CHAPTER 0

Executive Summary

0. Executive Summary

0.1 Introduction

1. The Coastal area Puducherry region, also known as Pondicherry, is the capital of the Union Territory (UT) of Puducherry, India and is located at 11.93°N, 79.13°E along the Malabar Coast, at 162 kms south of Chennai, the capital of Tamil Nadu. It is surrounded by Bay of Bengal on east and South Arcot district of Tamil Nadu on other three sides. It is one of the fastest growing cities at present. Puducherry, over period of past two decades, has witnessed more-than-anticipated growth in population, urban sprawl, vehicle ownership, traffic volume and economy. Increasing traffic has resulted in congestion, delays, rise in accidents and pollution levels, etc. which pose potential threat to the economic vitality and productive efficiency of the city.
2. Puducherry is one of the major tourism destination center in south India. It has one of the oldest Ports in the world. Puducherry region which is the scattered section of land consisting of 4 taluks (Puducherry, Ozhukarai, Villianur and Bahour), 2 municipalities (Puducherry and Ozhukarai), 5 communes (Ariyankuppam, Villianur, Mannadipet, Bahour, Nettapakkam) and 3 census towns (Ariyankuppam, Manavely, Villianur). Puducherry is served by four main roads which connects to Chennai, Tindivanam, Villupuram and Cuddalore. It is also the terminal of the railway line which connects Puducherry with Southern Railway broad gauge system. The city connected with Chennai through East Coast Road (ECR) and NH 66, Villupuram by NH 45A and Cuddalore by NH 45A.
3. Puducherry city municipality came in to existence during the year 1975 under the Pondicherry Municipalities Act. Apart from the Puducherry municipality, Ozhukarai Commune Panchayat was upgraded to municipality with effect from 14th January 1994. The setup for Puducherry region of 4 taluks, 2 municipalities, 5 communes and 3 census towns with a total area of 293 sq.km is the study area for the present study.
4. With this background, it is proposed to prepare Comprehensive Mobility Plan (CMP) in detail for Puducherry Region with the area of 293 sq. km with 9.50 lakhs population. The CMP will guide urban development requirement in future and will identify transport infrastructure improvement projects to achieve sustainable development. The CMP study, apart from formulating future roadmap for transport infrastructure improvement for the study area, it will also include an identified transport investment program & development strategy for short, medium and long term horizon.

0.2 Vision

1. Developing Puducherry as Healthy & Livable city providing its inhabitants Safe, Accessible, Affordable, Environmental friendly Transport system to cater their social, economic and resource needs resulting in:
   - Increasing Mobility and Accessibility
   - Improving Environmental Quality of City
   - Improving Road Safety

- Developing Cost Effective Transport System
- Social inclusion

0.3 Data Collection and Analysis

1. Traffic surveys and studies are an integral component of a Comprehensive Mobility Plan Study. Appreciation of existing traffic and travel characteristics is extremely important for developing comprehensive mobility plan. Comprehensive traffic and transport surveys were carried out along with secondary data collection from November 2014 to December 2014
2. Information compiled from secondary sources was updated through primary surveys to assess the existing traffic conditions. The surveys include classified traffic volume counts, turning movement counts at junctions, origin-destination, parking, household survey, road network inventory etc. The locations for each survey have been selected on the basis of site reconnaissance survey. It is ensured that the total volume of data captured through various surveys at the selected spots would be representative of the traffic and travel characteristics of Puducherry region as a whole.
3. After the details surveys conducted, several parameters defining the traffic and travel pattern of the study area for the base year were established. Important observations from the survey analyses are given hereunder:
   - The traffic volume counts were conducted for continuous 24 hours on a normal weekday at 8 outer cordon locations and for 1 hour for 1 outer cordon location to note the traffic volume entering and leaving Puducherry. At location Suthukeny, as the settlement character is rural in nature and when found only local trips were made, the survey was conducted only for the morning peak. Among the outer cordon (OC) locations, maximum traffic in a day was recorded near Gorimedu Check Post (OC2) with 32,205 vehicles (26,369 PCUs). The lowest volume was encountered at Madukarai (OC6) with 6346 vehicles (4776 PCUs).
   - The traffic volume counts were conducted for 16 hours at 5 locations along the screen line. Maximum traffic was observed at MG Road location (49,573 PCUs) (SL1) and low traffic volumes were recorded at Near Uppalam Water Tank Junction - Ambedkar Road (16,913 PCUs) (SL5).
   - At MG Road location – screen line 1 two wheelers has the highest modal share with 77% followed by NMT with 7.9% and Car/Jeep/Van with 6.3%. Peak hour share at this location is 8.6%.
   - Near Uppalam water tank junction – Ambedkar Road – screen line location 5 two wheelers has the highest modal share with 77% followed by Auto/Tata magic with 8.3% and Car/Jeep/Van with 6.6%. Peak hour share at this location is 14.3%.
   - Classified turning movement count surveys were carried out for 16 hours from 6:00 AM to 10:00 PM at the nine major junctions. The peak hour share is observed to be about 7.5% - 13.2%. During peak hour, maximum traffic is observed at Rajiv Gandhi Junction (8180 PCUs) followed by Nellithope Junction (7699 PCUs).

- The survey was conducted at nine outer cordon locations (OC). It is observed that average occupancy for 2 wheelers, Pvt. Car/jeep and Taxi is 1.4, 3.0 and 2.1 respectively. And public transport buses, mini bus, govt. city bus, govt. intercity bus and private bus have occupancy of 18.1, 33.6, 35.1 and 36.6 respectively.
- The analysis on load characteristics shows that the average payload carried by Mini LCV, LCVs, 2 Axle, 3 Axle and MAV 1.5, 2.5, 4.0, 5.1 and 8.0 tonnes respectively.
- Road inventory surveys were conducted for 384 kms. The data was analyzed in terms of parameters like type of road, ROW, carriageway, road classification, type of pavement, service lane availability, on-street parking, drainage facilities, footpath, street lighting facilities, road markings and road signage. From the survey, it was revealed that nearly 91% of roads is less than 20m wide. Only 9.1% of roads have carriageway more than 20m. On examination of the carriageway widths, it is observed that the Carriageway available for movement of vehicles less than 8m is about 85% roads. Only 8% of the road stretches are divided. Bitumen surfaces are most popular in Puducherry about 87% and about 10% of stretches have concrete pavement. Streetlights were observed along approximately 50% of the network, although in most cases, lights were available on one side only. Central lighting was not observed.
- From speed and delay survey it was understood that the average speeds in the CBD area was in the rage of 10 – 20 kmph and the average speeds on other roads were noticed to be 25 – 40 kmph.
- Parking surveys were conducted at both on and off street. At on-street, surveys were carried out at 18 on street locations for 12 hours. It was observed that majority of the parking were for short duration and the higher parking demand was observed from 17.30 -18.30 hrs in the ECR area.
- Three off street parking lots, namely, at Central Jail, New Bus Stand and at Railway station. At central jail and new bus stand parking facilities are exclusively for two wheelers. At railway station parking facilities are available for two wheelers, cars and Auto Rickshaw. The vehicle are parked at Central jail and Railway station – (eastern side of Railway Station) for short term period and at New bus stand and Railway station – (western side of Railway Station) for long term.
- Public transport Passenger Surveys: Boarding and alighting survey on 20 routes in Puducherry, for a period of 12 hours, covering both peak and off peak trips. Passenger Origin and destination survey were carried out on 17 PRTC and Private Bus routes and 3 IPT routes in Puducherry, for a period of 12 hours, covering both peak and off peak trips. The total ridership for the 17 routes was found to be 21,195 and the total daily ridership of all the buses is estimated to be 2,00,312. Most prominent routes that were identified from the analysis are Puducherry to Gorimedu, Puducherry to Bahour, Puducherry to Mettupalayam and Puducherry to Chinnaveerampattinam.
- The IPTs operates mainly in the city Centre. It is observed that 88% of the passengers had to wait for 10 to 20 minutes for the Auto. Work, business and

education and home are the most prominent purposes of travel among IPT passengers.

