

5.1 Present Scenario

Kochi is one of the few cities of India blessed with connection to other parts by all major modes of transport like road, rail, air and water. NH 17, NH 47 and NH 49; 3 National Waterways, an International Airport, Cochin Port located on strategic International Route and broad gauge lines linking Kochi to other States are the major intercity linkages.

The regional road linkages are supplemented by an extensive network of navigation routes through the lagoon system, serving the movement of passengers and cargo.

As part of the preparation of a report on the comprehensive study for the transport system in Greater Cochin area, RITES have done a survey in (2001). Its analysis reveals that

- 1 The buses contribute about 14% of the vehicular traffic and carry 73% of the Passenger traffic
- 2 The share of cars in terms of vehicular trips is about 38% carrying 15% of passenger trips.
- 3 Two wheelers contribute 35% of vehicular traffic and 8% of passenger traffic.
- 4 Auto rickshaws constitute about 13% of vehicular traffic and 4% of passenger trips.

As part of the comprehensive study for the transport system M/s RITES had undertaken O-D survey, Volume count surveys, speed and delay surveys, parking survey; pedestrian volume survey, travel characteristics etc. and the study results are utilized in the preparation of this document. The relevant study results are included as tables in Annexure.

5.2 TRAFFIC FLOW AND TRAVEL DEMAND

Increasing urbanization over the years has resulted in the development of vast areas as urban extension. Many roads were laid in an incremental manner to cater to the increased traffic demand. The City has developed in a disintegrated urban form spreading along major traffic corridors. Congestion on arterial roads is due to haphazard development, narrow streets, congested junction, unorganized parking etc. which creates hindrance to the smooth flow of traffic. Most of the bridges and major corridors are no longer able to cope up with even the present traffic demand. High travel time and congestions have created an adverse effect on the economic and environmental health of this city.

The running speed characteristics during peak and off-peak periods are presented in Table (Ref. Annexure 5.1). The running speeds are relatively low in the study area network with 72% have running speed around 20 kmph during peak hours and greater than 30 kmph during Off peak hours.

The major problems identified in road sector are listed below.

1. Majority of traffic problems are concentrated along two east-west corridors of the city
2. The city is divided into two parts by the Railway line
3. Improper traffic junctions
4. Chronic parking problems in core areas, lack of parking space results in road side parking causing bottle necks and creating traffic block
5. The pedestrian crossing across major corridors in city centre is a serious problem
6. The absence of bus bays causes considerable reduction in road capacity
7. Main roads are obstructed by transformers and hoardings installed on road margins
8. High volume of traffic in major corridors of the city core which do not have the capacity to bear the present traffic volume and creates high congestion
9. Narrow bridges and inadequate number of railway over bridges.
10. Encroachment of road by foot path vendors and petty shops which result in consequent narrowing of the area available for movement of traffic

A classified traffic volume survey was carried out in selected screen line (9 locations) mid blocks (23 locations) and intersections (40 locations) as part of the transportation study for Kochi.

The peak hour traffic at mid block locations varies between 423 PCU at Market road to 3979 PCU at MG Road. The heaviest traffic is observed at MG road (4000 PCU s) and Shanmugham road (3700 PCUs) during peak hours (Refer Annexure 5.2).

The hourly variation of traffic at mid block locations is presented in (Ref. Annexure 5.F1)

COMPOSITION OF TRAFFIC

The study of the share of different vehicles in the total volume of traffic has revealed that the share of cars varies between 25 to 32% along MG road and Central Business District (CBD) The share of two wheelers varies between 36 to 46% on MG road while the share of bus is about 11%. The share of autorishaws is about 14% while the share of bicycles is only 3%

INTENSITY AND DIRECTIONAL DISTRIBUTION OF TRAFFIC AT SCREEN LINE LOCATIONS

The intensity of traffic at screen line locations is presented in table (Annexure 5.3) It is observed from the analysis that the average daily traffic varies from 21347 PCUs to 60833 PCUs. The highest traffic is observed on the north ROB on the Banerji Road followed by the screen line point west of Kaloor on NH47. The traffic intensity is very high along the south ROB on SA road, which is of the order of 42672 PCUs. Like wise the peak hour traffic varies from 1847 PCUs at Venduruty bridge in the evening peak hour to 5142 PCUs at north ROB in the morning peak. The directional distribution of traffic at screen line location is generally in the ratio of 60:40 (N-S:S-N)

MOVEMENT OF PASSENGER AND VEHICULAR TRIPS

The distribution of passenger and vehicular trips of movement at the outer cordon points are represented in table given below. The analysis reveals that about 44000 vehicle trips and about 3.7 lakhs passenger trips are performed on an average day at the outer cordon Points of the study area.

