GOVERNMENT OF KERALA
KERALA STATE PLANNING BOARD

THIRTEENTH FIVE-YEAR PLAN
(2017-2022)

WORKING GROUP ON

ROAD AND ROAD TRANSPORT

REPORT

INDUSTRY AND INFRASTRUCTURE DIVISION

KERALA STATE PLANNING BOARD
THIRUVANANTHAPURAM

MARCH2017

PREFACE

In Kerala, the process of a Five-Year Plan is an exercise in people's participation. At the end of September 2016, the Kerala State Planning Board began an effort to conduct the widest possible consultations before formulating the Plan. The Planning Board formed 43 Working Groups, with a total of more than 700 members – scholars, administrators, social and political activists and other experts. Although the Reports do not represent the official position of the Government of Kerala, their content will help in the formulation of the Thirteenth Five-Year Plan document.

This document is the report of the Working Group on Road and Road Transport. The Chairpersons of the Working Group were Shri Subrata Biswas, Shri E Sreedharan and Professor Sushil Khanna. The Member of the Planning Board who coordinated the activities of the Working Group was Dr Ravi Raman. The concerned Chief of Division was Shri N. R. Joy.

Member Secretary

FOREWORD

Transport plays a significant role in the economic development of any region. As road transportprovides door-to-door connection and flexible movement of goods and passengers, its patronage by people are on the rise day by day.The quality of life now greatly depends on the quality of roads.The transport system in Kerala needs much improvement. The category of roads includes National Highways, State Highways & Major District Roads and PWD & local body roads.The State had cent percent connectivity to all villages by all-weather roads.

The capacity augmentation of PWD road is very slow compared to vehicular growth. There is great mismatch between the vehicular growth and augmentation of roads in the state. With adherence to IRC specifications, the existing roads has to urgently undergo qualitative improvement accomplishing multi pronged strategies to reduce traffic congestion, transit delay, environmental issues, easier access to desired destinations and reduction of accidents. Most of the roads have to undergo massive upgradation incorporating road safety features. It is proposed that major NHs and SHs passing through the State are to be widened to four lane standards with divided carriage way.The balance NHs and SHs are to be widened to two lane standards with adequate shoulders/ footpath, and other major roads to be widened with intermediate lane and adequate shoulders.

The new road development initiatives like the Hill Highway, Costal Highway, bypasses etc, also needs to be addressed in the 13thFive-Year Plan. Along with this priority should be given for the formulation of a "Regulatory Body" at the State Level and "Inter-departmental Co-ordination Committees" at the district level including representatives of the various departments/agencies and experts in the fields of transport sector for better preservation, maintenance & management of roads and vehicles.

The State Planning Board has constituted a Working Group on Road and Road Transport Sector for evolving suitable strategy and approach to 13th Plan under the Co Chairmanship of Shri.Subrata Biswas IAS, Additional Chief Secretary to Govt, Public Works Department,Shri. E. Sreedharan, DMRC, Delhi and Prof. Sushil Khanna, Indian Institute of Management, Kolkkatta.The Committee made three sittings and after detailed deliberations came out with the report covering policies and programmes needed for the transport sector development during the 13th Plan.

The Committee constitutes a drafting committee consists of Shri. T. Elangovan, former Director NATPAC, Shri. James Vadakkan, Member Gulathi Institute of Finance and Taxation and Dr. B.G. Sreedevi, Director NATPAC as members.We would like to make a mention about the service rendered by Shri. Sanjai R.J. Technical officer NATPAC for co-operating the preparation of the report.

We are grateful to all members for their participation and valuable suggestions /recommendations for road development strategy. Particular mention needs to be made for the support and whole hearted co operation of Dr. Raviraman, Member, State Planning Board right from the constitution of the Working Group to the finalisation of the Report. Special reference

is mentioned for Shri. N.R. Joy, Chief & Convener and Smt. Sangeetha K.R. Assistant Director & Co Convener,Industry and Infrastructure Division, State Planning Board arranged meeting and collected the materials from the different members of the committee for the preparation of the Report.

Sd/-	Sd/-	Sd/-
Shri Subrata Biswas IAS	Shri. E. Sreedharan	Prof. Sushil Khanna
Additional Chief Secretary to Govt	DMRC	Indian Institute of Management
Public Works Department	Delhi	Kolkata

CONTENTS

ANPR	Automatic Number Plate Recognition
AIS	Abbreviated Injury Scale
ARAI	Automotive Research Association of India
BMS	Bridge Management System
CBD	Central Business District
CNG	Compressed Natural Gas
CAGR	Compound Annual Growth Rate
CSIND	Kerala Shipping and Inland Navigation Department
CIAL	Cochin International Airport Limited
CCTV	Closed Circuit Television
DBFOMT	Design, Build, Finance, Operate, Maintain and Transfer
DEMU	Diesel Electric Multiple Unit
DMRC	Delhi Metro Rail Corporation
DRIQ Board	Design, Research, Investigations and Quality Control Board
DRSC	District Road Safety Council
EMU	Electric Multiple Unit
EMS	Engineering Procurement and Construction
FP	Fast Passenger
GPS	Global Positioning system
GST	Goods and Service Tax
GVA	Gross Value Addition
ICAO	International Civil Aviation Organization
ICD	Inland Container Depot
IPT	Intermediate Public Transport
IRC	Indian Road Congress
iRAP	International Road Assessment Programme
IRQ	Improvement of Riding Quality
ITS	Intelligent Transport System
IWT	Inland Water Transport
IWAI	Inland Water Authority of India
JV	Joint Venture
KHRI	Kerala Highway Research Institute
KIIFB	Kerala Infrastructure Investment Fund Board
KIAL	Kannur International Airport Limited
KMBR	Kerala Municipal Building Rules
KMRP	Kochi Metro Rail Project
KMRL	Kochi Metro Rail Limited
KRFB	Kerala Road Fund Board
KRSA	Kerala Road Safety Authority
KSRTC	Kerala State Road Transport Corporation
KSINC	Kerala State Inland Navigation Corporation
KTDFC	Kerala Transport Development Finance corporation
KURTC	Kerala Urban Road Transport Corporation
LPG	Liquefied Petroleum Gas
LSG	Local Self Government
LSFP	Limited Stop Fast Passenger
MEMU	MainlineElectric Multiple Unit
MDR	Major district Roads
MLP	Multi Level Parking
MoRTH	Ministry of Road Transport and Highways
MoR	Ministry of Railways
MRTC	Mass Rapid Transit System
MVD	Motor Vehicles Department

MVRC	Mumbai Rail Vikas Corporation
NATPAC	National Transportation Planning and Research Centre
NGOs	Non Governmental Organizations
NH	National Highways
NHAI	National Highway Authority of India
NHAI	National Highway Authority of India
NME	National Mission for Education
NSDP	Net State Domestic Product
NWW	National Water Way
PCU	Passenger Car Unit
PPP	Public Private Partnership
PMS	Pavement Management System
PWD	Public Works Department
R&D Projects	Research and Development Projects
RBDCK	Roads and Bridges Development Corporation Kerala
RFQ	Request for Quotation
RHMP	Rolling Heavy Maintenance Programme
RICK	Road Infrastructure Company Kerala Ltd
ROB	Railway Over Bridge
ROW	Right of Way
RTO	Regional Transport Office
SGDP	State Gross Domestic Product
SH	State Highways
SOP	Standard Operating Procedure
SPV	Special Purpose Vehicle
SRIP	State Road Improvement Project
SSA	Secondary Switching Area
STUs	State Transport Undertakings
SWTD	State Water Transport Department
TEUs	Twenty Foot Equivalent Unit
ULB	Urban Local Bodies
UMTA	Unified Metropolitan Transport authority
USA	United States of America
WCC	West Coast Canal

EXECUTIVE SUMMARY

Kerala is unique in many respects among the States of India. Kerala State is endowed with all major modes of transport like road, rail, water and air transport. The State boasts of one of the highest road density (853 km./100 sq.km), approximately three times the National average (387 km./100 sq.km). The State had cent percent connectivity to all villages by all-weather roads.Inland water transport, the most fuel efficient and environment friendly, although relegated to the background with the advent of faster motor transport is still working efficiently in the backwaters of central and south Kerala.This mode is now mostly used for ferry and tourist transport. The present transportation system in the state was evolved by piece-meal process, which remains under connected and uncoordinated. It is characterized by high operating cost, inefficiency and high accident risk.

The state is witnessing an unpredicted growth of motor vehicles. The annual growth of motor vehicles is such that it doubles in 5 to 6 years. There are about 3.72 lakh kilometers of roads in the state of which only 20 percentage are motorable. The rest are mostly narrow or single lane pathways intended for residential or street connectivity. 80 percentage of motorable traffic uses the arterial and sub-arterial roads consisting of National Highways, State Highways and Major District Roads which are under the supervision of Public Works Department. The capacity augmentation of PWD road is very slow compared to vehicular growth. There is great mismatch between the vehicular growth and augmentation of roads in the state. With adherence to IRC specifications, the existing roads has to urgently undergo qualitative improvement accomplishing multi pronged strategies to reduce traffic congestion, transit delay, environmental issues, easier access to desired destinations and reduction of accidents. Most of the roads have to undergo massive upgradation with widening and incorporation of road safety features. It is proposed that major NHs and SHs (state highway) passing through the State are to be widened to four lane width with divided carriage way.The other NHs and SHs are to be widened at least two lane standards with adequate shoulders/ footpath, and other major roads are widened to intermediate lane with adequate shoulders. The other road development initiatives like the Hill Highway, Coastal Highway, bypasses etc, also needs to be addressed in the 13thFive-Year Plan. Along with this priority should be given for the formulation of a "Regulatory Body" at the State Level and "Inter-departmental Co-ordination Committees" at the district level by including representatives of the various departments/agencies and experts in these fields of road and road transport for better preservation, maintenance & management of roads and vehicles.

Sixty percent of the vehicles registered and 45 percent of the road accidents in the state are in urban areas.Many urban areas have begun to feel the adverse effects of motorization like traffic congestion, acute shortage of parking spaces, road accidents and increasing levels of air pollution. The urban transport infrastructure should be planned to meet the long term projected demand of the commuters and other sections of the society. The serviceability indictors for the city should be fixed and action to be taken to achieve this during the 13thFive-Year Plan. Dedicated lanes for Public Transport System should be given top priority in all major urban areas along with the integrated terminals and public transport corridors. All bus stops should have modern bus shelters with passenger information system and passenger amenities. Measures to curb the use of private vehicles like restriction of odd-even number plates on alternate days,

congestion charging on selected corridors in the Central Business District (CBD) areas, implementation of green tax, observance of bus cum cycle day etc. shall be considered for implementation. The above measures will result in reduction of the share of private vehicles in urban area.

Road side parking is one of the major issues to be addressed to improve the level of service.Effective control and sustained enforcement of the existing rules itself can stop on-street parking on all roads. Parking restrictions and imposing parking fee are short term measures to curb parking. The long-term solution is to provide adequate parking facilities within the premises and PPP model parking facilities.

Kerala State has a total fleet of 25,449 buses, of which 19,145 are private buses (75%) and 6304 are KSRTC buses (25%). Private buses dominate the Bus Transport in all the districts of Kerala except Thiruvananthapuram. Public Transport Buses (stage carriages) per lakh of population in Kerala is 73 compared to 36.7 in Tamil Nadu (27503 buses) and 57.9 in Karnataka (36,66 buses). Occupancy Ratio in public transport buses in Kerala is just 50% only which indicates more than sufficient public transport buses. The main thrust in the 13thFive-Year Plan should be to shift commuters from using private vehicles to public transport, thereby reducing the number of personal vehicles on the road. The first step in this direction should be introduction of many more mini and medium buses which can operate in small and narrow roads with less passenger capacity. For this the Government has to consider conscious decision to reduce substantially quarterly road tax for public buses.Introduction of modern AC buses in all intercity and long distance routes should be considered. To support the development of viable integrated public transport system, it is essential that the station accessibility is also improved in line with the introduction of rationalized routes and feeder services by way of infusing aspects like walkability, cyclability, connectivity and multi modal integration.

By streamlining goods movement the priority should be given for the shifting of road based cargo traffic to water transport. It is expected that once NW No.3 becomes operational about 20% of the road based cargo traffic is expected to shift to water transport for which different policy initiatives and interventions are needed.The overall share of IWT is likely to be 5% by the end of 13th Plan period. Upgradation/introduction of automated modern integrated check posts will act as an effective monitoring system with hassle-free and speedier clearance, thereby reducing the down time from entry and exit. It would be desirable to frame a freight policy providing wider benefits to society, economies of scale in the provision of freight transport services in all sectors which lead to greater logistics efficiency, lower costs and more sustainable distribution. Several old inland feeder waterways including rivers and streams needs to be revived and modernized to include maximum cities and towns in the Inland waterway network.

More emphasis should be given to the reduction of road accidents in a phased manner. First step to initiate will be by strengthening the automated enforcement using different ITS techniques. Installation of maximum number of speed cameras will help reduce over speeding and accidents along with the usage of ANPR Cameras. This will take ahead step for controlling of road accidents. The need for establishing of Weigh Bridges along the sides of National Highways and State Highways should be addressed during this 13thFive-Year Plan. The Government should

publish suitable material to educate/aware public about role of "Good Samaritans" so that more people come forward to help the road accident victims to reach the nearest hospital, in case they come across one.

Even though planning of integrated Multi-modal Transport System has been in vogue in the state for the last several years, the objective was not achieved in an appreciable manner. Coastal shipping and Inland Water Transport (IWT) have not been able to realize their full potential of growth though they are more energy efficient, environmentally cleaner and economical. At present the Western Central Kerala region has the benefit of road, rail, Inland and Port connectivity.In order to promote inter-modal transport coordination for safe, efficient, customer friendly and faster movement of goods, there is a need tostandardize a common carrier or transfer method (Roll on-Roll off)which can be transshipped by road, rail, and barges and ships.

Development of new rail projects including railway lines has become a Joint Venture Project between Govt of Kerala and Ministry of Railways (GoI), adequate state funds need to be earmarked to match the funds allotted by the Ministry of Railways for rail development during the 13thFive-Year Plan. Planning of integrated multi- modal transport system and other major projects like extension of Kochi Metro, implementing of light metro, water metro, high speed rail, suburban rail etc. should be considered during 13thFive-Year Plan.

For the safety of travelers, especially women and children, SOS mobile application can be handy. In all modes of public transport and intermediate modes of public transport (auto, taxi etc.), driver (and conductor) identity and license display system could be implemented so that it can help deter anyone from taking any wrong steps. Heavy vehicles especially public passenger vehicles should be installed with CCTV cameras for crime detection and prevention. The side covering of auto rickshaws could be made transparent so that there is more visibility to the driver as well as fellow road users.

Land acquisition remains a major hurdle in Kerala considering the fact that land is scarce and therefore its utilization should be done judiciously. Land has to be made available for development of transport infrastructure taking into account the present and future demand confirming to relevant codes and practices prescribed/ followed by competent agencies like Indian Roads Congress (IRC), Ministry of Road Transport and Highways etc. A sound Policy should be in place for monetary compensation and/or rehabilitation of displaced people so that land acquisition does not stall the progress of any region.

Policy level intervention is required for making traffic studies mandatory for medium and large scale buildings. Traffic impact studies should address the issues of travel needs of the prospective visitors to and within the buildings and suggest measures to promote the use of public transport and non-motorized forms of transport. The developer would have to bear a part of the expenditure incurred in the improvements to be made to overcome the effects of this new development. Post impact studies would help in assessing the shortfalls and plan remedial measures.

At least 45% of the enforcement and engineering related manpower should be trained to manage and operate different transport operations and to control traffic congestion in cities and highways. Government should also take adequate steps to encourage in creating reserve traffic wardens after giving necessary training to students, youths and other volunteers/social activists to regulate traffic congested junctions during peak periods on voluntary/part time basis.

The number of dumped vehicles in various departments (police stations, Motor Vehicle Office) and those being dumped on the road side is increasing every day.Moreover, the dumped vehicles near road side create hindrance to road users and pose a serious threat to pedestrians. An effective system to address the issue is thus currently absent. In this regard, setting up a small shredding plant should be considered during 13th Plan. The metal used in such plants will generate more revenue and is sustainable.The processed dumped metal is supplied to secondary steel industries.Thus the shredding of confiscated vehicles in metal scrapping plants provides an effective and efficient solution to the problem of dumped vehicles. Suitable plans/techniques should be evolved for transport waste management including recycling of tyres, tubes, spare parts, oil, workshop wastes etc.

The transport sector is highly dependent on fossil fuels and is also the major sources of air pollution, especially the greenhouse gas emissions. In order to reduce the ill effects of transportation such as air and noise pollution, policy level interventions like imposition of green tax on vehicles above 10 years of manufacturing, incentives for green technologies, use of vehicle technology and promote switching from fossil fuels to LPG/ CNG/ Hybrid etc. are required. Electric vehicle charging points and related facilities have to be planned to encourage their use on a large scale. Customization of horns should be booked as a violation, fined and confiscated to avoid high decibel horns which in turn reduce noise pollution. Hence any future Transport Development must be based on the policy of Sustainable Transport. There should be a shift from the present private vehicle oriented infrastructure to mobility oriented sustainable technologies. Facilities for walking and cycling should form an integral part of road construction.

The Government should provide adequate budgetary support by earmarking at least 80 percent of all revenues earned from the transport sector for the development of transport infrastructure and should also encourage the private investment in developing transport infrastructure in the state. Along with this Government should also ensure the availability of land and guaranteed minimum returns to the Special Purpose Vehicles constituted for the purpose by way of capital grant and annuities to bridge the short falls in the revenue.

CHAPTER 1
OVERVIEW OF TRANSPORT SECTOR

General

1. The importance of infrastructure for sustained economic development is well recognized.Adequate and efficient infrastructure lowers transaction cost, has string backward and forward linkages, directly impacts the quality of life and acts as a catalyst in the growth and development of an economy. Transport is a crucial component of infrastructure.A well developed transport networks facilitates the integration and interdependence of different sectors by aiding quick and adequate movement of people and material. Transport infrastructure is also important for integratingrural communities in the socio economic structure of the nation. The transport system helps in expanding the market for goods and by doing so, it aids reaping the benefit of division of labour and thereby large - scale production. It is essential for the movement of raw materials, fuel, machinery etc. to the places of production. The more extensive and continuous the production in any sector, the greater will be the need for the transport facilities.

