

# VADODARA CITY BUS SERVICE

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## 8.0 Vadodara City Bus Service

### 8.1 Context

Vadodara lies on the Ahmedabad-Mumbai route which is known as the Golden Corridor. As per census 2001, the population in the Vadodara Mahanagar Seva Sadan (VMSS or the Vadodara Municipal Corporation) jurisdiction is 14.11 lakhs which in 2009 has grown to 15.8 lakhs as per projections.

### 8.2 Situation before Implementation of the Project

#### *8.2.1 Existing System of Bus Service*

The City Bus Service was primarily run by the Gujarat State Road Transport Corporation (GSRTC). The bus fleet operating within the city declined from 200 in 2003 to 85 in 2005. The frequency of buses also reduced to hourly during the daytime. Buses were inefficient and used diesel fuel. The operation had inadequate coverage and hence the consumers suffered. There was high non-revenue component due to wastage, pilferage, and ticket-less riders and thus suffered from unaccounted-for losses. There were no plans to increase the fleet or plans to hand over the city-bus operations to VMSS, as it was initiated in other cities of Gujarat.

On the other hand, the private vehicle ownership was increasing at a high rate of 8 to 9 % per year. The modal split of the populace shows a dependence on motorcycles (60%) followed by private four wheelers (25%) and auto rickshaws (15%). There was a high demand of efficient public transport system from local councilors, citizens, media and students of schools.

VMSS took up the initiative of organizing a city bus service on the basis of public private partnership. They felt that an efficient mass transportation system was needed for sustainability of not only the economy of the city but also for reducing pollution stress on the environment.

#### *8.2.2 Problems and Needs Addressed by the Project*

The City Bus Service was intended to overcome the following issues.

- Increasing vehicular pollution;
- Growing number of vehicle ownership;
- Increasing number of private vehicles (e.g. auto rickshaws, two wheelers and cars) on the roads;
- Lack of affordable and reliable city buses; and
- Lack of public transport system.

### ***8.2.3 Reason for Adoption of City Bus Service***

VMSS adapted public-private partnership initiative since it promised to generate revenues for the city without any investments or expenditure. Additionally, all the buses run on CNG (Compressed Natural Gas) which is an environment friendly fuel.

### ***8.2.4 Preparation of Feasibility Study***

VMSS studied the models of Surat, Bhavnagar, Rajkot and other City Bus Services of India and accordingly selected the best model for VMSS City Bus Service privatization. The private contractor also conducted a feasibility study based on the routes and bus stops provided by the VMSS, before floating the tender. A feasibility study of any public service agency should conduct cost benefit analysis. This is done to evaluate and match the additional / differential costs against not only revenues but social benefits, like benefits to of passengers and increase in the routes etc.

The study assessed the financial viability of the proposed bus system for first five years, and identified the fleet requirements, ticketing rates, maintenance etc.

## **8.3 Description of the Project**

### ***8.3.1 Project Description***

As per the directives of the State Govt. Dated: 22/09/2006, Municipal Commissioner proposed the privatization of City Bus Service which was approved by the Standing Committee Resolution – 538 / dated: 24-03-2005 and General Board Resolution – 34 / dated : 16-05-2005 with the following highlights:

- It was decided that VMSS does not have to bear any economic load with the privatization of the City Bus Service;
- VMSS has to follow guidelines for City Bus Service as per Urban Development and Urban Housing Development Department;
- VMSS had to take NOC from Divisional Controller, GSRTC for stoppage of current transport services and starting of privatization;
- VMSS had to send commitment to RTA for private route; and
- Private operator selection and stage carriage, rent, etc. should be handled by RTA.

VMSS studied the model of Surat, Bhavnagar, Rajkot and other City Bus Services of India and accordingly selected the best model for VMSS City Bus Service privatization.



Figure 8.1: Vadodara City Bus and Pick up stand / Q-shelter

**Pick up stands / Q- shade:** It was quite necessary to have sufficient numbers of pick up stands to provide adequate access to citizens. Therefore VMSS decided to incorporate advertising based revenue generation model in the tenders for the Pick-up stands/queue-shades. VMSS invited tenders for designing and maintaining 124 pick-up stands without any financial load on the corporation. The contract was awarded to the contractor – M/s.

Proactive In & Out Advertise Pvt. Ltd., Bombay on a BOT basis. The maintenance would be under the scope of work of the contractor for a period of five years.

**Initialization of the Service:** The City Bus service was started from 18th May, 2008 by initially 25 CNG buses after completion of all standard requisite approvals. The rate was kept at ₹ 2/- per route initially for 3 months to attract the citizens to make use of newly introduced City Bus Service. Gradually the fleet increased and at present 120 CNG buses are plying; target is to reach 250 buses till March 2010. Passengers traveled by city CNG buses are 1, 50,000 per day which will increase by 3, 50,000 in March 2010.

VMSS has taken care of different classes who make use of City Bus Service in which students are given 50% concession and handicapped and Service class people get 20% on prevailing ticket rates. Ticket rate tariff is kept on the basis of GSRTC's Fare Notification No. GG / 2006 / 19STC / 1099 / 830(1) / GS, Dated: 14 / 07 / 2006. At present 10% of total population is making use of this service and ticket rates are kept the same since initialization even after increase in ticket rates by GSRTC. All Buses are CNG fuel based and GPS system will be implemented for vehicle tracking. There are no complaints due to good frequency of buses, cheap rates and punctuality.

**Benefits To Environment And Users:** The buses runs on CNG fuel which is proven environment friendly and causes no health hazards to the citizens unlike vehicles operated by diesel fuel. It also makes improvement in ambient air quality, reduced health costs due to reduction in air pollution & better utilization of natural gas resources.

### ***8.3.2 Goals of the Project***

- 1) PPP module was introduced as proven mechanism with a clear objective to ease the city government from handling operational and administrative issues to run public transport system, apart from income generation.
- 2) PPP is also helping to promote competition, improve efficiency and increase in adequacy of services. It is also assisting in reduction of administrative and overhead expenses of the public sector position. The private enterprises have lower operating cost and greater capacity and freedom to obtain and maintain necessary bus fleet.

### ***8.3.3 Strategy Used to Achieve the Desired Goals***

Use of an innovative PPP model has been thought of to achieve the desired results.

### ***8.3.4 Activities Implemented to Achieve the Desired Goals***

The feasibility study conducted included the following sub-activities:

- Visit to Anand and Bhavnagar to understand how the city bus service systems is being operated;
- Traffic and transportation survey of Vadodara;
- Preparing technical documents such as proposal to put forth before the Standing Committee and General Body of the Corporation, tenders to invite quotes for operating city bus service and BOT based pick up stands etc.;
- Installation of traffic signals on the road junctions;
- Planning routes and deciding pick-up stands;
- Designing of pick up stands;
- Running the city bus service in PPP basis; and
- Developing website <http://new.vtcos.com/> to help citizens to download timetable and bus routes, register the complaints, provide feedback about the service and contact operator etc.

### ***8.3.5 Challenges / Constraints Encountered***

The phenomenal growth in the number of rickshaws and poor traffic orientation of the citizens have created difficulties' in day to day traffic despite efforts towards high standards of traffic engineering in the city.

### ***8.3.6 Expected Outcome of the Initiatives***

The Outcomes of these exercises are the basis for a comprehensive integrated set of transport sector strategies to transform the city towards sustainability.

- Reducing dependency on personal vehicle; encouraging use of Non Motorized Vehicles and public transit;

- Long term sustainability, strategy development to lessen the burden on public budget resources through PPP;
- Accessibility to all user groups incorporating local economic activities within the design;
- Effective maintenance of traffic island for overall pleasing effect and desired traffic benefits;
- Maintenance and excellence in design of bus stops;
- Annual revenue income of ₹ 18, 55,000/- for the VMSS from the City Bus Service.
- Annual revenues of ₹ 82,58,400/- from the advertising at pickup stands / Q – shades as per BOT; and
- Revenue to the Corporation, for the next five years is estimated to be around ₹ 18,000 per bus per year as premium from operators. Revenue of ₹ 66,600 per bus stand per year from advertisement is estimated to be obtained from 214 bus stands in the next five years.

### ***8.3.7 Role and Activities of the Partner***

**Public Partner:** Vadodara Mahanagar Seva Sadan is the lead implementing agency of the project. VMSS has defined the bus routes, bus stops and fare structure. It has also defined the quality of service in terms of frequency and has determined that buses should be run on CNG fuel. Regional transport authority is responsible for sanction of stage carriage permits under Motor Vehicles Act for city bus service, providing statutory sanction to these terms. The bus stands are made by VMSS on BOT basis. In lieu of the rights given to the operators for collecting fare, VMSS gets a premium on yearly basis from the operators.

**Regional Transport Authority:** provided technical assistance to VMSS in preparing proposal and tenders etc.

**GSRTC:** GSRTC provided route maps where city buses of the GSRTC were plying before 2005. This route map helped VMSS to devise route plan for the present requirement.

**Private Partner:**

- M/S Vtcos Private Limited - procured, owned, operated and maintained the buses; took care of expenditure on rolling stock and operation and maintenance (including

cost of driver and conductor, supervision of operations, fuels, repairs and maintenance);

- Provided uniforms (with logos of VMSS and the VTCOS Pvt. Ltd.) to drivers and conductors; and
- M/S Proactive In & Out Advertise Private Limited, Bombay – Built and Operate 124 Pick- up stands / Q-shades to give support to the City Bus Service of Vadodara.

### ***8.3.8 Important Stakeholders Involved and Communication / Networking Procedure for the Project***

All buses are provided with vehicle tracking system for monitoring the frequency and timely operation from the control room, which is currently set up at the concessionaire's office and which will be set at the VMSS main office.

## **8.4 Factors of Success**

The citizens have access to an improved transport facility through the introduction of city buses. Presently, approximately 101 buses are running on 41 routes. This city bus service provides cost effective and eco-friendly public transport options for the citizens; innovative features such as daily passes, students' passes and free travel for freedom fighters have been introduced.

There are a number of benefits to VMSS through Privatization, which are as follows:

- Income of VMSS increased with the offer premium of ₹ 18,55,000/- yearly from City Bus Service;
- Income of VMSS increased with the offer premium of ₹ 82,58,400/- for pickup stands / Q – shades as per BOT;
- Total income of VMSS increased by ₹ 1 crore / year with 70 nos. of bus services & 124 nos. of pickup stands / Q shades; and
- This amount would be utilized in the infrastructure development of the city.

The highlights of the success in the operation of the City Bus Service System include:

- Necessary approvals from Government of Gujarat within short time;
- Private investment by operators for buses, infrastructure and operation;



- Sharing of returns with operators against expenditure incurred;
- Decision with reference to tariff, routes and frequency of buses reserved to be done by the VMSS;
- Overall monitoring by VMSS;
- Transparent methodology for selecting the operator;
- Consultation with stakeholders for deciding the modalities (operators / traffic police / citizens / NGOs); and
- VMSS has allotted 2 plots measuring 4000 square meter to the concessionaire for setting up workshop / fuel stations / depots / daily cleaning system, etc at ₹ 1/- token rent / sq m.

A system of weekly review by the traffic department of the corporation has been put in place. The city bus service has been initiated and covers the entire spread of the city and an initial three month trial period was given for the citizens to give their feedback about the system and also to encourage them to use the service.

Citizen of Baroda city have given very good response and are very much pleased with the city bus services. In connection with this, VTCOS has taken initiative to start instant response facility i.e. SMS system for information and complains and suggestion from the citizen. Due to facilities and punctuality of city bus, National Award 2008 was awarded to VTCOS.

## 8.5 Budgetary Implications and Sustainability

### 8.5.1 Total Cost of the Project

Cost involved – bus procurement, regular maintenance of buses, staff, office infrastructure.

- M/S Proactive Advertising In and Out Ltd, Mumbai – Approx ₹ 2.8 Crore.
- M/S Vtcos Private Limited is not willing to share the cost of the project

### 8.5.2 Source of Finance for Sustainability of the Project

- 1) M/s. VTCOS Transportation Private Limited, Bhavnagar;
- 2) M/s. Proactive In & Out Advertise Private Limited, Mumbai; and
- 3) Vadodara Mahanagar Seva Sadan.

## 8.6 Impact of the Initiatives

In consideration of the unmatched efforts of VMSS of providing City Bus Service without disturbing ecosystem and by generating revenue without investing or spending, the Institute of Urban Transport, India of Urban Development Department, Government of India conferred an Award for Excellence in Urban Mobility, in the conference on Urban Mobility India-2008 at New Delhi. VMSS gained this award by competing with some 50 entries from various cities of India.

## 8.7 Summing Up

VMSS took up an initiative of organizing a sustainable city bus service on the basis of public private partnership since it promised to generate revenues for the city without any investments or expenditure. Moreover, all buses run on CNG, which reduce pollution stress on the environment.

The public partner is VMSS and the lead implementing agency to define the bus routes, bus stops and fare structure, quality of service in terms of frequency. The Regional Transport Authority is responsible for sanction of stage carriage permits under Motor Vehicles Act for city bus service, providing statutory sanction to these terms. The bus stands are made by VMSS on BOT basis. In lieu of the rights given to the operators for collecting fare, VMSS gets a premium on yearly basis from the operators.

The private partner is M/S Vtcos Private Ltd to procure, own, operate and maintains the buses; took care of expenditure on rolling stock and operation and maintenance (including cost of driver and conductor, supervision of operations, fuels, repairs and maintenance). M/S Proactive In & Out Advertise Private Limited has constructed 124 Pick- up stands / Q-shades on BOT basis.

The cost of the project is ₹ 2.8 crore, which involves bus procurement, regular maintenance of buses, staff, office infrastructure etc. Annual revenue income of ₹ 18, 55,000/- to VMSS is from the City Bus Service, while, annual revenue of ₹ 82, 58,400/- from the advertising is received at pickup stands / Q – shades as per BOT.

The city bus service of Vadodara is running successfully. Presently, approximately 101 buses are running on 41 routes providing cost effective and eco-friendly public transport with innovative features such as daily passes, students' passes and free travel for freedom fighters. On an average, 100,000 passengers travel by bus service. The total income of VMSS has increased by ₹ 1 crore per year with 70 nos. of bus services & 124 numbers of pickup stands / Q shades and this amount would be utilized in the infrastructure development of the city.

VITCOS has initiated SMS system for information, complaints and suggestions. In view of unmatched efforts of VMSS for providing City Bus Service without disturbing ecosystem and by generating revenue without investing or spending, the Government of India confer an Award for Excellence in Urban Mobility, 2008 on 5th December, 2008.

The major reasons for the success of the project are attributed to the necessary approvals from Government of Gujarat within short time; private investment for buses by operators, infrastructure and operation; sharing of returns with operators against expenditure incurred; Decision with reference to tariff, routes and frequency of buses reserved to be done by the VMSS.

VMSS has encountered challenges like the phenomenal growth in the number of rickshaws and poor traffic orientation of the citizens, which have created difficulties in day to day traffic despite efforts towards high standards of traffic engineering in the city.

# JALGAON CITY BUS SERVICE



## 9.0 Jalgaon City Bus Service

### 9.1 Context

Jalgaon is a city in western India, to the north of the Maharashtra state in Jalgaon District, which itself is located on the northern Deccan Plateau. Located within the productive, irrigated agricultural region of Khandesh, Jalgaon is a municipal corporation. Jalgaon is also the hometown of the Smt. Pratibha Patil, President of India. Modern Jalgaon now boasts of vast industrial areas, educational institutes and good hospitals. The city is well developed with good roads, shopping centres, and residential areas, and also has good communication and transport infrastructure.

Jalgaon is near the world famous Ajanta Caves and is one of the key attraction places for tourists all around the World. Jalgaon has a diverse climate. It is exceptionally hot and dry during summer with temperatures reaching as high as 47 degrees Celsius. Jalgaon receives about 700 mm rainfall during monsoons, which is followed by pleasant temperature in winter. The city is served by several major rail lines with routes to Mumbai, Nagpur, Delhi and Surat. It lies on National Highway-6 connecting it to Surat and Kolkata. The Ajanta Caves are located about 64 km (about 40 mi) to the south of Jalgaon, and the Yaval Wildlife Sanctuary is about 32 km (about 20 mi) to the north. As of 2001 India census, Jalgaon had a population of 3.68 lac.

### 9.2 Situation before City Bus Service

#### a) *Existing System*

Before implementation of the eco-bus service in Jalgaon city, the city-bus services were provided by the Maharashtra State Road Transport Corporation (MSRTC) which was not as per the increasing demand for transport services. The financial performance of the MSRTC was not good to cope-up with the citizen's demand and could not augment its fleet. As a result Intermediate Public Transport (IPT) like Auto-Rickshaws, private vehicles, etc. came on the roads of the city, creating congestions, air and noise pollutions, etc. Traffic situation became bad and it led to major accidents.

**b) *Problems and Needs Addressed by the Project***

- i) The number of buses plying on the routes was inadequate and quite old.
- ii) Frequency of buses was inadequate.
- iii) The over-all quality of services provided by MSRTC was extremely poor.
- iv) The MSRTC was not responding to the growth of the city by augmenting services. On the contrary it declined to start additional services.

**c) *Reason for Adoption of City Bus Service***

- i) MSRTC has communicated to the Jalgaon Municipal Corporation (JMC) that since the city bus service provided by them incurred huge losses, they wanted to close the city bus service.
- ii) JMC was also not in a position to invest huge amount of money required for purchase of buses, recruitment of staff and providing infrastructure.
- iii) Hence the Municipal Corporation took a conscious decision Vide Resolution No. 40 dated June 2008 to appoint an agency for providing public transport service on PPP basis.

**d) *Preparation of Feasibility Study***

A detailed feasibility study was not called for as the MSRT Corporation was already providing city services though they were inadequate. Prasanna Bus Links Private Limited (PBLPL), as an operator of JMC Unit only continued to operate city services (as a successor to MSRT Corporation).

**9.3 Description of the Project****i) *Project Description***

PBLPL has partnered with JMC to offer well-maintained, high frequency, and safer services for meeting the demand of public transport in Jalgaon. The project was launched on 15 August 2009.

JMC has constituted Transport Committee (TC) under section 25 of the Bombay Provincial Municipal Corporation Act, 1949. The committee constitutes of 13 members in which 12 member are appointed by the corporation. The committee is headed by the chairperson who is appointed for tenure of one year. Under chapter XX, section 342, the transport manager shall manage the transport undertaking and perform all acts necessary for the economical and efficient maintenance, operation, administration and development of the undertaking.



