidal Park Intersection: 25/08/2014 Morning 09.00 am to 10.00 am

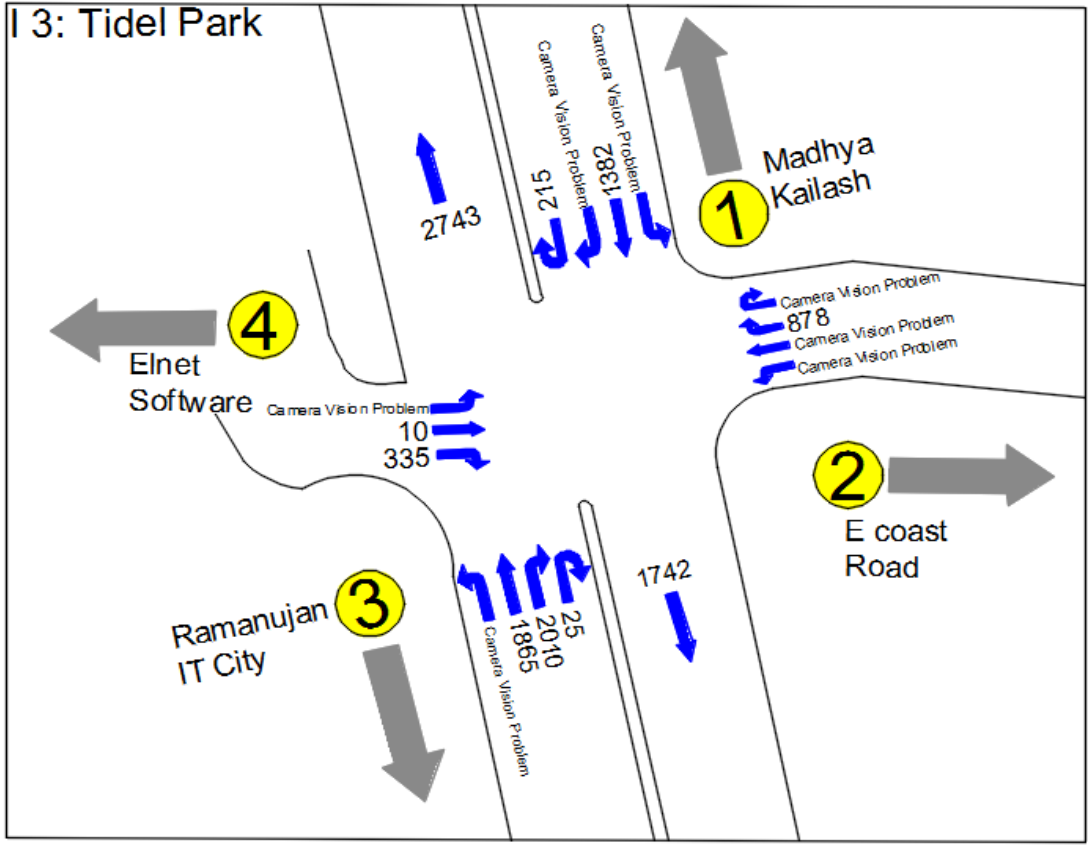


Tidal Park Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm

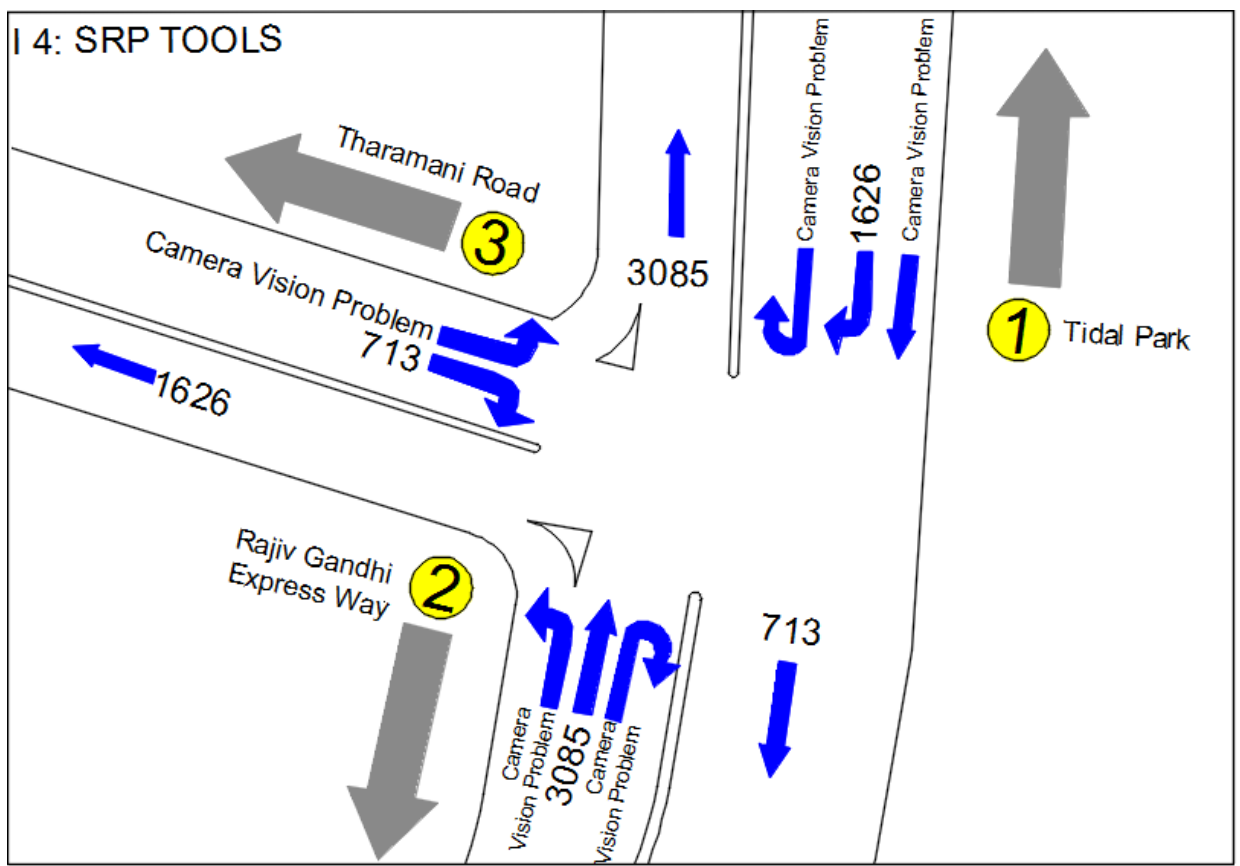
Annexure 2.2 (c):Traffic Summary - I3 Tidal Park



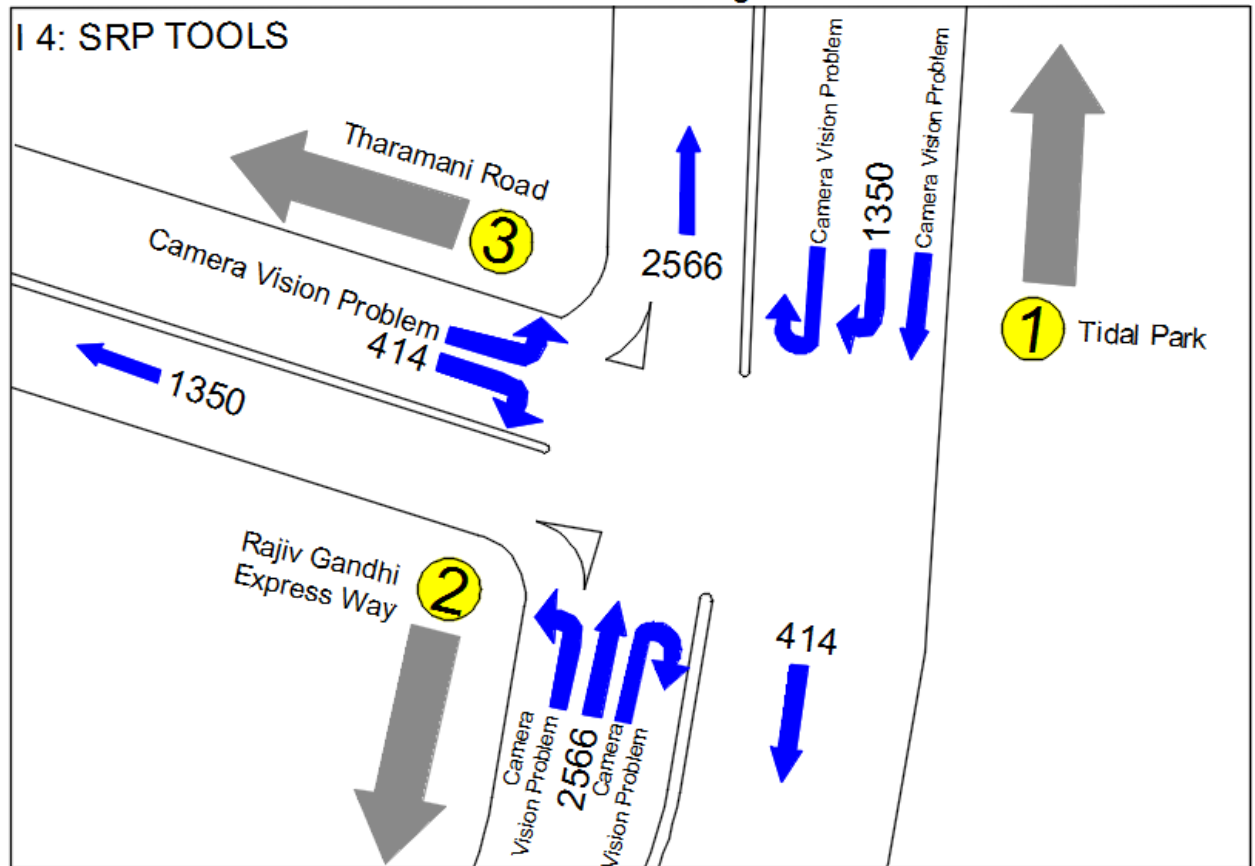
Tidal Park Intersection: 27/08/2014 Morning 09.00 am to 10.00 am



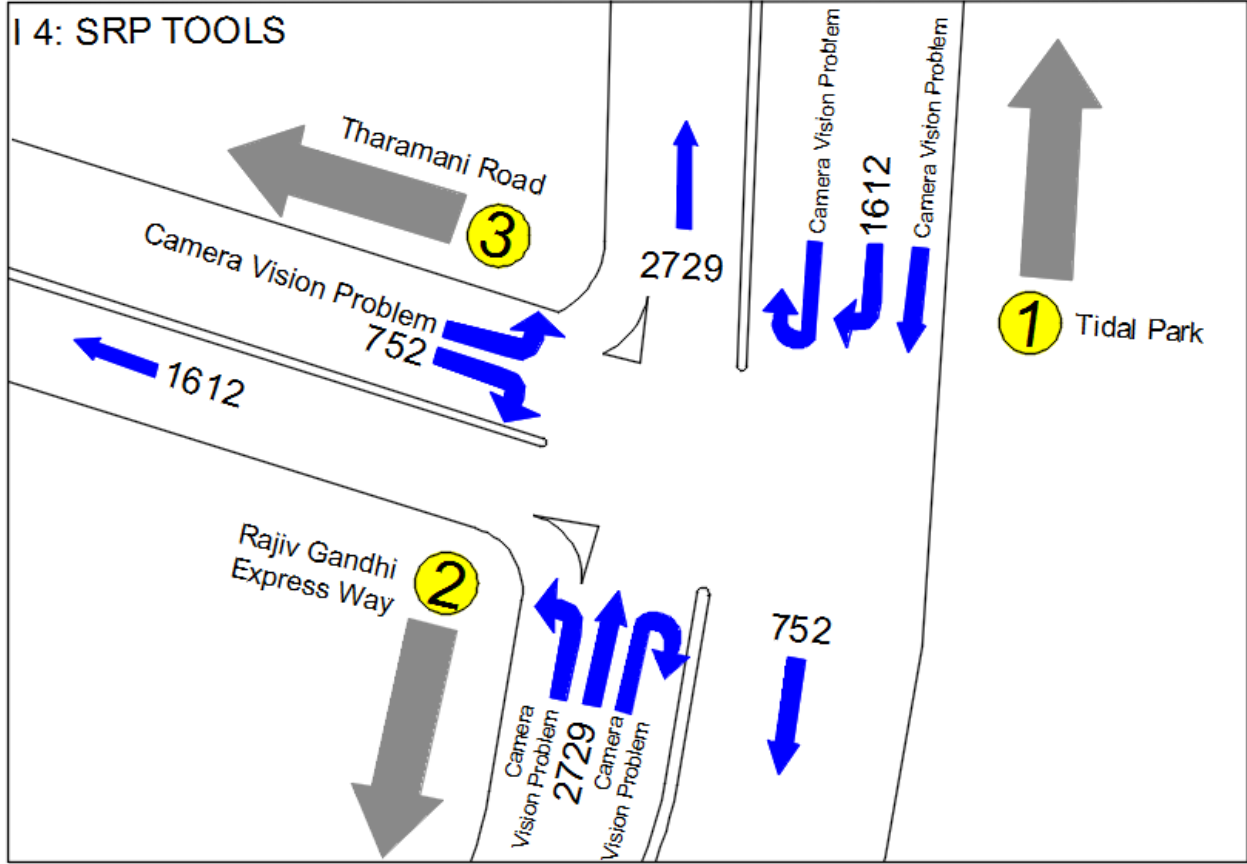
Tidal Park Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm



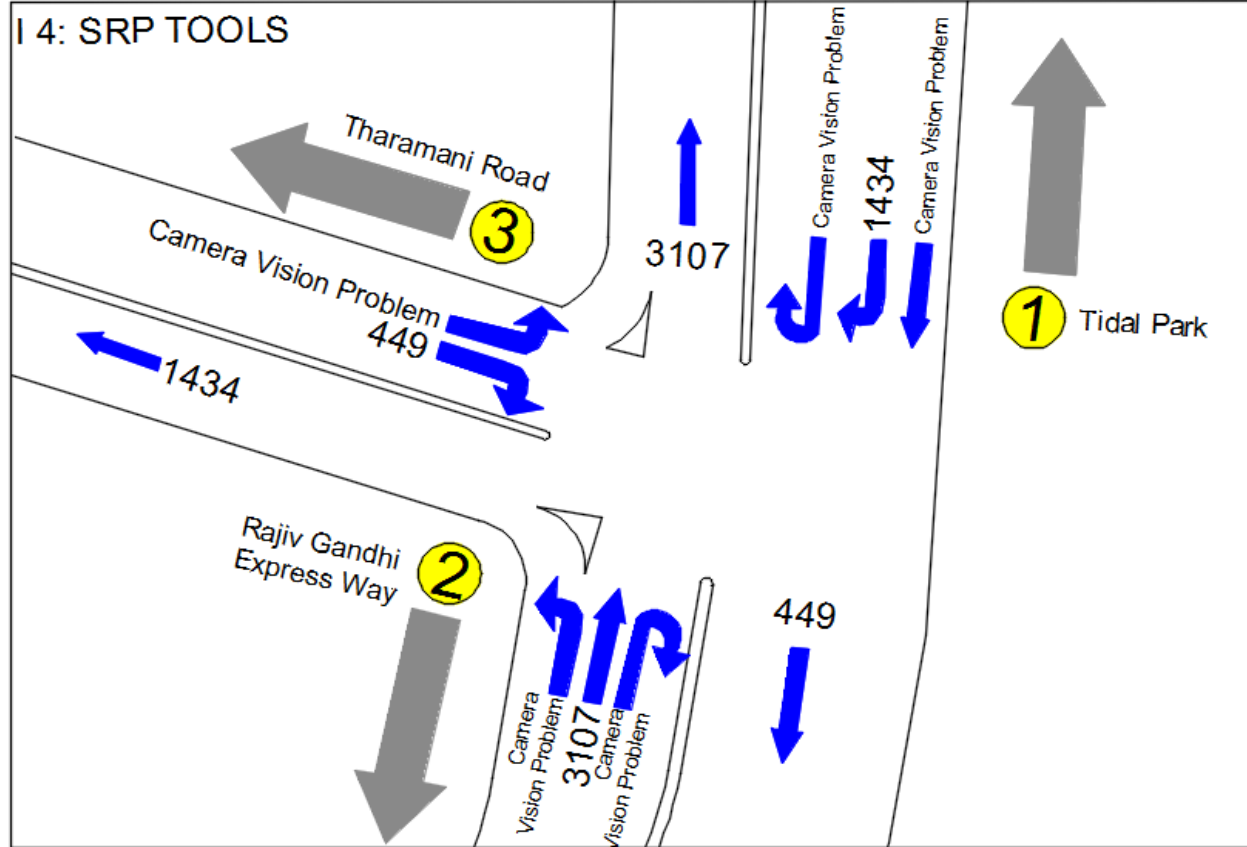
SRP Tools Intersection: 25/08/2014 Morning 09.00 am to 10.00 am



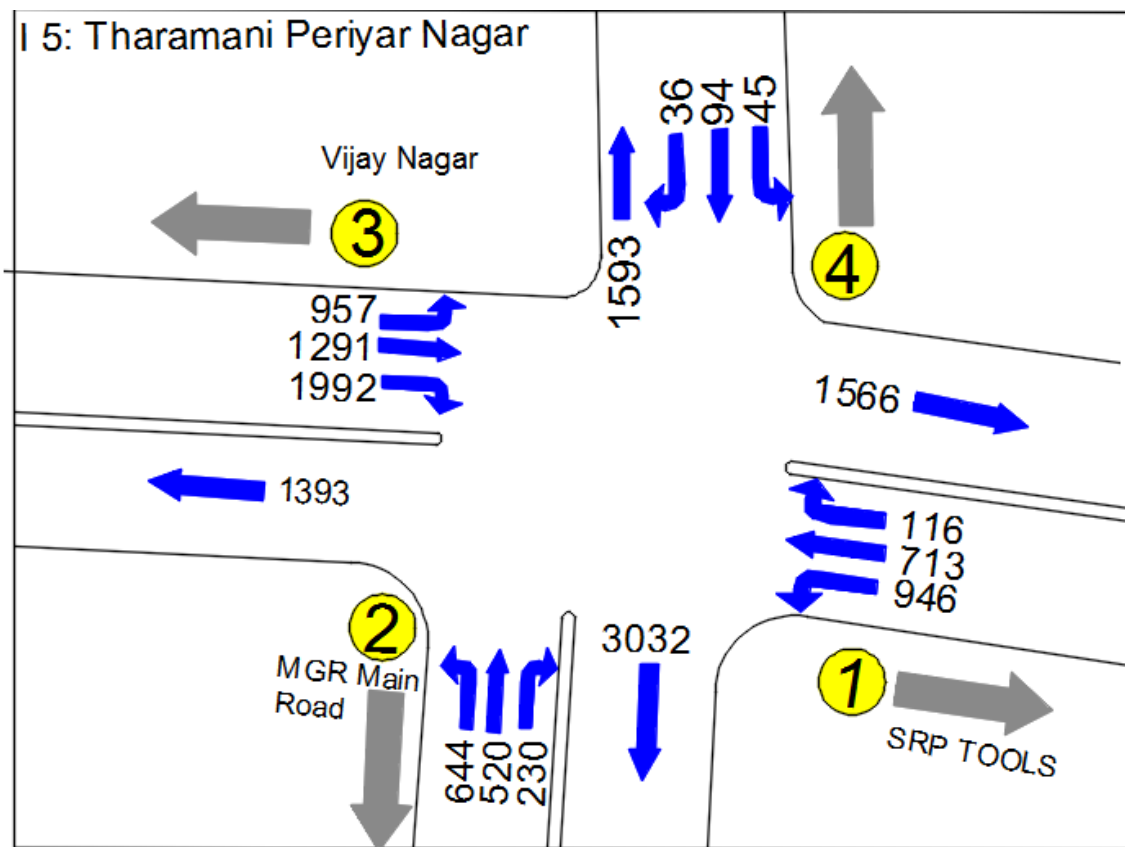
SRP Tools Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm



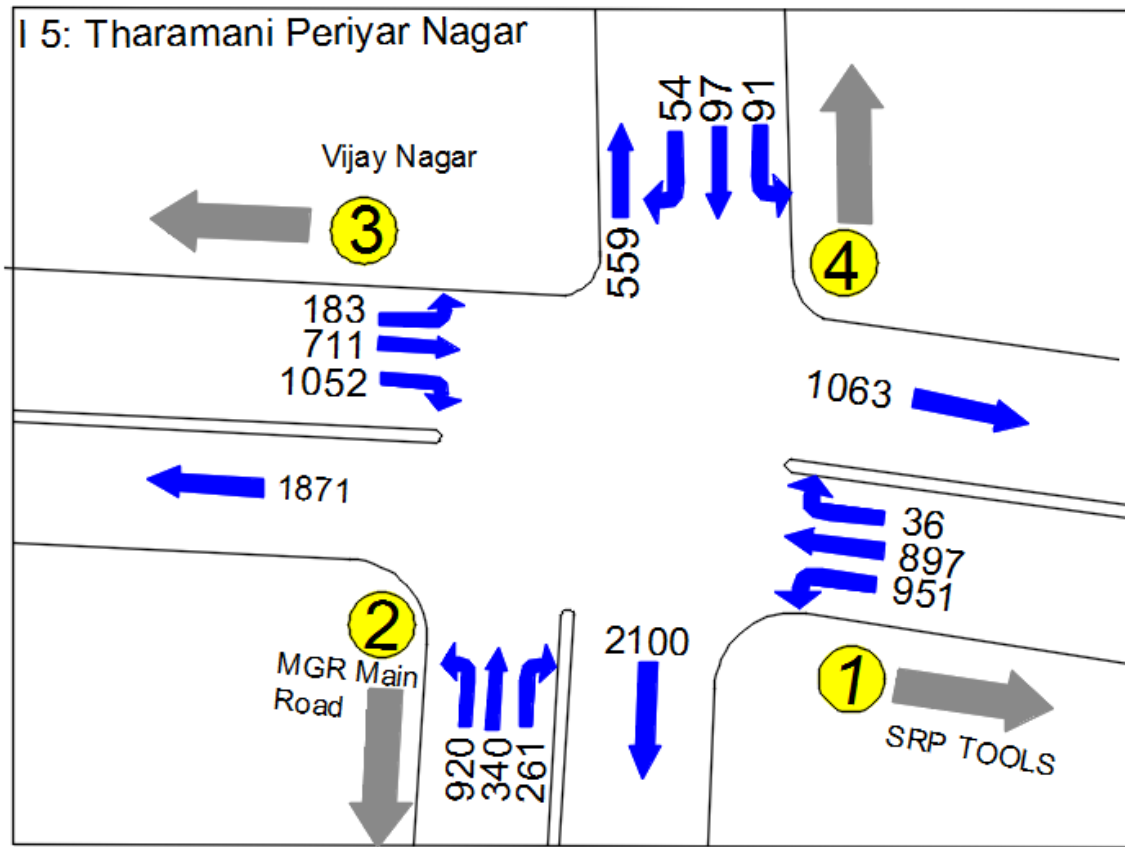
SRP Tools Intersection: 27/08/2014 Morning 09.00 am to 10.00 am



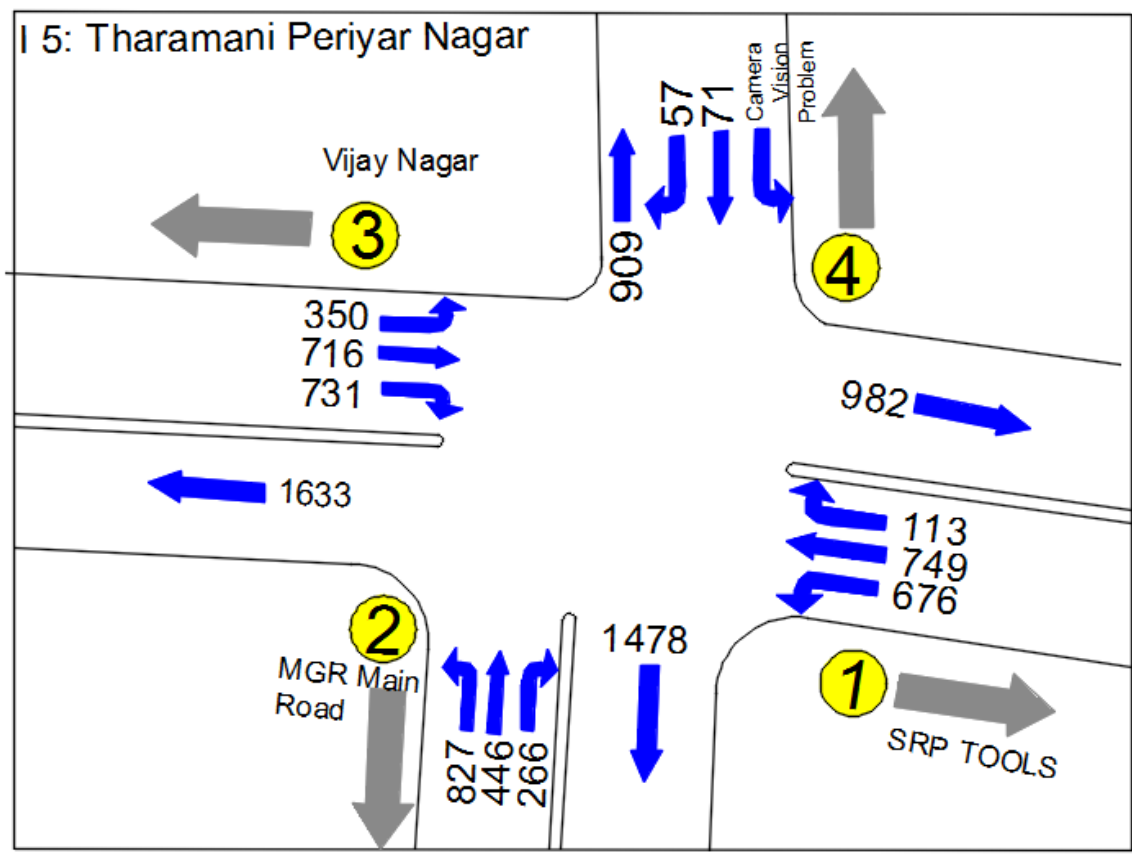
SRP Tools Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm



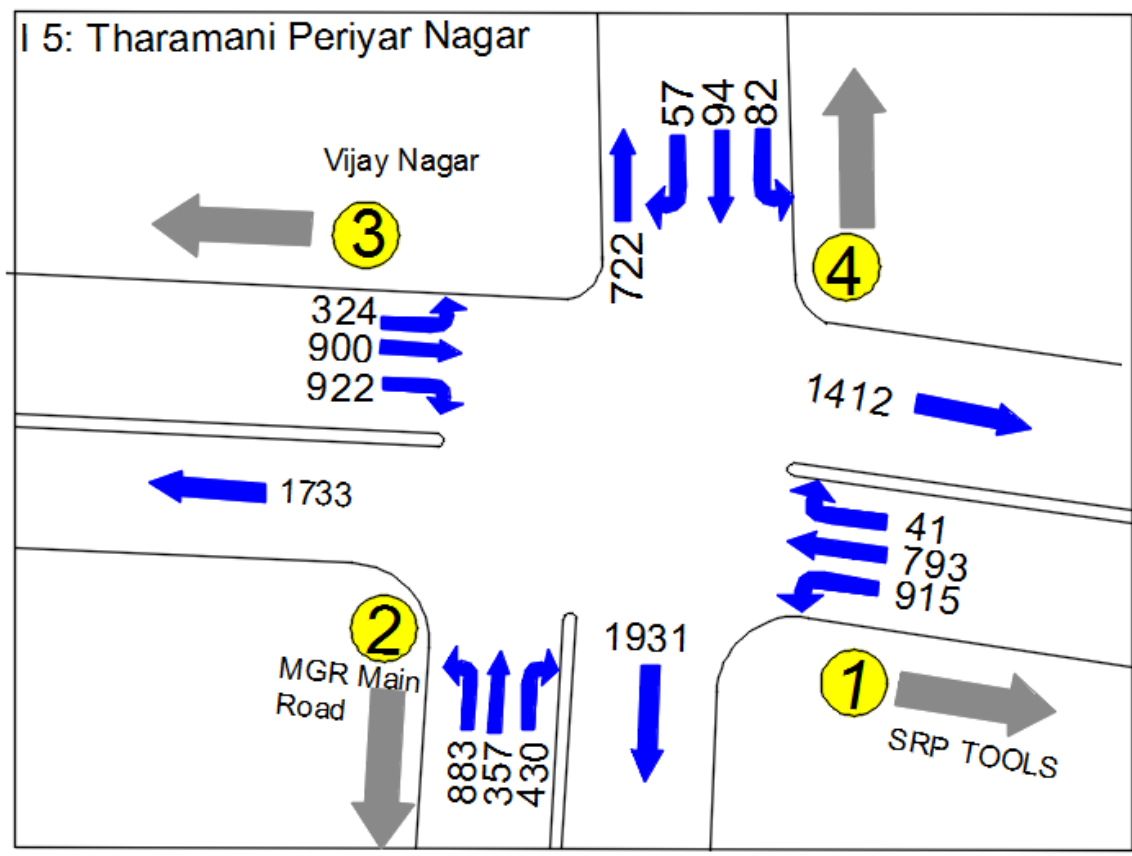
Tharamani Periyar Nagar Intersection: 25/08/2014 Morning 09.00 am to 10.00 am



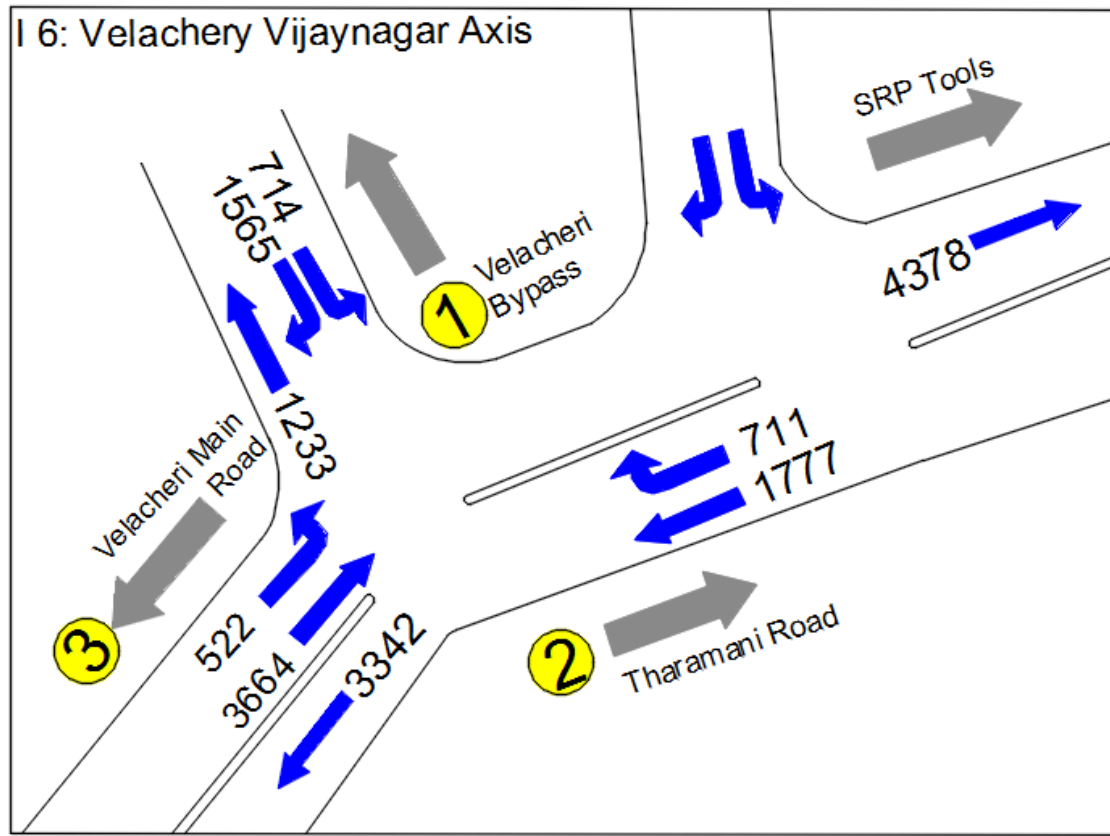
Tharamani Periyar Nagar Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm



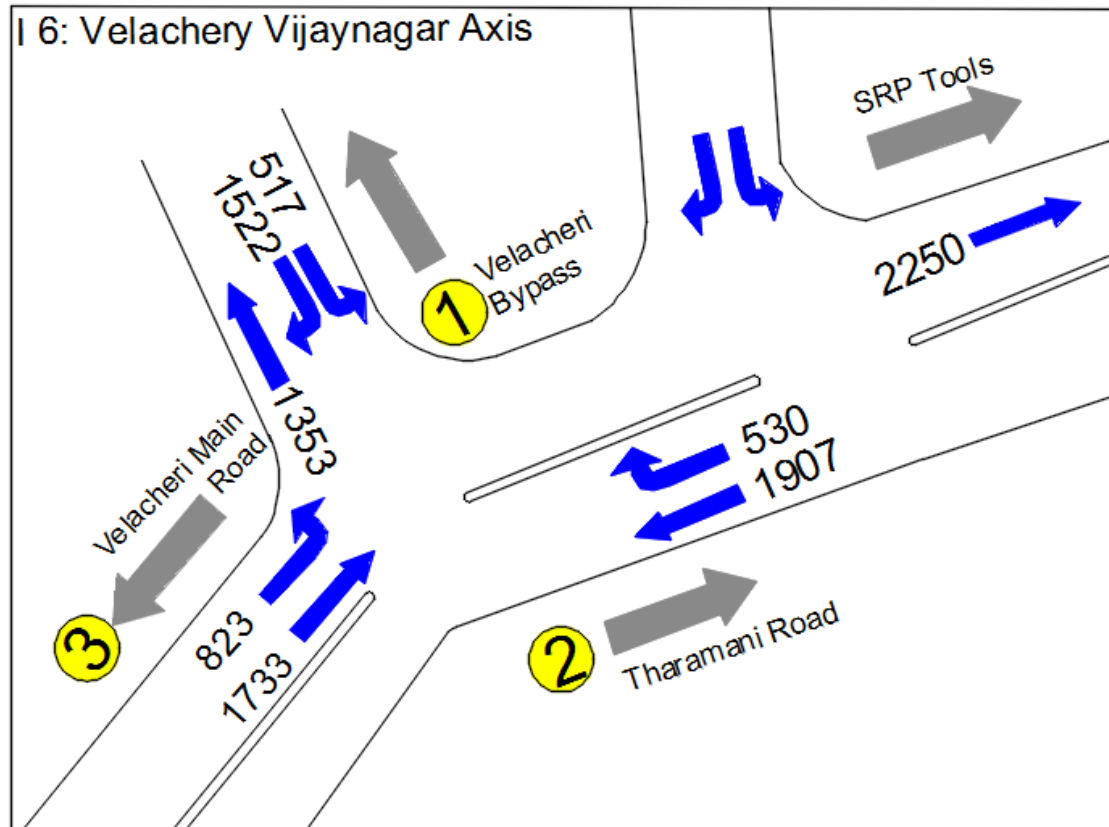
Tharamani Periyar Nagar Intersection: 27/08/2014 Morning 09.00 am to 10.00 am



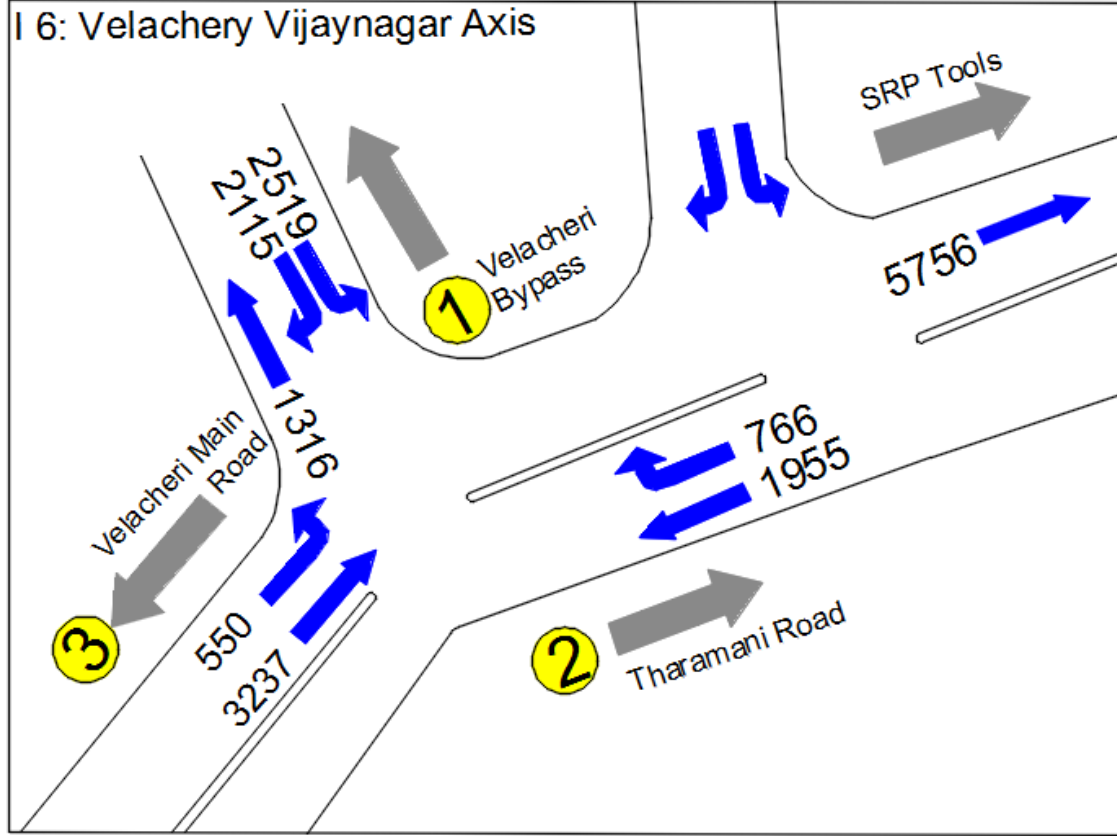
Tharamani Periyar Nagar Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm



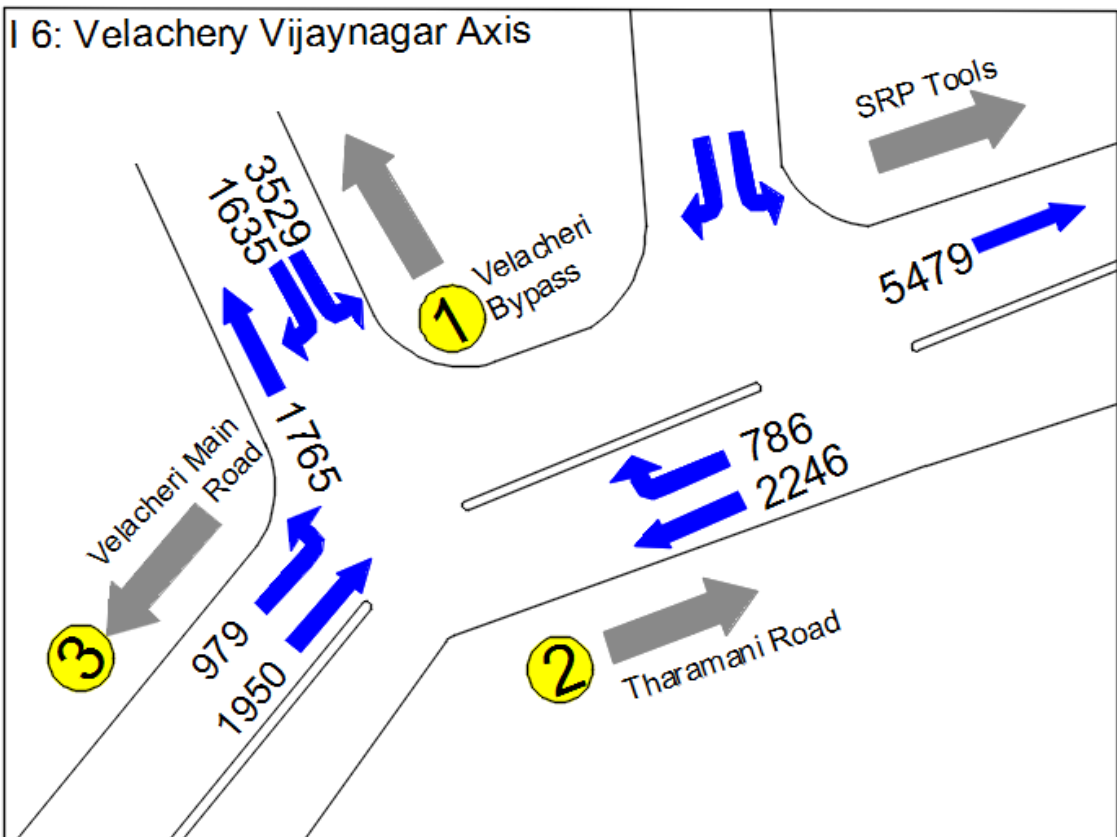
Velachery Vijaynagar Axis Intersection: 25/08/2014 Morning 09.00 am to 10.00 am



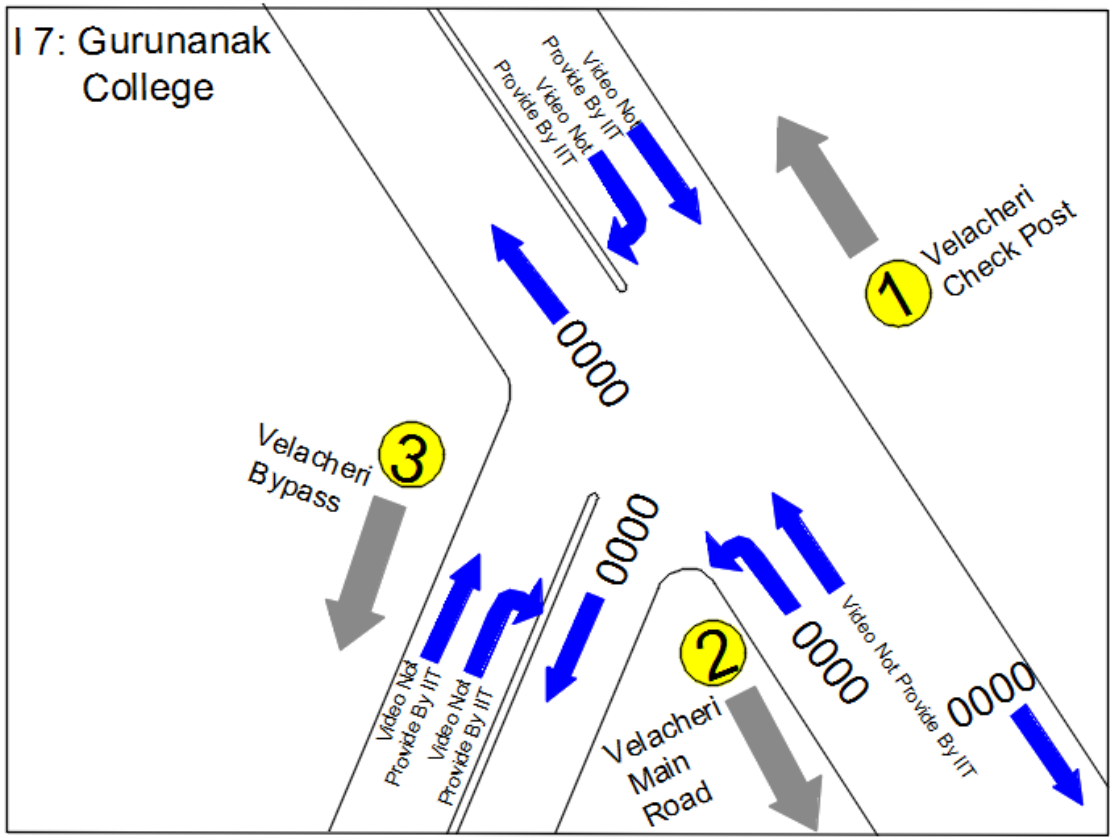
Velachery Vijaynagar Axis Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm



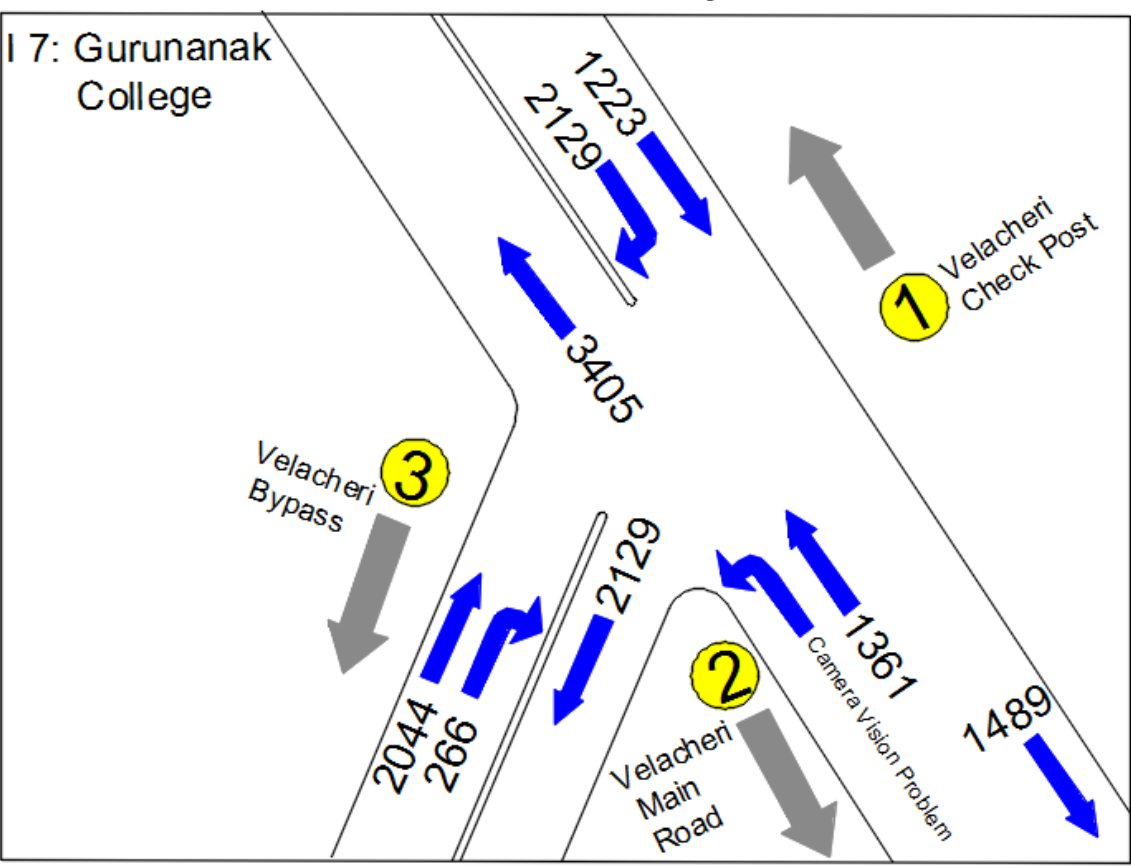
Velachery Vijaynagar Axis Intersection: 27/08/2014 Morning 09.00 am to 10.00 am



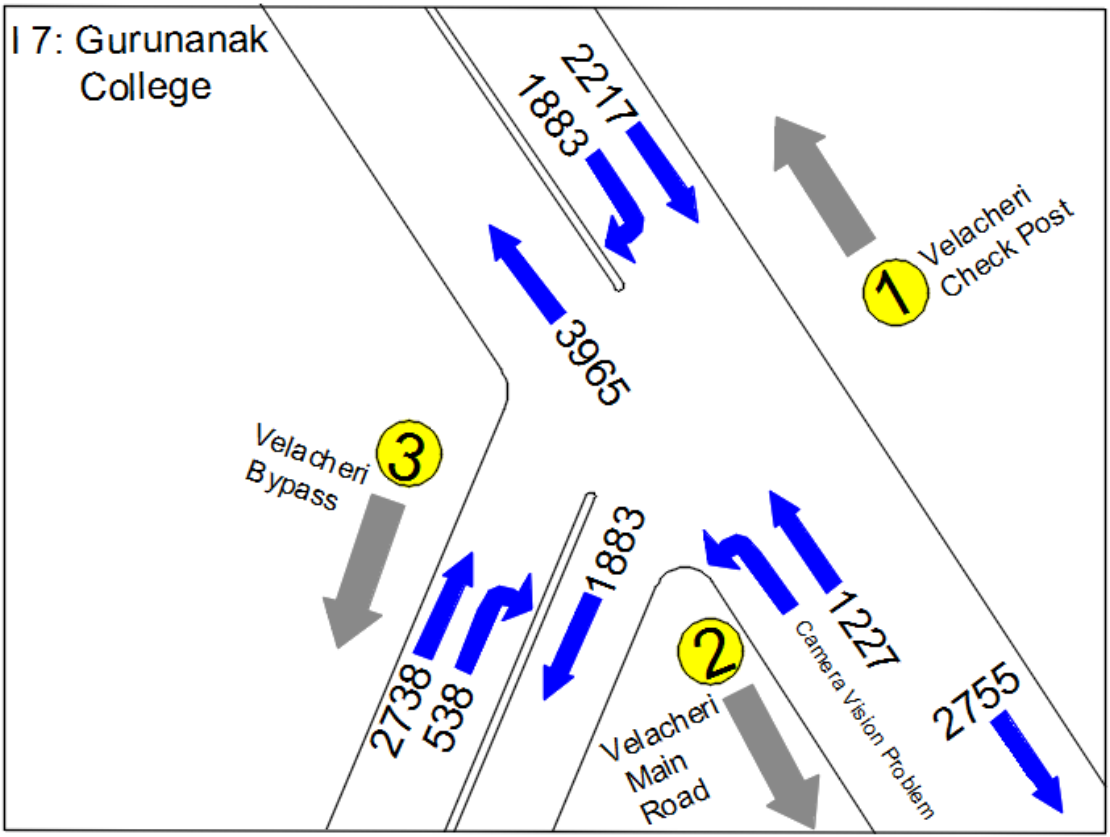
Velachery Vijaynagar Axis Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm



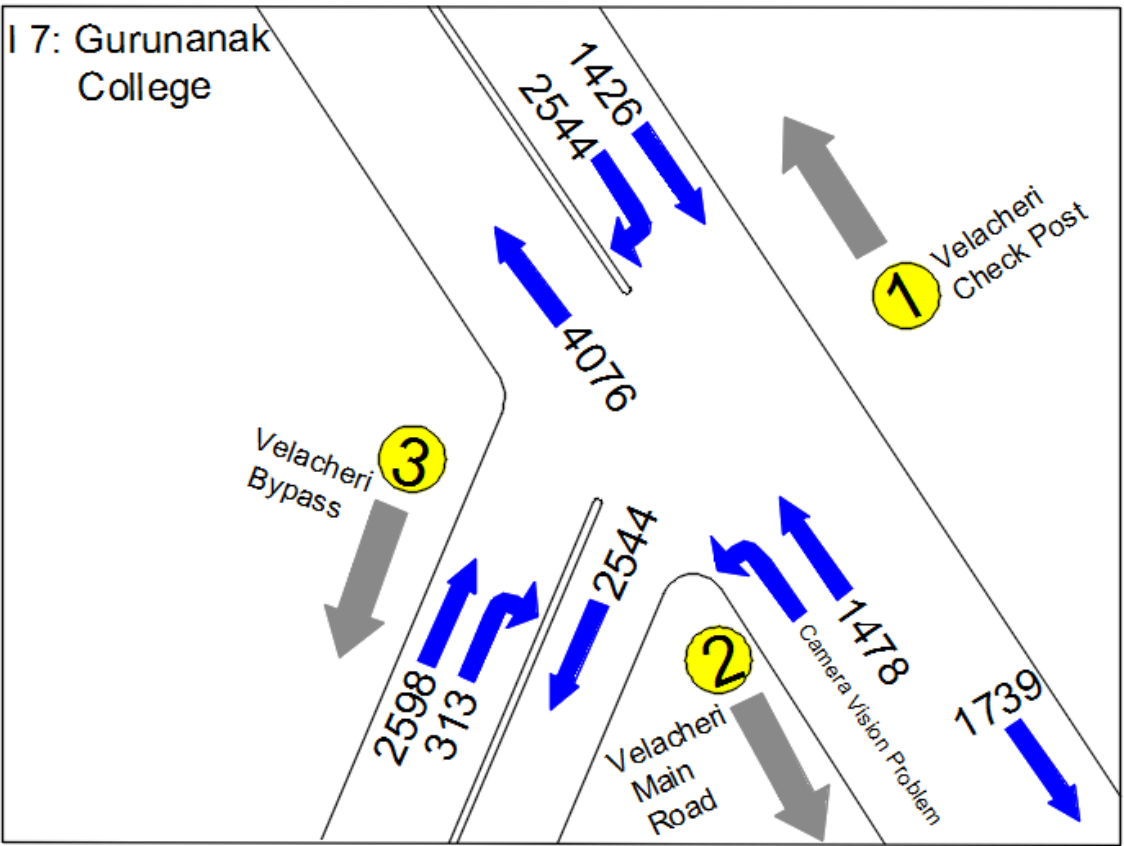
Gurunanak Intersection: 25/08/2014 Morning 09.00 am to 10.00 am



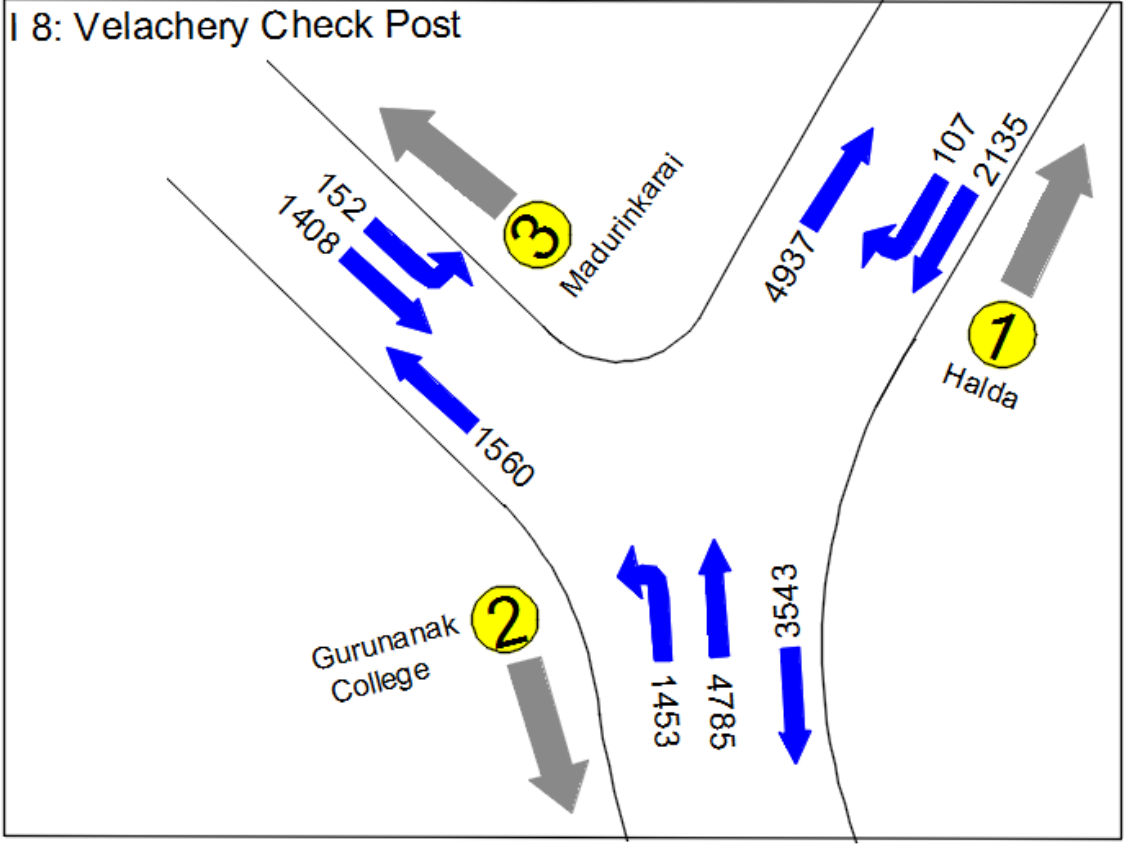
Gurunanak Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm



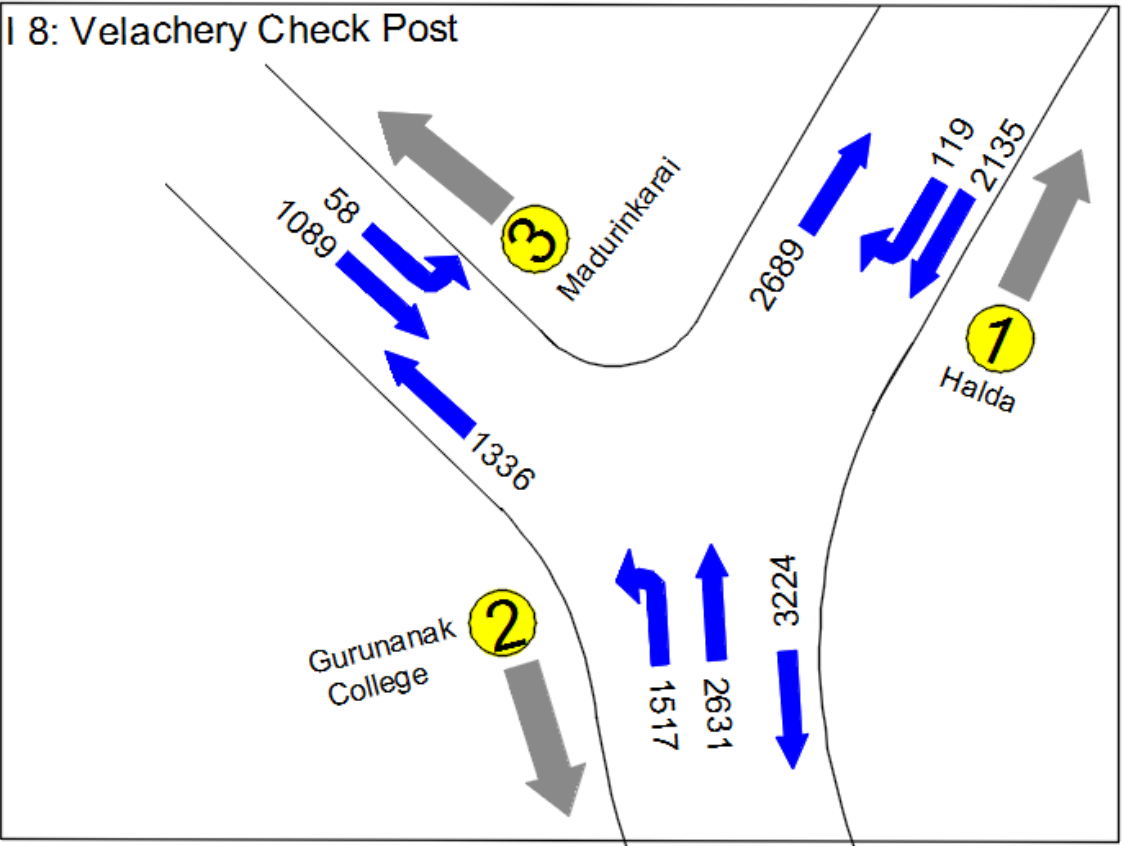
Gurunanak Intersection: 27/08/2014 Morning 09.00 am to 10.00 am



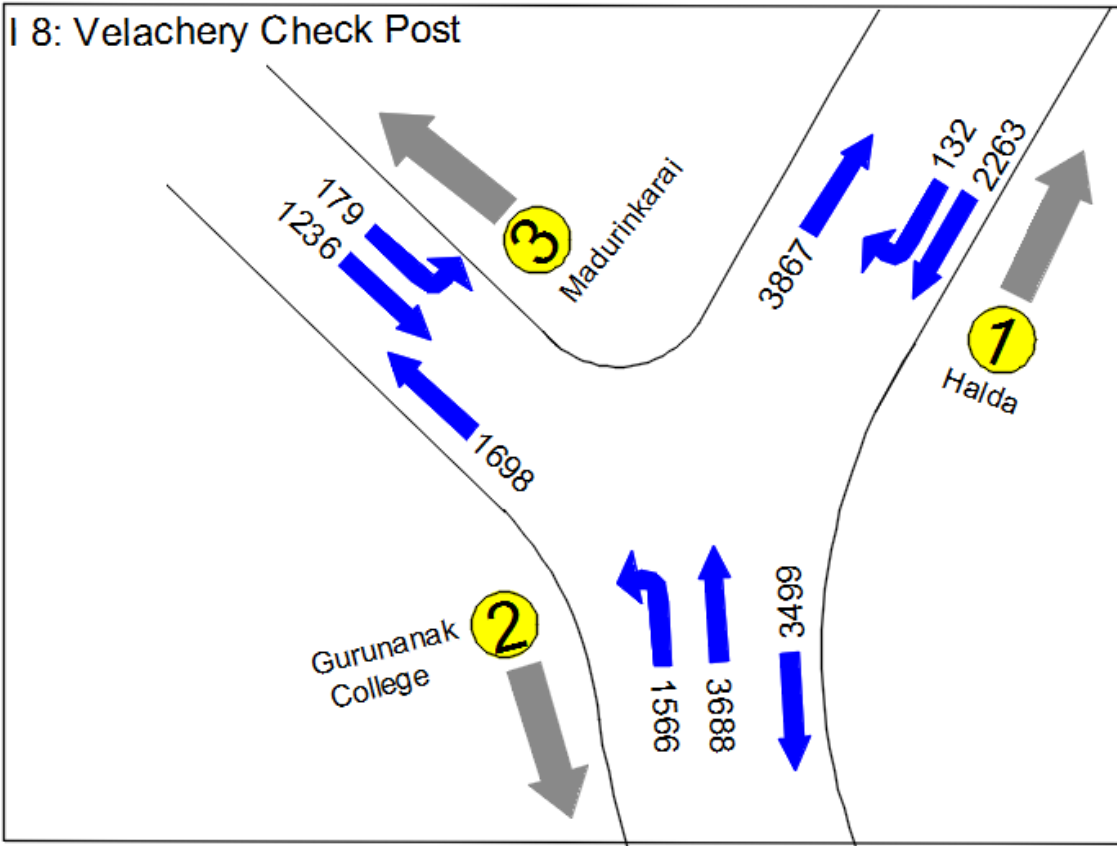
Gurunanak Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm



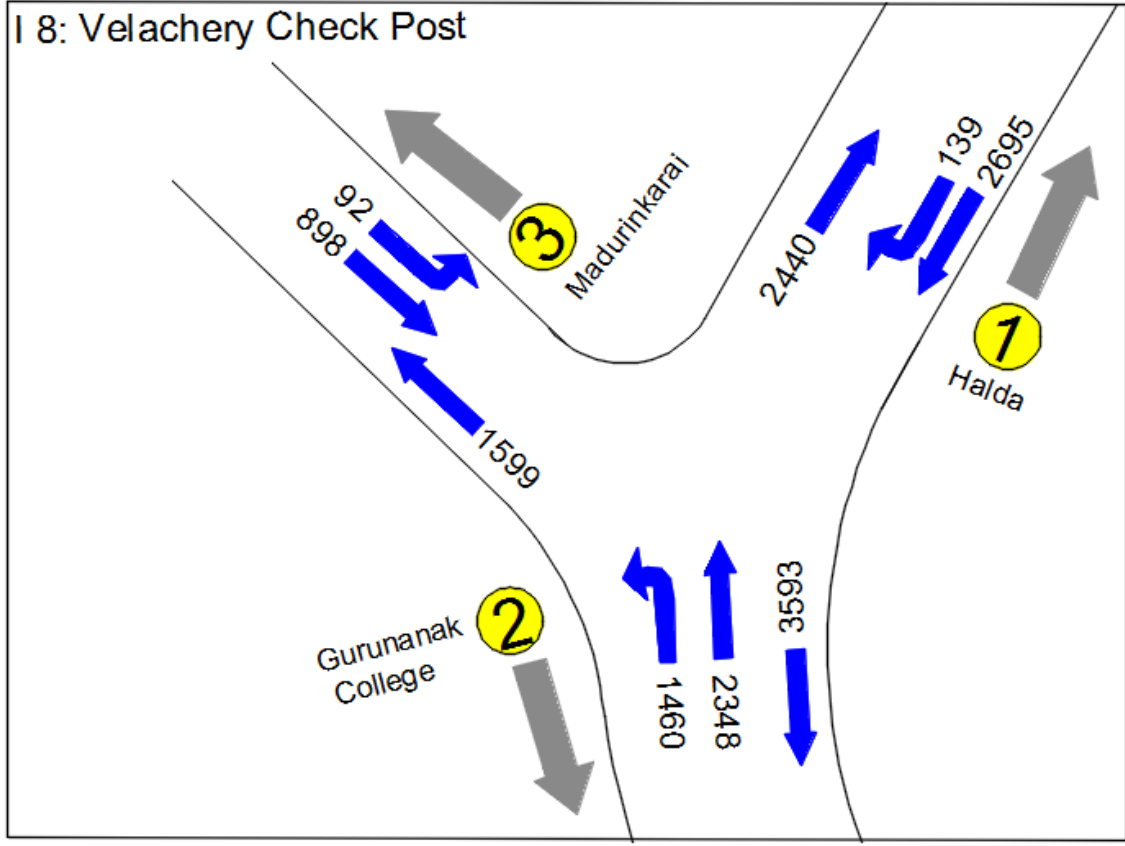
Velachery Check Post Intersection: 25/08/2014 Morning 09.00 am to 10.00 am