- Passenger head counts and Passenger OD were conducted at three terminals – New bus Stands, Puducherry Railway Stations and Villianur Railway Station. 63,042 commuters are observed to be using New Bus stand in a day. Total passengers entering/exiting the terminals with the peak volume and peak share are 9.1% and 7.4% respectively. 5061 commuters are observed to be using Puducherry Railway station in a day. 229 commuters are observed to be using Villianur Railway station in a day.
- The number of pedestrians walking across a stretch of road has been recorded at seven critical locations. It has been observed that there is a prominent pedestrian moment at Indira Gandhi Junction, JIPMER, between JN Street and Ajanta Square. However, at all locations, volume of pedestrians walking along the stretches warrants the need for foot over bridges.
- Tourist survey was carried out on weekends comprising Saturday and Sunday and also Friday evening. The tourist OD survey was carried out at Beach, Aurobindo Ashram and Ganapathi temple, Auroville Matri Mandir, and Chunnambar Boat house. Complete trip details of origin and destination of passengers were recorded during the survey. Tourist are arriving from Chennai (29%) and from other parts of Tamil Nadu (22%) and 51% when combined together. Apart from Tamil Nadu, tourists are arriving from Karnataka 20%; 18% from Bangalore and 2% from rest of Karnataka followed by North India (9%) and Andhra Pradesh (6%). While 73% are departing to Tamil Nadu (51% to Chennai and 14% to South Tamil Nadu) and three percent to Andhra Pradesh.
- Lighting survey was carried on ECR & other arterials and Boulevard area. Observed Lux values range is presented in figures below. Illumination to be enhanced at all the surveyed location in ECR, other arterial network and Boulevard area, except Anna Salai to Indian Oil Bunk, Rajiv Gandhi Junction, Nellithope, Lawspet Junction locations and Anna Salai Pothys.
- Form the vehicle type and fuel efficiency survey at petrol pumps, it is observed that 65% of cars use diesel as fuel. Since the city is a tourist place, there is significant demand of taxies and most of the taxies use diesel as fuel. Most of the modes have an age less than ten years except auto rickshaws. It is observed that 18% of auto rickshaws are of 10 to 15 years old and 12% of auto rickshaws are above 15 years old. Survey reveals that more than 50% of vehicles travelled greater than 20,000 km.
- Households were carried out in about 4671 households (about 2% of total population) in 42 wards of Puducherry, 37 wards of Oulgaret and Rural areas (Puducherry Rural, Villianur, Bahour, Nettapakam and Mannadipet) to determine the socio-economic and travel characteristics, such as household size, income, vehicle ownership, purpose wise per capita trip rates, modal split and compute the origin-destination matrices. A total of 14,92,510 person trips were generated on an average working day. On an average, nearly 86% of the trips made are within 5 km and 10% of the trips are in the range of 5 to 10 km.

- Per Capita Trip Rate (PCTR) with walk and without walk is 1.49 and 1.05 respectively.

0.4 Travel Demand Model and Urban Development Scenarios

1. The traditional four stage urban transport model has been prepared in sensitive modeling software called Cube Voyager. The base year transport network has been developed on the basis of inputs from detailed road network inventories and journey speed and delay surveys. The future transport networks for the purpose of transport demand modelling have been formulated with incorporation of proposed public transport corridors, transport infrastructure such as flyovers, etc into the network fed into the software package. Transfer penalties and other system constraints/potentials have been reflected through the variation of link speeds. Existing and proposed public transport (PT) routes are also coded in the network.
2. The results for base year were statistically validated.
3. The horizon years for short, medium and long term projects are set as 2020, 2026 and 2036 respectively.
4. Four different forms of population distribution strategies have been evolved based on the projections carried out by consultants for the horizon years. Distribution of total population within the study area zones has been attempted. Growth of population in certain areas due to committed developments, proposed land use, etc. has been appropriately considered. These are:
   - Master Plan Development Strategy
   - Brown Field Development Strategy
   - Twin/ Multi City Development Strategy
   - Corridor Development Strategy
5. The above strategies of development can be supported by various types of infrastructure development. Thus four network scenarios are evolved:
   - Do Nothing Scenario with Sprawl Landuse
   - Road Oriented Network Development with Sprawl Landuse
   - Public Transport Oriented Network Development
   - Multi City Development (Land use strategies)
6. The travel demand for 2036 is assigned on the network based on each scenario. Level of Service is determined by comparing the volumes on the road links to their respective capacities. The comparison between the “Business as Usual” and “Multimodal Network with TOD” scenarios for city center is presented below. When plotted side by side on same scale, the comparative figure clearly shows the improvements to the city’s traffic and transportation situation under proposed developments.

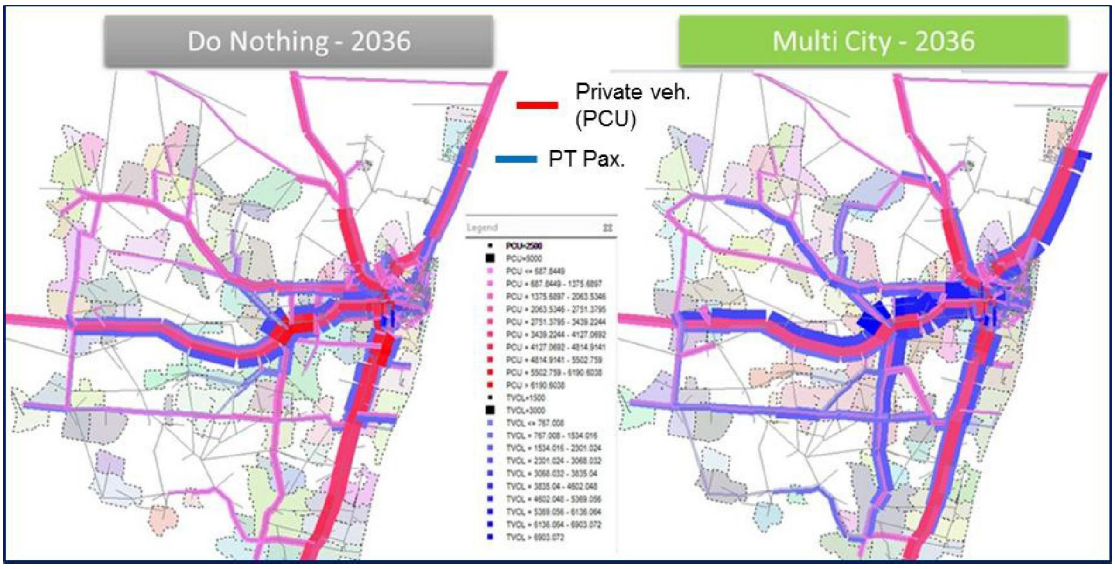


Figure-1: **Comparison between BAU and Public Transport Focused Scenarios**

7. The figure above shows that in the BAU scenario, most of the road network would get congested and volume: capacity ratios (v/c) would be greater than 1. In contrast, in the multi city network with TOD scenario, the person trips get concentrated along certain corridors and the congestion levels on the entire network is comparatively lower. So this scenario is recommended. The infrastructure proposals in the following chapters are based on Multi city network development scenario.
8. Along the high priority transit corridors, DEMU/ Tram-Train and trolley buses/Monorail are proposed, densification along them has been considered in the Multi City Development scenario. The corridors are as shown in the Figure below. Where the developments along the immediate reach (upto 500 m) of corridor will be developed with higher FAR followed by moderate reach (upto 1 km) with moderate FAR and low moderate reach (upto 2 km) with reasonable FAR.