Figure 9.1: Front and Side View of Jalgaon City Bus

Levy of fares and charges of transport services has been decided by the TC with the approval of the JMC and Regional Transport Authority Besides, routes, stages of fare (fare structure) is also done by the TC. The Corporation provides infrastructure and monitors the bus transport system, whereas the buses are procured, owned, operated and managed by the PBLPL.

However the JMC has transferred the rights to the above mentioned Transport Company, in lieu of the royalty of 85 Paise per km. The Corporation has also taken ₹ 25, 000 per vehicle from the Operator as a guarantee in the form of bank deposit. In case, the operators withdraws their services it is mandatory to give six-month notice period to the Corporation. However there is no guarantee for loan repayment from the Corporation.

It is important to note that escrow account is maintained by the transport agency. The revenue collected from the tickets, advertisements is deposited in the account and same is used on the following heads:

- 1) Government taxes;
- 2) Salary to the staff;
- 3) Bank loan installment;
- 4) Fuel and Maintenance;
- 5) Accident Insurance (vehicle and employ);
- 6) Royalty; and
- 7) Amount of fine (if imposed).

The transport agency is deploying Bharat II (Euro-II) standard buses which are economically viable, and support hi-tech IT facilities like the GPRS system, for real time information on the display board on the buses and shelters.

These buses have 200 mm ground Clearance and their turning circle radius is in the range of 7100 to 8000 mm. Besides these salient features, modern ticketing and pass system would also be one of the important features of the bus services. In a nut shell these buses are economical, eco-friendly and electronically sound. The ticket rates are ₹ 3/- for first 2 Km and 60 Paise per km thereafter.



Figure 9.2: GPS Fitted in Bus, Jalgaon

The PBLPL is operating 30 buses on 11 routes.

However 26 routes (15 routes on which the MSRTC was providing services and 11 new routes have been identified) have been identified to operate the eco-buses. It has been proposed to increase the number of buses upto 200 as per the CIRT norms i.e. 40 buses per 100, 000 populations.



The frequency has been increased by providing buses up to 5 minutes where traffic density is high and after every 10 minutes where the passenger load is moderate. At present new bus stops and bus shelters are being erected and the IT facilities are being installed.

### *ii) Goals of the Project*

To provide the best possible public transport service at affordable rates to the citizens.

### *iii) Strategy Used to Achieve the Desired Goals*

In order to achieve the above goal it was decided to adopt PPP for the entire project.

### *iv) Activities Implemented to Achieve the Desired Goals*

- 1) Identification of routes, stages and fixation and fares and charges.
- 2) Approval of appropriate authorities.
- 3) Appointment of an agency after a competitive bidding process.
- 4) Procurement of buses
- 5) Appointment and training of staff.



**Figure 9.3: Student Showing his bus pass**

### *v) Challenges / Constraints Encountered*

- 1) Resistance of local auto-rickshaw operators which was overcome by intervention by the Police Authorities.
- 2) Acquisition of land for construction of a depot workshop and bus terminus.

### *vi) Expected Outcome of the Initiatives*

- 1) Benefits to the commuters
  - a) Increased frequency
  - b) Clean and eco friendly buses
  - c) Fast and safe travel
  - d) Issue of Student Concession Passes.
  - e) Issue of monthly and tri-monthly passes to daily commuters.

f) Concession in fare to senior citizens, freedom fighters and Journalist.

2) **Benefits to the Government:** Timely payment of government taxes.

3) **Benefits to the Corporation:** Royalty of J.M.C. @ 85 Paise per K.M.

*vii) Role and Activities of the Partner*

1) Transport Committee

a) Policy decisions.

b) Levy of fares and charges of transport services has been decided by the transport committee with approval of the Municipal Corporation and R.T.A.

c) Approval to the Routes Stages and Fare structures.

2) Transport Manager

a) Identification of Routes stages and fares and charges.

b) Submission of proposal to Appropriate Authorities

c) Management of Undertaking.

d) Execution and overall implementation of PPP Model

3) Operator

a) Procurement of buses.

b) Appointment and Training of Staff.

c) Erection of Bus shelters.

*viii) Important Stakeholders Involved and Communication / Networking Procedure for the Project*

The Passengers Association in the city is proposed to be involved for improvement of the city bus services. Passenger information system is proposed to be used in the bus and at the shelter in order to:

1) Gives information about the routes and schedules.

2) Inside the bus to commuters to alight at the desired bus stop.

- 3) About the passenger, especially the school / collage going children to their parents regarding the boarding and alighting time to ensure safe travel.
- 4) To communicate any delay or any technical problem to avoid passenger hassle.

#### 9.4 Factors of Success

- 1) Kind of support given by Transport committee and Municipal Corporation.
- 2) State support from RTA/RTO.
- 3) Speedy procurement of buses, appointment and training of staff by the operator.
- 4) Acceptance by public.



Figure 9.4: Over Crowded Jalgaon City Bus

#### 9.5 Budgetary Implications and Sustainability

##### *i) Total Cost of the Project*

Total cost of project is ₹ 15 crores, out of which ₹ 3 crore have been invested so far (2010).

*ii) Sources of Finance for Sustainability of the Project are:* (a) PBLPL and (b) HDFC Bank. The Transport Committee has not provided any finance in the budget. The entire cost of the project is to be borne by the operator.

#### 9.6 Impact of the Initiatives

The study team of NIUA interacted with the commuters and found that the overall impact of the introduction of Eco Bus services on general public and daily commuters is positive.

Commuters using IPT modes earlier were switching over to these buses. Commuters were satisfied with the buses which are comfortable having good sitting arrangements.

## 9.7 Summing Up

The Jalgaon city bus service, based on PPP, was launched on 15 August 2009. The corporation of Jalgaon has constituted a Transport Committee, which is responsible for making policy decisions, and levy of fares and charges of transport services with the approval of the Corporation and R.T.A. The transport manager is responsible for identification of routes, fares and charges; submission of proposal to appropriate authorities; management of undertaking; and execution and overall implementation of PPP model.

Buses are procured, owned, operated and managed by the private sector, namely, PBLPL. It is also responsible for erection of bus shelters.

As on December 2009, it was operating 30 Eco buses (Bharat II) equipped with GPS, PIS, modern ticketing and pass-system etc. The frequency of these buses is 5 minutes where the traffic density is high and after 10 minutes where the passenger load is moderate.

It is to be noted that JMC has transferred the right to the private sector, in lieu of the royalty of 85 Paise per km. JMC has also taken ₹ 25,000 per bus from the operator as a guarantee in the form of Bank deposits.

Factors of success of the project / system are attributed to the support given by the Committee and JMC; State support from RTA / RTO; speedy procurement of buses and acceptance by the operator. However, challenges / constraints faced during the implementation period are resistance of local auto-rickshaw operators and delay in acquisition of land for the construction of depot, workshops and bus terminus. The satisfaction of the commuters is higher than ever since the introduction of new bus system since IPT.

# KOLKATA CAR PARKING SYSTEM



## 10.0 Kolkata Car Parking System

### 10.1 Context

Kolkata is the capital of the Indian state of West Bengal. It is located in eastern India on the east bank of the River Hooghly. As of 2001, Kolkata city had a population of 4,580,544, while the urban agglomeration had a population of 13,216,546. The Kolkata Municipal Corporation (KMC) area has registered a growth rate of 4.1% during 2001-11, which is the lowest among the million-plus cities in India. When referred to as Calcutta, it usually includes the suburbs, and thus its population exceeds 15 million, making it India's third-largest metropolitan area and urban agglomeration as well as the World's 8<sup>th</sup> largest agglomeration.

### 10.2 Situation before Implementation of the Project

#### *10.2.1 Problems and Needs Addressed by the Project*

Central Kolkata, particularly the New Market area near the KMC Head Office, is a very busy commercial zone with narrow streets and roads. The Lindsay Street, part of this locality and a very busy place with a market, shops and vegetable vendors around, is one of the most congested roads in terms of traffic. The problem was further aggravated by haphazard, unruly parking that led to serious traffic jams sometimes even resulting in brawls.

#### *10.2.2 Reason for Adoption of Particular Parking Project*

Parking in central Kolkata, the heart of this mega city, has always been a hassle as is the case with most inner city areas. The traffic woes are a source of concern, not only for the owners of vehicles but also the pedestrians. In an attempt to mitigate the situation, the KMC decided to utilize the rights to the space underground and undertake the parking project as a PPP (Public-Private Partnership) project on a Build, Own, Operate and Transfer (BOOT) basis.

The project benefited all the stakeholders – the KMC, the construction company/contractor (also known technically as the concessionaire) and most of all, the car owners and the harassed pedestrians – all in a most sustainable manner. The uniqueness of the project lies in the two direct car lifts for drivers to take their cars to and out of the parking lot.

### 10.3 Description of the Project

#### i) Project Description

There are two levels of basement in the system, of which the upper basement (Level-1) has been utilized for the purpose of commercial development while the lower basement (Level-2) is exclusively used for the car parking. This was a double-concession BOOT project, one for Level-1 and the other for Level-2.

#### Underground Level - 1: Commercial Development

To make the project self-sustaining and as part of BOOT arrangement, the KMC granted permission to Simplex to construct and lease out the commercial blocks on a long term basis on mutually agreed terms and conditions. Simplex pays the lease rent as well as basic rent. It was granted the right to enter into a lease agreement with the prospective trader ('lessee') for an initial period of 60 years during which it will collect the lease rent (the lease agreement is renewable in blocks of 30 years). The KMC collects the basic rent directly from the lessee for the period of the lease.



Figure 10.1: Underground Shopping Arcade Simplex Mall on Level-1

#### Underground Level - 2: Parking Lot

On the basis of entry and exit to the parking area, the mechanics of movement of vehicles from the surface to the parking bays is of two categories: shuttle dolly system and palette shifting system. Each palette is 6 meters in length and 2.5 meters in width.



Figure 10.2: Movement of vehicles from surface to Level-2 parking bays

The type of elevator also varies accordingly, blocks 1-3 and 5 have hydraulic elevator, while block 5 has provision for an electric elevator. The movement of vehicles, from the time it is set on the palette at the ticketing counter on the surface to being taken to level 2 and placed in the parking bay is fully automated and works more or less on the principle of a jigsaw puzzle. The ticketing is also done with the help of SCADA (Supervisory Control and Data Acquisition) software, where each entry of vehicle is marked with a Unique Identity Number given in a card to the vehicle owner. Database of every car is maintained by feeding in the car and license number. This is used daily to check revenue generation.

At the expiry of the concession period of 20 years, the parking system will be handed over to the KMC. After the expiry of such a period, Simplex may undertake to execute an annual maintenance and operation contract with the KMC on mutually agreed terms and conditions. At that point of time, and as per the agreement, Simplex shall train, free of costs, a maximum of 4 Engineers or qualified personnel nominated by the KMC to manage and maintain the system. This will be done during the period of 12 months prior to the expiry of stipulated period (notified in advance to KMC) to enable smooth hand over of the system.



Figure 10.3: Types of Parking: a) Palette Shifting and b) Shuttle



### ***Goals of the Project***

- To provide multi level underground car parking system at Lindsay Street on BOOT basis.
- To provide commercial complex at same place.

#### ***ii) Strategy Used to Achieve the Desired Goals***

The PPP parking project was conceptualized as a two-part BOOT project with two concession periods – one for the parking system and the other for the commercial complex (both underground). The overland portion was converted into a pedestrian plaza.

KMC is the owner of the stretch of land along Lindsay Street Opposite New Market, with all underground rights thereof. It offered the concessionaire, Simplex projects, the right to construct the parking system including the shopping complex at that location.

#### ***iii) Activities Implemented to Achieve the Desired Goals***

The KMC has allowed Simplex to impose and collect the parking charges for all the vehicles parked within the system on a mutually agreed terms and conditions. Simplex pays the KMC, 5% of the gross annual revenue earned from parking for the concession period of twenty years.

If Simplex makes any profit after meeting its expenses towards loan servicing, debt obligations, provision for all liabilities, contingencies, including the operation and maintenance cost but excluding payment of all dividends, then on availability of cash profit, the KMC would be given an extra bonus of 10% of the said profit.

Simplex has been given the right to put up advertisements in the form of show-windows, kiosks and other such formats of advertisement at no extra costs. The KMC has prohibited ‘on-street parking’ in the ‘zone of influence’ around the system and within a radius of 100 meters. This ensures that the people use this parking facility and in order to decongest the Lindsay Street locality.

#### *iv) Role and Activities of the Partner*

The KMC and Simplex Projects entered into a BOOT agreement for a period of 20 years for the parking system. All architectural designs and drawing were approved by the KMC. The technical design was from Holland from where engineers from Simpark took training.

#### *v) Important Stakeholders Involved and Communication / Networking Procedure for the Project are*

- KMC
- Simplex Pvt. Ltd.

### **10.4 Factors of Success**

- 250 parking slots in the underground parking system at L-2 level.
- Market complex at L-1 level with 200 shops on lease; the premium goes to the Concessionaire as charged by him.
- The pedestrian plaza on the ground is a bonus for the pedestrians.
- Street parking is no longer allowed on Lindsay Street, the traffic jams have become a thing of the past.

### **10.5 Budgetary Implications and Sustainability**

#### *i) Total Cost of the Project*

The Cost of Project is ₹ 36 crore (approx.) and is to be borne by the Concessionaire (Simplex Projects).

#### *ii) Source of Finance for Sustainability of the Project*

Parking Fee: Rs 10/- per hour (with a provision of discount for long-term parking) – to be collected by Simplex. KMC will get 5% of the parking revenue from Simplex Projects for 20 years until handing over of the project to KMC. This will generate estimated annual revenue of Rs 5 lakh for KMC. Besides, the KMC will get Secondary Basic Rent @ Rs 60/- per sq m per quarter (subject to upward revision by 10% after every five years) from the commercial space. This will generate an annual revenue of Rs 9, 20, 000/-.



Figure 10.4: Underground Parking Bay that can accommodate 250 cars in 5 blocks

## 10.6 Impact of the Initiatives

A public-private partnership model on BOOT basis has many advantages. Over a long concession period, both the BOOT operator and the KMC are bound to earn revenues and even profits. More importantly, a very sensitive issue of traffic has been resolved on a particularly busy street.

- 1) PPP models of partnership in infrastructure development form the most sustainable approach for a city government that most often has a resource crunch both, in terms of finance and in terms of engineering staff.
- 2) Public service provided by a local government can also become an alternative source of additional revenue.
- 3) Underground development can be an alternative where ground level space is scarce, especially in all mega cities.

## 10.7 Summing Up

In order to solve haphazard, unruly parking of vehicles at the Lindsay Street of Central Kolkata, KMC decided to utilize the rights to the space underground and undertake the parking project as a PPP (Public-Private Partnership) project on a BOOT (Build, Own, Operate and Transfer) basis.

There are two levels of basement in the system, of which the upper basement (Level-1) has been utilized for the purpose of commercial development while the lower basement (Level-2) is exclusively used for the car parking. This was a double-concession BOOT project, one for level 1 and the other for level 2. The overland portion was converted into a pedestrian plaza.

To construct and lease out the commercial blocks on a long term basis, KMC has granted the right to Simplex Pvt. Ltd (private sector) to enter into a lease agreement with the prospective trader ('lessee') for an initial period of 60 years. During this period, it will collect the lease rent (the lease agreement is renewable in blocks of 30 years). The KMC collects the basic rent directly from the lessee for the period of the lease.

The KMC and Simplex Projects entered into a BOOT agreement for a period of 20 years for the parking system. KMC has allowed Simplex to impose and collect the parking charges for all the vehicles parked within the system on a mutually agreed terms and conditions. Simplex pays the KMC, 5% of the gross annual revenue earned from parking for the concession period of twenty years.

The aforesaid PPP based model has many advantages as over a long concession period, both the BOOT operator and the KMC are bound to earn revenues and even profits. It may be treated as most sustainable approach for a local government that has a resource crunch both, in terms of finances and in terms of technical / engineering means. Moreover, underground parking can be one of the alternatives where ground level space is scarce, especially in megacities.

# VISAKHAPATNAM BUS RAPID TRANSIT SYSTEM

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## 11.0 Visakhapatnam Bus Rapid Transit System

### 11.1 Context

Visakhapatnam (Vizag) is second largest city of Andhra Pradesh with an area of 550 km<sup>2</sup>. It is primarily an industrial city, apart from being a port city. It is also home to the Eastern Naval Command. Vizag is a cosmopolitan mix of people from various parts of the country. From a population of a few thousand locals during the 18th century and early 19th century the population grew steadily every decade. The city doubled its population from 1990–2000 owing to a large migrant population from surrounding areas and other parts of the country coming to the city to work in its heavy industries. As of 2001 India census, Visakhapatnam had a population of 1, 329, 472.

### 11.2 Situation before Implementation of the Project

Currently, about 4.5 lakh registered vehicles ply on the city roads in Vizag City, 90% of which are cars and motorized two-wheel vehicles (MTWVs). The present travel demand in the City is about 12 lakh trips per day; a significant 65% of these trips are catered by private modes. The current modal split studies indicate that only 20% favour public transport. According to the NUTP, cities with one million-plus population must target a minimum public transport mode split of 50%. The demand for travel is predicted to grow to 16 and 28 lakh trips per day by 2011 and 2021 respectively.

Therefore, a higher modal split of above 50% has been recommended for Vizag to be achieved in phases. This can be attained by giving impetus to public transport to arrest the trend of personal modes. Equally, NMT modes and pedestrian traffic management has to be accorded due priority for integration and accessibility by keeping in view the safety aspects identified by the National Urban Transport Policy (NUT). The salient features of travel demand in the city are illustrated below:

#### 11.2.1 Problems and Needs Addressed by the Project

Similar to other UAs, in the near-future road capacity is going to be a major constraint for mobility in Visakhapatnam. Transport network in the city will not only require expansion but

widening and strengthening of the existing road network. The city's transport master plan has identified and planned a phase-wise implementation of mass public transport systems.

As a precursor to the detailed corridor design effort, a Detailed Project Report (DPR) was prepared which identified eight corridors of about 100 km for BRTS implementation. Given the rate at which the city is growing as a commercial, industry, and tourism hub set along the coastline of the Bay of Bengal, the proposal to develop and implement a comprehensive BRT system is justified.

The available travel trends from the past studies and the 'Feasibility Study of BRTS in Vizag' convened by ASCI has been studied. The trends suggest that the traffic volume on roads has been growing at the rate of about 5% p.a. It is expected that the traffic will, generally, continue to increase at the same rate for the next 20 years.

The maximum motorized vehicles volume expected in 2021 is 2800 PCU/hour/direction. The capacity for two lanes (one way) is over 4000 PCU/hour, after the buses and slow vehicles are segregated from the mixed traffic. There is provision of two lanes for motorized vehicles in each direction along the BRT corridor.