Table 55 Passenger and vehicular trips at outer cordon points

Sl.No	Movement Type	Passenger Trips	Vehicular Trips
1	Internal to External (%)	112674 (36.67)	14824 (33.68)
2	External to Internal (%)	120401 (39.18)	17672 (40.15)
3	External to External (%)	74214 (24.15)	121514 (26.17)
	TOTAL	307289 (100.00)	44010 (100.00)

Source : RITES Primary Survey, 2000

PASSENGER TRIP DISTRIBUTION BY MODE

The analysis on Modal split of passenger movement on intercity routes (Ref. Table5.5) shows that buses constitute about 14% of vehicular traffic but carry about 73% of the passenger traffic. The share of car in terms of vehicular trips is about 38% carrying 15% passenger traffic, while two wheelers is 35% carrying 8% passenger traffic. Auto constitutes about 13% of vehicular trip and 4% of passenger traffic.

Table 5.6

Distribution of Passenger and Vehicular Trips by Mode						
Sl. No.	Mode	TYPE OF TRIPS	INTERNAL TO EXTERNAL	EXTERNAL TO INTERNAL	EXTERNAL TO EXTERNAL	TOTAL
1	Car	Passenger (%)	15279(13.56)	20647(17.15)	11543(15.55)	47469(15.45)
		Vehicular(%)	5392(36.37)	7217(40.15)	4140(40.15)	16749(38.06)
2	Two Wheeler	Passenger (%)	7381(6.55)	9201(7.64)	6398(8.62)	22980(7.48)
		Vehicular(%)	5063(34.15)	6127(34.67)	4371(37.36)	15561(35.35.36)
3	Bus	Passenger(%)	84630(75.11)	86078(71.49)	53187(71.67)	223895(72.86)
		Vehicular %)	2378(16.04)	2419(13.69)	1415(12.29)	6212(14.11)

		Passenger (%)	5384(4.78)	4475(3.72)	3086(4.16)	12945(4.21)
4	Auto	Vehicular(%)	1991(13.44)	1909(10.80)	1588(13.79)	5488(12.47)
		Passenger (%)	112674(100)	120401(100)	74214(100)	307289(100)
TOTAL TRIPS		Vehicular(%)	14824(100)	17672(100)	11514(100)	440410(100)

Source:- Comprehensive study for GCDA area by RITES

ROAD NETWORK

The road network is constituted by a broken gridiron pattern. The main emphasis is on the north south axis with minor roads giving the east west connection. Undue concentration of services can be seen in certain areas of the city. But vast portion in the peripheral areas remain isolated. The lack of accessibility is contributed by poor quality of roads, narrow section of roadway crossing by railway line, canals and backwaters.

Right-of-way

53 % of the total roads in Kochi city are of local street category and have a right of way less than 5m. 35 % of roads in the study area are of Collector road category and have a right of way ranging from 5 to 10m; 8% of the roads are of sub-arterial category and have 3 % ROW ranging from 10 to 20 m. Hardly one per cent of the roads (5.939 Km) of the roads in Kochi city have right of way more than 40 meters. Distribution of right-of-way available for roads in Kochi city is given in table.

Table 5.7

Distribution of road network in Kochi City according to right-of-way

Sl. No	Right of way (m)	Road length (km)	Percentage
1	< 5	325.604	53
2	5 – 10	214.887	35
3	10 – 20	49.117	8
4	20 – 30	18.418	3
5	>40	5.939	1
	Total	613.965	100

Source: NATPAC Report 2006, Master Plan study for CoC

Carriageway width

The data collected from the inventory survey were analyzed to study the distribution of the road network in Kochi city with respect to availability of carriageway width. It was found that 16.3% of the roads have less than 3m carriageway, while 56.6% having single lane carriageway of 3.5m, 13.2% have intermediate lane of 5.5m, 8.5% have two lanes, 0.70% have three lanes (10m) and 4.7% have carriageway more than four lanes. **Table 7** (Ref. Annexure 5.7) gives the distribution of road network of Kochi city according to availability of carriageway.