India

2. India has an extensive road network and provides amenity to millions of people every day, thus road transport is one of the important ingredients for the social and economic development of the country. Therefore, if agriculture and industry make up the "body" of the Indian economy, transport and communications constitute its "nerves".The major modes of transport in India are roads, railways, airways, shipping and inland waterways. The sector is dominated by road transport, both in terms of share in passenger and freight carried and in terms of contribution to the national economy. Between the two main modes of transport, viz. road and railways, road transport carries about 90 percent of the total passenger traffic and 67 percent freight traffic. In terms of contribution to the economy, road transport contributes about 3.3 percent of Gross Value Addition (GVA) against the total transport sector contribution of 5 percent in the GVA. Sustained economic development and expanding road network have led to rapidly increasing motorized vehicles in India. Table 1.1 below gives the share of various sub sectors of the transport sector in GVA since 2011-12.

Table 1.1 *Percentage Share of Different Modes of Transport in Gross Value Added (GVA) at base year (2011-12)*

Sector/Year	2011 -12	2012-13	2013-14	2014-15
Transport Sector	4.92	5.02	5.01	4.99
ofwhich				
Railways	0.75	0.81	0.80	0.81
Road Transport	3.24	3.30	3.30	3.28
Water Transport	0.09	0.08	0.08	0.08
Air Transport	0.05	0.05	0.05	0.05
Services Incidental to Transport	0.78	0.78	0.77	0.77

Source: CSO

3. The total road length of the country increased significantly from 3.99 lakh km in 1951 to 54.02 lakh in 2014 and further to 54.72 lakh km in 2015, growing at a Compound Annual Growth Rate (CAGR) of 4.2 % up to 2015 from 1951.As on 31st March 2015, India's road density at 1.66 km /sq.km of area was higher than that of Japan (0.91 km/sq.km), USA (90.67 km/sq.km) and China (0.46 km/sq.km).National Highways account for only about 2 % of the total road length, but carry about 40 % of the total traffic. Out of the total length of National Highways, only 12% is four lane standard or more.

4. The Indian Railways are the second largest in the world under single management and consist of an extensive network of routes spread over 63,500 Km. Freight accounts for roughly 67% of revenues of the railways, and hence is financially more important. Civil aviation is gradually gaining importance in passenger movement with increased private participation in the operation of airlines and gradual improvements in airport infrastructure.However, it still is a very small proportion of the total passenger traffic and comprises less than 1% of the travel demand. Other modes in India are significantly primarily for freight movement. With an extensive coastline of 7,517 km, India has 12 major ports and 187 minor ports which were estimated to be well over 1000 million tonnes. However, in terms of the domestic freight movement, coastal shipping and inland waterways meet only about 1 5 of the total freight traffic demand. Pipeline as a mode of transport is relevant only for energy and energy products, and currently accounts for about 40% of the total petroleum traffic.

Kerala

5. Kerala State has a population of 3.34 crore as per Census 2011 residing in a geographical area of 38,863 sq. km. The State had a population density of 859 persons per sq. km, one of the thickly populated States in the Country. 48% of the people in the State are urbanites. Kerala is unique in many respects among the States of India. Kerala State is blessed with high rank in literacy rate (male - 96.11 % and female- 92.07 %) and Human Development Index. Sex ratio and density of population are the highest in the Country. Another unique feature of the State is that the rural urban divide is quite low with the entire State functioning as a single urban continuum with ribbon development all around. Eco tourism and geo tourism in Kerala has also taken off in a big way because of its destinations known for their natural beauty and exquisite landscapes.

6. Kerala State is endowed with all major modes of transport like road, rail, water and air transport. The State boasts of one of the highest road density (853 km./100sq.km), approximately three times the National average (387 km./100sq.km). The State had cent percent connectivity to all villages by all-weather roads. Inland water transport, the most fuel efficient and environment friendly, although relegated to the background with the advent of faster motor transport is still working efficiently in the backwaters of central and south Kerala.This mode is now mostly used for ferry and tourist transport. On the economic front, Kerala is the 13th largest economy in India which is dominated by the Service sector compared to other sectors. The State's per capita income is one of the highest in the Country. The growth in the State Gross Domestic Product (SGDP) of Kerala during the year 2015 was close to the national average of 15.04%.

Table 1.1*Major Development Indicators of Transport in Kerala*

Particulars	**Year**			
Transport Indicators	**2002**	**2007**	**2012**	**2015**
Population (In lakhs)	318.0	327.2	335.5	340.4
Roads				
National Highways	1524	1524	1542	1747
State Highways PWD	3851	4137	4068	4068
Major District Roads PWD	17496	24066	26237	26237
Total PWD Roads	21347	28203	30305	30305
Total Roads	137678	162149		372472
Motor Vehicles				
Public Transport Buses	26899	37076	21457	25270
KSRTC	4421	4559	5803	5629
Omni Buses	45067	101840	124290	151662
Taxis	82236	127873	175638	214216
Autorikshaws	265767	368706	575763	731000
Goods Vehicles	184176	294491	450902	565958
Cars	305887	567294	1226691	1702925
Two Wheelers	1289035	2418092	4127227	5828817
Total Motor Vehicles	**2315372**	**4025350**	**6865539**	**9421245**
Rail Length	1148	1148	1257	1257

Source State Planning Board

7. Kerala government is striving towards achieving integrated development of every stratum of society and sustainable growth in economy. A special emphasis is given in industrial and infrastructure development that could accelerate sustainable growth in the economy. In the case of transport infrastructure, the State has made good progress with the development of a solid road network, well connected airports, fairly dense rail network and few major and minor ports.In spite, the State is still in a trauma of major issues like traffic congestion, transit delay, high incidence of accidents with attendant social cost, increasing environmental pollution etc. Ever increasing vehicle population disproportionate to the transport infrastructure, lack of a transport vision/ mission, inadequate as well as underutilized funds and institutional mechanism to streamline proper implementation of planned activities are

the major bottlenecks in the realization of targets for transport sector. In this regard, Government has already mandated Kerala Infrastructure Investment Fund Board (KIIFB) to act as the nodal agency to scrutinize, approve and fund major infrastructure projects and targeted Rs 500 Billion outside of the budget, to provide investment for projects in sectors such as Transport, Water Sanitation, Energy, Social and Commercial Infrastructure, IT and Electronic Industry etc.

8. New Initiatives of the State Government in Transport sector during the 12th Plan period are the Kochi Metro Rail, Light Metro Rails, Joint Venture with Railways, Bypasses, ROB's etc. The transport sector in Kerala is highly dependent on fossil fuels and is one of the major sources for air pollution, especially the greenhouse gas emission, which needs to be controlled and reversed. So, the future Transport policy must be based on the policy of Sustainable Transport. There are several successful initiatives in several countries to achieve a greater degree of sustainability which can be adopted in Kerala with local changes.

Existing Transport Scenario of Kerala

Road Network

9. Kerala has one of the largest road networks in the country, aggregating to 3.72 lakh kilometers (2014-15) of roads in the state of which only 20 percentage are motorable. The rest are mostly narrow or single lane pathways intended for residential or street connectivity. 80 percentage of motorable traffic uses the arterial and sub-arterial roads consisting of National Highways (0.47%), State Highways (1.09%) and Major District Roads (7.04%) which are under the supervision of Public Works Department. The major road network of Kerala, though well connected, faces severe constraints due to the urban sprawl and the haphazard ribbon development all along the routes. The existing traffic levels at most stretches are excessive and beyond the road capacity. Bulk of the roads in the State is owned by local bodies including Panchayats, Municipalities and Corporation. National highways constitute 1.48% of the total road network and National Highways Authority of India (NHAI) is upgrading most of the National highways in the State.

Table 1.3*Roads Owned by Different Agencies*

Year	Panchayath	Municipal	Corporation	Others	PWD	NH	Total
1981			73188	2327	14838	839	91,192
% to TOTAL			80.25	2.55	16.27	0.92	100
1991	99022		8087		20283	1011	1,28,403
% to TOTAL	77.12		6.30		15.80	0.78	100
2001	87094	3193	4777	7703	21508	1560	1,25,835
% to TOTAL	69.21	2.54	3.80	6.12	17.09	1.24	100
2011	104257	8917	6644	7050	23242	1542	1,51,652
% to TOTAL	68.74	5.88	4.38	4.65	15.33	1.02	100
2015	3,06,342	18,412	6,644	9,023	30,305	1,747	3,72,472
% to TOTAL	82.25	4.94	1.78	2.42	8.14	0.47	100

Source NATPAC

Table 1.4*Classification of PWD Roads*

BSSL Below 3.5 M	SSL 3.5 M – 7.0 M	SDL 7.5 M – 10.5 M	TOTAL
4569.89	22783.98	2950.81	30304.68
15.08 %	75.18 %	9.74 %	100.00 %

Source NATPAC

Table 1 .5 *Carriage Way Width Wise Details of the of the PWD Roads*

Type of Roads Classification	7 M + Double Lane	5.5- 7.0 Single Lane	3.8-5.5 Multi Lane	Below 3.8 Below Single Lane	N A	TOTAL
State Highways	1640.31	2020.93	383.15	17.80	6.0	4068.19
% to total	40.32	49.68	9.42	0.44	0.14	100.00
Major District Roads	1310.50	10448.96	9930.94	3716.82	829.27	26236.48
% to total	4.99	39.83	37.85	14.17	3.16	100.00
TOTAL PWD Roads	2950.81	12469.89	10314.09	3734.62	835.27	30304.68
% to total	9.74	41.15	34.04	12.32	2.75	100.00

Source NATPAC

Table 1.6 *Ownership of National Highways in Kerala*

Roads under the control of NHAI	1338.874 km
National Highways under State PWD	408.377 km
TOTAL	1747.251 km

Source NATPAC

Table 1.7*National Highways in Kerala*

New No.	Existing No.	From	To	Length (km)
66	NH 17	Thalapady	Edapally	420.777
	NH47	Edapally	Kaliyikkavila	248.660
66		Thalappady	Kaliyikkavila	669.437
544	NH 47	Valayar	Edapally	160.000
85	NH 49	Bodimettu	Kundanoor	167.610
744	NH 208	Kollam	Kazhuthurutty	81.280
766	NH 212	Kozhikode	Kerala-Karnataka Brd	117.600
966	NH 213	Kozhikode	Palakkad	125.304
183	NH 220	Kollam	Theni in TN Border	190.300
966B	NH47A	Wellington Island	Kundanoor	5.920
966A	NH47C	Vallarpadam	Kalamaserry	17.000
183A		Bharanikkavu	Mundakayam	116.800
185		Adimaly	Chelimadu	96.000
Total National High Way Length in Kerala				**1747.251**

Source Economic Review 2015

10. 90% of the road network is with Local Bodies – Panchayats (83%), Municipalities (5%)and Corporations (2%) and hardly 1% with other departments. State Government finance the LSGs through Plan and Non-Plan funds transfers.Prioritizing the spending pattern of the transferred funds is decided by the LSGs. Conditions of roads maintained by the LSGs is comparatively poor. Since no direct plan funds are envisaged in the development of LSGIs roads, no proposal is envisaged here.

11. Departments and institutions managing the Road and Road Transport Sector

Public Works Department

1. PWD (NH)
2. PWD (Roads and Bridges)
3. Kerala Road Fund Board (KRFB)
4. Road Infrastructure Company Kerala (RICK) Ltd
5. Roads and Bridges Development Corporation (RBDCK)
6. Kerala Highway Research Institute (KHRI)

Programmes

1. State Road Improvement Project (SRIP) comprising "Rehabilitation Package under PPP Annuity Mode"
2. Rolling Heavy Maintenance Programme (RHMP)

Transport Department

1. Motor Vehicles Department
2. Road Safety Authority

3. Kerala State Road Transport Corporation
4. Unified Metropolitan Transport Authority (UMTA), Kochi
5. Kerala Transport Development Finance Corporation

Programmes

1. Driver Training Institutes

OTHERS (Research & Development)

1. National Transportation Planning and Research Centre (NATPAC)

Laws/Acts Governing the field of Road & Road Transport

1. National Highways Act 1956
2. Motor Vehicles Act
3. Kerala Municipalities Act 1994
4. Kerala Highway Protection Act 1999
5. Section 364 of Indian Penal Code
6. Central Road Fund Act 2000
7. Kerala Road Fund Act 2001
8. Kerala Road Safety Authority Act 2007
9. Kerala Public Ways Act 2011

Railway

12. The railway lines run straight in length connecting all the major towns and cities in Kerala. The State has a rail network of 1,257 km route length with a total track length of 1,588 km, operating under the control of Palakkad and Thiruvananthapuram Railway Divisions. The Palakkad Division operates 76 express and 49 passenger trains, carrying 2.16 lakh passengers per day while Trivandrum Division operates 80 express trains and 60 passenger trains every day, carrying 2.6 lakh passengers daily.Both these Divisions together contribute about one-third of the total revenue earnings of Southern Railway.The rail sector did not show much growth over the years. All the railway lines passing through the State are converted into broad gauge.There are about 200 railway stations in the state that are connected to almost all the major places inside the state as well as with other parts of the country. Doubling and electrification works are in progress in various parts of the State. Feasibility studies for some new lines are also underway in the rail sector.

13. Suburban Rail Project: Government of Kerala has decided to establish Suburban train services in Thiruvananthapuram – Chengannur /Harippad sector in Phase – I by constituting a Special Purpose Vehicle to run air conditioned MEMU/EMU Rakes. M/s Mumbai Rail Vikas Corporation (MVRC) has finalized the Detailed Project Report. A Special Purpose Vehicle was formed between Government of Kerala and Indian Railways for taking up implementation of the Project.

14. High speed railway line: Detailed project report was prepared for the construction of railway corridor between Thiruvananthapuram and Kasargode to run high speed trains. The proposed project on high speed railway line is under the active consideration of the Government.

Inland Water Network

15. In Kerala, there are many water bodies like rivers, canals, lakes, estuaries, backwaters etc providing adequate scope for Inland Water Transport (IWT). There are 41 rivers in Kerala that flows towards west clubbed with numerous backwaters. All these are part of the IWT system having a length of 1,895 km.It is the inland canals that connect the rivers from one to another. Important places which are commercially developed are situated on the banks of these rivers. Here comes the West Coast Canal (WCC) system which has a length of about 560 km.It starts from Kovalam in the south and extends up to Hosdurg in the north. Of this, the Kollam- Kottappuram stretch (168 km) is already declared as National Waterway-3 (NW-3) along with Champakkara (14 km) & Udyogamandal canals (23 km) by the Central Government in 1993 and is almost made fully functional.Recently, Central Government has declared the extension of NW-3 between Kottappuram and Kozhikode (160 km) as national waterway.Besides, four canals viz. Alapppuzha- Changanassery (28 km), Alappuzha-Kottayam- Athirampuzha (38 km) and Kottayam- Vaikom (42 km) have also been declared as national waterway by Central Government in April, 2016.

16. National Waterways are maintained by Inland Waterway Authority of India (IWAI), and other feeder canals maintained/operated by the Coastal Shipping and Inland Navigation (CSIND), Irrigation Departments, State Water Transport Department (SWTD) and Kerala shipping and inland Navigation Corporation Ltd. (KSINC). Cargo transportation through mechanized barges exists in NW-3.Most of the feeder canals and waterways suffer from navigational hazards like shallow depth and narrow width of channel during dry weather, siltation, bank erosion and absence of infrastructural facilities like jetties/ terminals and inadequacy of navigational aids.

17. Transportation by IWT is considered as the most efficient economic and environment friendly means of transportation. IWT has the advantages when compared with the railways and roadways. This is because the former consumes less energy and the cost is also less for cargo transportation when compared to railways and roadways.

Air transport

18. Kerala has three international airports viz: Thiruvananthapuram, Kochi and Kozhikode. All civilian airports functioning in the state are international airports, a feature which is unique to Kerala. Upon completion of Kannur International Airport, Kerala will join Tamil Nadu as the state with the most number of international airports.

Port Sector

19. Transportation by coastal shipping is the cheapest mode especially for bulk commodities and for long haulage traffic. Kerala has the advantage of 585 km coast line through which bulk cargos can be transported if multi-modal transshipment logistics can be built up at intermittent points along the coastline.Kerala has one major port at Cochin and 17 minor ports. Out of the 17 minor ports in Kerala, four are considered as intermediate ports based on berthing, cargo handling and storage facilities available in them. They are Vizhinjam, Beypore, Azheekkal and Kollam ports. The remaining 13 minor ports in the state are Neendakara, Alappuzha, Valiyathura, Kayamkulam, Manakkodam, Munambam, Ponnani, Vadakara, Thalasserry, Manjeswaram, Neeleswaram, Kannur and Kasaragod. Most of the minor and intermediate ports in the State are seasonal in nature with insufficient infrastructure to handle even medium and small sized vessels throughout the year. Presently cargo operations take place only in four ports, i.e. Vizhinjam, Beypore, Kollam and Azheekkal.The Government of Kerala has already decided to develop five minor ports through PPP mode. These Ports are Azheekkal, Beypore, Ponnani, Alappuzha and Kollam. Apart from this, a major port viz, Vizhinjam Deepwater International Container Transshipment Terminal is coming up in Thiruvananthapuram under PPP mode. An integrated logistic park should be planned at different regions to ensure easy and hassle free transshipment of cargo traffic. Presently, a multi -modal logistic park is proposed in Kochi region to serve the needs of Vallarpadam ICT and a similar facility is needed for Thiruvananthapuram region for the Vizhinjam Port too. Presently at the major market sites the interchange facilities for transferring of freight materials are done in a time bound manner.

Check Posts

20. In Kerala, there are many departmental check posts like commercial taxes, police, excise, forest, animal husbandry etc. of which commercial taxes check posts are large in number (83). Walayar, Bangra-Manjeswaram and Amaravila are the major commercial tax check posts in Kerala.Estimate shows that about 60 per cent of the movement of bulk commodities between Kerala and rest of the country takes place through Walayar which serves as a major trade route for movement of goods and people to and from neighboring states. With the Goods and Service Tax (GST) regime set to roll out in the near future, the Government is preparing to install a network of hi-tech cameras along the entry points to the State, to keep a close tab on freight traffic across the border and prevent tax evasion. Smart cameras, along with monitoring systems, would replace the commercial tax check posts and obviate the need for physical examination of freight. The pilot scheme would be implemented at Walayar.More squads would be pressed into service once the camera network was in place.

