DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF TRANSPORT

# URBAN TRANSPORT SYSTEM DEVELOPMENT PROJECT

## FOR COLOMBO METROPOLITAN REGION AND SUBURBS

CoMTrans URBAN TRANSPORT MASTER PLAN

## FINAL REPORT

SUMMARY

AUGUST 2014

**JAPAN INTERNATIONAL COOPERATION AGENCY**

ORIENTAL CONSULTANTS CO., LTD.

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MINISTRY OF TRANSPORT

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## FOR COLOMBO METROPOLITAN REGION AND SUBURBS

Shaping the Future of Urban Transport in Sri Lanka...
CoMTrans URBAN TRANSPORT MASTER PLAN

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(Exchange rate of May 2014)

# URBAN TRANSPORT SYSTEM DEVELOPMENT PROJECT FOR COLOMBO METROPOLITAN REGION AND SUBURBS FINAL REPORT (Summary)

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# Executive Summary

# 1. Introduction

The transport demand has increased remarkably over the past few years, especially in the Colombo Metropolitan Area (hereinafter referred to as CMA), which consists of the Colombo Municipal Council (hereinafter referred to as CMC) and the adjacent area, which is shown in Figure 1.1.

Due to the increase in traffic demand, the speed of vehicles on the roads has declined resulting in higher vehicle operating costs for vehicle owners and environmental deterioration on the entire community. These impacts negatively affect not merely the economic development in the CMA, but also that of the country because roughly half of the country's economic activities are concentrated in this area. In addition, the nation's largest international seaport and airport are located within the area. The CMA, therefore, requires improvement and development of the transport system to tackle the increasing transport demand.


Source: CoMTrans Study Team

**Figure 1.1 Colombo Metropolitan**

As the largest metropolitan area in Sri Lanka, the population of CMA was 3.7 million inhabitants in 2012. It is estimated that the total population of CMA will increase to 5.1 million people in 2035 and economic growth with urban development plans are expected. The total person trip demand would increase 1.75 times and the trip demand made by private modes of transport would increase rapidly due to the anticipated increase of household incomes.

Current traffic congestion becomes serious during the morning and evening peak periods within and around the boundary of CMC and is expanding its area. Furthermore, traffic congestion will worsen due to the anticipated increase of demand if appropriate countermeasures are not taken. Less utilisation of high occupancy vehicles, a lack of facilities for pedestrians and bus passengers, an insufficient capacity of public transport and poor enforcement of traffic rules aggravate the situation.

# 2. Urban Transport Problems in CMA

The urban transport problems have been explored to identify the urban transport planning issues.

## 2.1 Traffic Congestion

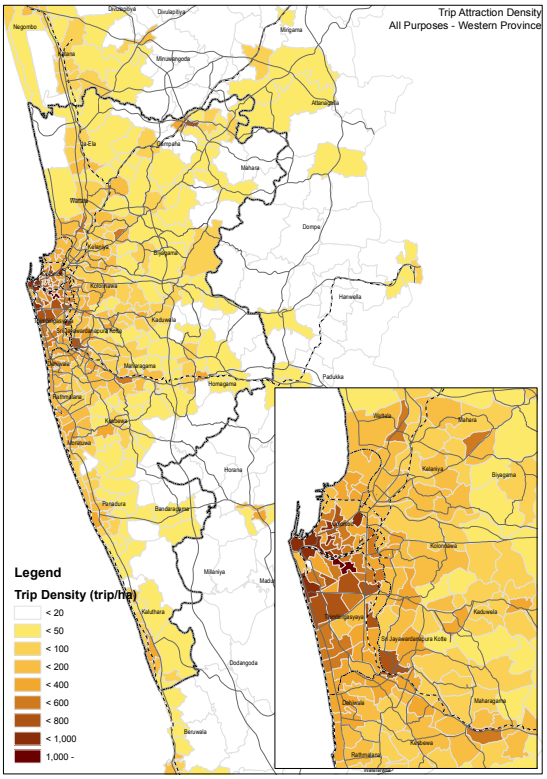
Traffic congestion has been worsening in recent years on the road network in the central area of CMA. Traffic congestion has brought about huge economic loss by increasing vehicle operating cost as well as travel time cost.

### (1) Concentration of Trip Attraction

Concentration of trip attraction can be observed inside CMC. This concentration is one of the causes for traffic congestion in CMA as shown in Figure 2.1.

### (2) Traffic Congestion in Morning and Evening Peak Hour

Traffic congestion is observed in the morning and evening peak periods at intersections of radial arterial roads, especially around the periphery of CMC and inner cities such as Borella, Maradana, Dematagoda, Town Hall and Nugegoda according to the travel speed survey as illustrated in Figure 2.2.




Source: CoMTrans Study Team

**Figure 2.1 Concentration of Trip Attraction in CMC**


Source: CoMTrans Study Team

**Figure 2.2 Travel Speed in CMC in the Evening Peak Hour**

## 2.2 Urban Transport Problems by Sub Transport Sector

Urban transport problems have been identified by sub transport sector as listed below;

### (1) Problems of the Railways

- Insufficient Linkage of the Network
- Lack of Feeder Service for Railways
- Insufficient Integration among Public Transport
- Lack of Railway Access to the International Airport

- Slow Operational Speed of Trains
- Deteriorated Rolling Stock, Track and Signalling Systems
- Insufficient Line Capacity
- Insufficient Revenue of Sri Lanka Railways
- Insufficient Expenditure for Maintenance
- Low Level of Service of Kelani Valley Line

**(3) Problems in Bus Transport and Other Road-Based Public Transport**

- Low Bus Operation Speed due to Traffic Congestion on Roads
- Pettah-Centred Bus Network
- Lack of Integration with Railways and Other Bus Terminals
- Low Service Level of Bus Operation
- Difficulty in Improvement of SLTB's Bus Service
- Inconvenient Bus Operation for Passengers due to Bus Rental System of Private Bus Operation
- Difficult Coordination between Public and Private Bus Operations
- Insufficient Support for Bus Fare Discount for the Transport Poor
- Insufficient Management on Bus Operation
- Market-Driven Regulatory Scheme of Road-Based Public Transport Modes

**(4) Problems on Road Network**

- Insufficient Road Network
- Lack of Pedestrian Space
- Lack of Road Network Master Plan for the CMA
- Lack of Road Design Standards for Urban Roads
- Low Accessibility of the Existing Expressway Network
- Need to Enhance Access to Colombo Port for Cargo Transport
- Lack of Linkage of Expressway Network

**(5) Problems on Traffic Control and Traffic Management**

- Traffic Congestion at Intersections
- Reduction of Traffic Capacity due to On-street Parking
- Traffic Accidents involving Pedestrians and Motorcycles

# 3. Urban Transport Planning Issues in Colombo Metropolitan Area

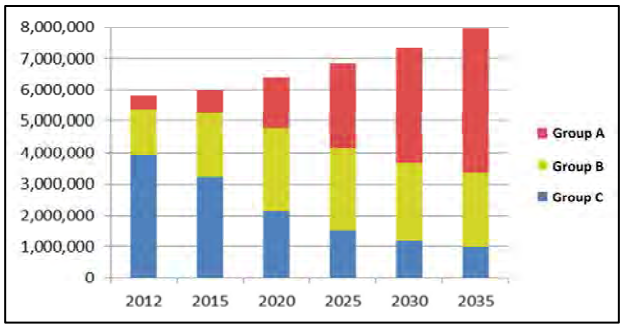
## 3.1 Perspective of Socio-Economic Aspect and Urban Structure

### (1) Urban Development in the City Centre and Suburbanisation

Urban development projects are planned mainly in the city centre and job opportunities will increase in the central area. Since the residential area will disperse and the urban area will be expanded to the suburb, it implies that commuter trips to the city centre will increase and the travel distance of commuters will be longer due to the dispersion of the residences of the population.

### (2) Increase in Real Household Income

As high economic growth is expected in the nation, real term household income will increase. In accordance with GRDP growth, real household income would also increase proportionally. It is estimated that the composition of Group C households, of which the monthly income is lower than Rs 40,000, would decrease from 67.8 % in 2012 to 12.5 % in 2035 as shown in Figure 3.1. In contrast the composition of Group A households, of which the monthly income is higher than Rs 80,000 would increase from 7.6% in 2012 to 56.3% in 2035.




Note: 2012 Estimation from CoMTrans Home Visit Survey.
2015-2035 projection, CoMTrans Study Team
It is considered that income 80,000 and over is Group A , income between 40,000 and 79,999 is Group B and, income below 39.999 Rs is Group C.

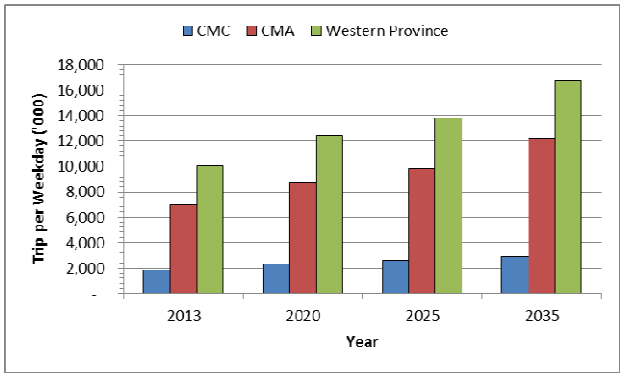
**Figure 3.1 Projected Population by Income Level in the Western Province**

### (3) Increase in Ownership of Private Modes of Transport

The increase of household income would bring about an increase of ownership of private passenger cars and motorcycles. The increase of private modes of transport naturally increases traffic demand on the roads and would cause serious traffic congestion.

### (4) Projected Transport Demand

In 2035 the total person trip production in the CMA would increase to almost 12.2 million person trips per day and this is 1.75 times of the present demand of 6.9 million person trips per day as illustrated in Figure 3.2.




Source: CoMTrans Estimate

**Figure 3.2 Increase of Person Trip Demand by Region: 2013 – 2035**

## 3.2 Planning Issues for Urban Transport System Development

It is anticipated that traffic congestion will continue getting worse and worse without efforts on the improvement of public

transport systems and the restriction of private modes of transport by the Government. Planning issues in urban transport system development are identified as follows:

**(1) Dealing with Peak Transport Demand and Concentration of Traffic in the City Centre**

Traffic congestion is brought about by peak traffic demand in time and spatial concentration of vehicular traffic in the city centre. To tackle the traffic congestion problem, one way is to flatten the peak demand. Another countermeasure is to distribute traffic concentration in the city centre to sub centres. This would be achieved by developing urban centres in suburban areas where a sufficient number of job opportunities should be provided. By distributing job opportunities in sub centres, these sub centres would attract the employed population from the surrounding areas and could reduce traffic concentration in the city centre.

**(2) Anticipated Shift to Private Modes of Transport**

According to the historical trend of modal shift in the last 28 years, the number of passengers crossing CMC boundary by private mode of transport increased approximately 2.5 times while the number of passengers using public transport remained roughly static. The vehicle ownership in recent years also shows a surge in the number of passenger cars, three-wheelers and motorcycles.

Group A households are captive to private modes of transport according to the Home Visit Survey results. Taking into consideration the fact that economic growth is expected in the CMA with huge urban development projects, the modal shift to private modes of transport will be accelerated if no government intervention is taken.

The share of public transport will continuously decrease with economic growth if the government does nothing. While some U.S. cities are recently trying to increase the share of public transport to reduce externalities of private mode of transports, a limited number of cities have succeeded to regain a share of public transport. Once car ownership and a share of private mode of transport increases, it is difficult to reverse it due to the captive characteristics of car users.

With the decrease of travel speeds on the roads due to the abovementioned severe traffic congestion, the speed of buses would decrease. This might accelerate the shift to private modes of transport. It is highly expected to break this vicious circle though provision of convenient, fast and high capacity public transport modes.

**(3) Necessity to Develop Extensive Congestion-Free Public Transport Network**

To deal with the traffic congestion problem in the city, the reduction of vehicular traffic demand is the main issue to pursue. Since the total travel demand in Colombo Metropolitan Area would increase in the planning period, a shift to public transport from private modes of transport is a challenging task for the Government. As traffic demand increases, traffic congestion on the road network would be worse and travel speed would be reduced in the future. The operation speed of ordinary buses will also be lower due to traffic congestion.

Public transport systems generally provide less convenient and longer travel time compared to private modes of transport, which can provide door-to-door service. Consequently, the public transport network to be introduced should be at a high level of service and congestion free by providing dedicated transport space in order to compete with private modes of transport.

In this regard, a heavy rail system, a medium-sized transit system and a bus rapid transit system

can be regarded as public transport systems with a high level of service in terms of operational speed and punctuality. It is therefore recommended to formulate the public transport systems for the Colombo Metropolitan Area with these congestion free systems and cover the public transport service area as widely as possible.

### (4) Transport Facilities for the Physically Handicapped

At present barrier free facilities such as elevators and escalators are not yet provided at railway stations and bus terminals. Thus it is not convenient for physically handicapped people to use public transport. It is required to provide such facilities to support them to travel as normal people in the city.

### (5) Transport System to Promote Health

Transport facilities for walking and bicycles have not had attention paid to it for a long time. Walking and bicycling has become popular since these modes are environmentally friendly and good for health. Walking is the most basic means for travel; therefore, the walking environment should be improved and developed in the future. Development of a pedestrian network separated from car traffic is good from the viewpoint of safety and good health overall. Furthermore, improvement in the walking environment would support the promotion of public transport use since when people use buses and the railways, they usually access the railway station and bus stops on foot.

## 4. Objectives for Urban Transport System Development

The analysis of the present urban transport problems and the planning issues in the Colombo Metropolitan Area have led to the identification of four major objectives which the urban transport system development needs to pursue.

### (1) Equity in Transport to All the Members in Society and Affordability of Public Modes of Transport

A minimum level of transport service should be provided to all members of society. In the CMA, the mobility of Group C is limited due to their insufficient income. The role of public transport is thus of great importance in providing affordable means of transport for the Group C people to access urban services. At the same time, it is necessary to develop transport facilities for the physically challenged. Such facilities are seldom seen in the CMA at the present time and the gradual improvement of transport facilities is needed.

A rail-based transport system is better than a bus rapid transit (BRT) and other types of public transport systems since a rail-based transport in general have a larger passenger transport capacity than ordinary bus transport. Usually, rail-based transport has a grade separated structure and is not disturbed by other modes of transport; consequently, it runs faster than BRT since BRT usually must stop at intersections. However, it requires a huge amount of investment as well as having a higher operation cost. This implies that the system needs to charge the passengers a higher transport fare. According to the Home Visit Survey, the Group C with a monthly income less than Rs 40,000 pays about Rs 4,000 for transport. This implies that about 10% of household income is consumed for transport. According to worldwide household expenditure statistics, the average transport expense is usually around 10% of household income and if it exceeds the 10%, households must sacrifice some other expense. Most households therefore, cannot afford to pay

more for transport than at the present level. If the fare of new or improved public transport system is much higher than the presently prevailing fare level, the majority of residents will not be willing to pay for a higher transport fare. Until their household income increases to a certain level, the Government should provide financial support for developing the new transport systems and probably for operation costs in the beginning.

### (2) Efficiency in Transport Systems to Support Economic Activities

Traffic congestion has resulted in a considerable amount of economic loss to society because of longer travel times, lack of punctuality and the deterioration of the environment. Efficiency in transport can be achieved by balancing transport demand and transport network capacity. Alleviation of traffic congestion can be dealt with in the following three ways: 1) by increasing road capacity through the development and improvement of the road network; 2) by optimising the utilisation of the existing road capacity by using a traffic control system and providing traffic information; and 3) by decreasing excessive vehicular traffic demand through transport demand management and diverting private mode users to public modes of transport.

At the same time, the promotion of public transport usage would also contribute toward economic efficiency by reducing vehicular traffic demand on the congested urban road network. Mass transit systems have an advantage over private modes of transport in terms of travel costs and lower consumption of space in the context of an urban area. The combination of all the approaches mentioned above will create an efficient transport system.

### (3) Environmental Improvement and Health Promotion related to Transport

Air pollution caused by motorised vehicles should be minimised through emission controls for automobiles, promotion of public transport and traffic demand control, especially in the congested areas. Countermeasures to reduce PM10 should be the main focus, particularly in the CMA. In addition, aesthetics should also be considered for developing an urban transport system.

Recently people are more concerned with health and tend to do physical exercises. Walking and bicycling are good for health and transport facilities such as pedestrian paths and cycling roads should be developed for supporting these activities.

### (4) Traffic Safety and Security in Transport

Since lives are invaluable and death and injury due to traffic accidents will bring great grief to family members and friends, traffic safety should be enhanced and the number of accident victims should be minimised through the enforcement of laws and regulations, intensive public campaigns, and training and education for drivers as well as the general public.

Improvement of traffic facilities through engineering design would contribute to the reduction of traffic accidents. Furthermore the security of children and women in public transport should be improved and it would partly contribute to increase the use of public transport.

## 5. Urban Transport Policy

To achieve the four different objectives for transport system development, the following transport policies are essential for the CMA;

1) Promotion of Public Transport Use
2) Alleviation of Traffic Congestion
3) Reduction of Traffic Pollutants/Traffic Noise and Promotion of Health
4) Reduction of Transport Accidents and Improvement of Security

These four transport policies are inter-related. The promotion of public transport is a principal measure to reduce dependence on private modes of transport. Mere improvement of public transport services, however, would not entice people who are accustomed to using private modes of transport to shift to public modes.

# 6. Urban Transport System Development Scenarios

The following four urban transport system development scenarios were evaluated to find the most appropriate option for long term transport system development for the CMA.

1) Base Case Scenario
2) Intensive public transport system development scenario
3) Mixed public transport and road network development scenario
4) Intensive road network development scenario

In addition, if these cases will not be able to alleviate traffic congestion, a further option can be added. Employment of transport demand management is this option and it includes car traffic restraint schemes such as Electric Road Pricing (ERP). Performance of each transport system development scenario is evaluated from the following aspects.

1) Efficiency: Economic Internal Rate of Return(EIRR) and NPV(Net Present Value)
2) Equity: Service area of quality public transport (railway, monorail and BRT)
3) Environmentally Friendly: Global Warming: Emission of $CO_2$
4) Traffic Safety: Economic loss due to traffic accidents

**Table 6.1 Evaluation of Urban Transport System Development Scenarios**

| Evaluation Item | A1 Intensive Highway Development | A2 Intensive Highway Development & TDM | B1 Combined Public Transport and Highway Development | B2 Combined Public Transport and Highway Development & TDM | C1 Intensive Public Transport | C2 Intensive Public Transport Development & TDM |
|---|---|---|---|---|---|---|
| Economic Internal Rate of Return (%) | 19.7% | 21.2% | 19.3% | 22.7% | 19.1% | 22.9% |
| Net Present Value (billion Rs.) | 622 | 765 | 564 | 779 | 541 | 797 |
| Population in the Public Transport Service Area [1)] | 1.26 million people | | 1.36 million people | | 1.40 million people | |
| Reduction of $CO_2$ Emission (million ton) | 4.2 | 6.4 | 5.8 | 7.7 | 5.8 | 8.3 |
| Reduction of Loss due to Traffic accident (million Rs. ) [2)] | 510 | 724 | 756 | 921 | 710 | 1066 |
| Overall Evaluation | B- | B+ | B- | A- | B- | A |

Source: CoMTrans Estimate Note: 1) Public transport service area is defined as the area within 800 meter radius from railway stations and BRT shelters. 2) Loss of traffic accidents are discounted value at 12%.

C2 is recommended as the most appropriate urban transport system development scenario, which include developing the public transport system extensively and at the same time employing Transport Demand Management (TDM) to promote the shift to public transport.

# 7. Strategies for Urban Transport System Development

The strategies for developing Urban Transport Systems in the Colombo Metropolitan Area can be divided into two stages; one is a strategy at the planning stage and the strategies should be taken into consideration when planning urban transport systems and land use. The other strategies are those related to project implementation.

## 7.1 Strategies for Integration with Urban Planning

### (1) Centre Development for Mass Transit Systems

Urban structure and transport systems should be integrated. For instance, a highway oriented transport network is suitable for low-density land use which can be seen in the suburbs of the United States. In contrast, a mass transit system is appropriate for high-density urban land use.

Sub-centre development is one way to deal with traffic concentration in the city centre. In order to develop the sub centres, strong transport linkage is required between the city centre of Colombo and the sub centres. Mass transit systems should be installed between these centres to support the travel needs of the people and goods. Conceptually, to support the viability of public transport systems, it is preferable that a city grows compactly in a form of poly-centric decentralisation. Guided urban development is essential to develop cities to be consistent with urban transport systems. In this regard, metropolitan-wide urban land use planning is also required.

### (2) Development of Public Transport Systems to be Synchronised with Urban Development

The Colombo Metropolitan Area has expanded outward from the city centre. In suburban areas the population density has not been high thus travel demand is not high at present time. In the future, as urbanisation continues, travel demand would increase and then mass transit systems might be required. Mass transit systems should be developed in accordance with urban development. Travel demand along the corridor should be monitored to determine the development timing of the mass transit system. This phased development should be taken into account in particular for the BRT system to be developed along the planned Middle Ring road in the suburban area.

### (3) Transit Oriented Development (TOD)

To make mass transit systems viable, high density urban development in the area surrounding rail-based transit system stations is preferable. In the city centre, high-rise office buildings and commercial facilities, such as shopping malls within walking distance from a station are desirable to increase passenger demand on the transit system. In suburban areas, high rise apartments near stations are a preferable form of land use for the mass transit system. To materialise these developments, high floor ratios should be promoted in the urban development plan. On the other hand, outside of the area surrounding the station the floor area ratios should be limited to prevent high density urban development. The urban transport master plan should take into consideration urban development structures. CoMTrans therefore proposes that the integration of urban

development with urban transport systems is of utmost importance. The strategy for the integration includes sub-centre development and Transit Oriented Development.

## 7.2 Strategies for Transport Planning

### (1) Development of Extensive Public Transport Networks

Public transport systems at a higher level of service should be developed in the form of networks so that people can reach their destinations within the system. A higher level of public transport service means a congestion free transport system; namely, railway, medium-size transit systems such as monorail and bus rapid transit(BRT). A public transport network should consist of several trunk lines with feeder services and it should cover as wide an area as possible.

### (2) Application of Transport Demand Management (TDM) and Car Traffic Restraint Scheme

Transport demand management (TDM) is necessary to alleviate traffic congestion in the CBD because new road construction, or even road widening is very difficult in the CBD and will be limited due to physical constraints such as the availability of land for the roads. Road pricing is a scheme to alleviate traffic congestion by charging vehicles entering congested areas in the city centre and it also raises funds for developing and improving the urban transport systems. Improvement of public transport is prerequisite for employing TDM.

## 7.3 Strategies in Project Implementation

### (1) Introduction of Private Sector Funding in Transport Infrastructure Development

This system reduces the government investment for transport infrastructure development replaced by private sector funding and encourages the participation of private organisations for operation and maintenance. It is common that urban highways are developed under BOT (Build Operate Transfer) scheme or PPP (Public Private Partnership) scheme in many cities thus when urban expressways are developed, it should encourage participation of the private sector in the form of BOT or PPP. However public transport system development is usually difficult to finance by only the private sector. In most common cases, public transport fares are regulated by the Government at low levels since the government should provide means of transport for low income households. Therefore it seems difficult to make public transport projects financially profitable merely with passenger fare revenue. In many countries a common practice for financing public transport is to provide infrastructure by the public sector and provide operation by the private sector.

### (2) Introduction of a Value-Capture System for Public Transport Development

Rail-based transport is not disturbed by ordinary traffic and this mode can provide fast speeds and large passenger capacity transport service. Railway passengers enjoy the fast and convenient railway service for travelling in the urban areas. In addition, railway service can increase the sales of department stores and shopping malls near stations and promote the values of land and housing along the railway corridor. However the railway company is not able to gain all the value added accrued from the railway development.

Since a rail-based transport system requires huge initial investment cost, the methodology of cost recovery should be done through value capture of development. In the case of private railway

companies in Japan, they develop housing areas along the railway corridor. After they provide new railway service, the land values increase and they sell the housing at a higher price and get profits from the real estate business. They are also starting retail businesses as well by building shopping malls at the terminal stations. From this kind of commercial business they can profit in addition to passenger transport service. To support the rail-based transit development project financially it is recommended to take this kind of business model into consideration.

### (3) Methodology of Space Preparation for Urban Development

To develop the desirable urban structure, sometimes land acquisition is required but it is no easy to implement; thus, new implementation methods should be introduced. There are two methodologies that can be applied in Sri Lanka.

**Land Re-adjustment**

This is a typical method of Japan's urban development to create a comfortable residential area. An irregular-shaped plot is re-plotted to a rectangular shape by reducing the site area. The reduced site area is provided for roads and sometimes parks or community facilities, and part of the land is sold to cover expenses for compensation and construction cost for road improvement. Then all lands are re-plotted and roads can be constructed. Although each land owner lost a part of the land, the land owners will gain more value since the land value will be increased as the road condition becomes much better than before.

**Urban Renewal Project**

This is also a typical method in the Japanese context to create urban centres within a commercial or business district. Land owners can organise an urban renewal association. Often a developer coordinates to organise the association and the Government is also involved. The lands are unified and shared with the owners and the developer. A part of the land is provided for public purposes, mainly roads. Thus, a building is constructed and all the members gain benefits by allocating the floors.

Both are still challenging methods for the Sri Lankan context. However, implementation methods are essential and should be recommended in order to achieve the Master Plan.

# 8. Urban Transport System Development Programmes

## 8.1 Urban Transport System Development Programme (1) for Promotion of Public Transport Use

The following policy measures are proposed for promoting public transport use;

1) Monorail Systems

   Multi-Modal Transport Hub and Multi-Modal Centre (MMC)

   Park & Ride and Station Plaza Development

   Provision of Direct Access to Multi-modal Transport Hubs for Inter-city Bus Services
2) Modernisation of Existing Railway System
3) Construction of Airport Connection Line

4) Development of Access Roads to Stations of Railways and New Transit System
5) Introduction of Bus Rapid Transit (BRT)
6) Road Development for Introducing BRT
7) Bus Priority System and Bus Location System for BRT
8) Regulatory Scheme for Road-Based Public Transport Modes

## 8.2 Urban Transport System Development Programme (2) for Alleviation of Traffic Congestion

The following policy measures are proposed for alleviating traffic congestion;

1) Ring Road Development
2) East - West Arterial Road Development in Eastern Part of Suburban Area
3) Expressway Network Development
4) Flyover Development
5) Port Access Road
6) Traffic Control
   - Traffic Signal Control Improvement
   - Traffic Information System
   - Parking Information System
7) Transport Demand Management (TDM)

## 8.3 Urban Transport System Development Programme (3) for Reduction of Air Pollutants/Traffic Noise and Promotion of Health

The following policy measures are proposed for reducing air pollutants and traffic noise as well as promoting health;

1) Establishment of Environmental Management Scheme
2) Establishment and Enhancement of Air Pollutant Emission Standards for Newly Manufactured and Imported Vehicles
3) Enhancement of Vehicle Inspection and Maintenance Programmes
4) Low Sulphur Diesel Programme
5) Promotion of Natural Gas Vehicles
6) Promotion of Hybrid Cars and Electric Vehicles
7) Promotion of Walking and Bicycle Use for Energy Saving and to Promote Health
8) Provision of Sidewalk for Urban Roads

## 8.4 Urban Transport System Development Programme (4) for Reduction of Fatalities and Injuries in Traffic Accidents and Improvement of Security

The following policy measures are proposed for reducing fatalities and injuries in traffic

accidents;

1) Education on Traffic Safety
2) Rehabilitation and Installation of Traffic Signal System
3) Rehabilitation of Railway Signal System
4) Analysis on Causes of Traffic Accidents
5) Provision of Sidewalks and Pedestrian Crossings
6) Establishment of Urban Road Design Standard for Sidewalks

# 9. Implementation Plan for CoMTrans Master Plan

It is, in principal, necessary to undertake various analytical steps with regard to the "project life cycle" as defined by the Government in order to estimate the impact of the "CoMTrans Master Plan" implementation on the public investment budget.

However, since the CoMTrans Master Plan is a transport network development plan, in which all projects are inherently inter-linked, it suffices to analyse accumulated required investment totals over the three planning horizons (short, medium and long-term), the total planning period (2015-2035) and investigate how these totals compare to the Government's policy targets established for public investments in the transport sector.

## 9.1 Total Investment Cost Required for CoMTrans Master Plan Implementation

Table 9.1 shows the needed investment volume for CoMTrans realisation without assuming any particular financing model.

- The total investment volume over the planning period from 2015 to 2035 is estimated at Rs 2,780,900 million, of this 59% of the total is for net investments and about 41% for implied O&M cost.
- The distribution of the investment and O&M combined cost components is estimated at 35% over the short-term, 31% over the intermediate term and the balance of 34% over the long-term.
- This total volume may exceed the capacity to finance at a 100% self-financing rate from public budget and envisaged public investment resources.

## 9.2 Government Budget Requirement to Implement CoMTrans Master Plan

The "reduction in burden" on the public budget could be achieved if the expressways are predominantly financed under a PPP scheme and the O&M burden for the monorail and also the BRT system could be shifted to private sector interests. The main message of the numbers is:

- Total net additions to investment over the whole planning period would be reduced from Rs 2,780,960 million to Rs 2,256,500 million or roughly by 19%
- The major gain would originate from reductions to the public investment budget, and
- Minor gain would also be achieved through reducing the impact on the Government's O&M expenditure.

**Table 9.1 Total Investment Requirements for the Entire CoMTrans Master Plan Realisation**

unit: million RS

| | | Short | Intermediate | Long | Total |
|---|---|---|---|---|---|
| | | 2015-2020 | 2021-2025 | 2026-2035 | |
| | | 6 years | 5 years | 10 years | 21 years |
| Investment | | | | | |
| | Monorail | 173,800 | 89,800 | 144,600 | 408,200 |
| | Railway | 67,800 | 146,400 | 74,500 | 288,700 |
| | BRT | 12,300 | 9,300 | 0 | 21,600 |
| | Bus | 0 | 0 | 0 | 0 |
| | Multi-Modal Transit Facility | 21,700 | 0 | 0 | 21,700 |
| | Road | 462,800 | 345,000 | 74,300 | 882,100 |
| | - Expressway | 407,100 | 138,300 | 0 | 545,400 |
| | - Other Roads | 55,700 | 206,700 | 74,300 | 336,700 |
| | Traffic Management | 2,800 | 7,500 | 7,500 | 17,800 |
| | Total | 741,200 | 598,000 | 300,900 | 1,640,100 |
| O & M | | | | | |
| | Monorail | 52,100 | 65,900 | 204,100 | 322,100 |
| | Railway | 46,100 | 75,000 | 187,300 | 308,400 |
| | - Additional Investment | 20,300 | 53,500 | 144,300 | 218,100 |
| | - Existing Infrastructure | 25,800 | 21,500 | 43,000 | 90,300 |
| | BRT | 10,300 | 14,100 | 28,300 | 52,700 |
| | Bus | 81,000 | 67,500 | 135,000 | 283,500 |
| | Multi-Modal Transit Facility | 3,900 | 3,300 | 6,500 | 13,700 |
| | Road | 43,500 | 38,100 | 76,200 | 157,800 |
| | - Additional Investment | 0 | 200 | 400 | 600 |
| | - Existing Infrastructure | 40,700 | 33,900 | 67,900 | 142,500 |
| | - Expressway | 2,800 | 4,000 | 7,900 | 14,700 |
| | Traffic Management | 200 | 500 | 1,800 | 2,500 |
| | Total | 237,100 | 264,400 | 639,200 | 1,140,700 |
| Grand Total | | 978,300 | 862,400 | 940,100 | 2,780,800 |
| % Composition | | 35% | 31% | 34% | 100% |

Source: CoMTrans Estimate

If it is assumed that the maximum allocation to the urban transport sector is 2% of GRDP in the Western Province, in the short term a shortage of development funds is expected. Consequently to fill the gap between the government budget and amount required for investment, it should consider utilising external financial sources such as ODA.

# 10. Institutional Setup and Regulatory Framework for Urban Transport

## 10.1 Transport Administration in Sri Lanka

The National Transport Policy sets the following administrative structure to ensure the adequate provision of transport infrastructure and services. The transport administrative structure is divided into five steps, i.e. policy, planning, implementation and monitoring, regulation, infrastructure provision, and service provision. Although transport policy is made by the MOT assisted by the NTC and other stakeholders and the planning is done by the NTC, the reality is that there are central and provincial governments involved in vertical sphere, and some numbers of institutions involved in horizontal sphere, even if only at the central government level. If including subsidiary institutions, such as the DMT, MOFP and so on, the number of stakeholders increases.

The complexity of the existing urban transport administration makes the urban transport administration in CMA inefficient and this makes it difficult to carry out new transport measures and integrated transport policies, such as inter-modal transfer/connection, a common transport pass system and so on. As stated in the National Transport Policy, the efficiency of transport administration lies in how such complexity can be dealt with in a planned manner. In order to ensure the planning function is strengthened and becomes a responsibility of the assigned agencies, the Government indicated in the National Transport Policy that it would establish a coordination mechanism for urban transport through the Presidential Committee for Urban Transport (PCUT), which is in line with the CoMTrans Team's recommendation as well. An ideal structure for the urban transport administration in CMA would be to establish an agency that is powerful in policy making, planning, monitoring budget allocation, and implementation of public transport service delivery, but lean in institutional structure, i.e. not creating another mega institution to hire many staff members and to fight over vested interests with the existing institutions.

## 10.2 Towards the Realisation of CoMTrans Master Plan

In line with the National Transport Policy, the CoMTrans suggests the establishment of an Urban Transport Council under the President. The council is expected to be a central high-level body that represents all main political decision makers in urban transport, including the Western Provincial Council. The members consist of appropriate ministers and/or deputy ministers from national government and the chief minister or transport minister of the Western Province Council. The council is to be led by the senior minister in charge for transport in the Administration. The council is set-up for making decisions on urban transport policy and planning in CMA, so it would not replace the existing transport sub-committee under the Cabinet nor the Parliament. The sub-committee for transport under the Cabinet shall be the final resort for the urban transport council, as well, to politically solve transport issues which encompass widespread areas.

### (1) Institutional Arrangement

The council must be established as a standing council until its functions are transferred to the envisaged urban transport authority in the future. However, it is not intended to create another institution such as a ministry, department or authority. Therefore, it is suggested to establish a sub-division under the Planning Division of the MOT to support the council as secretariat. The functions of the secretariat are to support all administrative and technical tasks appointed by the council; yet, considering the scarcity of professionals in urban development and transport planning

in the government sector, it is suggested that the academia, e.g. University of Moratuwa, provides technical support to the secretariat. Since the council consists of higher-level members, establishment of a technical committee or technical task force shall be taken into account once the council is formally established. The functions of the technical committee, among others, are to update the transport data collected for the CoMTrans master plan, and to formulate roll-over transport annual action plans, to monitor the progress of the master plan, and to provide technical inputs to the council.

It should be underlined that the council, the secretariat in the MOT and the technical committee must be legally supported as formal bodies, i.e. being established under a presidential decree and announced in a Gazette. It should be also noted that the proposed council is not, apparently, a monolithic bureaucracy which consolidates all present departments and agencies, but it is an efficient strategic policy setting body that coordinates and governs all the components of urban transport. It is also not a funding agency, but one of its duties is to make funding decisions under the framework of given functions of the council to support and recommend budget allocations to MOFP, which allocate budget directly to agencies based on its decisive criteria. The council is envisaged to be responsible for every facet of urban mobility including private modes and public transport and will also have some influential role in city development planning in close cooperation with NPPD, UDA, the Western Provincial Council and local authorities.

### (2) Legalising the CoMTrans Master Plan

Unless the CoMTrans master plan becomes a legally binding master plan, there would be no base for the newly established urban transport council to implement the plan, taking into account that respective ministries and local government must already have their own plans to develop roads, public transport service delivery and so on.

Considering that the anticipated members of the council will be almost the same as the members of the steering committee of the CoMTrans master plan study, it is expected that first the CoMTrans master plan would be agreed among the steering committee members and the MOT submit it as a legally binding master plan to the Administration to be endorsed. It is crucial that the short-term projects shall be jointly scrutinised with the National Planning Department of the MOFP, in terms of feasibility of budget allocations for forthcoming project proposals.

### (3) Risks for the Realisation of CoMTrans Master Plan

In the past, similar recommendations were made in several studies; yet, no coordination body was established. As stated in previous sections, several issues have hindered the realisation of the recommended measures, i.e. lack of continual political willingness and adverse political interventions, unclear delineation of functional responsibilities among transport related institutions, lack of coordination mechanisms, absence of legal basis for the master plan and absence of legal basis for the implementing institutions.

The biggest issue encountered for the realisation of the master plan is the unpredictable political influence and wandering political directions, which are hard to control or prevent. However, once the master plan becomes a legally binding document, it will be at least a roadmap for urban transport development in CMA. The previous JICA study team failed to make its master plan a legally binding plan, so it had weakness in the implementation stage; so it is strongly suggested that the Steering Committee agrees upon the CoMTrans master plan and make it a legally binding plan within the study period. Once the master plan is endorsed by all stakeholders, the council

can be established and functional responsibilities between the council and related line ministries, agencies and local authorities become crystal clear since the proposed projects and implementing agencies are indicated in the master plan.

# 11. Conclusions

Economic development has accelerated after the end of the civic conflict and travel demand has also increased rapidly. Colombo is the centre of economic activity in Sri Lanka thus the increase in traffic demand has been remarkable. In the Colombo Metropolitan Area, 6.9 million trips are made each day at present and it is estimated to grow to 12.2 million trips in 2035. It goes without saying that a mass transit system is needed to meet the increasing travel demand. In the CoMTrans master plan it is recommended to develop a monorail system together with a Multi-modal Transport Hub, Multi Modal Centre and Park & Ride systems. It is desirable to develop a rail-based transport system, which is not disturbed by ordinary road traffic. The rail-based transport system, however, requires a considerable amount of investment for development. Consequently, it usually takes a long time to develop the extensive rail-based transport network.

On the other hand, at present buses run at low speeds because buses are caught in the general traffic congestion on the roads, thus punctuality of operation is not ensured. A large number of residents now try to avoid using buses because of the low level of bus services such as over-crowding, lack of punctuality and lack of comfort. Therefore, a higher level of public transport service should be urgently provided to prevent the shift from public to private modes of transport. Furthermore, having merely one route of the rail-based transport system is not sufficient to attract people to public transport use but an extensive network should be formulated like a web to cover the major travel destinations in the metropolitan area. Improvement of transport nodes such as station plazas could make it easy and convenient to use public transport systems.

It should also be noted that the ability to pay for transport of the majority of the residents is low and it is therefore difficult to set public transport fares high enough to enable the private sector to provide a high level of public transport services.

In the short term and intermediate term, the public transport network should be formulated by combining the existing Sri Lanka railway which needs upgrading, a monorail system and BRT system. In the long run, a rail-based transport system is needed to provide a higher level of services as well as a higher passenger capacity. The development of a BRT system ensures the space for future rail-based transport system development with a higher level of services.

Improvement of public transport services alone cannot suppress the deeply rooted preference to use private modes of transport; consequently, traffic restraint schemes should be employed in the central area of CMA where traffic congestion is often observed.

Another important measure is to develop sub-centres in suburban areas and to distribute the urban functions, which are currently concentrated in CMC. By creating an alternative urban structure, traffic congestion problems would be alleviated to some extent.

Although promotion of public transport is the most important policy to alleviate the transport problems in the master plan, the road network has not been well developed and the capacity is significantly low in suburban areas. In particular, the progress of road network development has

not caught up with the expansion of urbanised areas, therefore, road network development is also important in suburban areas.

Transport infrastructure development requires a long period in order to be realised, thus in order to deal with the current transport problems, immediate actions are necessary. The short-term countermeasures include the installation of area-wide traffic signal systems and the improvement of present signal control. Traffic control such as one way systems is also taken into account for the alleviation of traffic congestion in specific areas.

# 12. Recommended Immediate Actions

### (1) Legal Framework for Transport Network Development

The target year of the CoMTrans urban transport master plan is 2035, which is 21 years from now. Developing transport infrastructure needs a long time. Once the urban transport master plan is agreed among the relevant stakeholders, it should be authorised and have legal binding for future development. This implies that the Right of Way (ROW) should be reserved for future development of transport facilities - railway and road networks. If urban development such as commercial building and residential complex developments are allowed in the areas set aside for the planned transport network, it would become difficult to develop the transport network in a desirable form. It is therefore proposed to establish a legal framework for setting aside a space for future transport system development.

### (2) Enhancement of Urban Land Use Regulations

CoMTrans emphasises the importance of integration between land use and the transport systems, thus Transit Oriented Development (TOD) is recommended in this regard. It needs high density urban development in the areas surrounding railway stations and important public transport hubs. Urban land use regulations which designate a type of land use and floor area ratio is needed for guiding land use to a desired pattern. In Sri Lanka, however, the floor area ratio has not been determined for every plot and no limitation on floor area is given to a block exceeding a certain size of plot area. Without limitation of the floor area ratio it is difficult to guide land use in the area surrounding the railway stations into high density, for instance high rise office buildings and apartments. Urban land use plans with guidance for the floor are ratio should be prepared for materialising TOD, otherwise it will be difficult to promote. If such regulations cannot be established, it would lead to failure in TOD and also it would worsen the traffic congestion.

### (3) Post Evaluation of Projects in the Urban Transport Master Plan

It is definitely important to conduct a post evaluation to understand the performance of the relevant agencies. If some projects are delayed in implementation, it requires exploring the reasons why the projects have not been executed as scheduled. If the projects have been implemented, the impacts of the projects on transport as well as economic activities should be examined carefully. It should be then fed back to the next stage and the plan should be modified and improved into a more efficient and convenient system. The circumstances surrounding the urban transport will change over time and the initial plan would not be suitable for a new situation. The urban transport master plan, which is prepared for the long period of 20 years, should be regarded as a rolling plan. It should be reviewed regularly and updated to fit in the new circumstances. A Plan-Do-Check-Action (PDCA) cycle should be applied for master plan implementation and monitoring.

### (4) Development of Urban Transport Database System

The CoMTrans conducted the first large-scale Person Trip Survey in Sri Lanka including Home Visit Survey and other relevant transport surveys. The data collected gives base data not only for transport planning but also for urban planning. In line with the master plan review and updating mentioned above, this database is useful for post evaluation of the master plan. The database should be updated and modified periodically for review and updating the master plan. Since the database covers a broad range of fields; demography, land use, economic activities, industry, and transport, the establishment of an urban transport database centre is desirable for maintenance of the database. The database centre could be established in the Ministry of Transport or a University. In addition, it is necessary to build the capacity of the transport planning experts who can undertake a transport analysis and plan using this database.

### (5) Further Investigation on Traffic Safety

Thanks to the accident data provided by the police, an extensive traffic accident database is available and it was analysed in the Study. Further detailed analysis on Black Spots is proposed to identify the places where traffic accidents frequently occur. The analysis will lead to the identification of causes of accidents and required countermeasures.

### (6) Promotion of Health in the Transport Sector

Developing of a pedestrian path network and bicycle road network, which connects major parks in the urbanised areas is proposed in the master plan. Construction of these facilities encourages walking, jogging and cycling by the citizens in the metropolitan area. These kinds of facilities contribute to green transport which aims at healthy and environmentally friendly transport.

### (7) Bus Operation Reform

Bus operation can be made more efficient and systematic without a huge investment. Currently real-time monitoring of bus operation can be achieved with a GPS device. Fare collection with an IC card through a communication device is also available now. The technical solutions are available for the difficulties in monitoring and management of bus operation. Now is a good opportunity to reform bus operation to provide better service for passengers. Installation of a GPS device on the buses enables bus fleet tracking on a real time basis, and then the management of bus companies can control their buses on the roads. Moreover, the introduction of the IC ticket system makes it possible to provide a subsidy for private bus companies, if the government would like to provide subsidy for private companies, since the exact number of discount tickets can be counted.

### (8) Feasibility Study for Project Implementation

A number of transport infrastructure development projects as well as soft measures have been proposed in the CoMTrans master plan. Although the feasibility study on Monorail and MmTH project has been conducted, the feasibility studies on the other projects are also important for alleviation of traffic congestion and the promotion of public transport. This includes BRT system development for developing an extensive quality public transport network integrated with the monorail and employment of ERP for demand management. It is recommended to conduct these feasibility studies at the earliest possible time.

# Summary Report

# CHAPTER 1 Introduction

## 1.1 Background

The transport demand has increased remarkably over the past few years, especially in the Colombo Metropolitan Area (hereinafter referred to as CMA)[1], which consists of the Colombo Municipal Council (hereinafter referred to as CMC) and the adjacent area which heavily depend on urban transport.

Due to the increase in traffic demand, the speed of vehicles on the roads has declined resulting in higher vehicle operating costs for vehicle owners and environmental deterioration on the entire community. These impacts negatively affect not only the economic development in the Colombo Metropolitan Area, but also that of the country because roughly half of the country's economic activities are concentrated in this area. In addition, the nation's largest international seaport and airport are located within the area. The Colombo Metropolitan Area, therefore, requires improvement and development of the transport system to tackle the increasing transport demand.

As the largest metropolitan area in Sri Lanka, the population of CMA was 3.7 million inhabitants in 2012. It is estimated that the total population of CMA will increase to 5.1 million people in 2035 and economic growth with urban development plans are expected. The total person trip demand would increase 1.75 times and the trip demand made by private modes of transport would increase rapidly due to the anticipated increase of household incomes.

Current traffic congestion becomes serious during the morning and evening peak periods within and around the boundary of CMC and is expanding its area. Furthermore, traffic congestion will worsen due to the anticipated increased demand if appropriate countermeasures are not taken. Less utilisation of high occupancy vehicles, a lack of facilities for pedestrians and bus passengers, an insufficient capacity of public transport and poor enforcement of traffic rules aggravate the situation.

It seems difficult for the government to invest for all of the transport infrastructure projects since a huge amount of investment is required for development. Appropriate allocation of funds should be examined not merely for one sector but for all sub sectors relevant to urban transport. It is also of great importance to promote private sector participation in transport system development and reduce the burden on the government in transport infrastructure development and transport service provision.