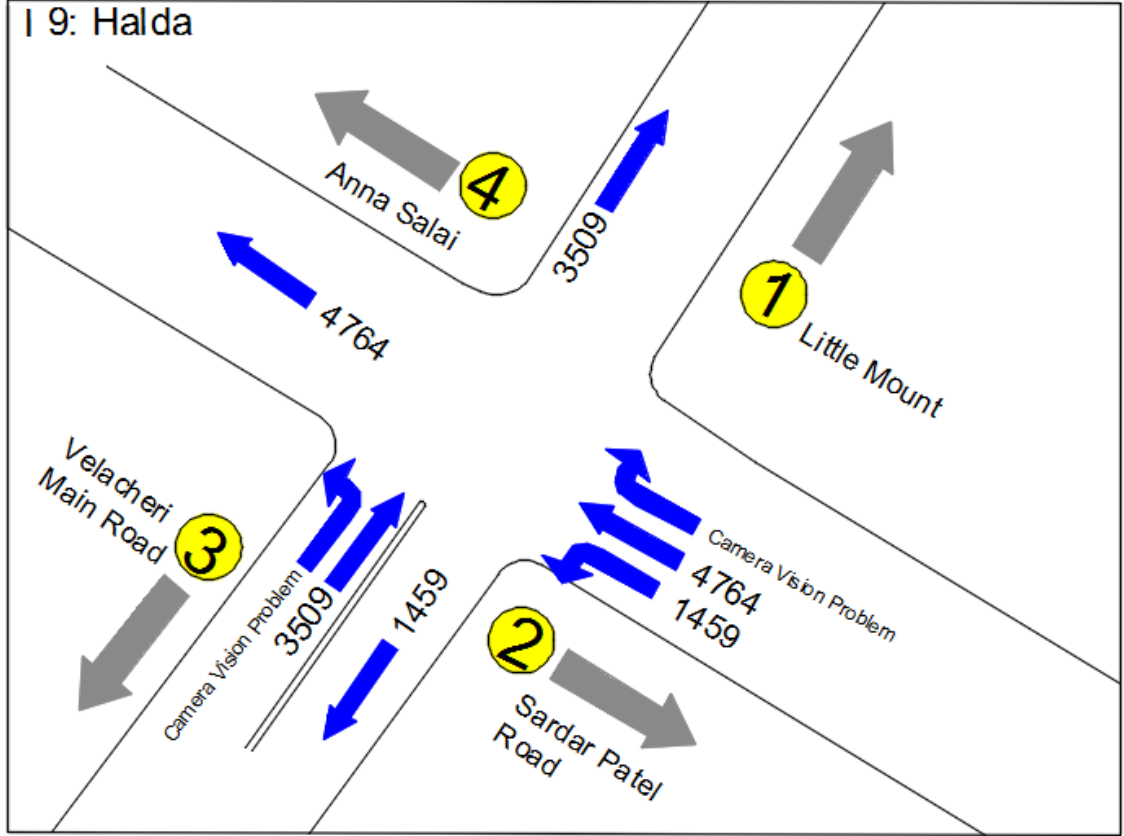
Velachery Check Post Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm



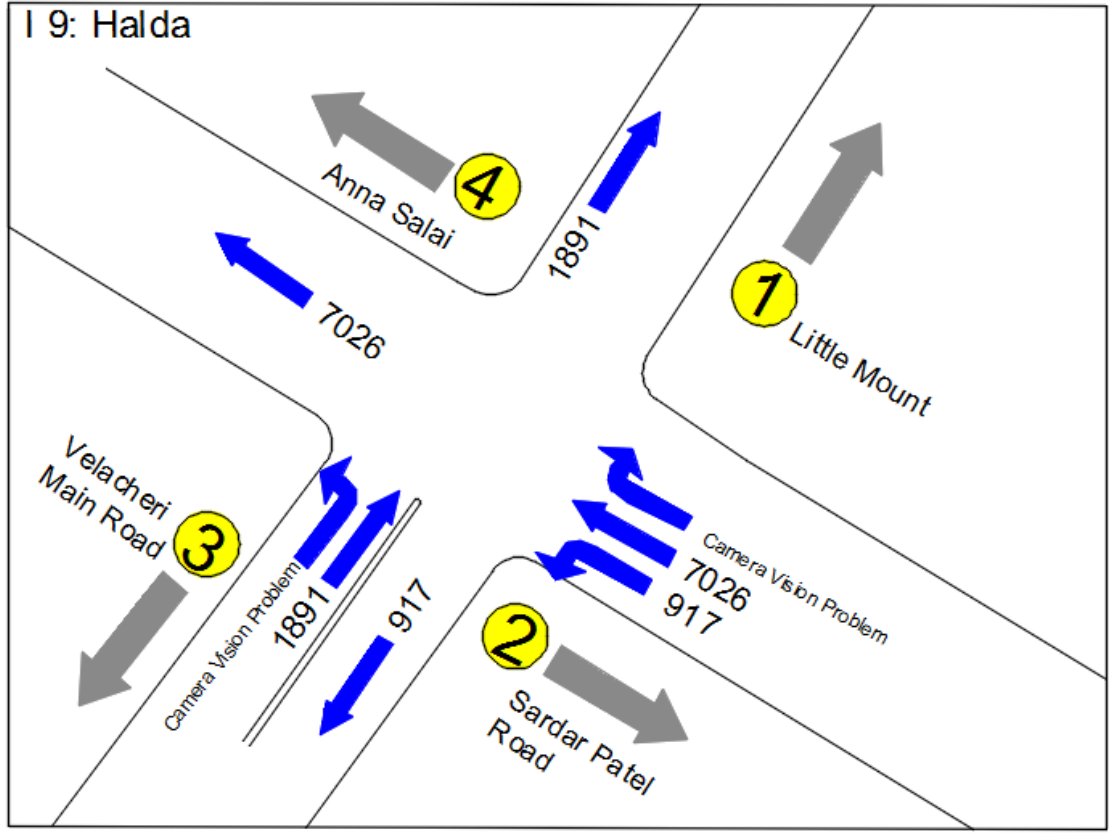
Velachery Check Post Intersection: 27/08/2014 Morning 09.00 am to 10.00 am



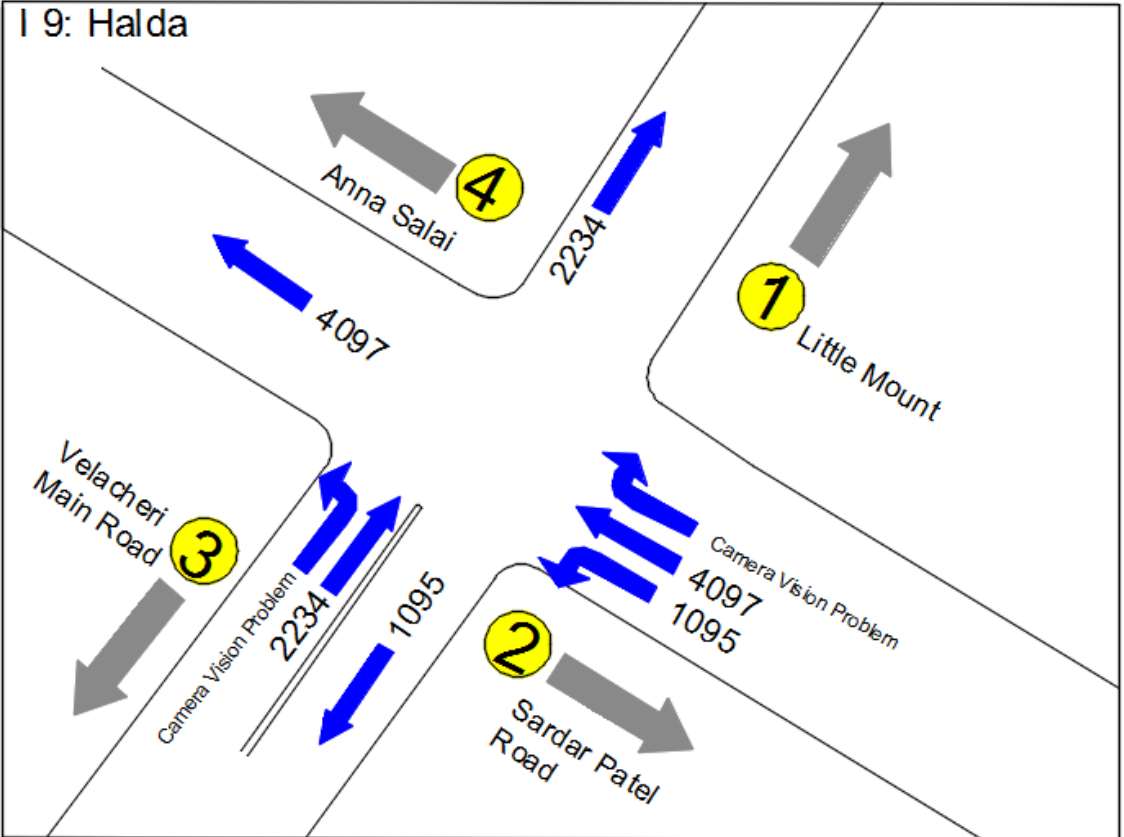
Velachery Check Post Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm



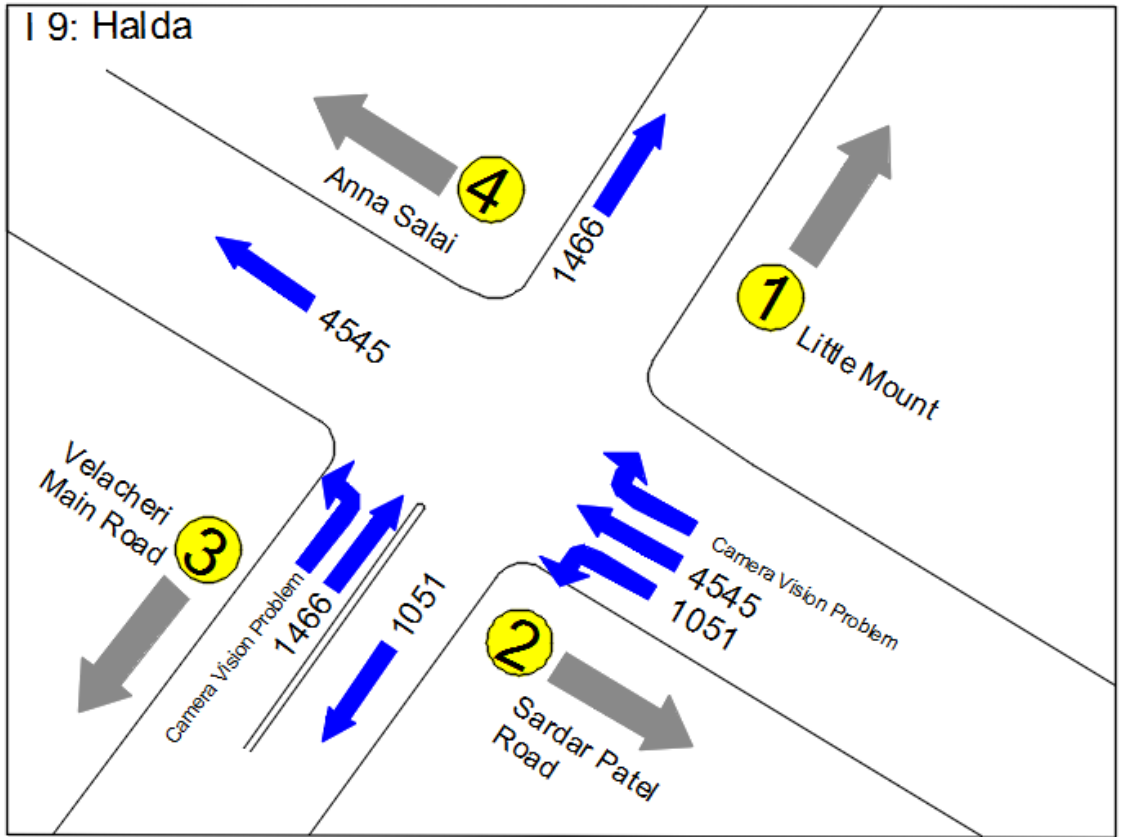
Halda Intersection: 25/08/2014 Morning 09.00 am to 10.00 am