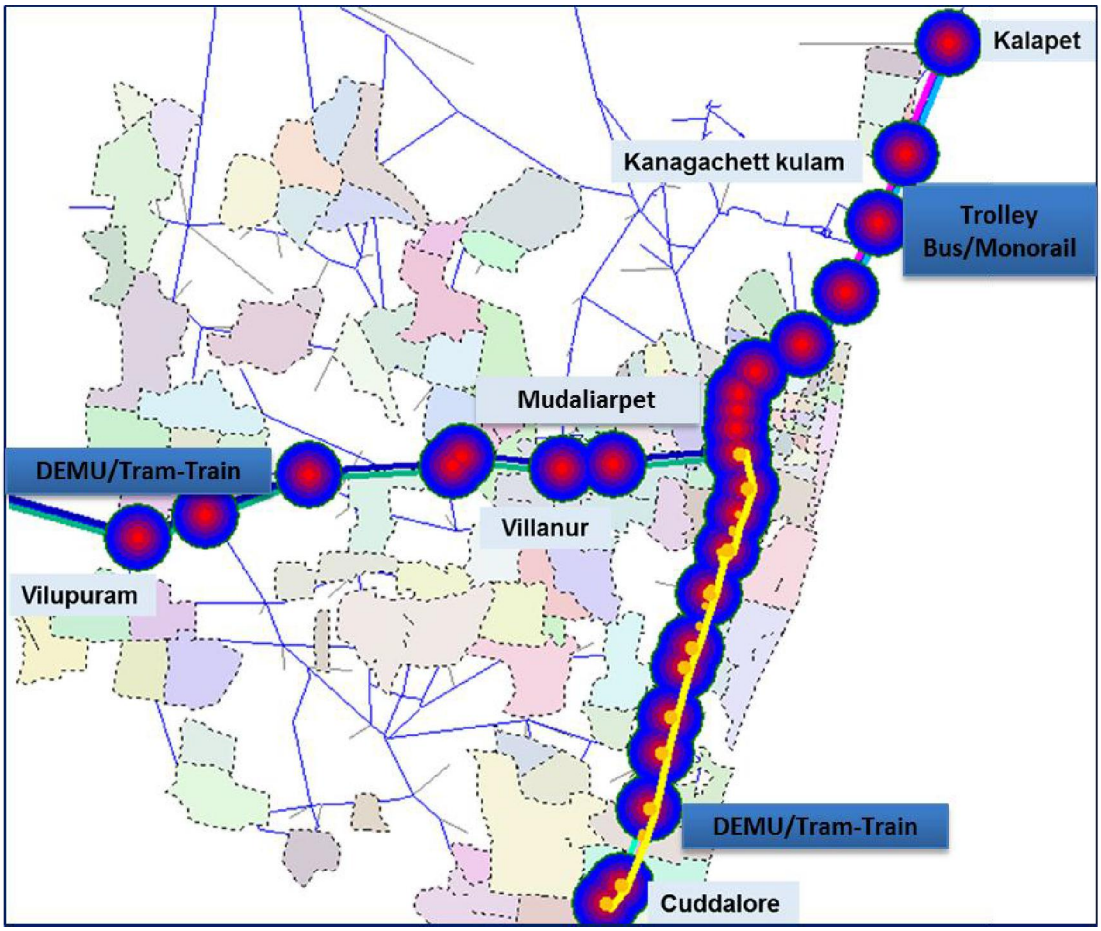


Figure-2: **Densification along Transit Corridors**

0.5 Service Level benchmarking

1. Benchmarking is now well recognized as an important mechanism for introducing accountability in service delivery. It involves measuring and monitoring of service provider performance on a systematic and continuous basis. Regular monitoring can help to identify performance gaps and introduce improvements through the sharing of information and best practices, ultimately resulting in better services to people. Service Level Benchmarks have been spelt out by Ministry of Urban Development for the following sectors:
   - Public transport facilities
   - Pedestrian infrastructure facilities
   - Non-Motorized Transport (NMT)facilities
   - Level of usage of Intelligent Transport System (ITS) facilities
   - Travel speed (Motorized and Mass Transit) along major corridors
   - Availability of parking spaces
   - Road safety
   - Pollution levels
   - Integrated land use transport system
   - Financial sustainability of public transport

2. The service levels of current traffic infrastructure available at Puducherry region have been evaluated and that the findings have been compiled below. The facilities are evaluated on a scale of 1 to 4, wherein 1 represents the best and 4 the lowest.

Table -1: Existing Level of Service of Traffic Infrastructure

S.No.	Sector	LOS	Comments
1	Public transport facilities	2	The city has public transport system which may need considerable improvements in terms of supply of buses / coaches and coverage as many parts of the city are not served by it. The frequency of the services available needs improvements. The system provided is comfortable.
2	Pedestrian infrastructure facilities	2	The city has pedestrian facilities which may need considerable improvements. The pedestrian facilities at intersections, availability of footpath etc. needs improvements as many parts of the city are not served by it.
3	Non-Motorized Transport (NMT)facilities	4	The city lacks adequate NMT facilities.
4	Level of usage of Intelligent Transport System (ITS) facilities	4	The city lacks adequate ITS facilities.
5	Travel speed (Motorized and Mass Transit) along major corridors	3	Small increase in flow may cause substantial increases in approach delay and hence, decrease in arterial speed.
6	Availability of parking spaces	4	The city authorities need to initiate immediate actions with respect to providing paid parking spaces and demand management for parking.
7	Road Safety	4	Need considerable improvements in Road design and available road infrastructure, traffic management and in other such reasons which significantly contribute to road safety.

3. With the gradual implementation of various projects identified in this study, the service levels of various infrastructural facilities shall improve.

0.6 Goals

1. Service Level Benchmarking targets has been assessed for the city in three different phases as short, medium and long term targets with the generic plan to achieve the targets. It is considered to achieve these targets to meet the vision of CMP of having a sustainable transport. The facilities are evaluated on a scale of 1 to 4, wherein 1 represents the best and 4 the lowest.

Table -2: Targeted Level of Service of Traffic Infrastructure

S.No.	Service Level Benchmark	LoS - Base Year	Level of Service (Los) Targeted			Generic Action Plan to Achieve the Target
			Phase I	Phase II	Phase III	
1	Public transport facilities	2	1	1	1	1. Improve the service coverage 2. Increase in frequency to reduce the average waiting time 3. Improving the level of comfort 4. Up gradation of fleet size 5. Organising PT system
2	Pedestrian infrastructure facilities	2	2	2	1	1. Covering the city with pedestrian facilities
3	Non-Motorized Transport (NMT)facilities	4	2	2	1	1. Covering the city with NMT facilities 2. NMT parking facilities at appropriate locations and interchanges
4	Level of usage of Intelligent Transport System (ITS) facilities	4	3	2	1	1. Availability of traffic surveillance 2. Provision of Passenger Information System (PIS) 3. Provision of Global Positioning System (GPS) 4. Provision of signal

S.No.	Service Level Benchmark	LoS - Base Year	Level of Service (Los) Targeted			Generic Action Plan to Achieve the Target
			Phase I	Phase II	Phase III	
						synchronisation
5	Travel speed (Motorized and Mass Transit) along major corridors	3	2	2	1	1. Improving travel speed of private and public transport vehicles by proposing road widening, junction improvements, etc.,
						2. Application of ITS at junctions
6	Availability of parking spaces	4	2	2	1	1. Introducing pricing for on-street parking
						2. Identifying premium parking areas
						3. Provision of off-street parking
7	Road Safety	4	3	2	1	1. Reducing vehicle-km travelled
						2. Focusing on safe NMT and pedestrian movement
						3. Provision of traffic calming measures and enforcement of rules and regulation
						4. Road widening, grade separations, etc.,

2. To achieve the target various scenarios of travel demand model were worked out. With the Business As Usual (BAU) scenario in the year 2036, the condition of the Puducherry worsens if nothing is done. With minimum improvement termed as Multi city Development for the city has been adopted by proposing Sub urban rail DEMU/Tram-Train/Monorail or Trolley buses.
3. Goals have been carved from the vision and objectives of the CMP. The targets set are shown in the comparative table below. With the Do nothing (BAU) scenario in the year 2036 the average speed will drop to 21 kmph, with increased vehicle hours of 42,149 hours. But if the Multi city Development is adopted as recommended, the PT

share will reach 38% from 20.7% as per Do nothing (BAU) and average speed of the vehicles will be 24 kmph.

Table -3: Comparative Analysis of Different Network Scenarios

Transport Network Scenario (Year 2036)	Vehicle Distance (km)	Vehicle Hours	Average Speed (kmph)	PT+IPT share	Transit Assignment		
					Pax. (Nos)	Pax. Km	Pax. Hr.
Base Year	4,16,091	17,677	23.54	23%	36,515	1,86,205	5,146
Transport Network Scenario (Year 2036)							
Do Nothing	9,12,467	42,149	21.65	23%	53,625	3,18,189	7,469
Radial Road Network	8,43,968	35,473	23.79	28%	60,960	2,25,012	5,169
PT Corridor	8,13,162	36,049	22.56	41%	99,013	6,42,791	18,830
Multi city	7,89,611	32,766	24.10	38%	82,352	4,49,533	13,864

Table -4: Comparison of Scenario-wise Emission levels

Pollution Parameters (Units in Kg)		CO2	SO2	PM	NOx	CO
Base	Existing	758420	13	153	5188	12154
Horizon Year - 2036						
Scenario 1	Business As Usual (BAU)	1675305	30	303	9104	26386
Scenario 2	Radial Road Network Development	1607887	29	286	8659	23471
Scenario 3	PT Corridor Development	1569370	28	255	8500	22015
Scenario 4	**Multi City Development**	**1450703**	**25**	**210**	**7843**	**21598**

From the above table, it is observed that multi-city development along with PT development is best option to reduce the carbon emissions. This is due to the shorter trip length and probable shift of persons from private to NMT modes for shorter trips. But, this is possible only with land use strategies and with introduction of electric vehicles; the emission can be further reduced to have Puducherry with a sustainable mobility and urban living.