## 1.2 Study Objective

In order to develop an efficient urban transport network and the promotion of a reliable and safe transport system, the objectives of the Urban Transport System Development Project for Colombo Metropolitan Region and Suburbs (herein under referred to as the Project) are:

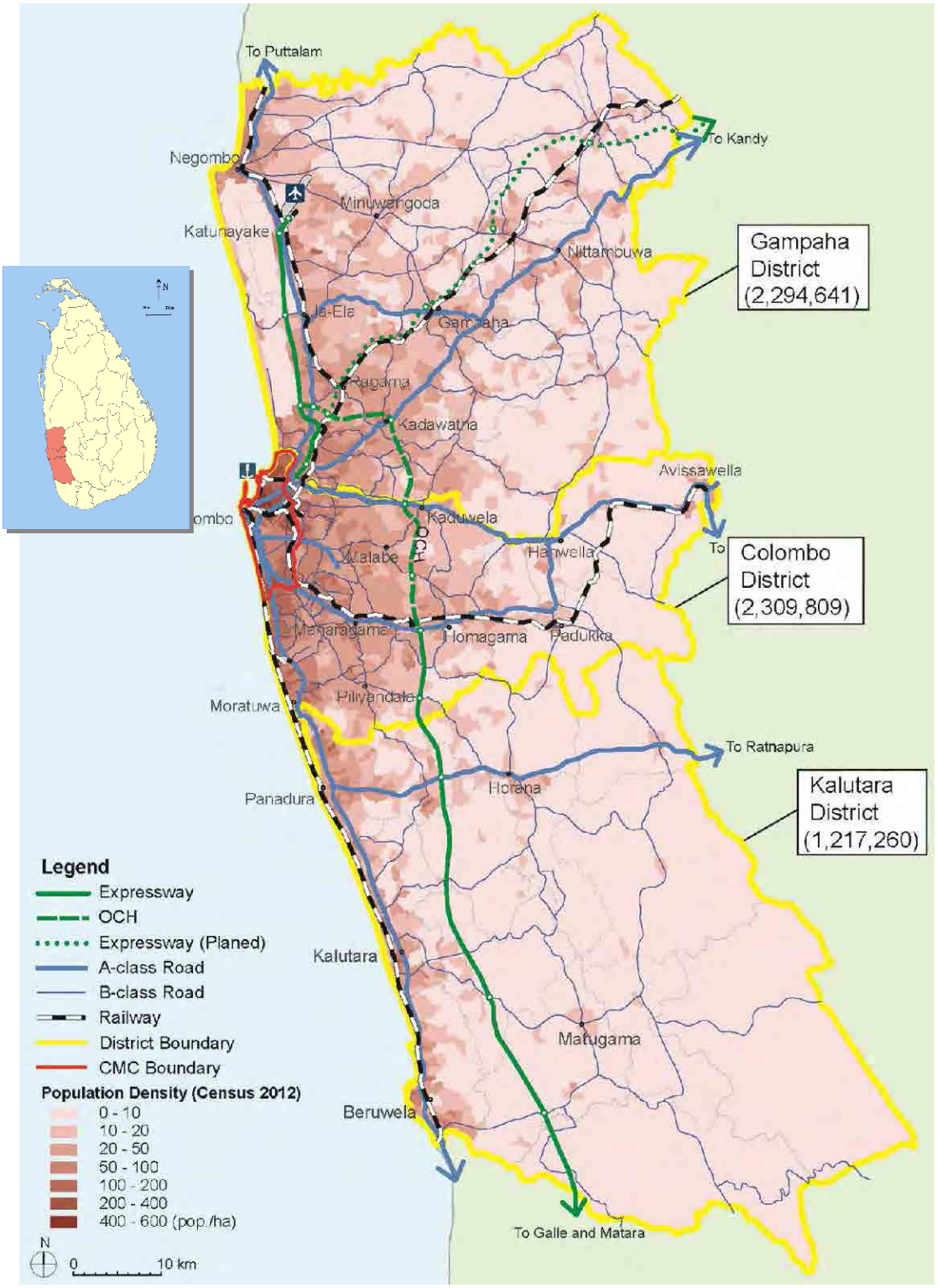
[1] Section 4.1 of the Main Report explains how to define the Colombo Metropolitan Area

- To prepare reliable transport data that can be utilised to evaluate and formulate transport development plans/projects in a scientific manner by conducting an area-wide transport survey.
- To formulate a comprehensive Urban Transport Master Plan for the Colombo Metropolitan Area including the six transport corridors prioritised by the Ministry of Transport with the justification of selected priority/leading projects for short-term, mid-term, and long-term implementation.
- To conduct a feasibility study on the prioritised project under the comprehensive urban transport master plan.

The target year for the Urban Transport Master Plan is 2035. The master plan includes an immediate implementation plan (2015), short-term (2020), intermediate-term (2025) and long-term (2035) transport system development plans.

## 1.3 Study Area and Planning Area

The Study area covers the entire Western Province where the transport surveys were conducted as shown in Figure1.3.1. The Western Province is comprised of the Gampaha, Colombo and Kalutara Districts. Seven municipal councils (MC) among 23 municipal councils in Sri Lanka are located in the Western Province including the Colombo municipal council, the largest municipality in Sri Lanka, and the Sri Jayawardenapura Kotte municipal council, an administrative capital. The planning area is the area for the Urban Transport Master Plan and it should cover the urbanised area in the planning horizon of Year 2035. The planning area including the Colombo Metropolitan Area (CMA) identified in the Study is described in Chapter 4.

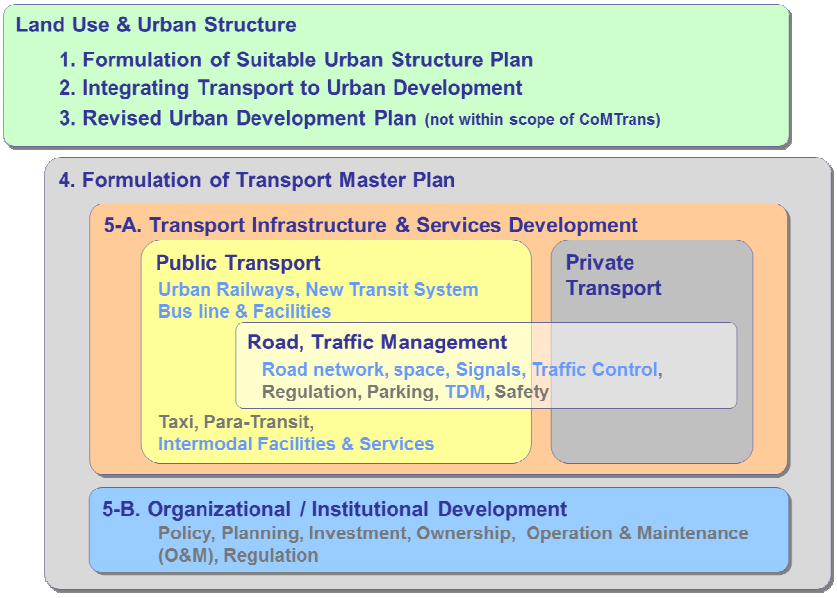



Source: CoMTrans Study Team

**Figure 1.3.1 Study Area**

## 1.4 Scope of the Study

The scope of the urban transport master plan formulation includes an urban structure and land use plan though detailed urban planning was not conducted in the Study. The urban transport master plan is formulated in a well-organised manner which integrates various types of public transport systems and road networks. Furthermore it should be incorporated with traffic control and transport management as well. To materialise the projects proposed in the master plan, institutional setups and financial arrangements are also taken into consideration. Figure 1.4.1 shows the overall scope for the urban transport master plan.




Source: CoMTrans Study Team

**Figure 1.4.1 Scope of Urban Transport Master Plan**

## 1.5 Structure of Final Report

The Final Report consists of the following reports:

- Main Report
- Summary Report (this report)
- Technical Reports

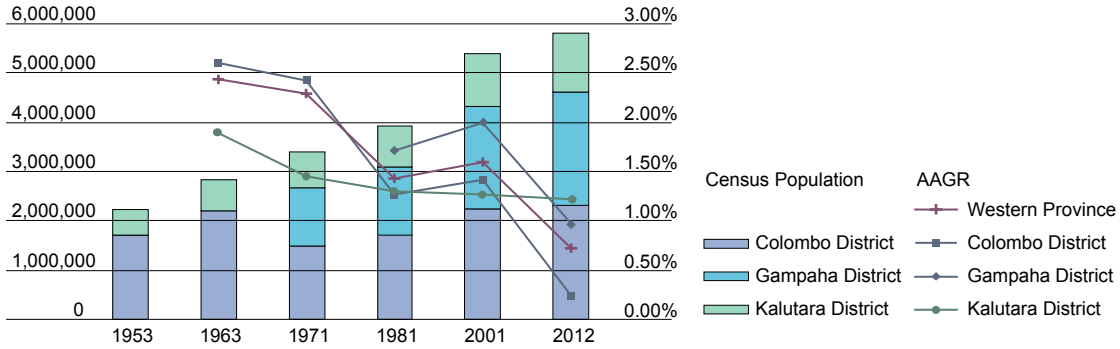
Technical reports deal with the technical aspects of the contents of the main report which include transport surveys conducted in the Study, urban structure and land use, identified present urban transport problems of transport sub sectors and the proposed development plans, transport models and demand forecasting, institutional aspects for master plan implementation, and the strategic environmental assessment.

# CHAPTER 2 Socio-economic Conditions and Urban Structure

## 2.1 Population

### 2.1.1 Population Growth

The population of Sri Lanka was 20,263,723 in 2012. Historically, the AAGR has been slowing down gradually. It was over 2% till 1971, but the latest AAGR from 2001 to 2012 was 0.69%. The population of the Western Province was 5,821,710 in 2012 and the AAGR was 0.72%. The AAGR of the Western Province has kept pace with that of the country. Within the Western Province, the AAGR of Colombo District is 0.23%, which is much lower than in other areas.




Note: Gampaha district was declared as a new administrative district, separated from Colombo District in 1978.
Source: Census of Population and Housing 2001 and 2012, Department of Census and Statistics

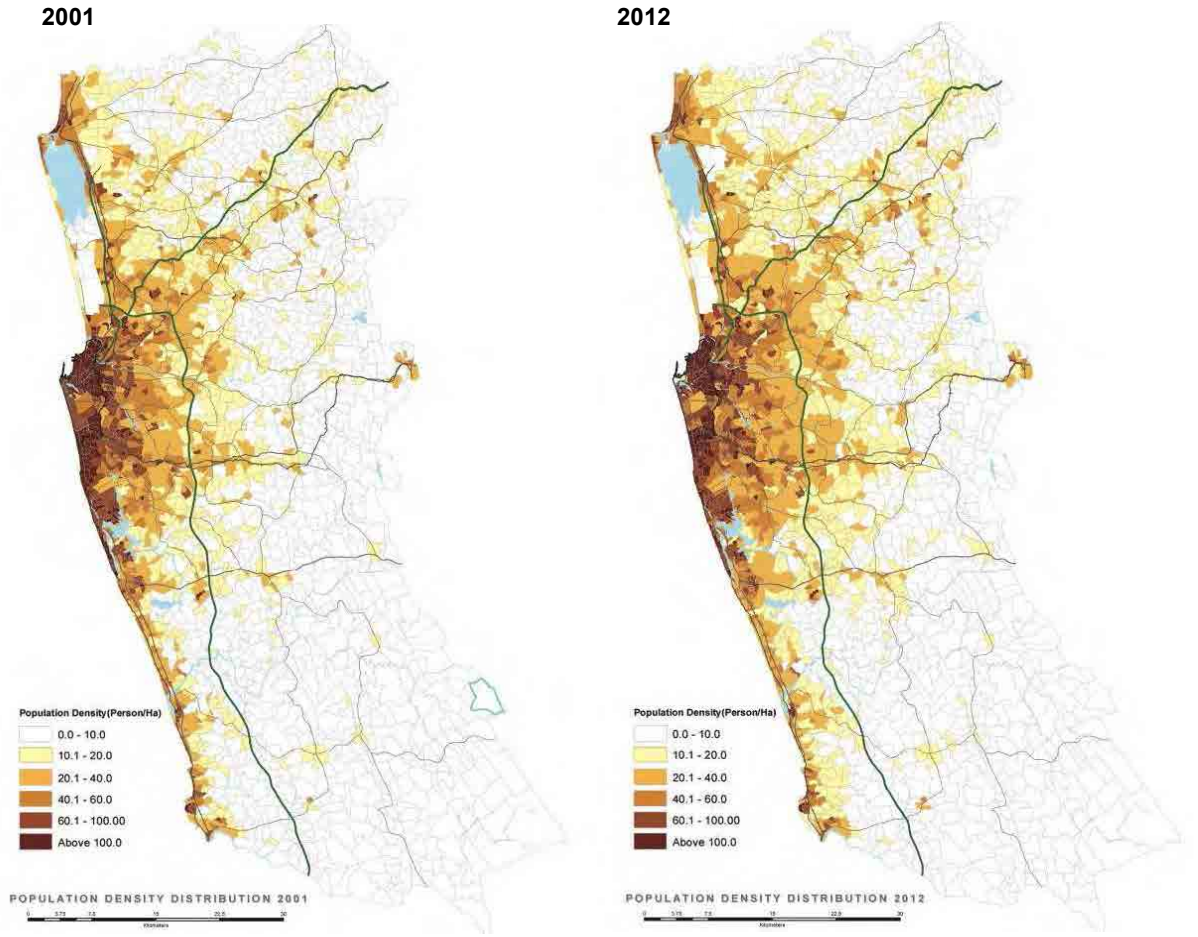
**Figure 2.1.1 Census Population in the Western Province**

### 2.1.2 Spatial Distribution and Growth Trend

**Population Densities in Residential Areas** were calculated by the CoMTrans Study Team based on the population by GND in the Census in the years 2001 and 2012 and are shown in Figure 2.1.2. The density maps show populated areas which can be considered as urbanised.

Generally, populations are concentrated around Colombo and the coastal areas. In the suburban areas, high density areas are concentrated along major roads and railway lines. Population density around Bandaranayake international airport is also high.

In 2012, high density areas expanded towards the north and east. Suburbanisation can be seen, especially around the OCH Corridor and the south western part of Gampaha District. The Kalutara District still is in a rural condition.

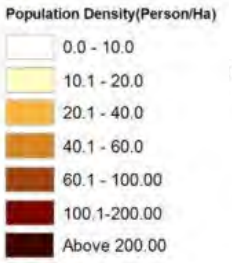



Note: Calculated by CoMTrans Study Team. Expressways/Highways are shown on the map as reference.

**Figure 2.1.2 Population Density in Residential Areas in the Western Province (2001/ 2012)**

The population density of the Colombo Municipal Council (CMC) is 13,779 persons per km$^2$. This density is comparable with the other central areas of major cities. The population density of the Colombo Metropolitan Area (CMA) is 3,699 persons per km$^2$. When compared to those of Ho Chi Minh City and Taipei metropolitan areas, the density is almost in the same range. It can be said that the population of CMA is standard as an urban area.

**Employed Population Densities at Work Places** in 2013 are also estimated based on the data from the Department of Census and Statistics, and the CoMTrans Home Visit Survey, and it is shown in Figure 2.1.3. The employed population is highly concentrated in CMC. High Level Road Corridor and Galle Road Corridor, and around major local urban centres, such as Negombo, Minuwangoda, Gampaha, Mirigama, and Horana, also have many of the employed population concentrated in them.




Source: CoMTrans Home Visit Survey 2013

**Figure 2.1.3 Employed Population Density at Working Places in 2013**

## 2.2 Land Use Patterns and Urban Structure

### 2.2.1 Land Use Patterns

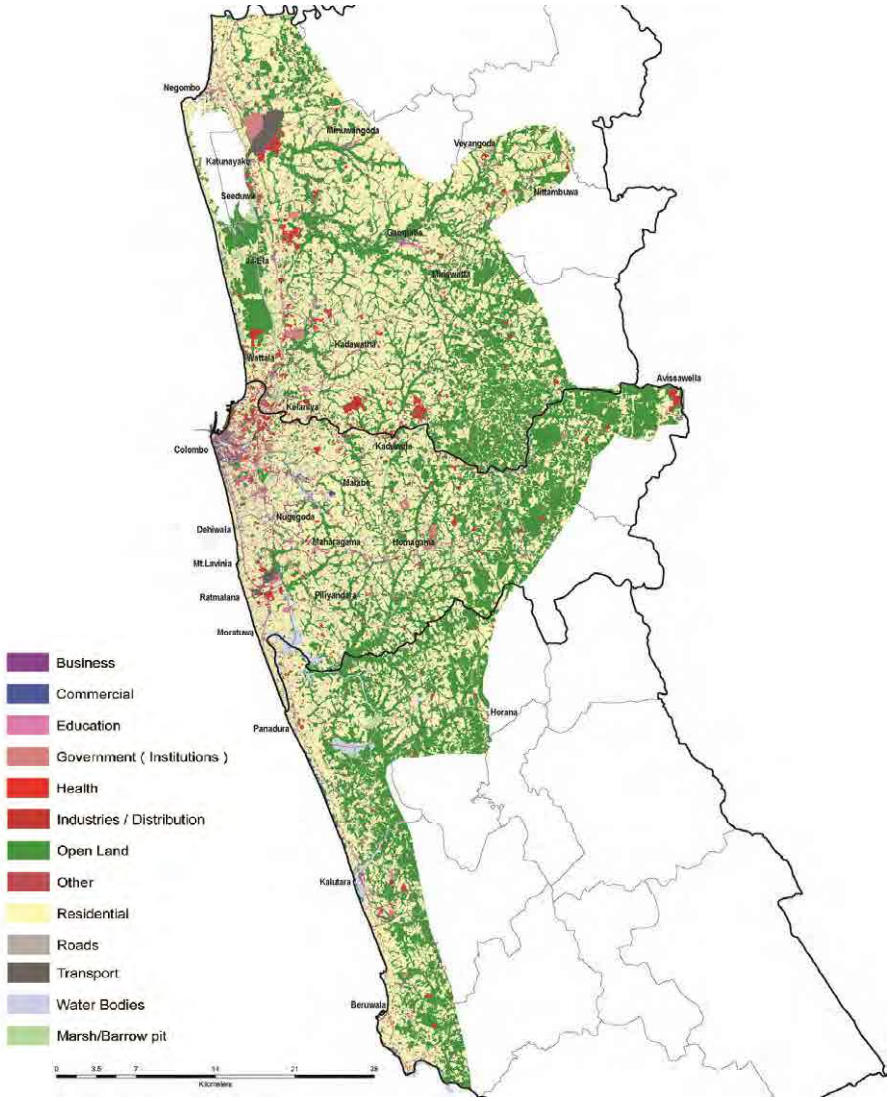
#### (1) Land Use Pattern in the Survey Area

The Land Use Survey was conducted by the CoMTrans Study Team in 2013 in order to determine the current land use pattern. Areas that are already urbanised and those presumed to be urbanised by the target year of 2035 were considered as the land use survey area. It has approximately 1,700 $km^2$, which is 45% of the Western Province. The results of the Land Use Survey in the Western Province are shown in Figure 2.2.1.

The built-up area in the land use survey area is approximately 1,000 km$^2$, and most of the land is used for residential purposes, which is approximately 50% of the total survey area. However, houses in suburban and rural areas have gardens. Therefore, population density is still low. The Eastern part of the area is still open land, or plantation, agricultural land and forestry. The sum of the residential use and the open land shares almost 90% of the total.

Urban land use, such as business and commercial, are concentrated around CMC. Other urban centres, such as Gampaha, Ragama, Negombo, Kaduwela, Maharagama, Nugegoda, and Kalutara have only a small concentration of urban land use. Very thin ribbon development is also typically observed along the major arterial roads, especially Kandy Road, High Level Road, Negombo Road and Galle Road. Except for the centres and ribbon development, commercial and business use areas in the suburbs and rural areas are very small and scattered. Only 7 km$^2$ are used for commercial purposes. The urban land use, except for the residential use, is 108 km$^2$, which is 6.2% of the total survey area.

Educational use or schools are well distributed around the area. It shows that the opportunity for primary education is provided equally.

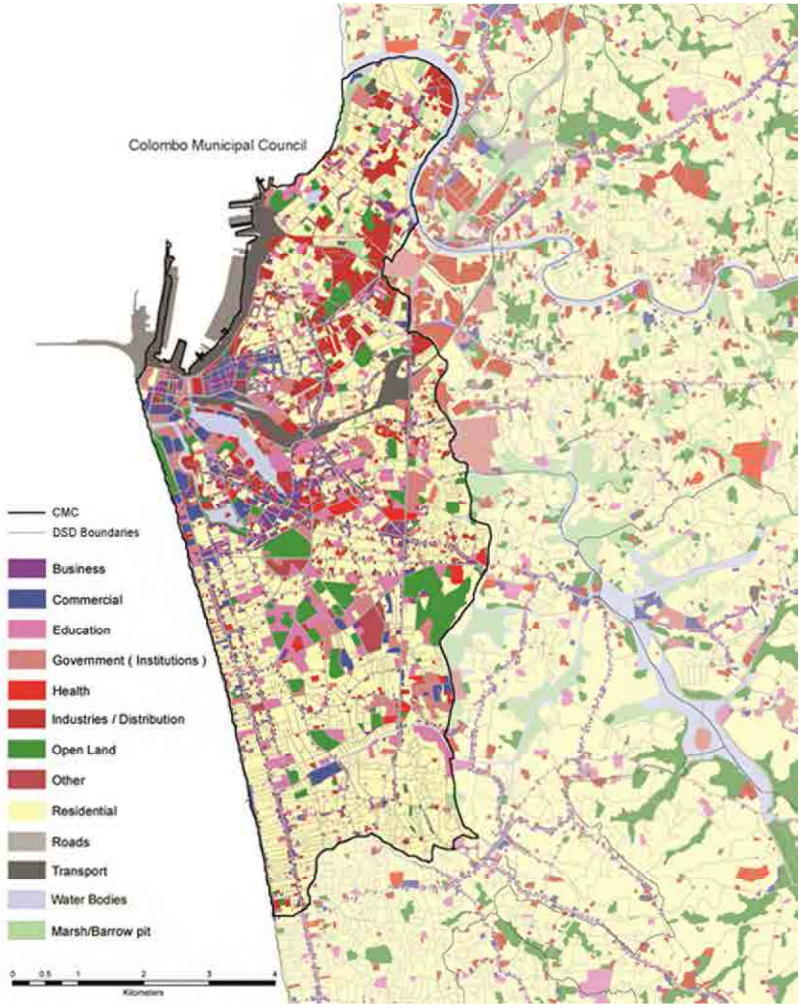



Source: CoMTrans Study Team

**Figure 2.2.1 Land Use in 2013**

### (2) Land Use Pattern in the Colombo Municipal Council

Land use in Colombo Municipal Council (CMC) is enlarged in Figure 2.2.2. In the Colombo Municipal Council Area, business and commercial land use areas are concentrated around Fort, Pettah, Maradana, Kolupittiya, and Borella and along Galle Road. Large scale government and institutional facilities are seen around the Cinnamon Gardens and Maradana area, but many small ones are scattered around the city. Parks and playgrounds are also seen in the Cinnamon Gardens where rich green environments can still be found. The northern parts of the city show that the lands are used in a mixture. On the other hand, residential uses are spread throughout the southern part of the city. Almost 42.0 % is residential land use, 3.5% are dedicated to commercial use and 4.5% to business use. It is supposed that outside of CMC there is more residential use than in CMC. Other remarkable uses are educational facilities and government/institutions. Each occupies more than 5% of the CMC, while only less than 1% of total land use survey areas are occupied by those uses. It can be concluded that CMC has many government offices and schools.




Source: CoMTrans Study Team

**Figure 2.2.2 Land Use of Colombo Municipal Council (2013)**

### 2.2.2 Current Urban Centres and Urbanised Area

Urban structure and characteristics can be understood from the existing structure plan, namely the Colombo Metropolitan Regional Structure Plan (1998) and the Regional Structure Plan of the Western Region Megapolis (2004). The result of the land use survey endorses the urban structure pattern more precisely.

#### (1) Urban Centres

Urban Centres are places where urban activities are concentrated. In other words, they are centres of commercial, business, and other urban related activities which serve residents living in certain areas. The existing urban centres are shown in Figure 2.2.3.

The National Physical Plan 2006 described a clear hierarchy in a structured manner. Urban centres are classified in the five categories. Each category indicates its extent of the area providing services and ideal population range. At the same time, specific urban facilities are identified.

This idea of urban centres in the Sri Lankan urban planning context have been applied to the development plans of the nation as well as each local authority, and is one of the basic concepts to consider regarding urban structures. More specifically, the land use zoning plan which is prepared in the development plans marked the commercial uses of urban centres. This is the major idea to lead the ideal urban structure in a region.

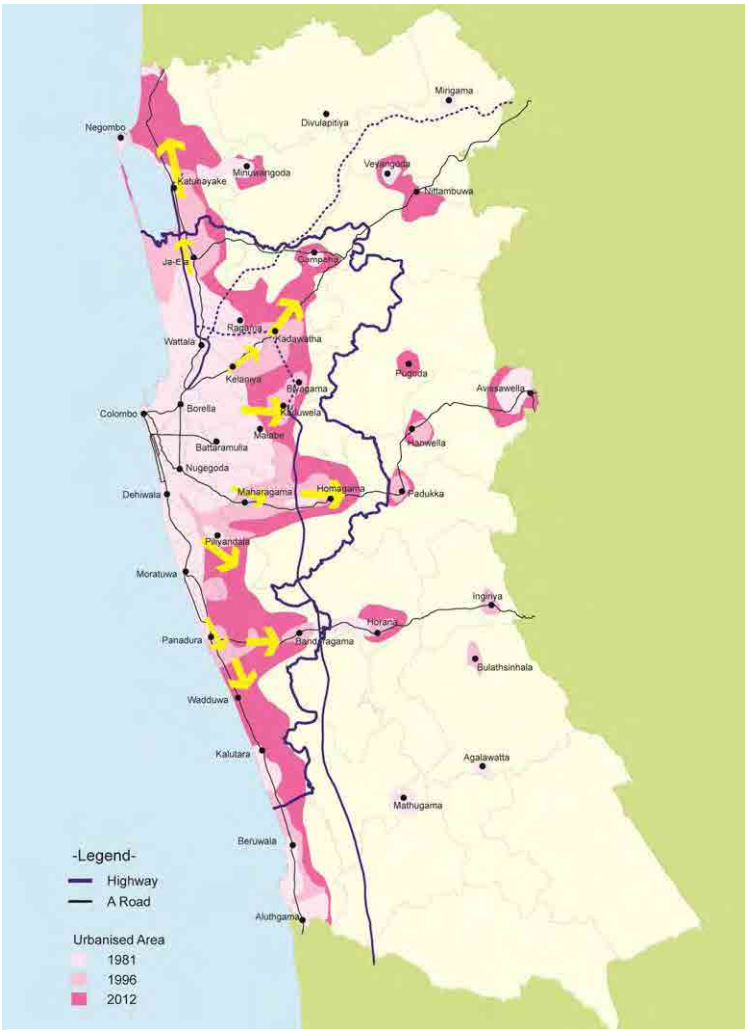

Note: Updated by CoMTrans Study Team based on "Existing Functional hierarchy of Urban Centres 1996, Colombo Metropolitan Regional Structure Plan 1998"

**Figure 2.2.3 Functional Hierarchy of Urban Centres**

#### (2) Urbanised Areas

The study of Colombo Metropolitan Regional Structure Plan 1998 shows the urbanised areas in 1981 and 1996. In addition, present urbanised areas can be found from the current population density and the land use pattern. Figure 2.2.4 shows urbanised areas in 1981, 1996, and 2012.

The urban area in 1981 was concentrated in the western part of the Western Province around CMC and surroundings, and some local urban centres such as Katunayake, Gampaha, Mirigama, Avissawella, Homagama, Horana, Kalutara, and Beruwala. By 1996, expansion of the urbanised area was notably observed along Negombo Road, Kadawatha and Nittambuwa on Kandy Road, around Kaduwela, along High Level Road, along Horana Road, and along Galle Road. By 2012, the urbanised areas were extended north to Negombo, and south to Kalutara. The coastal area became continuously urbanised. More expansion towards the east was also observed on High Level Road and Kandy Road, and towards Kaduwela. Urbanisation was also found on Horana Road, and around other local urban centres. The urbanised areas were formed around CMC and the coast line in a stripe shape. This is considered as the basis of the current basic urban structure.




Note: Updated by the CoMTrans Study Team based on the map "Spatial Distribution Pattern of Urban Centres, Colombo Metropolitan Regional Structure Plan 1998"

**Figure 2.2.4 Urbanised Areas in 1981, 1996 and 2012**

## 2.3 Economic Activity

### 2.3.1 GRDP of the Western Province

The Western Province is the most developed and urbanised region in Sri Lanka and its Gross Regional Domestic Product (GRDP) accounts for nearly 45% of the national GDP in the past five years. The "City Cluster Economic Development – Sri Lanka Case Study" 2010 by the Asian Development Bank, identified the Western Province as the main area in Sri Lanka for accelerated economic growth. In terms of the share, the tertiary industry has had 64%, which is higher than the rate of the National GDP. Table 2.3.1 summarises GRDP of the Western Province.

**Table 2.3.1 GRDP at Current Market Prices of the Western Province (2006 – 2011)**

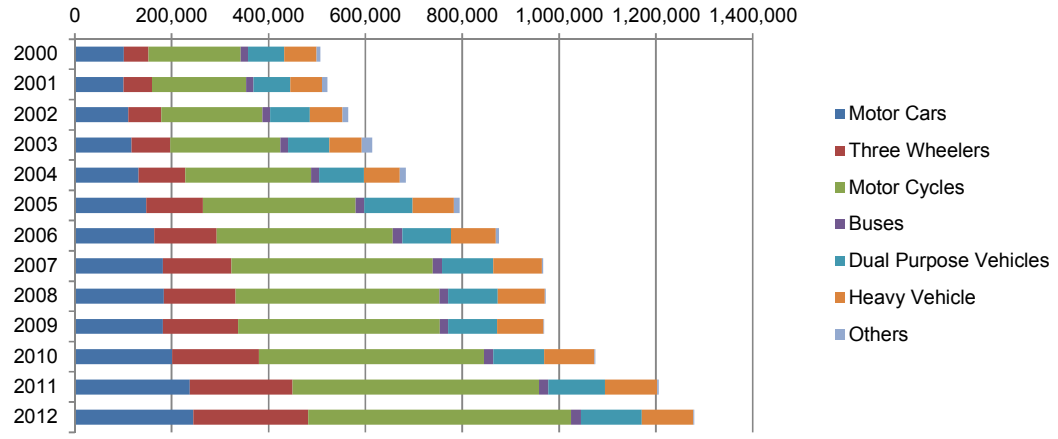
| Item | 2006 | 2007 | 2008 | 2009 | 2010 | 2011* |
|---|---|---|---|---|---|---|
| **GDP at Current Price of Sri Lanka (Mil. Rs.)** | **2,938,680** | **3,578,688** | **4,410,682** | **4,835,293** | **5,604,104** | **6,544,009** |
| **GRDP at Current Price of Western Province (Mil. Rs.)** | **1,472,065** | **1,663,759** | **2,003,055** | **2,216,346** | **2,512,908** | **2,905,159** |
| Share of Western Prov. to Sri Lanka | 50.1% | 46.5% | 45.4% | 45.8% | 44.8% | 44.4% |
| *Share of Primary Industry* | *1.7%* | *2.9%* | *3.1%* | *2.8%* | *3.0%* | *3.2%* |
| *Share of Secondary Industry* | *33.2%* | *31.9%* | *31.7%* | *33.0%* | *31.9%* | *32.7%* |
| *Share of Tertiary Industry* | *65.2%* | *65.1%* | *65.2%* | *64.2%* | *65.0%* | *64.1%* |

Note: * Provisional
Source: Central Bank of Sri Lanka

## 2.4 Motor Vehicle Registrations and Ownership

The total number of vehicles based on the revenue licences in the Western Province was 1,279,616 in 2012 according to the Motor Traffic Department of the Western Provincial Council. It has grown continuously, and was 2.3 times larger than the revenue licences issued ten years ago. Annually, it increased 8.5% on average. Compared to the population growth, which showed a 0.7% increase annually, the increase rate of vehicle population is much higher.

The number of motor cars increased as well, from 110,799 in 2002 to 244,636 in 2012. The number of motor cars per 100 people also doubled, from 2.0 in 2002 to 4.2 in 2012. And the number of three-wheelers has increased at a very high pace, almost 3.5 times in the past ten years. These remarkable increases in the number of vehicles are causing more and more severe traffic congestion in urban areas. Vehicle populations from 2002 to 2012 are shown in Figure 2.4.1.




Note: *AAGR: Average Annual Growth Rate from 2002 to 2012, calculated by CoMTrans Study Team
Source: Motor Traffic Department of the Western Provincial Council

**Figure 2.4.1 Vehicle Population in the Western Province**

# CHAPTER 3 Present Urban Transport Problems and Planning Issues

## 3.1 Present Urban Transport Problems

The urban transport problems have been explored to identify the urban transport planning issues.

### 3.1.1 Traffic Congestion

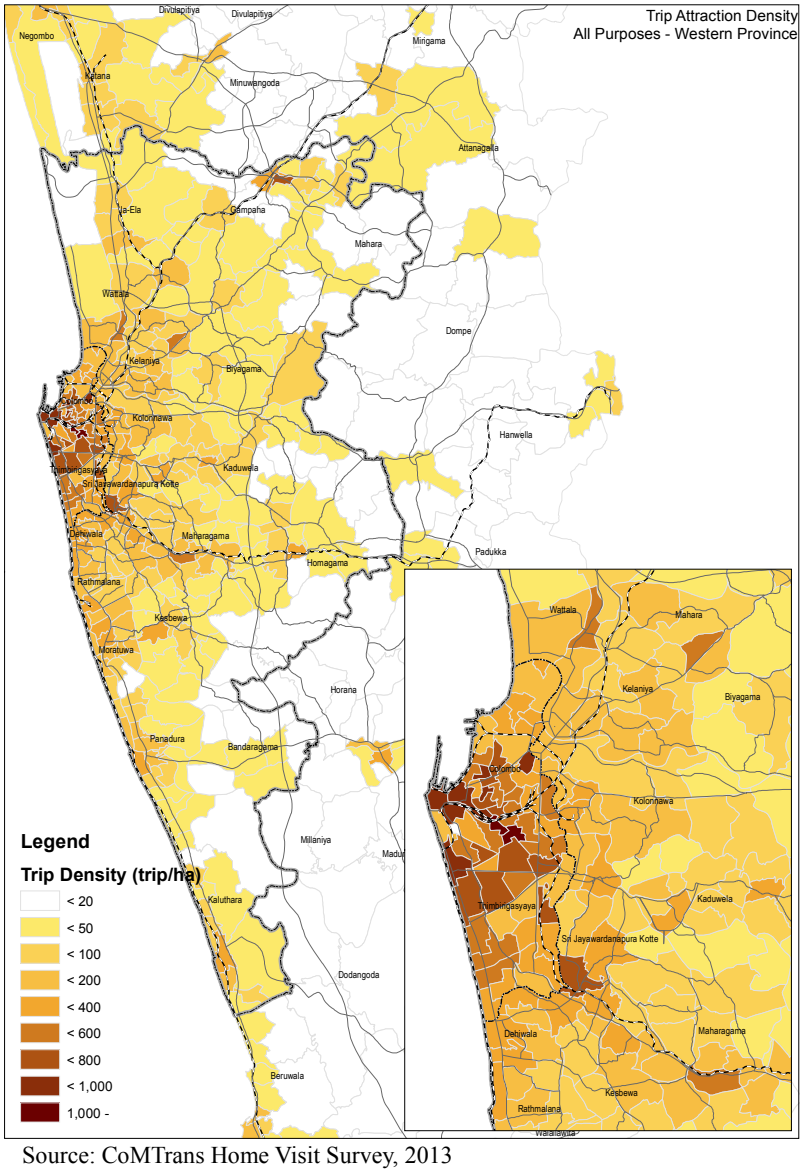
Traffic congestion has been worsening in recent years on the road network in the central area of CMA. Traffic congestion has brought about huge economic loss by increasing vehicle operating cost as well as travel time cost.

#### (1) Concentration of Trip Attraction

Concentration of trip attraction can be observed inside CMC. This concentration is one of the causes for traffic congestion in CMA as shown in Figure 3.1.1.

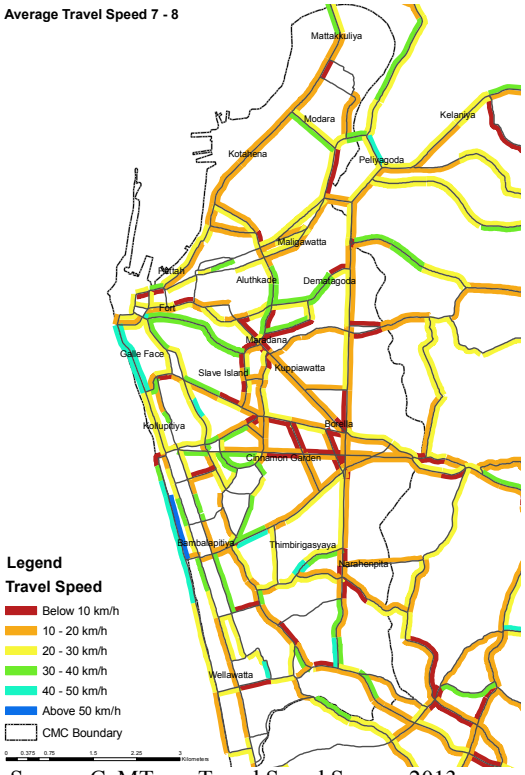
#### (2) Traffic Congestion in Morning and Evening Peak Hour

Traffic congestion is observed in the morning and evening peak periods at intersections of radial arterial roads, especially around the periphery of CMC and inner cities such as Borella, Maradana, Dematagoda, Town Hall and Nugegoda according to the travel speed survey as illustrated in Figure 3.1.3 and Figure 3.1.2.



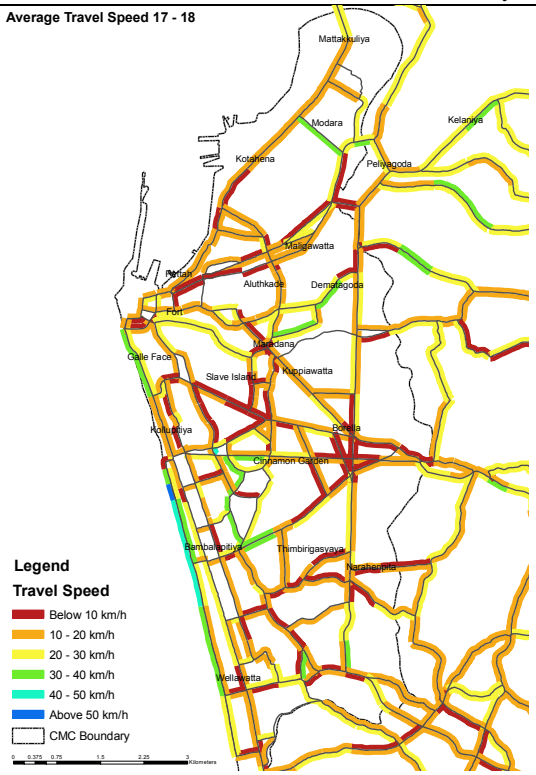

Source: CoMTrans Home Visit Survey, 2013

**Figure 3.1.1 Concentration of Trip Attraction in CMC**




Source: CoMTrans Travel Speed Survey, 2013

**Figure 3.1.3 Travel Speed in CMC in the Morning Peak Hour**



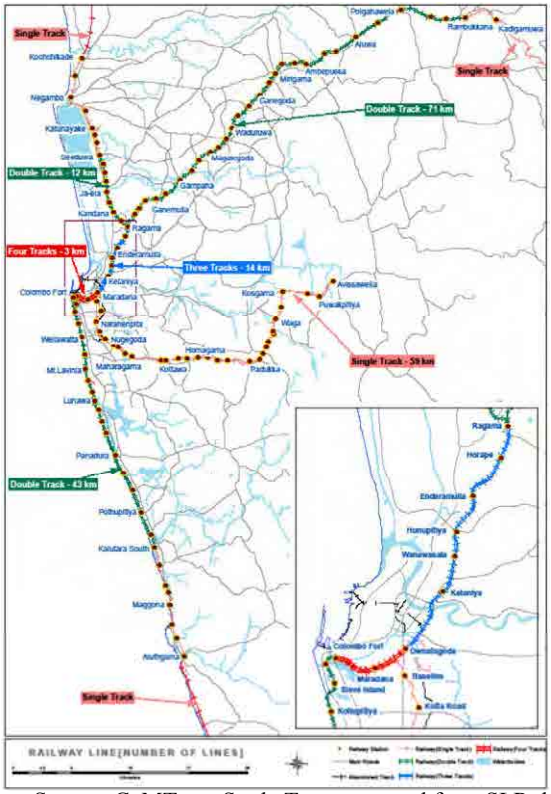

Source: CoMTrans Travel Speed Survey, 2013

**Figure 3.1.2 Travel Speed in CMC in the Evening Peak Hour**

### 3.1.2 Problems of the Railways

#### (1) Insufficient Linkage of the Network

The Main Line, the Coastal Line and the Kelani Valley Line go out from Colombo and the Puttalam Line branches from Ragama on the Main Line. All the lines converge on the Fort area but there are no mass transport systems connecting laterally. That will force the passengers to travel a long way to get to their destinations. Some metropolitan areas in developed and developing countries have succeeded in developing an extensive railway network with high service levels. This contributes to promote the use of public transport and to alleviate traffic congestion. While there is a radial railway network in the Western Province, the increase in service level of the existing railway lines and connection of these radial lines with high service level public transport is essential. A well connected railway




Source: CoMTrans Study Team arranged from SLR data

**Figure 3.1.4 Number of Tracks on Railways**

network is required for the convenience of the passengers.

### (2) Lack of Feeder Service for Railways

The circumstances in and around the stations are not sufficient for other transport modes to provide feeder service such as station plazas, bus stands and park and ride facilities. These facilities are not located close to the railway station in some cases. Railway stations should be connected with other modes of transport for easy transfer to the other transport modes.

### (3) Insufficient Integration among Public Transport

Railways should not compete with other public transport modes but should cooperate with them. Railways only provide service from station to station. To use the railway, passengers have to come to the station somehow. Bus or other road transport mode will provide feeder service to the railway. However, railways are currently competing with buses running parallel to the railway line such as Galle Road.

In terms of time tables of public transport, railways and buses servicing to railway stations functioning as feeder service are generally independent in the Western Province. If bus and railway frequency is significantly high, there would be minimum waiting time at transfer stations. Coordinated time tables of the railways and buses will be significantly important in suburban railway stations where frequency of railways and buses are relatively low.

### (4) Lack of Railway Access to the International Airport

Railways can also provide feeder service to the International Airport. The Puttalam line runs close to the airport but passenger service is not provided.

### (5) Slow Operational Speed of Trains

As shown tale below the average speed is less than 30km/h which is relatively slow compared to commuter railways in other countries. For instance, ordinary trains of private railways in Tokyo is in the range of 40-45km/h and that of express trains are 50-60km/h according to Morichi (2005). Other typical urban heavy railway examples in the world show the range of 40-50km/h (Gwilliam, 2002).

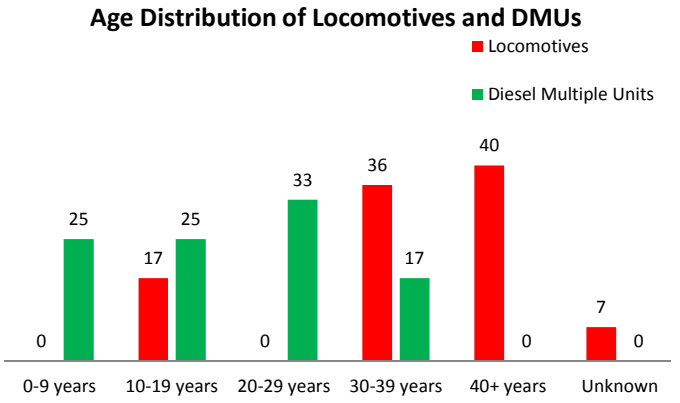
**Table 3.1.1 Average Scheduled Train Operation Speed**

| **Railway Line** and Section | Average Speed (km/hr) | Remarks | **Railway Line** and Section | Average Speed (km/hr) | Remarks |
|---|---|---|---|---|---|
| **Main Line** | | | **Coastal Line** | | |
| Fort- Maradana | 29 | Quadruple track | Fort – Ratmalana | 24 | Double track |
| Maradana – Ragama | 32 | Triple track | Ratmalana – Panadura | 18 | Double track |
| Ragama – Gampaha | 33 | Triple track | Panadura – Kalutara S | 35 | Double track |
| Gampaha – Ambepussa | 35 | Double track | Kalutara S – Althugama | 34 | Single track |
| **Puttalam Line** | | | **Kelani Valley Line** | | |
| Ragama – Ja Ela | 30 | Double track | Maradana – Padukka | 25 | Single track, a number of sharp curve sections |
| Ja Ela – Negombo | 29 | Mainly single track | Padukka - Avissawella | 25 | |
| Negombo – Kochchikade | 27 | Single track | | | |

Source: Calculated based on Time Table of Sri Lanka Railways, Gwilliam, K. (2002) "Cities on the move – a World Bank urban transport strategy review", The World Bank, pp. 113.Morichi S. (2005) "Long term strategy for Transport System in Asian megacities" Journal of Eastern Asia Society for Transport Studies. Volume 6, pp. 1-22.

### (6) Deteriorated Rolling Stock, Track and Signalling Systems

Of the total rolling stock, the availability of functional locomotives is about 70% and that of DMUs about 75%. It can be said that more than half of the rolling stock are aged or not available. DMUs and lower class passenger coaches are not air-conditioned. Trains are running without closing the doors to intake air for cooling. This is very dangerous for the passengers. In modern railway systems trains cannot start when a door is open and the doors cannot open when the train is running. Renewal and modernisation of the rolling stock is urgently required.




Source: Sri Lanka Railways

**Figure 3.1.5 Age Distribution of Rolling Stock**

The railway tracks are deteriorated and in a dangerous condition. An important point is to build safe tracks with minimum irregularities by replacing railroad materials including rails and fasteners and then maintaining ballast in good condition to counteract age-based deterioration and lack of maintenance. The Signalling System has deteriorated and it causes delays and the cancellation of trains occasionally.