Halda Intersection: 25/08/2014 Evening 05.00 pm to 06.00 pm








Halda Intersection: 27/08/2014 Morning 09.00 am to 10.00 am








Halda Intersection: 27/08/2014 Evening 05.00 pm to 06.00 pm






Annexure 2.3 (a): M1_Taluk Office Road

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
1	M1: Taluka office Road / Little Mount Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	1833	263	1560	115	145	3916	3347
				DN	One Way						
			Afternoon 01.00 pm to 02.00 pm	UP	1927	274	1404	93	176	3874	3309
				DN	One Way						
			Evening 05.00 pm to 06.00 pm	UP	2700	426	1888	208	203	5425	4585
				DN	One Way						
		25/08/2014	Morning 09.00 am to 10.00 am	UP	1548	148	1077	92	54	2919	2299
				DN	One Way						
			Afternoon 01.00 pm to 02.00 pm	UP	1860	256	2084	196	512	4908	5100
				DN	One Way						
			Evening 05.00 pm to 06.00 pm	UP	2669	356	2073	189	423	5710	5316
				DN	One Way						
		27/08/2014	Morning 09.00 am to 10.00 am	UP	1195	115	788	78	68	2244	1822
				DN	One Way						
			Afternoon 01.00 pm to 02.00 pm	UP	1566	151	1119	102	63	3001	2395
				DN	One Way						
			Evening 05.00 pm to 06.00 pm	UP	2762	429	1906	203	202	5502	4627
				DN	One Way						






Annexure 2.3 (b): M2_Sardar Patel Road_Dote Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)			
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)					
					0.5	1	1	1.5	3					
2	M2: Sardar Patel Road/Dote Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	1882	253	926	99	120	3280	2629			
				DN	1192	195	878	63	133	2461	2163			
			Afternoon 01.00 pm to 02.00 pm	UP	1779	217	1231	98	102	3427	2791			
				DN	1553	235	1129	35	131	3083	2586			
			Evening 05.00 pm to 06.00 pm	UP	1782	237	1296	78	119	3512	2898			
				DN	1354	200	1417	53	119	3143	2731			
		25/08/2014	Morning 09.00 am to 10.00 am	UP	Camera Vision problems									
				DN	2173	237	1557	36	116	4119	3283			
			Afternoon 01.00 pm to 02.00 pm	UP	Camera Vision problems									
				DN	1553	235	1129	35	131	3083	2586			
			Evening 05.00 pm to 06.00 pm	UP	Camera Vision problems									
				DN	1739	237	1293	112	192	3573	3144			
		27/08/2014	Morning 09.00 am to 10.00 am	UP	Camera Vision problems									
				DN	485	51	309	39	53	937	820			
			Afternoon 01.00 pm to 02.00 pm	UP	Camera Vision problems									
				DN	1551	274	950	96	129	3000	2531			
			Evening 05.00 pm to 06.00 pm	UP	Camera Vision problems									
				DN	1716	258	974	98	130	3176	2627			






Annexure 2.3 (c): M3_Sardar patel Road_Hot Chips

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
3	M3: Sardar Patel Road/Hot Chips	24/08/2014	Morning 09.00 am to 10.00 am	UP	1879	502	1463	190	108	4142	3514
				DN	1944	283	1438	91	182	3938	3376
			Afternoon 01.00 pm to 02.00 pm	UP	2536	311	1924	130	108	5009	4022
				DN	2003	287	1710	110	182	4292	3710
			Evening 05.00 pm to 06.00 pm	UP	162	330	2022	79	84	2677	2804
				DN	2153	294	1785	85	122	4439	3649
		25/08/2014	Morning 09.00 am to 10.00 am	UP	2003	287	1710	110	158	4268	3638
				DN	2959	434	2171	88	168	5820	4721
			Afternoon 01.00 pm to 02.00 pm	UP	2106	348	1498	248	216	4416	3919
				DN	3028	459	2119	216	215	6037	5061
			Evening 05.00 pm to 06.00 pm	UP	2036	357	1698	237	208	4536	4053
				DN	3034	357	2238	209	204	6042	5038
		27/08/2014	Morning 09.00 am to 10.00 am	UP	3908	464	1909	239	224	6744	5358
				DN	4192	476	2510	160	128	7466	5706
			Afternoon 01.00 pm to 02.00 pm	UP	1830	405	1658	312	197	4402	4037
				DN	2896	391	2141	219	353	6000	5368
			Evening 05.00 pm to 06.00 pm	UP	1940	312	1515	283	200	4250	3822
				DN	1718	218	2043	602	169	4750	4530






Annexure 2.3 (d): M4: Canal Bank Road (West)/Indra Nagar_Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)		
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)				
					0.5	1	1	1.5	3				
4	M4: Canal Bank Road (West)/Indra Nagar_Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	1231	116	802	74	72	2295	1861		
				DN	1012	103	674	77	57	1923	1570		
			Afternoon 01.00 pm to 02.00 pm	UP	1389	135	1010	87	50	2671	2120		
				DN	1075	92	866	69	68	2170	1803		
			Evening 05.00 pm to 06.00 pm	UP	1403	129	1126	60	50	2768	2197		
				DN	1106	104	950	63	46	2269	1840		
		25/08/2014	Morning 09.00 am to 10.00 am	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
			Afternoon 01.00 pm to 02.00 pm	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
			Evening 05.00 pm to 06.00 pm	UP	1655	180	1143	149	79	3206	2611		
				DN	1587	143	1125	144	86	3085	2536		
		27/08/2014	Morning 09.00 am to 10.00 am	UP	1521	141	972	81	85	2800	2250		
				DN	1672	179	852	67	54	2824	2130		
			Afternoon 01.00 pm to 02.00 pm	UP	1557	156	1129	107	60	3009	2404		
				DN	1334	179	963	154	88	2718	2304		
			Evening 05.00 pm to 06.00 pm	UP	1231	120	996	52	43	2442	1939		
				DN	1747	151	1014	146	101	3159	2561		






Annexure 2.3 (e): M5: Canal Bank Road (West)/NIFT_Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van, Tempo Traveler) Ambulance	HMV (Buses, Trucks, Army Truck, Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
5	M5: Canal Bank Road (West)/NIFT_Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	961	117	588	92	76	1834	1552
				DN	Camera Vision problems						
			Afternoon 01.00 pm to 02.00 pm	UP	1136	141	745	82	73	2177	1796
				DN	Camera Vision problems						
			Evening 05.00 pm to 06.00 pm	UP	1077	125	872	76	62	2212	1836
				DN	Camera Vision problems						
		25/08/2014	Morning 09.00 am to 10.00 am	UP	Video data not provided by IIT						
				DN	Video data not provided by IIT						
			Afternoon 01.00 pm to 02.00 pm	UP	1165	143	650	182	65	2205	1844
				DN	Camera Vision problems						
			Evening 05.00 pm to 06.00 pm	UP	1547	206	975	185	129	3042	2619
				DN	Camera Vision problems						
		27/08/2014	Morning 09.00 am to 10.00 am	UP	1970	336	965	59	80	3410	2615
				DN	Camera Vision problems						
			Afternoon 01.00 pm to 02.00 pm	UP	838	120	524	121	62	1665	1431
				DN	Camera Vision problems						
			Evening 05.00 pm to 06.00 pm	UP	1641	185	989	183	113	3111	2608
				DN	Camera Vision problems						






Annexure 2.3 (f) : M8: Tharamani Road/TCS_Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
6	M8: Tharamani Road/TCS_Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	1206	101	386	59	63	1815	1368
				DN	1130	104	351	55	77	1717	1334
			Afternoon 01.00 pm to 02.00 pm	UP	1281	140	547	51	65	2084	1599
				DN	1193	102	507	74	69	1945	1524
			Evening 05.00 pm to 06.00 pm	UP	1331	96	665	48	64	2204	1691
				DN	1137	111	537	50	61	1896	1475
		25/08/2014	Morning 09.00 am to 10.00 am	UP	185	20	95	5	15	320	260
				DN	80	11	39	2	6	138	111
			Afternoon 01.00 pm to 02.00 pm	UP	1734	198	721	89	140	2882	2340
				DN	1408	176	512	119	118	2333	1925
			Evening 05.00 pm to 06.00 pm	UP	1108	137	553	75	186	2059	1915
				DN	1767	126	913	78	171	3055	2553
		27/08/2014	Morning 09.00 am to 10.00 am	UP	4070	311	1379	55	107	5922	4129
				DN	1383	294	471	61	120	2329	1908
			Afternoon 01.00 pm to 02.00 pm	UP	1834	152	856	105	147	3094	2524
				DN	1379	151	517	118	128	2293	1919
			Evening 05.00 pm to 06.00 pm	UP	1412	140	591	101	180	2424	2129
				DN	2020	198	919	85	188	3410	2819






Annexure 2.3 (g): M9: Velachery Main Road/Mc Rennett_Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No.)	Total Vehicles (PCU)		
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)				
					0.5	1	1	1.5	3				
7	M9: Velachery Main Road/Mc Rennett_Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	496	60	109	89	81	835	794		
				DN	511	72	120	20	80	803	718		
			Afternoon 01.00 pm to 02.00 pm	UP	615	77	148	61	71	972	837		
				DN	645	80	175	31	64	995	816		
			Evening 05.00 pm to 06.00 pm	UP	673	89	176	19	64	1021	822		
				DN	646	78	127	27	81	959	812		
		25/08/2014	Morning 09.00 am to 10.00 am	UP	598	97	165	81	45	986	818		
				DN	625	116	148	85	96	1070	992		
			Afternoon 01.00 pm to 02.00 pm	UP	607	102	200	109	75	1093	994		
				DN	540	86	109	68	76	879	795		
			Evening 05.00 pm to 06.00 pm	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
		27/08/2014	Morning 09.00 am to 10.00 am	UP	504	85	151	63	56	859	751		
				DN	612	97	153	69	79	1010	897		
			Afternoon 01.00 pm to 02.00 pm	UP	117	23	26	28	13	207	189		
				DN	555	94	144	52	84	929	846		
			Evening 05.00 pm to 06.00 pm	UP	647	109	177	117	87	1137	1046		
				DN	458	97	129	58	111	853	875		






Annexure 2.3 (h): M10: Velachery Main Road/Pheonixmall

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)		
					0.5	1	1	1.5	3		
8	M10: Velachery Main Road/Pheonixmall	24/08/2014	Morning 09.00 am to 10.00 am	UP	2131	289	660	92	107	3279	2474
				DN	1754	207	545	75	104	2685	2054
			Afternoon 01.00 pm to 02.00 pm	UP	2268	201	715	180	220	3584	2980
				DN	2124	392	902	70	101	3589	2764
			Evening 05.00 pm to 06.00 pm	UP	1885	350	903	65	93	3296	2572
				DN	2044	316	869	43	89	3361	2539
		25/08/2014	Morning 09.00 am to 10.00 am	UP	2188	243	1054	89	218	3792	3179
				DN	3260	316	914	113	91	4694	3303
			Afternoon 01.00 pm to 02.00 pm	UP	2348	311	877	166	152	3854	3067
				DN	2295	293	785	172	119	3664	2841
			Evening 05.00 pm to 06.00 pm	UP	2441	335	1010	198	244	4228	3595
				DN	2490	334	930	142	147	4043	3163
		27/08/2014	Morning 09.00 am to 10.00 am	UP	1829	182	1235	73	271	3590	3254
				DN	3459	315	934	111	122	4941	3511
			Afternoon 01.00 pm to 02.00 pm	UP	1685	123	1079	66	205	3158	2759
				DN	2291	335	946	165	99	3836	2971
			Evening 05.00 pm to 06.00 pm	UP	1927	159	1208	67	263	3624	3220
				DN	2591	415	1011	131	159	4307	3395






Annexure 2.3 (i): M11: Velachery Main Road/ Blue Cross_Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)		
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)				
					0.5	1	1	1.5	3				
9	M11: Velachery Main Road/ Blue Cross_Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	705	83	237	154	78	1257	1138		
				DN	1027	178	418	72	25	1720	1293		
			Afternoon 01.00 pm to 02.00 pm	UP	1046	210	613	50	67	1986	1622		
				DN	786	201	617	56	20	1680	1355		
			Evening 05.00 pm to 06.00 pm	UP	1317	167	607	45	75	2211	1725		
				DN	1025	177	593	53	21	1869	1425		
		25/08/2014	Morning 09.00 am to 10.00 am	UP	2506	353	823	70	70	3822	2744		
				DN	1153	191	509	62	62	1977	1556		
			Afternoon 01.00 pm to 02.00 pm	UP	786	201	617	56	20	1680	1355		
				DN	790	203	620	56	20	1689	1362		
			Evening 05.00 pm to 06.00 pm	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
		27/08/2014	Morning 09.00 am to 10.00 am	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
			Afternoon 01.00 pm to 02.00 pm	UP	1036	183	476	65	33	1793	1374		
				DN	1191	192	499	65	71	2018	1597		
			Evening 05.00 pm to 06.00 pm	UP	1463	252	639	61	58	2473	1888		
				DN	2033	258	821	50	108	3270	2495		