The volume capacity ratio will be less than 0.8 and therefore, we can expect 'level of service 'C' most desirable in urban conditions. The extraction / separation of buses and motorized vehicles will improve the capacity of MV lanes. The provision of 2.5 m non-motorized vehicles (NMV) lane is quite sufficient to handle 2000 bicycles per hour in both directions.

The maximum passenger loads on the bus stops along PTC and STC corridor have been found to be approximately 200 inclusive of boarding and alighting. The bus stops along PTC and STC corridor have been designed with sizes 20 X 3.4 meter (for low passenger volume) and 30 X 3.4 meter (for high passenger volume). These platforms can handle the passenger loads of 240 (4 passengers per square meter) and 360 passengers respectively.

### ***11.2.2 Reason for Adoption of BRTS***

While several mass transport options are available, BRT systems are chosen with the specific intent to balance the cost aspect with the appropriate method of delivering quality public transport services in the city. Amongst the domain of high capacity public transport systems available world-over, it has been concluded that the transport demand forecast on the major

travel corridors in Visakhapatnam can be managed by a medium capacity public transport system such as a Light Rail Transit System (LRTS) or BRTS with dedicated bus lanes. Market estimates peg LRTS costs at about Rs 200 crore per km as compared to BRT systems costing about ₹ 20 crore per km. LRTS or MRTS projects being capital intensive are considered financially unviable. BRTS has been recommended considering the following key drivers:

- i) BRT promotes high-quality transit services on a cost-effective basis and will allow the management of Vizag city to develop a high-quality mass transport with affordable infrastructure cost and ability to operate without subsidies. The internal rate of return for BRTS in Vizag is fairly high and sustainable / achievable by public funds even after considering expenses to be incurred for procurement and operation of rolling stock.
- ii) BRTS can be implemented within shorter periods (1-3 years after conception) – a significant advantage over rail based mass transport in addition to the cost effectiveness.

### ***11.2.2 Preparation of Feasibility Study***

- i) Greater Vishakhapatnam Municipal Corporation (GVMC) has all possible efforts to address the development of public transport in Vishakhapatnam. A detailed feasibility study was convened by GVMC through Administrative Staff College in India (ASCI) in 2007. This study appraised a BRTS network of 100 km consisting of 6 BRTS corridors. It was recommended to take 2 corridors between RTC complex to Pendurthi (20.00 km) and Simhachalem (18.50 km) in the 1st Phase. The study was approved by MOUD and aid was granted through JNNURM programme.
- ii) Subsequently, Srei Infrastructure Finance Limited in association with CRAPHTS Consultant (I) Private Limited and McCormick Rankin International, Canada (MRIC) were deputed as DEPR consultants to prepare detailed designs and ensure quality supervision and assurance for the project. The implementation of the project commenced in Dec 2008 and till date progress on providing fixed infrastructure has been going on with 2 separate contractors assigned with 1 corridor each.



### 11.3 Description of the Project

Given the rapid growth of the country and increasing urbanization of UAs, strengthening of traffic and transportation systems in the nation and especially UAs will be a key challenge. Visakhapatnam is also experiencing immense growth and is on the horizon of launching itself as a major economic and commercial centre in the state and the nation. Keenly aware of the growth aspects, GVMC have been proactively addressing the needs of the city by adopting a comprehensive approach to plan, augment and streamline transport demand and supply.

Consistent with its philosophy to develop a viable and sustainable transport system for the city, GVMC has endeavoured to augment the supply of mass transport services at an affordable cost, and provide impetus to riding on public transport thereby encouraging personalized vehicles to shift modes. The city has been actively working towards creating a sustainable inter-modal transportation system.

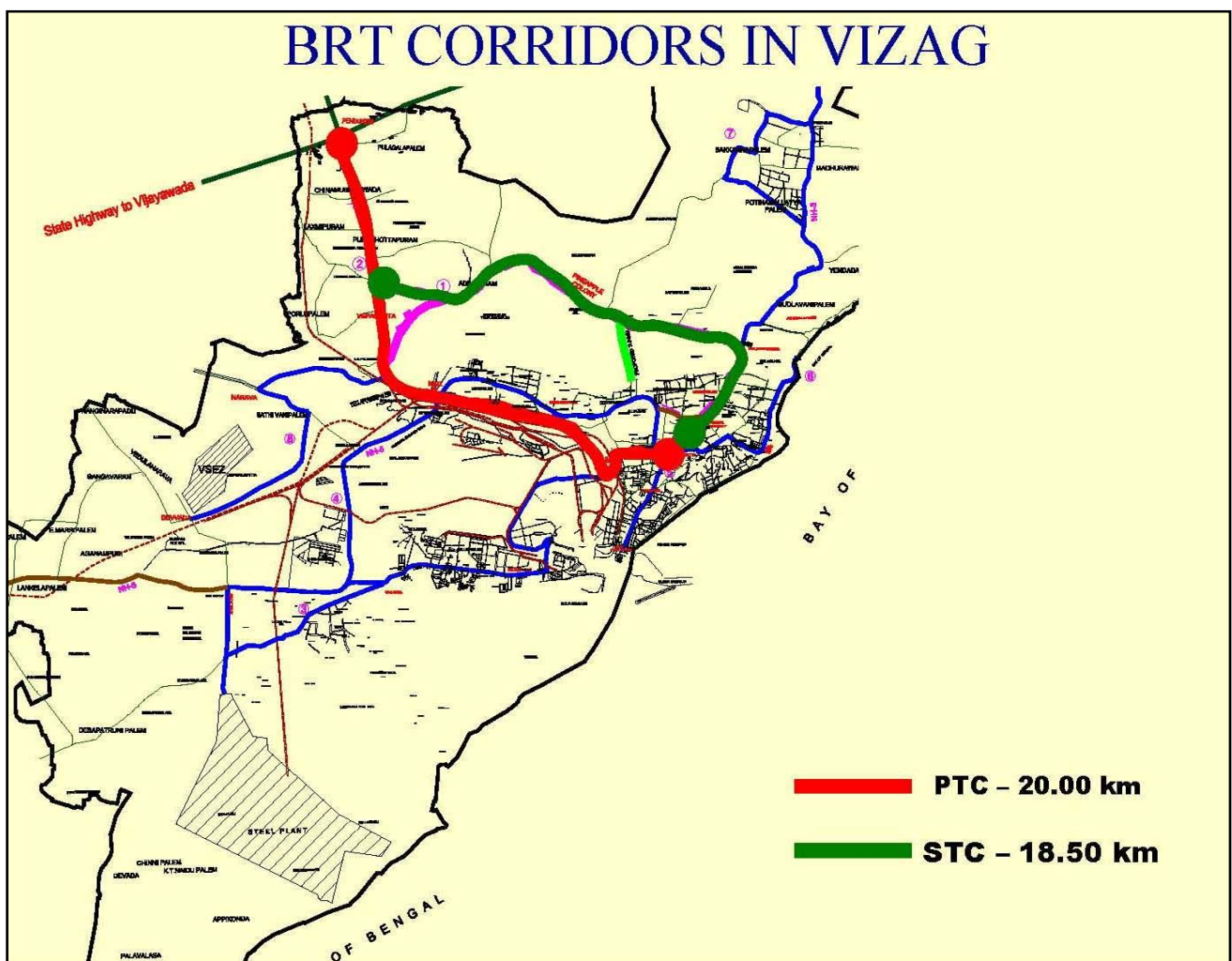


Figure 11.1: BRT Corridors in Visakhapatnam

*i) Goals of the Project*

- a) To provide all possible options to plan the system with the commuter's perspective a decision has been made not to compromise with space requirements for dedicated bus, MV, NMV lanes and safety aspects of pedestrian traffic.
- b) To augment transport supply at an affordable cost to the citizens.
- c) To prepare a comprehensive parking plan in place and will be implemented with control on demand and fiscal measures.

*ii) Strategy Used to Achieve the Desired Goals*

Project design features are detailed below:

- ❖ Min 30 m section at mid-block section;
- ❖ 36 section at stations / junctions;
- ❖ Dedicated bus lane, 7.0 m (2 x 3.5 m);
- ❖ 3.4 m. wide passenger platform with shelter;
- ❖ 2 x 3.25 m motorised vehicle lane (MV), 2 x 2.5 m non-motorised vehicle lane (NMV), minimum 2.0 m wide sidewalk on both sides;
- ❖ Placement of stations – mostly near side junctions, few at mid block sections based on demand and spaced at a distance of 500 to 700 m;
- ❖ Additional right turning (MV) lane at junctions;
- ❖ Provision of bus passing lane at some stations;
- ❖ Safe crossing facilities of bus passengers along zebra crossings and foot-over-bridges;
- ❖ Adequate depot and terminal facilities; and
- ❖ Safe dispersal and integration measures.

**Cross Sections of the Corridor including Flyover**

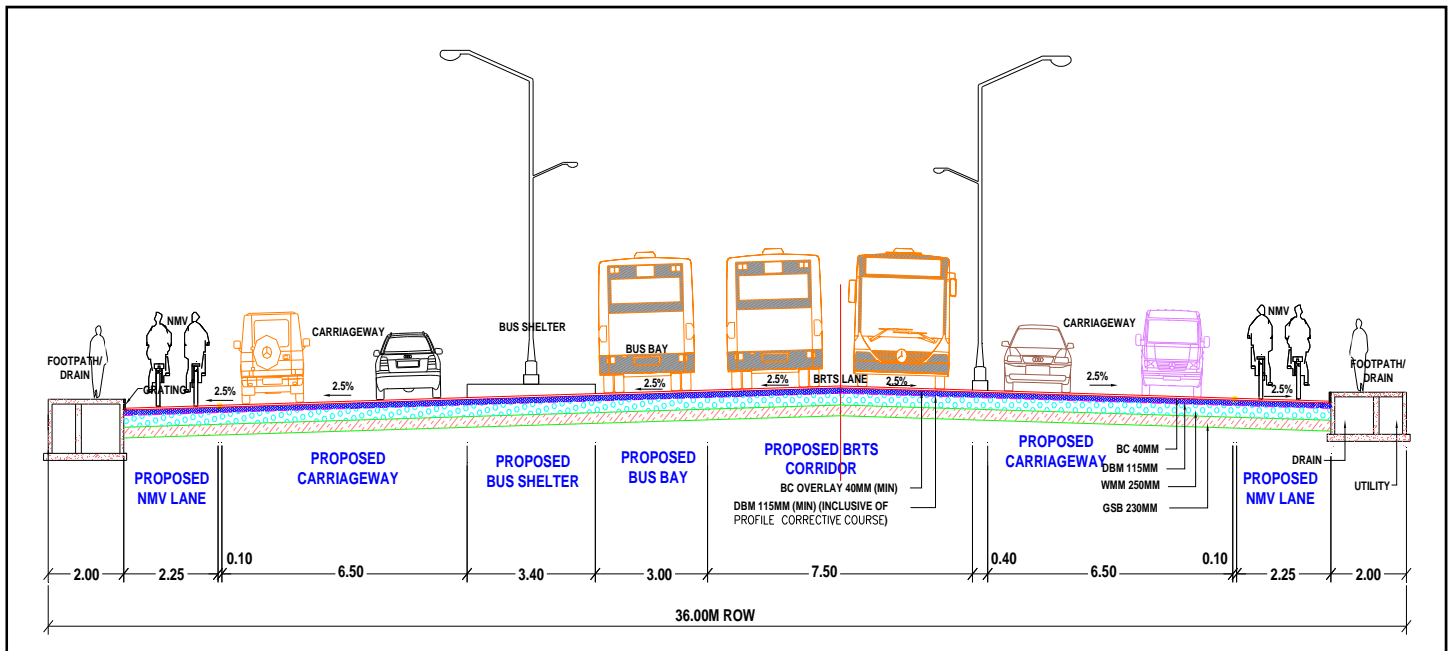


Figure 11.2: Typical Cross Section at 36.0 M Row (With Bus Bay)

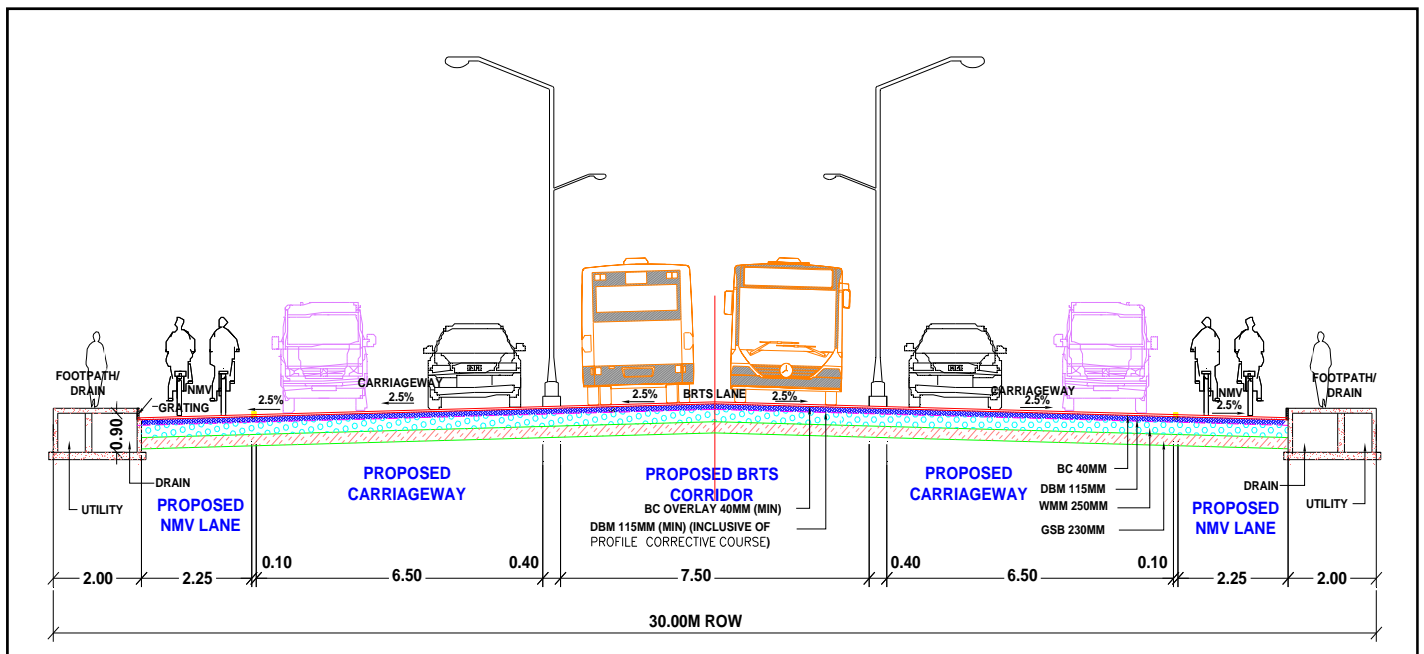


Figure 11.3: Typical Cross Section at 30.0 M Row

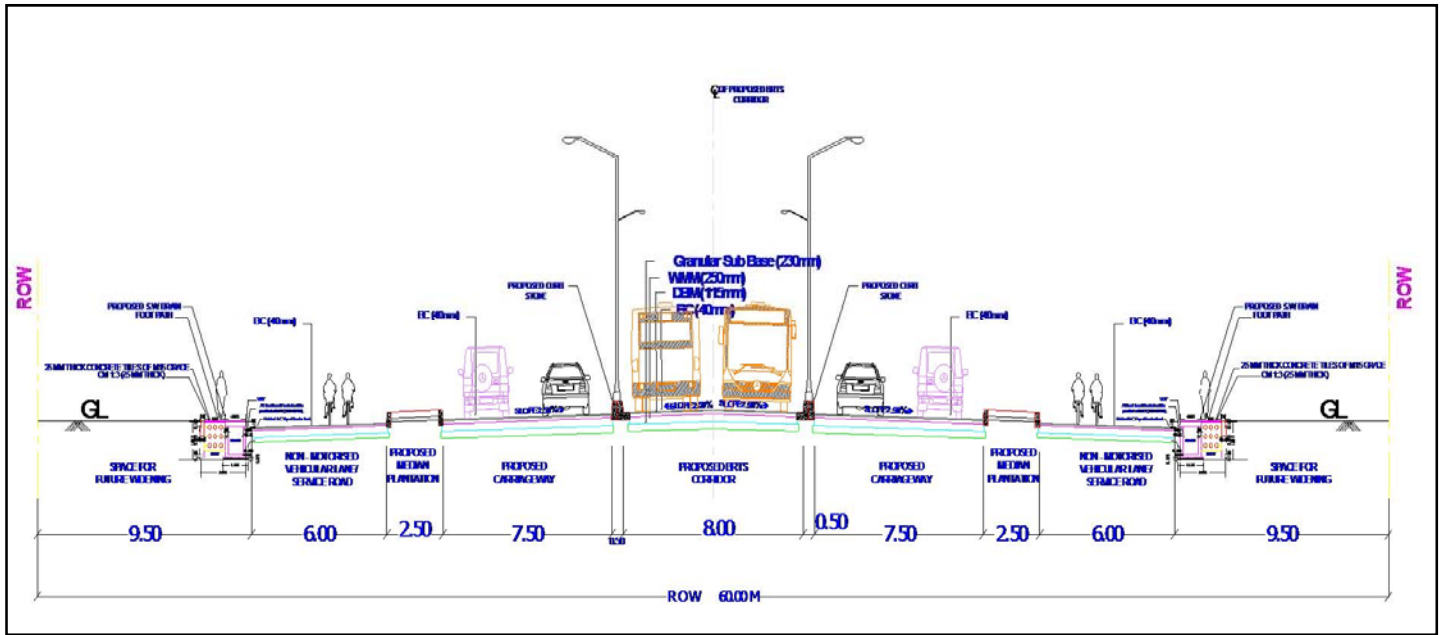


Figure 11.4: Typical Cross Section at 60.0 M Row

### Flyover

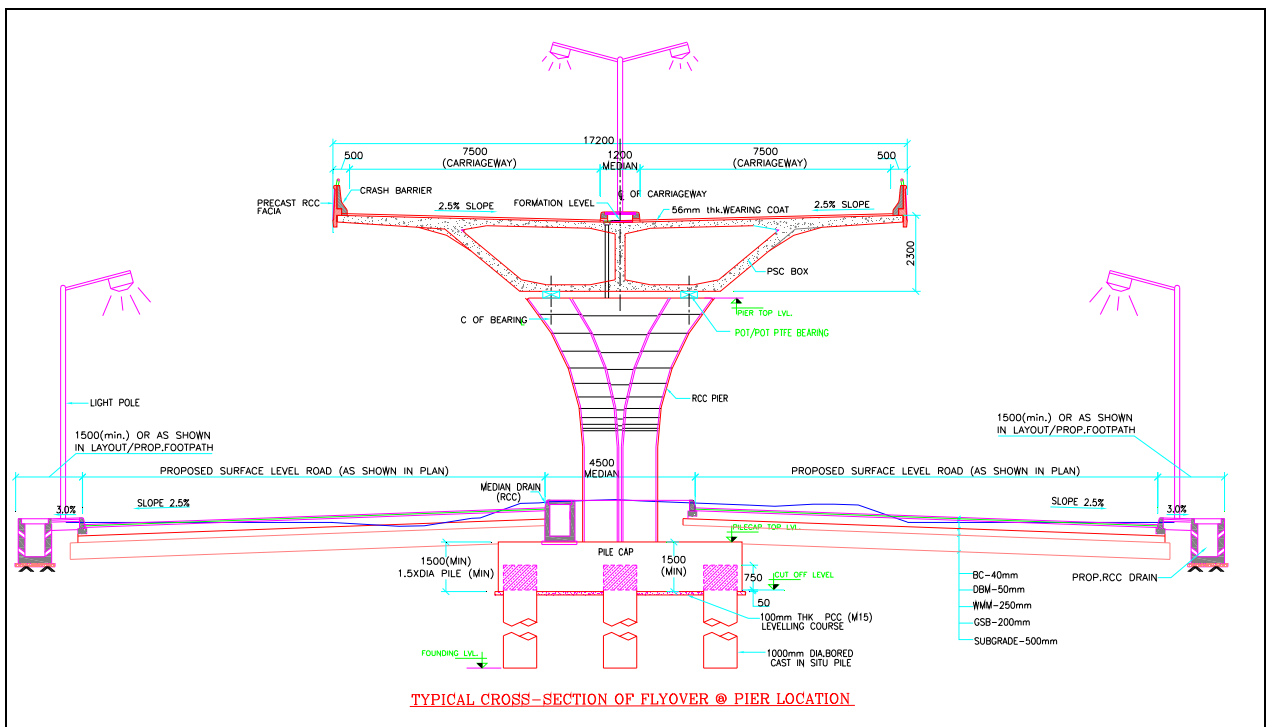


Figure 11.5: Typical Cross Section of Flyover, Pier Location

**The key aspects of the bus rolling stock and technology features are outlined below:**

- ❖ Standard 60 seat low floor urban bus (12 m length) is recommended to be introduced gradually and initially existing fleet of APSRTC will be utilized.
- ❖ To save cost, partial low floor buses may be introduced.
- ❖ Outline of Information Technology and Automatic Fare Collection System identified and is planned to be introduced later after sufficient trials are conducted.