Source: CoMTrans Study Team

**Figure 3.1.6 Deformation of Rail**

Source: CoMTrans Study Team

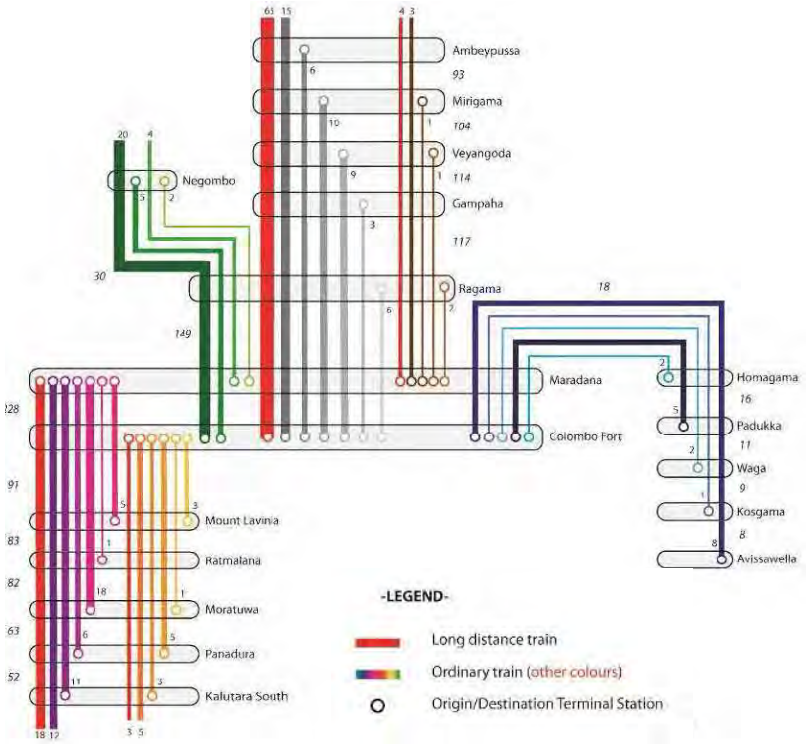
**Figure 3.1.7 Irregularity of Alignment**

Source: CoMTrans Study Team

**Figure 3.1.8 Broken Signal**

### (7) Insufficient Line Capacity

The tracks of Sri Lanka Railways are installed in a way that they are radiating from Colombo. Therefore, many trains gather near Colombo Fort and Maradana during morning and evening peak hours as illustrated in Figure 3.1.9. Thus, triple tracks and quadruple tracks are already used in the Main Line.

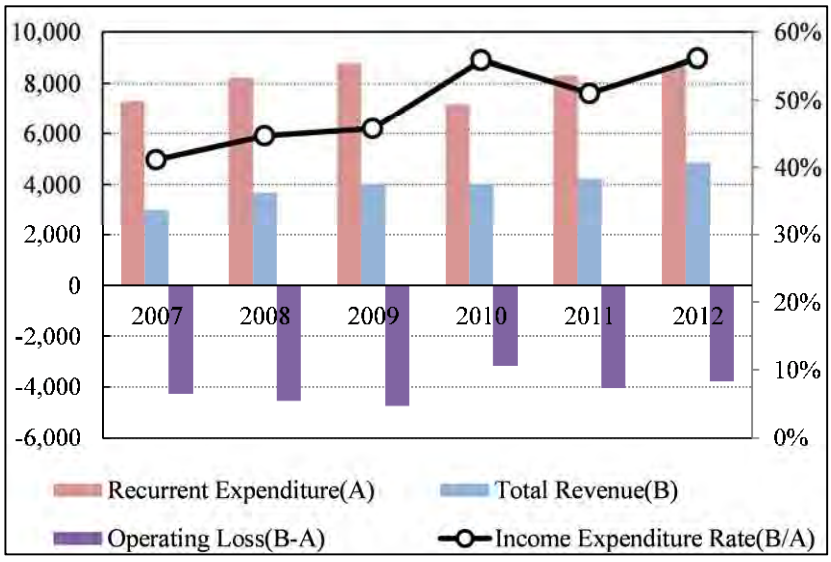



Source: CoMTrans Study Team

**Figure 3.1.9 Train Distribution Diagram**

### (8) Insufficient Revenue of Sri Lanka Railways

The SLR has continuously posted losses. Figure 3.1.10 depicts the revenue, expenditures and profit/loss of the SLR in the last six years. The revenue could not cover approximately only half of the expenditures. While the revenues are relatively level, there are some fluctuations in the expenditures.




Source: Sri Lanka Railways (unit: Rs. Mn.)

**Figure 3.1.10 Revenue, Expenditure and Profit/Loss of the Sri Lanka Railways**

**(9) Insufficient Expenditure for Maintenance**

Distribution of recurrent expenses of Sri Lanka Railway in Year 2010 indicates labour cost accounts for almost three quarters of the total cost and fuel cost follows. Material cost is only 0.5% and this is extremely small. Internationally, in most systems it will cost 5 to 10 % for procuring spare parts or replacing the systems. It is deemed that maintenance of the system is neglected or postponed. Higher efficiency in the use of labour and energy is required to reduce these costs and more allocation for maintenance cost is required.

**(10) Low Level of Service of Kelani Valley Line**

The Kelani Valley Line runs along High Level Road. It is located in highly populated areas and reaches Fort station. However, only ten trains a day are operated in each direction. Trains going to Fort are concentrated in the morning and most of the trains from Fort are operated in the afternoon. KV line was originally constructed as narrow gauge and converted to broad gauge in 1996. There are still a lot of sharp curves and the track condition is not good. The line does not fulfil its role. Modernisation of this line is also recommended.

### 3.1.3 Problems in Bus Transport and Other Road-Based Public Transport

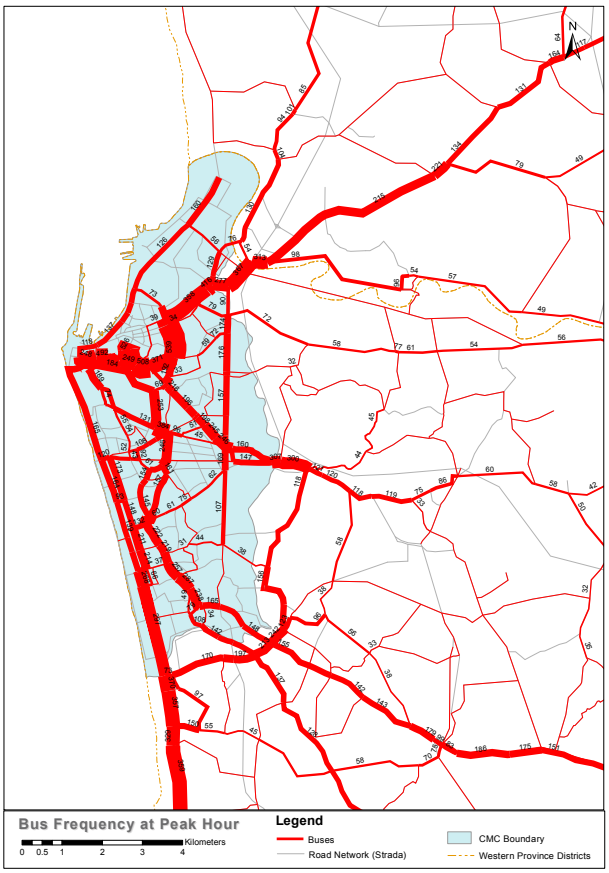
**(1) Low Bus Operation Speed due to Traffic Congestion on Roads**

Roads in the CMA, especially radial transport corridors, are congested during peak hours. Since buses share the road space with private motorised modes of transport such as cars, motorcycles and three-wheelers the travel speed of bus transport is dependent on the other modes. Moreover, travel speeds of buses are usually even slower than passenger cars as they have to stop at bus stops and passenger car can take the shortest path regardless of routes.

In line with economic growth, the shift to private motorised modes of transport is expected. This will further decrease the travel speed of buses. Therefore, this causes a vicious circle of losing public transport. Public transport with a dedicated track, lane or road is requisite to break the vicious circle. Thus, the development of space for bus and road-based public transport is required.

**(2) Pettah-Centred Bus Network**

In the Western Province, approximately 25,000 round-trips of intra-province buses are operated. Amongst those, 8,000 round-trips are made




Source: CoMTrans Study Team

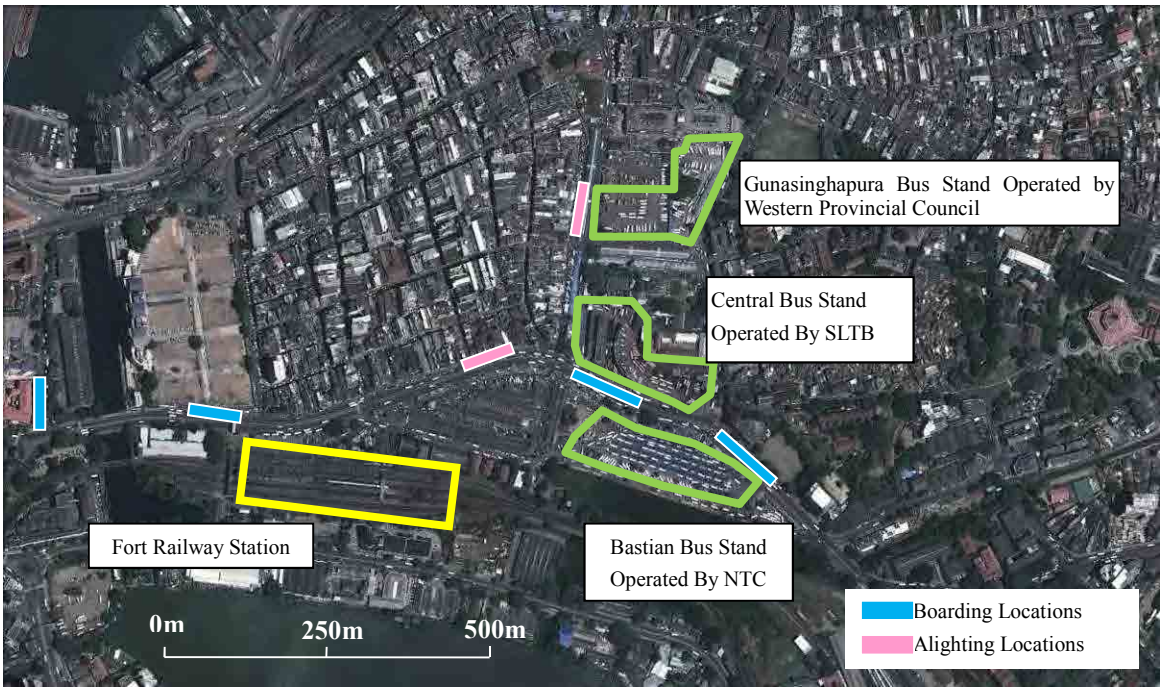
**Figure 3.1.11 Bus Operation during 7 - 8 AM in the CMC and Surroundings**

from/to the Pettah and Fort areas of Colombo. This means that bus routes in the Western Province are directed toward the Pettah area. In the case of inter-province buses, a half of the bus routes which cross the boundary of the Western Province have one of their terminal points in the Pettah or Fort area. The route system in the region is a radial pattern. This creates a significant load on the road system in the city centre. From the passengers' point of view, they cannot help going to the Pettah or Fort area to go to a city in another corridor.

### (3) Lack of Integration with Railways and Other Bus Terminals

Unlike private modes of transport, public transport requires connecting with each other. Railways are generally suitable for longer and high demand trunk routes with high capacity and relatively straight alignment. On the other hand, buses can serve narrow roads even with less traffic demand. However, some buses in Colombo have both of these functions. These two modes are often competing such as on the Colombo to Negombo, Gampaha, Homagama and Moratuwa corridors. This results in excessive congestion in the bus fleets and congestion on the roads.

Although some railway stations have station squares and bus stops in front of them, those two modes of public transport are not properly connected in terms of train/bus schedules and routes. Since the public transport is a network system, these two modes should be planned in an integrated manner.




Source: Ministry of Transport and CoMTrans Study Team

**Figure 3.1.12 Bus Terminals and Stops in the Pettah Area**

### (4) Low Service Level of Bus Operation

Although the private bus operators are making a profit with the current fare levels, their business

is dependent on depreciated bus fleets with minimum maintenance due to the lack of proper management and ownership.

**(5) Difficulty in Improvement of SLTB's Bus Service**

The SLTB suffers a financial loss every year and they are not able to improve the level of bus service, including frequency, travel time and the comfort of bus fleets. This is partly because the SLTB is providing a public service such as school buses for school children, night buses and buses for rural areas where sufficient bus passenger revenue cannot be obtained. Inefficiency in operation and political intervention and competition with private operators are also affecting this.

**(6) Inconvenient Bus Operation for Passengers due to Bus Rental System of Private Bus Operation**

Although some operators have a large number of buses, the majority of private bus operators are small scale and owners have only a few buses for rent to bus crews. In some cases bus drivers and conductors must pay the bus rental cost and fuel cost from the bus fares they collect from bus passengers. They attempt to maximise fare revenue and they are not very concerned with the convenience of passengers. This leads to unpleasant bus services to bus passengers.

On the other hand bus owners are not able to manage bus operation since they cannot trace the location of buses on the road. Furthermore bus operators cannot check the bus fare collection exactly which is collected by bus conductors on board. Thus the bus owner and operators utilise the bus rental system to reduce their management efforts and risk from the bus operation. This bus operation system makes it difficult to provide reliable bus operation; buses on the same routes are operated based on the time table but it is difficult to make real time adjustments of bus operation due to lack of coordination.

**(7) Difficult Coordination between Public and Private Bus Operations**

The bus time tables are prepared for many bus routes in the region; however, in the case of public and private bus operators jointly operate buses on the same route, bus operation in accordance with timetables is difficult to achieve due to traffic congestion and difficult coordination between two operators.

**(8) Insufficient Support for Bus Fare Discount for the Transport Poor**

Bus fare is set by NTC at an affordable level by taking the ability to pay of ordinary people into account. Bus crews of private operators should operate buses at regulated fare levels thus it is difficult for them to get students and pupils on board at discounted rates compared to the SLTB buses. Under these situations, only public buses and limited private buses could provide transport service for students and pupils at a discounted fare. Since these people are regarded as "transport poor" whose ability to pay for transport is generally low, the government provides subsidy for this kind of service.

The support for public transport is available for passengers on SLTB buses and the limited private buses and Sri Lanka Railway only. There is no discount ticket for pupils and students on private bus services except Sisu Seriya because the government does not provide financial support to the private operators. As a result, pupils and students do not use private bus services except special

bus services supported by the government due to relatively high fares. From the bus operator point of view, private bus operators are not able to take pupils and students at very low discounted fare.

SLTB operates buses on the same bus routes where private bus operators operate buses for helping bus passengers who travel at a discount rate. However this kind of arrangement of bus operation made by two different operators brings about inconvenience for bus passengers. Eventually bus frequency is reduced for students and pupils.

**(9) Insufficient Management on Bus Operation**

Bus operation is not well managed since it is difficult for the management to monitor the bus operation on a real time basis. Moreover bus fare collection is also difficult to check whether it is properly collected and whether the full amount is submitted to the management of the bus operators. To avoid such difficulties, sometimes management use a bus rental system with bus crews. In the bus rental system, bus operators and bus owners do not have to take care of bus operation and bus fare collection. They do not take operational risks and force responsibility on to the bus crews. This improper management of bus operation leads to a low level of bus service.

**(10) Market-Driven Regulatory Scheme of Road-Based Public Transport Modes**

Three wheelers and other road-based public transport vehicles are usually owned by small operators and individuals as this sector is less regulated and is market-driven. While an initial registration and an annual renewal of the three-wheeler licences are required, there is no restriction on the number of three wheelers.

Notably the surge in the number of three-wheelers is significant. As the industry is directly linked with the employment of drivers as well as transport in areas which are not covered by buses, coordination among relevant agencies and stakeholders to find a solution which will not affect the employment or transport service is essential.

### 3.1.4 Problems on Road Network

**(1) Insufficient Road Network**

Current traffic demands mean that the roads are almost at capacity or exceed capacity at several points during the peak hours. Especially, road traffic between the CMC and the eastern part of the suburban areas, such as Battaramulla, depends on one major arterial road and no alternative roads parallel to the major arterial road have been developed yet. As a consequence the road network forms a "fish bone" shape and excessive traffic flows are concentrated on the one

**Table 3.1.2 Road Density in Selected Cities**

| City/Area* | Data Year | Administrative Area ($km^2$) | Road area | |
|---|---|---|---|---|
| | | | $km^2$ | % of Administrative Area |
| **City of London** | 2005 | 3.2 | 0.8 | 25.0 |
| **CMC** | 2013 | 40.0 | 4.3 | **10.7** |
| **Inner New York** | 2010 | 59.0 | 15.2 | 25.7 |
| **Inner Tokyo** | 2009 | 75.0 | 16.2 | 21.6 |
| **City of Paris** | 1999 | 105.0 | 27.0 | 25.7 |
| **Inner Shanghai** | 2008 | 108.0 | 13.0 | 12.0 |
| **Inner Bangkok** | 2006 | 225.0 | 16.0 | 7.1 |
| **Taipei City** | 2008 | 272.0 | 20.9 | 7.7 |
| **Inner London** | 2005 | 310.0 | 56.5 | 18.3 |
| **Seoul City** | 2007 | 605.0 | 82.3 | 13.6 |
| **Tokyo 23** | 2010 | 622.0 | 101.2 | 16.3 |
| **Jakarta City** | 2007 | 656.0 | 48.0 | 7.3 |
| **New York City** | 2010 | 789.0 | 165.9 | 21.0 |
| **CMA** | 2013 | 996.0 | 37.4 | **3.8** |
| **Greater London** | 2005 | 1595.0 | 196.0 | 12.3 |

Source: Morichi, S and Acharya, S.R. (eds) (2012) Transport Development in Asian Megacities- New Perspective-, Springer
CoMTrans Study Team, Land Use Survey

major arterial road. Merging points at major intersections in suburban areas have become bottleneck intersections.

**(2) Lack of Pedestrian Space**

Almost none of the roads have sufficient space for sidewalks and shoulders under the existing conditions. Most urban roads lack space for pedestrian traffic. Only a few arterial roads provide sidewalks for pedestrians and this lack of sidewalks might cause frequent and serious traffic accidents involving pedestrians. Therefore, establishment of design standards for urban roads is needed and it is essential to improve the urban roads in accordance with the urban road design standards for road traffic safety.

**(3) Lack of Road Network Master Plan for the CMA**

The arterial road network has been developed and maintained by the Road Development Authority and CMC, however, no arterial road network development plan has been established for the whole of CMA. Therefore a road network master plan which considers comprehensive development of public transport should be established.

**(4) Lack of Road Design Standards for Urban Roads**

Highway design standards for intercity roads have been established and have been applied for road development and maintenance. The characteristics of urban traffic are different than intercity traffic, for instance, the traffic speed of intercity traffic is generally higher than urban traffic and pedestrian traffic is more important in urban areas. Thus it is desirable to develop a highway design standard specifically for urban roads.

**(5) Low Accessibility of the Existing Expressway Network**

The existing Southern Expressway (SEW) and on-going Outer Circular Highway (OCH) will form a circumferential expressway network which will run in the fringe of the metropolitan area. At present it is a considerable distance from the existing Kottawa interchange to the City centre of Colombo and it takes around one hour, depending on


Source: CoMTrans Study Team

**Figure 3.1.13 Existing Road Network in CMA**

traffic conditions. Car drivers and passengers cannot fully enjoy express service on the expressway due to the long distance from the nearest interchange. Therefore, accessibility between expressway's interchanges, the suburbs and the centre of Colombo should be enhanced. In addition traffic flows on the existing ordinary road network should also be distributed to secure proper travel time and speed.

**(6) Need to Enhance Access to Colombo Port for Cargo Transport**

In terms of cargo transport, there is no expressway access to the Port of Colombo at this moment. The Port of Colombo is an international hub in the Indian Ocean and the nation's largest port. Roughly three quarters of container throughput is transhipped in the Port of Colombo and the volume of import and export cargo has drastically increased in the last decade. According to the Screen Line Survey results and Truck OD Interview Survey results of the CoMTrans, a large number of large trucks utilise the Negombo corridor where several export processing zones (EPZs) and industrial estates are located followed by the Kandy corridor which has large hinterlands in the northern and central parts of the Island.

Although the Port Access Road functions as a main access road to the Port as an exclusive road for the port-related vehicles, the Port Access Road does not connect with the expressway network of the Colombo Katunayake Expressway (CKE) and the Southern Expressway. Congestion is, therefore, observed in the area around the entry points of the Port Access Road. The situation might be similar or even aggravated after the completion of on-going expressway projects, the Outer Circular Highway (OCH) and the Northern Expressway, as there is no direct access from the Port to the expressway network. This can significantly contribute to worsen the congestion along with the projected surge in the number of private vehicles in urban areas.

**(7) Lack of Linkage of Expressway Network**

When the Colombo Katunayake Expressway (CKE) is connected with the on-going OCH and the planned Northern Expressway, a considerable amount of vehicular traffic flow from the northern parts such as Kandy and Negombo would come to the city centre through CKE and cause traffic congestion at the end of CKE at the northern part of the new Kelani Bridge. A significant amount of traffic flow would approach the bridge but it is expected to cause traffic congestion at the bridge due to the limited traffic capacity. To deal with this anticipated traffic problem at the bridge, elevated road development is planned to distribute the traffic concentration to other areas. Even if an elevated road which connects with the CKE is developed, it would merely move the traffic congestion to the next intersection.

### 3.1.5 Problems on Traffic Control and Traffic Management

**(1) Traffic Congestion at Intersections**

Traffic congestion is seen at many intersections in the city centre of Colombo Municipality. Signal phasing is not appropriate at many signalised intersections. Traffic congestion is also observed at roundabouts and it is caused by the shortage of traffic capacity at roundabouts. As traffic demand increases, traffic flows cannot be properly dealt with without traffic signals.

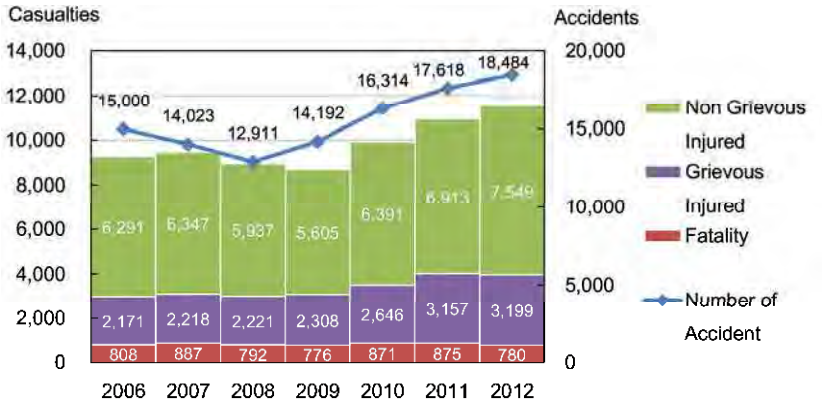
### (2) Reduction of Traffic Capacity due to On-street Parking

Traffic congestion is caused by the reduction of traffic capacity due to on-street parking because there are only a few parking spaces available in the city and the regulation of street parking is not strict in the Colombo Municipality.

### (3) Traffic Accidents

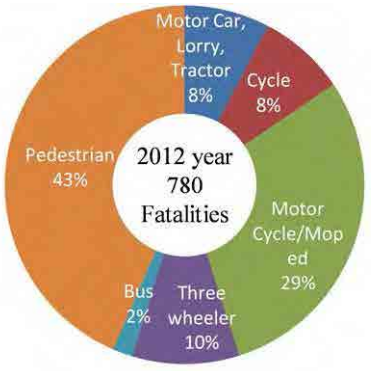
The number of traffic accidents has been increasing from 2009 to present in the Western Province. Fatalities involved in traffic accidents are pedestrian (43%) and motorcycles/mopeds (29%). About 75% of pedestrian fatalities are in the age group over 40 years old. Special attention should be paid for protection of older people from a traffic safety point of view.

About 70% of traffic accidents occurred at road sections between intersections. This implies a lack of sidewalks on arterial roads. This suggests the necessity of developing more sidewalks and pedestrian facilities to protect people from traffic accidents. Regarding the causes of traffic accidents 80% are from human factors such as aggressive/negligent driving and speeding. To reduce this kind of dangerous driving practices, driving education might be effective.




Source: Sri Lanka Police

**Figure 3.1.15 Number of Accidents and Injured in the Western Province**




Source: Sri Lanka Police

**Figure 3.1.14 Fatalities by Transport Mode**

# CHAPTER 4 Perspective of the Colombo Metropolitan Area

## 4.1 Identification of the Colombo Metropolitan Area

### 4.1.1 Identification of the Colombo Metropolitan Area (CMA)

The Colombo Metropolitan Area is defined in order to analyse and assess future transport demands and formulate a master plan. For this purpose, Colombo Metropolitan Area (CMA) is defined by:

a) areas that are already urbanised and those to be urbanised by 2035, and

b) areas that are dependent on Colombo.

In an urbanised area, urban activities, which are mainly commercial and business activities, are active and it is assumed that demand for transport is high. People living in areas dependent on Colombo area assumed to travel to Colombo by some transport measures.

According to the factors, which are the population distribution, the land use pattern, the on-going development projects, and commuters trip, the urbanised area, namely CMA was identified based on the DSD boundaries.


Source: CoMTrans Study Team

**Figure 4.1.1 Colombo Metropolitan Area**

### 4.1.2 Socio-Economic Framework

#### (1) Projected Population to 2035

The projected population to 2035 is summarised in Table 4.1.1. Population of the Western Province is now 5.8 million, and it is estimated to reach 7.9 million in the selected medium growth scenario.

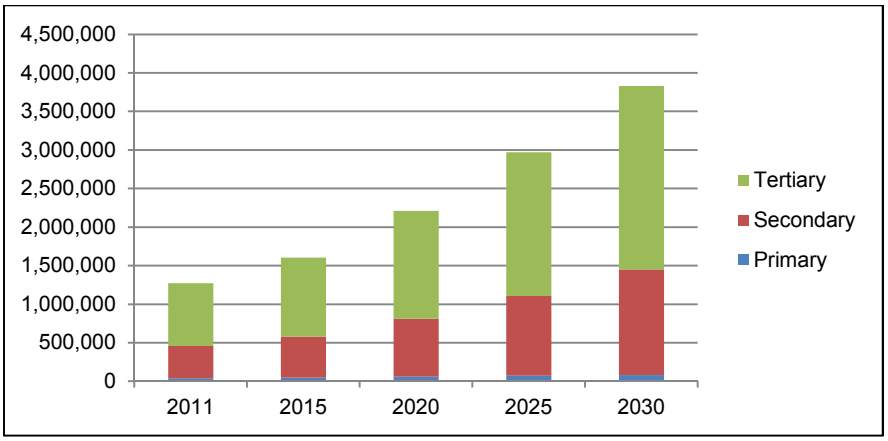
**Table 4.1.1 Projected Population of Western Province to 2035**

| | 2001 | 2012 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| Population | 5,381,197 | 5,821,710 | 6,007,500 | 6,386,000 | 6,842,200 | 7,369,100 | 7,940,200 |
| | | **'01-'12** | **'12-'15** | **'15-'20** | **'20-'25** | **'25-'30** | **'30-'35** |
| Average Annual Growth Rate | | 0.72% | 1.05% | 1.23% | 1.39% | 1.50% | 1.50% |

Source: CoMTrans Study Team

#### (2) Forecast of GRDP Growth

It is assumed that the share of the primary sector would decrease at the same rate of decrease as that in the employed population of the primary sector. The share of the secondary sector increased in the past five years at the annual average rate of 0.5%, and the share of the tertiary sector is slowly decreasing at the annual average rate of -0.3%. It would continue till 2035 at the same trend. Figure 4.1.2 shows GRDP forecast by each industrial sector.

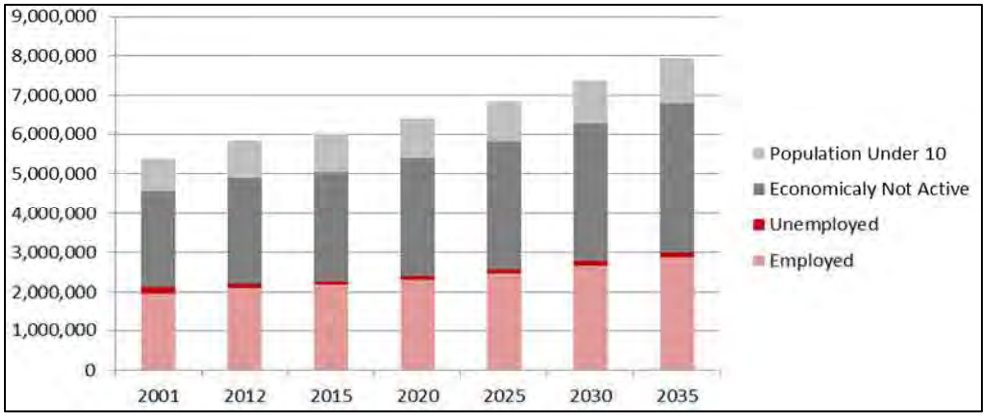



Note: 2001: Census of Population and Housing 2001, Department of Census and Statistics
2012: Estimation by CoMTrans Study Team based on the preliminary result of Census of Population and Housing 2012 and Sri Lanka Labour Force Survey Annual report 2011, Department of Census and Statistics
2015-2035: Projection, CoMTrans Study Team

**Figure 4.1.2 GRDP Projection by Industrial Sector in Western Province**

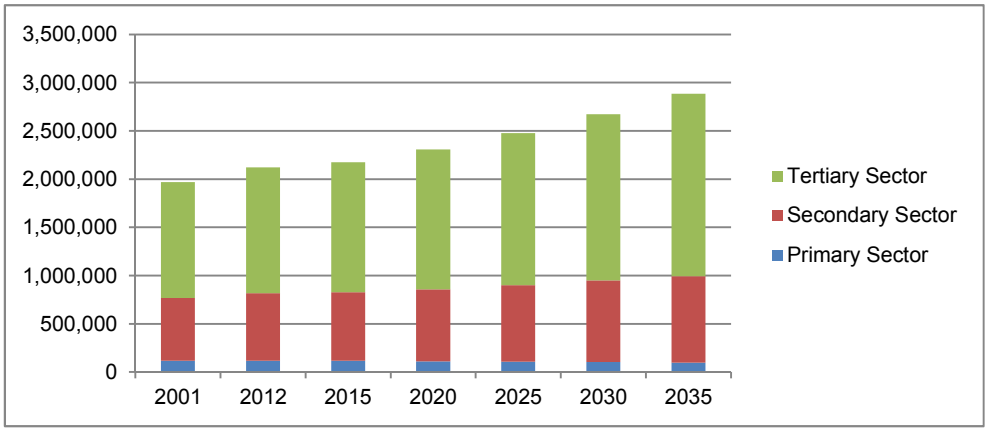
### (3) Forecast of Employed Population

Based on the past trend, assumed social changes such as increasing school enrolment and women's social progress, and the CoMTrans Home Visit Survey, the employed populations were estimated as shown in Figure 4.1.3 and the employed populations by industrial sectors were projected as shown Figure 4.1.4.




Source: Refer to Figure 4.2.1

**Figure 4.1.3 Proportion of Forecast Employed Population in Western Province**




Source: Refer to Figure 4.2.1

**Figure 4.1.4 Projected Employed Populations by Industry Sector**

### (4) Forecast of Student Population

Based on the CoMTrans Home Visit Survey and government policies on education, future student populations are forecasted. Table 4.1.2 shows the existing and projected student populations:

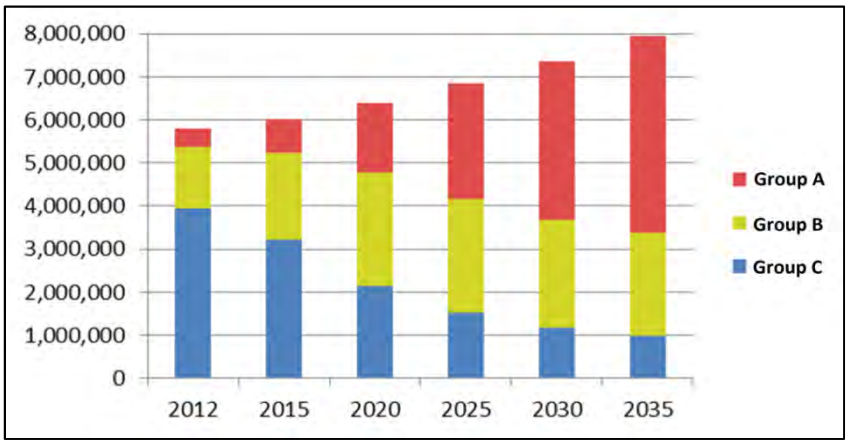
**Table 4.1.2 Projected Student Populations in Western Province and CMA**

| Western Province | 2012 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| **Total Population** | **5,821,710** | **6,007,500** | **6,386,000** | **6,842,200** | **7,369,200** | **7,940,200** |
| **Kindergarten** | **15,982** | **17,100** | **18,200** | **19,400** | **20,800** | **22,200** |
| **School Students (Grade1-G.C.E.(A/L)** | **1,131,382** | **1,197,000** | **1,318,400** | **1,419,200** | **1,501,800** | **1,587,300** |
| Students (grade1 - grade5) | 422,049 | 438,100 | 461,600 | 474,300 | 504,500 | 532,800 |
| Students (grade6 - grade8) | 276,612 | 290,400 | 315,900 | 336,900 | 349,800 | 373,300 |
| Students (grade9 - grade10) | 170,290 | 178,800 | 194,500 | 207,500 | 215,500 | 229,900 |
| Students (G.C.E. (O/L)) | 123,303 | 135,500 | 157,800 | 178,000 | 192,000 | 200,600 |
| Students (G.C.E. (A/L)) | 139,128 | 154,200 | 188,600 | 222,500 | 240,000 | 250,700 |
| **University Students** | **42,398** | **48,200** | **65,800** | **83,000** | **99,500** | **116,400** |
| **Other Students** | **27,681** | **32,000** | **39,100** | **46,200** | **49,800** | **52,000** |
| **Total Students** | **1,217,442** | **1,294,300** | **1,441,500** | **1,567,800** | **1,671,900** | **1,777,900** |
| *% of Student Population to Total* | *20.9%* | *21.5%* | *22.6%* | *22.9%* | *22.7%* | *22.4%* |

Source: CoMTrans Study Team

### 4.1.3 Forecast of Population by Income Group

It is assumed that income for households would simply grow at the same rate of the GRDP growth projection. Figure 4.1.5shows the projected population by income level. In 2012, 68% of total population was Group C and only 8% was Group A. In 2035 the Group C population will be less than 1 million, which is 13% of the total projected population, and over 4.5 million will be in the Group A population, which is 57% of the total.




Note: 2012 Estimation from CoMTrans Home Visit Survey. Income Unknown: 10,961 (0.2%)
2015-2035 projection, CoMTrans Study Team
It is considered that income 80,000 and over is Group A , income between 40,000 and 79,999 is Group B and, income below 39,999 Rs is Group C.

**Figure 4.1.5 Proportion of Projected Population by Income Level in the Western Province**

## 4.2 Urban Structure of the Western Province

### 4.2.1 Envisioned Urban Centres and Urbanised Area

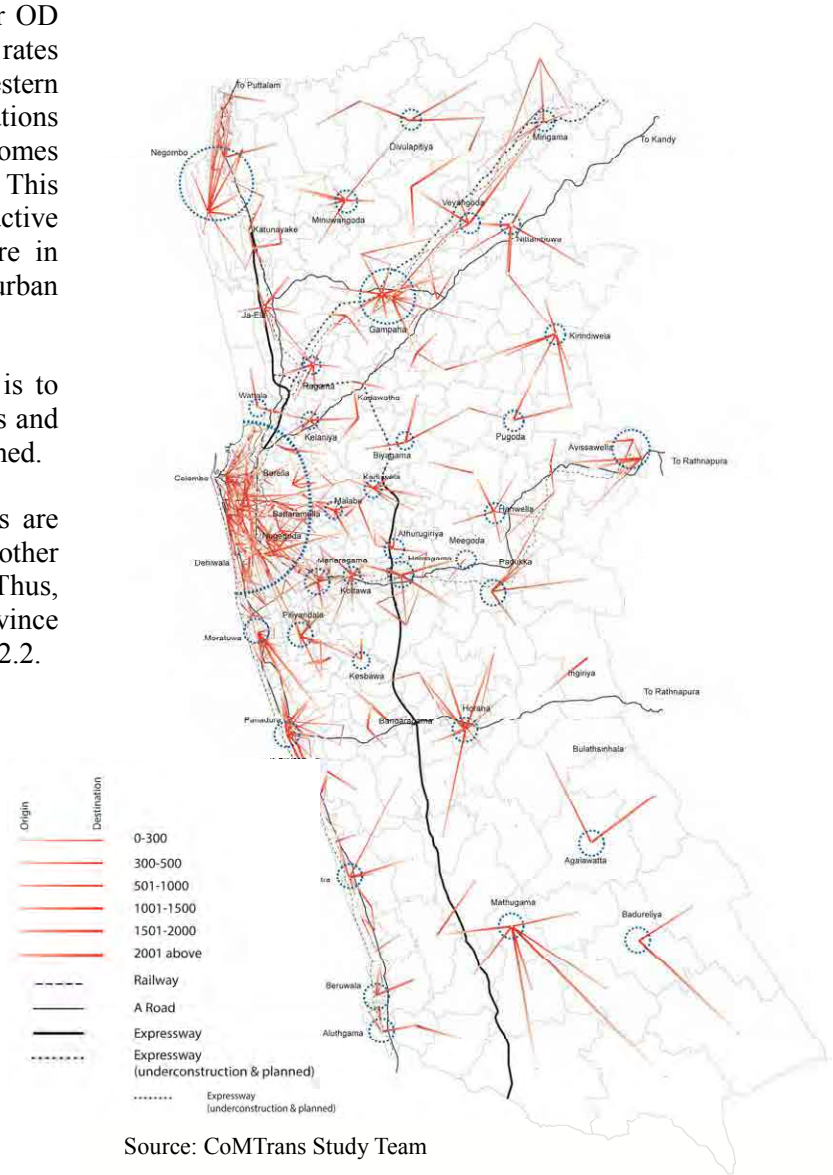
In the same way that urban structures were considered based on the factors mentioned in section 4.1, identifying urban centres is an essential step to formulate the urban structure.

Commuter trips are a new finding from the CoMTrans Home Visit Survey, in addition to the current land use, population density, and other factors. It guides the identification of urban centres as a base of urban structure.

Figure 4.2.1 shows desire lines for OD pairs with the two highest trip rates (Home-to-Other) in the Western Province. The origins and destinations show urban units, and this becomes clearer in observing the trip ends. This figure also shows where the active commercial and business areas are in the present condition, namely, urban centres.

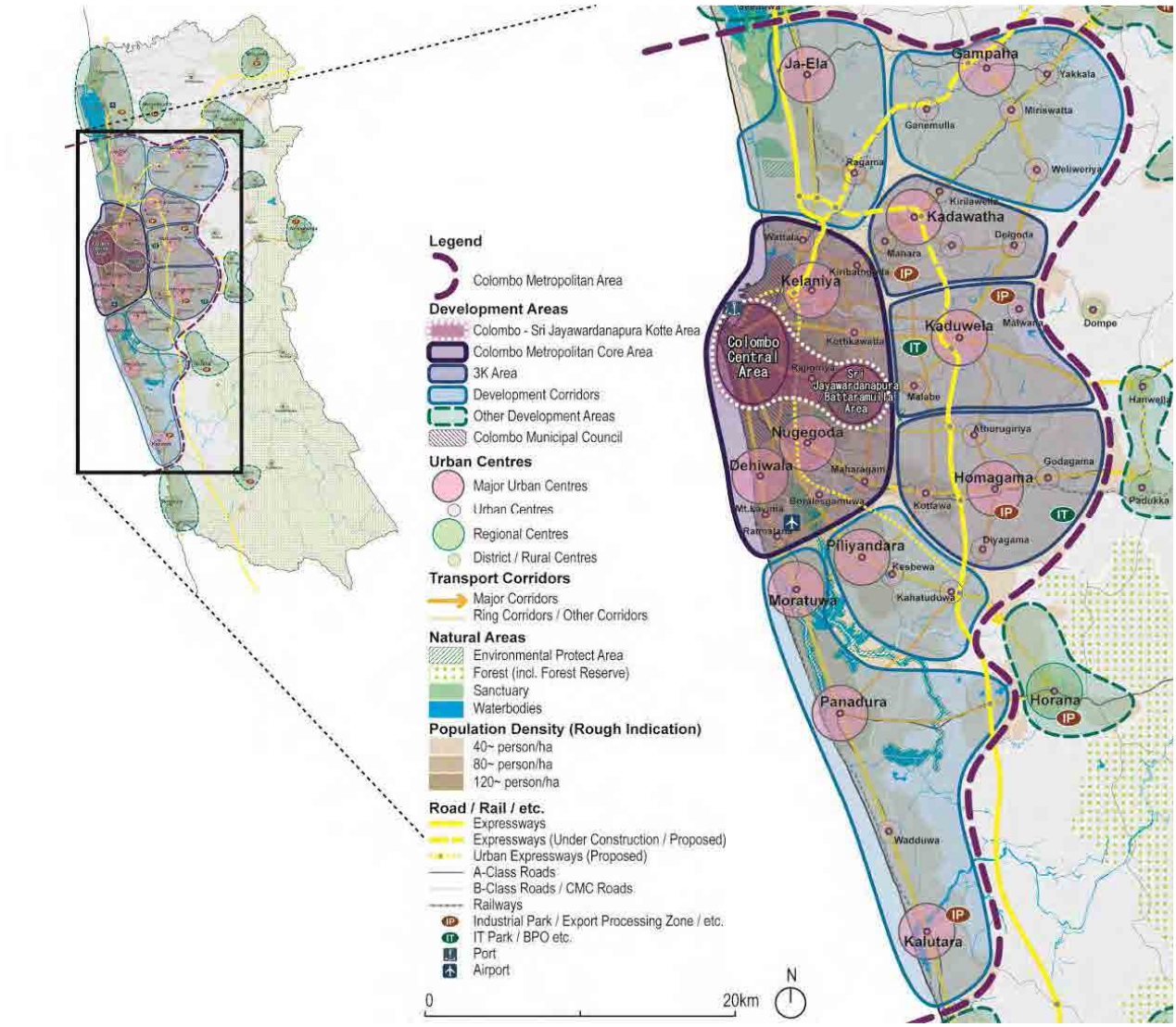
In the future, a strategic scenario is to be adapted and major urban centres and envisioned urbanised area is presumed.

Agglomerations of urbanised areas are characterised by the corridors or other special functions, and clustered. Thus, the urban structure of Western Province is formulated as shown in Figure 4.2.2.




Source: CoMTrans Study Team

**Figure 4.2.1 The Most Popular Destinations with Two Largest Trips from Each Zone**




Source: CoMTrans Study Team

**Figure 4.2.2 Envisioned Urban Structure of Western Province**

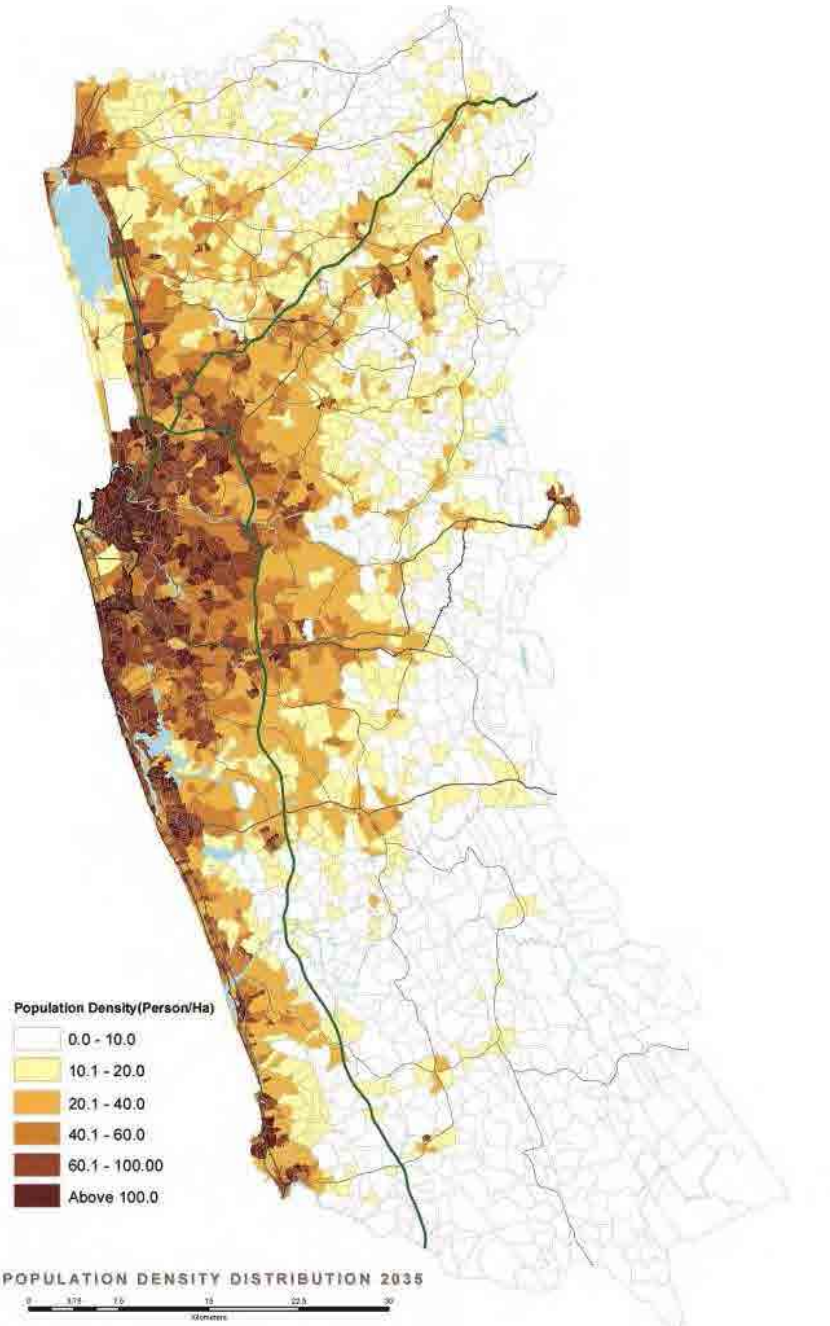
## 4.3 Population Distribution

### 4.3.1 Future Population Distribution

The population is distributed by considering the factors such as the road and public transport networks, the interchanges of Expressways and the future urban structure including the location of the urban centres, the employment centres or industrial estates. In the case of the medium population growth scenario, the population density in 2035 is estimated as shown in Figure 4.3.1.

As shown in the population density map, the Combo Metropolitan Area will have higher population density. The suburbs of Colombo would be more populated areas, especially the

Battaramulla area will attract more population. In the Gampaha District, population would concentrate along the Kandy Road, the Main Line of the railway, and Negombo Road. In Kalutara District, the populated area will be along the coast. While rural conditions will remain in the south-eastern part, small rural centres will be populated such as Matugama.




Note: Calculated by CoMTrans Study Team. Expressways/Highways are shown on the map as reference.

**Figure 4.3.1 Projected Population Densities 2035**

# CHAPTER 5 CoMTrans Urban Transport Master Plan

## 5.1 Future Perspective of Colombo Metropolitan Area

### 5.1.1 Perspective of Socio-Economic Aspect and Urban Structure

#### (1) Population Growth and Suburbanisation

Population will grow in the Western Province. It is projected to increase from 5.8 million people in 2012 to 7.9 million in the target year of 2035. The population of the Colombo Metropolitan Area will increase more rapidly since the metropolitan area is the main urban area of the province. Recently the population in CMC has been decreasing, while the population in the suburbs has been increasing rapidly. This suburbanisation continues and expands the urbanised area outward from the city centre.