Annexure 2.3 (j): M13: Velachery Bypass Road / Velachery Bypass_Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)		
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van-Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)				
					0.5	1	1	1.5	3				
10	M13: Velachery Bypass Road / Velachery Bypass_Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	Bad Video Quality								
				DN	1347	143	430	68	22	2010	1415		
			Afternoon 01.00 pm to 02.00 pm	UP	Bad Video Quality								
				DN	2225	231	439	85	28	3008	1994		
			Evening 05.00 pm to 06.00 pm	UP	Bad Video Quality								
				DN	1885	247	922	75	34	3163	2326		
		25/08/2014	Morning 09.00 am to 10.00 am	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
			Afternoon 01.00 pm to 02.00 pm	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
			Evening 05.00 pm to 06.00 pm	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
		27/08/2014	Morning 09.00 am to 10.00 am	UP	Bad Video Quality								
				DN	2521	283	722	30	189	3745	2878		
			Afternoon 01.00 pm to 02.00 pm	UP	Bad Video Quality								
				DN	1862	236	819	43	150	3110	2501		
			Evening 05.00 pm to 06.00 pm	UP	Bad Video Quality								
				DN	2091	307	863	90	251	3602	3104		

Annexure 2.3 (K): M14: Sardar Patel Road / Lemon Tree Axis

Sr. No.	Mid Block Name	Date	Session	Direction						Total Vehicles (No-)	Total Vehicles (PCU)		
					Two Wheeler (all categories)	Auto-rickshaws	Car / Van/Jeep/Police Van- Jeep	LCV(Goods Van,Tempo Traveler) Ambulance	HMV (Buses,Trucks,Army Truck,Multi Axle and Tractors)				
					0.5	1	1	1.5	3				
11	M14: Sardar Patel Road / Lemon Tree Axis	24/08/2014	Morning 09.00 am to 10.00 am	UP	One Way								
				DN	1441	367	3702	145	430	6085	6297		
			Afternoon 01.00 pm to 02.00 pm	UP	One Way								
				DN	3923	609	2665	169	318	7684	6443		
			Evening 05.00 pm to 06.00 pm	UP	One Way								
				DN	1672	349	2578	178	967	5744	6931		
		25/08/2014	Morning 09.00 am to 10.00 am	UP	One Way								
				DN	4160	728	2562	308	345	8103	6867		
			Afternoon 01.00 pm to 02.00 pm	UP	One Way								
				DN	4310	756	2587	503	431	8587	7546		
			Evening 05.00 pm to 06.00 pm	UP	Video data not provided by IIT								
				DN	Video data not provided by IIT								
		27/08/2014	Morning 09.00 am to 10.00 am	UP	One Way								
				DN	3690	612	2615	164	302	7383	6224		
			Afternoon 01.00 pm to 02.00 pm	UP	One Way								
				DN	3574	663	2593	402	440	7672	6966		
			Evening 05.00 pm to 06.00 pm	UP	One Way								
				DN	3975	582	2917	303	445	8222	7276		

Annexure 2.4 (a): M1_Taluk Office Road

Mid Block M1: Taluka office Road / Little Mount Axis
Date: 25/08/2014

2919 (2299 PCU)  To Madhya Kailash (UP)

Morning 09.00 am to 10.00 am

5710 (2316 PCU)  To Madhya Kailash (UP)

Evening 05.00 pm to 06.00 pm

Mid Block M1: Taluka office Road / Little Mount Axis
Date: 27/08/2014

2244 (1822 PCU)  To Madhya Kailash (UP)

Morning 09.00 am to 10.00 am

5502 (4627 PCU)  To Madhya Kailash (UP)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (b): M2_Sardar Patel Road_Dote Axis

Mid Block M2: Sardar Patel Road/ Dote_Axis
Date: 25/08/2014

(Vision problems)  To Madhya Kailash (UP)

To Guindy (DN)  4119 (3283 PCU)

Morning 09.00 am to 10.00 am

(Vision problems)  To Madhya Kailash (UP)

To Guindy(DN)  3573 (3144 PCU)

Evening 05.00 pm to 06.00 pm

Mid Block M2: Sardar Patel Road/ Dote_Axis
Date: 27/08/2014

(Vision problems)  To Madhya Kailash (UP)

To Guindy (DN)  937 (820 PCU)

Morning 09.00 am to 10.00 am

(Vision problems)  To Madhya Kailash (UP)

To Guindy (DN)  3176 (2627 PCU)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (c): M3_Sardar Patel Road_Hot Chips

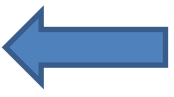
Mid Block M3: Sardar Patel Road/Hot Chips
Date: 25/08/2014

4268 (3638 PCU)  To Madhya Kailash (UP)

To Guindy (DN)  5820 (4721 PCU)

Morning 09.00 am to 10.00 am

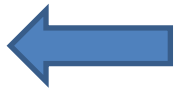
4536 (4053 PCU)  To Madhya Kailash (UP)

To Guindy (DN)  6042 (5038 PCU)

Evening 05.00 pm to 06.00 pm

Mid Block M3: Sardar Patel Road/Hot Chips
Date: 27/08/2014

6744 (5358 PCU)  To Madhya Kailash (UP)

To Guindy (DN)  7466 (5706 PCU)

Morning 09.00 am to 10.00 am


4250 (3822 PCU)  To Madhya Kailash (UP)

To Guindy (DN)  4750 (4530 PCU)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (d): M4: Canal Bank Road (West)/Indra Nagar_Axis

Mid Block M4: Canal Bank Road (West)/Indra Nagar_Axis
Date: 25/08/2014

(Video data not provided by IIT)  To SRP Tools (UP)

To Madhya Kailash (DN)  (Video data not provided by IIT)

Morning 09.00 am to 10.00 am

3206 (2611 PCU)  To SRP Tools (UP)

To Madhya Kailash (DN)  3085 (2536 PCU)

Evening 05.00 pm to 06.00 pm


Mid Block M4: Canal Bank Road (West)/Indra Nagar_Axis
Date: 27/08/2014

2800 (2250 PCU)  To SRP Tools (UP)

To Madhya Kailash (DN)  2824 (2130 PCU)

Morning 09.00 am to 10.00 am


2442 (1939 PCU)  To SRP Tools (UP)

To Madhya Kailash (DN)  3159 (2561 PCU)

Evening 05.00 pm to 06.00 pm


Annexure 2.4 (e): M5: Canal Bank Road (West)/NIFT_Axis

Mid Block M5: Canal Bank Road (West)/NIFT_Axis
Date: 25/08/2014

(Video data not provided by IIT)  To SRP Tools (UP)

To Tidal Park (DN)  (Video data not provided by IIT)


Morning 09.00 am to 10.00 am

3042 (2619 PCU)  To SRP Tools (UP)

To Tidal Park (DN)  (Vision problems)


Evening 05.00 pm to 06.00 pm

Mid Block M5: Canal Bank Road (West)/NIFT_Axis
Date: 27/08/2014

3410 (2615 PCU)  To SRP Tools (UP)

To Tidal Park (DN)  (Vision problems)

Morning 09.00 am to 10.00 am


3111 (2608 PCU)  To SRP Tools (UP)

To Tidal Park (DN)  (Vision problems)

Evening 05.00 pm to 06.00 pm


Annexure 2.4 (f) : M8: Tharamani Road/TCS_Axis

Mid Block M8: Taramani Road/TCS_Axis
Date: 25/08/2014

320 (260 PCU)  To Vijay Nagar (UP)

To SRP Tools (DN)  138 (111 PCU)


Morning 09.00 am to 10.00 am

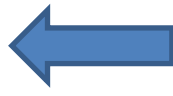
2059 (1915 PCU)  To Vijay Nagar (UP)

To SRP Tools (DN)  3055 (2553 PCU)


Evening 05.00 pm to 06.00 pm

Mid Block M8: Taramani Road/TCS_Axis
Date: 27/08/2014

5922 (4129 PCU)  To Vijay Nagar (UP)

To SRP Tools Park (DN)  2329 (1908 PCU)

Morning 09.00 am to 10.00 am

2424 (2129 PCU)  To Vijay Nagar (UP)

To SRP Tools (DN)  3410 (2819 PCU)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (g): M9: Velachery Main Road/Mc Rennett_Axis

Mid Block M9: Valachery Main Road/Mc Rennett_Axis
Date: 25/08/2014

986 (818 PCU)  To Guru Nanak College (UP)

To Vijay Nagar (DN)  1070 (992 PCU)

Morning 09.00 am to 10.00 am

(Video data not provided by IIT)  To Guru Nanak College (UP)

To Vijay Nagar (DN)  (Video data not provided by IIT)

Evening 05.00 pm to 06.00 pm

Mid Block M9: Valachery Main Road/Mc Rennett_Axis
Date: 27/08/2014

859 (751 PCU)  To Guru Nanak College (UP)

To Vijay Nagar (DN)  1010 (897 PCU)

Morning 09.00 am to 10.00 am

1137 (1046 PCU)  To Guru Nanak College (UP)

To Vijay Nagar (DN)  853 (875 PCU)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (h): M10: Valachery Main Road/Pheonixmall

Mid Block M10: Valachery Main Road/Pheonixmal
Date: 25/08/2014

3792 (3179 PCU)  To Check Post (UP)

To Guru Nanak College (DN)  4694 (3303 PCU)

Morning 09.00 am to 10.00 am

4228 (3595 PCU)  To Check Post (UP)

To Guru Nanak College (DN)  4043 (3163 PCU)

Evening 05.00 pm to 06.00 pm

Mid Block M10: Valachery Main Road/Pheonixmal
Date: 27/08/2014

3590 (3254 PCU)  To Check Post (UP)

To Guru Nanak College (DN)  4941 (3511 PCU)

Morning 09.00 am to 10.00 am


3624 (3220 PCU)  To Check Post (UP)

To Guru Nanak College (DN)  4307 (3395 PCU)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (i): M11: Velachery Main Road/ Blue Cross_Axis

Mid Block M11: Valachery Main Road/ Blue Cross_Axis
Date: 25/08/2014

3822 (2744 PCU)  **To Halda (UP)**

To Guru Nanak College (DN)  **1977 (1556 PCU)**


Morning 09.00 am to 10.00 am

(Video data not provided by IIT)  **To Halda (UP)**

To Guru Nanak College (DN)  **(Video data not provided by IIT)**

Evening 05.00 pm to 06.00 pm

Mid Block M11: Valachery Main Road/ Blue Cross_Axis
Date: 27/08/2014

(Video data not provided by IIT)  **To Halda (UP)**

To Guru Nanak College (DN)  **(Video data not provided by IIT)**

Morning 09.00 am to 10.00 am

2473 (1888 PCU)  **To Halda (UP)**

To Guru Nanak College (DN)  **3270 (2495 PCU)**

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (j): M13: Velachery Bypass Road / Velachery Bypass_Axis

Mid Block M13: Velachery Bypass Road / Velachery Bypass_Axis

Date: 25/08/2014

(Video data not provided by IIT)



**To Guru Nanak College
(UP)**

To Vijay Nagar (DN)



(Video data not provided by IIT)

Morning 09.00 am to 10.00 am

(Video data not provided by IIT)



**To Guru Nanak College
(UP)**

To Vijay Nagar (DN)



(Video data not provided by IIT)

Evening 05.00 pm to 06.00 pm

Mid Block M13: Velachery Bypass Road / Velachery Bypass_Axis

Date: 27/08/2014

(Bed Video Quality)



**To Guru Nanak College
(UP)**

To Vijay Nagar (DN)



3745 (2878 PCU)

Morning 09.00 am to 10.00 am

(Bed Video Quality)



**To Guru Nanak College
(UP)**

To Vijay Nagar (DN)



3602 (3104 PCU)

Evening 05.00 pm to 06.00 pm

Annexure 2.4 (k): M14: Sardar Patel Road / Lemon Tree Axis

Mid Block M14: Sardar Patel Road / Lemon Tree Axis

Date: 25/08/2014

To Ashok Leyland Limited
(DN)



8103 (6867 PCU)

Morning 09.00 am to 10.00 am

To Ashok Leyland Limited
(DN)



(Video data not provided by IIT)

Evening 05.00 pm to 06.00 pm

Mid Block M14: Sardar Patel Road / Lemon Tree Axis

Date: 27/08/2014

To Ashok Leyland Limited
(DN)



7383 (6224 PCU)

Morning 09.00 am to 10.00 am

To Ashok Leyland Limited
(DN)



8222 (7276 PCU)

Evening 05.00 pm to 06.00 pm

www.translinkinfra.com



TRANSLINK

INFRASTRUCTURE CONSULTANTS (P) LTD.

Bridging Channels for Growth

**210 - Atlantis Enclave, Opp. Maruti rowhouse
Subhash Chowk, Memnagar**

Ahmedabad – 380052

Phone: +91 79 40307308 Fax: +91 79 40098694

Email: info@translinkinfra.com

Web: www.translinkinfra.com