5.3 Surface type and condition of roads

The road network in the city was divided into different categories based on the type of surface. It is found that majority of the roads in the city (90%) were having bituminous surface. Of the remaining roads, 5% were having concrete surface, 3% WBM surface and 2% earthen surface. The condition of road is very important in deciding the riding quality of pavements. The distribution of road network according to surface type and condition are presented in **Table 8** (Ref. Annexure 5.8). It can be observed that only 37 % of the roads were in good condition. In the case of cement concrete, fairly good proportion of the roads (92%) were found to be in good condition.

Availability of footpath and drainage

The availability of roadside appurtenances is necessary for the smooth flow of traffic including pedestrian traffic. It was observed from the road inventory surveys that only 6% of the road network in Kochi city has footpath on both sides of the road and 87.5% of the roads network has drainage facility. However, only 8% of these roads were having covered drainage. **Table 9** (Ref. Annexure 5.9) gives the distribution of road network in Kochi city according to availability of footpath and drainage.

Table 5.9

Distribution of road network in Kochi city according to availability of footpath and drainage facility

Sl. No	Availability of footpath	Percentage of road length	Availability of drain	Percentage of road length
1	Footpath on one side	2	Covered drain	8
2	Footpath on both sides	6	Uncovered drain	68
3	No Foot Path	92	No drain	24
	Total	100	Total	100

Source: NATPAC Report 2006, Master Plan study for CoC

Traffic and Transport Safety

Most of the accidents occurring in the city involve pedestrians and this can be attributed to poor pedestrian facilities.

The number of road accidents registered in Kochi City has increased from 2,808 in 2002 to 30191 in 2004. An analysis of accident statistics revealed that the number of persons injured due to road accidents has increased from 2,811 in 2002 to 30224 in 2004. During the same period, the number of persons killed in road accidents has increased from 149 to 177. Table 10 (Ref. Annexure 5.10) gives the details of accidents occurred during 2002-04 in Kochi City.

Vehicle Population

The number of vehicles in Ernakulam district has increased from 91,411 in 1989 – 1990 to 525,204 in 2004 – 05 showing an average annual growth rate of 13%. Two wheelers constituted the major shares of vehicle population in the district with more than 62 percent. Table (Ref. Annexure 5.11) gives the growth trend in vehicle population in Ernakulam district during the period between 1990 and 2000.

Table 5.11 Growth trend in vehicle population in Ernakulam

Sl No	Type of Vehicle	1989 - 1990	1994 - 1995	2002 - 2003	2003 - 2004	2004 - 2005
1	Goods Vehicle	12059	15315	36628	39874	43922
2	Bus/ Mini Bus	2076	5176	9753	10931	12247
3	Car/ Jeep/ Van	24737	37481	71404	80448	91402
4	3 Wheelers	6219	17012	33478	35511	37629
5	2 Wheelers	44129	165250	283283	285221	326491
6	Others	2221	1547	12413	12937	13513
TOTAL		91441	241781	446959	464922	525204

Source: - Economic Review, Kerala State Planning Board

During the span of 15 years between 1990 and 2005, personalized vehicles such as scooter/ motor cycles and cars recorded a growth of 7.4 times and 3.7 times respectively. Buses and Mini Buses also increased by more than 5.8 times and good vehicles more than 3.6 times in 2005, compared to the vehicle population of 1990.

Composition of traffic at outer corden location is presented in figures given below. The share of car varies between 21 – 29 %. But for two wheelers it varies between 14 – 28 %. The share of goods vehicle is 14- 44 %. Buses account for 7-13 % at daily traffic. Autos account for 6-11% while slow mode is negligible. For composition of Traffic at Outer Cordon Locations (Ref. Annexure 5.F2)

5.4 PUBLIC TRANSPORT AMENITIES

The major public transport modes in Kochi are City Buses, Auto rickshaws and Ferry boats operated mainly by private operators. The bus system in Kochi area is operated by bus operators association through individual operators. A total of about 650 buses are operated on about 160 routes originating/ terminating from 60 locations scattered all over the city. The seating capacity of buses is 48, but it is observed that the average passenger occupancy is 42.

The National Urban Transport Policy (NUTP) recommends “ encourage and support investments in facilities that would keep people away from the use of personal vehicles rather than build facilities that would encourage greater use of personal motor vehicles” in order to promote sustainable development of the urban areas. The present Public Transport System may not be able to keep its present modal share under the current scenario unless policy changes in favour of public transport are implemented and complimenting them with improved Public Transport System infrastructure. The NUTP document also further state that the Central Govt. would therefore, recommend the adoption of measures that restrain the use of motor vehicles through market mechanism such as higher fuel taxes, higher parking fee, reduced availability of parking spaces etc...