#### (2) Urban Development in the City Centre

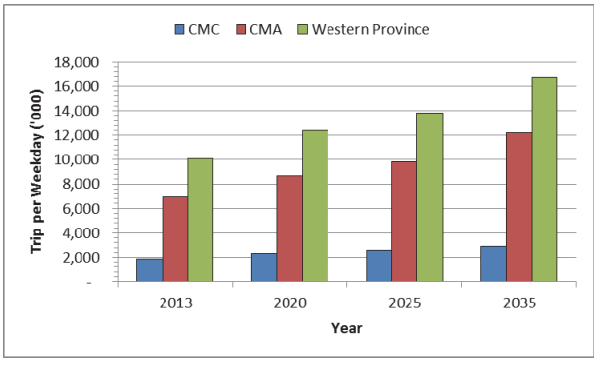
Urban development projects are planned mainly in the city centre and job opportunities will increase in the central area. Since the residential area will disperse and the urban area will be expanded to the suburb, it implies that commuter trips to the city centre will increase and the travel distance of commuters will be longer due to the dispersion of the residences of the population.

#### (3) Increase in Real Household Income

As high economic growth is expected in the nation, real term household income will increase. In accordance with GRDP growth, real household income would also increase proportionally. It is estimated that the composition of Group C[1] households, of which the monthly income is lower than Rs 40,000, would decrease from 67.8 % in 2012 to 12.5 % in 2035. In contrast the composition of Group A households would increase from 7.6% in 2012 to 56.3% in 2035.

#### (4) Increase in Ownership of Private Modes of Transport

The increase of household income would bring about an increase of ownership of private passenger cars and motorcycles. The increase of private modes of transport naturally increases traffic demand on the roads and would cause serious traffic congestion.




Source: CoMTrans Estimate

**Figure 5.1.1 Increase of Person Trip Demand by Region: 2013 – 2035**

[1] Classification of income

Group C: <40,000Rs./HH/Month; Group B: 40,000-79,999Rs./HH/Month; Group A: 80,000 Rs/HH/Month and over

### 5.1.2 Projected Transport Demand

In 2035 the total person trip production in the Colombo Metropolitan Area would increase to almost 12.2 million person trips per day and this is 1.75 times of the present person trip demand of 6.9 million person trips per day as indicated in Figure 5.1.1

## 5.2 Planning Issues for Urban Transport System Development

It is anticipated that traffic congestion will continue getting worse and worse without efforts on the improvement of public transport systems and the restriction of private modes of transport by the government. Planning issues in urban transport system development are identified as follows:

### 5.2.1 Dealing with Peak Transport Demand and Concentration of Traffic in the City Centre

Traffic congestion is brought about by peak traffic demand in time and spatial concentration of vehicular traffic in the city centre. To tackle the traffic congestion problem, one way is to flatten the peak demand by a staggered working hour system.

Another countermeasure is to distribute traffic concentration in the city centre to sub centres. This would be achieved by developing urban centres in suburban areas where a sufficient number of job opportunities should be provided. By distributing job opportunities in sub centres, thesesub centres would attract the employed population from the surrounding areas and could reduce traffic concentration in the city centre.

### 5.2.2 Need to Shift from Private Modes of Transport to Public Transport

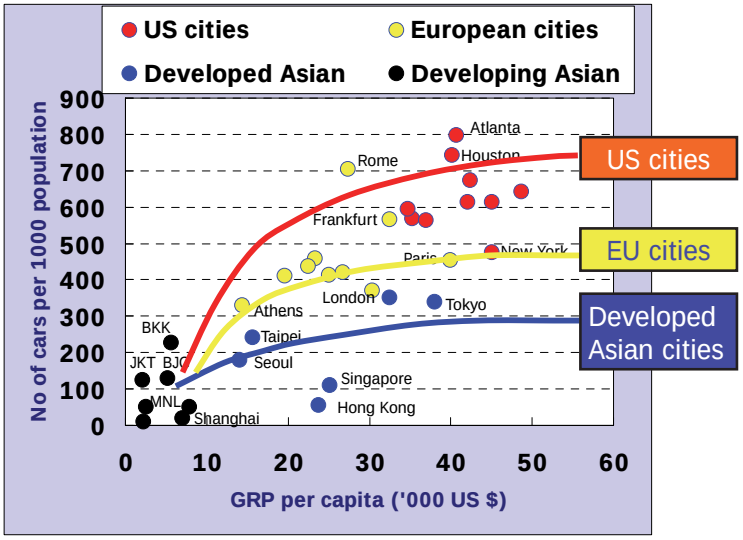
To deal with the traffic congestion problem in the city, the reduction of vehicular traffic demand is the main issue to pursue. Since the total travel demand in Colombo Metropolitan Area would increase in the planning period, a shift to public transport from private modes of transport is a challenging task for the Government. As traffic demand increases, traffic congestion on the road network would be worse and travel speed would be reduced in the future. The operation speed of ordinary buses will also be lower due to traffic congestion.

Public transport systems generally provide less convenient and longer travel time compared to private modes of transport, which can provide door-to-door service. Consequently, the public transport network to be introduced should be at a high level of service and congestion free by providing dedicated transport space in order to compete with private modes of transport.

In this regard, a heavy rail system, a medium-sized transit system and a bus rapid transit system can be regarded as public transport systems with a high level of service in terms of operational speed and punctuality. It is therefore recommended to formulate the public transport systems for the Colombo Metropolitan Area with these congestion free systems and cover the public transport service area as widely as possible.

According to the historical trend of modal shift in the last 28 years, the number of passengers crossing CMC boundary by private mode of transport increased approximately 2.5 times while the number of passengers using public transport remained roughly static. The vehicle ownership in recent years also shows a surge in the number of passenger cars, three-wheelers and motorcycles.

Group A households are captive to private modes of transport according to the Home Visit Survey results. Taking into consideration the fact that economic growth is expected in the CMA with huge urban development projects, the modal shift to private modes of transport will be accelerated if no government intervention is taken. Figure 5.2.1 shows vehicle ownership and gross regional products (GRP) per capita of cities in the United States (U.S.), the European Union (EU) and Asia. Cities in U.S., EU and developed Asian cities took different paths. While U.S. cities are dependent on cars, developed Asian cities succeeded to deter vehicle ownership with development of public transport systems.

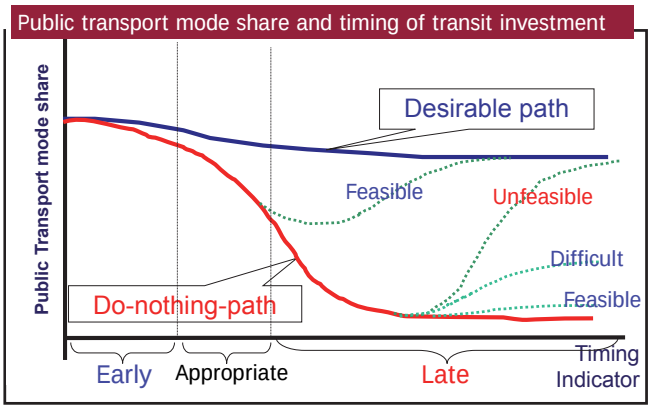



Source: Morichi, S and Acharya, S.R. (eds.) (2012) Transport Development in Asian Megacities -A New Perspective-, Springer

**Figure 5.2.1 Vehicle Ownership and GRP per Capita of Cities in U.S., E.U. and Asian Cities**

As shown in Figure 5.2.2, the share of public transport will continuously decrease with economic growth if the government does nothing. While some U.S. cities are recently trying to increase the share of public transport to reduce externalities of private mode of transports, a limited number of cities have succeeded to regain a share of public transport. Once car ownership and a share of private mode of transport increases, it is difficult to reverse it due to the captive characteristics of car users.

With the decrease of travel speeds on the roads due to the abovementioned severe traffic congestion, the travel time of buses will increase. This might accelerate the shift to private modes of transport. It is highly expected to break this vicious circle though provision of convenient, fast and high capacity public transport modes.




Source: Hanaoka, S. (2014) " International Experiences in Urban Transport Policies and Financial Options for Urban Transport Projects" presented for CoMTrans Special Seminar on Sustainable Urban Transport Development on 21st January, 2014

**Figure 5.2.2 Public Transport Mode Share and Timing of Transit Investment**

### 5.2.3 Environmental Friendly Transport System

In Sri Lanka, the transport sector contributed more than 50% of the $CO_2$ emissions in 2010. Road transport contributes 94 percent of $CO_2$ emissions produced by the transport sector. Since it is expected that $CO_2$ emissions will grow in accordance with the increase in vehicle ownership, the environmental policy for the promotion of lower emission vehicles such as electric cars and hybrid cars should be supported to control $CO_2$ emissions. At the same time, the promotion of public transport should also be taken into account for reduction of $CO_2$ emissions.

### 5.2.4 Transport Facilities for the Physically Handicapped

At present barrier free facilities such as elevators and escalators are not yet provided at railway stations and bus terminals. Thus it is not convenient for physically handicapped people to use public transport. It is required to provide such facilities to support them to travel as normal people in the city.

### 5.2.5 Transport System to Promote Health

Transport facilities for walking and bicycles have not had attention paid to it for a long time. Walking and bicycling has become popular since these modes are environmentally friendly and good for health. Walking is the most basic means for travel; therefore, the walking environment should be improved and developed in the future. Development of a pedestrian network separated from car traffic is good from the viewpoint of safety and good health overall. Furthermore, improvement in the walking environment would support the promotion of public transport use since when people use buses and the railways, they usually access the railway station and bus stops on foot.

## 5.3 Objectives for Urban Transport System Development

The analyses of the present urban transport problems and the planning issues in the Colombo Metropolitan Area have led to the identification of four major objectives which the urban transport system development needs to pursue.

### 5.3.1 Equity in Transport to All the Members in Society

A minimum level of transport service should be provided to all members of society. In the Colombo Metropolitan Area, the mobility of Group C is limited due to their insufficient income. The role of public transport is thus of great importance in providing affordable means of transport for the Group C people to access urban services.

At the same time, it is necessary to develop transport facilities for the physically challenged. Such facilities are seldom seen in the CMA at the present time and the gradual improvement of transport facilities is needed.

**Affordability of Public Modes of Transport**

A rail-based transport system is better than a Bus Rapid Transit(BRT) and other types of road based public transport systems since a rail-based transport in general have a larger passenger transport capacity than ordinary bus transport. Usually, rail-based transport has a grade separated

structure and is not disturbed by other modes of transport; consequently, it runs faster than BRT since BRT usually must stop at intersections. However, it requires a huge amount of investment as well as having a higher operation cost. This implies that the system needs to charge the passengers a higher transport fare. According to the Home Visit Survey, the Group C with a monthly income less than Rs 40,000 pays about Rs 4,000 for transport. This implies that about 10% of household income is consumed for transport. According to worldwide household expenditure statistics, the average transport expense is usually around 10% of household income and if it exceeds the 10%, households must sacrifice some other expense[2]. Most households therefore, cannot afford to pay more for transport than at the present level. If the fare of new or improved public transport system is much higher than the presently prevailing fare level, the majority of residents will not be willing to pay for a higher transport fare. Until their household income increases to a certain level, the government should provide financial support for developing the new transport systems and probably for operation costs in the beginning.

### 5.3.2 Efficiency in Transport Systems to Support Economic Activities

Traffic congestion has resulted in a considerable amount of economic loss to society because of longer travel times, lack of punctuality and the deterioration of the environment. Efficiency in transport can be achieved by balancing transport demand and transport network capacity. Alleviation of traffic congestion can be dealt with in the following three ways: 1) by increasing road capacity through the development and improvement of the road network; 2) by optimising the utilisation of the existing road capacity by using a traffic control system and providing traffic information; and 3) by decreasing excessive vehicular traffic demand through transport demand management and diverting private mode users to public modes of transport.

At the same time, the promotion of public transport usage would also contribute toward economic efficiency by reducing vehicular traffic demand on the congested urban road network. Mass transit systems have an advantage over private modes of transport in terms of travel costs and lower consumption of space in the context of an urban area. The combination of all the approaches mentioned above will create an efficient transport system.

### 5.3.3 Environmental Improvement and Health Promotion related to Transport

Air pollution caused by motorised vehicles should be minimised through emission controls for automobiles, promotion of public transport and traffic demand control, especially in the congested areas. Countermeasures to reduce PM10 should be the main focus, particularly in the CMA. In addition, aesthetics should also be considered for developing an urban transport system.

Recently people are more concerned with health and tend to do physical exercises. Walking and bicycling are good for health and transport facilities such as pedestrian paths and cycling roads should be developed for supporting these activities.

[2] Source: Jarvi Kauppila, Administrator Ten Stylised Facts about Household Spending on Transport 1 Joint Transport Research Centre of the OECD and the International Transport Forum No. 1/2011

### 5.3.4 Traffic Safety and Security in Transport

Since lives are invaluable and death and injury due to traffic accidents will bring great grief to family members and friends, traffic safety should be enhanced and the number of accident victims should be minimised through the enforcement of laws and regulations, intensive public campaigns, and training and education for drivers as well as the general public. Improvement of traffic facilities through engineering design would contribute to the reduction of traffic accidents. Furthermore the security of children and women in public transport should be improved and it would partly contribute to increase the use of public transport.

## 5.4 Urban Transport Policy

To achieve the four different objectives for transport system development, the following transport policies are essential for the CMA:

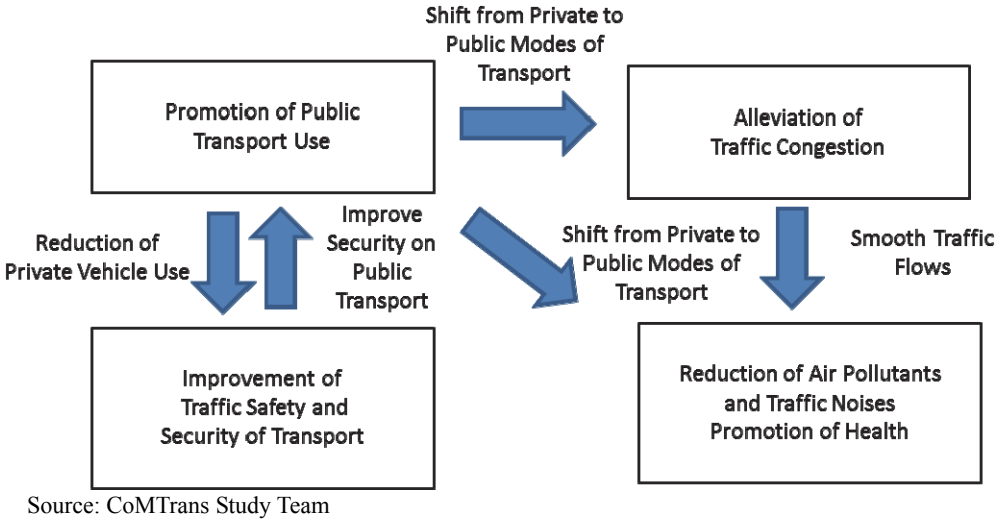
1) Promotion of Public Transport Use

2) Alleviation of Traffic Congestion

3) Reduction of Air Pollutants/Traffic Noise and Promotion of Health

4) Reduction of Transport Accidents and Improvement of Security

These four transport policies are inter-related as illustrated in Figure 5.4.1. The promotion of public transport is a principal measure to reduce dependence on private modes of transport. Mere improvement of public transport services, however, would not entice people who are accustomed to using private modes of transport to shift to public modes.



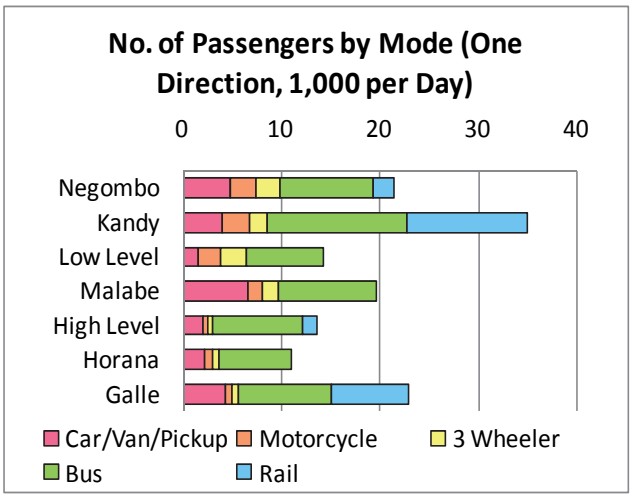

Source: CoMTrans Study Team

**Figure 5.4.1 Relationship between Urban Transport Policies**

# 5.5 Analysis on Major Transport Corridors

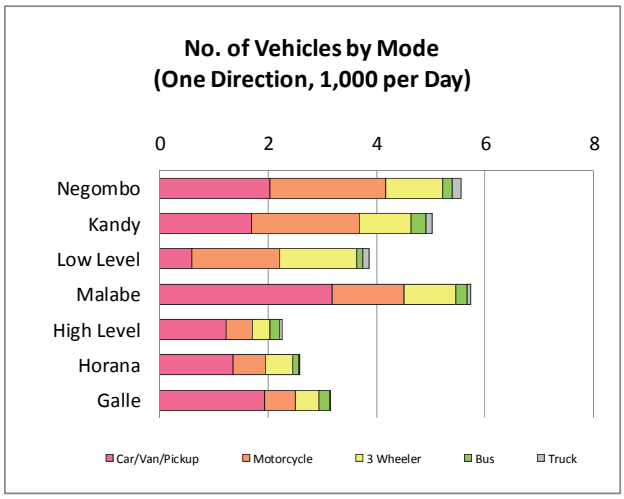
## 5.5.1 Seven Major Transport Corridors

Prior to the evaluation on the urban transport system development scenarios, preliminary analysis on seven major radial transport corridors was undertaken to understand the potential transport demand in the target year 2035. Seven transport corridors have been identified as major radial corridors which connects the city centre of Colombo and major urban centres in CMA as illustrated in Figure 5.5.3.



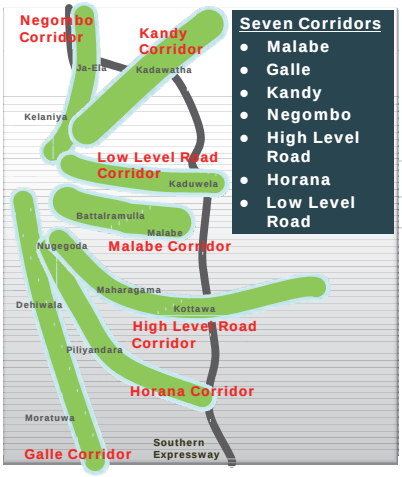

Source: CoMTrans Screen Line Survey 2013

**Figure 5.5.1 Number of Passengers by Mode of transport on Seven Corridors**



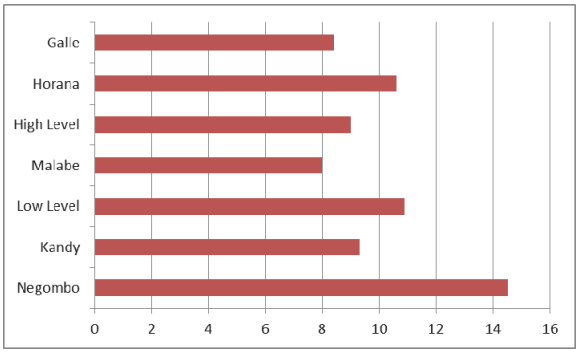

Source: CoMTrans Screen Line Survey 2013

**Figure 5.5.2 Number of Vehicles by Vehicle Type on Seven Corridors**




Source: CoMTrans Study Team

**Figure 5.5.3 Seven Transport Corridors**




Source: CoMTrans Travel Speed Survey, 2013

**Figure 5.5.4 Average Travel Speed in Morning Peak Hour on Seven Corridors**

### 5.5.2 Comparison of Public Modes of Transport

For transport system options, advantages and disadvantages of respective public modes of transport are compared. Options for pubic modes of transport include a Bus priority lane, Bus Rapid Transit (BRT), Automated Guided Transit (AGT), Monorail, LRT at Ground and Elevated, MRT Elevated, MRT Underground and Modernised Railway. Comparison of public modes of transport is listed in Table 5.5.1.

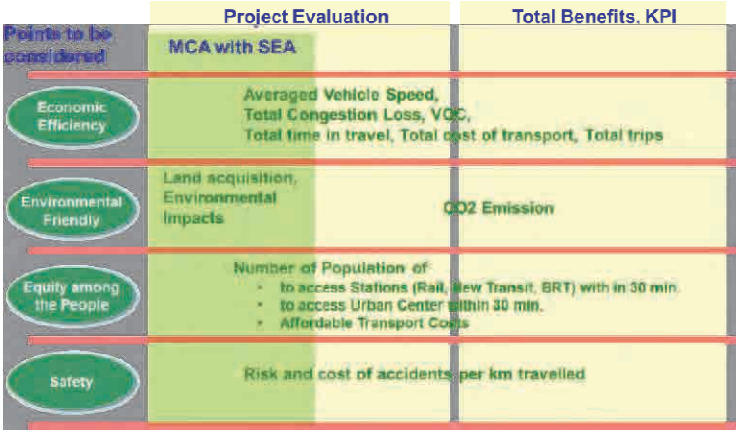
**Table 5.5.1 Comparison of Public Transport Options**

| System | Bus Priority System | BRT | AGT | Monorail | LRT | MRT - Elevated | MRT - Underground |
|---|---|---|---|---|---|---|---|
| Capacity* | -10k | 3-13k | 4-20k | 7-30k | 7-30k | 18-60k | 18-60k |
| Scheduled Speed | 10-20 km/h | 15-25 km/h | 20-30 km/h | 20-40 km/h | 20-40 km/h | 30-40 km/h | 30-40 km/h |
| Land Acquisition | no acquisition | along roads | only stations | only stations | station & some roads | station & curve sections | station exit only |
| Stop Spacing | 0.3 – 1 km | 0.5 – 1 km | 0.5 – 1 km | 0.5 – 1 km | 0.3 – 1 km | 1.5 – 2 km | 1.5 – 2 km |
| Initial Cost | USD ~1 M/km | USD 2 M/km | USD 30-60 M/km | USD 30-60 M/km | USD 35-60 M/km | USD 45-60 M/km | USD 90-100 M/km |
| O&M Cost | N/A | USD 1.3 / car-km<br>$0.03 per pax. | USD 2.0 / car-km<br>$0.04 per pax. | USD 2.5 / car-km<br>$0.03 per pax. | USD 4.0 / car-km<br>$0.04 per pax. | USD 5.0 / car-km<br>$0.03 per pax. | USD 5.0 / car-km<br>$0.03 per pax. |
| Daylight Interference | Not at all | Not at all | Pier & Slab | Pier & Beam | Pier & Slab | Pier & Slab | Not at all |
| Aesthetic Concern | No Concern | Station only | Pier & Slab | Pier & Beam | Pier & Slab | | Not at all |
| Noise | Rubber Tyre & Engine | Rubber Tyre & Engine | Rubber Tyre | Rubber Tyre | Rail & Tyre | Steel Rail & Tyre | No noise to ground level |

Note: * Capacities are in the number of passengers per hour, per direction. 1k means 1,000.

### 5.5.3 Selection of Appropriate Transport System for Seven Corridors

Candidate modes of transport are compared by the key performance indicators (KPIs), which include; a) Economic efficiency, b) Environmentally friendly, c) Equity in society and d) Safety. The KPIs are set for the measurable indicators for describing the system benefit from the entire transport system development as well as evaluation criteria for selection of transport options.




Source: CoMTrans Study Team

**Figure 5.5.5 Key Performance Indicators (KPIs)**

### 5.5.4 Selected Transport System Development Options for Seven Corridors

Based on the evaluation, the most suitable options were identified for each transport corridor, which are indicated in Table 5.5.2. It should be noted that these are results on a corridor basis so that it should be discussed in the view of network enhancement, especially the public transport network, such as monorail network, railway network and BRT network to link closely.

**Table 5.5.2 Selected Development Options for Each Corridor**

| Corridor | Selected Development Options | | |
|---|---|---|---|
| | Railway | New Transit System | BRT/Bus/Road |
| Negombo | Modernised | - | Bus Priority |
| Kandy | Modernised | - | BRT |
| Low Level Road | - | - | Bus Priority |
| Malabe | - | Monorail | - |
| High Level Road | - | Monorail | - |
| Horana | - | - | Bus Priority |
| Galle | Modernised | - | BRT supported by Marine Drive extension |

Source: CoMTrans Study Team, Note: - indicates no appropriate option is selected. Detailed evaluation procedure is explained in the Technical Report: Master Plan Formulation.

## 5.6 Urban Transport System Development Scenarios

### 5.6.1 Preparation of Urban Transport System Development Scenarios

The base case scenario and three urban transport system development scenarios are prepared to compare the advantages and disadvantages of each development scenario.

1) Base Case Scenario
2) Intensive public transport system development scenario
3) Mixed public transport and road network development scenario
4) Intensive road network development scenario

Base case scenario includes the transport system development identified in corridor analysis. Obviously the improvement consists of the selected option for each radial corridor. The other three cases include other facilities including transport facilities and services in the circumferential direction as well. In addition, transport demand management (hereinafter referred to as "TDM") such as electronic road pricing can be included as an option to reduce traffic congestion on the road network and to promote a modal shift from the private mode of transport to public transport.

## 5.7 Evaluation of Urban Transport Development Scenarios

The following four urban transport system development scenarios prepared above were evaluated to find the most appropriate option for long term transport system development for the CMA. In addition, if these cases will not be able to alleviate traffic congestion, a further option is also studied. Employment of transport demand management is this option and it includes car traffic restraint schemes such as ERP. Performance of each transport system development scenario is evaluated from the following aspects.

1) Efficiency: Economic Internal Rate of Return (EIRR) and Net Present Value (NPV)
2) Equity: Service area of quality public transport (railway, monorail and BRT)
3) Environmentally Friendly: Global Warming: Emission of $CO_2$
4) Traffic Safety: Economic loss due to traffic accidents

C2 is recommended as the most appropriate urban transport system development scenario, which include developing the public transport system extensively and at the same time employing TDM to promote the shift to public transport.

**Table 5.7.1 Evaluation of Urban Transport System Development Scenarios**

| Evaluation Item | A1<br>Intensive Highway Development | A2<br>Intensive Highway Development & TDM | B1<br>Combined Public Transport and Highway Development | B2<br>Combined Public Transport and Highway Development & TDM | C1<br>Intensive Public Transport | C2<br>Intensive Public Transport Development & TDM |
|---|---|---|---|---|---|---|
| Economic Internal Rate of Return (%) | 19.7% | 21.2% | 19.3% | 22.7% | 19.1% | 22.9% |
| Net Present Value (billion Rs.) | 622 | 765 | 564 | 779 | 541 | 797 |
| Population in the Public Transport Service Area [1)] | 1.26 million people | | 1.36 million people | | 1.40 million people | |
| Reduction of CO2 Emission (million ton) | 4.2 | 6.4 | 5.8 | 7.7 | 5.8 | 8.3 |
| Reduction of Loss due to Traffic accident (million Rs. ) [2)] | 510 | 724 | 756 | 921 | 710 | 1066 |
| Overall Evaluation | B- | B+ | B- | A- | B- | A |

Note: 1) Public transport service area is defined as the area within 800 meter radius from railway stations and BRT shelters.
2) Loss of traffic accidents are discounted value at 12%.
Source: CoMTrans Estimate

## 5.8 Strategies for Urban Transport System Development

The strategies for developing Urban Transport Systems in the Colombo Metropolitan Area can be divided into two stages; one is a strategy at the planning stage and the strategies should be taken into consideration when planning urban transport systems and land use. The other strategies are those related to project implementation.

### 5.8.1 Strategies for Integration with Urban Planning

#### (1) Centre Development for Mass Transit Systems

Urban structure and transport systems should be integrated. For instance, a highway oriented transport network is suitable for low-density land use which can be seen in the suburbs of the United States. In contrast, a mass transit system is appropriate for high-density urban land use.

Sub-centre development is one way to deal with traffic concentration in the city centre. In order to develop the sub centres, strong transport linkage is required between the city centre of Colombo and the sub centres. Mass transit systems should be installed between these centres to support the travel needs of the people and goods. Conceptually, to support the viability of public transport systems, it is preferable that a city grows compactly in a form of poly-centric decentralisation. Guided urban development is essential to develop cities to be consistent with urban transport systems. In this regard, metropolitan-wide urban land use planning is also required.

#### (2) Development of Public Transport Systems to be Synchronised with Urban Development

The CMA has expanded outward from the city centre. In suburban areas the population density has not been high thus travel demand is not high at present. In the future, as urbanisation continues, travel demand would increase and then mass transit systems might be required. Mass transit systems should be developed in accordance with urban development. Travel demand along the corridor should be monitored to determine the development timing of the mass transit system. This phased development should be taken into account in particular for the BRT system to be developed along the planned Middle Ring road in the suburban area.

#### (3) Transit Oriented Development (TOD)

To make mass transit systems viable, high density urban development in the area surrounding rail-based transit system stations is preferable. In the city centre, high-rise office buildings and commercial facilities, such as shopping malls within walking distance from a station are desirable to increase passenger demand on the transit system. In suburban areas, high rise apartments near stations are a preferable form of land use for the mass transit system. To materialise these developments, high floor ratios should be promoted in the urban development plan. On the other hand, outside of the area surrounding the station the floor area ratios should be limited to prevent high density urban development. The urban transport master plan should take into consideration urban development structures. CoMTrans therefore proposes that the integration of urban development with urban transport systems is of utmost importance. The strategy for the integration includes sub-centre development and Transit Oriented Development.

### 5.8.2 Strategies for Transport Planning

#### (1) Development of Extensive Public Transport Networks

Public transport systems at a higher level of service should be developed in the form of networks so that people can reach their destinations within the system. A higher level of public transport service means a congestion free transport system; namely, railway, monorail and bus rapid transit (BRT). A public transport network should consist of several trunk lines with feeder services and it should cover as wide an area as possible.

#### (2) Application of Transport Demand Management (TDM) and Car Traffic Restraint Scheme

Transport demand management (TDM) is necessary to alleviate traffic congestion in the CBD because new road construction, or even road widening is very difficult in the CBD and will be limited due to physical constraints such as the availability of land for the roads. Road pricing is a scheme to alleviate traffic congestion by charging vehicles entering congested areas in the city centre and it also raises funds for developing and improving the urban transport systems. Improvement of public transport is prerequisite for employing TDM.

### 5.8.3 Strategies in Project Implementation

#### (1) Encouraging Private Sector Participation

This system reduces the government investment for transport infrastructure development replaced by private sector funding and encourages the participation of private organisations for operation and maintenance. It is common that urban highways are developed under BOT (Build Operate Transfer) scheme or PPP (Public Private Partnership) scheme in many cities; thus, when urban expressways are developed, it should encourage participation of the private sector in the form of BOT or PPP. However public transport system development is usually difficult to finance by only the private sector. In most common cases, public transport fares are regulated by the Government at low levels since the government should provide means of transport for low income households. Therefore it seems difficult to make public transport projects financially profitable merely with passenger fare revenue. In many countries a common practice for financing public transport is to provide infrastructure by the public sector and provide operation by the private sector.

#### (2) Introduction of a Value-Capture System for Public Transport Development

Rail-based transport is not disturbed by ordinary traffic and this mode can provide fast speeds and large passenger capacity transport service. Railway passengers enjoy the fast and convenient railway service for travelling in the urban areas. In addition, railway service can increase the sales of department stores and shopping malls near stations and promote the values of land and housing along the railway corridor. However the railway company is not able to gain all the value added accrued from the railway development.

Since a rail-based transport system requires huge initial investment cost, the methodology of cost recovery should be considered through value capture of development. In the case of private railway companies in Japan, they develop housing areas along the railway corridor. After they provide new railway service, the land values increase and they sell the housing at a higher price

and get profits from the real estate business. They are also starting retail businesses as well by building shopping malls at the terminal stations. From this kind of commercial business they can profit in addition to passenger transport service. To support the rail-based transit development project financially it is recommended to take this kind of business model into consideration.

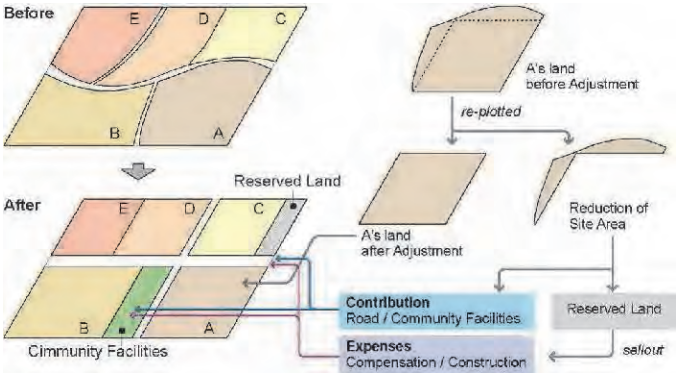
### (3) Methodology of Space Preparation for Urban Development

To develop the desirable urban structure, sometimes land acquisition is required but it is not easy to implement; thus, new implementation methods should be introduced. There are two methodologies that can be applied in Sri Lanka.

**Land Re-adjustment**

This is a typical method of Japan's urban development to create a comfortable residential area. It is illustrated in Figure 5.8.1.

An irregular-shaped plot is re-plotted to a rectangular shape by reducing the site area. The reduced site area is provided for roads and sometimes parks or community facilities, and part of the land is sold to cover expenses for compensation and construction cost for road improvement. Then all lands are re-plotted and roads can be constructed. Although each land owner lost a part of the land, the land owners will gain more value since the land value will be increased as the road condition becomes much better than before.

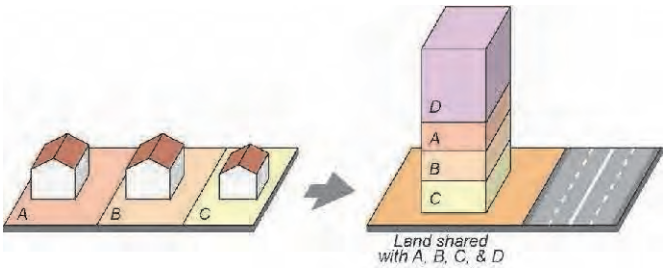



Source: CoMTrans Study Team

**Figure 5.8.1 Conceptual Method of Land Re-plotting**

**Urban Renewal Project**

This is also a typical method in the Japanese context to create urban centres within a commercial or business district. Figure 5.8.2 illustrates the simplified method of urban renewal.




Source: CoMTrans Study Team

**Figure 5.8.2 Conceptual Method of Urban Renewal**

Land owners can organise an urban renewal association. Often a developer coordinates to organise the association and the Government is also involved. The lands are unified and shared with the owners and the developer. A part of the land is provided for public purposes, mainly roads. Thus, a building is constructed and all the members gain benefits by allocating the floors.

Actually, there is a practice of this kind of urban renewal method in the Slave Island Project by UDA and the private sector. A plot of land is being developed and some of the land owners are allocated floors in a newly built building.

Although the above mentioned two methods are just theories, they would be a guide to some potential method for implementation. In order to carry this out, collaboration between the communities, land owners, the private sector such as developers, and the public sector such as the local government are required. They are still challenging methods for the Sri Lankan context. However, implementation methods are essential and should be recommended in order to achieve the Master Plan.

## 5.9 Inter-City Transport Systems

Transport systems are divided into Inter-city transport systems and urban transport systems. Inter-city transport systems provide transport services between cities. Before discussing urban transport system development, the development of inter-city transport systems is described.

### 5.9.1 Inter-city Passenger Transport Systems

Currently, inter-city bus services are concentrated in Pettah bus terminals and most of the city bus services are also departing from and arriving at the Pettah bus terminals. Around 7,400 intra provincial buses depart from and arrive at Pettah and some 3,300 inter-provincial buses leave and arrive at Pettah. The number of passengers departing from the Pettah bus terminal is estimated to be about 38,000 passengers per day for intercity bus services and some 14,000 passengers per day for intracity bus services. This concentration of bus operation causes traffic congestion in the Pettah area. On the other hand, the majority of inter-city railway passengers depart from and arrive at the Fort railway station. In terms of inter-regional passenger movement, the Fort and Pettah areas are the hubs of the inter-regional transport systems. People travelling from the northern part, eastern part and southern part of the country can change their mode of transport at these transport hubs. The Multi-modal transport hub is an interchange point of inter-regional transport and intra-regional transport.

The intercity passenger public transport system is connected with the urban transport system at Multi-modal Transport Hubs and Multi Modal Centres. Passengers from outside of the metropolitan area transfer at these transport nodes and go to final destinations by urban transport systems in the metropolitan area.

### 5.9.2 Inter-city Cargo Transport System

Major inter-city cargo trip demands are to/from the Colombo port. According to the Truck OD interview survey at Colombo port, the destinations of the trucks are the Puttalam District 27%, the Gampaha District 23%, CMC 17% and the Colombo District 12%, thus 50% of the destinations are located in the north. The other major cargo flows are generated and attracted in industrial estates and EPZs. At present, heavy vehicles to/from the Colombo port are passing through the northern part of CMC and this causes traffic congestion in the city centre. To reduce the burden of cargo traffic flows in the city centre, a truck ban in daytime is a countermeasure and the other way is a provision of direct access to the port by an expressway network. If the Port Access Road could be inter-connected with the inter-regional expressway network, the port-related cargo could be easily transported to outside of the region. Trucks can avoid passing through the business district thus they would not disturb traffic flows in the city centre.

# 5.10 Urban Transport System Development Programmes

## 5.10.1 Urban Transport System Development Programme (1) for Promotion of Public Transport Use

### (1) Monorail Systems

Based on the corridor analysis, the Malabe corridor has 60,000 vehicles entering the city and it is the highest compared to the other six corridors. Besides, the Malabe corridor is the only major corridor without rail-based public transport, excluding Low level road corridor and Horana corridor. Fort-Malabe corridor has been identified as the corridor which requires a rail-based transport system urgently. To make the most use of a monorail system on the Malabe corridor, which serves east-west direction travel in the metropolitan area, a north south monorail line should be added to serve other major destinations in the city.

**Multi-Modal Transport Hub and Multi-Modal Centre**

Each mode of public transport should be connected to function as a network. Public transport modes, including railways, inter-provincial buses, intra-province buses and new transit modes such as bus rapid transit (BRT) and monorail should be integrated. Railway, Monorail, and BRT as well as inter-provincial and city buses come to Fort station and the Pettah terminal. However the present station and three bus terminals are located separately and it is not convenient for passengers. Interchange facilities should be integrated and located at one place. The Multimodal Transport Hub shall function as an interchange facility for railway passengers, monorail passengers, and BRT passengers as well as ordinary bus passengers. The estimated number of passengers at Multi-modal Transport Hub is listed in Table 5.10.1. This indicates that a significant number of passengers would utilise the multi-modal transport hub. This means that the potential for urban development is also high. The urban development further increases the number of users of the hub.

**Table 5.10.1 Estimated Passenger Demand at Multi-modal Transport Hub in 2035**

| | Passenger Demand (day ,both ways) | Peak Ratio (both ways) | Peak Demand (one way) |
|---|---|---|---|
| Railway | 145,000 person/day | 20% | 14,500 person/h |
| Monorail | 42,000 person/day | 18% | 3,800 person/h |
| BRT | 5,000 person/day | 10% | 250 person/h |
| Total | 184,000 person/day | — | 18,550 person/h |

Source: CoMTrans Study Team

**Multi-modal Centre (MMC) and Park & Ride (P&R)**

While a multi-modal transport hub will be a key component to connect all major public transport modes, concentration of all bus transport in a limited area might cause congestion in the surrounding area. Therefore, the "Multi-Modal Centre" is proposed to divert a part of the transport hub function to the suburbs of the Colombo Metropolitan Area. Four multi-modal centres on major corridors are proposed to serve passengers by corridor.

In order to promote public transport use, integrated transit facilities for the different modes of transport are planned along the planned monorail corridors.

The Multi-modal centres (MMC) function as the transit facilities for passengers from feeder buses and inter-provincial buses at the edge of the urban area to the city centre by monorail and commuter railway. It should have enough space for kiss & ride and drop-off. CoMTrans proposes the following four MMCs that will be located on four major corridors;

- MMC near Kelaniya in a New railway station, CKE interchange, Monorail and Bus terminals
- MMC at Malabe with Monorail and Bus terminal
- MMC at Makumbura with Monorail, Bus terminal and OCH/Southern Expressway
- MMC at Moratuwa with Coastal railway Line and BRT

Park & Ride (P&R) is the facility which encourages transfer from private mode to public mode. Basically it provides car and motorcycle parking and smooth connection with public transport, e.g. monorail. Feeder buses will be connected at this P&R to transfer to higher capacity public transport modes.

**Provision of Direct Access to Multi-modal Transport Hubs for Inter-city Bus Services**

Further extension from the Port Access Road to the MmTH is recommended in order to provide direct access for intercity bus services. Currently, 10,800 buses for both intercity and intra-city bus services are concentrated in the Pettah bus terminals and they cause traffic congestion in the surrounding area. If intercity buses can be taken off of the arterial roads in the area, traffic congestion would be reduced. This access road should be developed together with MmTH development. Coordination of the two projects is required.

**Park & Ride and Station Plaza Development**

To enhance a modal shift from private modes of transport to public transport, park & ride and kiss & ride (drop-off and pick-up) at monorail stations are essential options. Park & ride will allow car, private three-wheeler and motorcycle users to go by a private mode to the station and park to ride the monorail. While transit oriented development is becoming a universal concept to achieve economically and environmentally sustainable cities and transport systems, it takes time to change urban structure. In the early stage of development of a public transport system, park & ride enhances the modal shift to a public transport mode.

A station plaza with a station square, bus bay, taxi bay, sidewalks and commercial developments in front of or above a monorail station is also a key to attract passengers from adjacent areas. The station plaza can function as a symbol of the area and provide space for gathering in case of natural disaster.

### (2) Modernisation of Existing Railway System

It is estimated that total railway passengers would increase to 1,715,000 passengers per day in 2035 if the proposed improvement of the railway were undertaken. To deal with the increasing passenger demand, the following improvement for the existing railway line is recommended.

- Electrification of Railway Line
- Renewal of Rolling Stock
- Improvement of Track
- Renewal of Signalling Systems
- Renewal of Telecommunication System
- Improvement of Train Operation

### (3) Construction of Airport Connection Line

According to the Air Passenger OD Interview survey, the total number of air passengers leaving the airport amounted to 8,185 persons by 64 flights on the survey day. The largest share of access modes to the international airport is private vehicles (car, jeep, passenger van and pickup) which consist of 38% followed by taxi at 32%. The share of public modes of transport is small. Buses carry 16% of the air passengers while railway transport only one percent of the passengers. This implies that public modes of transport should be improved for airport access.

Puttalam line runs very close to Bandaranaike Airport. The railway track branches from Katunayake South towards the airport but it does not reach the passenger terminal of the airport. Currently, only a freight train is operated once a day. Only a few kilometres of extension can connect the line to the passenger terminal and it can then provide passenger service from the city centre to the airport without being affected by road congestion. Electrification is also required for rapid and comfortable service.

### (4) Development of Access Roads to Stations of the Railways and the New Transit System

At present, railway service areas are limited due to the lack of access roads to the railway stations, in particular in suburban areas. Railway system improvement and development would not attract a great many passengers to use railway service if good access roads to railway stations are not provided. Therefore, it is strongly recommended to improve and to develop access roads to the stations at the same time as the railway and new transit system development. If sufficient width of access roads is not provided, it will be difficult to operate feeder bus services for railway passengers. Coordination between mass transit systems and the road network is of great importance for promotion of public transport.

### (5) Introduction of Bus Rapid Transit (BRT)

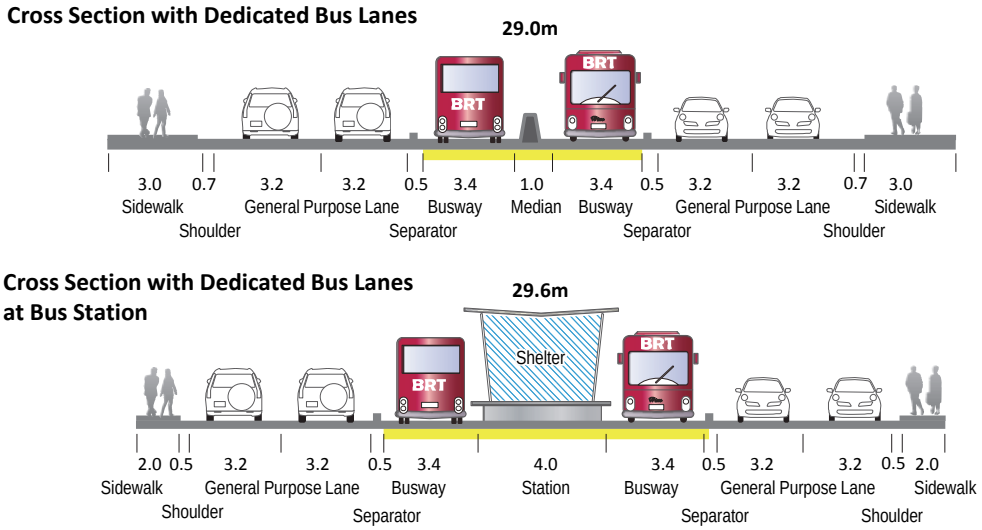
Conventional bus operation is often disturbed by traffic congestion with private passenger cars, in particular, in the city centre.

Bus rapid transit (BRT) can provide congestion-free public transport services since it has dedicated bus lanes. BRT is not expensive compared to a rail-based public transport system because usually it utilises the existing road facilities. Therefore, it can be regarded as an economical option although it requires three lanes per direction so as not to disturb ordinary traffic flows significantly.

Advantages of BRT compared to ordinary bus transport are listed below:

- High speed operation with an exclusive bus lane
- Reliable service by punctual operation
- Efficient transit with level boarding platforms and pre-boarding fare collection
- Central control of bus operation to ensure a quick response to any service disruptions
- Branding and market identification to attract various users including private car users, tourists etc.

Typical cross section of BRT systems are shown in Figure 5.10.1.




Source: CoMTrans Study Team

**Figure 5.10.1 Typical Cross Section of BRT System**

However, the existing roads which have enough space for the introduction of the exclusive bus lanes are limited in the suburbs around CMC, therefore BRT should be introduced along with the development of the road network. The maximum passenger demand appears at 223,000 passengers per day for both directions near new Kelani Bridge. PPHPD is 20,000 persons per hour per direction.

### (6) Road Development for Introducing BRT

It is proposed to introduce the Bus Rapid Transit (BRT) to form an efficient public transport network together with the existing railway network and a new transit system.