Passenger Interchange Points

21. Passenger interchange points consist of facilities like bus stops, terminals, depots and their individual facilities. The bus terminals, bus depots and bus stops are the contact points between the public transport user and the bus system.

22. *Bus terminal*. Most of the Bus terminals in the State lack basic facilities for passenger and buses and have become accident prone locations due to severe passenger bus conflicts in the absence of proper circulation plan for buses and passenger movements. New bus terminals have come up at Thiruvananthapuram, Kozhikode and Thiruvalla with basic amenities and there is a need for similar facilities at all major bus terminals in the State with uniform guidelines.

23. *Bus stops*. Most of bus stops in the State whether in urban areas or rural area are not having segregated bus bays and the buses stop at the middle of the carriageway blocking the movements of other vehicles and thus causing traffic congestion. The passengers also get a raw deal without passenger amenities like waiting sheds and proper information system. In order to increase the share of public transport modes, it is imperative that bus stops shall have all the facilities for passengers.

24. *Multi-modal transit facility*. In order to ensure seamless travel for commuters, an integrated Multi-modal Transit Facility has been felt necessary in different regions. Vytilla Mobility Hub in Kochi is the first of its kind to come up in the State with formation of Special Purpose Vehicle (SPV) – Vytilla Mobility Hub Society - for execution, of the Project. An SPV had already been formed at Kottayam and land acquisition process is at advanced stage for the construction of Kottayam Mobility Hub. Integrated Multi Modal Transit Facility is also recommended at major Cities such as Kozhikode, Thrissur, Kollam and Thiruvananthapuram.

Goods Terminals

25. There are no earmarked spaces for goods terminals at major urban areas in the State. Most of the goods vehicles are parked on the road especially on National Highways leading to cities/ towns during their non-plying times. Therefore, there is an urgent need for provision of goods terminals with modern facilities at major urban areas in the State.

Vehicle Population

26. The state is witnessing an unpredicted growth of motor vehicles such that the number of registered motor vehicles doubles every seven years. The vehicle population is expected to cross one crore mark by the end of March 2017.A major chunk (65%) of this vehicle stock is found in urban region straining the urban road infrastructure. As per economic review 2015, about 78% of the valid vehicle registrations in Kerala consist of private vehicles, which create excessive pressure on the existing road infrastructure.

Table 1.8*Motor Vehicle Growth - Type wise - in Kerala*

Year	Goods	Buses	Taxi	Cars	Jeeps	Autos	2Wheelers	Others*	TOTAL
1971	13162	6563	8848	33294	4828	1062	15117		86234
1981	24682	9159	18890	56802	7834	9640	59531		194597
1991	66226	21454	37830	125769	26133	67317	288498		647742
2001	173856	65681	75628	282996	69261	248350	1151735		2111885
2011	411661	139047	163407	1060861	73700	518741	3610838		6045322
2012	450902	145747	175638	1226691	73700	575763	4127227		6865539
2013	561197	171892	128250	1358728	74167	602547	5041495		8048673
2014	513496	160530	194358	1538246	73700	663241	5288529		8547966
2015	565958	176932	214216	1702925	73700	731000	5828817		9421245
%	**6.00**	**1.88**	**2.27**	**18.08**	**0.78**	**7.76**	**61.86**	**1.37**	**100.00**

*Others – Tractors, Tillers, JCB, Cranes etc.

Source Statistics for Planning 1988, Economic Review of various years

Passenger Transport

27. Passenger demand in the State is met by primarily road based bus transport provided by State owned KSRTC, KURTC and private operators, train, air and IWT. Although road transport dominates the transportation scenario in the state, people depend on railways for long haul transport needs. Inland Water Transport, Coastal Shipping and Air Transport have a limited share in the overall transport system.Mass rapid transit system is fast emerging in urban areas and in the initial stages of construction.

Mass Rapid Transport System (MRTS)

28. Realizing the advantages of mass transport system in meeting the intra-city commuter needs of major Cities of Kerala, Government of Kerala has embarked on Metro rail project for Kochi and Light Metro project for Thiruvananthapuram and Kozhikode Cities. With the commissioning of MRTS, major urban corridors are expected to be decongested in these Cities. The status of the project with regard to the MRTS in the State is briefed below;

29. Kochi Metro: Kochi Metro Rail Project (KMRP) is the flagship project of the Government of Kerala designed to address the transportation woes of Kochi City. The Project is implemented through the Kochi Metro Rail Ltd (KMRL) which is a Special Purpose Vehicle jointly owned by the Government of Kerala and Government of India with equity participation. The project is expected to be operationalized by the end of 2017.

30. *Light Metro Projects*. The proposed Light Metro projects at Thiruvananthapuram and Kozhikode will be implemented as a joint venture of Government of India (GoI), and Government of Kerala (GoK) with a funding pattern of 20% equity of GoK, 20% by GoI and the remaining 60% by way of external and domestic borrowings. Detailed Project

Report was prepared for the proposed Light Metro project and is expected to start construction soon.

Bus Transport

31. Kerala State has a total fleet of 25,449 buses, of which 19,145 are private buses (75%) and 6,304 are KSRTC/ KURTC buses (25%). Private buses dominate the bus Transport in all the districts of Kerala except Thiruvananthapuram. Public transport buses (stage carriages) per lakh of population in Kerala is 73 compared to 37 in Tamil Nadu (27,503 buses) and 58 in Karnataka (3,666 buses). Details of the Private and State run Public Transport Buses in South Indian States are shown in Annexure III. District wise number of private and KSRTC buses is shown in Annexure IV. The financial performance of KSRTC is dismal. The assets position demonstrates a negative position. The cost of operation is very high compared to other southern STUs. Details are appended in Annexure V.

Table 1.9*Growth of Private & KSRTC Buses*

Year	KSRTC		PRIVATE		TOTAL	
	Number	%	Number	%	Number	%
1965	901	20.61	3469	**79.39**	4370	100.00
2015	5,675/6304*	22.90	19145	**77.10**	24,820	100.00

*Note:**Details of KSRTC & adding KURTC

Rail Transport

32. Train services of different types namely passenger, express, super-fast, Jan Shatabdi, Rajadhani etc are operated in the rail network of Kerala. The services provided by railways are found to be over-utilized for passenger transport and have reached the saturation level. Reservation of seats and berths are not available on demand and one has to book tickets more than one month in advance. As per the study conducted by NATPAC, maximum passenger demand was observed at major Cities such as Mumbai, Chennai, Bengaluru, Jabalpur, Ahmedabad, Kolkatta, Bhubaneswar, Secunderabad and Delhi, especially in sleeper class.

33. In response to ever increasing demand for rail passenger services, Indian Railways has started running Diesel-electric Multiple Unit (DEMU) services (eight schedules) between Aluva and Piravam recently for commuter rail service. Initiatives have been made to run Suburban commuter services, and construct metro and high speed rail corridor covering major cities and towns.

Inland Water Transport (IWT)

34. The share of IWT in the passenger transport is quite negligible with a few government agencies operating boat services at limited areas of the State. State Water Transport Department (SWTD) with headquarters in Alappuzha is providing the much-needed

connectivity to the populace of water logged areas of Kuttanad with over 50 boats. Apart from the stretches of NW-3, SWTD is operating boat services in and around Kollam, Alappuzha, Nileswaram and Kasaragod, primarily meant for passenger transportation. KSINC and few private operators are operating barge services in and around Kochi area.

35. Kerala State Inland Navigation Corporation (KSINC) is also engaged in IWT freight and passenger transport with 12 barges, 11 boats and two Jhankars.The IWT system is still working efficiently in the backwaters of central and south Kerala. This mode is now mostly used for ferry and tourists transport.

Air Transport

36. Air transport is coming of age and is meeting bulk of international trips and limited inter-State trips. Inter-city services within the State have just been started. Unlike in other states where the capital city has the highest air traffic, in Kerala, air traffic is distributed evenly over the three airports. Despite this, all the three international airports of Kerala are among the top 15 busiest airports in India. More than eight lakh domestic passengers and 50 lakh international passengers are using these airports facilities in the state every year.

Intermediate Public Transport (IPT)

37. IPT modes consist of taxis, autorickshaws and minibuses/ tempos. Being an unorganized transport sector (free entry in the market), IPT modes continue to play an important role in providing first mile and last mile connectivity (10% share) due to their speedy and timely availability and ability to penetrate into every nook and corner of the region they are serving. It also provides job opportunities for the weaker sections of the society. Recently, Motor Vehicles Department has taken initiative to monitor auto rickshaws by using different color on trial base in Thiruvananthapuram City and, with this result, it is being replicated in other major cities too. The advent of online taxi aggregators in the IPT sector have heralded an open competition with autorickshaws and Motor Vehicles Department has taken the right initiative to implement GPS tracking system for monitoring the system.

Non-motorized Modes of Transport (NMT)

38. Walking and cycling are the two major non-motorized modes of transport in urban areas. Share of walk trips is in the range of 10 to 15%, and cycle trips accounts for less than 2%. However, share of NMT modes are found to be decreasing over the years.

39. *Pedestrians*. Pedestrians are the most important component and most vulnerable road users in the entire traffic stream. The average walk trip length is found to be varying from 0.5 to 1.5 km in various Indian Cities. Pedestrian facilities such as footpath, zebra crossings etc. are only provided along major road corridors.As part of City Development Plan, pedestrian facilities and amenities have been provided along major corridors of Thiruvananthapuram, Ernakulam and Kozhikode Cities. All other cities in Kerala lack pedestrian facilities and

amenities. The old aged and disabled peoples were not considered during the design of pedestrian facilities.

40. *Cyclists.* As revealed, the share of cycle trips is on the decline owing to advent of fast moving vehicles and lack of facilities for cyclists like cycle track, cycle repairing facilities etc. A new dawn has arisen with renewed interest on cycle as a mode of travel with app based cycle renting shops coming up at Techno Park in Thiruvananthapuram city and other places following suit.

Urban Transport Scenario

41. The State has been experiencing an outstanding annual growth in the number of vehicles during the last two decades. About 60 per cent of the vehicles registered and 45 per cent of the road accidents in the state are in urban areas. It is expected that about 55 percent of Keralites will live in urban centres by 2025. The urban roads suffer most due to the convergence of traffic. The state has been spending substantial funds on widening and improvements of the roads for increasing the carrying capacity of the roads. Though the expected benefits are considerable, urban planning practices prove that widening of roads in proportion to the increasing the traffic volume is not the only option in traffic planning. The narrow urban arterial and sub-arterial roads are flooded with all type of vehicles ranging from buses, trucks, two-wheelers, cars and cycles.The buses on these roads are forced to crawl behind autorikshaws, cycles or any other slow vehicles due to absence of adequate right of way.This is affecting the operational performance of the intra-city bus transport.Commuters gradually losing confidence in public transport system and choose alternative costly/ unhealthy modes such as parallel services, auto rickshaws, two-wheeler etc.This was the major reason for sudden buoyant demand for two wheelers among the middle class people of Kerala during last few decades.

Freight Transport

42. Kerala being a consumer state, depend on other states for almost all commodities of daily consumption. Inter-State Goods movements in Kerala are handled predominantly by road based private goods carriers, followed by Government owned rail network, private operated inland waterways (IWT) and coastal shipping.As per the recent study conducted by NATPAC, share of road was 78%, water (IWT and coastal shipping) 14% and rail 8%. In the case of road based goods movements, 2.4 lakh ton of freight were carried inter-State with a fleet of 25,000 goods vehicles per day through 36 major check posts in the State. It was observed that more than 80% of the goods movements were oriented towards the State while hardly 20% of the movements were made from Kerala State to other States. Movement of goods through roads entail huge vehicle operating cost, lack of safety and environmental pollution necessitating the need to shift to rail and waterways in the years to come.

43. Kerala State Inland Navigation Corporation (KSINC) is also engaged in IWT freight and passenger transport with 12 barges, 11 boats and two Jhankars. Over 10 lakh tonnes of

cargo (mainly imported cargo for the use of Eloor- Ambalamugal industrial belt) was transported to the hinterland per annum.

44. Kochi port handles around 15 million tonnes of cargo per year consisting of 12 million tonnes of imports and 3 million tonnes of exports. The Vallarpadam Container Terminal at Kochi has been commissioned recently. A second major port is presently under construction at Vizhinjam through private participation which will be a deep water international container transshipment terminal. This terminal would be able to cater to container vessels up to 8,000 TEUs in the initial phase and up to 12,000 TEUs in the final phase. The non-major ports of Kerala, showed a growth of 47.19% at 159,226 tonnes in 2014-15 against 108,175 tonnes in 2013-14.

Accident Scenario

45. Road accidents are considered to be the third major cause of death in the state. The state of Kerala has nearly 3% of the country's population but it has recorded about 10% of the country's road traffic accidents. Each day on an average, 11 people lose their lives and 120 people get injured from road accidents and the Kerala state incurs an additional financial burden of over Rs1,000 crore because of accidents. Rapid increase in the number of motor vehicles has been the major reason for the increasing number of road accidents in our state. Although the rate of absolute number of road accident cases have come down from 42,000 accidents in 2005 to around 36,000 now, the fatality rate has increased tremendously. Out of around 4,200 people who get killed every year in Kerala, 30 percentage are pedestrians and 35 percentage are two-wheeler riders. Around 142 cyclists are also killed in road accidents every year. In order to promote road safety, the Government of Kerala has initiated several innovative steps, the most important being the establishment of Kerala Road Safety Authority (KRSA) in 2006 to co-ordinate the initiatives of stake holders on road safety and creation of Road Safety Fund. To support KRSA, district wise councils named, District Road Safety Council (DRSC) was formed and even though they are all doing their designated roles, there was no notable achievement as expected for reducing the fatalities.

Table 1.10*Accident Trend in Kerala during 2001 -2015*

Year	No. of Accidents	No. of Motor Vehicles	Accidents/lakh vehicle
2001	38361	1910237	2008
2002	38761	2326372	1666
2003	39496	2552171	1548
2004	41219	2792074	1476
2005	42363	3122082	1357
2006	41647	3559504	1160
2007	39917	4023350	992
2008	37263	4442387	839
2009	35433	4880059	726
2010	35082	5395747	650
2011	35216	6072019	580
2012	36174	6865539	527
2013	35215	8048673	438

Year	No. of Accidents	No. of Motor Vehicles	Accidents/lakh vehicle
2014	36282	8547966	424
2015	39029	9648320	405

Source Motor Vehicles Department& NATPAC

Traffic Congestion

46. As a result of economic growth, share of private vehicles in the overall passenger trips is about 50%.The daily transport demand is expected to grow from 135 lakh trips to over 180 lakh passenger trips by 2025, with a dominant share of private vehicles. The traffic on roads is steadily increasing at a rate of about 3 to 6 percentage a year. The existing road network is unable to bear the increased vehicles and thus results in traffic congestion. The present transportation system in the state has evolved from a piece-meal approach, making it less efficient, and results in increased pollution, high accident risk etc.

Intelligent Transportation System (ITS) Applications

47. ITS applications have to be developed and encouraged as they offer a variety of technological solutions to the growing surface transportation problems thereby resolving many of the road safety issues. Kerala Government has taken many initiatives to increase the role of ITS in improving road safety. Nowadays, most of the ITS applications are limited to areas of traffic enforcement and have limited role in traffic management and monitoring. Surveillance cameras are installed at many locations in the major cities of Kerala which help in identifying traffic offenders. As part of creating awareness and helping general public, many mobile applications and E-learning portals were introduced by the departments like Motor Vehicles, Police and R &D centers like NATPAC. Even though lots of initiatives are made to spread the usage of ITS in Kerala, it is not yet fully fledged.

CHAPTER 2
PERFORMANCE OF TRANSPORT SECTOR DURING 12THFIVE-YEAR PLAN

Financial Performance of 12th Plan

48. Quality Infrastructure creation in road sector was the focus area during 12thYear Plan. The total outlay of the 12th Plan for the State is1,02,000 crore and for the Transport Sector is 8,540 crore. During the 12th Plan period, State Planning Board constituted a "Technical Committee on Road and Road Safety" under the chairmanship of Shri E Sreedharan. The recommendations of the report were implemented by various government departments. The outlay and expenditure of Transport sector during different Five-Year Plans are given in Table 2.1.

Table 2.1*The Outlay and Expenditure in the Transport Sector*Rupees in Crore

Five-Year Plan	Budget Outlay	Expenditure	% of Expenditure
Tenth (2002-07)	2477.71	2378.19	96
Eleventh (2007-12)	4458.81	6580.46	148
Twelfth (2012-17)1stfouryears	6385.85	9607.29	210

Source State Planning Board

49. The sub sector wise outlay and expenditure during the 12thFive-Year Plan are given in Table 2.2

Table 2.2*Sub Sector Wise Outlay and Expenditure during12thFive-Year Plan* Rupees in crore

Sectors	Annual Plan 12-13		Annual Plan 13-14		Annual Plan 14-15		Annual Plan 15-16	
PWD (R & B)	490.60	1635.64 (333.4%)	791.53	1314.1 (166%)	753.07	1259.6 (167.3%)	858.9	1954.6 (227.6%)
PWD NH	49.98	277.8 (555.7%)	63.63	160.72 (252.6%)	83.34	234.6 (281.6%)	92.16	338.5 (367.2%)
Sub total	***540.58***	***1913.4 (354%)***	***855.2***	***1474.77 (172.5%)***	***836.41***	***1494.2 (178.6%)***	***951.07***	***2293.1 (241.1%)***
KSRTC	57.07	57.07	59.00	59.00	65.42	62.85	39.55	19.55
MV Dept	17.18	2.10	15.85	10.1	36.84	12.94	34.7	7.35
Sub Total	**74.25**	**59.17**	**74.85**	**69.11**	**102.26**	**75.79**	**74.25**	**26.90**
SWTD	6.10	5.44	7.25	5.59	7.60	4.52	7.60	3.31
Grand Total	**620.93**	**1978.01**	**937.3**	**1549.47**	**946.27**	**1574.51**	**1032.92**	**2323.31**

50. A comparative analysis of the sector wise outlay and expenditure during the 10th and 11thFive-Year Plans reveals that the Transport Sector has utilized 12 % of the share of total expenditure against 10% of the share of outlay during the 10th Plan. This trend continued during the 11th Plan also by keeping 15% of the share of total expenditure against the share of outlay of 10%. During the 13th plan the expenditure exceeds by 225.42% in the Roads and Bridge sector. The main reason for the excess expenditure are
    1. Clearance of pending bills of 11thFive-Year Plan during the 12th Plan period.
    2. Spill over of the physical progress of the works to 12th Plan period

3. Sanctioning of works in excess of the budget provision.

Physical Performance

51. The following are the major departmental achievement during the 12th plan.

Roads

52. Total road length in Kerala increased from 1, 51,652 (2010-11) Kms to 3,72,472 Kmsduring 2014-15. Development and improvement works of 2219 kms of State Highways by utilizing an amount of Rs 35391.56 Lakh and 7750 kms of Major District Roads by an amount of Rs214702.29 Lakh by Public Works Department.For the construction and improvement of 18 Nos of Bridges in State Highways 161 Nos in Major District roads an amount ofRs 9850.10 Lakh utilized.For Railway Safety Works including construction and renovation of Railway over Bridges in PWD Roads Rs4000 lakh is expended. By utilizing an amount of Rs 7862.02 Lakh for the construction of 241 kms of road to Sabarimala under Sabarimala Road Project. An amount of Rs 12381.00 lakhis provided for Road Safety works viz.,for Erection of traffic Sign Boards, Road markings, Erection of hand rails, Providing traffic lights, Surveillance Cameras, Reflectors, Medium reflectors, Modular bumps and for conduction of Seminars, training programmes, Workshops etc and412 Km of road is improved/developed and four study works were conducted during this period.