**Figure 11.6: Bus to be operated on BRTS corridors**

**First Phase, 2 corridors were prioritised i.e. PTC & STC.**

- ❖ The Combined cost of prioritized 2 corridors (PTC & STC, Tunnel) is ₹ 452.93 Crores.
- ❖ The Project was approved by the Central Sanctioning and Monitoring Committee (CSMC), MoUD, GoI on 18-05-2007.
- ❖ The Detailed feasibility report was proposed as per the guidelines of NUTP, MoUD, and GoI.
- ❖ Administrative Sanction was accorded by the Govt. of AP vide G.O No: 1390 MA&UD (UBS) Dept. DT: 22-11-2007.
- ❖ GVMC invited Project Management Consultant (PMC) for BRTS exclusively in two phases in June, 2007: Phase 1: Detailed Engineering report along with the tender process i.e. bid process management; and Phase 2: Construction supervision and Quality Assurance.

- ❖ Consultancy for PMC was finalized on 29-08-07 with M/s. SREI Infrastructure Finance Limited (Lead Consultant), and LOA was issued with M/s McCormick Rankin International, Canada and M/s CRAPHTS Consultant (India) Pvt. Ltd, Haryana.
- ❖ The consultant submitted the Estimates, BOQ and Tender Documents for the prioritized corridors (PTC & STC) for getting approval of NIT from the Committee headed by the Engineer-in-Chief.
- ❖ The tenders were floated for the above corridors under EPC system with 2 years defect liability period. The tenders for the above corridors were finalized in Committee headed by the Principal Secretary MA&UD.
- ❖ PTC corridor was approved by the Govt. of AP. vide G.O.Rt.No:1384 MA&UD(UBS) Dept. dt:01-10-2008 for the M/s. Sadbhav Engineering Ltd with GKC Projects Ltd (JV) and STC Corridor was approved vide G.O. Rt.No:1397 MA&UD(K1) Dept. dt:03-10-2008 for the M/s.GVR Infra Projects Ltd, Hyderabad. Agreements were concluded with GVMC by the said firms.

Field Surveys, Investigations, Designs have been completed and construction work is in progress for 10 km segments each on PTC and STC.

### *iii) Activities Implemented to Achieve the Desired Goals*

Right from conceptualisation and detail design of the BRTS in Vizag, GVMC has been proactively considering and promoting all important aspects for successful completion of the project. Be it the stakeholder consultations, public advisory and quality assurance – all aspects have been dealt with in detail. GVMC has BRTS cell in place and consultants, engineers, contractors all work in a healthy atmosphere to find the best possible solutions for achieving the ultimate objective of producing a world class mass transport system.

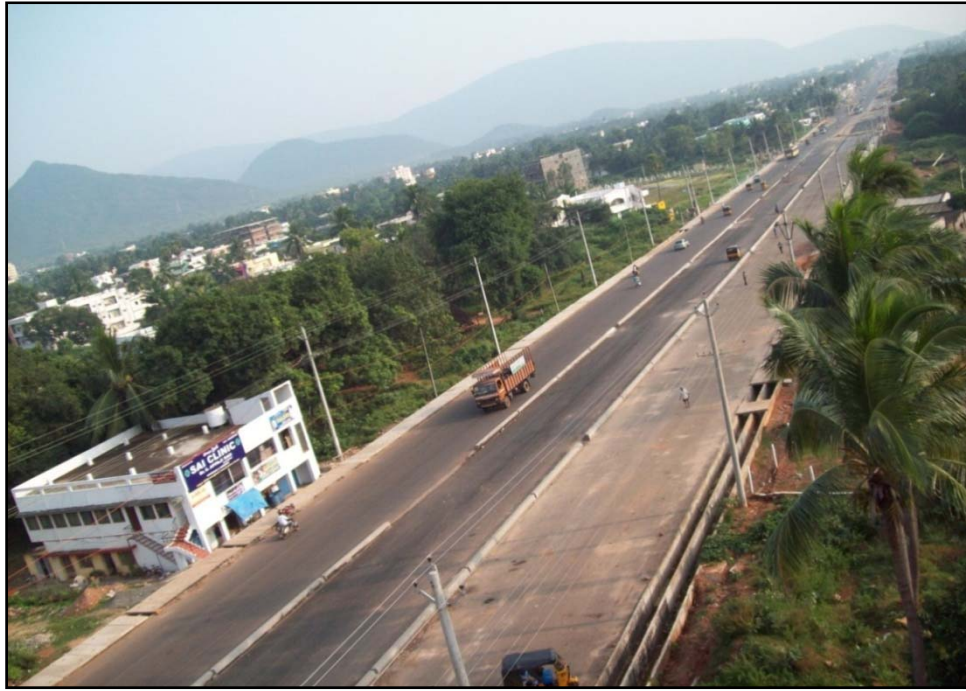


Figure 11.7: Pendurthi Transit Corridor at Visakhapatnam

The EPC contract modes has paved the way for PMC consultants to have a close look at the design offered by the contractors' and these are being debated, discussed, fine tuned to be more useful in terms of implementation, operational ease and practicality. The design process is vetted through quality assurance procedures embedded in the design and built contracts through clearly demarcated deliverables and timelines.

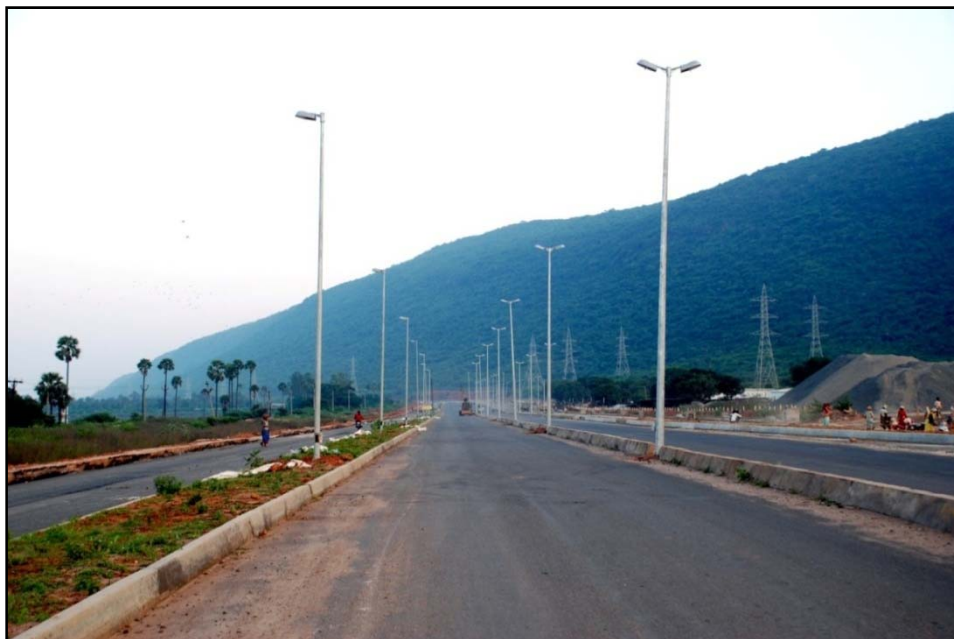


Figure 11.8: Simhachalem Transit Corridor at Visakhapatnam

The GVMC has laid emphasis on project quality and plans have been made to make the project a true success as perceived by the riding community and the general public. The city is best suited for BRTS. The services of Project Management Consultants have been taken to ensure successful implementation. Quality Assurance and Quality Control of all aspects (road design, BRT elements, construction, integration & operations) including management of project construction and execution are being perceived with great detail. A qualified team of professionals is in place to serve as GVMC's extended arm in ensuring project success.

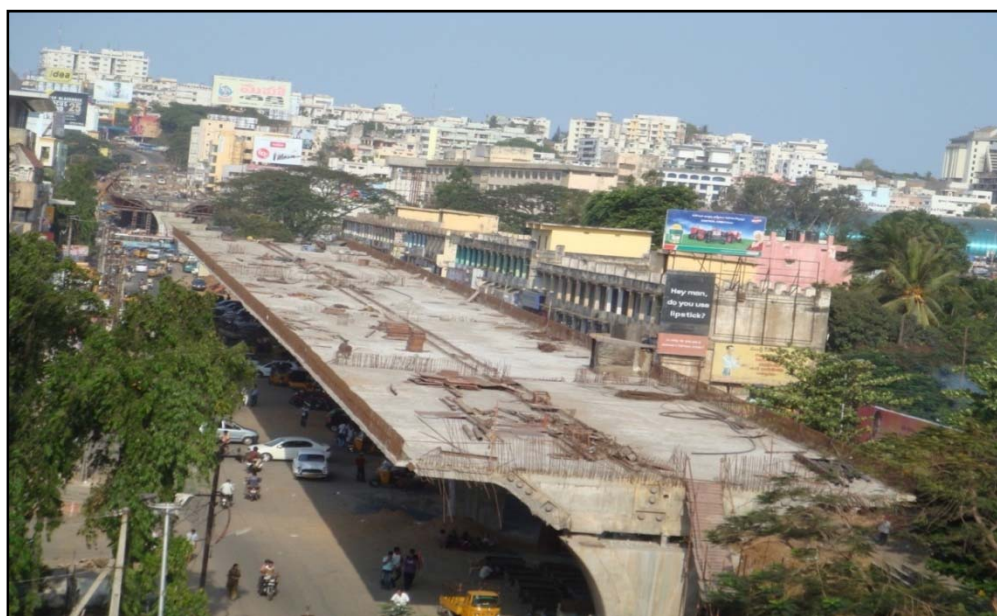


Figure 11.9: Flyover in Progress at Visakhapatnam

*iii) Challenges / constraints encountered and how it was conquered:*

The key concerns in the project are the land and property acquisitions required to produce a ROW of 30 m especially on PTC. At the bus stations along the PTC and STC we will require about 36 m ROW to construct bus bays. Therefore, primary issue is to availability of minimum ROW to achieve segregation of traffic on the corridors. Nature of compensation and re-settlement issues have been finalised first in consultation with affected public and their representatives. The co-ordination of various civic agencies and departments including GVMC, Vishakhapatnam Urban Development Authority (VUDA), APSRTC, BSNL, Traffic Police etc. is essential for effective implementation. The major issues to be reckoned are utility diversions and addressing the drainage. The traffic management and diversion during construction will need the services of Local Traffic Police in Vizag. The major constraints on



STC are the strategic locations of village settlements at Simhachalem, where property acquisition is rather difficult. Alternatives will need to be addressed and frozen.

These concerns have been addressed with minute's details at the ground zero level. Environmental and social issues have been addressed in the detail. Promotion of public understanding and fruitful solutions of developmental problems such as local needs and those of road users were discussed. In addition to discussing problems and prospects of resettlement, several stakeholders were consulted through focused group discussions and individual interviews.

Discussions were also held to understand their local transport needs and to achieve speedy implementation of the project with involvement of people. Nature and loss of structures, which are likely to be affected, were identified. It was this effort that took the project forward towards successful implementation. The main reason being the minimum land availability was ensured for bus lanes, MV, NMV and pedestrian sidewalks.

Experts from a wide spectrum of the society began discussing the concerns of some BRTS implementations in the country. While every new project is expected to experience some level of friction during initial stages, adequate efforts are underway to mitigate any adverse effects from the implementation of Vishakhapatnam BRT system for the following reasons:

- ❖ In a majority of instances across the world, project 'success' or 'failure' can quickly begin as a perception and soon turn into a reality. Such a perception is created due to the ability of the implementing agency to properly and adequately publicize information about on-going projects. Technically better projects have failed in many instances due to not providing adequate project information to the general public.
- ❖ It is anticipated that Vishakhapatnam, BRTS will not experience concerns because GVMC has been actively engaging the public through the social assessment study and wide publication in the news media.
- ❖ A second issue is with regard to proper planning of projects such as BRTS. Vishakhapatnam has been actively conceptualising, planning, and designing the project for over 2 years and is pursuing the implementation aspect with diligence. It is recommended that GVMC continue to brief the elected representatives and provide

information that the project had been thoroughly planned by taking into consideration the current and projected travel demand in the city.

- ❖ Projects that have ‘take-away’ lanes from the general purpose traffic, i.e., from the ‘existing’ lane geometry for BRTS dedication – mostly 7 meters – are considered an inappropriate strategy. Such an action is considered not only negative in terms of further constraining currently depleted capacity but also invites public anger. Vishakhapatnam BRTS does the opposite by not only widening the roadway for dedicating two lanes to BRTS but also improving opportunities for pedestrianisation and junction improvements. It is suggested that GVMC use this as a reason for seeking added right-of-way, thereby not taking away lanes from the general public but adding to public convenience, while removing buses out of general purpose lanes.
- ❖ Projects where the proposed BRT systems are for short lengths / short segments experience concerns. Any BRT system should be a multimodal effort with several interchange points to feeder services. Vishakhapatnam BRTS is proposed along 20km and 18km continuous stretches and therefore, provides a viable length of road segment for effective implementation. It is recommended that GVMC mention this key aspect since such a proposition is not only financially sustainable but also physically implementable.
- ❖ Systems that have developed in a very short duration may have caught the people by surprise thus adding to the syndrome ‘we did not hear or know about this problem.’ Vishakhapatnam BRTS is likely to not experience this problem because GVMC has already been informing the media and the general public about project progress; and social assessments have been educating the directly impacted citizens about project issues including seeking feedback and opinion; and above all, construction activity will invariably raise public awareness about project aspect.

***iv) Expected Outcome of the Initiative / Project / Best Practice:***

The progress of the implementation can be deemed satisfactory since its inception. The construction of BRTS infra commenced by Dec 2008 and since then we have been able to complete about 10 km each on PTC and STC corridor.

## **Development of Modern Bus Shelters and Foot Over Bridges on the BRT Corridors**

As part of development essential infrastructure facilities on the corridors, GVMC proposes to develop about 25 Foot-over Bridges integrated with modern Bus Shelters (a total of 76 shelters) for the safe movement of commuters at crossings, interchanges, boarding and alighting.

### **Development under PPP**

In order to leverage limited resource of GVMC it is proposed to develop the above Fob's and Bus Shelters on Public Private Partnership (PPP) Model dividing them in to three to four bid packages. The other advantages of the PPP model include:

- i)** The development under PPP model will provide a quality infrastructure with state of the art facilities and bring substantial saving in the capital investment of Government / GVMC.
- ii)** Construction, operation and maintenance risks will be transferred to the selected developers.
- iii)** GVMC would get the revenue share from the selected developers during concession period, in case a particular bid package works out to be commercially viable proposition.

### **Proposed Methodology for PPP**

- i)** As per the PPP model, the scope for the selected developer(s) would include the following major project components/activities:
  - a)** Implementing (financing, designing and executing) the proposed Modern Bus Shelter and Foot Over Bridges on BRTS Corridor on BOOT model, Vishakhapatnam
  - b)** Operating and maintaining the facilities for the given Concession Period.
  - c)** Transferring the facilities to GVMC after Concession Period.
- ii)** The selected developer(s) will have advertisement rights on the project facilities they create during the entire concession period. Capital cost (debt servicing) and O&M costs would be met from the revenues they receive from the advertisement.

- iii) Based on requirement, locations of the Bus Shelters and Foot Over Bridges are finalised.
- iv) Based on the traffic intensity including pedestrian movement, the project components of the facilities (i.e. with lift or without lift) are decided.
- v) Based on advertisement potential, the facilities (locations) are grouped in to individual bid packages.
- vi) Request for Proposals (RFP) would be invited from short-listed bidders for selection on competitive basis. The bid parameter for selection would be concession period quoted.

### Present Status of RFQ

- i) Request for Qualifications (RFQ) invited from the prospective leading business houses, entrepreneurs, advertising agencies, media houses, developers.
- ii) Seven firms submitted their applications and based on evaluation of their credentials vis-à-vis the stipulated financial and experiential qualification criteria, these firms would be short listed for issue of RFP documents.
- iii) Draft RFP documents are under discussion.
- iv) Typical design of Bus Shelter and FOB is being done for inclusion in the RFP document.