In the short-term, wide roads with three lanes per direction are to be utilised to accommodate dedicated bus lanes. This category of road includes the Base Line Road, Sri Saddhmma Mawatha, Pradeera Mawatha, Sri Sangaraja Mawatha and Olcott Mawatha.

### (7) Bus Priority System and Bus Location System for BRT

It is proposed to introduce both a Bus Priority System and a Bus Location System for BRT. It includes

- Mounting an RFID tag to each BRT bus,
- Installation of RFID receiving equipment,
- Development of a system for collection of the traveling status information,
- Development of a system to adjust the phasing time of the signals, and
- Development of a system for providing traffic information on the web.

#### (8) Regulatory Scheme for Road-Based Public Transport Modes

A regulatory scheme for proper restrictions on road-based public transport modes should be established taking into account road safety, congestion of roads, transparent service for customers and the employment of drivers and owners.

**Capacity Development for Bus Operation Improvement**

Capacity development for bus operations is not only about conventional approaches, such as institutional, administrative, and knowledge and skills, but also it should encompass disciplinary, moral and behavioural aspects, considering the nature of delivering services to the passengers. In that sense, the capacity building for general bus services is perceived in three tiers, i.e. the regulator, operator and employees. Considering the functional responsibilities of each tier, the focus of capacity building will be varied.

a) Regulator (Inter-Provincial bus services: National Transport Commission, Intra-Provincial bus services: Western Province Road and Passenger Transport Authority)
b) Operator (Public bus services: Sri Lanka Transport Board, Private bus services: Private bus operators)
c) Bus Drivers and Conductors

### 5.10.2 Urban Transport System Development Programme (2) for the Alleviation of Traffic Congestion

#### (1) Ring Road Network

At present, due to the lack of circumferential roads, cars cannot avoid traffic congestion in the centre of Colombo. If ring roads are developed, they will provide detour routes for traffic of which the destinations are not in the centre of Colombo.

Three ring roads are proposed which will enhance the accessibility between the suburbs and the centre of Colombo and distribute the heavy traffic volume especially on major arterial roads in the CMC. These ring roads are basically developed with the existing roads such as B class and other minor arterial roads managed by RDA and WPRDA.

The estimated traffic demand on the Middle Ring Road is about 50,000 pcu per day for both directions. In some sections, the traffic volume would reach about 60,000 pcu. Those for the Western Ring Road and the Eastern Ring Road would amount to around 40,000 pcu per day for both directions.

### (2) East – West Arterial Road Development in Eastern Part of the Suburban Area

The road network in the suburban areas is very limited, thus traffic flows are concentrated on the major arterial roads and chronic traffic congestion has been brought about. To accommodate the traffic demand, it is proposed to develop east-west arterial roads in suburban areas. The east-west roads would be a part of the access roads to monorail stations. The traffic demand on these east-west arterial roads was estimated in the range between 50,000 and 60,000 pcu per day for both direction. Traffic volume of Malabe-Battramulla Road in the Battaramulla area would exceed 100,000 pcu per day for both directions.

### (3) Expressway Network Development

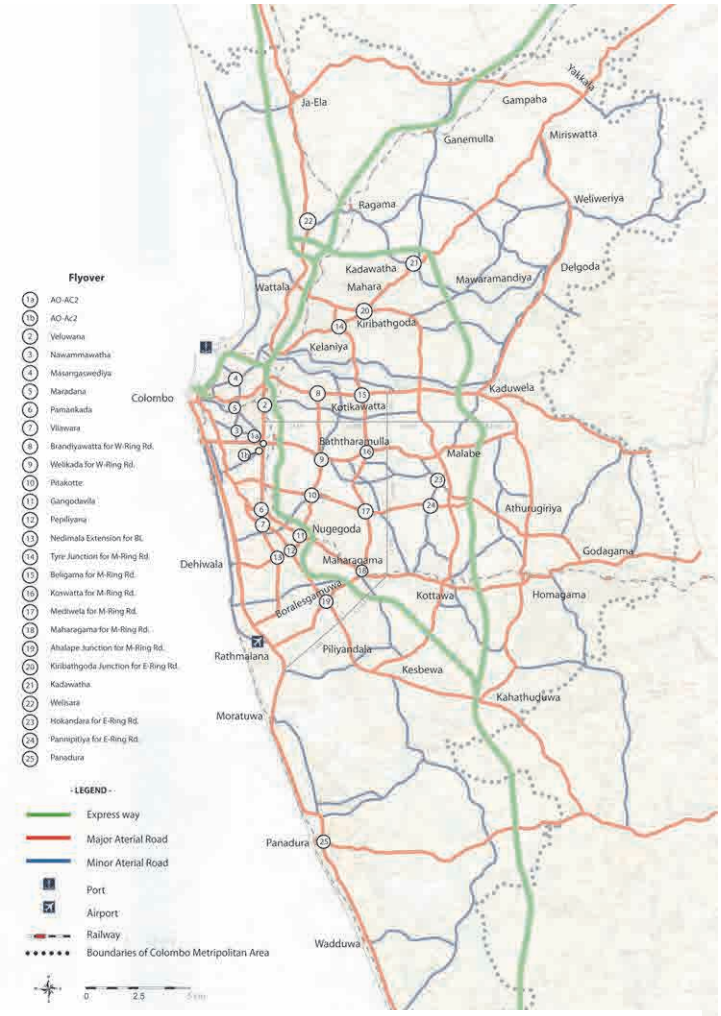
Under the current condition of the expressway network development, it is proposed to connect the CKE with the new urban expressway through the planned elevated road via Kirillapone up to the Southern Expressway.

Another urban expressway development option is the connection between Pore and Borella. This expressway should be carefully examined because the route is competitive with the planned Monorail Malabe - Borella - Fort line. It could reduce passenger demand on the Monorail.

When the two urban expressway options are compared, first one of proposed urban expressway is better from the viewpoint of network coverage since it would cover a wider area in the metropolitan area.

### (4) Flyover Development

In urbanised areas, traffic congestion is often observed at intersections due to insufficient traffic capacity which makes the intersections bottlenecks. Construction of a flyover provides grade separation of traffic flows and increases traffic capacity at intersections. It is proposed to develop flyovers at major intersections on the major arterial radial roads from the suburbs to the city centre as indicated in Figure 5.10.2.




Source: CoMTrans Study Team

**Figure 5.10.2 Flyover Development Plan**

However the development of flyovers in the city centre should be carefully examined from an

aesthetics point of view. If area-wide traffic signal control could substitute for grade separation, it might be better for aesthetics in the city centre. In line with the idea for reducing the traffic load at saturated intersections, if some road links, such as short cuts, could alleviate traffic congestion at the intersections, addition of those links shall be studied, such as the short-cut route for the crossing of Beira Lake which have been proposed originally under the Beira Lake Restoration Project Master Plan (1995).

**(5) Port Access Road**

Development of a port access road as a part of the expressway is proposed to deal with truck traffic in the port and surrounding area. If port access is provided, then it would reduce heavy vehicle traffic flows on the arterial road network in the vicinity of Colombo port. If space inside the port can be used for expressway road development, the road will be connected with CKE.

**(6) Traffic Control**

1) Traffic Signal Control Improvement

Traffic Signal Control Improvement includes Development of a Central Control Centre for traffic signals and Installation /Improvement of signalisation for intersections (including Controllers)

2) Traffic Information System

A Traffic Information System includes the installation of CCTV, the development of a system to detect sudden events (traffic volume, travel time, accidents etc.), and the development of a system for providing traffic information on the web.

3) Parking Information System

A Parking Information System includes the development of a system for collection of parking full/empty information and the development of a system for providing information.

**(7) Transport Demand Management**

In order to materialise the modal shift from private modes to public transport, it is necessary to apply a Transport Demand Management scheme. Policy measures for TDM are as follows;

- Fuel tax increase,
- Electronic Road Pricing (ERP),
- Peak hour shift by mobility management and regulation applications,
- Park and Ride (P&R) with incentive scheme and
- Parking pricing policy,
- HOV (High Occupancy Vehicle) lane etc.

**(4) Construction of Railway Freight Line**

The development of a freight railway line has been planned to carry bulk products, like oil, and

containers up to Dompe by the private sector. It would alleviate traffic congestion in the northern part of Colombo where many trucks carry cargo on the roads.


Source: CoMTrans Study Team

**Figure 5.10.3 Dompe Line Development Plan**

### 5.10.3 Urban Transport System Development Programme (3) for Reduction of Air Pollutants/Traffic Noise and Promotion of Health

#### (1) Establishment of Environmental Management Scheme

Environmental pollution could be avoided by continuous environmental management, implementing pollution control programmes that are evaluated and, if necessary, upgraded on a project cycle basis.

This requires an environmental management scheme which consists of environmental monitoring for evaluation and environmental impact simulation based on a regularly updated emission source inventory for planning. To establish and develop the scheme, capacity building for technical staffs and reinforcement of institution/capacity for policy makers in the scheme should be undertaken.

#### (2) Establishment and Enhancement of Air Pollutant Emission Standards for Newly Manufactured and Imported Vehicles

Establishing and the enhancement of emission standards for newly manufactured vehicles and for vehicles newly imported to the country is the most effective way to reduce vehicle emissions. Sri Lanka has adopted the emission standards established by the European Union and other equivalent standards for these vehicles since 2003. Different standards have been applied for each type of vehicle (Light-Duty Vehicles, Heavy-Duty vehicles, etc.). However, these standards are not effectively enforced and there has been no major enhancement to these standards. For example, emission standards for New – Light-Duty Vehicles have remained as EURO 1 since 2003. Thus, there should be a mechanism to review the existing standards applied for each type of vehicle and to update these standards in a practical manner.

#### (3) Enhancement of Vehicle Inspection and Maintenance Programmes

Reduction of air pollutants from vehicles is a primary measure to deal with air pollution problems caused by automobiles. Sri Lanka has an air emission reduction strategy mainly implemented and managed by the Department of Motor Traffic and Air Resource Management Centre (Air Mac). In the strategy, a Vehicle Emission Testing (VET) programme was officially commenced in November, 2008 as a Pilot Project in the Western Province. This programme requires that all vehicles check their emission to ascertain whether they are within the vehicle emission standards.

The Department of Motor Traffic has mandated that the certificate showing that the vehicle passed the emission testing must be submitted in order to renew the annual license for the vehicle. From 2008 to 2012, approximately seven million vehicles have been tested and approximately 15% of the tested vehicles failed to meet the standard. However, there has been a discussion that this programme has received many complaints, in that vehicles with serious emission issues are also given the green light. Thus, in order to improve this programme, the following aspects must be enhanced;

- Capacity building for VET centre technicians,
- Improvement of inspection and maintenance facilities,
- Audit the performance of inspectors, and
- Increase awareness of the public.

**(4) Low Sulphur Diesel Programme**

In order to reduce PM10 emission, a predominant air pollution factor, and to ensure compatibility with advanced diesel emission control systems such as trap oxidisers and oxidation catalysts, sulphur content in diesel should be kept at a low level. In Sri Lanka, steps were taken in 2007 to reduce the maximum sulphur content in diesel from 3,000 ppm to 500 ppm, however, this standard has not been met due to the inability of the refinery in Sri Lanka. In order to meet the standard for sulphur content of 500 ppm practically and further improve the fuel quality, it is fundamental to establish a mechanism to collaborate with the refinery sector to supply low sulphur diesel fuel.

**(5) Promotion of Natural Gas Vehicles**

The promotion of natural gas vehicles could reduce air pollutants like PM10 significantly. Although a natural gas vehicle requires its own engine configuration, gasoline vehicles have the same fuel combustion mode and can be converted to a dedicated natural gas type while diesel vehicles can be converted to dual fuel type (uses diesel and natural gas at the same time), by attaching additional equipment such as a storage tank. Natural gas vehicle promotion also requires sufficient refuelling stations, specially trained staff and equipped garages as its infrastructure.

**(6) Promotion of Hybrid Cars and Electric Vehicles**

Hybrid cars and electric vehicles are less polluting vehicles, thus it is recommended to promote these types of vehicles by giving tax incentives. Regarding the rate of reduction of taxes, a detailed study should be conducted to estimate economic benefits from these types of vehicles.

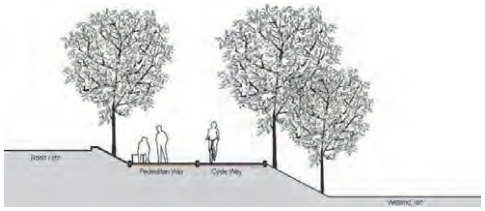
**(7) Promotion of Walking and Bicycle Use for Energy Saving and to Promote Health**

Walking and bicycling are non-motorised modes of transport without consuming fuel; thus, these modes are considered as environmentally friendly means of transport. Recently, walking and bicycling has become popular since walking and bicycling are good for health.

It is proposed to develop a pedestrian network as well as a pedestrian/bicycle network as shown in Figure 5.10.6. The network connects parks and Beira lake in the city centre and it is located along the wetland, coastal line and Kelani river.

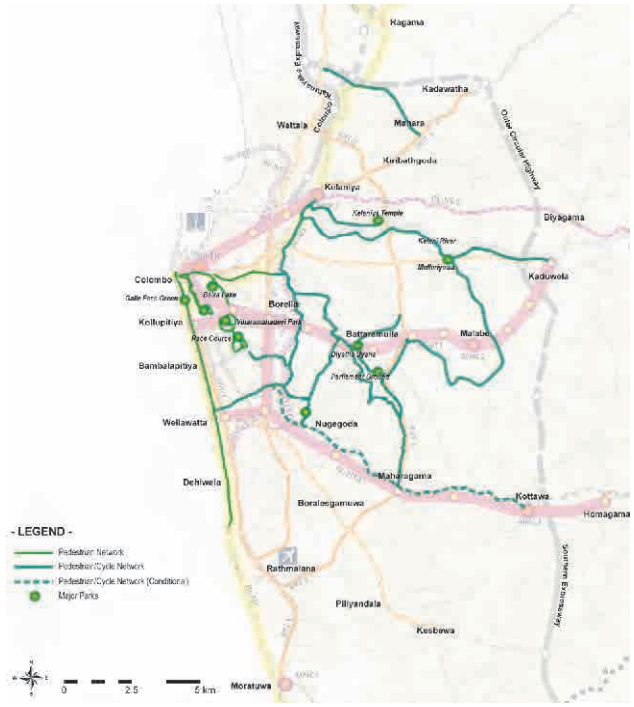
Source: CoMTrans Study Team

**Figure 5.10.4 Example of Pedestrian Paths in Colombo**



Source: CoMTrans Study Team

**Figure 5.10.5 Typical Cross Section of Pedestrian and Cycle Way**




Source: CoMTrans Study Team

**Figure 5.10.6 Pedestrian Path and Bicycle Road Network**

### (8) Provision of Sidewalk for Urban Roads

The provision of sidewalks is required to secure sufficient space for walking trips, which is a mode of access to public transport for urban residents and workers as well as tourists for creating more attractive urban areas.

The current cross section of urban roads is still insufficient (see photo below). For example, there is no distinction between the shoulder and sidewalk on High Level Road. This is probably because the sidewalk was not included in the design standard. Therefore, it is proposed to

establish a road standard for urban areas to create sufficient sidewalks.

### 5.10.4 Urban Transport System Development Programme (4) for Reduction of Fatalities and Injuries in Traffic Accidents and Improvement of Security

Countermeasures for traffic accidents in the Western Province are proposed as follows;

#### (1) Education on Traffic Safety

Most traffic accidents are attributable to human error, in fact, most traffic accidents on ordinary roads are caused by carelessness and violation of traffic rules. Traffic safety education programmes for both drivers and pupils at schools are effective measures to improve traffic safety.

#### (2) Rehabilitation and Installation of Traffic Signal System

A considerable number of traffic lights are out of order and need repair work in order to function properly. In addition, further installation of traffic signals should be undertaken, in particular, outside of CMC, where the number of traffic signals installed is very limited. More road sections should also be signalised for the safety of crossing pedestrians.

#### (3) Rehabilitation of Railway Signal System

Railway signals do not function properly at present. Due to improper railway signal systems, trains are often delayed or cancelled. The old signal system is not able to protect trains automatically and thus there are high risks for train collision. Rehabilitation of railway signals is a task urgently needed to improve railway safety.

#### (4) Analysis on Causes of Traffic Accidents

A traffic accident record reporting system should be developed and an accident database should be established as a part of an urban transport database system for analyses of the causes of traffic accidents.

#### (5) Provision of Sidewalks and Pedestrian Crossings

Many traffic accidents involve pedestrians and one reason for many pedestrians being involved in those accidents is lack of pedestrian facilities. Sidewalks and pedestrian facilities should be provided to reduce traffic accidents on the roads.

#### (6) Establishment of Urban Road Design Standard for Sidewalks

As recommended earlier, an urban road design standard should be established and sidewalks should be clearly indicated in the standard cross section for urban roads.

# 5.11 CoMTrans Urban Transport Master Plan

The proposed projects in the CoMTrans are listed in Tables 5.11.1 to 5.11.4 by Urban Transport System Development Program. Figure 5.11.1 illustrates the CoMTrans projects on the map in CMA. Figure 5.11.2 depicts the relationship between urban structure and urban transport system.

**Table 5.11.1 Projects in Program (1) for Promotion of Public Transport Use**

| Sector | Projects | | | Outline of the Project | Length (km) | Phase | | |
|---|---|---|---|---|---|---|---|---|
| | ID | Name | | | | Short- | Intermediate | Long- |
| Rail-way | RL-M1 | Modernization of Existing Railway | Coastal Line<br>Colombo Fort - Karutara South<br>Modernization of Existing Railway<br>Construction of New Railway Line | Replacing signalling system (new interlocking and train protection systems) | 42.5 | ✔ | | |
| | | | | Electrification (double track) | 42.5 | | ✔ | |
| | | | | Procurement of new train | 42.5 | | ✔ | |
| | | | | Construction third line and track layout improvement | 42.5 | | | ✔ |
| | RL-M2 | | Main Line<br>Colombo Fort – Veyangoda<br>Modernization of Existing Railway | Replacing signalling system (New interlocking and train protection systems),<br>Upgrade existing track (double track) | 37.6 | ✔ | | |
| | | | | Electrification (double track) | 37.6 | | ✔ | |
| | | | | Procurement of new train | 37.6 | | ✔ | |
| | RL-M3 | | Puttalam Line<br>Modernization of Existing Railway<br>Ragama - Negombo | Replacing signalling system (New interlocking and train protection systems)<br>Electrification<br>Track layout improvement<br>Procurement of new train | 23.3 | | ✔ | |
| | RL-M5 | | Main Line Modernization of Existing Railway (Colombo Fort – Maradana) | Improvement of train operation | 4.0 | ✔ | | |
| | RL-NR1 | New Railway Line | Airport Connection<br>Construction of New Railway Line<br>Katunayaka South - Airport Terminal | Extension of existing track to airport terminal<br>Replacing signalling system<br>Rehabilitation of existing single track<br>Electrification | 2.2 | | ✔ | |
| | RL-NT1 | New Transit System | Monorail [Phase 1] | Malabe – Kotahena<br>Town Hall - Kollupitiya | 23.0 | ✔ | | |
| | RL-NT2 | | Monorail [Phase 2-1] | Kotahena – Kelaniya<br>Malabe - Kaduwela | 11.9 | | ✔ | |
| | RL-NT3 | | Monorail [Phase 2-2] | Additional New rolling stock | | | | ✔ |
| | RL-NT4 | | Monorail [High Level Road] | Borella - Homagama | 19.7 | | ✔ | |
| | RL-NT5 | | Connecting line of Monorail [HL] and Coastal Line | Siebel - Wellawatta | 3.4 | | | ✔ |
| | RL-SF1 | Station Facility Improvement | | Major Station: Fort, Maradana,<br>Main Station: Negombo, Gampaha, Ragama, Kottawa, Moratuwa,<br>Sub-stations:<br>Main Line (Demadagoda, Kelaniya, Genemulla), Coastal Line (Secretariat, Kollupitiya, Bumbalapitiya, Dehiwala, Rathmalana), Puttalam Line (Kandana, Ja-Ela, Seeduwa, Katunayaka South), KV-Line (Baseline, Narahenpita, Nugegoda, Maharagama, Mlapalla) | | ✔ | | |
| | RL-SP1 | Spare Parts, Coach Renewals | | | | ✔ | ✔ | ✔ |

## Table 5.11.1 Projects in Program (1) for Promotion of Public Transport Use - continued

| Sector | Projects | | | Outline of the Project | Length (km) | Phase | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Short- | Intermediate | Long- |
| Road | RD-RN1 | Provision of Road Space for introducing BRT | Galle Road Widening for BRT Corridor | Widening of Galle Road to secure road space for future development of BRT | 14.8 | | ✔ | |
| | RD-RN2 | Securing Space for Future Development of BRT | Development of Middle Ring Road for BRT Corridor | Development of Middle Ring Road to secure road space for future development of BRT and connect between the suburb areas around CMC | 30.2 | | ✔ | |
| | RD-RN3 | Provision of Alternate Road for introducing BRT | Baseline Road Extension | Extension of Baseline Road to provide alternate road for private passenger cars and to utilise Galle road for BRT | 6.2 | | ✔ | |
| | RD-RN4 | | Marine Drive Extension | Extension of Marine Drive to provide alternate road for private passenger cars and utilise Galle road for BRT | 5.3 | ✔ | | |
| | RD-RN9 | Support on feeder services for railway and monorail | Access Roads to Railway/Monorail Station | Development of the connection between each station and arterial roads | 89.1 | | ✔ | ✔ |
| Bus/ BRT | BRT-1 | BRT Instalment | Phase-1 | Route-1: Fort - Moratuwa (20.6km)<br>Route-2 : Fort - Siebel Avenue (9.9km)<br>Route-3: Fort - Kadawatha (16.5km)<br>Route-4 Kiribathgoda-Wellawatta (17.0km) | 45.7 | ✔ | | |
| | BRT-2 | | Phase-2 | Route-5 Borella-Moratuwa (17.7km)<br>Route-6 Wattala-Maharagama (23.5km)<br>Route-7 Battaramulla Moratuwa (20.1km) | 38.8 | | ✔ | ✔ |
| | BT-1 | Improvement of Bus Terminals | | | | ✔ | | |
| | BT-2 | | | | | ✔ | | |
| | B-ST1 | Improvement of Bus Stop | | | | ✔ | | |
| | B-CD1 | Capacity Development | | | | ✔ | | |
| Traffic Management | TM-BL1 | Bus Location System for BRT + PTPS | BRT Section/Phase1 | Introduction section of BRT(Phase1) | | ✔ | | |
| | TM-BL2 | | BRT Section/Phase2 | Introduction section of BRT(Phase2) | | | ✔ | |
| | TM-BL3 | Bus Location System for Buses | | whole of the Colombo Metropolitan Area | | | | ✔ |
| Transport Interchange Facility | MmTH | Multi-modal Transport Hub | Fort/Pettah MmTH | Monorail, Rail, Bus, BRT terminals with Station Plaza | | ✔ | | |
| | MMC1 | Multi-modal Centre | Kelaniya MMC | | | ✔ | | |
| | MMC2 | | Malabe MMC | | | ✔ | | |
| | MMC3 | | Makumbra MMC | | | ✔ | | |
| | MMC4 | | Moratuwa MMC | | | ✔ | | |
| | MMC5 | Park & Ride Facility | | | | ✔ | | |

## Table 5.11.2 Projects in Programme (2) for Alleviation of Traffic Congestion

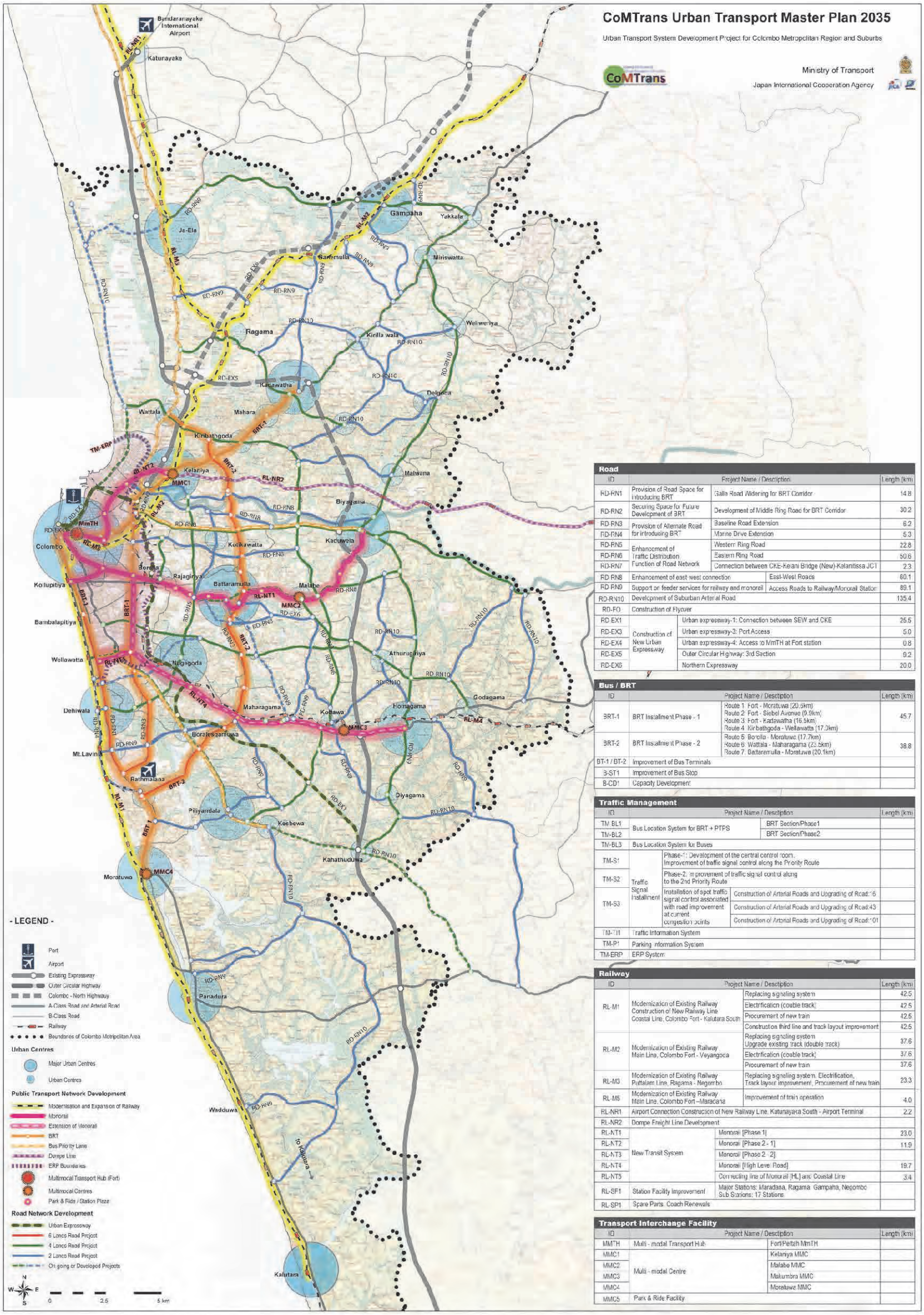
| Sector | Projects | | | Outline of the Project | Length (km) | Phase | | |
|---|---|---|---|---|---|---|---|---|
| | ID | Name | | | | Short | Intermediate | Long |
| Road | RD-RN5 | Enhancement of Traffic Distribution Function of Road Network | Western Ring Road | Development of the Ring Road by making most use of the existing roads for distributing traffic flows between the suburb areas and CBD. On-going projects are on B232. | 22.8 | ✔ | ✔ | |
| | RD-RN6 | | Eastern Ring Road | Development of the Ring Road by making most use of the existing roads for distributing traffic flows between the suburb areas and CBD. | 50.6 | | ✔ | ✔ |
| | RD-RN7 | | Connection between CKE - Kelani Bridge (New) - KelanitissaJCT | JICA Loan, On-going project. This road is planned as alternative route with elevated structure for heavy traffic on existing bridge. End of this connection is set on an existing road with an interchange in an urban area, it is a concern that increasing traffic volume will concentrate on that point in the future. | 2.3 | ✔ | | |
| | RD-RN8 | Enhancement of east-west connection | East - West Roads | Development of arterial road utilising existing roads in the east-west direction On-going projects and existing plans are on B231, B435, B241 and AB10. | 60.1 | | ✔ | |
| | RD-RN10 | Development of Suburban Arterial Road | | Development of the connection between each rural road and Major Road | 135.4 | | | ✔ |
| | RD-FO | Construction of Flyover | | 25 identified locations | | ✔ | ✔ | |
| | RD-EX1 | Construction of New Urban Expressway | Urban expressway-1: Connection between SEW and CKE | Development of urban expressway to connect CKE and SEW through urban area to avoid traffic concentration at one point in urban area | 25.5 | | ✔ | ✔ |
| | RD-EX3 | Construction of New Urban Expressway | Urban expressway-3: Port Access | Between the end of CKE and Colombo Port | 5.0 | ✔ | | |
| | RD-EX4 | Construction of New Urban Expressway | Urban expressway-4: Access to MmTH at Fort station | Development of an urban expressway to provide direct access from Malabe to Borella to deal with the anticipated increasing car traffic demand. | 0.8 | ✔ | | |
| | RD-EX5 | Construction of New Urban Expressway | Outer Circular Highway: 3rd Section | Financed by China Exim Bank, On-going project. A part of OCH | 9.2 | ✔ | | |
| | RD-EX6 | Construction of New Urban Expressway | Northern Expressway | Inter-regional expressway to connect Colombo and Kandy | 20.0 | ✔ | | |
| Traffic Management | TM-S1 | Traffic Signal Instalment | Phase-1 Development of the central control room. Improvement of traffic signal control along The Priority Route | Central control room Improvement of Signal (29) Installation of signal (25) (Change exist Roundabout and No-Signal) | | ✔ | | |
| | TM-S2 | | Phase-2 Improvement of traffic signal control along to The 2nd Priority Route | Improvement of Signal (37) Installation of signal (93) (Change exist Roundabout and No-Signal) | | | ✔ | |
| | TM-S3 | | Installation of spot traffic signal control associated with road improvement at current congestion points | Construction of Arterial Roads and Upgrading of Road: 16 | | ✔ | | |
| | | | | Construction of Arterial Roads and Upgrading of Road: 43 | | | ✔ | |
| | | | | Construction of Arterial Roads and Upgrading of Road: 101 | | | | ✔ |
| | TM-TI1 | Traffic Information System | | whole of the Colombo Metropolitan Area | | | | ✔ |
| | TM-P1 | Parking Information System | | whole of the Colombo Metropolitan Area, and R+R Parking | | | | ✔ |
| | TM-ERP | ERP System | | whole of the CMC boundary | | | ✔ | |
| Railway | RL-NR2 | Dompe Freight Line Development | | Construction of Dompe railway line | | | ✔ | |

## Table 5.11.3 Projects in Programme (3) for Reduction of Air Pollutants/Traffic Noise and Promotion of Health

| Sector | Projects | | | Outline of the Project | Length (km) | Phase | | |
|---|---|---|---|---|---|---|---|---|
| | ID | Name | | | | Short | Intermediate | Long |
| Railway | RL-NR2 | New Railway Line | Dompe Line<br>Construction of New Railway Line | Kelaniya - Dompe<br>New Construction of railway with double track<br>Mainly cargo train and some passenger train<br>Non-electrification | 22.8 | | | ✔ |
| Environmental | EN-01 | Air Emission Standard for Vehicles | | | | ✔ | | |
| | EN-02 | Vehicle Inspection and Maintenance Programmes | | | | ✔ | | |
| | EN-03 | Low Sulphur Diesel Programme | | | | ✔ | | |
| | EN-04 | Promotion of Natural Gas Vehicles | | | | ✔ | | |
| | EN-05 | Promotion of Hybrid Cars and Electric Vehicles | | | | ✔ | ✔ | |
| | EN-06 | Promotion of Walking and Bicycles | | | | ✔ | | |

## Table 5.11.4 Projects in Program (4) for Reduction of Transport Accidents and Improvement of Security

| Sector | Projects | | Outline of the Project | Length (km) | Phase | | |
|---|---|---|---|---|---|---|---|
| | ID | Name | | | Short | Intermediate | Long |
| Safety | SF-01 | Traffic Safety Education | Traffic safety education for drivers and school children | | ✔ | | |
| | SF-02 | Rehabilitation and Installation of Traffic Signal System | Repair and new installation of traffic signals | | ✔ | ✔ | |
| | SF-03 | Rehabilitation of Railway Signal System | Repair of railway signal system | | ✔ | | |
| | SF-04 | Provision of Sidewalks and Pedestrian Crossings | Provision of sidewalk along major arterial road and minor arterial roads | | ✔ | | |
| | SF-05 | Establishment of Urban Road Design Standard for Sidewalks | Establish design standard of urban roads including sidewalk | | ✔ | | |




**Road**

| ID | Project Name / Description | | Length (km) |
|---|---|---|---|
| RD-RN1 | Provision of Road Space for Introducing BRT | Galle Road Widening for BRT Corridor | 14.8 |
| RD-RN2 | Securing Space for Future Development of BRT | Development of Middle Ring Road for BRT Corridor | 30.2 |
| RD-RN3 | Provision of Alternate Road for Introducing BRT | Baseline Road Extension | 6.2 |
| RD-RN4 | | Marine Drive Extension | 5.3 |
| RD-RN5 | Enhancement of Traffic Distribution Function of Road Network | Western Ring Road | 22.8 |
| RD-RN6 | | Eastern Ring Road | 50.6 |
| RD-RN7 | | Connection between CKE-Kerani Bridge (New)-Kelanitissa JCT | 2.3 |
| RD-RN8 | Enhancement of east west connection | East-West Roads | 60.1 |
| RD-RN9 | Support on feeder services for railway and monorail | Access Roads to Railway/Monorail Station | 89.1 |
| RD-RN10 | Development of Suburban Arterial Road | | 135.4 |
| RD-FO | Construction of Flyover | | |
| RD-EX1 | Construction of New Urban Expressway | Urban expressway-1: Connection between SEW and CKE | 25.5 |
| RD-EX3 | | Urban expressway-3: Port Access | 5.0 |
| RD-EX4 | | Urban expressway-4: Access to MmTH at Fort station | 0.8 |
| RD-EX5 | | Outer Circular Highway: 3rd Section | 9.2 |
| RD-EX6 | | Northern Expressway | 20.0 |

**Bus / BRT**

| ID | Project Name / Description | | Length (km) |
|---|---|---|---|
| BRT-1 | BRT Installment Phase - 1 | Route 1: Fort - Moratuwa (20.5km)<br>Route 2: Fort - Slobel Avenue (9.9km)<br>Route 3: Fort - Kadawatha (16.5km)<br>Route 4: Kiribathgoda - Wellawatta (17.0km) | 45.7 |
| BRT-2 | BRT Installment Phase - 2 | Route 5: Borella - Moratuwa (17.7km)<br>Route 6: Wattala - Maharagama (23.5km)<br>Route 7: Battaramulla - Moratuwa (20.1km) | 38.8 |
| BT-1 / BT-2 | Improvement of Bus Terminals | | |
| B-ST1 | Improvement of Bus Stop | | |
| B-CD1 | Capacity Development | | |

**Traffic Management**

| ID | Project Name / Description | | Length (km) |
|---|---|---|---|
| TM-BL1 | Bus Location System for BRT + PTPS | BRT Section/Phase1 | |
| TM-BL2 | | BRT Section/Phase2 | |
| TM-BL3 | Bus Location System for Buses | | |
| TM-S1 | Traffic Signal Installment | Phase-1: Development of the central control room.<br>Improvement of traffic signal control along the Priority Route | |
| TM-S2 | | Phase-2: Improvement of traffic signal control along to the 2nd Priority Route | |
| TM-S3 | | Installation of spot traffic signal control associated with road improvement at current congestion points: Construction of Arterial Roads and Upgrading of Road:16 | |
| | | Construction of Arterial Roads and Upgrading of Road:43 | |
| | | Construction of Arterial Roads and Upgrading of Road:101 | |
| TM-TI | Traffic Information System | | |
| TM-PI | Parking Information System | | |
| TM-ERP | ERP System | | |

**Railway**

| ID | Project Name / Description | | Length (km) |
|---|---|---|---|
| RL-M1 | Modernization of Existing Railway Construction of New Railway Line Coastal Line, Colombo Fort - Kalutara South | Replacing signaling system | 42.5 |
| | | Electrification (couble track) | 42.5 |
| | | Procurement of new train | 42.5 |
| | | Construction third line and track layout improvement | 42.5 |
| RL-M2 | Modernization of Existing Railway Main Line, Colombo Fort - Veyangoda | Replacing signaling system<br>Upgrade existing track (double track) | 37.6 |
| | | Electrification (couble track) | 37.6 |
| | | Procurement of new train | 37.6 |
| RL-M3 | Modernization of Existing Railway Puttalam Line, Ragama - Negombo | Replacing signaling system, Electrification, Track layout improvement, Procurement of new train | 23.3 |
| RL-M5 | Modernization of Existing Railway Main Line, Colombo Fort – Maradana | Improvement of train operation | 4.0 |
| RL-NR1 | Airport Connection Construction of New Railway Line, Katunayaka South - Airport Terminal | | 2.2 |
| RL-NR2 | Dompe Freight Line Development | | |
| RL-NT1 | New Transit System | Monorail [Phase 1] | 23.0 |
| RL-NT2 | | Monorail [Phase 2 - 1] | 11.9 |
| RL-NT3 | | Monorail [Phase 2 -2] | |
| RL-NT4 | | Monorail [High Level Road] | 19.7 |
| RL-NT5 | | Connecting line of Monorail [HL] and Coastal Line | 3.4 |
| RL-SF1 | Station Facility Improvement | Major Stations: Maradana, Ragama, Gampaha, Negombo<br>Sub Stations: 17 Stations | |
| RL-SP1 | Spare Parts: Coach Renewals | | |

**Transport Interchange Facility**

| ID | Project Name / Description | | Length (km) |
|---|---|---|---|
| MMTH | Multi - modal Transport Hub | Fort/Pettah MmTH | |
| MMC1 | Multi - modal Centre | Kelaniya MMC | |
| MMC2 | | Malabe MMC | |
| MMC3 | | Makumbra MMC | |
| MMC4 | | Moratuwa MMC | |
| MMC5 | Park & Ride Facility | | |

**Figure 5.11.1 CoMTrans Urban Transport Master Plan 2035**

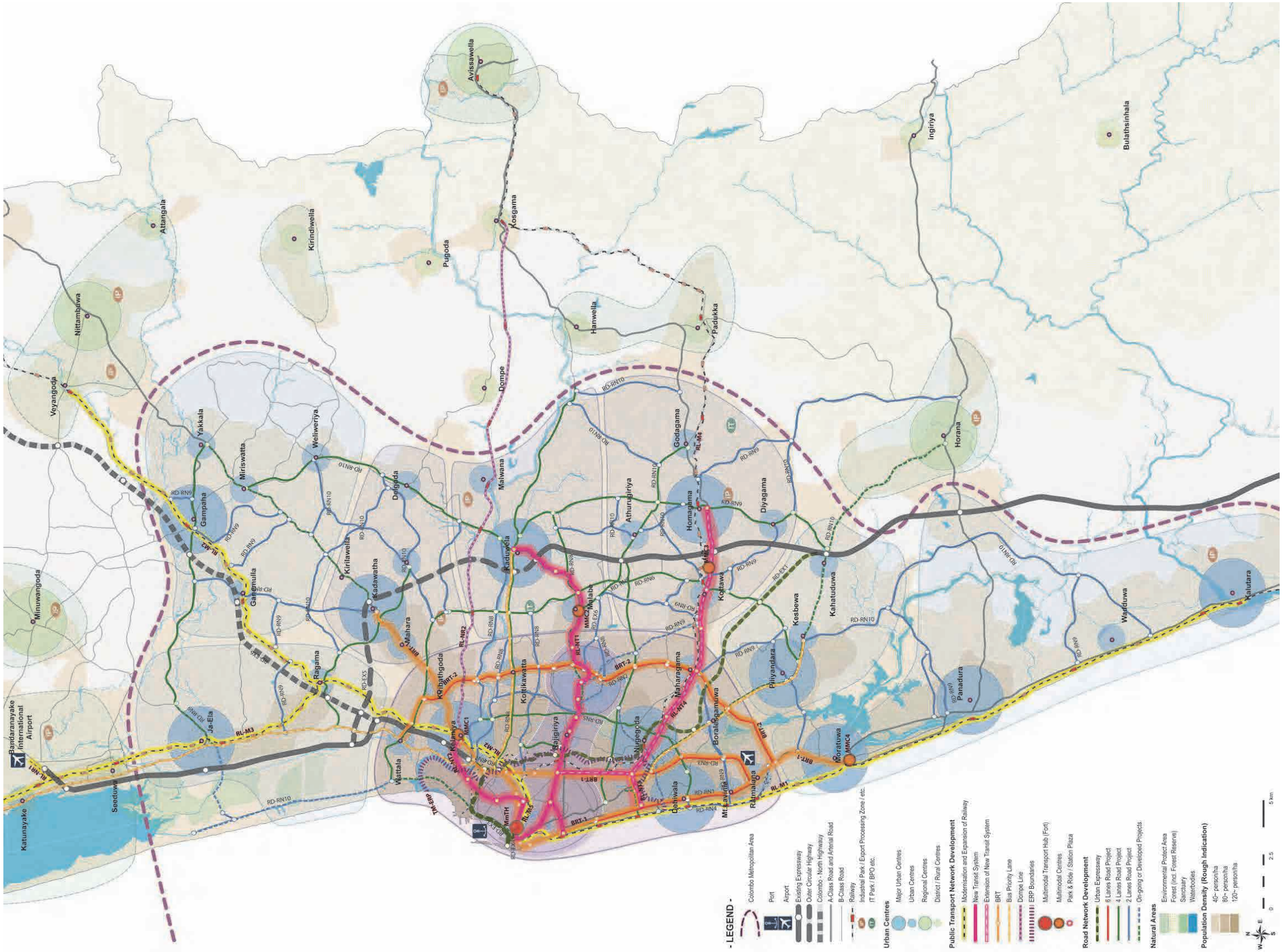



**Figure 5.11.2 CoMTrans Urban Transport Master Plan and Urban Structure in CMA**

# CHAPTER 6 Implementation Plan and Institutional Arrangement

## 6.1 Implementation Plan for CoMTrans Master Plan

It is, in principal, necessary to undertake various analytical steps with regard to the "project life cycle" as defined by the GLK in order to estimate the impact of the "CoMTrans Master Plan" implementation on the public investment budget.

However, since the CoMTrans Master Plan is a transport network development plan, in which all projects are inherently inter-linked, it suffices to analyse accumulated required investment totals over the three planning horizons (short, medium and long-term), the total planning period (2015-2035) and investigate how these totals compare to the Government's policy targets established for public investments in the transport sector.

### 6.1.1 Total Investment Cost Required for CoMTrans Master Plan Implementation

Table 6.1.1 shows the needed investment volume for CoMTrans realisation without assuming any particular financing model.

- The total investment volume over the planning period from 2015 to 2035 is estimated at Rs 2,780,900 million, of this 59% of the total is for net investments and about 41% for implied O&M cost.
- The distribution of the investment and O&M combined cost components is estimated at 35% over the short-term, 31% over the intermediate term and the balance of 34% over the long-term.
- This total volume may exceed the capacity to finance at a 100% self-financing rate from public budget and envisaged public investment resources.

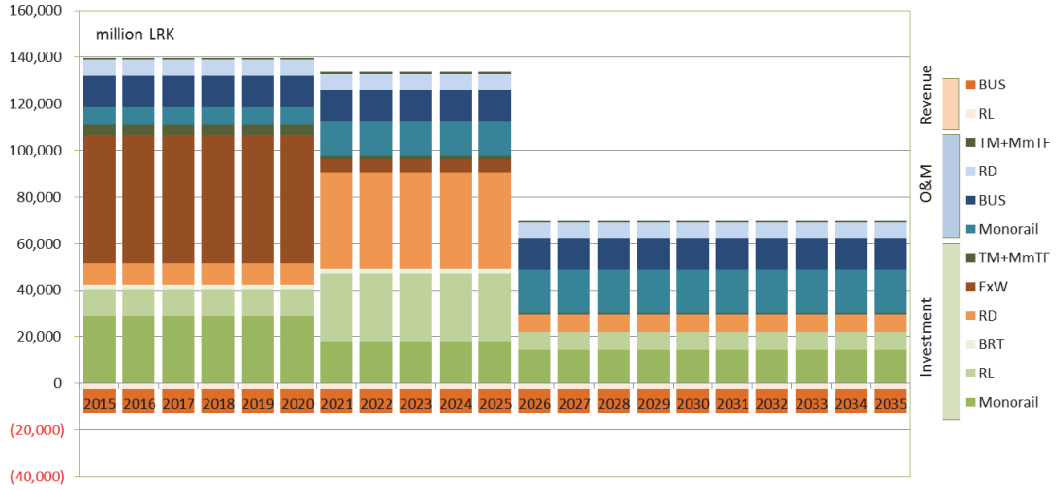
Figure 6.1.1 depicts the estimated annual requirement flow for investment and O&M cost by each transport mode. If there are larger portion of costs of investment in the short-term, then the share of O&M costs becomes larger in the intermediate and long-term.