53. For quality upgradation programmes for Kerala Highway Research Institute for Research on Road development, an amount of Rs 3920.00 lakh provided for feasibility Study for new projects and programmes, Conduction of training programmes within and outside the States, Purchase of equipments and IT (Hardware and Software) related items for research purpose etc.As part of up gradation of Kerala Highway Research Institute as quality control centre including Research and Development in Kerala Highway Research Institute,Quality Control of Works and Test, 3320 number of tests were conducted and the results were forwarded to the respective Chief Engineers for further action by utilizing an amount of Rs 640.29 Lakh.KHRI has completed investigation works on Detailed Project Report (DPR) for KSTP Phase II covering the maintenance component of 14 roads.

54. An amount of Rs 28910.00 Lakh was provided as budgeted outlay for NH and expenditure reported during the period was Rs 101150.00 Lakh (349.9%). Under the major scheme 'Development of Urban Links in National Highways' an amount of Rs 12420.75 lakh utilized for the construction of 75.16 Km of roads.An amount ofRs 49834.61 Lakh is utilized for the construction of 521.9 Kms of roads under the programme Central Road Funds.A key initiative of the Department during the period is construction of NH Bye passes in Kollam and Alappuzha, where land already acquired and the work is progressing.The Project is being implemented on a cost sharing basis between State and GoI and the work is proposed to be completed by August 2017.

Motor Vehicles Department

55. As part of Road Safety Programme, an amount of Rs 6218.00 Lakh was provided to Motor Vehicles Department.By utilizing an amount of Rs 1966.03 Lakh Department has started Driver Testing Tracks at Chevayoor (Kozhikode), Elavayoor (Kannur) and Parassala (Thiruvananthapuram).The works of three tracks, one each at Muvattupuzha, Muttathara and Monuppally is going on.An additional H track has been constructed at Kozhikode.12 handheld Radars, 7 Interceptors and 500 digital cameras were purchased.

56. Three Driving Simulators were procured and distributed to three Zonal offices as part of Road Safety Measures.Radar Surveillance System (Speed Camera System) installed at Palakkad, Thrissur, Kollam, Kottayam, Ernakulam and Kannur. Five GPS based Vehicle Tracking System is in implementing stage.VTU empanelment works are going on.Training is given to 480 staff members by utilizing an amount of Rs 80.00 Lakh.Construction of Driver Training Institute at Edappal has completed and training provided to more than 23000 persons by utilizing the Central Fund.

57. An amount of Rs 2540.00 Lakh is provided for the scheme Establishment of Vehicle Testing Stations and by utilizing an amount of Rs 820.50 Lakh, threeVehicle Testing Stations at Chevayoor (Kozhikode), Elevayoor(Kannur) and Parassala (Thiruvananthapuram) and works of three tracks one each at Moovattupuzha, Muttathara and Monuppally.To avoid the problem of overloading in Check posts, the Department has procured three Electronic Weighbridge and installed them at Aryankavu, Manjeswaram and Walayar.The process of procuring one pit type weighbridge for Gopalapuram Check post is going on.

Kerala State Road Transport Corporation (K S R T C)

58. An amount of Rs 22104.00 lakh was provided as budgeted outlay and expenditure reported that period was Rs 22004.00 lakh (99.55%). The major schemes of KSRTC are Development of Infrastructure and Modernization of Workshops, Modernization and Qualitative Improvement of Fleet, Total Computerization and E-Governance in KSRTC and Providing Training to Drivers, Technical Personnel and Officers.

59. KSRTC has implemented online reservation in connection with the total computerization and also made available software modules and sub modules viz, fleet management, fare structure management, rout management, inventory management, purchase management, general administration, financial accounting and internet.As part of the Revival package, to address the pension liability, the Government has created a pension fund and permittedKSRTC to collect Social Security Cess from passengers and agreed to contribute to Pension Fund in equal shares and to that of KSRTC's contribution, subject to a maximum of Rs 20.00 Crore per month.The total value of assets of the Corporation as per the valuation report is Rs 3674.13 Crore.Ten Public Sector / Commercial Banks have agreed to sanction loan to KTDFC for taking over the existing loan liabilities of KSRTC.

CHAPTER 3
KEY ISSUES AND CHALLENGES

Traffic Congestion

60. Traffic congestion is the order of the day in all urban areas of the State contributed by inadequate road width and 65% of the vehicles registered in the state are concentrated within the urban areas. Increased travel time, high vehicle operating cost, and environmental pollution are the end results of traffic congestion. The narrow urban arterial and sub-arterial roads are flooded with different type of vehicles including buses, trucks, two-wheelers, cars, autos and cycles.The buses on these roads are forced to crawl behind autorikshaws and slow moving vehicles due to absence of adequate right of way.This is affecting the economic performance of the intra-city bus transport and the commuters gradually lose the credibility in the public transport system and choose alternative costly and unhealthy modes such as parallel services, autos, two-wheeler etc.Heavy traffic along existing narrow roadways is the major cause of traffic congestions in urban areas. Expanding the road capacity with increase in traffic demand is not a sustainable approach as it leads to use of more natural resources.

Inadequate Road Infrastructure and Road Maintenance

61. Most of the roads in the State do not have adequate width so as to cater to the existing level of traffic. It is seen that only about one fourth of the roads have either two lane or four lane capacity while most of the roads have single lane or intermediate lane capacity. In the case of National highways, only about 12 % of the roads have four lane capacity while the remaining roads have only two lane or intermediate lane capacity. It should be noted that bulk of the inter city and inter State traffic are carried out by the National highways and State Highways which are only eight percent of the total network. Considering the demand supply gap, there is a huge need for upgradation of existing road network

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Non-Reliability and Inadequacy of Public Transport System

62. Due to inferior public transport services and lack of reliability and connectivity, the personalized vehicles are increasing in urban areas. Public Transport System in Kerala consists of mostly buses which are not able to keep up with their schedules due to traffic congestion. Even though there is considerable fleet of public transport buses in the state, their utilization has not been up to the mark due to improper planning and scheduling, low reliability, lesser comfort, longer travel times with waiting, lack of integration with other modes of transport etc.

Lack of Passenger Interchange Points

63. Lack of passenger interchange points and amenities at Bus terminals and bus stops results in safety risk for passengers boarding/alighting at bus terminals and bus stops in addition creates traffic congestion at bus stops.

Lack of Adequate First Mile/ Last Mile Connectivity

64. One of the key requirements of effective public transport system is the availability of cost effective and safe accessibility to the public transport facilities and vice versa. If the accessibility to Public Transportation system is not taken into account, even the highest standards of public transport facilities could not ensure good patronage. Presently the first mile/ last mile connectivity is served mostly by private vehicles followed by intermediate public transport vehicles such as taxis and autos and non-motorized transport modes like cycles and walk to a lesser level.

Lack of Facilities for Non-Motorized Transport (NMT)

65. NMT Modes such as cycling and walking which are seldom used now-a-days due to the non-availability of safe and adequate facilities to accommodate them in the ROW (Right of Way) available. When such NMT modes are forced to move along with fast moving traffic, accidents are bound to occur.

High Incidence of Private Vehicles

66. Presently, there are no regulations to control the growth of private vehicles. Rapid economic growth and liberalized vehicle loan from banks increase the purchasing power of private vehicles in India. Due to the inadequacy of public transport combined with lack of first mile/last mile connectivity increases the dependency on private modes. Moreover, it has the advantage of having no waiting time and less travel time. This is found to be one of the major reasons for sudden buoyant demand for two wheelers and cars in Kerala during last few decades.

Road Safety Issues

67. Due to the higher vehicular conflicts, level of service of urban roads stretches deteriorated sharply and also resulted in higher accident causalities.Accidents become a common scene on our roads and mostly involved by cyclists, pedestrians, and two wheelers.Road accident rate and fatalities are increasing in the state without any abetment. Narrow roads/ ROW (right of way), unregulated access points and land use, damaged roads, heterogeneous mixed traffic, ineffective enforcement and violation detection, attitude of road users and violations, low awareness levels, lack of pedestrian facilities, neglecting disabled persons are some of the issues which leads to high accident and fatality rates in Kerala.

Environmental Issues

68. The transport sector is highly dependent on fossil fuels and is also the major sources of air pollution, especially the greenhouse gas emissions. It is reported that on an average, 70% of the pollution is caused by transport.

Parking Issues

69. With higher vehicle ownership and inadequate right of way (ROW) increases the demand for parking in urban area. Provision of parking facilities eat up a lot of premium space in urban area, which could otherwise have been utilized for better needs. On street parking of vehicles decreases the capacity of roads. Mandatory parking spaces which are stipulated by the Kerala Municipal Building Rules (KMBR) are not provided and as a result building's parking requirements spills onto the carriageway of adjacent roads in most of the cases.

Land Acquisition

70. Kerala is left behind many a times from being a part of prestigious road infrastructure projects just because of the difficulty in land acquisition of prime land. Most of the road widening projects are delayed due to the problems encountered during land acquisition. Lots of opportunities are thus lost to Kerala in the field of transport infrastructure augmentation.

Inadequate Facilities at Check Posts

71. The infrastructure facilities currently available are inadequate for the effective functioning of the check posts in Kerala. Currently there is no arrangement for data sharing among 6 departmental check posts. Kerala being a consumer state the volume of vehicles entering/exiting the state is of a very high magnitude. When it comes to efficiency in detection of violation and administration of penalties and other levies, there exists an element of constraint. This is mainly due to the inbuilt inadequacy of the check post system based on manual method of operation.

Inadequate Funds/ Under-utilization of Funds

72. Funds are a major concern in the execution of any project whether major or minor. In some cases, it could be found that available funds are not utilized properly leaving lot of unutilized funds. Depending too much extra budgetary support through external funding is not prudent. A mechanism needs to be evolved to speedy utilization of funds on the one side and making available adequate funds through alternate means like KIIFB.

Transport Waste Management

73. Suitable plans/techniques are not evolved for transport waste management including recycling of tyres, tubes, spare parts, oil, workshop waste etc. Vehicles involved in accidents cases kept at various police stations as evidences are not disposed of within the stipulated period. This also causes many types of problems for the road users and also to the environment.

Fare Structuring

74. Independent semi judicial body (Like Electricity Regulatory Commission) is required in transport sector to closely monitor the operation cost and revenue of various public transport and IPT modes.Periodical restructuring of fares is required to ensure the viability of the industry and safeguard the interest of the general public as well.

Overloading of Freighted Vehicles

75. The issue pertaining to plying of overloaded vehicles on highways& other roads has been considered by Supreme Court and various High Courts.In this regard, the Hon'ble Supreme Court has categorically made it clear that detention of overloading and collection of compounding fee does not mean authorization for the overloaded vehicles to ply. Because of overloading, roads are deteriorating at a faster rate. The inability to enforce the law regarding mandatory off-loading of the excess loads makes these roads deteriorate. The main reason for implementing mandatory off-loading of the excess loads is because of lack of infrastructure to off-load and store excess loads.

Maintenance of Road and Allied Infrastructure

76. Building of new roads and without properly maintaining them will reduce its riding quality. If maintenance is not done at proper time, roads are deteriorating rapidly. Traditionally, annual road maintenance works are executed by PWD.Presently, the indicators of the service levels such as roughness, potholes, cracking, patch repair, rutting and skid resistance are not taken into account as per MORTH guidelines. The current road maintenance schedules executed by PWD for the various categories of roads are given below.

Table 3.1*Current Road Maintenance Schedule of PWD Roads*

Name of the road	**Years**
National Highways	3
State Highways	3
Other Roads	1.5

Dumped Vehicles

77. The number of dumped vehicles in various departments (police stations, Motor Vehicle Office) and those being dumped on the road side is increasing every day.This result in reduction of available space that could be productively made use of.Moreover, the dumped vehicles near road side create hindrance to road users and pose a serious threat to pedestrians.A few of such vehicles are sold as ordinary scrap at a relatively low value.An effective system to address the issue is thus currently absent. There exists an imminent need to address the issue of dealing with confiscated/dumped vehicles.

CHAPTER 4
APPROACH AND STRATEGIES TO 13TH PLAN

Approach

78. In order to fill the gaps and to solve the key issues in transport sector, it is inevitable to prepare a Five-Year Planned document. The main approach for the 13th plan in transportation sector is be to provide safe, economic, efficient, comfortable, clean, well - integrated, environment friendly and sustainable transportation system for Keralites today and in the future. To achieve the said focus, the following objectives and strategies are to be completed in a phased manner with tangible targets.
    1. Regulate, Plan and Develop transport and related infrastructure
    2. Augmentation of transport networks and mobility
    3. Improvement of rural transport and providing accessibility
    4. Providing high quality and reliable Public Transport Services
    5. Reduction in accidents and improve road safety
    6. Promotion of Non-Motorized Transportation Systems
    7. Establishing an effective and efficient transport sector that results in economic growth
    8. Mitigate environmental pollution by promoting Green Transport
    9. Improved customer service
    10. Appropriate institutional mechanism and capacity building

79. The above objective can be fulfilled through improving connectivity to upcoming growth regions in the state, by inter-modal transport planning, and systematic implementation of projects and schemes planned in line with the characteristics of inter-state, inter-district and intra-city transport demand of people and goods in the state and their ideal modal share. The trend of urbanization, land use changes, the growthplans of different sectors of the economy, the inherent strength and weaknesses of different modes and transportation system with special reference to their sustainability, efficiency, employment generation, productivity, resource and social costetc. will be taken into account for intermodal planning.

Strategies

80. In order to achieve the said approaches, the following strategies are to be completed or initiated in phased manner during 13th plan with tangible targets.

Growth Potential of Transport Sector in Kerala

81. A number of factors influence the roads and road transport sector in the State which include the growth of population, land use changes, growth in NSDP. They, in turn, contribute to increase in per capita trip rate, and vehicle population which cause traffic congestion, transit delay and environmental degradation. Road crashes and accident severity are the resultant impact of the above. The future transport scenario should envisage the growth in the above parameters so as to assess the impact and act accordingly for the next 5 years. Based on

existing growth rates of transport parameters having an impact on the sector and the consequences thereon, the following growth scenario are visualized for the State.

Table 4.1*Growth Scenario Visualized for the State*

Factor	Present growth rate (%)	Future growth rate (%)
Population	0.48	0.40
Vehicle population	12%	13%
Traffic on NH	5 to 7	3 to 5
Traffic on SH	3 to 5	2 to 3
Traffic on other roads	2 to 3	1 to 2
Accidents	Fluctuating	Fluctuating

82. The traffic growth rate is expected to decrease over the years in view of the following factors
    1. low population growth,
    2. wide use of IT applications in the years to come,
    3. dispersion of traffic from high level corridors to low level corridors due to increased traffic congestion in the existing corridors.
    4. Bypasses and new roads as well as upgraded roads to take care of additional traffic generated in the State

83. With a stagnant population, increasing social status of population, upgraded road network, the trip length of residents 8 km at present is bound to increase to 10 km with per capita trip rate remaining almost same at 1.07 in urban areas and both reaching same in rural areas as per NATPAC studies.The optimistic projected traffic will be around 10 crore distributed on 3.72 lakh km road length at the end of 13thfive-year plan. The traffic growth rate would thus remain less than the present traffic growth rate.

Roads

84. *Capacity augmentation/upgradation*. There should be a comprehensive development plan for the road improvement targeting each and every road of the state. The following targeted road development plan should be adopted
    1. Share of four lane road to increase from 0.48% to 1.37% (additional 3,300 km of NH and urban roads)
    2. Existing North South Highway Corridor to be developed as per MoRTH standards
    3. Coastal Highways (593 km)
    4. Hill Highways (600 km)
    5. Core Road Network in Cities/Towns
    6. Share of two lane road to increase from 22% to 27% (additional 18,000 km)
    7. Share of intermediate lane road to increase from 25% to 30% (additional 17,000 km)
    8. Share of single lane road to decrease from 51%to 41%
    9. Construction of flyover at major intersections
    10. Initiating access controlled highway from north to south
    11. Construction of bypasses for major cities

12. 664 km of urban roads to have cycle track
13. 5,000 km of urban roads to have footpath
14. Grade separated facilities for pedestrians

85. As per the aforesaid targeted road development, the road stretch with the priority list is appended in Annexure VIII.In accordance with priority for public transport, all major highways and urban public transport corridors should have segregated bus bays. Dedicated lanes for bus transport also should be given the top most priority at least in the five corporation areas in the city. Road safety features such as well-designed junctions, grade separated flyovers at important junctions, pedestrian facilities like flyovers/underpasses, adequate road signs and markings, utility ducts should form part of the road network.

86. *Improvement of Riding Quality.* Maximum priority to be given to improve riding quality (IRQ) of existing PWD road network and widening of PWD roads to two lanes. The target is to make all the PWD roads into two lane IRC standards which are single or intermediary lane widths and construction of the missing links to two lane roads.

87. *New Road Development Initiatives.*Besides the improvement of the existing roads, new Road Development initiatives like Hill Highway, Costal Highway and bypasses also should find a place in the 13th Plan.Coastal highways and hill highways are to be developed covering the entire State benefitting those residing in the coastal and hilly areas and ushering the all-round development with due focus on Tourism.