### *Roles / activities of the partners at each stage of the Initiative / Project / Best Practice:*

GVMC has been very active in pursuing the goals and objectives with which the project was conceptualised. Being the main civic agency in Vizag, GVMC has discussed the project with elected representatives, multi-political party and public forums. With the formation of SPV, the final shape of the project is being formalised on operational, ITS and maintenance issues.

### *v) Important Stakeholders Involved and Communication / Networking Procedure for the Project*

The project will be implemented by a Special Purpose Vehicles (SPV) with equity stakes through GVMC, APSRTC & VUDA. Working group has been constituted with Local Government Representatives. Government have already approved the formation of Special Purpose Vehicle (SPV) named “Visakhapatnam Urban Transport Company Limited” and company has been registered with the Registrar of Companies for registration of the SPV

under name VUTCL for implementation and operationalisation of the BRTS. As per the Government approval APSRTC will be the major stakeholder with 51% equity and the Greater Visakhapatnam Municipal Corporation with 25 % equity & VUDA with 24% equity as other stakeholders.

## OBJECTIVES OF SPV

The main objectives of proposed SPV Company are as follows:

- ❖ To provide bus rapid transit system to public by way of planning, designing, financing, developing constructing, maintaining, marketing operating and enabling BRTS.
- ❖ To provide and/or facilitate provision of multi model transport services including owning, licensing and operating bus routes, passengers and other modes of transportation.
- ❖ To serve as a single agency which will facilitate, coordinate, control and monitor the activities of various public and private partners that are an integral part of the BRTS planning, implementation and operational functions.
- ❖ To engage in and/or to facilitate development and operation of mass transit system.

## Status of SPV

- Formed as per G.O.Ms.No.817 of MA&UD Dated: 26<sup>th</sup> November 2008.
- VUTCL name registered with ‘Ministry of Corporate Affairs’.
- DIN (Directors Identification Number) for 6 Directors out of 7 including Chairman & CEO Obtained. DIN of ED RTC is to be obtained.
- APSRTC - 51% equity, GVMC equity -25% and VUDA equity - 24%.
- Authorized share Capital ₹ 2.50 Cr. - ₹ 10 /- per equity share.
- GVMC Body adopted by G.O. on 29-12-2008
- MoA and AoA finalised
- Co-ordination committee for implementation / execution of BRT project vides G.O. Rt. N. 1808 of MA&UD Dated: 19-12-2008.
- Revised order issued vides G.O Ms. No. 77 MA & UD (H Dept ) Dt17.02.2010 forming VUTCL with 7 Board of Directors with Collector , Vsp as Chairman ,

Commissioner GVMC as CEO and Executive Director APSRTC as Managing Director.

#### 11.4 Factors of Success

The success of public transport initiative in Vizag will result in large number benefits accruing to public directly or indirectly, when the project is made operational in about one year's time. In all cities in India supply effective public transport has been a forgone and travel and mobility needs are exclusive in the hands of private vehicles and para-transit services. We are largely unprepared to tackle severe traffic congestion, air pollution, accidents and loss of sense of community.

BRTS Vizag will create a high quality public transport to enhance the mobility pattern and demonstrate that people and community come first. It will increase the modal split in favour of public transport – being the ultimate strategy of the Government of India (MOUD) to promote public transport in the country. The other benefits can be quantified at a later date when the system is operational. BRTS will reorganise road space with the segregated MV, NMV and dedicated bus lanes and will enhance road capacity utilisation factors. Dedicated bus lanes will promote public transport & discourage use of private vehicles.

BRTS corridor will cater to all modes of road transport. Also systematic movement of traffic in dedicated lanes ensures smooth flow, frictionless travel, and savings in travel time / cost, minimise accidents & enhances safety. The provision of exclusive segregated NMV lane will promote safety to slow moving vehicles and planned & protected sidewalk facilities will guide the pedestrian safely. The key sustainability indicators will be protection of environmental conditions, energy savings, readiness of people to shift to PT, reduction in road accidents etc.

#### 11.5 Budgetary Implications and Sustainability

##### *i) Total Cost of the Project*

The BRTS corridors PTC & STC has been planned for the various improvements / enhancements needed to construct dedicated bus lanes, segregated MV and NMV lanes including footpaths and foot over bridges at different locations. Accordingly, construction packages were devised by GVMC for various sections of the project corridors.

It is envisaged that the project would involve widening of project road, construction of new pavements for bus transit, MV lanes, NMV lanes, construction of cross and longitudinal drainage, footpaths and foot over bridges, street lighting, traffic signs and road markings etc. The detailed cost estimate has been worked out using detailed quantities of different items of works derived from the detailed design, drawings and unit rates.

- ❖ The estimated cost for providing fixed infrastructure for civil and electrical infrastructure is estimated at ₹ 339 crore which has provision of ₹ 1.5 crore as contingencies. The cost shifting of utilities has been estimated at ₹ 26.5 crore.
- ❖ The specification of Automatic Vehicle Tracking System and Passenger Information System has been outlined for the project. The cost estimate for producing ITS related facilities for 300 buses, 50 bus stops, 8 terminals, 3 depots and a Control Centre has been provisioned. The total cost is estimated at INR 6 crore. The O&M cost shall be about 15% of capital cost.

**Financial partners involved:**

The funding is given partly by Government of India (Funding through JNNURM initiative), partly Government of Andhra Pradesh and GVMC in the ratio of 50%, 20% and 20% respectively. GVMC is planning to achieve its share by accessing loans form FI / Bank up to 50% of its contribution in the project.

***ii) Source of Finance for Sustainability of the Project***

The annual operational and maintenance cost of the system per annum will be about Rs 25 crore by year 2011 and 39 crore for year 2021. The expected ridership on the PTC and STC corridor will 1.85 lakh by year 2011 & 3.15 lakh by year 2031 passengers daily. The estimated bare box revenue will be about 73 crore per annum by year 2011 and will increase to 125 crore by year 2021. In addition to this about Rs 5 crore per annum can be generated through advertisement rights. Being the Government funded capital intensive project, the operational viability is expected to be sound as the project IRR comes to healthy 41%. This implies that project is operationally quite viable and not only the rolling stock (buses), but other systems (fare collection system and intelligent transportation systems) can also be financed from the fare box revenue and even after that there will be enough in the kitty of SPV - VUTCL to maintain the fixed infrastructure efficiently.

Since an IRR of 15% is considered a reasonable proposition to attract investors for financing rolling stocks, a proportion of total revenue is enough to give this kind of return for successful rolling stock concession and maintaining the BRTS infrastructure in efficient conditions.

The profitability of the project was critically analysed based on variation in the rolling stock cost – impact of +20% and the variation in the project revenue (on account of ridership, fare level and other incomes) of the project. The operational would not be effected even with negatively side sensitivity of key variables under reasonable scenario. The project IRR will off course be very sensitive to the revenue fluctuations. GVMC has taken advance actions on implementing the part of BRT infra like bus stations; grade separated pedestrian facilities, ‘off-street’ parking on PPP mode.

### 11.6 Impact of the Initiatives

- ❖ The project has been discussed in the MOUD progress review meetings and seminars many times. The project was presented in the international seminar conducted by Indo-German Institute of Advance Technology (IGIAT) and Gayatri College of Engineering, Vizag - promoted and sponsored by;
- ❖ Federal Transit Administration (FTA), Washington;
- ❖ German Technology for Technology Cooperation (GTZ);

Since the venue was Vizag, the delegates visited the BRTS corridors and showed keen interest in the project. The project was discussed in many forums in the seminar and received wide publicity and attention.

### 11.7 Summing Up

As feasibility study, convened by GVMC, appraised a BRTS network of 100Km consisting of 6 BRTS corridors. In first phase, 2 corridors between RTC complex to Pendurthi (20.00 Km) and Simhachalem (18.50 Km) were recommended. The study was approved by MoUD and aid was granted through JNNURM programme. Visakhapatnam BRTS is also a PPP based project. ‘Public’ is represented by a SPV named ‘Visakhapatnam Urban Transport



Company Limited' (VUTCL). The project will be implemented by a Special Purpose Vehicles (SPV) with equity stakes through GVMC (25% equity), APSRTC (51 % equity) and VUDA (24 % equity).

The main objectives of SPV are to provide BRTS by way of planning, designing, financing, developing and constructing etc.; facilitate multi modal transport services including owning, licensing and operating bus routes; and serve as single agency to facilitate, coordinate, control and monitor the activities of various public and private partners.

As per PPP model, the scope for developer (private sector) would include implementing bus shelters, foot over bridge on BOOT, operating, maintaining and transferring the facilities to GVMC after concession period; having advertisement rights etc.

Challenges / constraints faced during the construction of corridors are related to land and property acquisition for RoW, utility diversions and addressing the drainage, traffic management and diversion of traffic, strategic location of village settlements, environment and social, problems and prospects of resettlements etc.

The projects are progressing as per the schedule. The construction of BRTS infrastructure had commenced by December 2008. About 10 km of BRT corridors, on PTC as well as STC, have been completed.

# Summary & Conclusion

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## 12.0 Summary and Conclusions

As mentioned in the 'Introduction' chapter, the present study documents ten urban transport initiatives/projects undertaken in ten cities of India. It covers four BRTS projects of Ahmedabad, Pimpri-Chinchwad, Visakhapatnam, Jaipur; five Modern City Bus Services (MCBS) of Jalandhar, Jabalpur, Surat, Vadodara and Jalgaon; and multilevel underground parking project of Kolkata. Apart from Jaipur Public Transport (through BRT and Modern City Bus Service) project, the remaining are PPP based projects. For each the study documents mainly description of the project including situation before implementation of the initiative, factors of success, budgetary implications, performance and impact of the project. Besides, it also identifies challenges / constraints, lessons learnt, and provide suggestions.

### 12.1 PPP in Case studies

PPP is the method in which public and private sector cooperate and partner with each other to provide infrastructure and / or improved public services. 'Public' is represented by SPV in the projects of Ahmedabad, Pimpri-Chinchwad, Jaipur, Visakhapatnam, Jalandhar, Jabalpur; Municipal Corporation in case of Surat, Vadodara, Kolkata; and Transport Committee in Jalgaon. 'Private' is represented by Private Sector Organizations / Companies involved in financing the project or for technical / engineering means or for management purposes. There are many PPP models available in which public and private sectors enter into the partnership such as Service Contract, Management Contract, Concession and Lease, BOT, BOOT, DBFOT etc.

#### 12.1.1 BRTS Projects in Selected Cities

Ahmedabad Janmarg Limited is a SPV, constituted by the Ahmedabad Municipal Corporation, to manage the BRT project. It is responsible for planning, selection of operators, monitoring of service quality, fare revisions, future BRTS expansion plan etc. There are nine PPP arrangements (contracts), for bus procurement, operation and maintenance; ITS on BOT, development foot over bridges on DBFOT; supply and service of bus stations, sliding doors; management of pay and park facility; lease of advertisement rights; housekeeping and cleaning of buses; development and maintenance of landscape; and maintenance contract of bus stations (civil works), etc.

Table 12.1A: Highlights of Public Private Partnership in BRTS Projects of Selected Cities

Cities	Public-Private Partnership	
	Public Sector	Private Sector
Ahmedabad	<p>Ahmedabad Janmarg Limited, a SPV, for:</p> <ul style="list-style-type: none"> <li>• Planning of services;</li> <li>• Selection of operators;</li> <li>• Monitoring of service quality;</li> <li>• Fare revisions;</li> <li>• Coordination with relevant departments; and</li> <li>• Future BRTS expansion plan.</li> </ul>	<p>PPP Arrangements(Contracts):</p> <ul style="list-style-type: none"> <li>• Bus Procurement, Operations and Maintenance;</li> <li>• Integrated Information System including Automatic Ticketing and Vehicle Tracking System(BOT);</li> <li>• Supply &amp; Service Contracts for Bus Station Sliding Doors, Turnstiles;</li> <li>• House Keeping &amp; Cleaning of Bus Stations;</li> <li>• Management of Pay &amp; Park facilities;</li> <li>• Lease of Advertisement Rights;</li> <li>• Development of Foot Over Bridges on DBFOT;</li> <li>• Development &amp; Maintenance of Landscape; and</li> </ul> <p>Maintenance Contracts for Bus Stations (Civil Works), Lighting of Bus Stations &amp; Corridor, Monitoring and Maintenance of BRTS Corridor (Civil works), Signage.</p>
Pimpri -Chinchwad	<ol style="list-style-type: none"> <li>1. Pune Mahanagar Parivahan Mahamandal Ltd. (PMPML) responsible for managing facilities and services (operating buses).</li> <li>2. PCMC Infrastructure Company, a SPV, to:                     <ul style="list-style-type: none"> <li>• Plan, construct, operate and maintain the BRT corridor through funds generated by the Urban Transport Fund. Premium on loading of Transfer of Development Right (TDR) is a robust source of revenue.</li> </ul> </li> </ol>	<p>Private Sector for Road Furniture:</p> <ul style="list-style-type: none"> <li>• Bus stops;</li> <li>• Public toilets;</li> <li>• Landscaping;</li> <li>• General maintenance; and</li> <li>• Advertisement rights offered on Mumbai Pune road of 12Kms.</li> </ul>
Jaipur	<ol style="list-style-type: none"> <li>1. Jaipur Development Authority responsible for:                     <ul style="list-style-type: none"> <li>• Development of BRT infrastructure; and</li> <li>• Supervision of construction works of BRT corridors.</li> </ul> </li> <li>2. Jaipur City Transport Services Ltd., a SPV to:                     <ul style="list-style-type: none"> <li>• Look after overall BRT projects;</li> <li>• Procurement of bus operators, collection agencies, ITS agency; and</li> <li>• Regulate, control and monitor BRT operation.</li> </ul> </li> <li>3. Unified Metropolitan Transport Authority deals with the policy level decisions, which are related to land use and transport.</li> <li>4. PDCOR Ltd and STUP Consultant Ltd. are responsible for infrastructure designing, bus operation and supervision of Engineering works.</li> </ol>	<p>No private sector involved.</p> <p>In future, JDA would construct bus stops / shelters / stations in the city through PPP.</p>
Visakhapatnam	<p>Visakhapatnam Urban Transport Company Limited, a SPV, (with equity stakes through GVMC, APSRTC &amp;VUDA) responsible for:</p> <ul style="list-style-type: none"> <li>• Planning, designing, financing, developing constructing, maintaining, marketing operating;</li> <li>• Providing multi model transport services including owing, licensing and operating bus routes, passengers and other modes of transportation; and</li> <li>• Serving as a single agency which will facilitate, coordinate, control and monitor the activities of various public and private partners.</li> </ul>	<p>Private Sector is for:</p> <ul style="list-style-type: none"> <li>• Implementing (financing, designing and executing) the bus shelters and foot over bridges on the corridors on BOOT model;</li> <li>• Operating and maintaining facilities for given Concession period; and</li> <li>• Transferring facilities to GVMC after Concession period.</li> </ul>

In Pimpri-Chinchwad BRTS project, PCMC Infrastructure Company is a SPV to plan, construct, operate and maintain BRT corridor through funds generated by UTF. Premium on loading TDR is a robust source of revenue. Private sector is being involved for road furniture, viz. bus stops, public toilets, landscaping, general maintenance etc. Advertisement rights have been offered on Mumbai Pune road of 12 Km.

Visakhapatnam Urban Transport Company Limited has been constituted as a SPV, along with equity stakes through GVMC, APSRTC and VUDA, for implementation and operationalisation of the Visakhapatnam BRTS. Private sector is being involved for implementing bus shelters and foot over bridges on BOOT; operating and maintaining facilities on given concession period.

In case of Jaipur public transport (through BRT and modern city bus service), JDA is responsible for development of BRT infrastructure and supervision of construction works on BRT corridor. JCTSL is a SPV to look after BRT projects; procurement of bus operators, collection agencies, ITS agencies; and to regulate, control and monitor BRT operations. However, UMTA deals with policy level decisions. No private sector has been involved. It was reported that the private sector would be involved for constructing bus stops/shelters in the city areas (Table 12.1A).

### *12.1.2 Modern City Bus Services in Selected Cities*

Surat and Vadodara are the two cities of Gujarat in which the Municipal Corporations represent the public sector and are responsible for identifying routes, bus stops, fixing up of fare structure and ensuring the quality of service. Private sectors are involved for procuring, owning, operating and maintaining buses; constructing bus stops / pick-up stands / queue shades on BOT, taking care of expenditure on rolling stocks etc.

In case of Jalandhar and Jabalpur, public sector is represented by SPVs to operate and manage public transport system. The SPV of Jalandhar city bus service provides differentially priced services and the Municipal Corporation of Jalandhar provides space for city bus depots and bus queue shelters on lease basis. In both the cities, private sectors are involved for operating buses, construction of bus queue shelters / bus stops on BOT; ITS system (GPS and PIS) etc.