## Table 6.1.1 Total Investment Requirements for the Entire CoMTrans Master Plan Realisation

*million LKR*

| Base Case | | | Short 2015-2020 6 years | Intermediate 2021-2025 5 years | Long 2026-2035 10 years | Total 2015-2035 21 years | Note |
|---|---|---|---|---|---|---|---|
| Cost | **Grand Total** | | **978,300** | **862,500** | **940,000** | **2,780,900** | |
| | Investment | **Total** | **741,100** | **598,100** | **300,900** | **1,640,100** | |
| | | Monorail | 173,800 | 89,800 | 144,600 | 408,200 | |
| | | Railway | 67,800 | 146,400 | 74,500 | 288,700 | |
| | | BRT | 12,300 | 9,300 | 0 | 21,700 | |
| | | Bus | 0 | 0 | 0 | 0 | |
| | | Road | 462,700 | 345,100 | 74,300 | 882,100 | |
| | | *Expressway* | *407,100* | *138,300* | *0* | *545,400* | |
| | | *Other Road* | *55,700* | *206,700* | *74,300* | *336,700* | |
| | | Traffic Management | 2,800 | 7,500 | 7,500 | 17,700 | |
| | | Multi-modal Transit Facility | 21,700 | 0 | 0 | 21,700 | |
| | O&M | **Total** | **237,200** | **264,400** | **639,200** | **1,140,800** | |
| | | Monorail | 52,100 | 65,900 | 204,100 | 322,100 | *5% of Investemnt Cost* |
| | | Railway | 46,100 | 75,000 | 187,300 | 308,500 | |
| | | *Additional Investment* | *20,300* | *53,500* | *144,300* | *218,200* | *5% of Investemnt Cost* |
| | | *Existing Infrastructure* | *25,800* | *21,500* | *43,000* | *90,300* | *50% of current National OM cost* |
| | | BRT | 10,300 | 14,100 | 28,300 | 52,700 | *13% of Investment Cost* |
| | | Bus | 81,000 | 67,500 | 135,000 | 283,500 | *50% of current National OM cost* |
| | | Road | 43,500 | 38,100 | 76,200 | 157,800 | |
| | | *Additional Investment* | *0* | *200* | *400* | *600* | *4.3 mil. LKR/km/year* |
| | | *Existing Infrastructure* | *40,700* | *33,900* | *67,900* | *142,500* | *Currnt OM cost for AB roads* |
| | | *Expressway* | *2,800* | *4,000* | *7,900* | *14,700* | *12.6 mil.LKR/km/year* |
| | | Traffic Management | 200 | 500 | 1,800 | 2,500 | *1% of Investment Cost* |
| | | Multi-modal Transit Facility | 3,900 | 3,300 | 6,500 | 13,700 | *3% of Inevestment Cost* |
| Revenue | **Total** | | **76,800** | **64,000** | **128,000** | **268,800** | |
| | Monorail | | 0 | 0 | 0 | 0 | *TBD* |
| | Railway | | 13,800 | 11,500 | 23,000 | 48,300 | *50% of current Natinal Revenue* |
| | BRT | | 0 | 0 | 0 | 0 | *TBD* |
| | Bus | | 63,000 | 52,500 | 105,000 | 220,500 | *50% of current Natinal Revenue* |

Source: CoMTrans Estimate




Source: CoMtrans Estimate

**Figure 6.1.1 Investment Cost, O&M Cost and Revenue of CoMTrans Master Plan Projects**

### 6.1.2 Government Budget Requirement to Implement CoMTrans Master Plan

Table 6.1.2 summarises the potential public budget impact if a PPP financing scheme is assumed for the expressways, parts of O&M of the monorail and parts of the BRT system.

**Table 6.1.2 Total Investment Requirements for the Entire CoMTrans Master Plan Realisation (PPP Financing Scheme)**

*million LKR*

| Financing Model A [Application of PPP Scheme] Investment: Expressway (Gov. 20%) exl. OCH & New Kelani Bridge O&M: Monorail, BRT, Expressway (Private) | | | Short | Intermediate | Long | Total | Note |
|---|---|---|---|---|---|---|---|
| | | | *2015-2020* | *2021-2025* | *2026-2035* | *2015-2035* | |
| | | | *6 years* | *5 years* | *10 years* | *21 years* | |
| Cost | **Grand Total** | | **868,900** | **687,900** | **699,700** | **2,256,500** | |
| | Investment | **Total** | **665,700** | **487,500** | **300,900** | **1,454,100** | |
| | | Monorail | 173,800 | 89,800 | 144,600 | 408,200 | |
| | | Railway | 67,800 | 146,400 | 74,500 | 288,700 | |
| | | BRT | 12,300 | 9,300 | 0 | 21,700 | |
| | | Bus | 0 | 0 | 0 | 0 | |
| | | Road | 387,400 | 234,400 | 74,300 | 696,100 | |
| | | *Expressway* | *331,700* | *27,700* | *0* | *109,100* | *Gov. share = 20%* |
| | | *Other Road* | *55,700* | *206,700* | *74,300* | *336,700* | |
| | | Traffic Management | 2,800 | 7,500 | 7,500 | 17,700 | |
| | | Multi-modal Transit Facility | 21,700 | 0 | 0 | 21,700 | |
| | O&M | **Total** | **203,100** | **200,400** | **398,900** | **802,400** | |
| | | Monorail | 26,100 | 16,500 | 0 | 42,500 | *5% of Investemnt Cost Short-term: Gov. 50% Intermediate-term: Gov. 25%* |
| | | Railway | 46,100 | 75,000 | 187,300 | 308,500 | |
| | | *Additional Investment* | *20,300* | *53,500* | *144,300* | *218,200* | *5% of Investemnt Cost* |
| | | *Existing Infrastructure* | *25,800* | *21,500* | *43,000* | *90,300* | *50% of current National OM cost* |
| | | BRT | 5,200 | 3,500 | 0 | 8,700 | *13% of Investment Cost >> Private Short-term: Gov. 50% Intermediate-term: Gov. 25%* |
| | | Bus | 81,000 | 67,500 | 135,000 | 283,500 | *50% of current National OM cost* |
| | | Road | 40,700 | 34,100 | 68,200 | 143,100 | |
| | | *Additional Investment* | *0* | *200* | *400* | *600* | *4.3 mil. LKR/km/year* |
| | | *Existing Infrastructure* | *40,700* | *33,900* | *67,900* | *142,500* | *Currnt OM cost for AB roads* |
| | | *Expressway* | *0* | *0* | *0* | *0* | *12.6 mil.LKR/km/year >> Private* |
| | | Traffic Management | 200 | 500 | 1,800 | 2,500 | *1% of Investment Cost* |
| | | Multi-modal Transit Facility | 3,900 | 3,300 | 6,500 | 13,700 | *3% of Inevestment Cost* |
| Revenue | | **Total** | **76,800** | **64,000** | **128,000** | **268,800** | |
| | | Monorail | 0 | 0 | 0 | 0 | *TBD* |
| | | Railway | 13,800 | 11,500 | 23,000 | 48,300 | *50% of current Natinal Revenue* |
| | | BRT | 0 | 0 | 0 | 0 | *TBD* |
| | | Bus | 63,000 | 52,500 | 105,000 | 220,500 | *50% of current Natinal Revenue* |

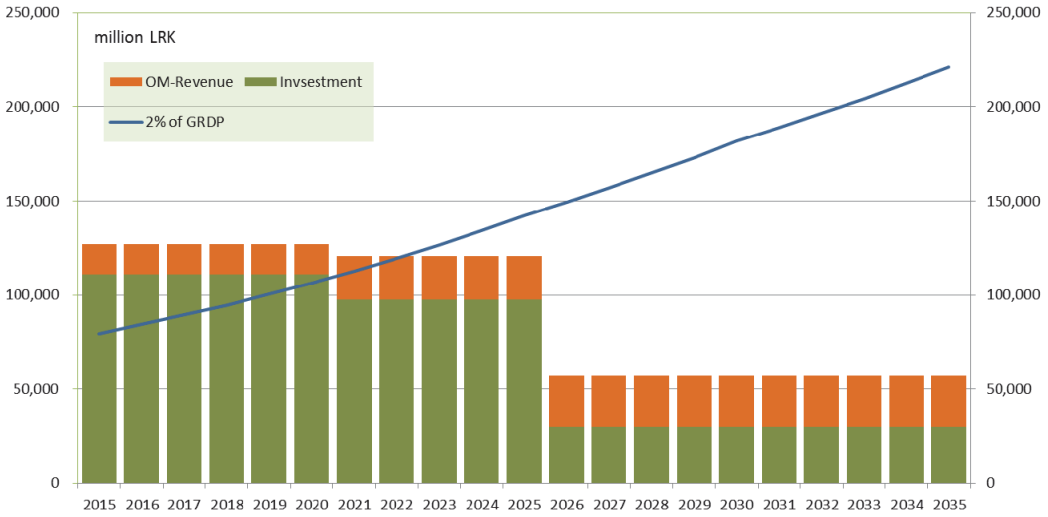
Source: CoMtrans Estimate

Table 6.1.2 demonstrates the "reduction in burden" on the public budget that could be achieved if the expressways are predominantly financed under a PPP scheme and the O&M burden for the monorail and also the BRT system could be shifted to private sector interests. The main message of the numbers is:

- Total net additions to investment over the whole planning period would be reduced from Rs 2,780,960 million to Rs 2,256,500 million or roughly by 19%
- The major gain would originate from reductions to the public investment budget, and
- Minor gain would also be achieved through reducing the impact on the Government's O&M expenditure.

Figure 6.1.2 depicts the situation in a more graphical format.

If it is assumed that the maximum allocation to the urban transport sector is 2% of GRDP in the Western Province, in the short term a shortage of development funds is expected. Consequently to fill the gap between the government budget and amount required for investment, it should consider utilising external financial sources such as ODA.




Source: CoMtrans Estimate

**Figure 6.1.2 Estimated Investment Cost and OM Cost of CoMTrans Master Plan**

## 6.2 Institutional Setup and Regulatory Framework for Urban Transport

### 6.2.1 Transport Administration in Sri Lanka

The National Transport Policy sets the following administrative structure to ensure the adequate provision of transport infrastructure and services.

The transport administrative structure is divided into five steps, i.e. policy, planning, implementation and monitoring, regulation, infrastructure provision, and service provision. Table 6.2.1 shows the institutions which deliver the abovementioned five functions by transport mode.

**Table 6.2.1 Transport Administrative Structure by Transport Mode**

| | Policy Making | Planning | Regulation | Infrastructure Provision | Service Provision |
|---|---|---|---|---|---|
| Motor vehicles (all) | Ministry of Transport assisted by NTC and other stakeholders | NTC (in concurrence with province for national plans and to get concurrence from centre to provincial plans). | DMT | RDA/PRDA/ LA & Private | Private |
| Railways | | | SLR | | |
| Inland Waterways | | | | Provincial Councils | Private |
| Road Passenger Transport Services | | | NTC (Inter) RPTA (Intra) | SLTB/NTC/ RPTA/LA/ Private | SLTB/Private |
| Para-transit (carriage of passengers) | | | DMT/NTC RPTA (Intra) LA | LA | Private |
| Rental vehicles | | | DMT | Private | Private |
| Freight vehicles (carriage of goods) | | | NTC (Inter) RPTA (Intra) | Private | Private |
| Non-motorized | | | LA | RDA/PRDA/ LA | Private |
| Traffic Management | | | LA | RDA/PRDA/ LA | RDA/PRDA/ LA |

Source: National Transport Policy on Transport in Sri Lanka, Ministry of Transport, 2009.

Corresponding to the table above, detailed functional responsibilities are illustrated in Table 6.2.2 in the following page. Although Table 6.2.1 indicates transport policy is made by the MOT assisted by the NTC and other stakeholders and the planning is done by the NTC, the reality is that there are central and provincial governments involved in vertical sphere, and some numbers of institutions involved in horizontal sphere, even if only at the central government level. If including subsidiary institutions, such as the DMT, MOFP and so on, the number of stakeholders increases.

## Table 6.2.2 Functional Responsibilities of Transport related Institutions

| Sector | Sub-sector | Policy | Planning | | | | | Regulation | | Fare/Revenue | | | Infrastructure Development | | | | Asset Management | | | Operation and Management | | | | | | | Law |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ploicy Making | Master Plan (Mid-, Long-term Planning) | Strategic planning (Action Plan) | Service Delivery Planning | Planning for Public Transport Infrastructure Developmen (include Budgeting) | Authorization/License and Permit Approval | Regulatory Authority/Regulator | Formulating and updating Administrative & Technical Standards, Norms, Minimum Service Standards and Guidelines | Fare Setting | Managing Fare Collection System | Sales revenue and assets management | Financial planning and Budgetary Expenditure (Budget | Land Acquisition | Procurement of Infrastructure Development (Constructio | Construction Supervision & Technical Inspection | Land | Base Infrastructure | Upper Infrastructure (Equipment & Facility) | Financial Source for Operation and Maintenance (O&M) | Operation and Maintenance of Constructed Infrastructu (Base) | Operation and Management of Equipment & Facility (Up | Financial Arrangement for Business Operation | Business Operation | Property Management (shops, vendors and so on) | Business Operation Performance Evaluation | Law Enforcement |
| Road Network | Class A & B (National Road) | MoHPS | RDA MoHPS | RDA MoHPS | | RDA | RDA | RDA | RDA MoHPS | | | | RDA MoHPS | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA & LA | RDA & LA | | | | | RDA & NPL |
| | Class C (Provincial Road) | PRDA | PRDA | PRDA | | | | PRDA | RDA MoHPS | | | | PRDA | PRDA | PRDA | PRDA | PRDA | PRDA | PRDA | PRDA | PRDA | PRDA | | | | | PRDA & NPL |
| | Class D & E (Local Authority Road) | PRDA & LA | LA PC | LA PC | | | | LA | RDA MoHPS | | | | LA PC | LA | LA | LA | LA | LA | LA | LA PC | LA | LA | | | | | LA & NPL |
| | Urban expressway (toll road) | MoHPS | RDA MoHPS | RDA MoHPS | RDA | RDA | RDA | RDA | RDA MoHPS | RDA MoHPS | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | RDA | | RDA & NPL |
| Rail-based Transport | Railway | MOT | SLR MOT | SLR MOT | SLR MOT | SLR MOT | MOT | SLR | SLR | SLR MOT | SLR | SLR | SLR MOT | MOT | SLR | SLR | SLR | SLR | SLR | SLR | SLR | SLR | SLR | SLR | SLR | SLR MOT | SLR MOT |
| Bus Transport | General bus service (Public) (Inter-province bus service) | NTC | NTC | NTC | NTC | SLTB *5 | NTC | NTC | NTC | NTC & SLTB | SLTB | SLTB | | | | | | | SLTB | SLTB | | SLTB *5 | SLTB | SLTB | | SLTB | NTC & NPL |
| | General bus service (Private) (Inter-province bus service) | NTC | NTC | MoPTS | MoPTS | | NTC | NTC | NTC & MoPTS | NTC | NTC | OPR | | | | | | | OPR | OPR | | OPR *5 | OPR | OPR | | OPR | NTC & NPL |
| | General bus service (Public) (Intra-province bus service) | NTC | NTC | NTC | SLTB | SLTB | SLTB | NTC | NTC | SLTB | SLTB | SLTB | | | | | | | SLTB | SLTB | | SLTB *5 | SLTB | SLTB | | SLTB | NTC & NPL |
| | General bus service (Private) (Intra-province bus service) | RPTA | RPTA | RPTA | RPTA | RPTA | RPTA | RPTA | NTC & RPTA | NTC | OPR | OPR | | | | | | | OPR | OPR | | OPR | OPR | OPR | | OPR | RPTA & NPL |
| | Bus terminal (Inter-provincial bus terminal) (Public) | NTC | SLTB | SLTB | SLTB | SLTB | SLTB | NTC | NTC | NTC | SLTB | SLTB | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | | NTC | | NTC & NPL |
| | Bus terminal (Inter-provincial bus terminal) (Private) | MoPTS | MoPTS | MoPTS | MoPTS | MoPTS | MoPTS | NTC | NTC | NTC | OPR | OPR | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | NTC | | NTC | | NTC & NPL |
| | Bus terminal (Intra-provincial bus terminal) | RPTA & UDA | RPTA & UDA | RPTA | RPTA | RPTA | RPTA & PC | NTC | NTC | RPTA | RPTA | RPTA | Prov Council | Prov Council | Prov Council | Prov Council | Prov Council | Prov Council | Prov Council | RPTA | RPTA | RPTA | RPTA | | RPTA & LA | | RDA & NPL |
| | Bus stop/shelter (Class A & B roads) | NTC, RDA UDA | NTC, RDA UDA | NTC, RDA UDA | | NTC, RDA UDA | RPTA | RDA | RDA | | | | RDA | RDA | RDA | RDA | RDA | RPTA | RPTA | RPTA | RPTA | RPTA | | | | | RDA & NPL |
| | Bus stop/shelter (Class C, D & E roads) | RPTA LA | RPTA LA | RPTA LA | | RPTA LA | RPTA LA | PRDA & LA | PRDA & LA | | | | RPTA LA | RPTA LA | RPTA LA | RPTA LA | RPTA LA | RPTA | RPTA | RPTA | RPTA | RPTA | | | | | PRDA, LA & NPL |
| Paratransit | Three Wheeler & Taxi | MoPTS | RPTA | RPTA | RPTA | RPTA & LA | RPTA | RPTA | RPTA | RPTA | OPR | OPR | | | | | | | | OPR | | OPR | OPR | OPR | | OPR | RPTA & NPL |
| | Private coach services (school van, corporate van) | MoPTS | RPTA | RPTA | RPTA | RPTA & LA | RPTA | RPTA | RPTA | RPTA | OPR | OPR | | | | | | | | OPR | | OPR | OPR | OPR | | OPR | RPTA & NPL |

Note: LA: local authorities, OPR: operator, Source: CoMTrans Study Team

The complexity of the existing urban transport administration, as illustrated in Table 6.2.2, makes the urban transport administration in CMA inefficient and this makes it difficult to carry out new transport measures and integrated transport policies, such as inter-modal transfer/connection, a common transport pass system and so on. As stated in the National Transport Policy, the efficiency of transport administration lies in how such complexity can be dealt with in a planned manner. In order to ensure the planning function is strengthened and becomes a responsibility of the assigned agencies, the Government indicated in the National Transport Policy that it would establish a coordination mechanism for urban transport through the Presidential Committee for Urban Transport (PCUT), which is in line with the CoMTrans's recommendation as well. An ideal structure for the urban transport administration in CMA would be to establish an agency that is powerful in policy making, planning, monitoring budget allocation, and implementation of public transport service delivery, but lean in institutional structure, i.e. not creating another mega institution to hire many staff members and to fight over vested interests with the existing institutions.

### 6.2.2 Towards the Realisation of CoMTrans Master Plan

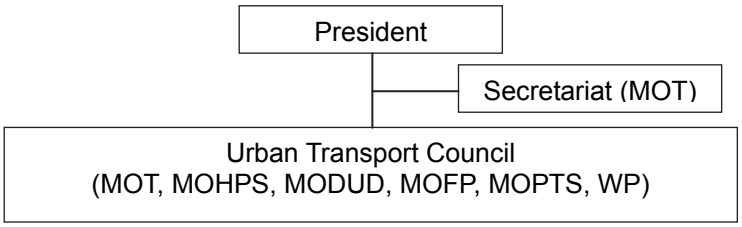
In line with the National Transport Policy, the CoMTrans suggests the establishment of an Urban Transport Council under the President. The council is expected to be a central high-level body that represents all main political decision makers in urban transport, including the Western Provincial Council. The members consist of appropriate ministers and/or deputy ministers from national government and the chief minister or transport minister of the Western Province Council. The council is to be led by the senior minister in charge for transport in the Administration. The council is set-up for making decisions on urban transport policy and planning in CMA, so it would not replace the existing transport sub-committee under the Cabinet nor the Parliament. The sub-committee for transport under the Cabinet shall be the final resort for the urban transport council, as well, to politically solve transport issues which encompass widespread areas.

#### (1) Institutional Arrangement

The council must be established as a standing council until its functions are transferred to the envisaged urban transport authority in the future. However, it is not intended to create another institution such as a ministry, department or authority. Therefore, it is suggested to establish a sub-division under the Planning Division of the MOT to support the council as secretariat. The functions of the secretariat are to support all administrative and technical tasks appointed by the council; yet, considering the scarcity of professionals in urban development and transport planning in the government sector, it is suggested that the academia, e.g. University of Moratuwa, provides technical support to the secretariat. Since the council consists of higher-level members, establishment of a technical committee or technical task force shall be taken into account once the council is formally established. The functions of the technical committee, among others, are to update the transport data collected for the CoMTrans master plan, and to formulate roll-over transport annual action plans, to monitor the progress of the master plan, and to provide technical inputs to the council.

It should be underlined that the council, the secretariat in the MOT and the technical committee must be legally supported as formal bodies, i.e. being established under a presidential decree and announced in a Gazette. It should be also noted that the proposed council is not, apparently, a monolithic bureaucracy which consolidates all present departments and agencies, but it is an

efficient strategic policy setting body that coordinates and governs all the components of urban transport. It is also not a funding agency, but one of its duties is to make funding decisions under the framework of given functions of the council to support and recommend budget allocations to MOFP, which allocate budget directly to agencies based on its decisive criteria. The council is envisaged to be responsible for every facet of urban mobility including private modes and public transport and will also have some influential role in city development planning in close cooperation with NPPD (National Physical Planning Department), UDA, the Western Provincial Council and local authorities.




Source: CoMTrans Study Team

**Figure 6.2.1 Urban Transport Council**

### (2) Legalising the CoMTrans Master Plan

Unless the CoMTrans master plan becomes a legally binding master plan, there would be no base for the newly established urban transport council to implement the plan, taking into account that respective ministries and local government must already have their own plans to develop roads, public transport service delivery and so on.

Considering that the anticipated members of the council will be almost the same as the members of the steering committee of the CoMTrans master plan study, it is expected that first the CoMTrans master plan would be agreed among the steering committee members and the MOT submit it as a legally binding master plan to the Administration to be endorsed. It is crucial that the short-term projects shall be jointly scrutinised with the National Planning Department of the MOFP, in terms of feasibility of budget allocations for forthcoming project proposals.

### (3) Risks for the realisation of CoMTrans Master Plan

In the past, similar recommendations were made in several studies; yet, no coordination body was established. As stated in previous sections, several issues have hindered the realisation of the recommended measures, i.e. lack of continual political willingness and adverse political interventions, unclear delineation of functional responsibilities among transport related institutions, lack of coordination mechanisms, absence of legal basis for the master plan and absence of legal basis for the implementing institutions.

The biggest issue encountered for the realisation of the master plan is the unpredictable political influence and wandering political directions, which are hard to control or prevent. However, once the master plan becomes a legally binding document, it will be at least a roadmap for urban transport development in CMA. The previous JICA study team failed to make its master plan a legally binding plan, so it had weakness in the implementation stage; so it is strongly suggested that the Steering Committee agrees upon the CoMTrans master plan and make it a legally binding plan within the study period. Once the master plan is endorsed by all stakeholders, the council

can be established and functional responsibilities between the council and related line ministries, agencies and local authorities become crystal clear since the proposed projects and implementing agencies are indicated in the master plan.

# CHAPTER 7 Conclusions and Recommendations for Materialisation of CoMTrans Urban Transport Master Plan

## 7.1 Conclusions

Economic development has accelerated after the end of the civic conflict and travel demand has also increased rapidly. Colombo is the centre of economic activity in Sri Lanka thus the increase in traffic demand has been remarkable. In the Colombo Metropolitan Area, 6.9 million trips are made each day at present and it is estimated to grow to 12.2 million trips in 2035. It goes without saying that a mass transit system is needed to meet the increasing travel demand. In the CoMTrans master plan it is recommended to develop a monorail system together with a Multi-modal Transport Hub, Multi Modal Centre and Park & Ride systems. It is desirable to develop a rail-based transport system, which is not disturbed by ordinary road traffic. The rail-based transport system, however, requires a considerable amount of investment for development. Consequently, it usually takes a long time to develop the extensive rail-based transport network.

On the other hand, at present buses run at low speeds because buses are caught in the general traffic congestion on the roads, thus punctuality of operation is not ensured. A large number of residents now try to avoid using buses because of the low level of bus services such as over-crowding, lack of punctuality and lack of comfort. Therefore, a higher level of public transport service should be urgently provided to prevent the shift from public to private modes of transport. Furthermore, having merely one route of rail-based transport system is not sufficient to attract people to public transport use but an extensive network should be formulated like a web to cover the major travel destinations in the metropolitan area. Improvement of transport nodes such as station plazas could make it easy and convenient to use public transport systems.

It should also be noted that the ability to pay for transport of the majority of the residents is low and it is therefore difficult to set public transport fares high enough to enable the private sector to provide a high level of public transport services. In the short term and intermediate term, the public transport network should be formulated by combining the existing Sri Lanka railway which needs upgrading, a monorail system and BRT system. In the long run, a rail-based transport system is needed to provide a higher level of services as well as a higher passenger capacity. The development of a BRT system ensures the space for future rail-based transport system development with a higher level of services.

Improvement of public transport services alone cannot suppress the deeply rooted preference to use private modes of transport; consequently, traffic restraint schemes should be employed in the central area of CMA where traffic congestion is often observed.

Another important measure is to develop sub-centres in suburban areas and to distribute the urban functions, which are currently concentrated in CMC. By creating an alternative urban structure, traffic congestion problems would be alleviated to some extent.

Although promotion of public transport is the most important policy to alleviate the transport problems in the master plan, the road network has not been well developed and the capacity is

significantly low in suburban areas. In particular, the progress of road network development has not caught up with the expansion of urbanised areas, therefore, road network development is also important in suburban areas.

Transport infrastructure development requires a long period in order to be realised, thus in order to deal with the current transport problems, immediate actions are necessary. The short-term countermeasures include the installation of area-wide traffic signal systems and the improvement of present signal control. Traffic control such as one way systems is also taken into account for the alleviation of traffic congestion in specific areas.

## 7.2 Recommended Immediate Actions to be Taken

### (1) Legal Framework for Transport Network Development

The target year of the CoMTrans urban transport master plan is 2035, which is 21 years from now. Developing transport infrastructure needs a long time. Once the urban transport master plan is agreed among the relevant stakeholders, it should be authorised and have legal binding for future development. This implies that the Right of Way (ROW) should be reserved for future development of transport facilities - railway and road networks. If urban development such as commercial building and residential complex developments are allowed in the areas set aside for the planned transport network, it would become difficult to develop the transport network in a desirable form. It is therefore proposed to establish a legal framework for setting aside a space for future transport system development.

### (2) Enhancement of Urban Land Use Regulations

CoMTrans emphasises the importance of integration between land use and the transport systems, thus Transit Oriented Development (TOD) is recommended in this regard. It needs high density urban development in the areas surrounding railway stations and important public transport hubs. Urban land use regulations which designate a type of land use and floor area ratio is needed for guiding land use to a desired pattern. In Sri Lanka, however, the floor area ratio has not been determined for every plot and no limitation on floor area is given to a block exceeding a certain size of plot area. Without limitation of the floor area ratio it is difficult to guide land use in the area surrounding the railway stations into high density, for instance high rise office buildings and apartments. Urban land use plans with guidance for the floor are ratio should be prepared for materialising TOD, otherwise it will be difficult to promote. If such regulations cannot be established, it would lead to failure in TOD and also it would worsen the traffic congestion.

### (3) Post Evaluation of Projects in the Urban Transport Master Plan

It is definitely important to conduct a post evaluation to understand the performance of the relevant agencies. If some projects are delayed in implementation, it requires exploring the reasons why the projects have not been executed as scheduled. If the projects have been implemented, the impacts of the projects on transport as well as economic activities should be examined carefully. It should be then fed back to the next stage and the plan should be modified and improved into a more efficient and convenient system. The circumstances surrounding the urban transport will change over time and the initial plan would not be suitable for a new situation. The urban transport master plan, which is prepared for the long period of 20 years, should be regarded as a rolling plan. It should be reviewed regularly and updated to fit in

the new circumstances. A Plan-Do-Check-Action (PDCA) cycle should be applied for master plan implementation and monitoring.

### (4) Development of Urban Transport Database System

The CoMTrans conducted the first large-scale Person Trip Survey in Sri Lanka and other relevant transport surveys. The data collected gives base data not only for transport planning but also for urban planning. In line with the master plan review and updating mentioned above, this database is useful for post evaluation of the master plan. The database should be updated and modified periodically for review and updating the master plan. Since the database covers a broad range of fields; demography, land use, economic activities, industry, and transport, the establishment of an urban transport database centre is desirable for maintenance of the database. The database centre could be established in the Ministry of Transport or a University. In addition, it is necessary to build the capacity of the transport planning experts who can undertake a transport analysis and plan using this database.

### (5) Further Investigation on Traffic Safety

Thanks to the accident data provided by the police, an extensive traffic accident database is available and it was analysed in the Study. Further detailed analysis on Black Spots is proposed to identify the places where traffic accidents frequently occur. The analysis will lead to the identification of causes of accidents and required countermeasures.

### (6) Promotion of Health in the Transport Sector

Developing of a pedestrian path network and bicycle road network, which connects major parks in the urbanised areas is proposed in the master plan. Construction of these facilities encourages walking, jogging and cycling by the citizens in the metropolitan area. These kinds of facilities contribute to green transport which aims at healthy and environmentally friendly transport.

### (7) Bus Operation Reform

Bus operation can be made more efficient and systematic without a huge investment. Currently real-time monitoring of bus operation can be achieved with a GPS device. Fare collection with an IC card through a communication device is also available now. The technical solutions are available for the difficulties in monitoring and management of bus operation. Now is a good opportunity to reform bus operation to provide better service for passengers. Installation of a GPS device on the buses enables bus fleet tracking on a real time basis, and then the management of bus companies can control their buses on the roads. Moreover, the introduction of the IC ticket system makes it possible to provide a subsidy for private bus companies, if the government would like to provide subsidy for private companies, since the exact number of discount tickets can be counted.

### (8) Feasibility Study for Project Implementation

A number of transport infrastructure development projects as well as soft measures have been proposed in the CoMTrans master plan. Although Monorail and MmTH projects are now under a feasibility study, the feasibility studies on the other projects are also important for alleviation of traffic congestion and the promotion of public transport. This includes BRT system development

for developing an extensive quality public transport network integrated with the monorail and employment of ERP for demand management. It is recommended to conduct these feasibility studies at the earliest possible time.

# CoMTrans Proposed Project Profiles

# CoMTrans PROPOSED PROJECT PROFILE

Proposed projects are described in project profiles below;

| | Project ID | Project Name | Type |
|---|---|---|---|
| 1 | RL-M1 | Modernisation of Coast Line (Colombo Fort - Kalutara South) | Rail-based Transport |
| 2 | RL-M2 | Modernisation of Main Line (Colombo Fort - Veyangoda) | Rail-based Transport |
| 3 | RL-M3 | Modernisation of Puttaram Line (Ragama - Negombo) | Rail-based Transport |
| 4 | RL-M5 | Modernisation of Main Line (Colombo Fort - Maradana) | Rail-based Transport |
| 5 | RL-NR1 | Airport Connection (Katunayake South - Airport Terminal) | Rail-based Transport |
| 6 | RL-NR2 | Dompe Line (Kelaniya - Dompe) | Rail-based Transport |
| 7 | RL-NT1 | Monorail [Phase 1] | Rail-based Transport |
| 8 | RL-NT2,3 | Monorail [Phase 2] | Rail-based Transport |
| 9 | RL-NT4 | Monorail [High Level Road Line] | Rail-based Transport |
| 10 | RL-NT5 | Monorail [Connecting Line with Monorail (High Level Road Line) | Rail-based Transport |
| 11 | BT-01 | Bus Rapid Transit (BRT) | Bus |
| 12 | MM-1~5 | Multi-modal Transport Hub (MmTH), Multi-modal Centre (MMC), and Park & Ride (P&R) | Rail-based Transport/ Urban Planning |
| 13 | RD-RN2 | Securing Space for Future Development of BRT / Development of Middle Ring Road for BRT Corridor | Road |
| 14 | RD-RN3 | Provision of Alternate Road for Introducing BRT / Baseline Road Extension | Road |
| 15 | RD-RN4 | Provision of Alternate Road for Introducing BRT / Extension of Marine Drive | Road |
| 16 | RD-RN5 | Enhancement of Traffic Distribution Function of Road Network / Development of Western Ring Road | Road |
| 17 | RD-RN6 | Enhancement of Traffic Distribution Function of Road Network / Development of Eastern Ring Road | Road |
| 18 | RD-EX1 | Construction of New Urban Expressway / Connection Between the SEW and the CKE | Road |
| 19 | RD-EX3 | Construction of New Urban Expressway / Connection Between New Urban Expressway (RD-EX1) and Port Area | Road |
| 20 | RD-EX4 | Construction of New Urban Expressway / Connection Between New Urban Expressway (RD-EX3) and New Fort Station | Road |
| 21 | RD-FO | Fly-over Installation | Road |
| 22 | TM-S1,S2,S3 | Traffic Signal Control Improvement | Traffic Management |
| 23 | TM-TI1 | Traffic Information System | Traffic Management |
| 24 | TM-BL1,BL2 | Bus Priority System + Bus Location System for BRT | Traffic Management |
| 25 | TM-BL3 | Bus Location System for Public/Private Buses | Traffic Management |
| 26 | TM-P1 | Parking Information System | Traffic Management |
| 27 | TM-ERP | ERP System | Traffic Management |
| 28 | RS-1 | Education for Road Safety / Tight Control of Driver's Licence | Traffic Safety |
| 29 | RS-2 | Installation or Improvement of Pedestrian Crossing and Sidewalk | Traffic Safety |
| 30 | RS-3 | Enforcement of Safety Measures on 7 Corridors to Reduce Traffic Accidents | Traffic Safety |
| 31 | EN-01 | Air Emission Standard for Vehicles | Environment |
| 32 | EN-02 | Vehicles Inspection and Maintenance Programmes | Environment |
| 33 | EN-03 | Low Sulphur Diesel Programmes | Environment |
| 34 | EN-04 | Promotion of Natural Gas Vehicles | Environment |
| 35 | EN-05 | Promotion of Hybrid Cars and Electric Vehicles | Environment |
| 36 | EN-06 | Promotion of Walking and Bicycles | Environment |

# CoMTrans PROPOSED PROJECT PROFILE

**Project ID Code**

RL-M1

**Project Name**

Modernisation of Coast Line

**Transport Sub Sector**

☑ Railway and New Transit
☐ Bus Transport
☐ Road
☐ Traffic Management
☐ Traffic Safety
☐ Environment
☐ Urban Planning
☐ Institution/Funding

**Urban Transport Policy:**

☑ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

**Project Location**

Colombo Fort - Kalutara South (42.5km)

**Project Priority**

☑ Short-term
☑ Medium-term
☑ Long-term

**Implementation Period**

Total 10 years

**1. Objectives of Project**

- To increase the capacity for railway passenger transport with short interval frequency of train service
- To improve safety and level of service for railway passenger such as speed and riding feeling

**2. Expected Benefits**

- Increase of railway transport capacity to meet future passenger demand
- Improvement of level of service for railway passenger
- Savings in travel time

**3. Project Description**

- Replacing signalling system (new interlocking and train protection systems) [Short Term]
- Electrification (double track) [Medium-Term]
- Procurement of new train sets [Medium-Term]
- Construction of third line [Long-Term]
- Improvement of track layout [Medium-Term]

**4. Linkages with Other Projects/Sectors**

- Monorail system with the connection at Kollupitiya, Fort/Pettah Multi-modal Transport Hub (MmTH)
- BRT and bus at Multi-modal Centre (MMC) at Moratuwa

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**

Sri Lanka Railways

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

Sri Lanka Railways

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 596.6 Million
Recurrent O & M: US$ 11.9 M/year

**10. Special Considerations**

Since the CTC with Relay Interlocking and Bi-directional Automatic Block Signalling on double lines was installed in 1962, replacing of the signalling system is an emergency issue.

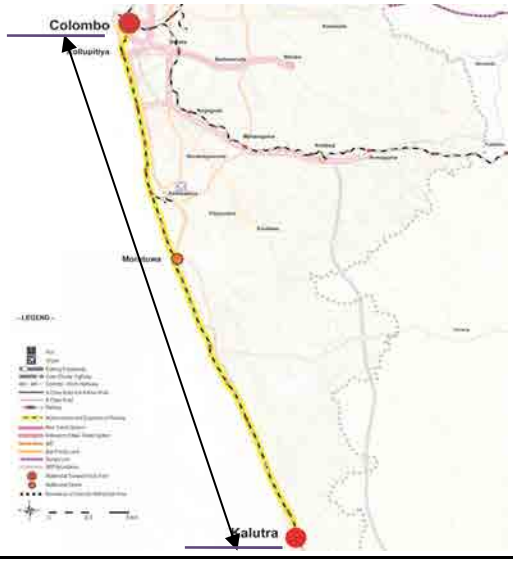
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-M2 | Modernisation of Main Line | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Colombo Fort – Veyangoda (37.6km) | ☑ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 10 years |

**1. Objectives of Project**

- To increase the capacity for railway passenger transport with short interval frequency of train service
- To improve safety and level of service for railway passenger such as speed and riding feeling

**2. Expected Benefits**

- Increase of railway transport capacity to meet future passenger demand
- Improvement of level of service for railway passenger
- Savings in travel time

**3. Project Description**

- Replacing signalling system (new interlocking and train protection systems) [Short-term]
- Upgrade existing track (double track) [Short-term]
- Electrification (double track) [Medium-term]
- Procurement of new train sets [Medium-term]

**4. Linkages with Other Projects/Sectors**

- Monorail system around Kelaniya station and at the Fort/Pettah Multi-modal Transport Hub (MmTH)
- BRT and bus at Multi-modal Centre (MMC) at Kelaniya

**5. Important Assumptions (Conditions for the Project)**

- Collaborating with the track layout improvement between Colombo Fort and Ragama [RL-M5]

**6. Implementing Agency**

Sri Lanka Railways, financed by Chinese Government

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

Sri Lanka Railways

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 730.6 Million
Recurrent O & M: US$ 14.6 M/year

**10. Special Considerations**

Since the CTC with Relay Interlocking and Bi-directional Automatic Block Signalling on double lines was installed in 1962, replacing of the signalling system is an emergency issue.

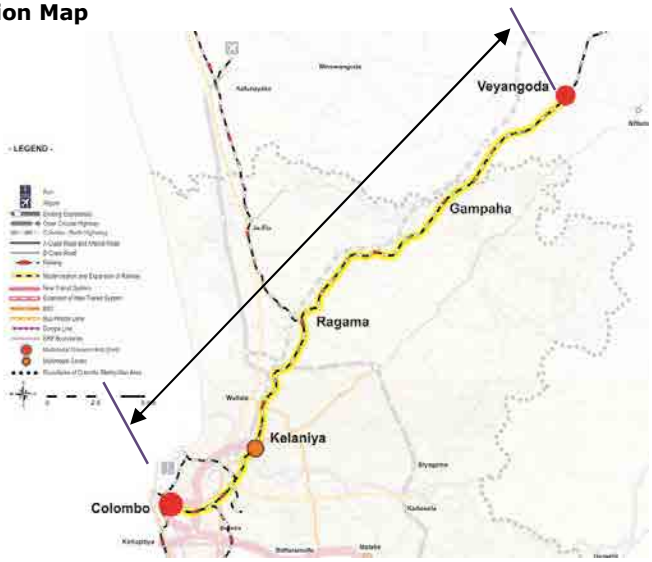
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-M3 | Modernisation of Puttalam Line | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Ragama – Negombo (23.3km) | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**

- To increase the capacity for railway passenger transport with short interval frequency of train service
- To improve safety and level of service for railway passenger such as speed and riding feeling

**2. Expected Benefits**

- Increase of railway transport capacity to meet future passenger demand
- Improvement of level of service for railway passenger
- Savings in travel time

**3. Project Description**

- Replacing signalling system (new interlocking and train protection systems)
- Electrification (double track)
- Track Layout improvement
- Procurement of new trains

**4. Linkages with Other Projects/Sectors**

- Bus terminal development at Multi-modal station/centre

**5. Important Assumptions (Conditions for the Project)**

- Completion of electrification between Fort and Ragama

**6. Implementing Agency**

Sri Lanka Railways

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

Sri Lanka Railways

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 375.1 Million
Recurrent O & M: US$ 7.5 M/year

**10. Special Considerations**

Since the CTC with Relay Interlocking and Bi-directional Automatic Block Signalling on double lines was installed in 1962, replacing of the signalling system is an emergency issue.

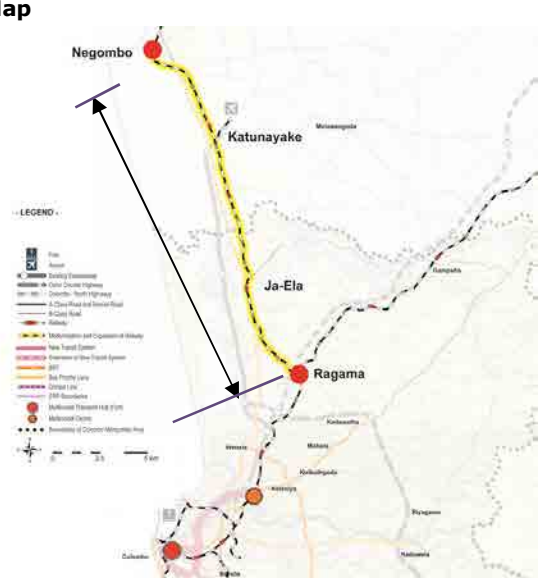
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-M5 | Modernisation of Main Line (Track Layout Improvement) | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport ☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution ☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Colombo Fort – Maradana (4.0km) | ☑ Short-term<br>☐ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**
- To increase frequency for railway operation on the most congested section by improving track layout to ensure proper management together with many railway lines on this section

**2. Expected Benefits**
- Increase railway transport capacity to meet future passenger demand
- Savings in travel time for railway passenger
- Savings in train accidents in this section

**3. Project Description**
- Track Layout improvement (Colombo Fort - Maradana)
- Construction of a viaduct (double track) for the Main line route as an priority line with electrification and improved signalling system
- Remodelling of station (Fort and Maradana)

**4. Linkages with Other Projects/Sectors**
- Fort/Pettah Multi-modal Transport Hub (MmTH), which connects with Monorail, BRT and Bus

**5. Important Assumptions (Conditions for the Project)**
- Collaboration with Electrification and improved signalling system for Main Line [RL-M2]

**6. Implementing Agency**
Sri Lanka Railways

**7. Financing Scheme**
☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**
Sri Lanka Railways

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 90.3 Million
Recurrent O & M: US$ 0.5 M/year

**10. Special Considerations**
- Since this is the most congested section in Sri Lanka Railways, track layout improvement and installation of viaduct for the priority routes of the Main line are an emergency issue.

**11. Environmental Impact**
1) Social Environment
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-NR1 | Airport Connection | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Katunayaka South - Airport Terminal (2.2km) | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 3 years |

**1. Objectives of Project**
- To provide direct train operation as an airport access railway service to/from the Fort station to the Airport terminal

**2. Expected Benefits**
- Promotion of railway service for airport users
- Savings in travel time from the Fort area to the airport

**3. Project Description**
- Construction of track works (single track)
- Construction of new station at the airport terminal
- Electrification
- Installation of signalling system and communication system

**4. Linkages with Other Projects/Sectors**
- Bus service for direct airport access

**5. Important Assumptions (Conditions for the Project)**
Completion of electrification for Main and Puttalam Lines

**6. Implementing Agency**
Sri Lanka Railways

**7. Financing Scheme**
☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**
Sri Lanka Railways

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 25.0 Million
Recurrent O & M: US$ 0.5 M/year

**10. Special Considerations**
Currently, public transport service to access the airport from the central part of Colombo is limited to bus. Direct railway access will be realised if only a 2km section will be constructed with proper management of direct operation.

**11. Environmental Impact**
1) Social Environment
- Land Acquisition: Not major Required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-NR2 | Dompe Line | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☑ Reduction of Pollution
☐ Promotion of Health
☐ Alleviation of Traffic Congestion
☐ Reduction of Traffic Accident

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Kelaniya - Dompe (22.8km)<br>Alawathupitiya (Stabling Yard) | ☐ Short-term<br>☐ Medium-term<br>☑ Long-term | Total 5 years |

**1. Objectives of Project**

- To provide railway services mainly for cargo from the oil refinery and dry-port (EPZ) to Colombo port and to connect to Main Line, it will be utilize for passenger transport in future.

**2. Expected Benefits**

- Reduction of GHGs by modal shift of cargo transport from truck and container trailer
- Savings in travel time costs and hauling costs for cargo

**3. Project Description**

- Construction of track works (double track)
- Installation of signalling system and communication system and stabling yard at Alawathupitiya

**4. Linkages with Other Projects/Sectors**

- Monorail system and Multi-modal centre (MMC) at Kelaniya with BRT and Bus services

**5. Important Assumptions (Conditions for the Project)**

Non electrification

**6. Implementing Agency**

Sri Lanka Railways

**7. Financing Scheme**

☐ Public Sector
☑ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

Sri Lanka Railways or Private

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 377.8 Million
Recurrent O & M: US$ 12.0 M/year

**10. Special Considerations**

There is the Sapugaskanda oil refinery and several planed dry-port (EPZs). Therefore, railway connection to the Colombo Port area realises cost effective and environmentally friendly solution.

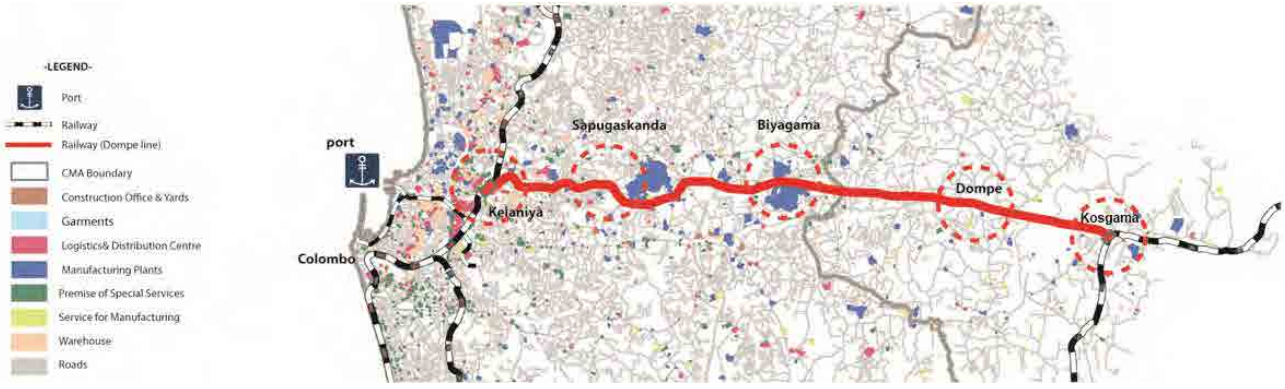
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Further investigation is required.
- Resettlement :B or C
- Other Social Impact: B or C

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-NT1 | Monorail [Phase 1] | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☑ Reduction of Pollution
☐ Promotion of Health
☑ Alleviation of Traffic Congestion
☐ Reduction of Traffic Accident

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Malabe-Fort – Kotahena (Route 1),<br>Kolluptiya – Town Hall (Route 2)<br>(Total Length: 23 km) | ☑ Short-term<br>☐ Medium-term<br>☐ Long-term | More than 6 years |

**1. Objectives of Project**

- To provide a new transit system in the high population density area to alleviate vehicle based transport congestion, as well as in low public transport service area.

**2. Expected Benefits**

- Reduction of GHGs by modal shift from vehicle based passenger transport and alleviation of vehicle traffic congestion
- Savings in travel time costs

**3. Project Description**

- Construction of monorail track (simple elevated beam), elevated stations with civil works
- Installation of electrical and mechanical system
- Construction of train depot
- Preparation of rolling stock (train sets)

**4. Linkages with Other Projects/Sectors**

- Sri Lanka Railways (Main Line, Coast Line)
- Fort/Pettah Malti-modal Transport Hub (MmTH)
- Multi-modal Centre (MMC) with BRT and Bus at Malabe
- Park and Ride (P&R) facilities
- ERP (Electric Road Pricing) system

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**

Ministry of Transport

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

To be discussed

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 1,321.5 Million
Recurrent O & M: US$ 50.7 M/year

**10. Special Considerations**

- Several urban developments and road projects shall be coordinated/ accommodated.