The Inland Water Transport System is comprised of ferries operating from 10 major terminals. The ferries operated by Pvt. Operators as well as KINCO; act as the principal link between the mainland and islands.

The route between Fort Kochi and Vypeen is the major route having about 12,000 passengers daily. Fort Kochi – Vypeen carries the maximum daily vehicle traffic of 1225. Water transport is also being used as a major transport for carrying goods.

Bus Transport

The seating capacity of buses is 48, but it is observed that the average passenger occupancy is 42. Table (Ref. Annexure 5.12) shows the guidelines issued by the Ministry of Urban Development, Govt. of India in 1998. This is designed for effective traffic management. Aware of this situation the National Policy of Urban Transport (NUPT) recommends “encourage and support investments in facilities that would keep people away from the use of personal vehicles rather than build facilities that would encourage greater use of personal motor vehicles” in order to promote sustainable development of the urban areas. The present Public Transport System may not be able to keep its present mode share under the current scenario unless practice policy changes in favour of public transport are implemented and complimenting them with improved Public Transport System infrastructure. The NUPT document also further state that the central Govt. would therefore, recommend the adoption of measures that restrain the use of motor vehicles, through market mechanism such as higher fuel taxes , higher parking fee, reduced availability of parking spaces etc.

Table 5.12

Sl.No	City with Population in Millions	Desired share of Public Transport (%)
1	0.5—1.0	25
2	Above 1.0—2.0	30—40
3	2.0—3.0	50—60
4	3.0—5.0	60—70
5	5.0 plus	70—85

Source: Traffic and Transportation policies and strategies in urban areas in India’s Ministry of Urban Development. GOI

Suburban Railway

At present there is no suburban train service. Only long distance trains are plying. But sub urban rail system can be introduced by laying additional lines to the existing corridors. Sub urban train in north–south corridor, (Angamaly—Cherthala) and West–East Corridore (Ernakulam—Piravam road) can be introduced in the 1st phase which can be extended further to Trissur in the north and Alleppey in the south, like wise it can be extended to Kottayam in the east. In this context we limit the coverage upto Kalamassery in the north, Kumbalam in the south and Tripunithura in the east, which is the limit of designated Kochi city and can be extended further in due course. The Railways Department may make sufficient investment considering the need for the proposal.

Mass Rapid Transport System (MRT)

M/s RITES has identified a corridor starting from Alwaye in the north and Pettah in Tripunithura in the east via Ernakulam South, which is the most critical path demanding mass transport after a detailed and comprehensive study. A detailed project report has been prepared for this 25.253 km length corridor with an estimate amount of Rs 2239 crores by the Delhi Metro Rail Corporation. Expression of interest has been invited as a BOT project and is under scrutiny by GOK. As per the DPR viability gap of Rs 635 crores has been reported.

FARE STRUCTURE

City Bus

For city buses minimum fare is Rs.3/- up to 5 km and 52 paise per Km for additional distance.

Auto rikshaw

R.T.O. has fixed minimum fair of Rs. 10/- for 1.5 km distance with subsequent increase by Rs. 5/- for each additional KMs and waiting charge of Rs. 1/- for 15 minutes

Taxi charge

Minimum Rs.50 /- for a distance of 5 km and Rs. 6.5 per km for additional distance and waiting charge is Rs. 6 / per hour

Ferry

Refer Annexure 5.13

PARKING

Parking Characteristics

Parking survey was carried out at selected corridors as indicated in figure below. The registration number plate method was used to carry out the survey. The registration numbers of the parked vehicle were noted for every half-hour interval. The out puts obtained from the analysis are broadly classified into Parking Accumulation, Parking Duration and Parking Demand