Table 12.1B: Major Highlights of Public Private Partnership in Modern City Bus services of Selected Cities

Cities	Public Private Partnership	
	Public Sector	Private Sector
Jalandhar	<ol style="list-style-type: none"> <li>Jalandhar City Transport Service Limited, a SPV, to:                             <ul style="list-style-type: none"> <li>Operate and manage Public Transport system;</li> <li>Provide differentially priced services; and</li> </ul> </li> <li>Municipal Corporation of Jalandhar to provide space for City Bus Depot and bus queue shelters on lease basis.</li> </ol>	Private Sector is for: <ul style="list-style-type: none"> <li>Bus Queue shelters on BOT;</li> <li>GPS on BOOT;</li> <li>Monthly bus passes;</li> <li>Electronic ticketing machine;</li> <li>Five bus operators; and</li> <li>Public Information System (PIS).</li> </ul>
Surat	<ol style="list-style-type: none"> <li>The Surat Municipal Corporation is to:                             <ul style="list-style-type: none"> <li>Identify routes, bus stops and fixing up fare structure; and</li> <li>Quality of service in terms of frequency and CNG fuel.</li> </ul> </li> <li>Regional Transport Authority for sanctioning carriage stage permits providing statutory sanctions to these terms.</li> </ol>	Private Sector is for: <ul style="list-style-type: none"> <li>Procuring, owning, operating and maintaining buses;</li> <li>Expenditure on rolling stock;</li> <li>Construction of bus stops on BOT; and</li> <li>Rights given to operators by SMC for collecting fares.</li> </ul>
Jabalpur	Jabalpur City Transport Services Limited, a SPV, to operate and manage the public transport system in a PPP model.	Private Sector is for: <ul style="list-style-type: none"> <li>Procuring and operating buses;</li> <li>Making passes;</li> <li>Constructing bus stops on BOT; and</li> <li>On line Vehicle Tracking System – GPS and PIS.</li> </ul>
Vadodara	<ol style="list-style-type: none"> <li>Vadodara Mahanagar Seva Sadan is the lead implementing agency to:                             <ul style="list-style-type: none"> <li>Identify bus routes, bus stops and fixing of fare structure;</li> <li>Define quality of service in terms of frequency</li> <li>Determine the buses should run on CNG</li> </ul> </li> <li>Regional Transport Authority for:                             <ul style="list-style-type: none"> <li>Sanctioning stage carriage permits providing statutory sanctions to these terms.</li> <li>Providing technical assistance to VMSS in preparing proposal and tenders etc.</li> </ul> </li> <li>Gujarat State Road Transport Corporation for providing route map.</li> </ol>	Private Sector is to: <ul style="list-style-type: none"> <li>Procure, own, operate and maintain the buses;</li> <li>Take care of expenditure on rolling stock and operation and maintenance;</li> <li>Provided uniforms (with logos of VMSS and the VTCOS Pvt Ltd) to drivers and conductors; and</li> <li>Construct Pick-up stands / Queue shades on BOT.</li> </ul>
Jalgaon	<ol style="list-style-type: none"> <li>A Transport Committee, constituted by Jalgaon Municipal Corporation, for:                             <ul style="list-style-type: none"> <li>Policy decisions;</li> <li>Levy of fares and charges of transport services has been decided by the transport committee with approval of the Municipal Corporation and R.T.A.; and</li> <li>Approval to the Routes Stages and Fare structures.</li> </ul> </li> <li>Transport Manager for:                             <ul style="list-style-type: none"> <li>Identification of routes stages and fares and charges;</li> <li>Submission of proposal to Appropriate Authorities;</li> <li>Management of Undertaking; and</li> <li>Execution and overall implementation of PPP Model.</li> </ul> </li> </ol>	Private Sector is to: <ul style="list-style-type: none"> <li>Procure, own, operate and manage buses;</li> <li>Erection of Bus shelters;</li> <li>Appointment and Training ;</li> </ul> <p><b>Note:</b> Municipal Corporation of Jalgaon has transferred the rights to the above mentioned transport company, in lieu of the royalty of ₹ 0.85 per km. The Corporation has also taken ₹ 25,000 per vehicle from the Operator as a guarantee in the form of bank deposit.</p>

In Jalgaon, a 'Transport Committee' represents public sector and is responsible for policy decisions, levy / fixing of fares / fare structure, identification of routes, execution and over all implementation. Private sector is to procure, own, operate and manage buses; erection of bus shelters, providing ITS etc. It is to be noted in this context that the Municipal Corporation has transferred the aforesaid rights to the transport company and in lieu of the royalty of ₹ 0.85 per Km. Moreover; the Municipal Corporation has also taken ₹ 25,000 per vehicle from the Operator as a guarantee in the form of bank deposit (*Table 12.1B*).

In Kolkata Multilevel Underground Parking Project, the Kolkata Municipal Corporation is representing 'Public' and has land rights but it may not have sufficient finance and engineering means to develop the project. It involved private sector, Simplex Private Limited to construct and lease out the commercial blocks (at Level-1) and car parking system on a double - concession BOOT basis (*Table 12.1 C*).

**Table 12.1C: Major Highlights of PPP for Kolkata Multilevel Underground Parking at Lindsay Street**

Public Private Partnership	
Public Sector	Private Sector
<p>Kolkata Municipal Corporation to:</p> <ul style="list-style-type: none"> <li>• Offer the concessionaire, Simplex Pvt. Ltd. (private sector), the right to construct the parking system and commercial complex. Architectural designs and drawings were approved by the Corporation; and</li> <li>• Collect the basic rent directly from the lessee</li> </ul>	<p>Private Sector to:</p> <ul style="list-style-type: none"> <li>• Construct commercial complex (at Level -1) on BOOT;</li> <li>• Construct underground car parking (at Level-2) on BOOT; and</li> <li>• Impose and collect parking charges and pay the Corporation.</li> </ul>

After going through the above mentioned analysis, one can infer that public and private sectors enter into Public-Private Partnership through various types of agreements, contracts or concessions to meet their requirements. Public sector (SPV, ULBs, TC) usually do not have sufficient finances or technical expertise / means due to which they have to depend upon private sector for procuring, operating and maintaining of buses; erection of bus shelters / bus stops; providing ITS and other infrastructures.

However, the role of public sector, as mentioned above, is planning, designing, identification of routes, fixing of fares, over all supervision and monitoring of the project. In nutshell, this is all done for providing efficient and better quality services to the citizens.

It is expected that the PPP arrangements may help in making the project successful in terms of operational performance. As mentioned earlier, the operational performance largely depends upon financial performance, which itself is subject to management efficiency and fare structure. The system should initially recover its operating cost from its fare box (achieving breakeven point).

Capital cost is recovered in a fixed period of time either from fare box or revenue from other sources, like revenue from advertisements, rents etc. The following section of this chapter tries to identify success stories – best practices by evaluating overall performance of the case projects with the available data / information on the projects.

## 12.2 Success Stories – Best Practices

Out of ten urban transport projects, eight have been implemented and running successfully. However, Jalgaon City Bus Service has recently been started. Amongst eight implemented projects, two are the BRTS of Ahmedabad and Jaipur; five are City bus services of Jalandhar, Surat, Jabalpur, Vadodara, Jalgaon; and Kolkata Multilevel Underground Parking Project.

Following case studies may be treated as success stories in terms of their overall performance and impacts of the project:

**Ahmedabad BRTS** with new technological applications / innovations has been in operation for the past one year. It carries about 90,000 passengers daily with deployment of 45 diesel buses (30 AC buses out of 45, 12 meter long, 900mm floor height), with commercial speeds greater than 24 Kms per hour. A review of the two months progress of the Ahmedabad BRTS project, in terms of various parameters, indicates that the system is running successfully. Average passengers per day, average collection per day, average passenger per bus per day, average collection per bus per day have increased considerably during two months period. During the period, average rating giving to BRTS by users is 8.61 out of 10.

Besides the above, the operation 23 buses during first four month , reflects positive impacts, such as an increase in ridership (from 17,315 in first month to 69,759 passengers per day in eleventh month), increase in revenue (from ₹ 4,500 to ₹ 8,700 per bus per day), modal shift (shift of passengers from motor cycles, cars and 3-wheelers, which is about 50% of the total BRTS users), dependable service / reliability (95% departures are on time, 65% of arrivals were on time), improvement in travel speed (peak hour speed-24Kmph against 16-18 Kmph



of AMTS), improvement in the level of air pollution due to CNG buses, decrease in accidents rates etc.

The major reasons for the success (factors of success) of Ahmedabad BRTS may be attributed mainly to its good institutional structure, which maximize the quality of service, minimize the cost of service, and cost sharing using a PPP model. The project has been awarded by MoUD as the Best Mass Transit Project under JNNURM in the year 2008-2009. It was given 2010 Sustainable Transport Award for visionary achievements in sustainable transportation and urban livability in a function held at Washington.

**Table 12.2: Overall Performance / Impacts of the Projects of Selected Cities**

Performance / Impacts of the Projects							
Cities / Projects	Increase in Ridership	Increase in Revenue	Improvement in service frequency	Information Availability (ITS)	Reduction in Pollution	Reduction in Accidents	Users Satisfaction
Ahmedabad BRTS	✓	✓	✓	✓	✓	✓	✓
Jaipur Public Transport	✓	NA	✓	✓	✓	NA	NA
Vadodara City Bus service	✓	✓	✓	✓	✓	NA	✓
Surat City Bus Service	NA	NA	✓	✓	✓	NA	✓
Jalandhar City Bus Service	✓	✓	NA	✓	NA	NA	✓
Jabalpur City Bus Service	NA	✓	NA	✓	NA	NA	✓
Jaigaon City Bus Service	✓	NA	✓	✓	NA	NA	✓

NA – Not available

**Jaipur Public Transport Service** through BRT and modern city bus service is not a PPP based project. However, it may be treated as success story due to some changes, viz. improvement in travel speed (17 kms in 18 minutes at 25 Km / hr), increase in ridership (from 55,000 to 2,00,000), reduction in accidents (reduced by 12.65%), reduction in green house gas emission (complying with BS-III emission norms), reduction in air and noise pollution (complying with BS-III norms and engine is fitted at rear of buses), increase in

service frequency (7 to 15 minutes), more geographical coverage (grid system for route designing), reduction in energy consumption etc.

The reasons for the success of this project are attributed to planning and design: technical inputs like, low floor buses, AC buses, next vehicle display board / system, GPS, on board stop announcement, signal priority on specific signals, ticket system-prepaid / automated.

The **City Bus of Vadodara** is running successfully. Presently, approximately 101 buses are running on 41 routes providing cost effective and eco-friendly public transport with innovative features such as daily passes, students' passes and free travel for freedom fighters. The buses runs on CNG fuel which is proven environment friendly and makes improvement in ambient air quality leading to reduction in air pollution & better utilization of natural gas resources.

Passengers traveled by city CNG buses are 1, 50,000 per day which will be increased by 3, 50,000 in March 2010. There are a number of benefits to VMSS by Privatization, viz. income of VMSS increased with the offer premium of ₹ 18,55,000/- yearly from City Bus Service; income of VMSS increased with the offer premium of ₹ 82,58,400/- for pickup stands / Q – shades as per BOT; and the total income of VMSS has increased by ₹ 1 crore / year with 70 numbers of bus services and 124 nos. of pickup stands / Q shades and this amount would be utilized in the infrastructure development of the city.

The major reasons for the success of the project are attributed to private investment by operators for buses, infrastructure and operation and sharing of returns with operators against expenditure incurred. The Government of India has conferred an Award for Excellence in Urban Mobility on 5<sup>th</sup> December, 2008.

The **City Bus Service of Surat** is having a fleet of 116 buses, which are operating on 41 routes. These buses are efficient (in terms of frequency), cost effective and eco-friendly. Around 50,000 commuters travel by these buses daily. It issues daily passes, students' passes and allow free travel to freedom fighters. Besides, a system of weekly review by the traffic department of the corporation has been put in place to make the system more effective and efficient. Its success is attributed to the PPP model used for providing the service. It has received Best PPP Initiatives in Urban Transport award, by MoUD in the year 2008.

**Jalandhar City Transport Service Limited** (JCTSL), a SPV, to operate and manage the public transport system and provide differentially priced services. In the first phase, JCTSL have 16 buses having GPS and PIS system, which will expand very soon. Since it has started recently in the beginning of 2009, the operational as well as financial performance was not available.

However, the study team of the Institute interacted with the officials of JCTSL to know about its performance. They mentioned that the operating cost is being covered by fare revenue (from fair box). The team also interacted with the commuters who were traveling by these buses. It was found that the commuters, who were using Intermediate Public Transport (IPT) modes earlier, have switched over to these buses. The commuters were found satisfied with the services of these buses.

The **City Bus Service of Jabalpur** is running 28 Metro and 9 Mini Metro buses on 6 and 4 routes (July 2009) successfully. The financial performance of it is up to mark. Revenue is being collected as ₹ 26 per Km against operating cost of ₹ 24 per Km thus proving that Metro bus operation in Jabalpur is profitable under the PPP mode. Moreover, commuters were found to be satisfied with the service.

In **Jalgaon City**, around 30 Eco buses (Bharat II), equipped with GPS, PIS, modern ticketing and pass-system were being operated by Prassan Bus links Pvt Ltd under the overall supervision of Transport Committee constituted by Jalgaon Municipal Corporation (as on December 2009). The frequency of these buses is 5 minutes where the traffic density is high and after 10 minutes where the passenger load is moderate.

It was reported by the authorities that the ridership was increasing as it was attracting commuters who were travelling earlier by other modes of transport. Most of the commuters found quite satisfied with services in terms of frequencies and quality of the service (NIUA's study team interviewed with the commuters).

**Kolkata Multilevel Underground Parking Project**, having 250 parking slots in underground parking system at Level 2 and market complex at Level 1 with 200 shops on lease, may also be treated as successful project. The pedestrian plaza on the ground is a bonus for the pedestrians. Street parking is no longer allowed on Lindsay Street, the traffic jams have become a thing of past. This project is being replicated in many cities such as Mumbai, Pune etc. In this case also, the success of the project is attributed to PPP models used in it.

Performance parameters / assessment indicators of aforesaid projects are given in Table 12.2 for ready reference.

### 12.3 Major Challenges / Constraints and Lessons Learnt

It is to be mentioned that the aforesaid case studies are success stories in many respect but these have encountered many challenges or constraints, either at the time of planning or at the time of implementation. Challenges / constraints indicated in the case studies may be classified in following categories:

#### 1) Related to Finance

- Financial constraints due to cost escalation (Pimpri-Chinchwad);
- Financial sustainability of overall operation (Jaipur).

**Lesson Learnt:** Financial viability of the project should be worked out keeping in view the trend of inflation rate.

#### 2) Related to Planning

- Inadequate RoW in some areas (Jaipur);
- Availability of minimum ROW to achieve segregation of traffic on the corridors (Vishakhapatnam);
- Land acquisition of properties to produce RoW (Visakhapatnam);
- Acquisition of land for construction of depot, workshop and bus terminals (Jalgaon);
- Unavailability of lands for provision of parking near bus stops (Jaipur);
- Land acquisition delays the implementation process & land acquisition issues (Jaipur);
- Lack of interagency coordination (Jaipur and Vishakhapatnam); and
- Shifting of utility services (Jaipur) addressing drainage (Visakhapatnam).

**Lesson Learnt:** Land use planning should be integrated with transport planning in newly developing areas. NUTP also suggests the same.

#### 3) Related to Operation of Buses

- Low frequency of buses (Jabalpur);

- Buses are time efficient but the frequencies of these buses are very low (Jalandhar); and
- Existing routes are not viable for profit to the Bus Operators (Jalandhar).

**Lesson Learnt:** Travel demand on different routes should be reviewed periodically.

#### 4) Related to Technical Issues

- Problem of driving buses as the engine fitted at the rear side of bus and there is no automatic transmission system (Jabalpur); and
- Buses are big in size, operation on narrow road is not smooth having inadequate turning radius (Jalandhar);

**Lessons Learnt:**

- ❖ Automatic transmission is must not only to improve maneuvering but also to reduce the wear and tear of the buses; and
- ❖ Minibuses should be operated on such roads where widening of roads is not possible.

#### 5) Socio-Economic Issues

- Agitation by auto rickshaws drivers;
- Poor knowledge of traffic sense of the citizens have created difficulties in day to day traffic despite efforts towards high standards of traffic engineering in the city (Surat and Vadodara); and
- Strategic locations of village settlements at Simhachalem, where property acquisition is rather difficult (Vishakhapatnam).

**Lesson Learnt:** Awareness Campaign should be organized to provide knowledge about the project as well as traffic rules.

## 12.4 Suggestions

Keeping in view the review of the case studies / projects, in terms of overall performance and impacts of the projects, PPP arrangements / models used, challenges / constraints encountered at the time of planning or implementation of the project and lessons learnt, some suggestions can be given to improve future planning and implementation of the urban transport projects:

- 1) The analysis of various case projects reveals that PPP is one of the factors, which is responsible for making the project successful. In the case projects, public sector has been represented by Municipal Corporation (Surat, Vadodara and Kolkata), SPV (Ahmedabad, Pimpri-Chinchwad, Jaipur, Visakhapatnam and Jabalpur) and Transport Committee (Jalgaon). The aforesaid Municipal Corporations have been performing their roles efficiently, however, it may be suggested that there should be a dedicated body, like SPV or TC, which could concentrate only on transport activities to make the project more successful.
- 2) The public sector should be responsible for planning, designing, identifying routes and locations of bus stops / bus queue shelters, fixing of fares etc (as indicated in many case projects). Moreover, it should be responsible for monitoring the operation of buses to ascertain as to whether the operators are operating buses as per the schedule or time table. It has been pointed in case of Jalandhar that the operators were operating their buses only on profit making routes and avoided operations on uneconomic routes. In such cases, the public authority should assess the commuters' volumes on uneconomic routes and fix up the frequency of buses accordingly.
- 3) As indicated earlier, the revenue from the fares or fare box is the major source of revenue, therefore, fixation of fares or preparing fare structure should be done by the public authorities. It is one of the important responsibilities of the public sectors as indicated in case studies also. In this context, it may be suggested that the fares should not be pegged at levels lower than that required to cover the cost. Moreover, the fares should be revised periodically to meet the operating cost. It has been reported that the operators in the some case projects provide concessional passes to certain sections of the citizens. In this regard, it may be suggested that the operator should not be forced to provide concessions. If special fares or concessions are given, the departments / local bodies concerned should compensate the operators. For example, the revenue loss as a result of issuing passes to students should fully be reimbursed by the Ministry of Education or any other concerned departments.
- 4) The authorities should explore alternative ways to generate revenues besides the fare box. PCMC has developed an innovative financial model (Annex VII of the study) to create a new revenue stream to UTF to construct, operate and maintain BRT corridors. It has allowed TDR from other zones to BRT corridor on payment of premium, which

makes 59% of the total income potential of BRT corridor. The same model may be replicated in the BRT projects of other cities.

- 5) The analysis of various PPP arrangements / models, used in the case studies, reveals that the PPP depends upon the requirements of the public sector. The financial health of most of the Municipal Corporations / Municipalities or Urban Transport Undertakings is not sound to provide urban mass transport services as per increasing demand. In such cases, public sector should enter into PPP and engage the private sector (private companies) through service contract to procure, operate and maintain the buses (as in case of Ahmedabad, Jalandhar, Vadodara, Surat, Jalgaon, etc).
- 6) If a public sector does not have technical and engineering means, it may involve the private sector for specific purposes, viz. construction of bus queue shelters / bus stops on BOT (as in case of Jalandhar, Surat, Jabalpur, Vadodara and Jalgaon), construction of foot over bridges on DBFOT (Ahmedabad) or on BOOT (Visakhapatnam); and ITS - GPS, PIS etc on BOT (as in Jabalpur, Surat, Vadodara, Jalandhar, Ahmedabad). The Ahmedabad BRT project has introduced latest technological applications, which are classified in three broad areas, viz. wireless station and bus door operations by driver, RFID based Docking System; Integrated Transit Management System; and Area Traffic Control System. This system is operating successfully and may be replicated in other BRT projects of other cities.
- 7) In order to make the BRTS more successful, it may be suggested to identify nodal points at BRT corridors and provide 'feeder' services from these nodal points to important city areas. The alternative modes of transport, viz. mini buses, battery vans, tempos etc. may be used to provide feeder service. This practice is being done in case of Ahmedabad BRTS.
- 8) As indicated in some case studies, land acquisition for providing RoW in city area had become one of the major constraints. In such cases, the government should take a quick decision to release the land by giving appropriate compensations to the property owners. In newly developing areas of the cities, land use planning should be integrated with the transport planning (NUTP also suggests the same). The selection of public transport modes should be done keeping in view the characteristics of the city. For large cities metro is advisable while BRTS suits for medium size cities. Modern city bus service, equipped with ITS, is also one of the alternative modes for medium sized cities.