4. The share of public transit increases if road oriented improvements are made. The reason is that buses also benefit from these improvements and provide commuters with comparable service in many areas. Yet another scenario, the Transit Oriented Development only sees the greatest increase in the Public Transit Ridership, 41% share. This increase is due to not only the shift of population near the transit corridors via policy changes in the Land use policies but also by providing better connectivity for public transit users.
5. The multi city development scenario also allows for the development of the roads in the city which leads to a shift back to the private modes as compared to the Transit Oriented development only. Since it is practically not possible to only develop public transit and let the road users choke under congestion, it is also understood that the

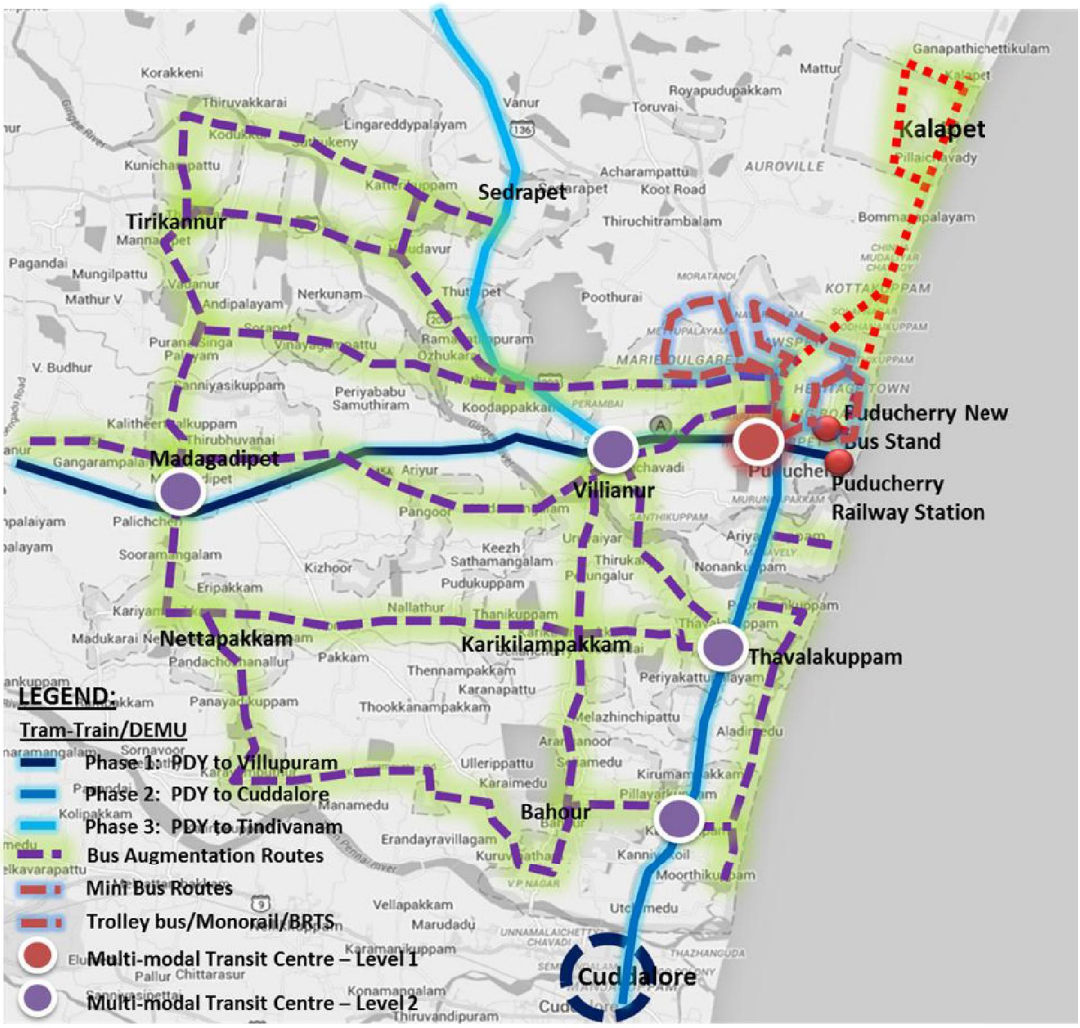
best possible ridership share that is practically possible comes from the “multi city development".

Table -5: Comparative Analysis of Modal Share for different scenarios

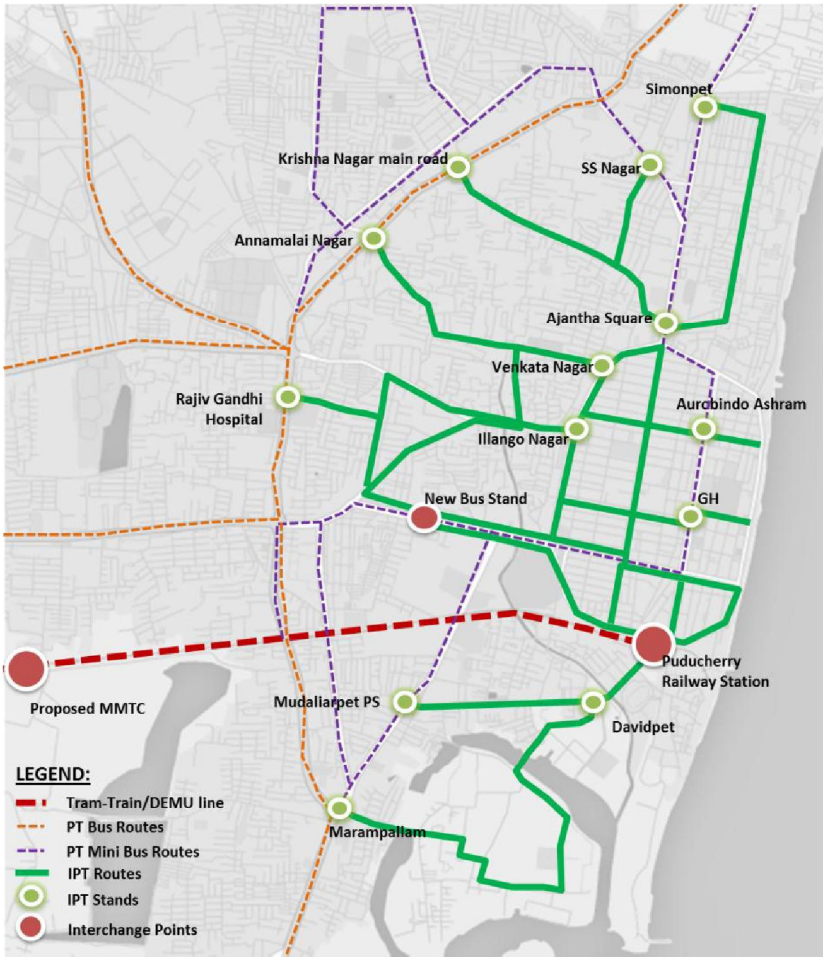
Transport Network Scenario (Year 2036)	Trips				Percentage (%)			
	Pvt	PT	IPT	NMT	Pvt	PT	IPT	NMT
Base Year	6,44,115	1,66,245	15,357	1,15,600	**64%**	**20.6%**	**1.90%**	**14%**
Business as usual	9,84,691	2,54,145	23,414	1,76,715	**62%**	**20.6%**	**1.90%**	**14%**
Road Oriented	8,74,490	3,22,096	23,414	1,70,800	**58%**	**26%**	**1.90%**	**14%**
Transit Oriented	7,40,936	4,71,502	30,765	1,74,048	**46%**	**38%**	**2.50%**	**14%**
Multi city with land use Development	7,36,332	4,13,781	26,414	2,50,620	**42%**	**36%**	**2.10%**	**20%**