88. There is an urgent need to identify and develop a Core Network of arterial routes which have high traffic volume comprising State Highways, MDRs and LSG roads with a Corridor concept.Surfacing and two laning of such roads under "Core Network" to be done on priority.

89. Also, an access controlled super highway to be planned based on future traffic projections from the north to south away from all cities and towns but with connectivity to them, in order to ensure fast movement of vehicles across the length and breadth of the State. Initiatives also to be taken to exploit central highway development projects, like Golden quadrilateral project, port connectivity projects and the East -West, North -South corridors which is covering around 14,162 Km.

90. *Land acquisition/land pooling techniques.*Land acquisition remains a major hurdle in Kerala considering the fact that land is scarce and therefore its utilization should be done judiciously. Land has to be made available for development of transport infrastructure taking into account the present and future demand confirming to relevant codes and practices prescribed/ followed by competent agencies like Indian Roads Congress (IRC), Ministry of Road Transport and Highways etc. Land Pooling method can be adopted which is a viable alternative for rehabilitation/resettlement primarily because of the difficulties involved in acquiring clear, marketable and litigation-free appropriately sized contiguous land parcels for development. Land pooling benefits the government as well as the land owners as it aids in expediting development of infrastructure and urban areas. Keeping all

this in mind a sound Policy should be in place for monetary compensation and/or rehabilitation of displaced people so that land acquisition does not stall the progress of any region.

91. *Road maintenance management.*To improve efficiency in road maintenance works of PWD, following MoRTH specifications, a uniform format to be developed in compiling the information related to Right of Way (ROW) and other assets starting from LSGD level to State level. The data should be available in electronic form with facility for periodic updating on real time basis, as and when land is acquired to augment the existing ROW and strengthening/renewal/widening is done. The road management focuses to gradually shift to outsourcing, whereby the expertise / skills in the construction industry could be harnessed and utilized to bring the cost effectiveness in maintaining the road assets through innovative operation/maintenance contracts on PPP model. To allow local authorities and industrial houses to 'adopt' the regional/local roads and own responsibility for maintaining it, up to a reasonable standard.

92. The existing method of road maintenance method should be replaced by uniform method on real time basis
    1. NH - 7 years maintenance contract
    2. SH - 5 years maintenance contract
    3. Other roads - 3 years maintenance contract
        1. Gradual shifting of departmental maintenance operation to maintenance contracts on PPP mode.
        2. Using of modern techniques on road maintenance covering use of plastic, reclaimed asphalt pavement, polymer modified bitumen etc.
        3. Construction of rigid pavement/interlocking in areas prone to flood and high traffic intensity, to minimize recurring maintenance cost and obstruction to traffic movement.
        4. Updation should be made on the online data base system (Pavement Management System/Bridge Management System) even after minor maintenance.

93. *Consultants, contractors & skilled work force.*Contractors are the major partners in progress for both construction projects of the Government and PPP projects.Healthy growth of the domestic contractors to be promoted and support from foreign contractors procured. Consultancies in Roads sector, as well as the task of planning, design, construction, and maintenance are the responsibility of the PWD.Future road projects to be implemented through PPP mode, the main modes of contract on "Design, Build, Finance, Operate, Maintain and Transfer (DBFOMT) Basis"; demands independent engineering experts supported with finance, legal, social and environment specialists, to attract investors and financial institutions.

94. *Technology, equipment's & machinery.*The evolution of multiple technologies in road construction has resulted in the introduction of Tools & Plants like Wet Mix Plants, soil compactors, tandem vibratory rollers, pneumatic rollers, excavators etc and use of

bituminous materials like RAP, shredded plastic etc. Provisions to be incorporated in the contracts for usage of maximum hi tech machineries in all road constructions.In order to support the existing contractors, PWD to take the initiative in developing a new business model to avail these facilities to contractors.

95. *Coordination for road development in the state.*There are several departments, Organizations and institutions managing the Road and Road Transport Sector in Kerala and specific Legislations, Acts, Rules and guidelines governing the functioning of the various organs in the Road and Road Transport and the control of Road Traffic. Priority should be given for the formation of a "Regulatory Body" at the State Level by including representatives of the various sectors of PWD and its line departments, Transport Dept, LSG Dept, Local bodies, R&D Institutions and experts in these fields for better coordination, maintenance & management of roads and vehicles. Similar "Inter-departmental Co-ordination Committees" may be formed at the district level.

96. *Monitoring/evaluation/ quality control of projects.*For monitoring/evaluation of existing road infrastructure, international practices like International Road Assessment Programme (iRAP) should be utilized along with a three tier quality management system involving the civil society. To give star ratings for each of the road stretches based on identified attributes. Single star is the worst rated and five star is the best rated roads and policies to be developed to make all roads to achieve at least a minimum, three star rating. Road Safety auditing to be made part of all road infrastructure projects. Non-destructive tests should also be conducted to measure quality of the pavements.

97. *Pre and post traffic impact studies.*Policy level intervention is required for making traffic studies mandatory for medium and large scale buildings/commercial complexes. In developed cities like Dubai, such practices are prevalent whereby proper traffic studies are conducted and traffic impact study report is submitted along with the application for sanctioning of new buildings/ developments. Traffic impact studies should address the issues of travel needs of the prospective visitors to and within the buildings and suggest measures to promote the use of public transport and non-motorized forms of transport. The developer would have to bear a part of the expenditure incurred in the improvements to be made to overcome the effects of this new development. Post impact studies would help in assessing the shortfalls and plan remedial measures.

Transport Department

98. *Motor vehicles.*Kerala has a vehicle population growing at the rate of about 10 to 12% per year during the last 10 years. Likewise, out of the total vehicle population by 13th plan and it is estimated that 62% are two wheelers, 18 % cars, 8 % autos, 6% goods vehicles and remaining other vehicles.

Table 4.2*Estimated Motor Vehicle Growth for next 5 years - Type wise - in Kerala*

Year	Goods	Buses	Taxi	Cars	Jeeps	Autos	2Wheelers	Others	TOTAL
2017	610308	191230	230900	1839063	79340	789332	6292283		10171813
2018	662509	207586	250649	1996360	86126	856845	6830466		11041813
2019	715309	224130	270625	2155464	92990	925133	7374834		11921813
2020	768709	240862	290828	2316376	99932	994197	7925388		12811813
2021	822709	257782	311258	2479096	106952	1064037	8482128		13711813
%	**6.00**	**1.88**	**2.27**	**18.08**	**0.78**	**7.76**	**61.86**	**1.4**	**100.00**

Source Motor Vehicles Dept.

99. *Transport safety measures to control road accidents.*Road Safety has to be addressed in holistic manner by providing safer roads, safer vehicles, safer drivers and effective and efficient enforcement of safety rules/regulations. There are 5 E's in Road Safety – Education, Engineering, Enforcement, Emergency Care, and Evaluation– which needs to be addressed simultaneously to achieve best results in reducing accidents and their severity level. Existing fatality rate per lakh population ranges between 4 -6 persons and fatality rate of pedestrians and NMT range between 40% and 60%.To address this burning issue, focused approach as follows to be taken up

Education

1. Mandatory refresher course to traffic violators to removedriving licenses
2. Mandatory refresher cum training course to freight owners/drivers, public transport drivers, auto/taxi drivers etc. for licenses/permit renewals.
3. Soft policing by school children to propagate road safety awareness.
4. Training cum refresher course to Police, MVD, Medical staff, Ambulance operators and otherson Standard Operating Procedures (pre-and post-accident scenario)
5. Spreading Emergency Contact numbers to citizens through various print and audio-visual media.

Engineering

1. Remedial measures for accidents black spots: Transport Department, Police, PWD and others to partner in road safety auditing and remedial measures in identified blackspots/stretches
2. Application of ITS
    1. Installation of vehicle actuated traffic signals
    2. Install signals adapted for emergency vehicle preemption (priority to emergency vehicles)
    3. Installation of synchronized signal system in major urban corridors
    4. Integrated vehicle surveillance system (Police &MVD)

Enforcement

1. Procurement of road safety equipment's:
    1. Procurement of equipment's like body worn cameras, laptops, speed radars, alcohol breath analyzer, red/green light emitting baton, whistle, reflective coat/ jacket, rain coat, dust mask, camera etc. along with the proper training to the concerned user staff
2. Child Restraint systems to be made mandatory in four wheelers:
    1. Procurement/ setting up of child restraining system suppliers
    2. Policy level intervention to be made for implementation of child restraining system
3. Prohibition of drunken driving with help of mobile medical van:
    1. Procure/ obtain mobile medical unit and necessary direction should be given to the enforcement agencies to undertake surprise drunken driving testing with the help of mobile medical van for testing on the spot.
4. ITS applications including alcohol lock, seatbelt lock, electronic drivers' license, collision warning system:
    1. Implement ITS in all type of vehicles
    2. Automated challan system for traffic violations
    3. Introduction of Multi capturing radar system
    4. RFIDs to be made mandatory for all valid registered vehicles within thestate

Emergency Care

1. Classification of medical care centres into Level I to IV:
    1. Health department to classify medical care centres into Level I to IV, near NH &SH for providing medical emergency treatment to roadaccident victims.
    2. Provide details of classification to volunteers and general public
2. Spread ambulance services/ training to ambulance staff/ helicopter ambulance:
    1. To delegate operation of ambulance services in all major cities/ towns in the State else form a co-ordination panel to bring all local ambulance/hospitals under one platform for service sharing organize training to ambulance staff
    2. Air ambulance services to citizens in remote areas
3. Imparting first aid and primary medical care training to citizens along major roadsides:
    1. to organize volunteers for assisting road accident victims
    2. To provide training to volunteers in first aid and primary medical care
4. Classification of road accident injury with latest Abbreviated Injury Scale (AIS) for determining the cost of accidents:
    1. To form a medical training team to study latest AIS
    2. Medical training team to train hospital staff in using AIS
    3. Use latest version of AIS for classification of injuries in all medical carecentres.
    4. Use of AIS in Accident Register cum Wound Certificate

Evaluation

1. Establish a methodology to evaluate each road safety activity and prepare guidelines
2. All firms capable of evaluating should be selected, trained and empanelled
3. Evaluation results to be used to prioritize road safety activities which are to be sanctioned in future

100. *Enhancing safety of passengers/travelers.*For the safety of travelers, especially women and children, SOS mobile application can be handy. In all modes of public transport and intermediate modes of public transport (auto, taxi etc.), driver (and conductor) identity and license display system to be implemented to help deter anyone from taking any wrong steps.Heavy vehicles especially public passenger vehicles to be installed with CCTV cameras for crime detection and prevention.The side covering of auto rickshaws to be made transparent to provide more visibility to the driver as well as fellow road users. This simple step can bring down the accidents involving auto rickshaws to some extent.

101. *Good samaritans rules.*Many Good Samaritans are helping road accident victims and saving many lives. In this direction, the Ministry of Road transport & Highways (MoRTH) have issued guidelines to be followed by hospitals, police and all other authorities for the protection of Good Samaritan. Further, Ministry has also issued Standard Operating Procedure (SOP) for the examination of Good Samaritans by the Police or during trial. Both the guidelines have been mandated by Honorable Supreme Court of India with slight modifications. The Kerala Government should publish suitable material to educate/aware public about role of "Good Samaritans" so that more people come forward to help the road accident victims to reach the nearest hospital, in case they come across one.

102. *Control of overloading through construction of weigh bridges.*The issue pertaining to plying of overloaded vehicles on highways & other roads has been raised from time to time.Establish Weigh Bridges along the sides of National Highways and State Highways with adequate facilities for off-loading excess loads. Oxbow lands along side of major roads can be used for setting up ofweigh brides onPPP model.

103. *Streamlining goods transportation.*Freight transportation makes production and consumption of goods to occur at different locations. Inter-state goods movements are handled predominantly by road based goods carriers, followed by rail and waterways. It is said that around 20,000 goods vehicles pass through 20 Commercial check posts in Kerala in a single day. As per a recent study by NATPAC, the share of road is 78%, water transport - 14% and movement by rail is 8%.However, a study by Planning Commission (2008) reveals that the Road transport carry almost 88% of total traffic, while Railways handled about 10% of total traffic and Water transport carried less than 2% of cargo movement.

Table 4.3 *Estimated Goods Vehicles passingThrough the Commercial Tax Check Posts for Next 5 Years in Kerala*

Year	Goods Vehicle Passing through Commercial Check Posts	Tonnage (In Lakh)
2017	76,65,000	919.8
2018	80,48,250	965.79
2019	84,50,663	1014.07
2020	88,73,196	1064.80
2021	93,16,855	1118.02

104. For streamlining Goods Traffic during 13th Plan
    1. Freight policy covering rte optimization, strategic shift in goods transport etc to be evolved
    2. Promote/Restrict/Incentivize transfer of hazardous and non-perishable goods through water transport mode
    3. Integrated Logistic Park and goods terminals: Mandatory implementation of Integrated Logistic Park at major cities/towns and minor ports in a phased manner
    4. Green channel and Integrated Check Posts : Implementation of green channel system to make the hassle free movement of goods transportation
    5. Upgradation of Modern Integrated Check Posts: Implementation of automated check posts operation is necessary especially at Walayar, Manjeswaram and Amaravila.

105. *E- Governance.*Government should strengthen introducing modern web based database of the vehicles and adopt E- payment scheme for payment of taxes and modern methods of vehicle tracking and monitoring system such as Electronic Road Pricing (ERP) system at all congested and accident prone locations.
    1. Automatic driver licensing system & Automatic Vehicle Testing System
        1. All RTOs to install automatic driver licensing systems and vehicle testing systems accompanied by live road test
        2. Strict test with adjustment of rear view mirrors, usage of indicators andseatbelt, parking maneuver to be checked
        3. Online State Registry for Licenses and Vehicle Registration in line with MoRTH (Vahan & Sarthi)
        4. Online learners license
        5. Online technology based licensing system
        6. Technology based fitness test of vehicles
        7. Registration of vehicles and obtaining driving licenses from anywhere in State

Motor vehicles (amendment) bill 2016.

106. In the present Motor Vehicles Act, there are 223 Sections out of which the Bill aims to amend 68 sections whereas Chapter 10 has been deleted and a chapter 11 is being replaced with new provisions to simplify third party insurance claims and settlement process.The important provisions are the following

1. Higher Penalties – Theminimum fine for being caught driving under the influence of alcohol or drugs has been increased from Rs 2000 to Rs 10,000 and for rash driving, it has been increased from Rs 1000 to Rs 5000
2. Cashless treatment for Road Accident Victims
3. Increased Compensation for the family of the deceased – If an individual dies in hit and run case, the central government is required to provide a compensation ofRs 2.00 Lakh or more to their family
4. Inclusion of Good Samaritan Guidelines – to protect Good Samaritans (bystanders who come, forward, in good faith, to help road accident victim) from civil and criminal liability and make it operational for them to disclose their identity to the police or medical personnel
5. National Transportation Policy – Central Government is required to develop a 'National Transportation Policy' to establish a frameworkfor road transportation planning, for granting of permits, and set priorities for the road transport system
6. Compulsory Insurance – Central Government set up a 'Motor Vehicle Accident Fund' that will provide an automatic cover for all road accident victims in India
7. Automated Fitness Training for Vehicles – Introduction of an automated process to test the fitness of motor vehicles by October 1, 2018
8. National Registry for Licenses and Registrations -Creation of a 'National Register for Driving License' and a 'National Register for Vehicle Registration through MoRTH existing Vahan (for vehicle registry) and Sarthi (for driving licenses) platform
9. Electronic Monitoring – Government to ensure proper electronic surveillance on national and state highways and urban roads.

107. *Vehicle scrapping plant.*An effective system to address the menace of aged/dumped vehicles is to set up shredding plants at 3 regions in the state covering south, north and central in a phased manner. This will ensure green/clean environment and revenue to the Government addressing a uniform policy for scrapping vehicles.

Urban Transport

108. 60 percent of the vehicles registered and 45 percent of the road accidents in the state are in urban areas. It is expected that about 65 percent of Keralites will live in urban centres by 2030. Due to inferior public transport services and lack of reliability and connectivity, the personalized transport demand is ever increasing in urban areas. This situation demands mass transport facilities in urban areas like Metro, Commuter rail (Light Rail/Mono Rail) system etc. The urban transport infrastructure should be planned to meet the long term projected demand of the commuters and others sections of the society taking into account various serviceability indicators like speed, walkability, accidents, congestion, air quality NMT etc. A network of ring and radial roads, bypasses, link roads, fly overs, multi-level off -street parking facilities, pedestrian crossing facilities etc. should be constructed in cities and towns to relieve traffic congestions around CBD areas.
    1. Encourage greater use of public transport and non -motorized modes
    2. Dedicated Bus lanes should be created in the existing main roads

3. Enabling establishment of multi -modal public transport systems that are well integrated, providing seamless travel across modes.
4. Establishing effective regulatory and enforcement mechanisms that allow a level playing field for all operators of transport services and enhanced safety for the transport system users.
5. Establishing institutional mechanisms for enhanced coordination in the planning and management of transport systems.
6. Enhancing the Intelligent Transport System (ITS) for traffic management.
7. Promoting the use of green technologies which should help in reducing pollution levels.
8. Encouraging PPP mode development in urban transport infrastructure
9. Enabling the availability of adequate trained manpower / institutional mechanism to manage different transport operations and plan for sustainable urban transport.

Public Transport Network

1. Development of mass transport system like Metro, Light Rail Transit, Bus Rapid Transit and Sub urban rail
2. Dedicated lanes for Public Transport System should be given top most priority in all major urban areas.
3. All major highways and urban public transport corridors should have segregated bus bays
4. All Bus stops should have modern bus shelters with passenger information system and passenger amenities.
5. All Bus terminals should be modernized with passenger and crew facilities.
6. Develop Integrated terminals on all major urban centers

109. *Bus transport.*The main thrust in the 13thFive-Year Plan should be to shift commuters from using private vehicles to public transport, thereby reducing the number of personalized vehicles on the road. Introduction of small /mini buses as per the demand accessed in by routes and narrow roads. To counter the fare structure comparing two wheeler conveyances, conscious decision to introduce green incentives to fleet owners should be considered. All bus terminals and interchange stations to be upgraded with modern passenger amenities.