- 9) In case of Jaipur and Visakhapatnam, coordination problems have been faced with the agencies involved. In this regard, it may be suggested that the public body- SPV or transport committee should intervene to solve the coordination problem with the relevant departments or agencies involved. The NUTP has suggested constituting Unified Mass Transit Authority (UMTA) for the purpose.
- 10) As in case of Jalandhar, drivers are not driving buses smoothly as they find difficulty in changing the gears (from lower to higher or from higher to lower) because of the rear side fitted engine in the buses. Generally, the gears are changed by hearing the sound of engine, which is not possible in the aforesaid buses. It may be suggested that these buses should have automatic transmission not only to improve the maneuvering but also to reduce the wear and tear of the buses;
- 11) Technically sound projects are not successful unavailability of in many instances due to not providing adequate project information for the general public. As indicated in Visakhapatnam BRT project, it is imperative to engage the public through the social assessment study and wide publication in the news media. In other words, the co-operation of citizens is imperative to make the project successful in real sense. Awareness Campaign should be organized to provide knowledge about the project. Moreover, citizens should be consulted at the time of planning of the project for seeking their feedback and opinion. They should be aware about transport service, which is to be given to them. People's participation in implementation of the project should also be encouraged.



# Reference & Annexures

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## ANNEXURE

Annex-I**List of Metro rail Projects approved by the Government of India and those under process/consideration (As on July 1, 2009)**

<u>List of Metro Rail Projects approved by the Government India and those under process/consideration</u>				
S. No.	Project	Length (in km)	Cost (Rs.in crore)	Status
<b>National Capital Region</b>				
1.	<u>Delhi MRTS Phase I</u>	65.05	10571	Project was sanctioned on 12.11.1996 and has been fully commissioned and made operational.
	Shahdara-Rithala	22.06		
	Vishwavidyalaya-Central Secretariat	10.84		
	Indraprastha-Dwarka	25.65		
	Dwarka sub-city (Dwarka- Dwarka VI)	6.5		
2.	<u>Delhi MRTS Phase II</u>	54.675	8605.36	Project was initially sanctioned on 30.3.2006 and revised sanction order issued on 7.3.2008. Project is under implementation.
	Vishva Vidyalaya - Jahangir Puri	6.36		<u>Target/Completion date</u> Commissioned on 3.2.2009 (9 months ahead of schedule)
	Central Secretariat - Qutab Minar	12.525		30.6.2010
	Shahdara - Dilshad Garden	3.09		Commissioned on 30.6.2008 (6 months ahead of schedule)
	Indraprastha - New Ashok Nagar	8.07		30.6.2009

	Yamuna Bank - Anand Vihar ISBT	6.16		31.12.2009
	Kirti Nagar - Mundka (along with operational link to Inderlok)	18.47		31.3.2010
3.	Extension of Delhi Metro from Ambedkar Nagar in Delhi to Sushantlok (Gurgaon)	14.47	1581	The project was sanctioned on 4.12.2006 and is under implementation. It is targeted for completion by 31.7.2010.
4.	Extension of Delhi Metro from New Ashok Nagar in Delhi to NOIDA Sector-32	7.0	827	The project was sanctioned on 19.3.2008 and is under implementation. It is targeted for completion by 30.6.2009.
5.	High Speed Express Link from New Delhi Railway Station to IGI Airport	19.2	3076	The project was sanctioned on 17.5.2007 and is under implementation. It is targeted for completion in June, 2010.
6.	Central Secretariat to Badarpur	20.16	4012	The project was sanctioned on 17.5.2007 and is under implementation. It is targeted for completion in June, 2010.
7.	Express link from IGI Airport to Dwarka Sector-21	3.50	793	Project has been sanctioned on 29.1.2009 and is targeted for completion by 30.9.2010.
8.	Metro link from Dwarka Sector-9 to Sector-21	2.76	275 + 81.11 (cost of rolling stock to be met by DMRC)	The project was sanctioned on 25.4.2008 and is under implementation. It is targeted for completion by December, 2009.
9.	Extension of Delhi Metro to Faridabad	13.875	2028	Matter is under process by Delhi Metro Rail Corporation Ltd. for obtaining approval of GNCTD and thereafter for submission of agenda note for consideration of Empowered Committee. Government of Haryana (GoH) has also been

				requested to submit Comprehensive Mobility Plan (CMP), improvement of city bus service, setting up of special purpose vehicle, etc. GoH and GNCTD reminded at the level of Secretary(UD).
10.	Extension of Delhi Metro from Anand Vihar ISBT to Vaishali, Ghaziabad	2.574	320	It is understood that DMRC has undertaken construction of the project as deposit work of Ghaziabad Development Authority. DPR and formal proposal are awaited from Govt. of Uttar Pradesh.
11.	Metro link from Jahangirpuri to Badli	3.425	394	Brief Project Report was submitted by DMRC to Chief Secretary, GNCTD on 18.5.2006 for 'in principle' approval, which is awaited. Meanwhile, DMRC has undertaken other priority projects mentioned above to be completed before Commonwealth Games, 2010.
12.	Extension of Delhi Metro to Bahadurgarh (Haryana)	11.781	1432	GoH has submitted DPR to GNCTD on 10.3.2009 for approval. Copy of letter has also been sent to MoUD for processing
13.	Delhi MRTS Phase III	138.9	24,303	Proposal discussed by Secretary(UD) on 26.3.2009 with concerned Ministries and Planning Commission. Sub-Committee constituted to recommend viable financing options.
<b>Other Than National Capital Region</b>				
13.	Bangalore Metro Rail Project	33	6395	Project sanctioned by the Govt. on 11.5.2006. Project is targeted for completion by 31.12.2011.
14.	East-West Metro corridor, Kolkata	13.77	4676	Project sanctioned by the Govt. on 30.7.2008. Project is targeted for completion by 31.01.2015.
15.	Varsova-Andheri-	11.07	2356	MoUD has proposed to provide

	Ghatkopar Line-I, Mumbai			equity/Viability Gap Funding (VGF) for this project as a Special Central Assistance (SCA) of Rs.650 crore outside JnNURM on similar lines, as was given to BRIMSTOWAD project. Secy.(UD) has written a D.O. letter dated 12.9.2008 to Secy., Deptt. of Expenditure in this regard. However, Secy., Deptt. of Expenditure vide letter dt. 24.10.2008 do not favour the proposal for funding the VGF for the ongoing Varsova-Andheri-Ghatkopar corridor of Mumbai Metro Project outside JnNURM.
16.	Charcop-Bandra-Mankhurd Line-2, Mumbai	31.87	7660	Empowered Committee in its meeting held on 25.8.2008 has recommended in principle for giving 20% VGF as per project cost of Rs.7660 crore under the VGF scheme of Ministry of Finance.
17.	Colaba-Mahim-Bandra Line-3, Mumbai	19.95	10571	Proposal awaited from State Govt.
18.	Chennai Metro Rail Project, Tamil Nadu	50	14600	Draft Cabinet Note duly approved by the Hon'ble UDM sent by Ministry of Finance for comments/ approval.
19.	Kochi Metro Rail Project, Kerala	25.3	2991.5	The matter is presently under consideration by the Planning Commission for in principle approval.
20.	Hyderabad Metro Rail Project, Andhra Pradesh	71.29	11892	The concession for Hyderabad Metro Rail Project has been awarded by Govt. of Andhra Pradesh to consortium led by M/s Nav Bharat based on concession agreement approved by Empowered Institution and Empowered Committee of Ministry of Finance,
				GoI. No VGF is envisaged. The lowest bidder has quoted negative VGF of Rs.30311 crore spread over 34 years.

Source: Ministry of Urban development, Government of India



## Annex-II

### Metro Rail Projects through Public Private Partnership (PPP)

#### A. II.1 Mumbai Metro Rail Project

Mumbai Metro Master Plan has identified a 146.5 kms network to provide a rail based mass transit connectivity to people within an approach distance of 1 to 2Km; to serve the areas not connected by existing Suburban Rail System and to provide proper inter change facilities for connectivity for neighbouring areas like Thane, Navi Mumbai and Vasai - Virar etc.

**Table II.1: Mumbai Metro Rail Project**

Phases	Length (in Km)
<b>Phase I</b>	
Varsova – Andheri – Ghatkopar	11.07
Charkop – Bandra – Mankhurd	31.871
Colaba – Bandra	19.75
<b>Total</b>	62.69
<b>Phase II</b>	
Charkop – Dahisar	7.50
Ghatkopar – Mulund	12.50
<b>Phase III</b>	
BKC – Kanjur Marg Via Airport	20.50
Andheri (East) – Dahisar (east)	18.00
Hutatma Chowk – Ghatkopar	21.8
Sewri – Prabhadevi	3.5
<b>Total Length</b>	146.50

Source: Mumbai Metropolitan Regional Development Authority

In Phase I, Varsova-Andheri-Ghatkopar corridor (Line I) of 11.07 km will be commissioning by 2010-2011. The cost of the project is ₹ 2356.00 crore. The Viability Gap Funding (VGF) grant

from the Central Government is ₹ 471 crore (Special Central assistance), while the VGF from the government of Maharashtra is ₹ 179 crore.

The Charkop – Bandra – Mankhurd corridor (Line- II) is planned as an elevated corridor for its entire length of 31.871 kms. The completion cost of the project is ₹ 7660 crore. VGF grant from the central Government is ₹ 1, 532 crore. The Corridor has 27 stations, all stations are elevated. Depot and stabling facilities have been planned at both ends of corridor at Charkop and Mankhurd. The concession agreement was signed on 21<sup>st</sup> January 2010 and expected to be commissioned by the year 2013-14.

**Table II.2: A Funding Pattern of Metro Rail Project of Mumbai**

	Project	Length (kms)	Commissioning Schedule	Cost (₹ in crore)	Funding Plan (₹ in crore)
1)	<b>Mumbai Metro Line-1</b> Varsova-Andheri-Ghatkopar	11.07	Commissioning By 2010-11	2356.00	Equity Concessionaire -379 (74%) Equity MMRDA - 134 (26%) Debt - 1194 VGF grant GoI - 471 (SCA*) VGF GoM - 179
2)	<b>Mumbai Metro Line-2</b> Charkop-Bandra-Mankhurd	31.87	Concession Agreement signed On 21.01.2010 Commissioning by 2013-14	7660.00	Equity Concessionaire- 1609 Equity of MMRDA-NIL Debt – 3753 (*DE Ratio=70:30) VGF GoI- 1532 VGF GoM- 766
3)	<b>Mumbai Metro Line-3</b> Colaba -Bandra	20	Approval awaited	-	Not applicable.

Source: Ministry of Urban Development (MoUD) [\*SPA - Special Central Assistance; \*DE – Debt Equity]

The Government of Maharashtra has designated Mumbai Metropolitan Region Development Authority as the project implementing authority. The project is being implemented on Build, Operate and Transfer (BOT) through Public Private Partnership (PPP). The Concessionaries of the project implementation is the SPV comprising M/s Reliance Infrastructure LTD, SNC Laval in (Canada) and Reliance Communications.

### A.II.3 Hyderabad Metro Rail Project

The Hyderabad Metro Rail Project covers three high density traffic corridors of the city, viz. Miyapur-LB Nagar (28.87 Km, 27 stations); JBS- Falaknuma (14.78 Km–16 stations) and

Nagole-Shilparamam (27.51 km, 23 stations). Thus, the total length is 71.16 km with 66 stations. The project is in PPP mode on Design, Build, Finance, Operate and Transfer (DBFOT) basis. Cost of the project, as approved by the Government of India is ₹ 12, 132 crore. Up to 40 % of the project cost, i.e., a maximum of ₹ 4, 853 crore can be given as VGF by the Central and State Governments together, subject to competitive bidding. The Government of India has sanctioned ₹ 2, 363 crore as its share under the VGF scheme for this purpose. This amount forms 20% of the estimated cost of the project of ₹ 12, 132 crore minus the State taxes component of ₹ 318 crore.

The previous Concessionaire M/s. Maytas Metro Ltd. failed to achieve financial closure by the due date, the Concession Agreement with them was terminated by the Government in July 2009. Their bid security of ₹ 60 crore along with ₹ 11 crore paid by them was forfeited and the Government of Andhra Pradesh invited global bids through fresh pre-qualification. Financial bids for the Project were opened on July 14, 2010. Three of the six pre-qualified firms participated in the bids.

**Table II.3: Firms Participated in the Bids**

	Firms	Amount (₹ in crore)	Percentage of Project Cost
1.	Larsen & Toubro Ltd	1,458	12
2.	Transstroy India-OJSC Transstroy Russia-CR 18G Consortium	2, 200	18
3.	Reliance Infrastructure Consortium	2, 991	25

Source: MoUD

The Government of Andhra Pradesh has selected the successful lowest bidder M/s Larsen & Turbo Ltd as the Concessionaire for the Hyderabad Metro Rail Project at their quoted grant amount of ₹ 1458 crore (12% of Total Project Cost) and awarded the Project to them. The Mo UD facilitated sanctioning of the VGF grant of ₹ 2,363 crore for the Project.

## **A.II.4 High Speed Express Link from New Delhi Railway Station to IGI Airport and Extension from IGI Airport to Dwarka Sector 21**

### *(A) Link form New Delhi Railway Station to IGI Airport*

In order to address the growing road traffic congestions and need for fast evacuation of passengers and visitors at the Airport, the Delhi Metro Rail Corporation Ltd. (DMRC) had submitted a proposal to the Government of India to provide a High Speed Express Link from New Delhi Railway Station to IGI Airport. The Government of India (GoI) gave sanction to implement the High Speed Express Link from New Delhi Railway Station to IGI Airport of length 19.2 Km. at a total estimated completion cost of ₹ 3076 crore including taxes on 17 May 2007. The details of the sanction are given below:

#### **i) Alignment**

The alignment will be from New Delhi Railway Station via Baba Kharak Singh Marg, Ram Manohar Lohia Hospital, Mother Teresa Crescent, Sardar Patel Marg, Dhaula Kuan and National Highway No.8 to IGI Airport.

#### **ii) Length**

The length of the alignment shall be as under:

Underground length	5.5 km
Elevated length	11.6 km
Switchover ramp	2.1 km
Total	9.2 km

#### **iii) Stations**

The stations will be located at New Delhi City Terminal, Shivaji Stadium (Baba Kharak Singh Marg), Dhaula Kuan and IGI Airport Terminal.

#### **iv) Gauge**

The Express link has been approved on standard gauge. The coaches with proven designs are available worldwide on standard gauge. Adoption of standard gauge has been accepted as it will

be more economical and will also need lesser time in supplying and commissioning to suit the completion of the link before Common Wealth Games i.e. by June, 2010.

**v) Rolling Stock**

The rolling stock required for the Express link will be of different design than normal metro due to higher speed (135 kmph or more), different sitting arrangements, luggage carrying arrangements, etc. The link shall, therefore, be a standalone system.

**vi) Train Maintenance Depot**

Train maintenance depot is proposed to be located at T-Junction where NH-8 and road to domestic airport meets. Approximately, 5 hectare land is required for this purpose, which is under occupation of the Defence Authorities, but at present lying vacant.

**vii) Land Requirement**

The land belonging to various Ministries / Departments as well as autonomous / statutory bodies / agencies of the GoI / GNCTD, which is required for the project, will be taken over by GOI / GNCTD at inter-departmental transfer rates notified by the MoUD, while the Railway land required, if any, will be made available on lease rates based on the market price of the land to be agreed upon between the MoUD and the Ministry of Railways (MoR).

**viii) Cost Estimates**

The overall capital cost for the line at March 2006 price level comes to ₹ 2541.81 crore (including taxes and duties). The completion cost is ₹ 3, 076 crore (including taxes and duties).

**ix) Financing Plan**

Under Concessionaire approach approved, the civil works outside the Airport i.e., cost of land, alignment, stations are to be shared by Government of India (GoI) and GNCTD equally as equity contribution. The cost of civil works within the airport will be borne by Airport Operator (Rs.350

crore) as grant to DMRC. The balance cost including rolling stock is to be borne by the concessionaire. The break-up of the financing plan is given below:

**Table II.4: Funding Arrangements for High Speed Express Link from New Delhi Railway Station to IGI Airport**

	Particulars	₹ (in crore)	Percentage
1.	Grant by Airport Operator to DMRC towards civil jobs inside the airport (To be provided upfront)	350	12
2.	Equity by the Government of India (GOT) towards civil jobs outside airport	599	19
3.	Equity by GNCTD towards Civil Jobs outside airport	599	19
4.	Equity by Concessionaire to maintain debt to equity ratio of 7:3	461	15
5.	Domestic Debt @10% by Concessionaire	1067	35
	<b>Total</b>	<b>3076</b>	<b>100</b>

Source: MoUD

#### **x) Additional Investment to be made by the Concessionaries as traffic increases**

Additional investment cost ₹ 768.00 Crore with taxes at completion cost has been provided in the year 2021-2022 to be provided by the concessionaire. These costs have been provided to take care of increased requirement of rolling stock and related equipment on account of the increased traffic since the existing rolling stock would be insufficient to carry out the traffic estimates in these years. This cost shall be fully borne by the concessionaries.

#### **xi) Operation & Maintenance Costs**

The total O&M cost shall be borne by the concessionaries.

#### **xii) Taxes**

Taxes and duties livable for this project have been incorporated in the total completion cost of ₹ 3, 076 crore.

**xiii) Implementation of the Project**

The civil works of the project shall be executed by Delhi Metro Rail Corporation Ltd. as per detailed project report (DPR) and revised project profile on PPP mode. Concessionaire shall also be fixed by DMRC and concessionaire agreement to be finalized in consultation with Ministry of Urban Development.