Figure 5.1 Pedestrian and Parking Survey Locations

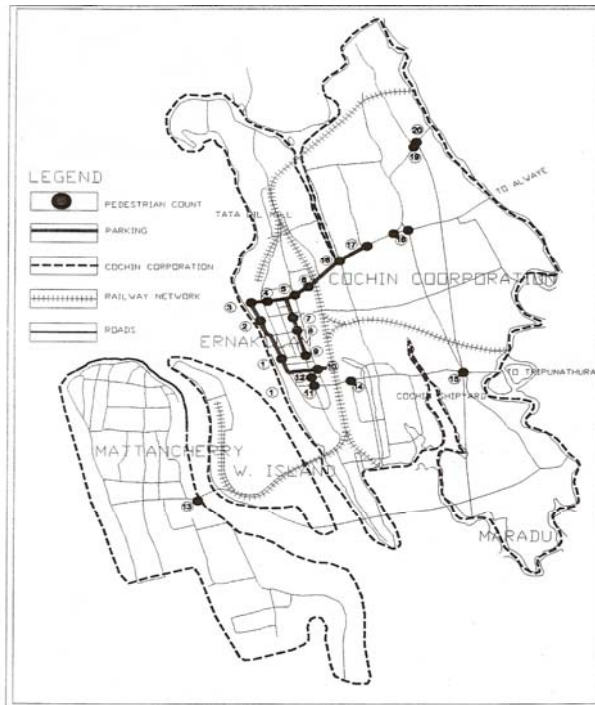


Figure 2:55 Pedestrian and Parking Survey Locations

Table 5.14

PARKING DEMAND

Sl.No	Location		car	AUTO	T.WHL.	LCV	Paking demand (E.C.S.)
1	M.G. Road	Ravi Puram to Madhav Pharmacy	1698	972	1891	0	3143
		Madhav Pharmacy to Ravi Puram	2162	1038	2092	0	3723
2	Banerjee Road	Kaloor to High Court	491	428	693	0	1092
		High Court to kaloor	876	398	803	0	1475
3	Edappaly Road	Kaloor to Jwaha Std.	339	164	489	0	625
		Jwaha Std to Kaloor	288	209	470	0	615
4	Broadway Road	Banerjee Road to Paico	93	43	65	12	182
		Paico to Banerjee Road	489	214	537	39	935
5	Shanmugham Road	High Court to Hospital	553	129	450	0	795
		Hospital to High Court	359	83	291	0	515
6	Market Road	Veg. Market to Hospital	484	340	428	53	1064
		Hospital to Veg. Market	270	217	378	49	704
7	S.A. Road	Pallimuku to Janatha	266	147	270	0	481
		Janatha to Pallimuku	286	204	467	0	610
8	South Jn. Road	Ssouth Jn to Jos Jn.	378	377	200	0	805
		Jos Jn. to South Jn.	31	51	111	0	110
9	D.H. Road	Jos Jn.toB.T.H.	139	187	198	0	376
			113	84	123	0	238

Source:- Comprehensive study for GCDA area by RITES

PARKING SURVEY**Traffic attraction zones**

The parking survey analysis shows that high parking demand are around M.G.Road, Shanmugham Road, Banerji Road, Broadway, Market road etc. These areas are basically commercial centers; more the activity the parking demand will be high. Parking is directly depended on activity. If the activity increases the parking demand would increase proportionately.

Parking Accumulation and Duration

Peak parking demand, parking duration of vehicles has been analysed. The highest demand has been observed at M.G. Road (3723 ECS) followed by Banerji Road (1474 ECS). Parking demand is significant at Market road (1064 ECS) Broadway (935 ECS) South Junction (805 ECS) and Shanmugham Road (795 ECS) (Ref. Annexure 5.14)

Short-term parking (<4 hours) is predominant at all corridors. The long-term parking is observed mainly along Shanmugham Road (8%) and S.A. Road (4%). The maximum parking space hours are observed at M.G. Road along Madhava Pharmacy to Ravipuram (4701) followed by Banerji Road along High court to Kaloor (1708). (Refer Annexure 5.15 & 5.16).

PER CAPITA TRIP RATE

The total daily trips, as derived from the household survey, in the Greater Cochin area are about 14.56 lakhs. About 92 % of these are vehicular trips while 8 % are walk trips. The per capita trip rate is found to be 0.765,

of this the component of vehicular trips is 0.704 and walk trips is 0.061. Of the total trips, about 19 % of the trips are intra-zonal while 81% are inter-zonal. Among the vehicular trips, the inter-zonal trips contribute about 14% and intra-zonal trips contribute about 78% of the total trips. Of the walk trips, intra-zonal trips contribute about 6%, while inter-zonal trips contribute about 2 % of the total trips.