110. All Public Transport buses in the State should gradually be converted to green fuel like CNG, LNG/Electric etc. The Government should lend subsidies for the conversion as well as for setting up sufficient number of CNG fueling/Electric Charging Stations across the State. The cost of the subsidies on fuel charging stations /fuel depots should be covered in the 13thFive-Year Plan period. Attract transport operators through green incentives to introduce CNG/LNG/Electric vehicles and fueling /charging stations.In order to reduce the ill effects of transportation such as air and noise pollution, policy level interventions like imposition of green tax on vehicles above 10 years of manufacturing, use of vehicle technology to promote switching from fossil fuels to LPG/ CNG/ Hybrid to be initiated.

111. Inter Unit analysis of KSRTC reveals that about 30% of the units of the State exhibit poor performance.Financial performance of KSRTC is not in tune with its physical achievements due to high Staff/Bus ratio, more breakdowns/lakh km, low fleet utilization, increase in operating expenditure, hike in pension commitments, increase in interest payments, operation in uneconomic routes and granting concessional travels leads to increasing losses to the Corporation.

112. Though the occupancy ratio in KSRTC has increased from 67.14% in 2009-10 to 75.09% in 2011-12, it is not appreciable considering the higher occupancy in private carriages and inadequate road infrastructure in Kerala that result in lesser use of public modes of transport.

113. Modification of schedules based on scientific traffic studies, route rationalization, increasing productivity/employee/bus, bringing down operational expenses, preventive mechanisms/ materials management needs to be focused by the Department to bring it to the national standards.

Table 4.4*Procurement of Buses during 13thFive-Year Plan*

Name of the project	Details of the Project	13th Plan-State Plan Fund Requirements
Cost of 1000 CNG/LNG/Electric buses	Rs 60 lakhs/Bus	Rs 600 Crore
Cost of 200 Volvo/Scania/Benz Buses	Rs 1 crore/Bus	Rs 200 Crore
TOTAL		Rs **800 crore**

Mass Transport System

114. *Kochi metro.*Kochi Metro Rail Project (KMRP) is the flagship project of the Government of Kerala designed to address the transportation woes of Kochi City. The Project is implemented through the Kochi Metro Rail Ltd (KMRL) with a total cost Rs 5181.79 Crore with a joint initiative of GoI & GoK.The original project duration is June 2017, but it will span in 13th Plan with a demand of Rs1,150 Crore.Total fund requirements of the Kochi Metro rail during the 13thFive-Year Plan isRs1,150 Crore to meet traffic demand of 4.82 lakh projected daily ridership as per DPR.

Table 4.5*Project Details of Kochi Metro*

SL No	Connected Places	Length (KM)	CostRs Crore
Phase 1	Aluva to Petta (22 stations)	25.6	5181.79
Phase 1 (a)	Pettah to SN Junction (Extention)	2.00	359.00
Phase 2	JNL Stadium to the IT City Kakkanad	11.00	2577.25

Source Kochi Metro Rail Limited

Water Metro Project by KMRL

115. Kochi Metro Rail Corporation (KMRL) obtained clearance to implement the Kochi Water Metro Project at an estimated cost of Rs 741.28 crore with German loan assistance through

(KFW) and State share of Rs 103 crore. This project envisages the development of 76 Km of Waterways in Kochi City, with vessels and terminals and span is 13th plan with a target completing in 2019 and projected daily ridership as per DPR is 40316.

Light Metro Rail Projects

116. Light Metro Rail Projects at Kozhikode and Thiruvananthapuram is implemented at an estimated cost of Rs 6728 crore (Rs 4219 crore for Thiruvananthapuram to be completed in 5 years and Rs 2509 Crore for Kozhikode to be completed in 4 years) bya Joint Venture of GoK and GoI with 20% equity each and remaining 60% borrowings. The project is to be completed in four years and state government funding requirements in the 13thFive-Year Plan to Rs 1619 crore.

Table 4.6*Total State Government Funding Requirements for Light Metro Rail Projects*

Light Metro Projects in Kerala – Funding Pattern			
Location	Trivandrum	Kozhikode	Total (RsCrore)
Completion Cost by 2021	4219	2509	6728

High Speed Rail

117. A Feasibility Report on High Speed Rail Project between Thiruvananthapuram - Kannur (430 km) with an estimated cost of Rs 1,27,849 crore has been prepared by DMRC.The project needs to be considered based on future traffic demands/potential and further detailed deliberations at various levels.

Mass Transport System

118. For promoting public transport, Government to initiate
    1. Introduction of high tech and modern buses
    2. Introduction of mini buses to cater to first mile/ last mile connectivity
    3. Relocation/ augmentation of auto rickshaw/ Taxi stands
    4. MVD to enablemobile app based auto/ taxi services
    5. Introduction of smart cards for seamless travel
    6. Introduction of real time trip planner (mobile app, online and through SMS)
    7. Passenger information system
    8. Introduction of high tech and modern buses
    9. First mile/ last mile connectivity,
    10. Development of trunk and feeder system, ,
    11. Development of parking spaces at terminals
    12. ITS applications like Bus vehicle tracking system
    13. Parking guidance system,
    14. Passenger information system etc.

119. To support the development of viable integrated public transport system, it is essential that the station accessibility to be improved in line with the introduction of rationalized routes and feeder services through
    1. *Walkability.* Promote safe, active and comfortable walkway
    2. *Cyclability.* encourage safe cycling with secure parking and cycle paths
    3. *Connectivity.* encourage/enable street connectivity
    4. *Multi modal integration.* Enable integration through institutional, physical, fare, operational and identity.

120. *Promotion of non-motorized modes (NMT) of transport.*Focus to be given on the movement of people and not that of vehicles by Non-Motorized modes like walking, cycling etc. Provide safe cycle tracks, walkways, secure cycle parking and street connectivity

121. *Streamlining of intermediate public transport modes.*
    1. IPTincludes Radio Taxi and App based Taxi services such as TAXIO, Ola and Uber
    2. Proper regulation, coordination and integration of these services including autorikshaws
    3. Other measures like rationalizing IPT stands, sound fare fixation, and application of web based services in managing the supply and demand.

122. *Reducing the incidence of private vehicles.* The following measures are to be considered for reduction of the share of private vehicles in urban area.
    1. restriction of odd-even number plates on alternate days
    2. congestion charges on selected corridors in the Central Business District (CBD) areas
    3. Implementation of green tax
    4. Observance of bus cum cycle day etc.
    5. Regulation on private vehicle ownership through innovative methods
    6. Traffic management measures to regulate private transport through parking fee, congestion charging, green tax on polluting vehicles and restrictions on private vehicles usage

123. *Parking & parking policy.*Effective control and sustained enforcement of the existing rules itself can regulate/ avoid on-street parking problems in cities. Parking restrictions and imposing market driven parking fee are short term measures to curb parking. The long-term solution is to provide adequate parking facilities within the premises. Parking occupies large portions of carriageway space and to be recognized in determining the principles for allocation of parking space, and levying parking fee, whichtruly represents the value of the land occupied.

124. *Parking policy.*An appropriate Parking Policy to be evolved to remove the obstacles from roadways thereby improving the steady flow of traffic and increasing road capacity.
    1. Improving NMT access to major public transport stations coupled with bicycle parking would improve the patronage of public transport. Park and ride facilities for bicycle users, with convenient interchange, would be another useful measure
    2. Graded scale of parking fee, recovers economic cost of the land used for parking

3. Multi-level Parking (MLP) complexes should be made mandatory in city centres where several high rise commercial complexes are located.
4. All parking complexes could be encouraged to go in for electronic metering to make the investments viable.
5. Peripheral parking schemes at outskirts of cities with public transport connectivity should be encouraged to reduce incidence of parking within city limits
6. Use of ITS in management of parking both on street and off street to be encouraged.
7. Parking guidance system at off street locations and introduction of parking metre aton street locations
8. Common parking-lot to be developed in residential areas to decongestthe carriageway from parked vehicles
9. Initiate Demand Management measures viz, Parking restrictions, Variable parking fees,
10. Integrated Parking management plan for cities to utilize the available road space more efficiently, reducing parking demand and increasing the parking supply with traffic management and facilities.

125. *Responsibility of local bodies in parking.*
1. LSGD to invest Plan fund for development of off street parking on PPP Model/innovative mode
2. The enforcing authorities to ensurethat building rules on parking are followed
3. Multi storied / Underground parking as best option innew commercial complexes
4. Promote Automated Car Parking Systems
5. On-street parking to be banned and developOff-street Parking spaces through "Pay and Park" facilities.

Rail Transport

126. Government of Kerala and Ministry of Railways, Government of India have formed a Joint Venture Company with an Equity Participation of 51:49 on Ist September 2016, namely "Kerala Rail Development Corporation (KRDCO) for the implementation of following upcoming Railway Projects in Kerala.

127. The following areas needs special focus
1. Developing a multi-modal logistics hub with modern equipments for cargo handling, Industrial clusters and nodes
2. Focus on the customer with better and customized service,
3. Reduction in freight tariffs
4. Comfort and safety in travel
5. Modernization/Upgradation of railway stations
6. Participation and cooperation with railways on fund sharing and land acquisition
7. Construction of ROB's and RUB's where ever needed.
8. Elimination of Railway Level Crossings

128. Kerala receives 6.25% of the Central Road Fund raised within the state through Fuel Cess for elimination of level crossings. This would be around Rs 500 crore per year. This fund should be effectively utilized to eliminate railway level crossings in the next 5 years.
    1. Rapid Rail Transit System (Suburban Rail Project) between Thiruvananthapuramand Chengannur
    2. Angamaly – Erumely – Sabari Rail Route
    3. Ettumanoor – Sabari Link line
    4. Erumeli – Pathanamthitta – Punalur line
    5. Guruvayoor – Thirunavaya Rail link line
    6. Thalassery – Mysore Rail Project
    7. Thiruvanathapuram – Nagarcoil – Kanyakumari Line – Doubling
    8. Rail Over Bridge (ROB) / Rail Under Bridges (RUB)
    9. Container Rail line to Cochin International Airport

Air Transport

129. At present there are three international airports in Kerala located at Thiruvanthapuram, Kochi and Kozhikode respectively. A new airport is coming up near Mattannur in Kannur district. Both national and international services are operating from these three airports to major destinations both within and outside the country. Over 8 lakh domestic passengers and 50 lakh international passengers are using these airport facilities in the state every year. The government policy in aviation sector would be to promote easier and faster air transport facility for the business, tourist and emergency traffic by constructing medium sized airports/helipads/airstripsin all 14 districts / major tourist locations in the state.This will encourage inter-city air taxi services both in public and private sector using smaller aircrafts and helicopters for faster connectivity especially to the eastern hill locked regions for emergency needs as well as commerce and tourism.

130. The following action to be considered in a phased manner during the 13th Plan.
    1. Expansion and up-gradation of operational airports to meet demand from industrial sectors.
    2. Promote easier and faster air transport facility for the business, tourists and emergency traffic by constructing small and medium size helipads in all 14 districts and major tourist locations in the state.
    3. Scaling up/restarting Seaplane operations especially focusing the disaster management/domestic travel/eco tourism.
    4. Access controlled and green field highways connecting airports

Trivandrum Airport

1. Trivandrum Airport is the DGCA/ICAO (International Civil Aviation Organization) Licensed Airport.
2. The Airport operation is being carried out as per the temporary renewal of the license every year by DGCA/ICAO.

3. AAI to facilitate the basic strip clearance area for renewal of license for airport operation.
4. For providing basic air strip clearance parallel taxi track & further expansion etc,it is essential to acquire around 41 acres of land

Cochin International Airport

1. During the year 2015-16, nearly 7.8 million passengers travelled through this airport and 67,729 MT of cargo was handled.
2. The total passenger demand is expected to grow to 10 million by 2021 and 15 million by 2028. Cochin International Airport Ltd (CIAL) has already completed new International Terminal and the existing Terminal converted as Domestic Terminal.

131. The following road project requires urgent action in the next 5-year period: to cater the demands of Cochin airport.
    1. Widening and strengthening of Kalady – Airport Road
    2. Widening and strengthening of Angamaly – Airport Road
    3. Bypass roads at Angamaly, Aluva, and Kalady
    4. Completion of Seaport – Airport Road

132. Early completion of the above roads on Fast track basis would help to reduce the traffic congestion and delay to passengers experienced on the approach roads connecting MC Road with Airport and NH with Airport Road. The financial commitments to these projects for the next five years have not been indicated because of the options referred above.

133. *Kozhikode International Airport.*Recent renovation, upgrades and expansion has been completed and Airports Authority of India have provided runway lead - in lighting system for the first time in India at Calicut airport as per the recommendations of the DGCA.The following roads & junctions exposed to accident risk needs immediate rectification during this period
    1. Kolathur Junction on NH 966 between Palakkad and Kozhikode
    2. Kondotty Junction on NH 966 between Palakkad and Kozhikode
    3. Melangadi Jn on Kondotty to Thirurangadi road
    4. EMEA college Road towards aiport on Kondotty to Thirurangadi road
    5. Kakkancherry Jn on NH 66 between Kuttippuram and Kozhikode
    6. Edavannappara - Airport Road
    7. Pallikkal Bazar - Airport Road
    8. Kondotty- Manjeri Road

134. There is also an urgent need to acquire around 485 acres of land for developing runway and terminal for Kozhikode Airport.

135. *Kannur International Airport.* The Kannur International Airport (KIAL) is the second green field airport setup in the PPP mode in civil aviation infrastructure sector in Kerala. It is expected to provide an international gateway in the northern Malabar region for domestic - tourists passenger and cargo hub.Creating connectivity infrastructure is considered to be as

important as the development of Airport itself. In this regard, the following roads need to be developed

1. Kannur - Mattannur
2. Thalassery - Mattannur
3. Payannur - Mattannur
4. Karnataka Border - Mattannur
5. Mattannur -Anjarakkandi - Thalassery
6. Wayanad - Mattannur
7. Mahi - Muzhuppilangad by pass
8. Nadapuram - Thalassery road

136. The aforesaid airports related approach roads need to be widened to 4/6 lane standards with provision for footpath and parking near urban and suburban stretches. For this an amount of Rs.2500 crore is needed during the 13thfive-year plan.

Inter - Modal Transport Coordination

137. *Inter - modal connectivity.*Planning of integrated Multi-modal Transport System has been in vogue in the country for the last several years and nothing has been able to achieve this objective in an appreciable manner. Coastal shipping and Inland Water Transport have not been able to realize their full potential of growth though they are more energy efficient, environmentally cleaner and economical. At present the Western Central Kerala region has the benefit of road, rail, Inland and Port connectivity.The eastern growth regions such as Wayanad, Munnar, Kumili (Thekkadi), Sabarimala, Thenmala, etc. do not have multi-modal connectivity.These regions at present depend on only roads for connectivity which is very slow, risky and rudimentary. The Government should encourage setting up of rail and air connectivity to these regions both in public and private sectors. In order to promote inter-modal coordination for safe, efficient, customer friendly and faster movement of goods, there is need tostandardize a common carrier or transfer method (Roll on-roll off)which can be transshipped by road, rail, and barges and ships.Facilities like Roll on – Roll off enables loading of a truck directly on a flat thereby avoiding movement of long haul traffic in hilly and difficult terrain through road transport. Multi-axle vehicles need to be encouraged for such roll on-roll off movement. Necessary multi modal logistic parks and Inland Container Depots (ICDs) need to be established to transfer carriers from the main mode to feeder modes having best location advantages.

138. *Integrated multi-modal mobility hub – bus ports.*In order to ensure seamless travel for commuters, an integrated Multi-modal Transit Facility has been felt necessary in different regions. Vytilla Mobility Hub in Kochi is the first of its kind to come up in the State with formation of SPV – Vytilla Mobility Hub Society - for execution, of the Project. The first phase costing Rs14.5 crore was completed in 2011.The second phase of the Project costing Rs 433.34 crore is to be taken up for execution in DBFOT mode of PPP after identifying non-negotiable components essential to serve the interest of the public. An SPV had already been formed at Kottayam and the land acquisition steps are at advanced stage in the case of Kottayam Mobility Hub. Integrated Multi Modal Transit Facility is recommended for Kozhikode,

Thrissur, Kollam and Trivandrum cities. Preparatory works have already begun in some of the cities like Kottayam, Thrissur and Trivandrum.

139. *Integrated multi-modal logistic park.*Similar to Mobility Hub concept, an integrated Logistic park should be planned at different regions to ensure easy and hazel free transshipment of cargo traffic. A Multi-modal Logistic Park is proposed in Kochi region to serve the needs of Vallarpadam ICT and a similar facility is needed for Thiruvananthapuram region for the Vizhinjam Port too. There is also a need for constructing multi-modal logistic parksat selected locationsin the state on north-south and east-west directions which will act as new industrialand commercialgrowthcentres andforfacilitating goods transportationtoand fro theseindustrial zonesand elsewhere.These centres will be served by all modes and there will be integrated movement of goods by different modes.

140. *Training & capacity building.*Although there are about 11 million registered drivers in the State, there is a dearth of skilled drivers to drive heavy vehicles including passenger buses and goods vehicles.Most of the heavy vehicle drivers are very young and do not have adequate training in handling these vehicles.Likewise there is also great demand for expertise in managing various transport related activities including travel and tour operations and managing traffic.There is a need to ensure continuous availability of trained and skilled manpower in transport sector.At least 45% of the enforcement and engineering related manpower should be trained to manage and operate different transport operations and to control traffic congestion in cities and highways. Government should also take adequate steps to encourage in creating reserve traffic wardens after giving necessary training to students, youths and other volunteers/social activists to regulate traffic congested junctions during peak periods on voluntary/part time basis.

Upgradation of Research & Development Institutions/Consultancy

141. Kerala Highway Research Institute, the South Zone Regional Office is the quality control wing mandated with the task of assuring three tier quality assurance as well as innovative technology infusion in Road Sector.
    1. Design, Research, Investigations and Quality Control(DRIQ) Board to be upgraded
    2. KHRI to obtain NABL accreditation
    3. NATPAC to be strengthened and institutions to take up consultancy works and pilot new technologies/ programmes in transport sector
    4. The training wing of PWD to be revamped with due focus on new technology/management practices
    5. Apart from induction training to PWD Engineers, periodical mid-career training programmesandtraining visits abroad to equip them to the latest technology
    6. Industry and R&D Institutesinteraction for skill and capacity building of Technical officers and equipping them in modern technology and management practices
    7. Exposure visits to major projects/ technologies and piloting them in state
    8. Training and capacity building of Contractors and workforce

9. Policy on allowingall technical officers to take up assignments with reputed contacting and consulting organizations both in public/private sector nationally /globally for a fixed tenure and retaininglien with the parent department to update capacity.