0.7 Transport Infrastructure Proposals

1. The improvement proposals have been divided into various modules. They are listed below.
2. The Public Transport Proposals include
   - Introduction of Rail based Transit - Tram-Train/MEMU/DEMU
   - Introduction of Trolley Bus / CNG buses / Monorail
   - Strengthening of Existing City Bus System
   - Development of Intermodal facilities
   - Introduction of Pulse timetabling



3. At present the IPTs that operates in Puducherry is polluting and carries passengers in an unsafe manner. So, gradually, towards the end of the Short term it is proposed to introduce new e-rickshaws to ply within Boulevard area. New routes shall be identified and operated at higher frequency. The existing shared auto shall be put for discard and the present operators may be requested to buy e-rickshaw at subsidised rates. Previously, there were e-autos in the name of “Bijli” plying in Puducherry but due their inefficiency, it was not a success. But the recent manufactured e-rickshaws are energy efficient with better torque.
   IPT routes identified within the Puducherry city are provided in the figure given below:-



Other routes are:-

- Villianur Main Road to Mettupalayam Industrial Estate
- MG Medical College – Bahour
- Villianur Railway Station to Villianur Main Market
- Villianur Railway Station to Sulthanpet
- Thattanchavadi water tank to Vadamangalam Road
- MG Medical College to Bahour via Pinnachikuppam (Long Term Plan)
- Madagadipet to Kariamanikkam via SMV Engineering College (Long Term Plan)
- Madagadipet to Tirikannur (Long Term Plan)

4. New Links have been identified for decongesting existing network. They are:
   - New sub -arterial road along Arumbathapuram Road.
   - Vadamangulam main road to Reddiyarpalayam.
   - Vazhudavur road – Tindivanam Road.
5. Many of the road sections are to be widened which are part of the committed projects and few proposed based on the future assignment. They are:-
   - NH 45A from Cuddalore to Puducherry and Puducherry to Villupuram: 4-Lane with service lane.
   - SH 49 ECR: 4-Lane with service lane.

- SH 203 Vazudavur Road: 4-lane to four lane with service road.
- Bahour road from Villianur: 2 lane to four lane.
- Karyamputhur Road: Intermediate Lane to 2 lane.
- Madagadipet to Tirikannur road: Intermediate Lane to 2 lane.
- Sedrapet Main Road: Intermediate lane to 2 lane.
- Uruvaiyur to Abhishekpakkam Road: Intermediate lane to 2 lane.
- Pilliyarkuppam to Mannadipet road (Intermediate lane to 2-lane).

6. Proposed schemes for the flyovers are as follows. They have also been shown in Figure below:
   - Proposed grade separated intersection at ECR road: as a part of the widening and up-gradation of ECR road, flyover is proposed at the Rajiv Gandhi & Indira Gandhi junction to decongest the junction.
   - Up-gradation of ROB at East coast road: ROB is proposed at NH 45A East coast road where the railway line is crossing to decrease the delay and not to interpret the traffic movement at the east coast road.
   - Proposed ROB at Villianur: ROB is proposed at NH 45A Villianur zone where the railway line is crossing to decrease the delay and not to interpret the traffic movement. All other roads where rail crossings are present to be provided with Automatic or manual rail gates and when traffic increases, R.O.B is recommended.

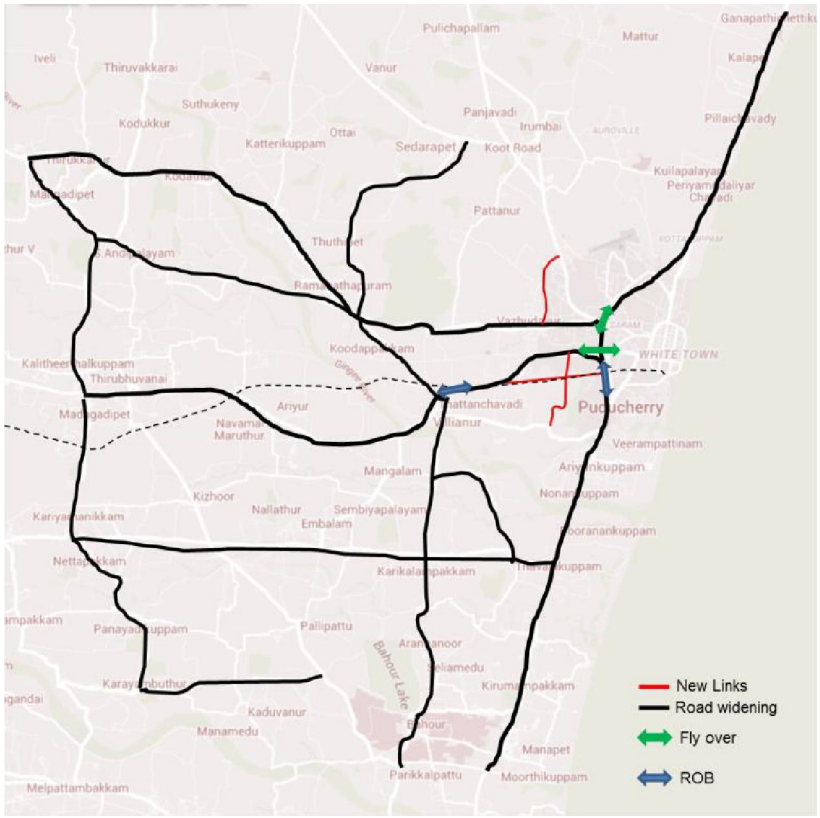


Figure -3: Proposed Road Network Development Plan

7. Improvements that have been proposed at identified junctions include:

- IPT / Rickshaw bays
- Traffic signal with pedestrian phase
- Hawker areas and
- Signage
- Pedestrian footpath and refuge area
- Road markings
- Grade separation (if required)

The junctions are listed below:

- Ajanta Junction
- Raja theater Junction
- Anna Salai junction
- Subbiah Square
- Venkata Subba Reddiar Square
- Cross section in front of New Bus Stand
- Kottakuppam Junction
- Rajiv Gandhi Junction
- Uppalam Water Junction
- Ariyankuppam Bridge

8. To deal with the existing and future freight movement, the following strategies are proposed and they have been represented graphically in Figure below.
   - Till the new truck terminal is not constructed near Sedrapet, existing truck terminal at Mettupalayam shall be in use with provision of driver facilities such as dormitories, eateries, toilet blocks, proper boundary walls and gates constructed. Also, security guards may also be deployed for safe parking of trucks with goods.
   - A strict enforcement should be made that all the trucks coming from other location should only terminate at truck terminal and the good from truck terminal would be carried by LCVs or Mini LCVs into the city area.

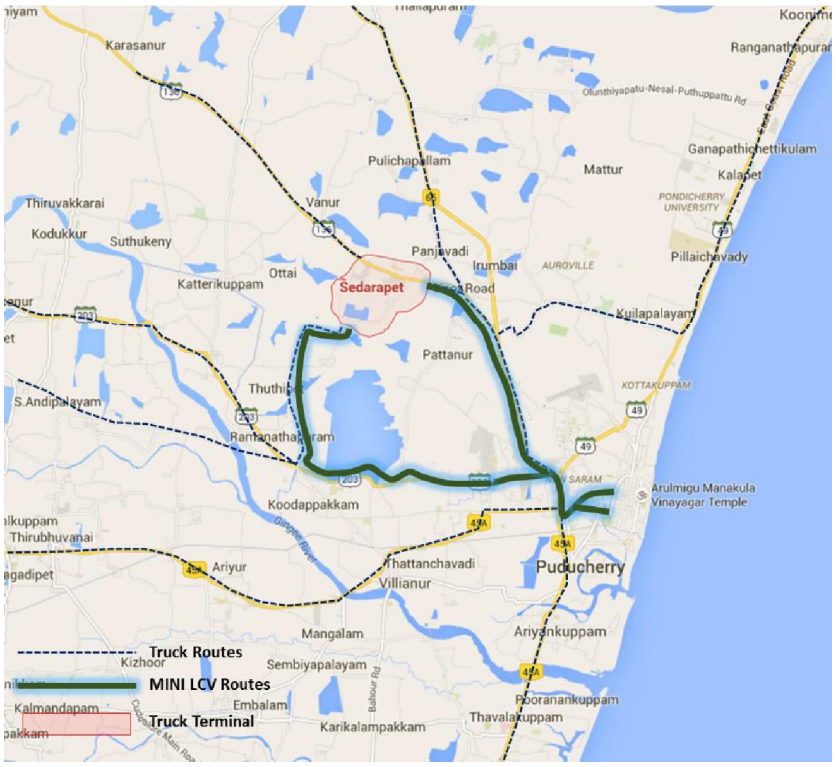


Figure-4 Truck routes for proposed Sedrapet Truck Terminal

9. In boulevard area, MG Road and Jawharlal Nehru street were indentified as pedestrian intensive zones. The junctions Rajiv Gandhi and Indira Gandhi can also be considrered as pedestrian intensive zone as there is a heavey pedestrian crossing at those junction. JIPMER location too have a significant amount of pedestrian movement. At these road sections, apart from footpaths, public spaces with seating, public toilets and landscaping shall be developed.
10. Various elements have been proposed in the street design so that there is equitable space for all road users, including pedestrians. Elements such as tactile paths for the blind, ramps for movement of wheel chairs, use of minimal barriers have been integrated in the design. Adequate lighting and street furniture such as signage have been proposed for convenience and enhancement of safety.
11. All the proposed schemes, including footpaths, provision of pelican signals, facilities for disabled, etc and their locations are provided in the figure given below:-