PEDESTRIAN SURVEY

The pedestrians are the most vulnerable road users in the city, where the footpath are absent except for M.G.Road and Banerji Road. There is large amount of pedestrian crossings near ferry stations and at major intersections. Analysis revealed that provision of pedestrian surveys at Menaka, Kacherippady, Town hall, Kaloor, Kadavanthra are warranted continuous footpaths of minimum 2 m. width are required along either side of arterial roads. Zebra crossings at major intersections are required to ensure safe pedestrian crossings.

5.6 TERMINAL SURVEY

Bus Terminal Survey

Surveys were conducted at 5 bus terminal from 6 A.M. to 10 P.M. regarding the parking accumulation, parking duration and passenger interviews

It is seen that uniformly in all terminals almost 90% of the buses have parking duration less than 30 minutes. The heaviest passenger volume is observed at Kaloor with 21406 passengers. About 15% of bus journey are below 5k.m. Trip length 13% between 5-10 km., 11% between 10-15 km., 27 % between 15 to 20 km. 25 % between 20-50 km. while only 9% proceed 50 km trip length. From the start point to originating terminal, about 50% of the trips are performed by bus, 42 % by walk, 4% by autos and 4% by other modes. From the terminating terminal to end point 29% of the trips are performed by bus, 65% of the trips by walk, 4% by autos, and 2% by other modes.

IWT Terminal Survey

The passenger inflow/outflow at important ferry terminals was surveyed to assess the characteristics of IWT transport. Important ferry terminals spread over the area were selected for the purpose. The route between Fort Kochi and Vypin is a major route with 11,688 daily passengers. The classified vehicle count was carried out and it is seen that Fort Kochi – Vypin route carries the maximum daily vehicle traffic of 1225. About 49% of the IWT trips are for work purpose and 16% for education. For faster and more efficient IWT service about 87% are willing to pay 125 % of the existing fare. From the origin to the IWT Terminals, 61% of the trips are performed by bus, 32% by walk and the balance by two wheelers and autos. About 39% of IWT trips are less than 0.5 k. m. trip length.

5.7 INSTITUTIONAL ARRANGEMENTS

The facilitation and management of traffic and transportation in this area is at present done by a multiplicity of agencies/departments like Local Bodies, GCDA, GIDA, Roads and Bridges Corporation, PWD, NHAI, RTO, Police, KINCO, KSRTC, Railways, Road Fund Board, Inland Waterways Authority of India etc... No single agencies are solely accountable for providing transport services as well as transport infrastructure resulting in overlapping functions, functional and spatial fragmentation.

Key Issues and Challenges

- ❖ Inadequate lane width to carry the present / future traffic volumes
- ❖ Insufficient East-West corridors and lack of ROB's
- ❖ Absence of properly configured intersections and junction flyovers.
- ❖ Chronic parking problems in CBD area
- ❖ Poor pedestrian infrastructure (absence of subway, footpath, pedestrian crossing etc)
- ❖ Absence of bus bays
- ❖ Bus terminal situated in CBD which compels the Buses to ply through the congested corridors of CBD.
- ❖ Insufficient traffic management system
- ❖ Absence of integrated terminals for different modes of transport (Road, Rail, Water, Air)
- ❖ Absence of truck/ transport terminal at present
- ❖ Declining share of public transport
- ❖ Poor road maintenance (As there is rain for nearly 6 months, roads are damaged very quickly which incur heavy cost on maintenance of the roads)

- ❖ Signals, metro –usability funds
- ❖ Vehicle carrying capacity of the road is not growing proportionate with the growth of vehicles
- ❖ Lack of organized Taxi / Auto Stand
- ❖ Encroachment of Road / Footpath by street vendors / Bunk Shops
- ❖ Lack of Public comfort Kiosks
- ❖ Lack of Co ordination among departments
- ❖ Lack of utility ducts

Kochi city is expecting enormous growth very shortly due to the coming up of International Transshipment terminal at Vallarpadam, the LNG terminal at Puthuvipu, the SBM (Single Buoy Mooring) of KRL at Vypin, the special economic zones at Vypin/ Vallarpadam, Kakkanad, the internet cities, cruise terminals etc... Kochi is the Gateway for all the international optical cable fibre net work. This will be an added advantage to Kochi to become an IT hub of India. All the above will fuel the development of many international business ventures in the city.

The current road network and public transport cannot handle the present travel demand. The proposed projects will add fuel to the existing burning problem if not tackled properly. There is no single agency accountable for the management monitoring and comprehensively facilitating the overall transportation mechanism. Formulation of a Unified Metropolitan Traffic and Transport Authority of Kochi is required to effectively co-ordinate all modes of transport operating in this area.