Ensuring Safer Drivers and Setting up of Driver Training System for KSRTC

142. During 2015, 21.46 % of KSRTC buses were involved in the accidents and as a group of vehicles, KSRTC creates maximum accidents.A scientific bus module for training of the drivers of KSRTC as well as private vehicles by utilizing the services of institutions like NATPAC or national level R & D institutions (ARAI) and experts in the selected fields related to traffic rules, road signage, behavioural aspects, defensive driving techniques etc to be developed and implemented.Regular/Refresher training is to be given to the drivers covering private buses/ school buses and tippers in a phased manner based on feedback.

143. Our departments need to be reoriented to the needs of current emphasis on private sector participation and implementation of large scale projects with the assistance from the multilateral funding agencies like JBIC, World Bank, ADB etc.

Resource Mobilization

144. In the present trend of globalization and privatization, sufficient investible capital is available with multi-national companies/NRIs and other financial institutions which can be exploited for investments at home in bankable infrastructure projects. Such efforts would not only lead to provision of secure transport, availability of wider choice and lower prices to the common man, but also help the state to achieve a much-needed sustained double digit growth in the coming decades. The sources of financing the road transport sector are (1) Government Budget (2) KIIFB (3) NHAI (4) Central Road Fund and (5) Innovative new fund raising mechanisms. To meet the expenditure on road development and to reduce dependence on borrowings, the Committee recommends setting up a non-lapsable and non-fungible "Highway Development Fund".

145. One of the reasons for the current situation in the road sector is that even the Road Tax collected is not invested for road development. Details of the MV tax collected and the expenditure incurred under PWD proves the point. Year wise MV tax collected and amount spent under PWD head from 1957 onwards is detailed in Annexure VI. Even the investments made in the Road and Road Transport Sector during the various Five-Year Plans were not sufficient to cope with the ever-increasing motor vehicles in Kerala.

146. The investments required for the next five years in the Road Sector and the availability of State Funds (MV Tax) and the Plan funds (proposed) reveals that State of Kerala has to think of innovative sources from where the required funds can be generated to meet the investment demands for Road Transport in the State.

147. The following are some of the innovative sources
    1. Infrastructure Development Cess on Fuel

2. Leasing/Hiring of Oxbow/Excess land on SH and MDRs
3. Funding through new financing mechanisms

Physical Targets & Financial Requirements

148. There is a need to maintain and increase the momentum generated during the 12thFive-Year Plan and commitment of the Government to provide the much needed road infrastructure so as to improve transport efficiency.A broad indication of the requirements for the 13thFive-Year Plan, keeping in view the major thrust areas identified by the working group and removal of deficiencies on the road and transport infrastructure has been attempted.

CHAPTER 5
MAJOR RECOMMENDATIONS

149. Based on broad objectives and strategies outlined, the Committee came up with the following specific recommendations to be taken up in achieving the targets in the Road and Road Transport sector during the 13thFive-Year Plan.

Roads and Bridges

150. The existing road network has to undergo a qualitative improvement with an aim to reduce traffic congestion and transit delay, environmental betterment, easier access to desired destinations and reduction in accident risks.Most of the existing roads have to undergo massive upgradation with widening and incorporation of road safety features.It is proposed that major NHs and SHs passing through the State are to be widened to four lane width with divided carriage way.The other NHs and SHs are to be widened at least two lane standards with adequate shoulders/footpath and other major roads are widened to intermediate lane with adequate shoulders.The following are the major recommendations for 13th Plan and Road and Transport sector development plan.

1. Top priority should be given to the improvement of existing roads and development of new roads through PPP mode, with adherence to IRC/MoRTH specifications;
2. All SHs should be improved and designed into double lane standards as per IRC specifications;
3. All MDRs should be designed and improved into standard single lane as per IRC specifications;
4. Share of four lane road to increase from 0.48 % to 1.4% (additional 3,400 km of NH and urban roads);
5. Share of two lane road to increase from 22 % to 27 % (additional 18000 km);
6. Share of intermediate lane road to increase from 26% to 30 % (additional 17,000 km);
7. Share of single lane road to decrease from 51% to 41%;
8. Resource Mobilization & Land Pooling for rehabilitation is to be planned;
9. Local Bodies should prioritize the improvement of roads especially, for the improvement and linking of existing roads;
10. Action plan for the upgrading railway level crossings to RUB/ROB should be taken up;
11. Develop an action plan for encouraging the engineers of the PWD to take up jobs with contracting and consulting organizations both in public/private sector nationally /globally for a fixed tenure and retaininglien with the parent department to update capacity
12. Future road projects should be implemented under PPP mode preferably on Design, Build, Finance, Operate, Maintain and Transfer (DBFOMT) Basis;
13. Procurementand use of hi-tech machineries in road construction;
14. Implement Hill highway and Coastal highway projects in a phased manner;
15. Formulate PWD/ Transport inter departmental coordination committee at State level and in all districts levels for better preservation, maintenance & management of roads and reduction of accidents;

16. All main road intersections to be well - designed with proper medians, channelizers, adequate road signs,markings etc;
17. Improve last mile connectivity to ports and industrial hubs to enhance seamless movement of goods and services;
18. Integrate road network with rail and IWT for a multimodal transit system;
19. Provision for sewage, water, electrical and other utility ducts along roadside to be provisioned in future road developments
20. Include new technologies and marginalized materials for road construction, Natural rubber latex, plastic waste, glass/coir fiber, Reclaimed Asphalt etc
21. More pedestrian friendly walkways/foot paths
22. All encroachments on foot paths to be eliminated
23. More roads to have ear marked cycle tracks

Road Transport

1. Use of Intelligent Transportation System to tackle traffic congestion;
2. Formulate web based platform for asset management of roads cum accident database system to become an updated Management Information System
3. Strict enforcement and governance through the usage of ITS techniques viz. installation of maximum Speed Camera Surveillance System, portable interceptors, GPS based vehicle tracking system, automated vehicle testing stations etc.;
4. Control of overloading via automated weigh bridges along the major corridors on PPP mode with offloading facilities;
5. Revamping of existing tax and subsidy policy;
6. Improvement of Public Bus Transport Systems especially by introducing modern buses in government & private sector as per the demand accessed and route rationalization.
7. Regular Training for KSRTC drivers and other public transport drivers
8. Frame a freight policy with wider benefits to society and economies of scale in all sectors which lead to greater logistics efficiency, lower costs and more sustainable distribution;
9. Promote CNG/LNG/Electric vehicles through subsidies and policies;
10. Pay & Park Facilities for on street parking and enable Off -street parking facility
11. Integrated Intermodal transport coordination ensuring the last mile connectivity
12. Policy Level intervention in the area of scrappage of used vehicles;
13. Road Safety to be embarked on a Mission Mode to achieve zero tolerance by 2030.

Other Transport Services

1. Timely completion ofKochi Metro Rail Project including proposed extension
2. Development of mass transport projects likeMetro, Light Rail Transit, Bus Rapid Transit, Suburban Rail and Water Metro Project
3. Railway development projects to be undertaken onMOU/JVC/SPVs especially new lines, link lines, doubling, electrification and signal systems on priority basis;

151. With the implementation of the said recommendations proposed, it is expected there will be substantial improvement in overall transportation scenario of the State, which focus on safety of road user, traffic congestion, environmental pollution etc. The Government should provide adequate budgetary support by earmarking at least 80 percent of all revenues earned from the transport sector for the development of transport infrastructure and should also encourage private investment in developing transport infrastructure in the state. Along with this Government should also ensure the availability of land and guaranteed minimum returns to the Special Purpose Vehicles (SPV) constituted for the purpose by way of capital grant and annuities to bridge the short falls in the revenue.

Proposed Programmes/ Projects during 13th Plan

Road& Bridges

Table 4.1*Proposed Programs/Project with projected financials*

Schemes	Physical KM	Financial(Rs Crore)	Participation of Private Sector
National Highways (By State PWD)			Yes
NH to Standard Double Lane	408.38	2000	
State Highways			Yes
SDL to SML			
SSL to SDL	2683	4255	
BSSL to SDL	18	45	
Major District Roads			Yes
SDL to SML			
SSL to MDR standard ie. 5.5 M	4000	4000	
BSSL to MDR standard ie. 5.5M	1500	2000	
Other Roads (LSGD & Others)			Yes
BY PASSES		1000	Yes
Hill Highway (50% of 1200 KM)	600	2400	Yes
Coastal Highway	600	4000	Yes
Maintenance through PPP Model		To add	Yes
Contractors/Consultants		To add	Yes
Equipment's & Machinery		To add	Yes
TOTAL		**19700**	

Table 4.2*Funding pattern for Shredding plant*

Programmes proposed				
Schemes	**Physical**	**Area Required**	**Financial Rs Crore**	**Participation of Pvt Sector**
Small Shredding plant (Capacity of the main shredder is 10 vehicles an hour) with dumping yard	2	5 acres	100	Yes
TOTAL	**2**		**100**	

Road Transport

Table 4.3*Funding of software development for safety of travelers*

Programmes proposed			
Schemes	**Physical**	**Financial Rs Crore**	**Participation of Pvt Sector**
Development of mobile software	1	2	Yes
TOTAL		**2**	

Table 4.4 *Programmes Proposed – Motor Vehicles Department*

Schemes	**Physical**	**FinancialRs Crore**	**Participation of Pvt Sector**
Upgradation & Modernization of Check posts	5	100	Yes
Incentivize related Fee		15	-
TOTAL		**115**	

Table 4.5*Proposed Projects/Programmes – Motor Vehicles Department*

Schemes	**Physical**	**Financial Rs Crore**	**Participation of Pvt Sector**
Implementation of E - Governance		1.80	NA
Road Safety Measures			
Modernization of fleet			
Portable Interceptor Motor Vehicles		85.00	NA
Radar Surveillance Systems			
GPS Based Vehicle Tracking System			
Vehicle Testing Stations and Driver Testing Tracks all RTO Offices		150	YES
Modernization of Check Posts	Weigh Brides	0.06	No
Setting up of Model Inspection and Certification Centre		0.06	No
Weigh Bridges along road sides for checking and off-loading over loading			YES
Installation of Speed Detection Cameras	166	30.00	NA
Maintenance Cost of different equipment's used for the road safety control measures		17.00	NA
Setting up of unit offices		1.00	
TOTAL		**284.92**	

Source Motor Vehicle Dept Estimates

Table 4.6*Financial Projection for the 13thFive-Year Plan (Year Wise) –Motor Vehicle Department* Rupees in crore

Component	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
TOTAL	57.85	49.25	52.45	69.67	55.70	284.92

Table 4.7 *Funding pattern for the development of parking facilities*

Programmes Proposed			
Schemes	**Physical**	**FinancialRs Crore**	**Participation of Pvt Sector**
20 parking ground each for 5 Corporations	100	100	Yes
5 parking grounds for 60 Municipalities	300	300	Yes
TOTAL		**400**	

Table 4.8*Programmes proposed – Training*

Schemes	**Physical**	**Financial Rs Crore**	**Participation of Pvt Sector**
Upgradation of R & D Centres	**-**	20.00	
Online Database creation	3	5.00	Yes
SOS Mobile Application	1	1.00	Yes
Capacity Building	Technical staff	10.00	Yes
Refresher Training	All drivers	5.00	
Public Awareness Advertisements		10.00	Yes
TOTAL		**51.00**	

Table 4.9*Initiatives for development of Integrated Multi-modal Logistic Park*

Programmes proposed			
Schemes	**Physical**	**Financial Rs Crore**	**Participation of Pvt Sector**
Mobility Hubs	4	500	Yes
Major Port & Minor Ports	5	550	Yes
TOTAL	**9**	**1050**	

Table 4.10*Proposed Physical Targets and the financial requirements for 13thFive-Year PlanRupees in crore*

Category	Quantity	Cost
Development of National Highways (By State PWD)	408.38 km	2000.00
NATIONAL HIGHWAYS TOTAL		**2000.00**
Development of State Highways		
BSSL to SSL	18 km	45.00
SSL to SDL	2683 km	4255.00
Development of Major District Roads		
BSSL to MDR of 5.5 M	1500 km	2000.00
SSL to MDR of 5.5 M	4000 km	4000.00
Coastal Highway	600 km	4000.00
Hill Highway (50% of the total length of 1200 Km)	600 km	2400.00
By Passes		1000.00
PWD Asset Information System		10.00
Capacity Building & Human Resource Management PWD		10.00
PWD TOTAL		**17,720.00**
Motor Vehicles		
E –Governance		1.83
Road Safety Measures, portable interceptor vehicles, GPS based vehicle tracking system, Radar Surveillance Systems		85.00
Vehicle Testing Stations		150.00
Speed Detection Cameras		30.00
Modernization of Check Posts		0.06
Maintenance Cost		17.00
TRANSPORT DEPT TOTAL		**283.89**
METRO RAIL PROJECT		1150.06
WATER METRO PROJECT		103.00
LIGHT METRO PROJECT		1619.00
HIGH SPEED RAIL PROJECT		NA
JOINT VENTURE RAILWAY PROJECTS		1400.00
INTEGRATED MOBILITY HUBS	4	500.00
INTEGRATED MULTI MODEL LOGISTICS PARKS	5	550.00
PARKING	300	400.00
KSRTC PURCHASE OF BUSES		800.00
Small Shredding Plant	2	100.00
Online data Base & Mobile Application		6.00
Up gradation of R & D Centres		20.00
Capacity Building & Refresher Training		15.00
Public Awareness Advertisements		10.00
TOTAL		**26,676.95**
		@ 26,677 crore

ANNEXURE 1

PROCEEDINGS OF THE MEMBER SECRETARY
STATE PLANNING BOARD
(Present: Sri. V. S. Senthil IAS)

Sub: Formulation of XIII Five Year Plan (2017-2022) – Constitution of Working Group – **Road & Road Transport-** reg.

Ref: Note No. 260/2016/PCD/SPB dated 06.09.2016 of the Chief (i/c) PCD, SPB

ORDER No. SPB/295/2016/I&I (WG-6) Dated: 20.09.2016

As part of formulation of XIII Five Year Plan, the State Planning Board has decided to constitute Working Groups to formulate draft proposals in the various major development sectors and sub sectors. Resource persons including Professionals, Administrators and Experts connected with the sectors were identified as members of the Working Groups. Accordingly, the **Working Group on Road& Road Transport** sector is hereby constituted with the following members.

Co-Chairpersons

1. Sri. Subrata Biswas, Additional Chief Secretary to Govt. Public Works Department, Govt. Secretariat, Thiruvananthapuram
2. Prof. Sushil Khanna, Indian Institute of Management, Kolkkatta 700 104, 218 B, Lake Terrace Ext, Phone No. 91-33-24678300-06 extn.179

Member

1. Sri. K.R. Jyothilal IAS, Secretary to Government, Transport Department, Govt. Secretariat, Thiruvananthapuram
2. Sri. P. K. Satheesan, Chief Engineer, PWD (R&B),Thiruvananthapuram
3. Sri. P.G. Suresh, Chief Engineer, Kerala State Transport Project, Thiruvananthapuram
4. Sri. K. P. Prabhakaran, Chief Engineer, PWD (NH), Thiruvannthapuram
5. Sri. Anandakrishnan IPS, Transport Commissioner, Motor Vehicles Department, Thiruvananthapuram
6. Sri. Antony Chacko, Managing Director, KSRTC, Thiruvananthapuram
7. Sri. Elias George IAS, Managing Director, Kochi Metro Rail Project ,.Kochi
8. Sri. P. I. Sheik Pareeth IAS, Managing Director, Kerala Rapid Transit Corporation Ltd., Corporate Office, Vellayambalam,
9. Dr. B.G. Sreedevi, Director, NATPAC, Thiruvananthapuram
10. Sri. T. Elangovan, Scientist – G (Rtd.), NATPAC, Thiruvananthapuram

11. Sri. R. Sasikumar, Member, Rakshadhikari, NH Road Development Committee, Nirmalyam, KRA 7, Karamana, Nemom P.O., Thiruvananthapuram
12. Sri. James Vadakkan, Vadakkan House, Mundankal P. O., Pala, Arunapuram Via., Pin Code 686574, Phone 04822-213829, Mobile No.09633300951
13. Sri. Dejo Kappen, Kappil House, Meenachil P. O., Pincode 686577 Mobile No. 09447300978
14. Sri. M.G. Rahul, General Secretary, Kerala State Transport Employees Union, PRA 180, Sasthangalam P.O., Thiruvananthapuram
15. Sri. K. K. Divakaran, Koothulli, Thodikulam, Noorani P O, Palakkad -+919447131244

Convener

Sri. Joy N.R., Chief, Industry& Infrastructure Division, State Planning Board, Thiruvananthapuram

Co- Convener

Assistant Director, Transport Sector, Industry and Infrastructure Division, State Planning Board

Terms of Reference (Road & Road Transport)

1. To review the development of the Road and Road Transport sector with emphasis as to progress, achievements, present status and problems under its jurisdiction during the 11th and 12th Five Year Plan periods.
2. To evaluate achievements with regard to the plan projects launched in the Road and Road Transport sector, both by the State Government and by the Central Government in the State during these plan periods.
3. To list the different sources of data in regard to the Road and Road Transport sector and provide a critical evaluation of these data sources, including measures for improvement.
4. To identify and formulate a set of output and outcome indicators (preferably measurable) for the Road and Road Transport and base the analysis of the previous plans on these indicators.
5. To outline special problems pertaining to the Road and Road transport sector.
6. To suggest, in particular, a set of projects which can be undertaken during the 13th Plan period in the Road and Road transport sector.

Terms of Reference (General)

1. The Chairperson is authorised to modify Terms of Reference with the approval of State Planning Board. The Chairperson is authorised to invite, on behalf of the Working Group, experts to advice the Group on its subject matter. These invitees are eligible for TA and DA as appropriate.

2. The Working Group will submit its draft report by 1st December 2016 to the State Planning Board

3. The non- official members of the Working Group will be entitled to travelling allowances as per existing government norms. The Class I Officers of GOI will be entitled to travelling allowances as per rules if reimbursement is not allowed from Departments.

Sd/-
MEMBER SECRETARY

To

The Members concerned

Copy to:-

The Accountant General, Kerala (A&E) with C/L
The Sub Treasury Officer, Vellayambalam.
The PS to the Hon. Vice Chairman, State Planning Board.
PA to Member Secretary
CA to Member (KRR)
All Divisions, State Planning Board.
The Sr. Administrative Officer, State Planning Board.