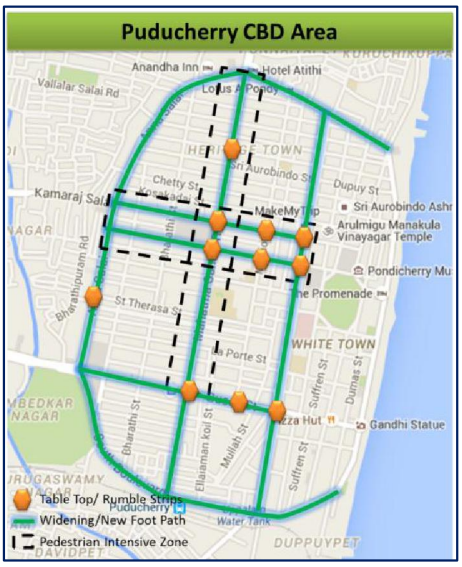
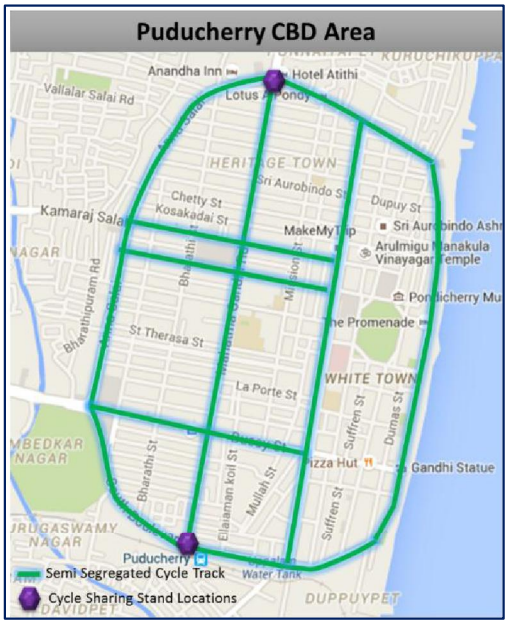
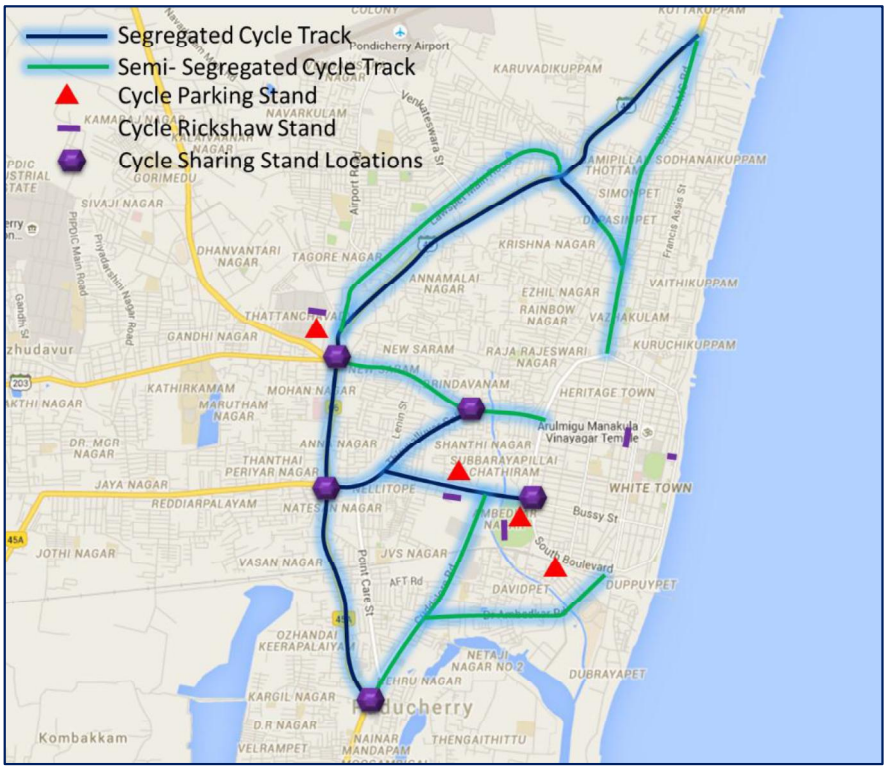


Figure-5: Table top and New / Widening Footpath Location in CBD

12. Cycle tracks can be proposed, based on the demand observed, in the following areas:
    - Boulevard Area
    - Goubert Avenue
    - Ariyankuppam
    - Kanniakoil
    - Bahour
    - Villianur – Karikalampakkam
    - Thavalakuppam
    - Lawspet



13. Parking for NMT modes is also provided at the following locations in city:
    - Near Beach Road
    - Rajiv Gandhi Chowk
    - HM Kassim Street
    - Old Bus stand
    - Thanthai Periyar Statue



14. Parking strategies, for both off street and on street parking, have been proposed. The parking management plan has been shown in Figure 6.

Figure -6 Proposed Parking Management Plan

The Old bus stand parking shall be with offices on the ground and parking on the upper levels

15. Various ITS applications, such as Vehicle actuated traffic signals, Variable Message Signs, Traffic Management Centre (TMC) and Automatic Vehicle Location System (AVLS), Public information system (PIS) for public transport systems have been proposed in Puducherry.
16. Surveillance Cameras have been proposed at:
    - Intersections where vehicle actuated signals are provided
    - New Bus Stand
    - Old Bus Stand
    - MG Road
    - Jawaharlal Nehru Street
    - Bussy Street
    - HM Kassim Road
    - Rangapillai Street
    - French Town
    - Goubert Market
17. The following identified streets have been identified for corridor improvement:
    - Jawaharlal Nehru Street
    - Goubert Avenue
    - Duma Street

- Suffern Street
- Romian Rolland Street

Long term proposed model streets

- Perumal Koil Street
- Kamatchi Amma Koil Street
- Sri Aurobindo Street
- Vysali Street
- Kosakadai Street
- Needarajapayar Street
- St. Theresa Street
- La Porte Street
- Marine Street
- Dupuy Street
- Villianur Car Street
- Lawspet Main Road
- Vallalar Salai Road

18. Strengthening of regional connectivity, as indicated in the figure below, have been proposed for overall development of the study area.
    - Road Connectivity: At present, Puducherry and Karaikal is connected by National Highway 45A which start from Puducherry and ends at Nagapattinam. It is recommended to widen the existing 2-Lane to 4-Lane from Puducherry to Karaikal as shown in the figure below for hassle free and safe movement of vehicles. In later stages, as a long term improvement, it is recommended to extend the widening of road till Nagapattinam and Velankkani.