5.8 Vision

To attain an integrated transport system which leads to efficient, speedy, smooth, comfortable and safe traffic flow with high priority to public transport which is environment friendly and accessible to the disabled.

5.9 Strategies

5.9.1 Strategy for network improvement

Widening and Strengthening of carriage way of Road Structures

With due consideration to the growing traffic intensity, major roads, corridors, state highways and National Highways running through the city are to be extended and expanded. This shall involve construction of flyovers, bridges, subways/ foot over bridges, improvements to intersections etc. This shall also involve removal of encroachments on road margins, shifting of electrical poles, trees etc. and strengthening of road structures with pavements, footpaths and surface margins with a provision for storm water drains, utility ducts etc.

Construction of New Radial Roads, which are the Missing Links in the Transport Network

To connect the existing city area to the newly developing outskirts area, Ring roads and radial roads are proposed in the Master Plan. This will provide for the planned connectivity and proper road alignment to facilitate growth of peripheral areas.

5.9.2 Strategies for Planning, Reforms and Institutional Strengthening

Constitution of Greater Cochin Transport Authority (GCTA)

The issue of institutional accountability can be addressed by formulating an apex authority “Greater Cochin Transport Authority”. It establishes coordination between the line departments in providing an efficient transport services. This acts as the single most authority that has administrative control of the transport sector.

Comprehensive Traffic and Transport Study for the entire CUA Region

Greater Cochin Development Authority initiated the comprehensive study of traffic and transportation system for Greater Kochi area. This study was carried out by RITES and the study report was submitted in 2001. The study report proposed various road infrastructure development schemes to be taken up and one of the major improvement proposals pertained to the development of Light Rail Transit system between Aluva and Thrippunithura. But this report has to be updated considering mega projects like Container terminal project, IT projects etc to be launched at Cochin soon.

This strategy is aimed to come out with sustained solutions for the entire Kochi and its suburbs as a unit that has financial and environmental viability. This also includes the current institutional analysis, policy, and financial and service delivery issues

Traffic and Transportation Management using G.I.S. and GPS Technologies

Use of Global Positioning System (GPS), a satellite based positioning and navigation technology, will help track the position of the public transport vehicles from a central location. This data is very useful in assessing the performance of the services offered. The same data can be beamed back to the electronic information boards at bus stops that will display information on the location of the busses and the expected arrival time. Use of such service has additional benefits in tracking the traffic conditions on the roadways, unauthorised roadside parking, delays at intersections, passenger demand, as well as immediate notification to the control centre in case of accidents, all without any involvement of the driver or conductor. This strategy will also improve the share of public transport.

5.9.3 Strategy for Finance

Urban Transportation Development Fund

Infrastructure development for efficient functioning of transport system is a capital-intensive process and a substantial financial burden will have to be shouldered by the government. The state government or the local bodies do not have the required resources for financing such developments, thus delaying the projects indefinitely. The Central Government in the National Urban Transport Policy (NUTP) has recommended levy of direct taxes that would be credited to the account of the 'Urban Transport Fund' and used exclusively to meet the urban transportation needs. NUTP has further specified that such direct taxes could be in the form of a supplement to the petrol and diesel taxes, betterment charges on landowners or even in the form of employment tax on employers. Such provisions will also result in making private vehicular transport more expensive and result in a shift towards use of public transport systems. A similar approach is recommended for implementation in Kochi.

5.9.4 Improve the Share of Public Transport

Increasing the Fleet of Bus

As per the standards of GoI, a city should have at least 100 buses per lakh of population. It is also mentioned that by 2020, this should go up to 250 buses per lakh population. This is also supported by the prevailing over crowded buses specifically in peak hours. With the introduction of MRTS and Suburban railway system the need for buses can be reduced slightly. Hence a fleet of 100 buses per annum for the three consecutive years will meet the demand. In addition mini luxury buses can be introduced to ply through the city centre linking the major residential areas of the city. This will reduce the use of personal vehicles & thereby reduce traffic congestion.

Dedicated Bus corridors, Bus bays and Terminals:

100 bus bays have been identified for provision of convenient stoppages for buses so that they do not cause inconvenience to the traffic following through the major corridors. Further, dedicated bus corridors and construction of bus terminals at major hubs will ease the traffic flow, significantly increase the share of public transport and will also improve the comfort of the passengers through the development of 'hub and spoke' system of transport.