**11. Environmental Impact**

1) Social Environment

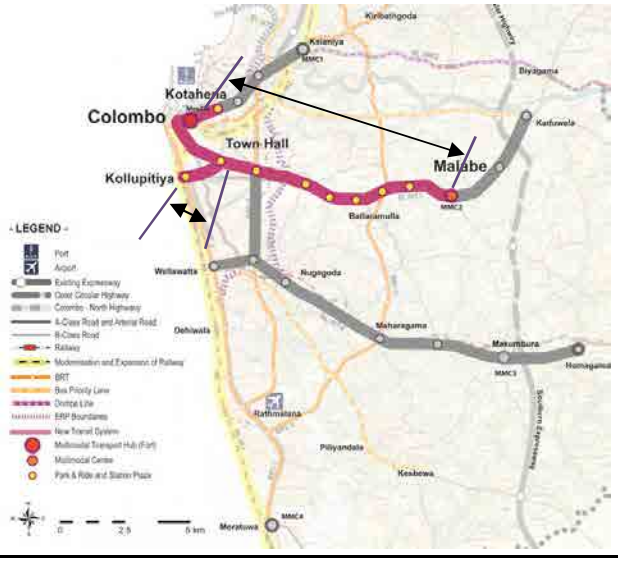
- Land Acquisition: Minimum land acquisition required at some stations (Further study will be conducted under CoMTrans)
- Resettlement :B
- Other Social Impact: B

2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-NT2,3 | Monorail [Phase 2] | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☑ Reduction of Pollution
☐ Promotion of Health
☑ Alleviation of Traffic Congestion
☐ Reduction of Traffic Accident

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Mattakkuliya - Kelaniya<br>Malabe-Kaduwela<br>(Total Length: 11.9 km) | ☐ Short-term<br>☑ Medium-term<br>☑ Long-term | Total 6 years |

**1. Objectives of Project**

- To provide new transit system extended from phase 1 network to connect with Kelaniya Multi-modal Centre (MMC) in order to alleviate vehicle based transport congestion, as well as in a low public transport service area.

**2. Expected Benefits**

- Reduction of GHGs by modal shift from vehicle based passenger transport and alleviation of vehicle traffic congestion
- Savings in travel time costs

**3. Project Description**

- Construction of monorail track (simple elevated beam), elevated stations with civil works
- Installation of electrical and mechanical system
- Preparation of rolling stock (train sets)

**4. Linkages with Other Projects/Sectors**

- Sri Lanka Railways (Main Line)
- Multi-modal Centre (MMC) with BRT and Bus at Kelaniya
- Park and Ride (P&R) facilities
- ERP (Electric Road Pricing) system

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**

Ministry of Transport

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

To be discussed

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 882.6 Million
Recurrent O & M: US$ 34.1 M/year

**10. Special Considerations**

- Additional land acquisition is required if road widening project is not executed by RDA and CMC.

**11. Environmental Impact**

1) Social Environment

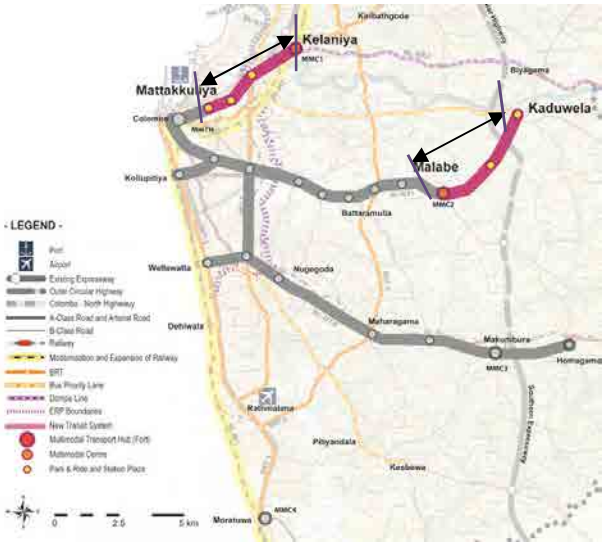
- Land Acquisition: Further investigation is required.
- Resettlement :B
- Other Social Impact: B

2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-NT4 | Monorail [High Level Road Line] | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☑ Reduction of Pollution
☐ Promotion of Health
☑ Alleviation of Traffic Congestion
☐ Reduction of Traffic Accident

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Borella - Homagama<br>(Total Length: 19.7 km) | ☐ Short-term<br>☐ Medium-term<br>☑ Long-term | Total 6 years |

**1. Objectives of Project**

- To provide a new transit system extended from phase 1 network toward High Level Road, where the large numbers of trips are generated to CMC.

**2. Expected Benefits**

- Reduction of GHGs by modal shift from vehicle based passenger transport and alleviation of vehicle traffic congestion
- Savings in travel time costs

**3. Project Description**

- Construction of monorail track (simple elevated beam), elevated stations with civil works
- Installation of electrical and mechanical system
- Preparation of rolling stock (train sets)

**4. Linkages with Other Projects/Sectors**

- Sri Lanka Railways (KV Line)
- Multi-modal Centre (MMC) with BRT and Bus
- Park and Ride (P&R) facilities
- ERP (Electric Road Pricing) system

**5. Important Assumptions (Conditions for the Project)**

Completion of monorail project of Phase 1

**6. Implementing Agency**

Ministry of Transport

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

To be discussed

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 731.1 Million
Recurrent O & M: US$ 14.4 M/year

**10. Special Considerations**

- Detailed alignment of monorail network shall be accommodated with future road widening/ construction projects.

**11. Environmental Impact**

1) Social Environment

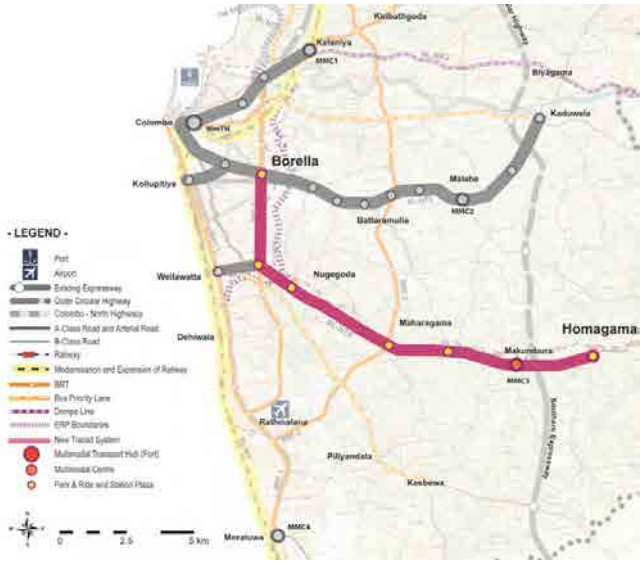
- Land Acquisition: Further investigation is required. Basically minimum land acquisition is required if monorail is constructed on existing road, only required around several station area
- Resettlement :B
- Other Social Impact: B

2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RL-NT5 | Monorail<br>[Connection with Monorail (High Level Road Line) and Railway (Coast Line)] | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☑ Alleviation of Traffic Congestion
☑ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Siebel - Wellawatta<br>(Total Length: 3.4 km) | ☐ Short-term<br>☐ Medium-term<br>☑ Long-term | Total 6 years |

**1. Objectives of Project**

- To provide a new transit system extended from phase 2 network toward Wellawatta station on Coast Line, which forms enriched and flexible public transport network for promoting public transport users.

**2. Expected Benefits**

- Reduction of GHGs by a modal shift from vehicle based passenger transport and alleviation of vehicle traffic congestion
- Savings in travel time costs

**3. Project Description**

- Construction of monorail track (simple elevated beam), elevated stations with civil works
- Installation of electrical and mechanical system
- Preparation of rolling stock (train sets)

**4. Linkages with Other Projects/Sectors**

- Sri Lanka Railways (Coast Line)
- ERP (Electric Road Pricing) system

**5. Important Assumptions (Conditions for the Project)**

Completion of monorail project of High Level Road Line

**6. Implementing Agency**

Ministry of Transport

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

To be discussed

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 169.2 Million
Recurrent O & M: US$ 3.6 M/year

**10. Special Considerations**

- Detailed alignment of monorail network and location of stations shall be accommodated with future road widening/ construction projects and railway project on coast line.

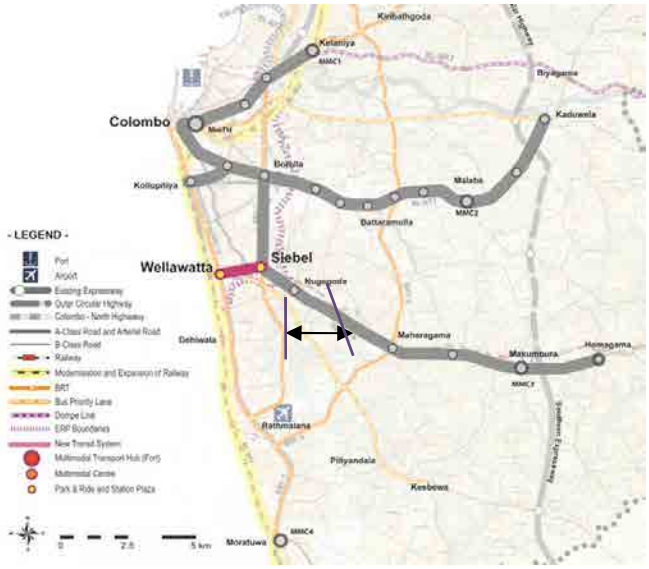
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Further investigation is required.
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| BT-01 | Bus Rapid Transit (BRT) | ☐ Railway and New Transit<br>☑ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Route-1: MmTH-MoratuwaMMC4<br>Route-2A: KelaniyaMMC1-MmTH-KelaniyaMMC1<br>Route-2B: KelaniyaMMC1-Kadawatha<br>Route-3: KelaniyaMMC1-MoratuwaMMC4<br>Route-4: Wattala-Battaramulla-MoratuwaMMC4<br>(Total length: 135.8 km) | ☑ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 2 to 3 years for each route |

**1. Objectives of Project**

- To promote the utilisation of public transport by improving the operation speed and quality of bus service

**2. Expected Benefits**

- Increase of passenger transport capacity for bus services
- Reduction of GHG emission compared ordinary bus
- Savings in Travel Time Costs

**3. Project Description**

- Installation of exclusive bus-way with bus priority signals
- Installation of bus fleet which has capacity to meet the demand (articulated vehicles)
- Construction of BRT shelters with level boarding platform and with safe access from footpath to ensure the safety and convenience of passengers
- Electronic ticket system will be implemented for smooth boarding and alighting
- Bus location information will be collected by on-board GPS devices, sent to the control centre and used for the operation system and for passenger information boards

**4. Linkages with Other Projects/Sectors**

- Multi Modal Centre (MMC) at Moratuwa, Kelaniya
- Fort/Pettah Multi-modal Transport Hub (MmTH)
- Sri Lanka Railways
- Monorail
- Ordinary Bus

**5. Important Assumptions (Conditions for the Project)**

Wide width multiple road lanes is required to install additional dedicated BRT lane. Traffic management at junction and BRT station should be carefully designed for ensuring safety and sufficient of traffic capacity.

**6. Implementing Agency**

- Ministry of Transport
- Road Development Authority
- Colombo Municipal Council

**7. Financing Scheme**

☑ Public Sector
☑ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

Both public and private could be operated. Detailed should be discussed and determined.

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 165.0 Million
(phase1: US$ 93.9 Million, phase2: US$ 71.0 Million)
Recurrent O & M: US$ 21.5 M/year
(phase1: US$ 13.1 Million, phase2: US$ 8.4 Million)

**10. Special Considerations**

- Since the traffic congestion is getting severe in the CMC area, promotion of the utilisation of public transport is an important task.
- While BRT can transport a comparatively large volume passengers with low construction cost, it could be an option to achieve the task.
- The public transport network will be improved efficiently, by installing BRT and connecting it with the other public transport modes.

# CoMTrans PROPOSED PROJECT PROFILE

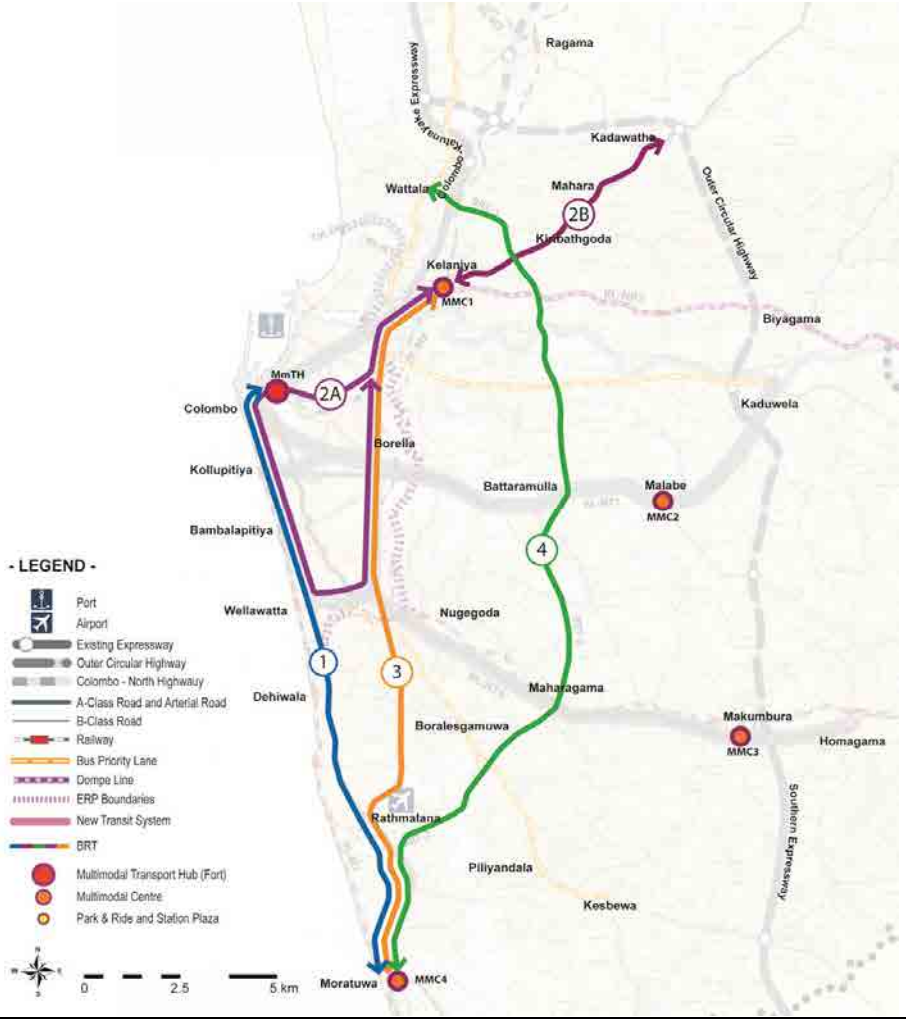
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Further detailed investigation is required, especially in bus station areas.
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**




| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| MM-1~5 | Multi-modal Transport Hub (MMTH), Multi-modal Centre (MMC), and Park & Ride (P&R) | ☑ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☑ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

| | |
|---|---|
| ☑ Promotion of Public Transport | ☐ Alleviation of Traffic Congestion |
| ☐ Reduction of Pollution | ☐ Reduction of Traffic Accident |
| ☐ Promotion of Health | |

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| MmTH: Fort/Pettah<br>MMC: Kelaniya, Malabe, Moratuwa<br>P&R: Several stations on the Monorail network | ☑ Short-term<br>☐ Medium-term<br>☐ Long-term | Total 5 years |

# CoMTrans PROPOSED PROJECT PROFILE

**1. Objectives of Project**

- To promote the utilisation of public transport by improving the function of transport nodes

**2. Expected Benefits**

- Providing user-friendly public transport services to smooth mode transfer
- Creating opportunities for commercial and attractive urban centre facilities as transport node with different transport mode.
- Promoting a modal shift from private to public at P&R facilities

**3. Project Description**

- MmTH at Fort/Pettah: providing smooth/safety/comfort transport hub for passenger transfers between Monorail, Railway, BRT and ordinary bus, together with commercial facilities.
- MMCs: Kelaniya and Malabe MMC is the terminal station of monorail line which connects the monorail and its feeder. Moratuwa is the multi-modal transfer points with railway, BRT and feeder bus services.
- P&Rs: providing at major monorail stations in suburban areas to let commuters transfer from private vehicles to public transport

**4. Linkages with Other Projects/Sectors**

- Sri Lanka Railways
- BRT and Ordinary Bus
- Monorail
- ERP (Electric Road Pricing) system for encouraging P&R
- Urban planning and development around these transport facilities
- Commercial developments (Kiosk, Shopping centre, restaurants and office/hotel buildings) especially at MmTH

**5. Important Assumptions (Conditions for the Project)**

Land preparation for MmTH is essential, because the relocation plan of the Manning market and other shops are still under enforcement.
Institutional coordination is required.

**6. Implementing Agency**

- Ministry of Transport together with following institutions;
  - Road Development Authority
  - Colombo Municipal Council and Local Authorities
  - Sri Lanka Railways
  - SLTB, WP-RPTA, NTC

**7. Financing Scheme**

☑ Public Sector

☑ Public Private Partnership

☐ Private Sector Initiative

**8. Expected Operator (if any)**

To be determined (for bus terminal operation, terminal facility operation and commercial area operation)

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 195.7 Million
Recurrent O & M: US$ 5.8 M/year

**10. Special Considerations**

- Since the traffic congestion is getting severe in the CMC area, promotion of the utilisation of public transport is an important task.
- To promote the utilisation of public transport, convenient transfer between other transport modes is a key factor.
- With the installation of MMTH, MMC and P&R facilities, the connectivity between each transport mode will be substantially improved.
- By consolidating the transfer function, passengers can save their transfer time

**11. Environmental Impact**

1) Social Environment

- Land Acquisition:

Further investigation is required

- Resettlement :

B or C, depend on the progress of the relocation plan for Manning market. In addition, further investigation is required for existing shops the area of MmTH. For MMC and P&R, further on-site investigation is required.

- Other Social Impact: B

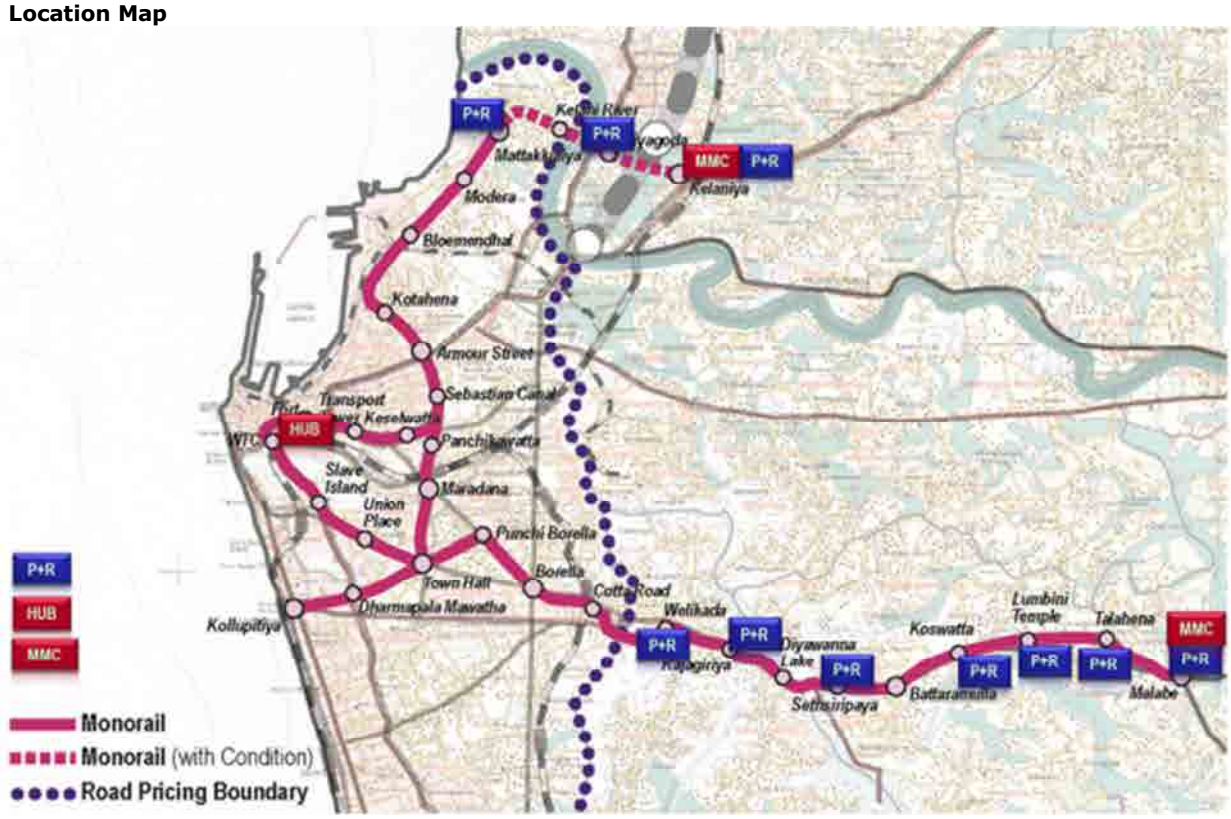
2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

# CoMTrans PROPOSED PROJECT PROFILE

**12. Location Map**




MMC at Moratuwa is also the candidate for mode transfer with Railway, BRT, feeder bus services.

# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RD-RN2 | Securing Space for Future Development of BRT / Development of Middle Ring Road for BRT Corridor | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport
☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Middle Ring Roads, which will serve future BRT system through between Wattala, Kelaniya, Battaramulla, Maharagama and Rathamalana | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**

- To secure space for the future development of BRT
- To encourage activities among sub-centres
- To provide alternative routes for distributing traffic volume

**2. Expected Benefits**

- For BRT users: savings in travel time costs and
- Alleviation of traffic congestion
- Increase of economic activities among sub-centre

**3. Project Description**

- Widening of existing road for securing the space for a dedicated lane for BRT
- Total length: 30.2km, Number of lanes: six
- Improvement of intersections

**4. Linkages with Other Projects/Sectors**

- BRT system on middle ring road

**5. Important Assumptions (Conditions for the Project)**

Large land acquisition (370,000 $m^2$) and resettlement are required.

**6. Implementing Agency**

- Road Development Authority

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

- Road Development Authority (for Road Maintenance)
- To be determined for BRT operation

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 267.5 Million
Recurrent O & M: US$ 5.3 M/year

**10. Special Considerations**

Traffic volumes of existing arterial roads are almost at capacity at several points during the peak hours, the shortage of alternative routes for through traffic in CMC area is an emergency issue, an arterial ring road with the space for installation of BRT in the future as an alternative route is required.

Sub-centre development encourages the economic activities and reduces certain level of traffic volume to enter CMC.

**11. Environmental Impact**

1) Social Environment

- Land Acquisition:
  Approx. 370,000 $m^2$ of land acquisition is estimated.
- Resettlement :
  B or C, further detailed investigation is required.
- Other Social Impact: B

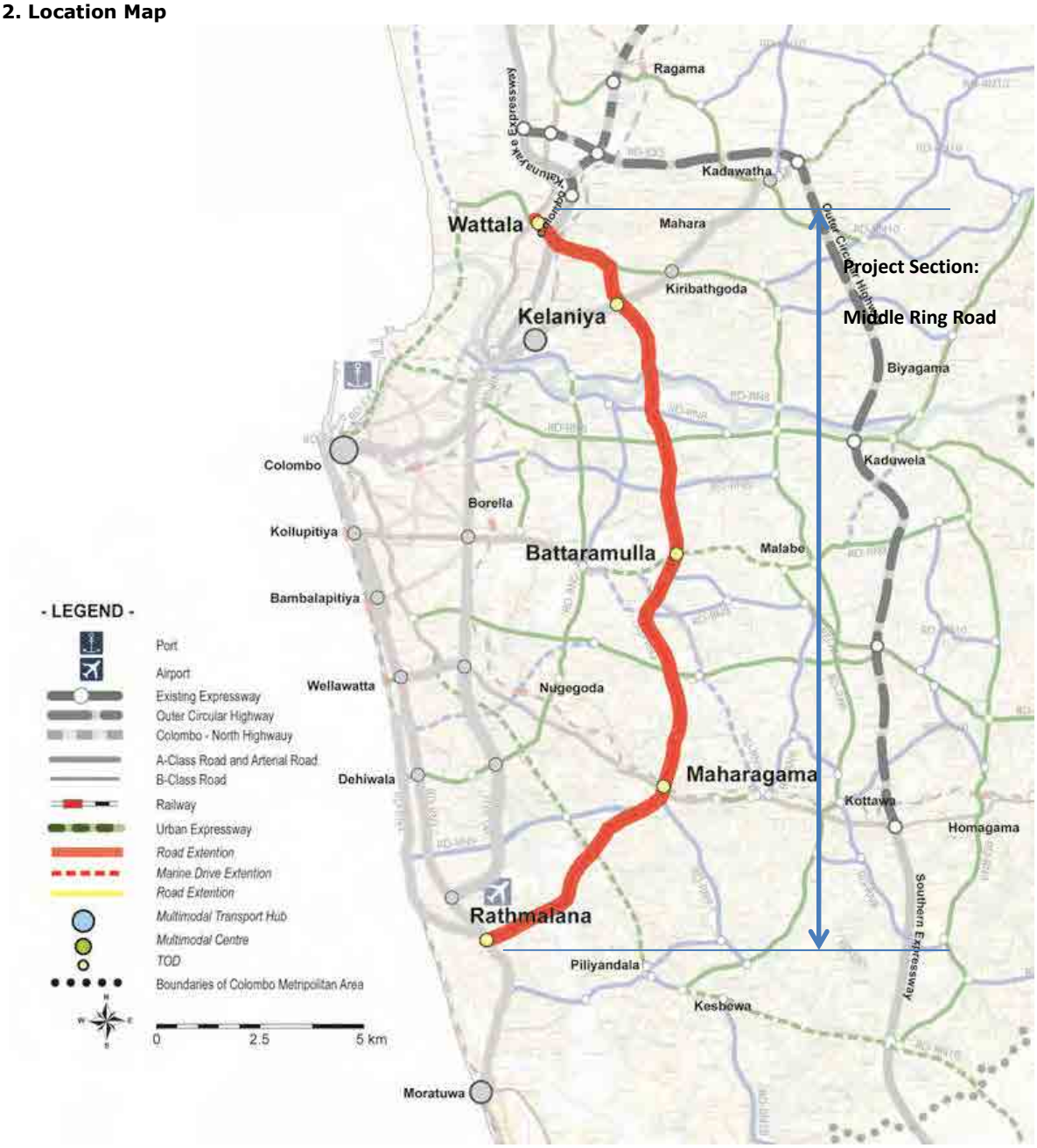
2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

# CoMTrans PROPOSED PROJECT PROFILE

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

**Project ID Code**

RD-RN3

**Project Name**

Provision of Alternative Road for Introducing BRT / Baseline Road Extension

**Transport Sub Sector**

- ☐ Railway and New Transit
- ☐ Bus Transport
- ☑ Road
- ☐ Traffic Management
- ☐ Traffic Safety
- ☐ Environment
- ☐ Urban Planning
- ☐ Institution/Funding

**Urban Transport Policy:**

- ☑ Promotion of Public Transport
- ☑ Alleviation of Traffic Congestion
- ☐ Reduction of Pollution
- ☐ Reduction of Traffic Accident
- ☐ Promotion of Health

**Project Location**

Baseline Road (proposed extended section), which will serve future BRT system through between Pamankada junction and Rathmalana

**Project Priority**

- ☐ Short-term
- ☑ Medium-term
- ☐ Long-term

**Implementation Period**

Total 5 years

**1. Objectives of Project**

- To secure space for the future development of BRT
- To encourage activities among sub-centres
- To provide alternative routes for distributing traffic volume

**2. Expected Benefits**

- For BRT users: savings in travel time costs and
- Alleviation of traffic congestion
- Increase of economic activities among sub-centre

**3. Project Description**

- Extension of Baseline Road from B84 to A2 road
- Total length: 6.2km, Number of lanes: six
- Improvement of intersections

**4. Linkages with Other Projects/Sectors**

- BRT system

**5. Important Assumptions (Conditions for the Project)**

Large land acquisition (116,000 $m^2$) and resettlement are required.

**6. Implementing Agency**

- Road Development Authority

**7. Financing Scheme**

- ☑ Public Sector
- ☐ Public Private Partnership
- ☐ Private Sector Initiative

**8. Expected Operator (if any)**

- Road Development Authority (for Road Maintenance)
- To be determined for BRT operation

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 67.9 Million
Recurrent O & M: US$ 1.3 M/year

**10. Special Considerations**

Traffic volumes of existing arterial roads are almost at capacity at several points during the peak hours, the shortage of alternative routes for through traffic among Horana road, Galle road and northern areas of CMC is an emergency issue, the extension of Baseline Road is required as an alternative route.

**11. Environmental Impact**

1) Social Environment

- Land Acquisition: Approx. 116,000 m2 of land acquisition is estimated.
- Resettlement : B or C, further detailed investigation is required.
- Other Social Impact: B

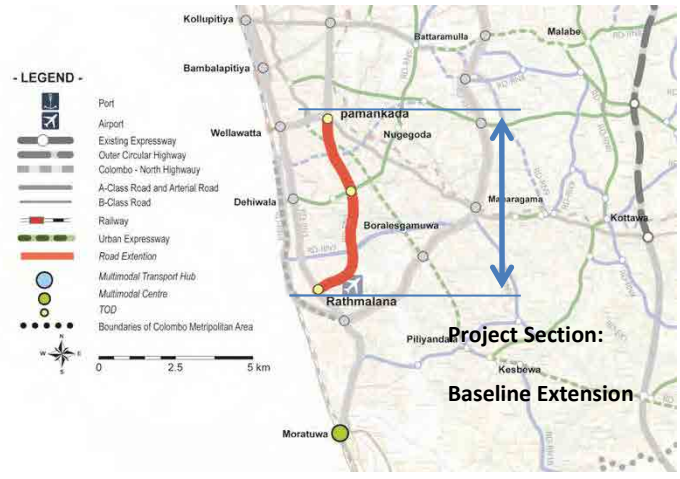
2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:

A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RD-RN4 | Provision of Alternative Road for introducing BRT / Extension of Marine Drive | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport ☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution ☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Proposed extended section of Marine Drive Road between Dehiwala to Rathmalana | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**
- To secure the road traffic capacity at Galle corridor section for the instalment of a future BRT system on Galle corridor
- To provide alternative routes for distributing traffic volume

**2. Expected Benefits**
- For BRT users on Galle corridor: savings in travel time costs and
- Alleviation of traffic congestion

**3. Project Description**
- Extension of Marine Drive Road from Dehiwala Railway Station to Rathmalana East
- Total length: 5.3km, Number of lanes: two
- Elevated structure on the railway ROW

**4. Linkages with Other Projects/Sectors**
- BRT system on Galle Corridor

**5. Important Assumptions (Conditions for the Project)**
Land acquisition (64,000 $m^2$) and limited resettlement are required due to utilization of the space above railway line.

**6. Implementing Agency**
- Road Development Authority

**7. Financing Scheme**
☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**
- Road Development Authority (for Road Maintenance)
- To be determined for BRT operation

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 210.9 Million
Recurrent O & M: US$ 4.2 M/year

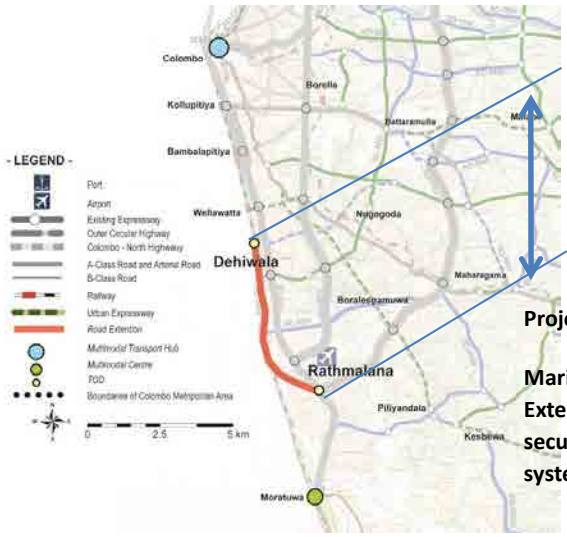
**10. Special Considerations**
Traffic volumes of existing arterial roads are almost at their capacities, the shortage of alternative routes for through traffic between the southern area of CMC and the Port area is an emergency issue, the extension of Marine Drive is required as an alternative route.

**11. Environmental Impact**
1) Social Environment
- Land Acquisition: Approx. 64,000 $m^2$ of land acquisition is estimated.
- Resettlement : B or C, further detailed investigation is required.
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RD-RN5 | Enhancement of Traffic Distribution Function of Road Network / Development of Western Ring Road | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport ☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution ☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Piliyagoda – Rajagiriya - Dehiwala | ☑ Short-term<br>☐ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**
- To distribute traffic volume for mitigation of the existing traffic congestion in CMC and improve the accessibility between the suburbs around CMC.

**2. Expected Benefits**
- Savings in Travel Time Costs
- Alleviation of Traffic Congestion

**3. Project Description**
- Widening of existing road
- Total length: 22.8km, Number of lanes: 4 or 2
- Construction of connecting roads
- Improvement of intersections

**4. Linkages with Other Projects/Sectors**
- TOD developments

**5. Important Assumptions (Conditions for the Project)**
Large land acquisition (254,000 $m^2$) and resettlement are required.

**6. Implementing Agency**
- Road Development Authority

**7. Financing Scheme**
☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 140.4 Million
Recurrent O & M: US$ 2.8 M/year

**10. Special Considerations**
Traffic volumes of existing arterial roads are almost at capacity at several points during the peak hours, the shortage of alternative routes around the CMC boundary for through traffic in CMC area is an emergency issue, an arterial ring road as an alternative route is required.

**11. Environmental Impact**
1) Social Environment
- Land Acquisition: Approx. 254,000 $m^2$ of land acquisition is estimated.
- Resettlement: B or C, further detailed investigation is required.
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RD-RN6 | Enhancement of Traffic Distribution Function of Road Network / Development of Eastern Ring Road | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport
☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Hendala - Hunupitiya – Warakanatta - Sapugaskanda – Bollegala – Malabe – Pannipitiya – Piliyandala - Moratuwa | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**

- To distribute traffic volume for the mitigation of the existing traffic congestion in CMC and improve the accessibility between the suburbs around OCH.

**2. Expected Benefits**

- Savings in Travel Time Costs
- Alleviation of Traffic Congestion

**3. Project Description**

- Widening of existing road
- Total length: 50.6km, Number of lanes: 4 or 2
- Construction of connecting roads between major arterial roads and the suburbs around OCH
- Improvement of intersections

**4. Linkages with Other Projects/Sectors**

- TOD developments

**5. Important Assumptions (Conditions for the Project)**

Large land acquisition (725,000 $m^2$) and resettlement are required.

**6. Implementing Agency**

- Road Development Authority

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 421.6 Million
Recurrent O & M: US$ 8.4 M/year

**10. Special Considerations**

Traffic volumes of existing arterial roads are almost at capacity at several points during the peak hours, the shortage of alternative routes in a north-south direction for through traffic between the CMC boundary and the OCH is an emergency issue, an arterial ring road as an alternative route is required.

**11. Environmental Impact**

1) Social Environment

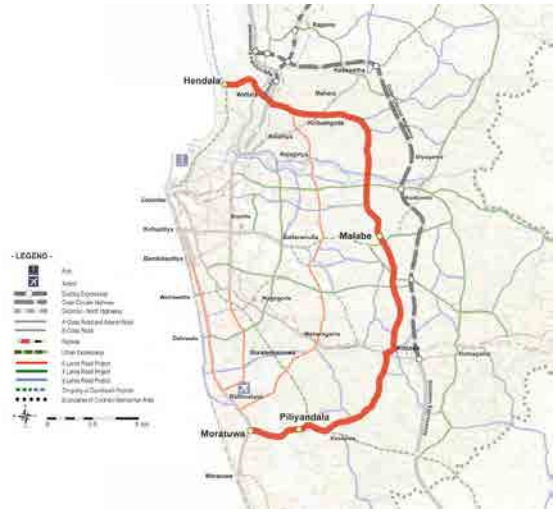
- Land Acquisition: Approx. 254,000 $m^2$ of land acquisition is estimated.
- Resettlement: B or C, further detailed investigation is required.
- Other Social Impact: B

2) Natural Environment

- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RD-EX1 | Construction of New Urban Expressway / Connection Between the SEW and the CKE | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport
☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☐ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Orugodawatta – Borella – Nugegoda – Boralesgamuwa - Kathathuduwa | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**
- To form an urban expressway network connected with south side (Southern Expressway) and CMC central area with a high capacity expressway network.

**2. Expected Benefits**
- Savings in Travel Time Costs
- Alleviation of Traffic Congestion due to long distance trips

**3. Project Description**
- Connection between the SEW and the CKE as an urban expressway (Elevated, dedicated road)
- Total length: 25.5km, Number of lanes: 4
- 4 interchanges with on/off ramp

**4. Linkages with Other Projects/Sectors**
- Southern Expressway
- New Kelani bridge – Kelanitissa JCT
- Port Access Road

**5. Important Assumptions (Conditions for the Project)**
Large land acquisition (391,000 $m^2$) and resettlement are required, even the alignment is planned on paddy field.

**6. Implementing Agency**
- Road Development Authority

**7. Financing Scheme**
☑ Public Sector
☑ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**
- To be discussed, Private operator is possible

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 1,051.9 Million
Recurrent O & M: US$ M/year

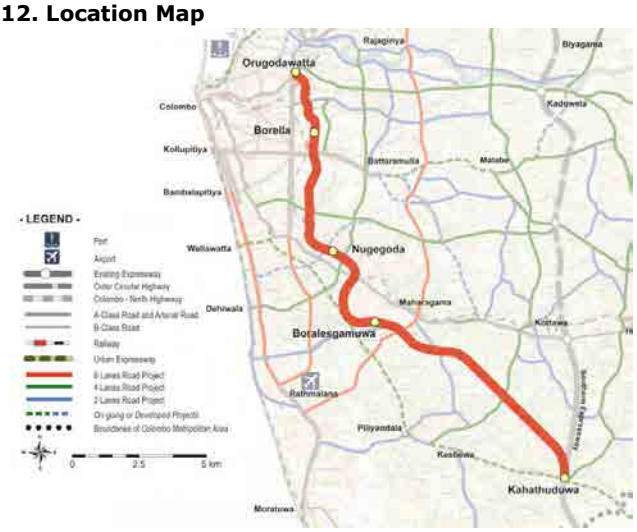
**10. Special Considerations**
- In order to improve the low accessibility between the northern and southern areas of CMC and expressways, additional lines are required as urban expressways to use the existing expressways effectively.

**11. Environmental Impact**
1) Social Environment
- Land Acquisition: Approx. 391,000 $m^2$ of land acquisition is estimated.
- Resettlement: B or C, further detailed investigation is required.
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

**Project ID Code**

RD-EX3

**Project Name**

Construction of New Urban Expressway /
Connection Between New Urban Expressway (RD-EX1) and Port Area

**Transport Sub Sector**

- ☐ Railway and New Transit
- ☐ Bus Transport
- ☑ Road
- ☐ Traffic Management
- ☐ Traffic Safety
- ☐ Environment
- ☐ Urban Planning
- ☐ Institution/Funding

**Urban Transport Policy:**

- ☐ Promotion of Public Transport
- ☑ Alleviation of Traffic Congestion
- ☐ Reduction of Pollution
- ☐ Reduction of Traffic Accident
- ☐ Promotion of Health

**Project Location**

Colombo Port – Port Access Road

**Project Priority**

- ☑ Short-term
- ☐ Medium-term
- ☐ Long-term

**Implementation Period**

Total 5 years

**1. Objectives of Project**

- To form an urban expressway network with a connection from the Colombo Port area to CKE and other expressways via RD-EX1.
- To provide heavy truck and container trailer dedicated route on an elevated road.

**2. Expected Benefits**

- Savings in Travel Time Costs
- Alleviation of Traffic Congestion
- Reducing number of heavy trucks and container trailers on an urban area
- Direct connection for inter-city bus

**3. Project Description**

- Connection between port area and the new urban expressway (RD-EX1)
- Total length: 5.0km, Number of lanes: 4
- 1 interchange and 1 junction are planned

**4. Linkages with Other Projects/Sectors**

- MmTH direct access ramp
- RD-EX1 (Orugodawatta – Kathathuduwa
- New Kelani bridge – Kelanitissa JCT

**5. Important Assumptions (Conditions for the Project)**

Land acquisition and resettlement can be minimised if the alignment is passed within the premises of port

**6. Implementing Agency**

- Road Development Authority

**7. Financing Scheme**

- ☑ Public Sector
- ☑ Public Private Partnership
- ☐ Private Sector Initiative

**8. Expected Operator (if any)**

- To be discussed, Private operator is possible

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 139.0 Million
Recurrent O & M: US$ M/year

**10. Special Considerations**

Installation of custom clearance area within port side.

**11. Environmental Impact**

1) Social Environment
- Land Acquisition: minimum by using the area of port premises.
- Resettlement: B, further investigation is required
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

# CoMTrans PROPOSED PROJECT PROFILE

**Project ID Code**

RD-EX4

**Project Name**

Construction of New Urban Expressway /
Connection Between New Urban Expressway (RD-EX3) and New Fort Station

**Transport Sub Sector**

- ☐ Railway and New Transit
- ☐ Bus Transport
- ☑ Road
- ☐ Traffic Management
- ☐ Traffic Safety
- ☐ Environment
- ☐ Urban Planning
- ☐ Institution/Funding

**Urban Transport Policy:**

- ☑ Promotion of Public Transport
- ☑ Alleviation of Traffic Congestion
- ☐ Reduction of Pollution
- ☐ Reduction of Traffic Accident
- ☐ Promotion of Health

**Project Location**

Port Access Expressway –
MmTH (Multi-modal Transport Hub)

**Project Priority**

- ☑ Short-term
- ☐ Medium-term
- ☐ Long-term

**Implementation Period**

Total 3 years

**1. Objectives of Project**

- To prepare an inter-city bus route from a Multi-modal Transport Hub (MmTH) at Fort station connected to a port access elevated road and further expressway network

**2. Expected Benefits**

- Savings in Travel Time Costs (Inter-city bus)
- Alleviation of Traffic Congestion due to inter-city bus

**3. Project Description**

- Direct ramp connection between port area and the new urban expressway (RD-EX3)
- Total length: 0.8km, Number of lanes: 2 for only limited use
- 1 interchange is planned

**4. Linkages with Other Projects/Sectors**

- Multi-modal Transport Hub (MmTH), especially inter-city bus departure/arrivals

**5. Important Assumptions (Conditions for the Project)**

Enforcement of restriction for entering the access ramp only for inter-city bus

**6. Implementing Agency**

- Road Development Authority

**7. Financing Scheme**

- ☑ Public Sector
- ☑ Public Private Partnership
- ☐ Private Sector Initiative

**8. Expected Operator (if any)**

- To be discussed, Private operator is possible

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 22.2 Million
Recurrent O & M: US$ M/year

**10. Special Considerations**

**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Further investigation is required
- Resettlement: Further investigation is required.
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

# CoMTrans PROPOSED PROJECT PROFILE

| **Project ID Code** | **Project Name** | **Transport Sub Sector** |
|---|---|---|
| RD-FO | Fly-over Installation | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport ☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution ☐ Reduction of Traffic Accident
☐ Promotion of Health

| **Project Location** | **Project Priority** | **Implementation Period** |
|---|---|---|
| Total 25 points<br>Detailed locations are shown in the location map | ☑ Short-term<br>☑ Medium-term<br>☐ Long-term | 2 years/point |

**1. Objectives of Project**
- To increase traffic capacity at intersections with free flow

**2. Expected Benefits**
- Alleviating traffic congestion at each intersection

**3. Project Description**
- Installation of Fly-over ( 25 points )
- Number of lanes: 4 lanes for both directions

**4. Linkages with Other Projects/Sectors**
- Development of Western Ring Road
- Development of Middle Ring Road for BRT Corridor
- Development of Eastern Ring Road
- Baseline Road Extension

**5. Important Assumptions (Conditions for the Project)**
The construction period should be determined by monitoring future traffic demand and the progress of road development plans. Coordination with public transport service is also essential.

**6. Implementing Agency**
- Road Development Authority

**7. Financing Scheme**
☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**
- n.a.

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 57,900 Million
Recurrent O & M: US$ 1,150 M/year

**10. Special Considerations**
Installations of fly-over shall be carried out at the same time that other development plans mentioned above are constructed in the suburban area.

Regarding in the CMC, they shall be determined and carried out considering increasing traffic volumes.