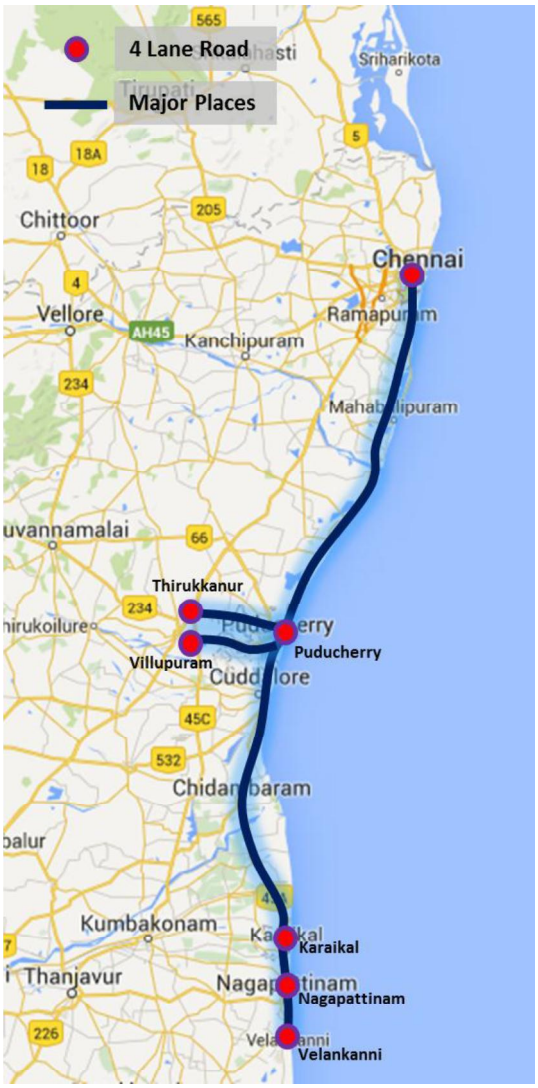


Figure -7 Road Widening proposals from Puducherry

- Rail Connectivity: Rail connectivity to Puducherry from centres such as Chennai, Cuddalore, Villupuram and Tindivanam may be enhanced by provision of new line between Chennai-Puducherry via Mahabalipuram, extention of proposed Nagari-Tindivanam rail link to Puducherry, doubling of rail link between Villupuram and Cuddalore and introducing high frequency rail based systems – MEMU/DEMU
- Ferry / Cruise ship services: Puducherry has under-utilized harbor and Karaikal is also a sea side town. So, ferry service is proposed between the two places as shown in the figure below. This shall also help in reducing the private modes from the NH 45 A. The service could be further extended till Nagapattinam and Velankkani. It is recommended to provide hovercraft service till Cuddalore

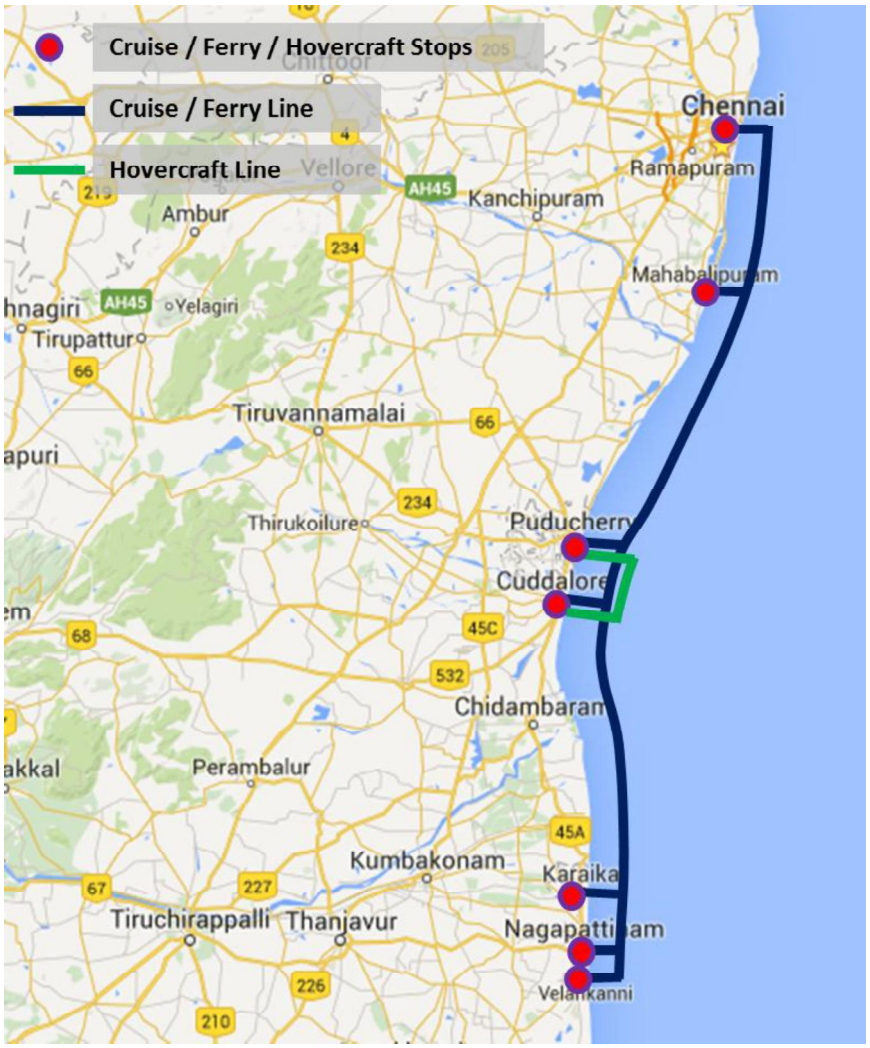


Figure -8 Proposed Ferry/Cruise Connection from Puducherry

0.8 Regulatory and Institutional Measures

1. The National Urban Transport Policy (NUTP) as well as Working Group on Urban Transport for 12th Five Year Plan made a recommendation for setting up dedicated authority/ cells for urban transport. The recommendations say an autonomous authority called 'Unified Metropolitan Authority' in cities with population in excess of one million and an UMTA for a group of smaller cities. When a city is too small to support a professional team by itself, the State Government should provide such a cell either at its HQ. The role of UMTA will be in co-ordination between various authorities and corporation, Identification of Schemes, Implementation Strategies, Approaching GOI/State Govt/PPP mode for financing the scheme, Set-up traffic Engineering/Transport Planning Cell. The official who shall hold various positions in UMTA for study area at state and district level have been tabulated below:

Table-6: Composition of UMTA at State Level

Person	Role in UMTA
State-Level	
Chief Secretary,	Chairman
Principal Secretary, Finance	Member
Principal Secretary, Transport	Member - Convener
Principal Secretary, Housing and Environment	Member
Director, LAD	Member
Inspector General of Police	Member
MD, PRTC	Member
DRM, Railways	Member
Two experts in the field of Transport Planning nominated by the Government	Members

Table-7: Composition of UMTA at City Level

Person	Role in UMTA
Secretary, Transport	Chairman
Transport Commissioner	Member - Convener
Secretary, Tourism	Member
Director, Local Administration Department	Member
Chief Town Planner – Town and Country Planning Department	Member
Member Secretary, PPA	Member
Secretary, Economics & Statistics	Member
Executive Engineer, Port Department	Member
Director, Department of Science, Technology and Environment	Member
Secretary, Planning & Research	Member
Secretary, Fisheries and Fisherman Welfare	Member
Inspector General of Police	Member
Chief Engineer, PWD	Member
DRM, Railways – Trichy Division	Member
Two experts in Transport Planning / Urban planning nominated by the Government	Member

2. A road safety cell required to be set-up to implement and reach the targets proposed in Puducherry road safety policy. The agencies involved in implementation of Puducherry road safety policy shall be:-
    a. Transport Department
    b. Traffic Police Department
    c. PWD/PWD-NH
    d. LAD – Municipal Corporation, Commune Panchayats
    e. Department of health

0.9 Phasing and Block Cost Estimates

1. The total cost for all the proposals is about Rs. 5321 Crores. The summary details of block costs of all the proposals in various phases are shown in table below:

Table-8: Cost Estimates (in crores) as per Implementation Plan

Cost Summary	Project Cost (in Cr) Phase I	Project Cost (in Cr) Phase II	Project Cost (in Cr) Phase III	Total Project Cost (in Cr)
Total cost from Projects	**1998.88**	**1711.97**	**1026.3**	**4736.71**
Miscellaneous Cost (5% of Sub Total Cost)	99.94	85.6	51.31	236.84
Total	**2098.82**	**1797.57**	**1077.61**	**4973.54**
Detailed Project Report Cost (2% of Total)	41.98	35.95	21.55	99.47
Project Management Cost (5% of Total)	104.94	89.88	53.88	248.68
Grand Total	**2245.74**	**1923.4**	**1153.04**	**5321.69**

The above mentioned cost is excluding land acquisition costs and as per the new decree by the MoUD in July 2015 regarding land acquisition cost for new project; it is advised to take the cost as 100% of the total project Cost as compared to earlier 30% of the total project Cost.