Introduction of MRTS:

Regarding the mass transport system, DPR for Kochi metro project has been prepared by Delhi Metro Rail Corporation and the expression of interest as received is under scrutiny. The total project cost is Rs 2239 crores for a length of 25.25 KM starting from Alwaye to Petta and Tripunithura. The project is proposed to be implemented on BOT basis and as per the project report it is understood that an amount of Rs 635 crores is required as viability gap fund.

5.9.5 Strategy for Better Transport Infrastructure Streamlining, regularising the heavy cargo transport

As the work of major projects like Container Transshipment terminals have already started in addition to the existing port facilities, specific dedicated corridors along the important routes will be developed extensively for the

cargo transport along the important routes where such cargo transport traffic is predominant. This traffic will be regularised in city core by introducing differential timings. Adequate number of Truck terminals will be provided to prohibit the on road parking of heavy cargo.

Junctions and Traffic Signal improvements

Cochin City has about 39 intersections, out of which only a few on CBD area are manned. All of these intersections shall be scientifically improved and provided with better LED controlled signal system.

Synchronized traffic control

There are more than 25 signalised intersections in the Cochin city area alone. Unless all these signals are linked with suitable area traffic management system, the overall delays may not come down. Optimisations of signals as an integrated network will be able to give better results pertain to the core area. Hence the Synchronized system with traffic sensors on the approaches, assisted by Video Cameras for incidence detection and management shall be installed.

Traffic Signs and Markings

The traffic in Cochin City being mixed in nature and carriageway being a non-standard format, the carriageways need extensive traffic signs and road markings to provide guidance for disciplined and safe driving. It is observed that on many important corridors traffic guidance in the form traffic signs and lane markings are not up to the standards. It is necessary to standardize the lane markings, edge markings, median markings, pedestrian crossings, parking zones etc, Locations for installing traffic delineators, and traffic are identified on all important travel corridors extending over a length of 320 Km and the same has to be implemented.

Parking management

It is proposed to demarcate parking stalls and design the parking fee structure to improve parking turnover. A proper parking policy, which looks at users-pay principle, is imperative. Off street parking complexes (Elevated parking) for private vehicles at 39 important nodal points in the city are required to ease traffic congestion by releasing precious carriage way. Involvement of private partnership will be sought for such projects. Underground paid parking lots are proposed to be developed in public open areas in CBD. Besides there is urgent need to stream line the para-transit vehicles at major trip attraction centres by provision of suitably designed para-transit hubs. As many as 5 locations have been identified to implement this scheme. Similarly there is a need for providing parking spaces for private bus operators. 16 such locations, on all major arterial roads are identified for this purpose.

Parallel roads

There are situations when alternative roads have to be developed to reduce the traffic load on overburdened links. Finding space for such development is difficult in densely built up areas of the Urban Area. Only possibility is to open up new corridors by utilising the vacant land available at the peripheral areas of the city. Such a plan will have dual benefits of providing alternate routes and also help in non-encroachment of important lands.

Road widening

Given that the percentage area covered by roads in the city is less than 10 % of the total area, road-widening programme improves channel capacity by adding more area to the circulation channels. Cochin is one of the cities, which has been able to implement road-widening programme with the participation of nearby land owners, successfully, most of them surrendering their land free of cost for the formation of road. 16 major congested links have been identified for widening with some of them being already implemented.

Conclusion:

The growth in number of vehicles has far exceeded the growth and spread of the roads in the study area during the past 15 years. The total number of registered vehicles in the district is almost 5.75 times the number in 1990. Public transport, however, caters to the major share of trips (72%). This has rendered the roads congested leading to traffic blocks. Improper junctions, inadequate lane widths, narrow bridges, encroachment of roads and absence of integrated terminals, all lead to inefficient traffic flow. The expected growth of population in the light of

major investments proposed is likely to worsen the situation. The strategy is to improve the road network by providing missing links, improve the junctions, integration of different modes of transport, full exploitation of the water transport facility, creation of an Urban Transport Development Fund, constitution of a Greater Cochin Transport Authority, rationalization of bus routes, provision of parking facilities (underground & vertical) & development of Truck Terminals outside the city. Suburban railway system with MEMU services can contribute towards decongesting the road network. The total project cost under the Traffic and Transportation sector comes to 4252crores excluding the funds required for suburban rail service.