Forwarded by Order

Sd/-
Chief, (Industry & Infrastructure Division)

PROCEEDINGS OF THE MEMBER SECRETARY
STATE PLANNING BOARD
(Present: Sri. V. S. Senthil IAS)

Sub: Formulation of XIII Five Year Plan (2017-2022) –Working Group –**Road& Road Transport-**Reconstituted - reg.

Read: This Office order of even number dated 20.09.2016

ORDER No. SPB/295/2016/I&I (WG-6) Dated: 23.09.2016

As part of formulation of XIII Five Year Plan, the Working Group on **Road and Road Transport** has been constituted vide paper read above. The Working Group on Road and Road Transport is hereby reconstituted by including one new member viz. Sri. P.U. Abdul Kalam.

Co-Chairpersons

1. Sri. Subrata Biswas, Additional Chief Secretary to Govt. Public Works Department, Govt. Secretariat, Thiruvananthapuram
2. Prof. Sushil Khanna, Indian Institute of Management, Kolkkatta 700 104, 218 B, Lake, Terrace Ext., Phone No. 91-33-24678300-06 extn.179

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4. Sri. K.P. Prabhakaran, Chief Engineer, PWD (NH), Thiruvannthapuram
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10. Sri. T. Elangovan , Scientist – G (Rtd.), NATPAC, Thiruvananthapuram
11. Sri. R. Sasikumar, Member, Rakshadhikari, NH Road Development Committee, Nirmalyam, KRA 7, Karamana, Nemom P.O., Thiruvananthapuram
12. Sri. James Vadakkan, Vadakkan House, Mundankal P. O., Pala, Arunapuram Via. Pin Code 686574 - Phone 04822-213829 - Mobile No.09633300951

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15. Sri. K. K. Divakaran, Koothulli, Thodikulam, Noorani P O, Palakkad - +919447131244
16. Sri. P.U. Abdul Kalam, Puthenpurakkal, South Aryad, Alappuzha

Convener

Sri. Joy. N.R., Chief, Industry & Infrastructure Division, State Planning Board, Thiruvananthapuram

Co- Convener

Assistant Director, Transport Sector, Industry and Infrastructure Division, State Planning Board

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All Divisions, State Planning Board.
The Sr. Administrative Officer, State Planning Board.

Forwarded by Order

Sd/-
Chief, (Industry & Infrastructure Division)

PROCEEDINGS OF THE MEMBER SECRETARY
STATE PLANNING BOARD
(Present: Sri. V.S.Senthil IAS)

Sub: - Formulation of XIII Five Year Plan (2017-2022) –Working Group –**Road& Road Transport-** Reconstituted - reg.

Read: -1. This Office order of even number dated 20.09.2016

ORDER NO.SPB/295/2016/I&I (WG-6) DATED: 06.10.2016

As part of formulation of XIII Five Year Plan, the Working Group on Road and Road Transport has been constituted vide paper read above. As per the suggestion of the Hon'ble Vice Chairman, the Working Group on Road and Road Transport is hereby reconstituted by including Shri. E. Sreedharan, DMRC as Co- chairperson .

Co-Chairpersons

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All Divisions, State Planning Board.
The Sr. Administrative Officer, State Planning Board.

Forwarded by Order

Sd/-
Chief, (Industry & Infrastructure Division)

ANNEXURE 2

Name of District	Carriage Width												District Total
	SH						MDR						
	7 & above	5.5-7.0	3.5-5.5	Below 3.8	N/A	Total	7 & above	5.5-7.0	3.5-5.5	Below 3.5	N/A	Total	
Thiruvananthapuram	126.295	61.914	2.573	..	..	190.782	174.037	1017.266	853.344	218.79	30.577	2294.014	2484.796
Kollam	44.503	71.718				116.221	43.759	897.315	571.635	236.693	19.67	1769.072	1885.293
Pathanamthitta	174.483	97.925	..	..	..	272.408	28.965	700.847	774.852	193.71	..	1698.374	1970.782
Alappuzha	126.173	44.752	0.39	..	..	171.315	116.819	794.199	303.962	59.502	87.786	1362.268	1533.583
Kottayam	193.761	174.213	27.51	..	..	395.484	118.399	614.196	1574.79	360.827	55.848	272.06	3119.544
Idukki	30.9	716.831	181.468	17.8	…	946.996	25.5	228.174	994.038	361.02	277.88	1886.618	2833.608
Ernakulam	174.786	137.508	17.995	..	..	330.289	165.816	510.578	1437.67	325.533	33.36	2472.957	2803.246
Thrissur	183.2	76.466	..	..	..	259.666	43.981	814.019	449.195	227.514	5.04	1539.649	1799.315
Palakkad	151.74	91.203	8	..	..	250.943	172.214	1148.978	176.217	572.316	145	2214.725	2465.668
Malappuram	174.57	166.342	7.5	..	..	348.412	148.696	1061.87	636.572	270.79	76.63	2194.558	2542.97
Kozhikkod	57.847	93.96	106.34	..	..	258.147	118.132	583.83	646.461	265.23	21.98	1635.633	1893.78
Wayanadu	37.48	65.505	12.8	..	6	121.785	0.36	712	418.406	75.13	6	1211.896	1333.681
Kannur	83.021	153.914	5.54	..	..	242.475	140.34	806.55	708.016	342.82	5	2002.726	2245.201
Kasargode	81.55	68.68	13.035	..	..	1633.265	13.48	559.137	385.778	207.04	64.5	1229.935	1393.2
District Total	**1640.309**	**2020.931**	**383.148**	**17.8**	**6**	**4068.188**	**1310.498**	**10448.959**	**9930.936**	**3716.815**	**829.271**	**26236.479**	**30304.667**

ANNEXURE 3

Bus Population Ratio in Southern States

State	Population Lakhs	STU Bus Number	Private Bus Number	Total Number
Kerala	3,40,00,000	5,675	19,145	24,820
% to total		22.9	77.1	100
Bus per lakh population		16.7	56.3	73.0
TAMIL NADU	7,51,64,000	19,950	7,553	27,503
% to total		72.5	27.5	100
Bus per lakh population		26.6	10.1	36.7
KARNATAKA	6,32,21,000	23,720	12,906	36,626
% to total		64.8	35.2	100
Bus per lakh population		37.5	20.4	57.9

*Source*Economic Review and reply under RTI Act from Tamil Nadu & Karnataka

ANNEXURE 4

District Wise Number of Private & KSRTC Buses 2014 & 2015

District	PRIVATE Buses		KSRTC Buses	
	2014	**2015**	**2014**	**2015**
Trivandrum	431	450	1461	1539
Kollam	928	1022	631	615
Pathanamthitta	945	1042	308	313
Alapuzha	955	1053	467	48
Kottayam	1627	1793	445	458
Idukki	415	457	230	235
Ernakulam	2535	2793	567	546
Trichur	1956	2156	386	365
Palakkad	1170	1290	208	208
Malappuram	2118	2335	213	215
Kozhikode	1816	2002	240	237
Wayanad	484	533	270	252
Kannur	1944	2142	269	270
Kasargode	478	527	153	154
TOTAL	**17802**	**19145**	**5848**	**5675**

Source Economic Review – 2015, Vol 2, Pages 246/254 to 256

ANNEXURE 5

Physical & financial performance of southern STUs

Parameters	Kerala	Tamil Nadu	Karnataka	Andhra Pradesh
Income – Earnings (Paisa per KM)	**3257.9**	**2767.9**	**3272.1**	**2928.0**
EXPENSES – Salary	2172.0	1320.0	1070.0	1141.0
Fuel	1706.1	1130.5	1366.0	N A
Other Materials	331.7	112.8	188.2	N A
Other Expenses	671.4	395.1	715.8	N A
Total Expenses	**4881.2**	**2958.4**	**3340.0**	**3301.7**
Loss per KM	1623.3	190.5	67.9	373.7
Average Km per Bus	327.5	473.4	357.2	409
KM per Employee	37.26	70.17	71.11	58.84
Fleet Utilization %	80.5	94.7	91.3	91.1
Schedule Cancellation %	19.5	5.3	8.7	8.9
Bus Staff Ratio	8.79	6.75	5.02	6.33

*Source*Performance Review of STUs 2014-15, ASRTU, CIRT, IJTM April June 2015

ANNEXURE 6

YEAR WISE Motor Vehicle Tax Income and Expenditure on Roads & Transport(Rs CRORE)

	REVENUE		EXPENDITURE		PUBLIC WORK TOT. EXPENS			Source
Year	M V Tax (Accounts)	Charges (Accounts)	PWD (Accounts)	Tr& Com (Accounts)	REVENUE (B. E)	CAPITAL (B.E)	TOTAL (B E)	
1957-58	1.54	0.22	2.25	1.92	3.24			BIB 1980
1961-62	2.68	0.51	5.21	3.32	5.63			
1965-66	4.15	0.91	3.93	0.10	4.41			
1970-71	6.82	1.29	8.70	0.47	8.96			
2003-04	585.78	207.90	486.62	14.37	510.73	156.21	666.94	
2004-05	610.48	103.98	600.07	15.93	510.02	81.57	591.59	
2005-06	628.51	86.05	871.43	18.16	967.96	82.60	1050.56	
2006-07	707.74	84.11	703.49	17.16	794.42	698.58	1493.00	
2007-08	853.17	103.12	723.87	34.67	911.95	688.60	1600.55	
2008-09	937.45	148.75	1048.58	51.35	878.44	653.73	1532.17	
2009-10	1131.10	138.50	955.23	87.82	977.85	563.12	1540.97	
2010-11	1331.37	161.86	668.93	71.07	741.67	2542.97	3284.64	BIB 2016
2011-12	1587.13	174.10	1162.74	167.93	1376.50	1163.28	2539.77	
2012-13	1924.62	195.92	1645.83	190.92	1484.12	2687.06	4171.18	
2013-14	2161.09	231.98	1632.34	117.93	1733.69	1106.15	2839.85	
2014-15	2364.95	280.83	1760.61	176.56	1956.26	1228.37	3184.63	
2015-16	2837.35	413.03	2648.39	249.02	1889.78	2370.03	4259.51	
2016-17	3351.49	460.02	2079.35	203.89	2079.35	2216.37	4295.73	

Source Budget in Brief of Various years,Finance Dept, Govt of Kerala , Thiruvananthapuram

ANNEXURE 7

Funds allotted to various Five-Year Plans to kerala

5-year Plan	Period	TOTAL PLAN Amount (Rs Cr)	Transport & Communications	% to Total
1stFive-Year Plan	1951-56	25.89	3.36	12.98
2ndFive-Year Plan	1956-61	80.22	7.18	8.95
3rd Five-Year Plan	1961-66	182.31	11.96	6.56
Annual Plan	1966-69	144.37	10.67	7.39
4thFive-Year Plan	1969-74	345.76	30.76	8.90
5thFive-Year Plan	1974-79	691.00	47.88	6.93
Annual Plan	1979-80	239.54	16.25	6.78
6th Five-Year Plan	1980-85	1801.62	118.61	6.58
7thFive-Year Plan	1985-90	2546.91	273.58	10.74
8thFive-Year Plan	1992-97	7373.93	622.32	8.44
9thFive-Year Plan	1997-2002	16386.81	1282.17	7.82
10thFive-Year Plan	2002-2007	23121.98	2747.92	11.88
11thFive-Year Plan	2007-2012	48393.01	7242.10	14.97
2007-08		6488.40	915.89	14.12
2008-09		8042.16	901.87	11.21
2009-10		9755.67	1378.22	14.13
2010-11		11011.89	1786.79	16.23
2011-12		13094.89	2259.33	17.25
12thFive-Year Plan	2012-2017	107202.74	11634.10	10.82
2012-13		16343.96	2589.66	15.85
2013-14		16443.89	2226.46	13.54
2014-15		19999.29	2184.46	10.92
2015-16 RE		23845.43	2756.97	11.56
2016-17 BE		30570.17	1876.55	6.14

Source Budget in Brief , Finance Dept, GoK

ANNEXURE 8

List of Prioritized Roads to be considered for Improvement

Sl.No	Road No	Name of road stretch		District	Existing Volume(PCU)
1	NH544	Edappally	Kalamassery	Ernakulam	80865
2	NH 066	Vyttila	Palarivattom	Ernakulam	64214
3	NH544	Chalakkudy	Thrissur	Thrissur	63221
4	NH 085	Thrippunithura	Irumbanam	Ernakulam	54031
5	NH 066	Palarivattom	Edappally	Ernakulam	50612
6	NH 066	Karunagappally	Kayamkulam	Kollam	45857
7	NH 066	Cherthala	Aroor	Alappuzha	44822
8	NH 066	Aroor	Vyttila	Ernakulam	40966
9	NH 066	Kollam	Karunagappally	Kollam	40238
10	NH 066	Edappally	Paravoor	Ernakulam	39640
11	NH 066	Chakkai	Kazhakkoottam	Thiruvananthapuram	37775
12	NH544	Palakkad	Walayar	Palakkad	35911
13	NH544	Thrissur	Palakkad	Thrissur	35510
14	NH 066	Ramanattukkara	Kozhikode	Kozhikode	33426
15	NH 766	Kozhikode	Kunnamangalam	Kozhikode	32650
16	NH 066	Neyyattinkara	Balaramapuram	Thiruvananthapuram	32547
17	NH 066	Kannur	Thaliparamba	Kannur	31790
18	NH 066	Kozhikode	Vadadara	Kozhikode	30923
19	NH 066	Kazhakkoottam	Attingal	Thiruvananthapuram	27355
20	NH 744	Kollam	Kundara	Kollam	26641
21	NH 066	Attingal	Kollam	Thiruvananthapuram	26237
22	NH 066	Thalassery	Kannur	Kannur	23716
23	NH 066	Kanhangad	Kasargode	Kasargode	19340
24	NH 744	Kundara	Kottarakkara	Kollam	16937
25	NH 066	Neeleswaram	Kanhangad	Kasargode	16716
26	NH 066	Ponnani	Chamravattam	Malappuram	16480
27	NH 966A	Kalamassery	Vallarpadam	Ernakulam	16392
28	NH 066	Alappuzha	Cherthala	Alappuzha	14999
29	NH 066	Paravoor	Chavakkad	Thrissur	14233
30	NH 066	Thaliparamba	Neeleswara	Kasargode	12851
31	NH 744	Kottarakkara	Punalur	Kollam	10892
32	NH 066	Chamravattam	Kuttippuram	Malappuram	10790
33	NH 066	Chavakkad	Ponnani	Thrissur	9483
34	NH 744	Punalur	Chenkottai	Kollam	8460
35	NH 185	Cheruthoni	Kattappana	Idukki	3721
36	SH 41	Palarivattom	Kakkanad	Ernakulam	48819
37	SH57	Kanhanad	Kasargode	Kasargode	28970
38	SH39	Perumbilav	Pattambi	Palakkad	22662
39	SH56	Kanhanad	mavungal	Kasargode	20980
40	SH23	Shoranur	Pattambi	Palakkad	19587
41	SH23	Pattambi	Perinthalmanna	Palakkad	18728
42	SH30	Koothuparamba	Thalassery	Kannur	18636
43	SH61	Chalakkudi	Irinjalakuda	Thrissur	18417

Sl.No	Road No	Name of road stretch		District	Existing Volume(PCU)
44	SH50	Chavakkad	Kunnamkulam	Thrissur	18166
45	SH22	Irinjalakuda	Thrissur	Thrissur	17694
46	SH22	Kodungalloor	Irinjalakuda	Thrissur	16344
47	MC road	Thiruvanathapuram	Kottarakkara	Kollam	15114
48	SH38	Kannur	Koothuparamba	Kannur	14084
49	SH08	Punalur	Pathanapuram	Kollam	13250
50	MC road	Adoor	Pandalam	Pathanamthitta	12496
51	SH48	Punalur	Anchal	Kollam	12422
52	MC road	Pandalam	Chegannor	Pathanamthitta	11009
53	SH57	Neeleswaram	Kanhanad	Kasargode	10570
54	MC road	Kottarakkara	Adoor	Kollam	10271
55	SH58	Thrissur	Pollachi	Thrissur	9699
56	SH42	Piravom	Thodupuzha	Ernakulam	9169
57	SH30	Koothuparamba	Mattannur	Kannur	8841
58	SH61	Irinjalakuda	Moonnupeedika	Thrissur	7994
59	SH59	Kuttiyadi	Mananthawady	Wayanadu	7546
60	SH41	Kuttikkanam	Kattappana	Idukki	7151
61	SH60	Mananthawady	Thalasserry	Wayanadu	7083
62	SH33	Kattappana	Puliyanmala	Idukki	6996
63	SH47	Attingal	Venjaramoodu	Thiruvanathapuram	6282
64	SH36	Thaliparamba	Sreekandapuram	Kannur	6117
65	SH64	Varkala	Parippally	Thiruvanathapuram	5906
66	SH43	Kattappana	Erattayar	Idukki	4402
67	SH42	Piravom	Elanji	Ernakulam	3261
68	MDR	Kalamasserry	Kakkanad	Ernakulam	25540
69	MDR	Kannur	Mattannur	Kannur	20646
70	MDR	Chamravattam	Edappal	Malappuram	20500
71	MDR	Ponnani	Chamravattam	Malappuram	18700
72	MDR	Chavakkad	Thrissur	Thrissur	15665
73	MDR	Kalpetta	Mananthawady	Wayanadu	13941
74	MDR	Pandalam	Mavelikkara	Pathanamthitta	12292
75	MDR	Pattambi	Cherupulassery	Palakkad	11864
76	MDR	Chamravattam	Thrissur	Malappuram	10760
77	MDR	Attingal	Chirayinkezhu	Thiruvananthapuram	9865
78	MDR	Karunagappally	Sasthamkotta	Kollam	9545
79	MDR	Pandalam	Mavelikkara	Pathanamthitta	9537
80	MDR	Thrippunithara	Piravom	Ernakulam	9016
81	MDR	Koothuparamba	Mananthawady	Wayanadu	7699
82	MDR	Varkala	Kallambalam	Thiruvananthapuram	7426
83	MDR	Mananthawady	Mysore	Wayanadu	5949
84	MDR	Piravom	Kaduthuruthy	Ernakulam	5444
85	MDR	Varkala	Paravoor	Thiruvananthapuram	3994
86	MDR	Varkala	Kadakkavoor	Thiruvananthapuram	1544