0.10 Institutional Setup and Financing Options

1. The existing institutional setup has been studied and a SWOT analysis has been done. Strengthening of various departments through inclusion of experienced professionals and capacity building of the human resources have been suggested. The formation of a common umbrella above all departments involved in urban transportation has been proposed in the form of Unified Metropolitan Transport Authority (UMTA).
2. The formation of a dedicated transport fund has been proposed and possible sources of revenue for the same have been indicated.
3. The financing options for various projects have been indicated below:

Table-9 Proposed Project Implementation Agencies/ Organization

Proposals	Proposed Schemes	Probable Funding Agencies
SPV - Southern Railways, Transport Department		
Public Transport system	Rail-based: Tram-Train/ DEMU/MEMU	Central/ State Govt. funds, AMRUT
SPV - PRTC, Transport Department, Private Operators		
Public Transport system	Trolley bus/ CNG Bus / Hybrid Buses	Central/ State Govt. funds, AMRUT
PRTC		
Public Transport system	Bus routes -fleet size improvement	Central/ State Govt. funds, AMRUT

Proposals	Proposed Schemes	Probable Funding Agencies
Municipal Corporation, Commune Panchayats, PWD, PWD-NH		
Pedestrian Facility Improvement	Footpath	Municipal funds, Road Safety Fund
	Table-top Crossing	Municipal funds, Road Safety Fund
	Pelican Signals	Municipal funds, Road Safety Fund
	FOB with Escalator and Elevator	Municipal funds, Road Safety Fund
	Escalator and Elevator for FOB	PWD Highways, Municipal Funds
NMT Facility Improvement	Semi Segregated Cycle Track	PWD Highways, DUTF
	Cycle Sharing Stands	PWD Highways, DUTF
	Segregated Cycle Track	PWD Highways, DUTF
	Cycle Parking Stands	PWD Highways, DUTF
	Cycle Rickshaw Stands	PWD Highways, DUTF
Corridor Improvement Plan	*H.M Kassim Road (Along Canal) & J.N Street*	Municipal funds, AMRUT
	Development of Footpaths	
	Development of NMT Track	
	Multi Utility Zone	
	On Street Parking	
	Toilet Blocks	
	Green Areas	
Municipal Corporation, PPP		
Parking Management Plan	On Street Parking	Municipal funds, PPP, AMRUT
	Off Street Parking	Municipal funds, PPP, AMRUT
	MLCP	Municipal funds, PPP, AMRUT
Transport Department, PRTC, SSP Traffic Police		
Intelligent Transport systems	Semi Actuated Signals	Municipal funds, DUTF, AMRUT
	Pelican Signals	Municipal funds, DUTF, AMRUT
	Automated Vehicle Location System	Municipal funds, DUTF, AMRUT
	Variable Message Signs	Municipal funds, DUTF, AMRUT
	ITS Control Centre	Municipal funds, DUTF, AMRUT
	Public Information System	Municipal funds, DUTF, AMRUT
	Common Mobility Card	Municipal funds, DUTF, AMRUT
	Mobile Phone Application	Municipal funds, DUTF, AMRUT

Proposals	Proposed Schemes	Probable Funding Agencies
	Surveillance Cameras	Municipal funds, DUTF, AMRUT
	GPS	Municipal funds, DUTF, AMRUT
Municipal Corporation, Commune Panchayats		
PT	Inter-Modal facilities	PPP, Central/ State Govt. funds, AMRUT
	Bus Stops	PPP, Central/ State Govt. funds, AMRUT
Terminals	Proposed New Bus stand	PPP, Central/ State Govt. funds, AMRUT
NHAI, PWD-NH		
Flyovers	Indira Gandhi Flyover	Multi-lateral funding Agency, Central/State Govt. funds
	Rajiv Gandhi Flyover	Multi-lateral funding Agency, Central/State Govt. funds
ROBs	East coast Road	Multi-lateral funding Agency, Central/State Govt. funds
	Villianur Road	Multi-lateral funding Agency, Central/State Govt. funds
PWD-NH		
New Links	New sub -arterial road along Arumbathapuram Road	Multi-lateral funding Agency, Central/State Govt. funds
	Vadamangalam main road to Reddiyarpalayam	Multi-lateral funding Agency, Central/State Govt. funds
	Vazhudavur road – Tindivanam Road	Multi-lateral funding Agency, Central/State Govt. funds
NHAI, PWD-NH		
Road Widening	NH 45A By-pass: 4-Lane to six lane	Multi-lateral funding Agency, Central/State Govt. funds
	SH 49: 4 lane to six lane	Multi-lateral funding Agency, Central/State Govt. funds
	SH 203 : 4-lane to four lane with service road	Multi-lateral funding Agency, Central/State Govt. funds
	Cuddalore main road : Intermediate Lane to 2 lane	Multi-lateral funding Agency, Central/State Govt. funds
	Bahour road from Villianur: 2 lane to four lane	Multi-lateral funding Agency, Central/State

Proposals	Proposed Schemes	Probable Funding Agencies
		Govt. funds
	Karyamputhur Road: Intermediate Lane to 2 lane	Multi-lateral funding Agency, Central/State Govt. funds
	Madagadipet to Tirikannur road: Intermediate Lane to 2 lane	Multi-lateral funding Agency, Central/State Govt. funds
	Sedrapet Main Road: Intermediate lane to 2 lane	Multi-lateral funding Agency, Central/State Govt. funds
	Uruvaiyur to Abhishekapakkam Road: Intermediate lane to 2 lane	Multi-lateral funding Agency, Central/State Govt. funds
	Pilliyarkuppam to Mannadipet road (Intermediate lane to 2-lane)	Multi-lateral funding Agency, Central/State Govt. funds
Transport Department, Traffic police, PWD/PWD-NH, LAD, Department of Health		
Road Safety policy and action plan	Accident recording, Black Spot identification	Road Safety Fund
	Roads according to road safety standards and safety features on roads	Road Safety Fund
	Upgradation of emergency care system	Road Safety Fund
	Safer vehicles and strict enforcement of road safety rules	Road Safety Fund
	Implementation of ITS and monitoring systems	Road Safety Fund

0.11 Stakeholders Meetings and Review Meetings

1. As part of the scope of the study, two stakeholder meetings and one stakeholder review meeting was conducted. Stakeholders meetings were conducted at Inception Stage and Draft Report stage and review meeting at all stages with stakeholder review meeting at interim Stage. Feedbacks and comments were gathered during all the meetings from the stakeholders which paved the path in understanding the study area and designing the proposals accordingly.

0.12 Way Forward – Funding from Central Government

1. The CMP is a key document providing the rationale for transport proposals. Therefore, within the overall planning hierarchy, the CMP can be considered as an important document for seeking Central Government funding. CMP is also a useful document to facilitate funding from other National or International source of funding.
2. After Approval of CMP from Puducherry Transport Department and State Government, the CMP could be sent for approval from MoUD. After Approval from MoUD, Feasibility and DPR studies for prioritized projects could be taken up by

Puducherry Transport Department, Municipal Corporations, LAD and PWD, PWD-NH.

0.13 Conclusions

1. Puducherry is emerging as one of the main tourist and Knowledge hub in south India and with the presence of administrative institutions, growth of the city remain imminent. This can lead to an increase in the vehicular trips and thereby deteriorating the urban environment. So, by preparing CMP, measures shall be formulated in such a way that efficient connectivity and inclusive development strategies can be implemented. With improved mobility between villages and Puducherry city area, the strategies shall supports and enhance economic, social and environmental sustainability. The following conclusion is derived from the CMP for Puducherry region:
   - Existing traffic and transport scenarios have been analyzed to identify critical areas and issues.
   - All projects and proposals are in line with objectives of NUTP for equitable road space, promoting Public transport, encouraging walk trips and NMT usage.
   - Inputs from the stakeholder meetings and those of the reviews have been incorporated while formulating proposals for CMP.
   - Proposals include provision of footpaths, public areas, cycle tracks, Sub urban rail MEMU/DEMU/ Tram-Trains and trolley buses / Hybrid buses.
   - Transport Infrastructure proposals have been identified in phases and preliminary costs has been estimated for the same.

   Possible sources of funding and implementing agencies have been identified through which the proposals can be taken up for implementations.