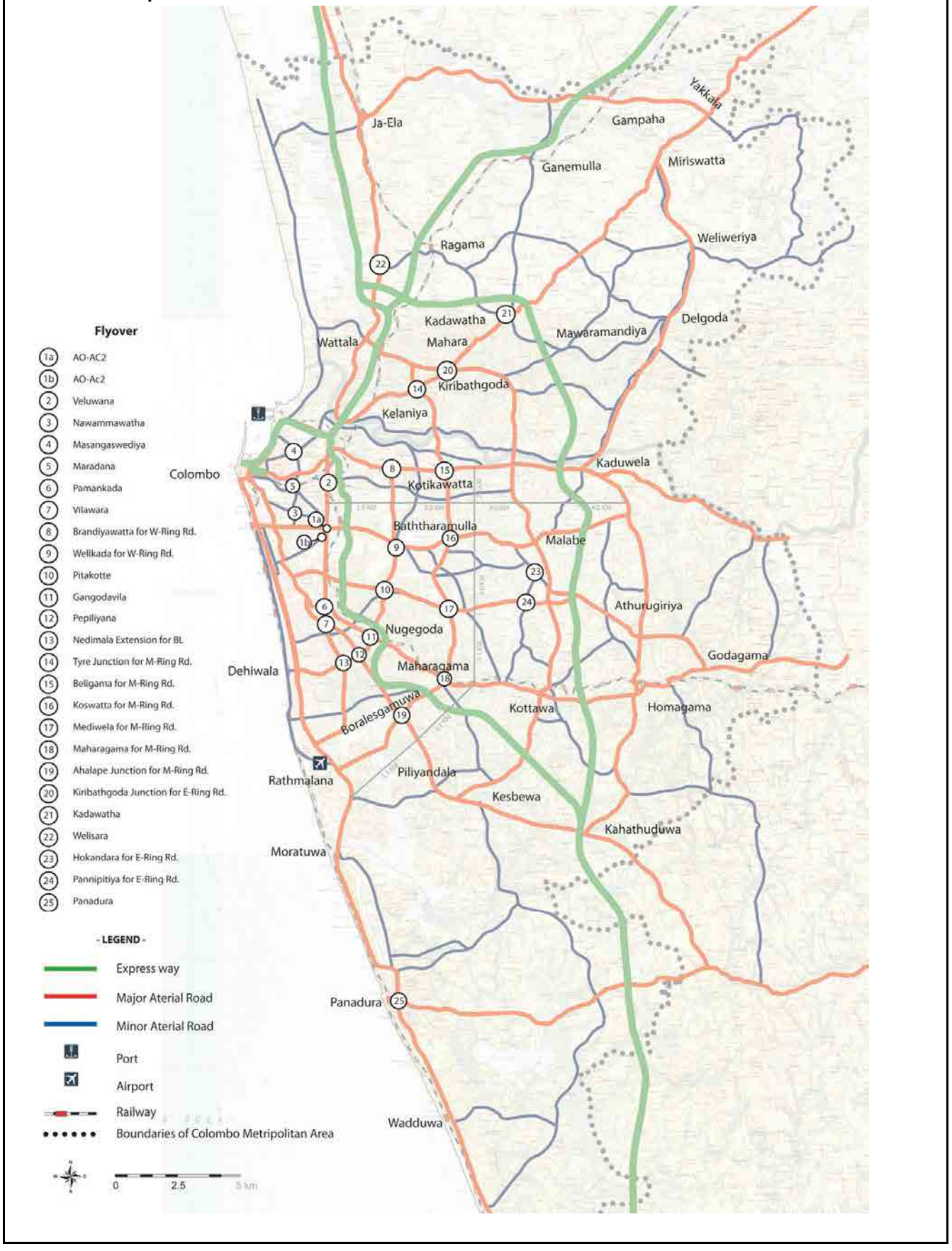
**11. Environmental Impact**

1) Social Environment
- Land Acquisition:
  1,400 ~ 4,200 $m^2$/point
- Resettlement: B or C, further investigation is required.
- Other Social Impact: B

2) Natural Environment
- Air pollution: B
- Noise and vibration: B
- Flooding: B
- Biodiversity: B
- Flora and Fauna: B

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

<table>
<tr><td>Project ID Code<br><br>TM-S1~S3</td><td colspan="3">Project Name<br><br>Traffic Signal Control Improvement</td><td rowspan="3">Transport Sub Sector<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☑ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding</td></tr>
<tr><td colspan="3">Urban Transport Policy:<br>☐ Promotion of Public Transport<br>☑ Alleviation of Traffic Congestion<br>☑ Reduction of Pollution<br>☐ Reduction of Traffic Accident<br>☑ Promotion of Health</td></tr>
<tr><td colspan="2">Project Location<br>Congestion points in Colombo Metropolitan Area</td><td>Project Priority<br>☑ Short-term<br>☑ Medium-term<br>☑ Long-term</td><td>Implementation Period</td></tr>
<tr><td colspan="2">1. Objectives of Project<br>- To alleviate traffic congestion by optimised traffic signal control with an area-wide signal control system</td><td colspan="3">2. Expected Benefits<br>- Reducing in traffic congestion by optimised signal control<br>- Increase in traffic capacity of intersections by signalization at No-signal / Roundabout<br>- Improvement of the environment (noise, air) by reduction of traffic congestion</td></tr>
<tr><td colspan="2">3. Project Description<br><u>Phase1(S1):14.5 Million USD [Short-term]</u><br>- Development of the central control room.<br>- Improvement of traffic signal control along The Priority Route (Improvement:28 locations, New:25 locations)<br><u>Phase2(S2) :27.4 Million USD [Middle-term]</u><br>- Improvement of traffic signal control along to The 2nd Priority Route (Improvement:37 locations, New:93 locations)<br><u>Other(S3) :32.8 Million USD [Long-term]</u><br>- Installation of spot traffic signal control associated with road improvement<br>- Short term Period:16 locations(3.3 Million USD), Intermediate term Period:43 locations(8.8 Million USD), Long term Period 101 locations(20.7 Million USD)</td><td colspan="3">4. Linkages with Other Projects/Sectors<br>- Road improvement (Widening, New Construction)</td></tr>
<tr><td colspan="2">5. Important Assumptions (Conditions for the Project)</td><td colspan="3">6. Implementing Agency<br>- Road Development Authority<br>- Colombo Municipal Council</td></tr>
<tr><td colspan="2">7. Financing Scheme<br>☑ Public Sector<br>☐ Public Private Partnership<br>☐ Private Sector Initiative</td><td colspan="3">8. Expected Operator (if any)<br>- Road Development Authority<br>- Colombo Municipal Council</td></tr>
<tr><td colspan="2">9. Project Cost (in 2013 Constant Price)<br>Initial Investment Cost: US$ 75.0 Million<br>Recurrent O & M: US$ M/year</td><td colspan="3">10. Special Considerations</td></tr>
</table>

# CoMTrans PROPOSED PROJECT PROFILE

**11. Environmental Impact**

1) Social Environment

- Land Acquisition: not major acquisition
- Resettlement: A
- Other Social Impact: B or C, further investigation is required in case of roundabout with bore tree and religious monuments.

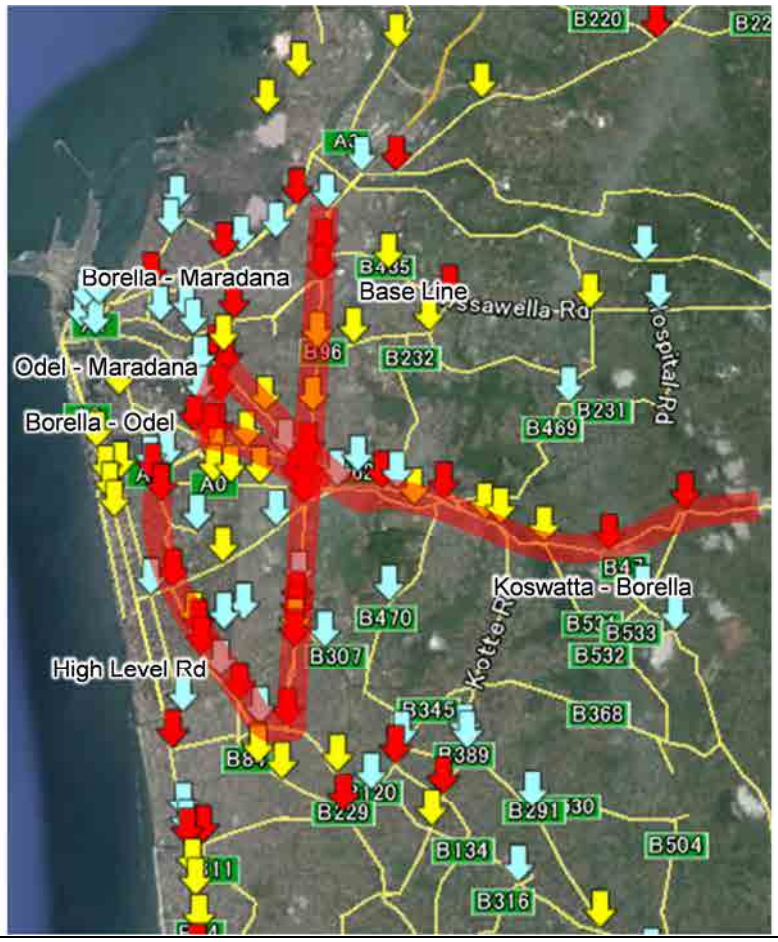
2) Natural Environment

- Air pollution: A
- Noise and vibration: A
- Flooding: B
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

The red colour route shows the Priority Routes for improvement of signal control.



# CoMTrans PROPOSED PROJECT PROFILE

<table>
<tr><td>Project ID Code<br><br>TM-TI1</td><td colspan="2">Project Name<br><br>Traffic Information System</td><td rowspan="2">Transport Sub Sector<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☑ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding</td></tr>
<tr><td colspan="3">Urban Transport Policy:<br>☐ Promotion of Public Transport<br>☑ Alleviation of Traffic Congestion<br>☑ Reduction of Pollution<br>☐ Reduction of Traffic Accident<br>☑ Promotion of Health</td></tr>
<tr><td colspan="2">Project Location<br>Colombo Metropolitan Area</td><td>Project Priority<br>☐ Short-term<br>☑ Medium-term<br>☑ Long-term</td><td>Implementation Period</td></tr>
<tr><td colspan="2">1. Objectives of Project<br>- To maximise the transportation network function by real-time traffic information, road closure information and taffic regulation information.<br>- To guide the driver to select an appropriate route<br>- To optimise traffic flow and distribute traffic to alternative routes</td><td colspan="2">2. Expected Benefits<br>- Reducing in travel time by selecting the optimal route<br>- Increase in drivers' understanding where the congested points are and where the accidents occur.</td></tr>
<tr><td colspan="2">3. Project Description<br><u>Collecting Information</u><br>- Installation of CCTV cameras to detect the traffic situation, especially for sudden events (congestion, accidents) with image processing program at approx. 200 location<br><u>Development of data analysis and equipment to accumulate the data</u><br>- Development of system for detecting sudden events<br>- Development of collection system on accumulated accurate congestion information, road closure information and Traffic regulation information.<br><u>Provision of information</u><br>- Development of dissemination system through internet/SMS/information board on road for reporting traffic congestion information and guiding the alternative route</td><td colspan="2">4. Linkages with Other Projects/Sectors<br>- Current CCTV system<br>- Flyover projects<br>- Monorail alignment at intersections<br>- BRT alignment at intersections<br>- Elevated expressways<br>- Road improvements (Widening, Construction)<br>- Common transport card (IC card) system</td></tr>
<tr><td colspan="2">5. Important Assumptions (Conditions for the Project)<br>The current CCTV's optical cable spread by Traffic Police would be utilised for this system.</td><td colspan="2">6. Implementing Agency<br>- Road Development Authority<br>- Colombo Municipal Council</td></tr>
<tr><td colspan="2">7. Financing Scheme<br>☑ Public Sector<br>☑ Public Private Partnership<br>☐ Private Sector Initiative</td><td colspan="2">8. Expected Operator (if any)<br>- Road Development Authority<br>- Colombo Municipal Council</td></tr>
<tr><td colspan="2">9. Project Cost (in 2013 Constant Price)<br>Initial Investment Cost: US$ 33.0 Million<br>Recurrent O & M: US$ M/year</td><td colspan="2">10. Special Considerations</td></tr>
</table>

# CoMTrans PROPOSED PROJECT PROFILE

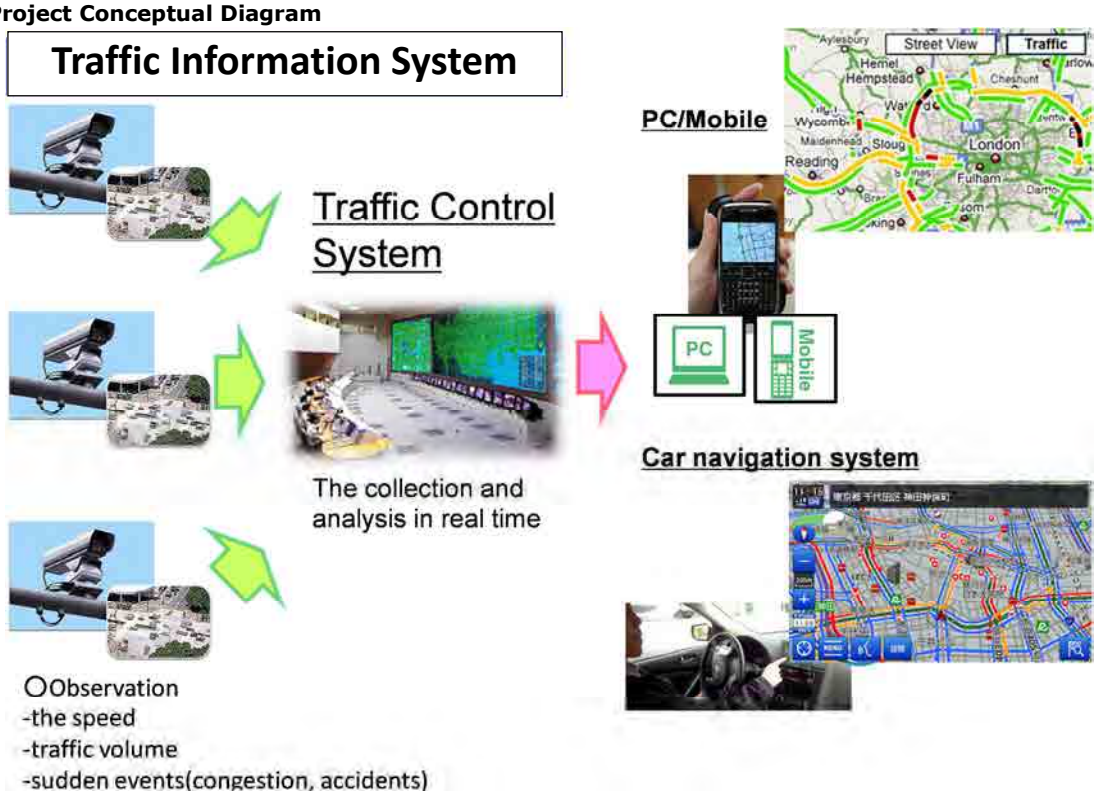
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: A
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Project Conceptual Diagram**



# CoMTrans PROPOSED PROJECT PROFILE

| **Project ID Code** | **Project Name** | **Transport Sub Sector** |
|---|---|---|
| TM-BL1,BL2 | Bus Priority System + Bus Location System for BRT | ☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☑ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☑ Promotion of Public Transport ☑ Alleviation of Traffic Congestion
☑ Reduction of Pollution ☐ Reduction of Traffic Accident
☑ Promotion of Health

| **Project Location** | **Project Priority** | **Implementation Period** |
|---|---|---|
| Development in accordance with the development of BRT ( BRT; Phase1, Phase2) | ☑ Short-term<br>☑ Medium-term<br>☐ Long-term | |

**1. Objectives of Project**

[Bus Priority System]

- To improve the bus service level for users by ensuring punctual bus operation and operational speeds

[BRT Bus Location System]

- To ensure an appropriate traffic control for BRT
- To disseminate accurate information for BRT services such as bus arrival time, delayed schedule
- To promote a modal shift to public transport service

**2. Expected Benefits**

- Realisation of BRT system by ensuring travel speed and reliability
- Reduction of traffic congestion
- Improvement of the environment (noise, air) and time loss by promotion of change to public transport

**3. Project Description**

Collecting Information

- Installation of RFID tag on each BRT bus (Phase1:121 buses, Phase2: 78 buses)
- Installation of RFID receiving equipment at the Bus stops and the major intersections (Phase1: about 90 locations, Phase2: about 70 locations)

Development of data analysis and equipment to accumulate the data

- Development of system to adjust the phasing time of the signals
  - This system is to analyse "extend/ shorten" the signal time in the direction of travel of the BRT for priority passage, and to control the signals by communicating information to each signal controller
- Development of system for the collection of the travelling status information (Location, Pathway, Travel speed)

Provision of information

- Development of a system for providing traffic information on the web/SMS
- User: WEB (PC, Mobile), Bus stop: information board, Bus user :information board, Operation Manager: WEB (PC, Mobile)

**4. Linkages with Other Projects/Sectors**

- BRT system and operation
- Traffic Information system
-

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**

- Road Development Authority
- Colombo Municipal Council
- Ministry of Transport
- Western Province Road Passenger Transport Authority
- Traffic police

# CoMTrans PROPOSED PROJECT PROFILE

**7. Financing Scheme**

☑ Public Sector

☑ Public Private Partnership

☐ Private Sector Initiative

**8. Expected Operator (if any)**

- To be discussed.

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 5.0 Million

Recurrent O & M: US$ M/year

**10. Special Considerations**

Traffic congestion on the minor roads along BRT route should be carefully discussed.

**11. Environmental Impact**

1) Social Environment

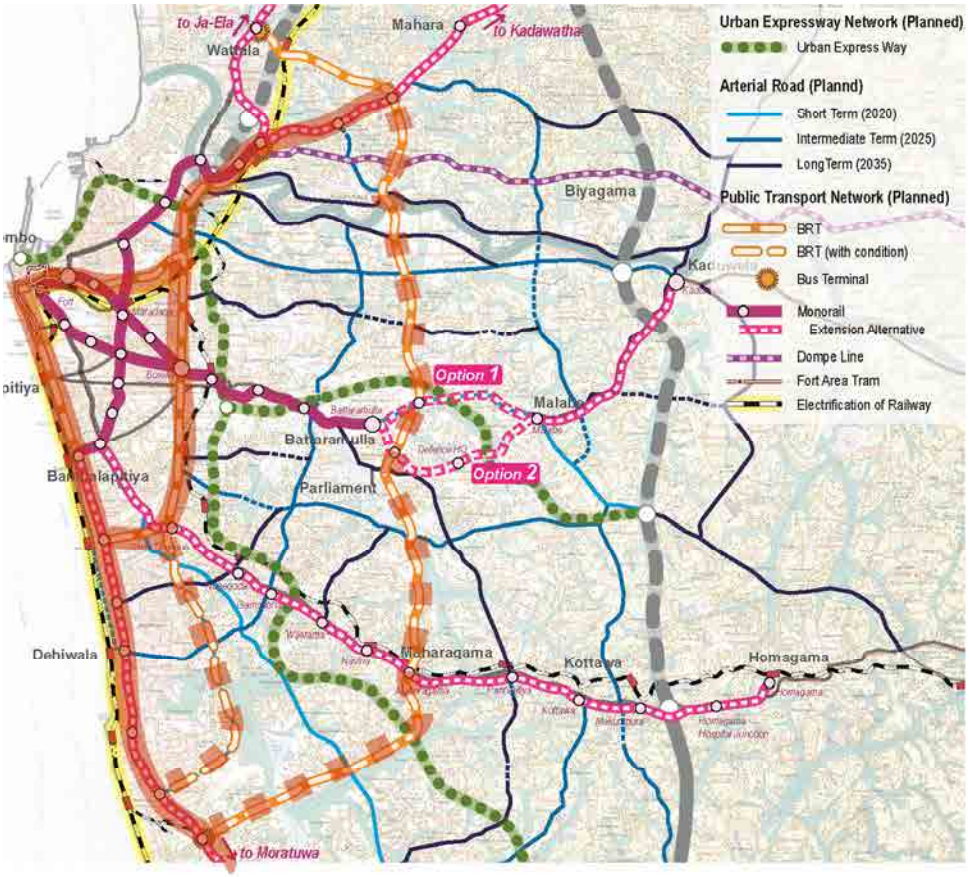
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment

- Air pollution: A
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

<table>
<tr><td>Project ID Code<br>TM-BL3</td><td colspan="2">Project Name<br>Bus Location System for Public/Private Buses</td><td rowspan="3">Transport Sub Sector<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☑ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding</td></tr>
<tr><td colspan="3">Urban Transport Policy:<br>☑ Promotion of Public Transport ☑ Alleviation of Traffic Congestion<br>☑ Reduction of Pollution ☐ Reduction of Traffic Accident<br>☑ Promotion of Health</td></tr>
<tr><td>Project Location<br>Colombo Metropolitan Area</td><td>Project Priority<br>☐ Short-term<br>☑ Medium-term<br>☐ Long-term</td><td>Implementation Period</td></tr>
<tr><td colspan="2">1. Objectives of Project<br>[Operation Manager]<br>- To understand the current situation of each bus operational status (GPS positioning system, Pathway, and Travel speed with driving record system)<br>- To analysis appropriate bus routes and instruct its route by an operation manager<br>[Bus User]<br>- To improve the level of bus services such as dissemination of bus arrival time and ensure punctual bus operation<br>- To promote bus transport services from private mode</td><td colspan="2">2. Expected Benefits<br>- Improvement of convenience to the users of Public buses by Development of optimised bus routes<br>- Reduction of traffic congestion<br>- Improvement of the environment (noise, air) and time loss by promotion of change to public transport</td></tr>
<tr><td colspan="2">3. Project Description<br><u>Collecting Information</u><br>- Installation of equipment for transmitting location information on each bus (about 1,000 buses)<br><u>Development of data analysis and equipment to accumulate the data</u><br>- Development of a system for the collection of the travelling status information (Location, Pathway, Travel speed)<br><u>Provision of information</u><br>- Development of a system for providing traffic information on the web<br>- User: WEB (PC, Mobile), Operation Manager : WEB (PC, Mobile)</td><td colspan="2">4. Linkages with Other Projects/Sectors<br>- BRT Installation<br>- Traffic information system<br>- Common transport card (IC card) system</td></tr>
<tr><td colspan="2">5. Important Assumptions (Conditions for the Project)</td><td colspan="2">6. Implementing Agency<br>- Ministry of Transport<br>- CMC<br>- Traffic police</td></tr>
<tr><td colspan="2">7. Financing Scheme<br>☑ Public Sector<br>☑ Public Private Partnership<br>☐ Private Sector Initiative</td><td colspan="2">8. Expected Operator (if any)<br>- To be discussed</td></tr>
<tr><td colspan="2">9. Project Cost (in 2013 Constant Price)<br>Initial Investment Cost: US$ 1.0 Million<br>Recurrent O & M: US$ M/year</td><td colspan="2">10. Special Considerations<br>Institutional arrangement should be carefully designed.</td></tr>
</table>

# CoMTrans PROPOSED PROJECT PROFILE

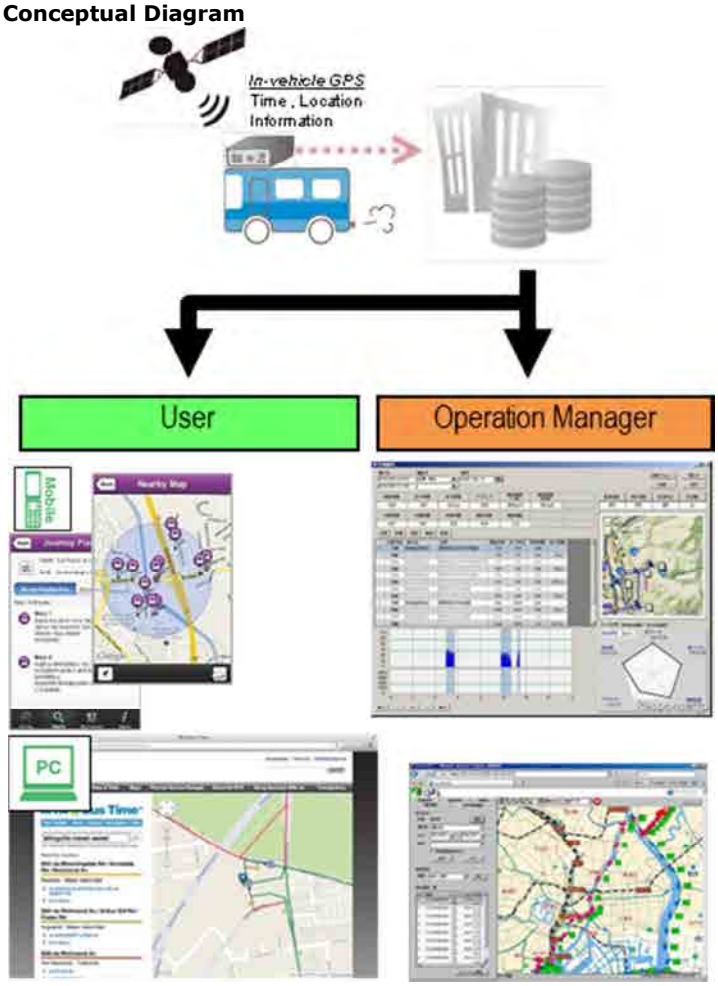
**11. Environmental Impact**

1) Social Environment
- Land Acquisition: A
- Resettlement: A
- Other Social Impact: B

2) Natural Environment
- Air pollution: A
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Project Conceptual Diagram**



# CoMTrans PROPOSED PROJECT PROFILE

| **Project ID Code** | **Project Name** | **Transport Sub Sector** |
|---|---|---|
| TM-P1 | Parking Information System | ☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☑ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport ☑ Alleviation of Traffic Congestion
☐ Reduction of Pollution ☐ Reduction of Traffic Accident
☐ Promotion of Health

| **Project Location** | **Project Priority** | **Implementation Period** |
|---|---|---|
| Public parking and P&R station, possibility to link to private car parking | ☐ Short-term<br>☐ Medium-term<br>Long-term | |

**1. Objectives of Project**
- To prevent cars from prowling for looking for parking area by providing parking location information and full/empty status of each parking facility

**2. Expected Benefits**
- Reduction of traffic congestion in the around parking areas by reduction of traffic prowling

**3. Project Description**

Collecting Information/ Data Clearing House

- Development of a system for collection of parking Full/Empty information system for transmission of information from each parking administrator (The use of PC, and Mobile), and of processing guidance information based on the collected data

Provision of information

- Development of system for providing information via road side display board and internet/SMS

**4. Linkages with Other Projects/Sectors**
-

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**
- To be discussed among Ministry of Transport, CMC, RDA and traffic police

**7. Financing Scheme**
☑ Public Sector
☑ Public Private Partnership
☑ Private Sector Initiative

**8. Expected Operator (if any)**
- To be discussed

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$ 25.0 Million
Recurrent O & M: US$ M/year

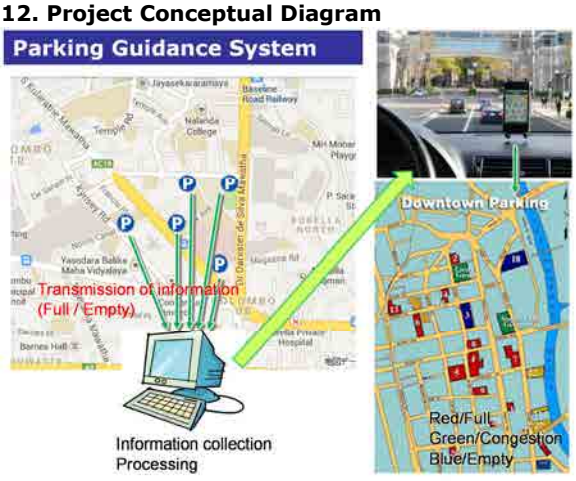
**10. Special Considerations**
Institutional arrangement should be carefully designed

**11. Environmental Impact**
1) Social Environment
- Land Acquisition: Not Required
- Resettlement :A
- Other Social Impact: B

2) Natural Environment
- Air pollution: A
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Project Conceptual Diagram**



# CoMTrans PROPOSED PROJECT PROFILE

| **Project ID Code** | **Project Name** | **Transport Sub Sector** |
|---|---|---|
| TM-ERP | ERP (Electric Road Pricing) System | ☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☑ Traffic Management<br>☐ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport ☑ Alleviation of Traffic Congestion
☑ Reduction of Pollution ☐ Reduction of Traffic Accident
☑ Promotion of Health

| **Project Location** | **Project Priority** | **Implementation Period** |
|---|---|---|
| CMC Boundary | ☐ Short-term<br>☑ Medium-term<br>☐ Long-term | |

**1. Objectives of Project**

- To reduce vehicles entering the city of Colombo
- To promote a modal shift from private car use to public transport by charging a fee for entering CMC

**2. Expected Benefits**

- Modal shift for current private mode user to public transport
- Improvement of the environment (noise, air) and reduction of travel time by alleviation of traffic congestion

**3. Project Description**

Collecting Information

- Construction of non-stop toll gates at main routes through the CMC Boundary (15 locations: see location map).
- Development of recognition system with passed vehicle at toll gate
- Development of violated vehicle tracking system

Charging system

- Installation of fee payment machines
- Installation of fee payment instruments in Colombo city (about 100 locations)

**4. Linkages with Other Projects/Sectors**

- Monorail
- Railway
- BRT
- P&R facilities
- Multi-modal Centres (MMCs)
- Bus services

**5. Important Assumptions (Conditions for the Project)**

Acceptance of ERP system within a civil society

Legalisation of traffic regulation and penalty system

**6. Implementing Agency**

- Road Development Authority
- Colombo Municipal Council
- Traffic police

**7. Financing Scheme**

☑ Public Sector
☑ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

- To be discussed

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$ 19.0 Million
Recurrent O & M: US$ M/year

**10. Special Considerations**

It should be discussed whether the revenue from ERP system could be earmarked for the budget of the public transport system.

# CoMTrans PROPOSED PROJECT PROFILE

**11. Environmental Impact**

1) Social Environment

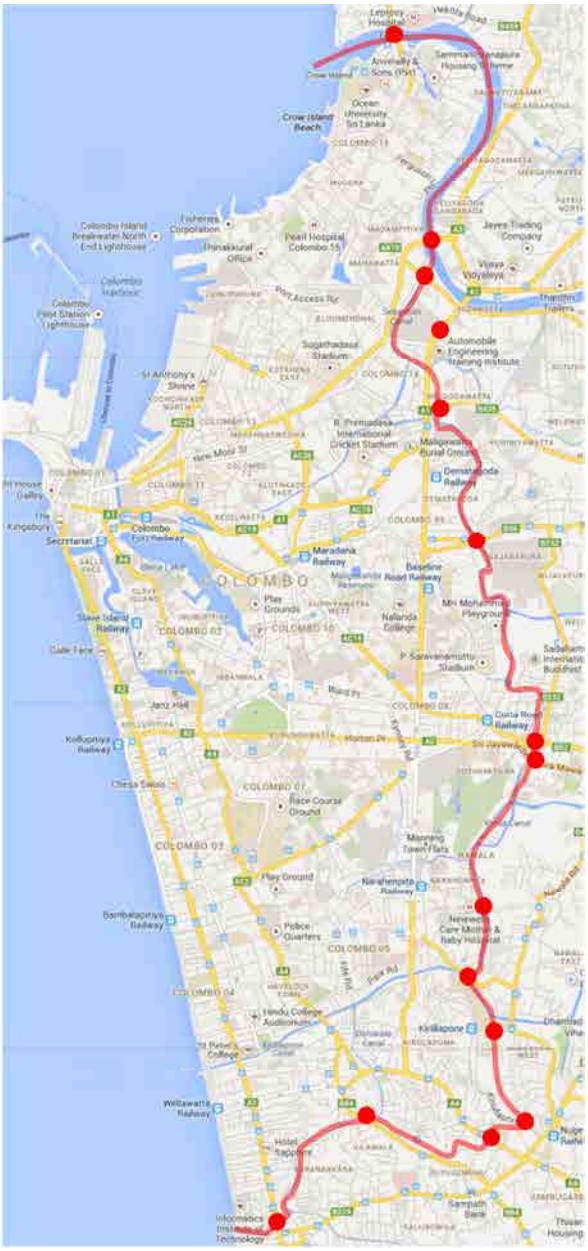
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment

- Air pollution: B
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**



# CoMTrans PROPOSED PROJECT PROFILE

| Project ID Code | Project Name | Transport Sub Sector |
|---|---|---|
| RS-1 | Education for Road Safety / Tight Control of Driver's Licence | ☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☑ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☑ Reduction of Traffic Accident
☐ Promotion of Health

| Project Location | Project Priority | Implementation Period |
|---|---|---|
| Colombo Metropotitan Area | ☑ Short-term<br>☐ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**

- To improve drivers' skill and manner
- To improve traffic manner of pedestrians

**2. Expected Benefits**

- Reduction of fatalities in traffic accident

**3. Project Description**

- Road Safety education in school
- Awareness programs for public transport drivers (Bus, Three wheeler)
- Awareness programs for young riders and old pedestrians
- Improve education before issuing driver's license
- Tightening driver's license examination
- Tight controls on drivers without a license
-

**4. Linkages with Other Projects/Sectors**

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**

- Ministry of Transport, Department of Motor Traffic and National Council for Road Safety
- Traffic Police

**7. Financing Scheme**

☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

**9. Project Cost (in 2013 Constant Price)**

Initial Investment Cost: US$_____Million_____
Recurrent O & M: US$_____M/year_____

**10. Special Considerations**

Fatalities of young riders and older pedestrians in traffic accidents are comparatively high in the Western Province. Young drivers and riders are primary responsible offender of fatal accidents.

**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Not necessary
- Resettlement: A
- Other Social Impact: A

2) Natural Environment
- Air pollution: A
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

**n.a.**

# CoMTrans PROPOSED PROJECT PROFILE

| **Project ID Code** | **Project Name** | **Transport Sub Sector** |
|---|---|---|
| RS-2 | Installation or Improvement of Pedestrian Crossing and Sidewalk | ☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☑ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |

**Urban Transport Policy:**

☐ Promotion of Public Transport
☐ Alleviation of Traffic Congestion
☐ Reduction of Pollution
☑ Reduction of Traffic Accident
☐ Promotion of Health

| **Project Location** | **Project Priority** | **Implementation Period** |
|---|---|---|
| Location where the frequent traffic accident with pedestrian happens. (CMC, Negombo Road, etc.) | ☑ Short-term<br>☑ Medium-term<br>☐ Long-term | Total 5 years |

**1. Objectives of Project**
- To decrease pedestrian accidents on roadside
- To decrease pedestrian accidents when they are crossing a road

**2. Expected Benefits**
- Reduction of pedestrian fatalities

**3. Project Description**
- Improvement of sidewalks
- Installation of guardrails
- Installation of pedestrian crossings
- Installation of traffic light at intersection and pedestrian crossing
- Installation of road traffic signs and warning board of a pedestrian crossing

**4. Linkages with Other Projects/Sectors**
- Development/improvement of roads

**5. Important Assumptions (Conditions for the Project)**

**6. Implementing Agency**
- Traffic Police
- Road Development Authority
- CMC

**7. Financing Scheme**
☑ Public Sector
☐ Public Private Partnership
☐ Private Sector Initiative

**8. Expected Operator (if any)**

**9. Project Cost (in 2013 Constant Price)**
Initial Investment Cost: US$____Million__
Recurrent O & M: US$____M/year

**10. Special Considerations**
43% of fatalities in traffic accidents involved pedestrians in the Western Province in 2012.

**11. Environmental Impact**

1) Social Environment
- Land Acquisition: Not major required
- Resettlement :B
- Other Social Impact: B

2) Natural Environment
- Air pollution: A
- Noise and vibration: A
- Flooding: A
- Biodiversity: A
- Flora and Fauna: A

[Legend]:
A: No Impact
B: Moderate Impact
C: Serious Impact

**12. Location Map**

n.a.

# CoMTrans PROPOSED PROJECT PROFILE

<table>
<tr><td>Project ID Code<br><br>RS-3</td><td colspan="2">Project Name<br><br>Enforcement of Safety Measures on 7 Corridors to Reduce Traffic Accidents</td><td rowspan="2">Transport Sub Sector<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☑ Road<br>☐ Traffic Management<br>☑ Traffic Safety<br>☐ Environment<br>☐ Urban Planning<br>☐ Institution/Funding</td></tr>
<tr><td colspan="3">Urban Transport Policy:<br>☐ Promotion of Public Transport<br>☐ Alleviation of Traffic Congestion<br>☐ Reduction of Pollution<br>☑ Reduction of Traffic Accident<br>☐ Promotion of Health</td></tr>
<tr><td>Project Location<br>Location where the frequent traffic accident happens.<br>(e.g. 7 Corridors)</td><td>Project Priority<br>☑ Short-term<br>☑ Medium-term<br>☐ Long-term</td><td>Implementation Period<br>Total 5 years</td><td></td></tr>
<tr><td colspan="2">1. Objectives of Project<br>- To decrease head on accidents<br>- To decrease accidents during overtaking<br>- To decrease accidents during night time</td><td colspan="2">2. Expected Benefits<br>- Reduction of fatalities in vehicle traffic accidents</td></tr>
<tr><td colspan="2">3. Project Description<br>- Installation of Centre Median<br>- Installation of Ramble Strip<br>- Introducing Fast lane<br>- Introducing No-passing zone<br>- Increase and improve roadside lights</td><td colspan="2">4. Linkages with Other Projects/Sectors<br>- Development/improvement of roads</td></tr>
<tr><td colspan="2">5. Important Assumptions (Conditions for the Project)</td><td colspan="2">6. Implementing Agency<br>- Traffic Police<br>- Road Development Authority</td></tr>
<tr><td colspan="2">7. Financing Scheme<br>☑ Public Sector<br>☐ Public Private Partnership<br>☐ Private Sector Initiative</td><td colspan="2">8. Expected Operator (if any)</td></tr>
<tr><td colspan="2">9. Project Cost (in 2013 Constant Price)<br>Initial Investment Cost: US$ Million<br>Recurrent O & M: US$ M/year</td><td colspan="2">10. Special Considerations<br>Except pedestrian related accidents, the major types of fatal accidents are “head on crash” and “in conjunction with overtaking” in the Western Province.</td></tr>
<tr><td colspan="2">11. Environmental Impact<br>1) Social Environment<br>- Land Acquisition: Not major required<br>- Resettlement :B<br>- Other Social Impact: B<br>2) Natural Environment<br>- Air pollution: A<br>- Noise and vibration: A<br>- Flooding: A<br>- Biodiversity: A<br>- Flora and Fauna: A<br><br>[Legend]:<br>A: No Impact<br>B: Moderate Impact<br>C: Serious Impact</td><td colspan="2">12. Location Map<br><br>n.a.</td></tr>
</table>

# CoMTrans PROPOSED PROJECT PROFILE

| **Project ID Code** EN-01 | **Project Name** Air Emission Standard for Vehicles | **Transport Sub Sector** |
|---|---|---|
| **Urban Transport Policy:**<br>☐ Promotion of Public Transport<br>☒ Reduction of Pollution/ Promotion of Health<br>☐ Alleviation of Traffic Congestion<br>☐ Reduction of Traffic Accident | | ☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☒ Environment<br>☐ Urban Planning<br>☒ Institution/Funding |
| **Project Location** n.a. | **Project Priority**<br>☑ Short-term<br>☐ Medium-term<br>☐ Long-term | **Implementation Period** 3 years |

| | |
|---|---|
| **1. Objectives of Project**<br>- To establish and enhance of emission standard for vehicles.<br>- To reduce air emission generated from transport sector. | **2. Expected Benefits**<br>- Contributing to improvement of air quality in Colombo area |
| **3. Project Description**<br>- Review of existing emission standards<br>- Establishing and enhancement of emission standards for newly manufactured vehicles and for vehicles newly imported to the country. | **4. Linkages with Other Projects/Sectors**<br>Vehicles inspection and maintenance programmes (EN-02) |
| **5. Important Assumptions (Conditions for the Project)**<br>None | **6. Implementing Agency**<br>Air Resource Management Centre (AirMAC) |
| **7. Financing Scheme**<br>☐ Public Sector | **8. Expected Operator (if any)**<br>n.a. |
| **9. Project Cost (in 2013 Constant Price)**<br>Management cost | **10. Special Considerations**<br>None |
| **11. Environmental Impact**<br>Positive | **12. Location Map**<br>n.a. |

| **Project ID Code** EN-02 | **Project Name** Vehicles Inspection and Maintenance Programmes | **Transport Sub Sector** |
|---|---|---|
| **Urban Transport Policy:**<br>☐ Promotion of Public Transport<br>☒ Reduction of Pollution/ Promotion of Health<br>☐ Alleviation of Traffic Congestion<br>☐ Reduction of Traffic Accident | | ☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☒ Environment<br>☐ Urban Planning<br>☒ Institution/Funding |
| **Project Location** n.a. | **Project Priority**<br>☒ Short-term<br>☐ Medium-term<br>☐ Long-term | **Implementation Period** 3 years |

| | |
|---|---|
| **1. Objectives of Project**<br>- To improve a vehicle inspection and maintenance programme for the checking of air emissions. | **2. Expected Benefits**<br>- Air emissions from vehicles shall be within the vehicle emission standards resulting in improvement of air quality. |
| **3. Project Description**<br>- Capacity building for VET centre technicians<br>- Improvement of inspection and maintenance facilities<br>- Audit the performance of inspectors<br>- Increase the awareness of the public | **4. Linkages with Other Projects/Sectors**<br>Air emission standard for vehicles (EN-01) |
| **5. Important Assumptions (Conditions for the Project)**<br>None | **6. Implementing Agency**<br>- Department of Motor Traffic<br>- Air Resource Management Centre (AirMAC) |
| **7. Financing Scheme**<br>☐ Public Private Partnership | **8. Expected Operator (if any)**<br>Private Sector Participation |

# CoMTrans PROPOSED PROJECT PROFILE

| **9. Project Cost (in 2013 Constant Price)**<br>Management cost | **10. Special Considerations**<br>None |
|---|---|
| **11. Environmental Impact**<br>Positive | **12. Location Map**<br>n.a. |

| **Project ID Code**<br>EN-03 | **Project Name**<br>Low Sulphur Diesel Programmes | **Transport Sub Sector**<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☒ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |
|---|---|---|

**Urban Transport Policy:**

☐ Promotion of Public Transport ☐ Alleviation of Traffic Congestion
☒ Reduction of Pollution/ Promotion of Health ☐ Reduction of Traffic Accident

| **Project Location**<br>n.a. | **Project Priority**<br>☐ Short-term<br>☒ Medium-term<br>☐ Long-term | **Implementation Period**<br>5 - 10 years |
|---|---|---|

| **1. Objectives of Project**<br>- To improve a fuel quality, by reducing a sulphur content in diesel. | **2. Expected Benefits**<br>- Improvement of air quality |
|---|---|
| **3. Project Description**<br>Establishment of a mechanism to collaborate with the refinery sector to supply low sulpher diesel fuel | **4. Linkages with Other Projects/Sectors**<br>Air emission standard for vehicles (EN-01) |
| **5. Important Assumptions (Conditions for the Project)**<br>None | **6. Implementing Agency**<br>Ministry of Environment/Ministry of Petroleum Resource |
| **7. Financing Scheme**<br>☐ Public Private Partnership | **8. Expected Operator (if any)**<br>n.a. |
| **9. Project Cost (in 2013 Constant Price)**<br>Project cost will include an upgrade of a refinery. The cost shall be further refined. | **10. Special Considerations**<br>None |
| **11. Environmental Impact**<br>Positive | **12. Location Map**<br>n.a. |

| **Project ID Code**<br>EN-04 | **Project Name**<br>Promotion of Natural Gas Vehicles | **Transport Sub Sector**<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☒ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |
|---|---|---|

**Urban Transport Policy:**

☐ Promotion of Public Transport ☐ Alleviation of Traffic Congestion
☒ Reduction of Pollution/ Promotion of Health ☐ Reduction of Traffic Accident

| **Project Location**<br>n.a. | **Project Priority**<br>☐ Short-term<br>☒ Medium-term<br>☐ Long-term | **Implementation Period**<br>5 - 10 years |
|---|---|---|

| **1. Objectives of Project**<br>- To promote Natural Gas Vehicles in order to reduce air pollutants | **2. Expected Benefits**<br>- Improvement of air quality |
|---|---|
| **3. Project Description**<br>Establish a strategy for a promotion of Natural Gas Vehicles including<br>- Conversion of engine configuration for Natural Gas | **4. Linkages with Other Projects/Sectors**<br>n.a. |

# CoMTrans PROPOSED PROJECT PROFILE

| | |
|---|---|
| - Promotion of sufficient refueling stations | |
| **5. Important Assumptions (Conditions for the Project)**<br>None | **6. Implementing Agency**<br>Ministry of Environment |
| **7. Financing Scheme**<br>☐ Public Sector<br>☐ Private Sector Initiative | **8. Expected Operator (if any)**<br>n.a. |
| **9. Project Cost (in 2013 Constant Price)**<br>Project cost will include the installation of refueling stations. The cost shall be further refined. | **10. Special Considerations**<br>None |
| **11. Environmental Impact**<br>Positive | **12. Location Map**<br>n.a. |

| | | | |
|---|---|---|---|
| **Project ID Code**<br>EN-05 | **Project Name**<br>Promotion of Hybrid Cars and Electric Vehicles | | **Transport Sub Sector**<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☐ Traffic Management<br>☐ Traffic Safety<br>☒ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |
| **Urban Transport Policy:**<br>☐ Promotion of Public Transport<br>☒ Reduction of Pollution/ Promotion of Health<br>☐ Alleviation of Traffic Congestion<br>☐ Reduction of Traffic Accident | | | |
| **Project Location**<br>n.a. | **Project Priority**<br>☒ Short-term<br>☐ Medium-term<br>☐ Long-term | **Implementation Period**<br>1-3 years | |

| | |
|---|---|
| **1. Objectives of Project**<br>- To promote Hybrid Cars and Electric vehicles in order to reduce air pollutants | **2. Expected Benefits**<br>- Improvement of air quality<br>- Efficient use of natural resource |
| **3. Project Description**<br>Establish a strategy for the promotion of Hybrid Cars and Electric vehicles including<br>- Detail study for economic benefit<br>- Enhance tax incentive | **4. Linkages with Other Projects/Sectors**<br>n.a. |
| **5. Important Assumptions (Conditions for the Project)**<br>None | **6. Implementing Agency**<br>Ministry of Environment |
| **7. Financing Scheme**<br>☐ Public Sector<br>☐ Private Sector Initiative | **8. Expected Operator (if any)**<br>n.a. |
| **9. Project Cost (in 2013 Constant Price)**<br>Project cost will include installation of battery charging stations. The cost shall be further refined. | **10. Special Considerations**<br>None |
| **11. Environmental Impact**<br>Positive | **12. Location Map**<br>n.a. |

# CoMTrans PROPOSED PROJECT PROFILE

| | | |
|---|---|---|
| **Project ID Code**<br>EN-06 | **Project Name**<br>Promotion of Walking and Bicycles | **Transport Sub Sector**<br>☐ Railway and New Transit<br>☐ Bus Transport<br>☐ Road<br>☒ Traffic Management<br>☐ Traffic Safety<br>☒ Environment<br>☐ Urban Planning<br>☐ Institution/Funding |
| **Urban Transport Policy:**<br>☐ Promotion of Public Transport<br>☒ Reduction of Pollution/ Promotion of Health<br>☐ Alleviation of Traffic Congestion<br>☐ Reduction of Traffic Accident | | |
| **Project Location**<br>n.a. | **Project Priority**<br>☐ Short-term<br>☒ Medium-term<br>☐ Long-term | **Implementation Period**<br>5 years |

| | |
|---|---|
| **1. Objectives of Project**<br>- To promote Walking and Bicycle for energy saving in transport and for promoting health | **2. Expected Benefits**<br>- Promoting non-motorised modes of transport (sustainable transport)<br>- Contribution to reduction of net traffic<br>- Improving public health |
| **3. Project Description**<br>Development of a pedestrian path network as well as a pedestrian/bicycle road network, connecting key features including parks, wetland, coastal line and a river. | **4. Linkages with Other Projects/Sectors**<br>n.a. |
| **5. Important Assumptions (Conditions for the Project)**<br>None | **6. Implementing Agency**<br>CMC and relevant municipalities |
| **7. Financing Scheme**<br>☐ Public Sector | **8. Expected Operator (if any)**<br>n.a. |
| **9. Project Cost (in 2013 Constant Price)**<br>Minor to medium cost for the establishment of pedestrian and/or bicycle paths. | **10. Special Considerations**<br>None |
| **11. Environmental Impact**<br>Positive | **12. Location Map**<br>n.a. |