This project shall be part of an Integrated Transport Master Plan (ITMP), which will also include the plan for the feeder routes, etc. check-in facilities for passengers by all airlines at New Delhi Terminal, Shivaji Stadium (Baba Kharak Singh Marg) and Dhaula Kuan and baggage handling at New Delhi terminal and Shivaji Stadium shall be planned and provided by DMRC Ltd., Ministry of Civil Aviation and its affiliated agencies. Feeder / Intermodal transport and adequate parking facilities at all the stations shall be provided by Government of National Capital Territory of Delhi (GNCTD) and DMRC Ltd. The project shall be completed by June 2010.

***(B) Extension Metro Rail from IGI Airport to Dwarka Sector 21***

In continuation of the afore said order, GoI has considered the need for extension of this Express Link from IGI Airport to Dwarka Sector-21, which is being developed as a big transport hub having Metro line, Integrated Rail-cum-Bus Transport (IRBT) and Inter State Bus Terminal (ISBT). The sanction, for implementing the above mentioned extension, was given on 29 January 2009 through Order No. L-14011/1/2002-MRTS. The details of the above sanction are given below:

**i) Alignment**

The alignment from IGI Airport to Dwarka Sector-21 of length 3.5 km approx. will be completely underground.

**ii) System**

All the system / sub-systems (i.e. traction, signaling, telecommunication, automatic fare collection, air-conditioning and tunnel ventilation system), including standard gauge, will be the same as that of High Speed Express Link from New Delhi Railway Station to IGI Airport. At

Dwarka Sector-21, there will be facility of passenger interchange with Dwarka Metro line. No check in facility for air Travellers is proposed at Dwarka Sector-21 Station.

### **iii) Train Maintenance Depot**

No separate depot will be necessary.

### **iv) Land Requirement**

The land belonging to various Ministries / Departments as well as autonomous / statutory bodies/agencies of the GoI / GNCTD, which is required for the project, will be taken over by GoI / GNCTD at inter- departmental transfer rates notified by the MoUD, while the Railway land required, if any, will be made available on lease, the charges of which will be worked out on the basis of commercial market prices available for that area, as fixed by L&DO of Ministry of Urban Development, in case the land so given is commercially exploited / proposed to be exploited by Delhi Metro Rail Corporation (DMRC) Ltd.

This will be applicable for only that part of the land commercially exploited/proposed, In case the Railway land given to DMRC is not used / proposed not to be used for commercial exploitation, the land rate applicable for the surrounding land based on the existing use will be considered for working out lease charges.

### **v) Cost Estimates**

The overall completion cost of the project is estimated at ₹ 793 crore (including taxes and duties) as under: Cost of civil works - ₹ 534.64 crore; Cost of system - ₹ 258.36 crore

### **vi) Financing Plan**

The extension of Airport Express line from the Airport to Sector-21 will also be funded on Public Private Partnership (PPP) basis with the civil works alone to be completed by DMRC and the systems and rolling stock being provided by the Concessionaire. The cost of civil works will be shared by Government of India (GoI), Government of National Capital Territory of Delhi (GNCTD) and Delhi Development Authority (DDA). the latter's contribution being as a grant



and the contribution of GoI and GNCT as equity to DMRC. The funding arrangement will be as under:

**Table II.5: Funding Arrangement for Extension of the High-Speed Express Link from IGI Airport to Dwarka Sec-21**

S.No.	Particulars	Rs. (in crore)	Percentage
1.	Equity by Govt. of India towards civil works	158.60	20.00
2.	Equity by GNCTD towards civil works	158.60	20.00
3.	Grant by DDA	217.40	27.42
4.	Concessionaire's investment	77.50	9.77
5.	Domestic debt by Concessionaire	180.90	22.81
	<b>Total</b>	793.00	100.00

Source: MoUD

#### **vii) Implementation of the Project**

The implementation of the project shall be on PPP basis with the civil works alone to be completed by DMRC as per detailed project report (DPR) and the system and rolling stock being provided by the Concessionaire. The project is targeted for completion by September 2010, in time for the Commonwealth Games in 2010. Civil works within the Airport premises have to be completed for this link early to enable the Airport Operator to complete their works. This project shall be part of an Integrated Transport Master Plan, which will also include the plan for the feeder routes, etc. Feeder / Inter-modular transport and adequate parking facilities at all the stations shall be provided by Government of Notional Capital Territory of Delhi (GNCTD) / DDA and DMRC Ltd.



**Annex-III****BRTS Projects Sanctioned Under JNNURM (As on January 31, 2009)**

<b><u>BRTS PROJECTS SANCTIONED UNDER JNNURM</u></b>		
<b>Total – 422.35 kms at Rs 4770.966 crore (ACA Rs 2195.668cr)</b>		
<b>Pune</b>	<b>101.77 km</b>	<b>Rs 1051.00 crore</b>
<b>Pimpri Chinchwad</b>	<b>42.22 km</b>	<b>Rs 738.16 crore</b>
<b>Indore</b>	<b>11.45 km</b>	<b>Rs 98.45 crore</b>
<b>Bhopal</b>	<b>21.71 km</b>	<b>Rs 237.76 crore</b>
<b>Ahmedabad</b>	<b>88.50 km</b>	<b>Rs 981.35 crore</b>
<b>Rajkot</b>	<b>29.00km</b>	<b>Rs 110.00 crore</b>
<b>Surat</b>	<b>29.90 km</b>	<b>Rs. 469.00 crore</b>
<b>Jaipur</b>	<b>39.45 km</b>	<b>Rs 479.55 crore</b>
<b>Vijaywada</b>	<b>15.50 km</b>	<b>Rs 152.64 crore</b>
<b>Vizag</b>	<b>42.80 km</b>	<b>Rs 452.93 crore</b>
<b># Delhi</b>	<b>14.6 kms (implementing with own funds)</b>	

Source: Ministry of Urban Development, Government of India



**Annex - IV****Initiatives / Best Practices Format**

<b>FORM I</b>	
<b>General information about your Organisation</b> (Fill the following queries and provide one page write up about your organisation and project as well)	
<b>Project Contact Person:</b>	
<b>Submitter (if different from above) and submitter's affiliation:</b>	
<b>Detailed Address of the Organization/Agency</b>	
<b>Telephone No.</b>	<b>Office:</b>
	<b>Residential:</b>
	<b>Fax:</b>
	<b>E-mail:</b>
<b>Type of the Organization-</b> Government Individual NGO Co-operatives Other	
<b>Partnering Agencies/Individuals</b>	
<b>INFORMATION ABOUT INITIATIVE/PROJECT / BEST PRACTICE (Illustrative)</b>	
<b>A: Context</b>	
1. Title of the Initiative/ Project / Best Practice:	
2. Geographic Location:	
3. Focus Area:	
<b>B: Situation before implementation of the Initiative/ Project/ Best Practice</b>	
1. Describe in brief (not more than 200 words), the situation as it was before the start of the project: (Describe in narrative form rather than in bullet form-( no. of vehicles or p.c.u )	
2. What were the problems/needs addressed by the best practice?	
3. Reason for the adoption of particular system?	
4. Preparation of feasibility report?	
<b>C. Description of the Initiative/ Project/ Best Practice</b>	
1. Describe the Initiative/ Project/Best Practice in narrative form (in 500 words)	
2. Goals of the Initiative/ Project/ Best Practice	

3. Strategy used to achieve the desired goals
4. Activities implemented to achieve the above goals
5.Challenges/constraints encountered and how it was conquered
6. Outcome of the Initiative /project/ best practice
7. Roles/ activities of the partners at each stage of the initiative/ project/ best practice
8. Important stakeholders involved and communication/networking procedure for the initiative/project/ best practice
<b>D. Factors of Success</b>
1. Describe the main successful (positive and sustainable) results/factors/conditions for the initiative/project/ best practice
<b>E. Budgetary Implications and Sustainability</b>
1. Approximate total cost for the initiative/project/ best practice
2. Financial partners involved
3. Source of Finance for the sustainability of the initiative/ project/ best practice
<b>F: Impact of the Initiatives / Best Practice</b>
1. Have the best practice been disseminated in any forum and have received any recognition
2. Documentation and Research work/References for the best practice, if any
3. Please enclose any photographs and resource products, paper clippings along with the entry.
4. Has the project achieved the set targets/objective?

PLEASE SEND THIS FORM AS AN ATTACHMENT TO:

dghosh@niua.org or rchandra@niua.org

**OR Post / Fax A Copy to:**

Coordinator Transport Project  
 National Institute of Urban Affairs (NIUA)  
 I & II Floor, Core 4B, India Habitat Center, Lodhi Road, New Delhi – 110003, India  
**Telephone:** +91-11-24643576(Director), 24617517, 24617543, 24617769, 24643284  
**Fax:** +91-11-24617513, **Website:** www.niua.org

## Annex-V

### **Thane Railway Station Area Traffic Improvement Scheme**

#### **V.1 Context**

Thane City is located about 19 m inland from the coast on the north-eastern edge of Greater Mumbai and about 34 kms from Central Business District (CBD) of Mumbai. It serves primarily as dormitory town. Thane has been experiencing a rapid growth. Thane's present (2009) population is about 1.8 to 2.0 million, which is expected to grow to about 3.4 millions by the year 2031.

Thane Municipal Corporation is one of the largest municipal corporations in Mumbai Metropolitan Region (MMR). Per Capita income of Thane City is Rs. 58,22,400. It is about 140% of per capita income of Maharashtra (Rs. 41,331) The Thane City contributes about 19% of employment among the employments in MMR excluding MCGM. Thane, till the last decade, was an industrial town. However, due to its proximity and connectivity with Mumbai and excellent civic facilities provided by Thane Municipal Corporation (TMC), people are opting to stay in Thane. This has increased the demand for housing and basic infrastructure.

Thane city is socially vibrant and culturally very balanced. The City is witnessing big growth all around. The physical development of Thane is circular, as the city has grown around the CBD in western area adjoining the Railway station. Thane Railway Station is one of the Railway stations on the very first rail link in Indian subcontinent. Presently it is one of the major stations on suburban section of Central Railway.

#### **V.2 Situation before Implementation of the Scheme**

##### ***V.2.1 Existing System***

The major mode of intra-city transport is Railways. The Thane Municipal Corporation has four suburban railway stations within its limits. Major modes of inter city traffic are Public Transport

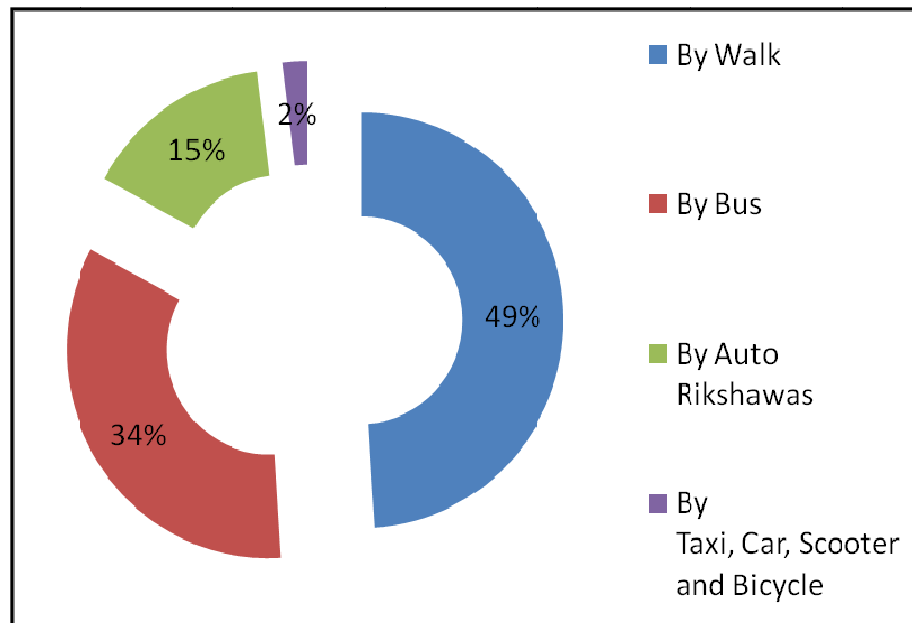


Figure V.1: Modal split-up of traffic at Thane Railway Station

Buses (Thane Municipal Transport, State Transport, Company buses), other IPT modes (Auto Rickshaw, Taxi etc.), Two wheelers and by walk. The bus mode acts as a major feeder service to the sub-urban trains.

Out of the four Railway Stations in TMC limits, Thane Railway Station is the busiest station handling about six lakhs of commuters per day. The CBD of Municipal limits are also located around the Thane Railway Station. Hence, the origin and destination of major portion of inter city trips is Thane Railway Station.

Available transport infrastructure in Thane Station Area was inadequate to cater to tremendous traffic demands. It is pertinent to mention here that; bus mode acts as a major feeder service to the sub-urban train. The Thane Municipal Transport alone had been operating 4000 daily trips from Thane Railway Station. In addition, the State Transport Corporation operates about 1500 trips.

Owing to tremendous overload on available transport infrastructure, the commuters had been facing great distress due to frequent traffic jams, delays in travel time, rising pollution levels



while reaching in and out of Railway Station. The situation had been causing arterial block in the mobility of the City.

Congestions outside most of the Railway Stations in major metropolitan cities in India are well known. The Thane Municipal Corporation had therefore undertaken Thane Railway Station Area Traffic Improvement scheme by splitting various modes of IPT traffic.

### ***V.2.2 Problems and Needs Addressed by the Scheme***

The Thane Railway station is one of the Stations on first Rail link in Indian subcontinent. The station came into existence in 1853. Since, then the area outside station had developed in non-planned manner. The available circulation area, about 8000 sq m is inadequate to cater to cater to present traffic demands.

The commuters travelling from Thane Railway station are facing great distress owing to following reasons:

- Congested Station Area with frequent traffic jams;
- No safe passage for pedestrians (about 3 lac travelers prefer to walk to and from station);
- Haphazard and crisscross movement of vehicles and pedestrians;
- No proper and adequate pickup points for autos, taxis and buses;
- Queuing of buses in approach road network because of lack of space in front of Station;
- No streamlined movement of traffic;
- Inadequacy of space for traffic movement;
- Demands for Additional Space as well as Segregation of traffic; and
- Need for planning for effective traffic dispersal.

### ***V.2.3 Reason for Adoption of Particular System***

- a) **Pedestrian:** - Pedestrian form about 49% of the total commuters. Due to particular arrangement of suburban Railway Station, Railway commuters from eight out of ten platforms have to use Railway Foot Over Bridges. Hence, by extending these FOB by

175 m and 225 m respectively on North and South side of Railway Station, the pedestrian are provided with safe and unobstructed path to disperse out of busy Railway Station Area. Thereby about 80% of the pedestrian will now disperse without entering already inadequate circulation area.

- b) **Low Level Deck and Flyover for buses:** - The buses contribute about 34% of the IPT mode. Low level deck for bus stops and connecting flyovers has been constructed in front of railway station for buses. As seen above, about 80% of the Rail commuters at Thane Station have to use Railway FoBs. By connecting these FoBs to the Low Level Deck for buses in front of Railway Station and by provision of dedicated corridor to buses, the Public Transport system has been prioritised.
- c) **Other IPT modes:** - Proper pick up points for other IPT modes (Autos/ Taxis, Private vehicles) have been provided at ground level below deck.



Figure V.2: Traffic condition at Thane railway station before SATIS

### V.3 Description of the Scheme

#### V.3.1 Project Description

Thane Railway Station is the origin and destination of around six Lakhs of commuters each day. Hence, all the modes of inter city traffic viz. TMT, ST buses, auto rickshaws, taxis, private vehicles and pedestrians approach the railway station simultaneously. Previously, this resulted in high intensity of mixed traffic in front of Thane Railway Station as well as the approaching road network. The approaching road network and the limited circulation area in front of Thane Railway station were inadequate to handle such huge flow of mixed traffic. Mixed flow of traffic crisscrossing each other's right of ways resulted in frequent and very high traffic congestion. In addition to this, the over saturation at pick-up points for different inter city modes of transport aggravated the problems.

There has been no proper pedestrian facility to almost half of the commuters who walk on foot to and from Railway Station. The approaching road network could not be augmented simply by widening of roads due to the restrictions of Row as per Development Plan. Hence, the improvement proposal had to be envisaged considering the available road widths only. The present scheme has been envisaged accordingly.



Figure V.3: Transition through Station Area traffic Improvement Scheme

## V.4 Major Components

- a) **Low Level Deck and connecting Flyover:** Low Level deck admeasuring about 2700 sq m has been provided in front of Thane Railway Station with clear height of 4.0 m. Well-planned bus stops for IPT Public Transport Buses have been erected on the deck. An exclusive flyover for buses of about 860m in length having two down ramps on different roads in station area connects the low level deck. Thus the buses can disperse out of station area over this flyover quickly.
- b) **Concourse Area:** A concourse area admeasuring 1200 sq. m. connects the Railway FoBs, new extended skywalks and the low level deck for buses. This area shall also be used for Railway ticket counters and additional commuter facilities viz. food court etc.

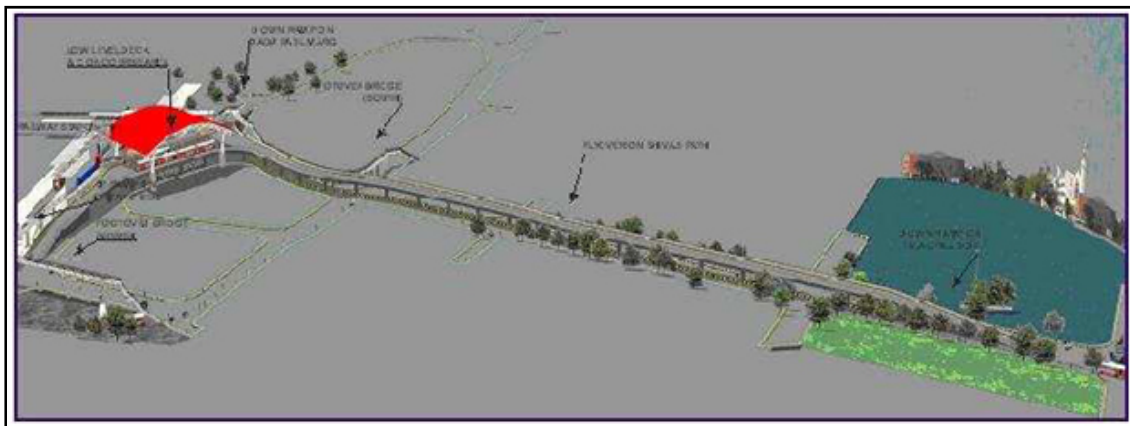


Figure V.4: Major components of the scheme

- c) **Extension of Foot Over Bridges on North and south side of Railway Station:** two skywalks of length 225 m and 175 m have been constructed respectively on south and north side of Thane Railway station. This helps in dispersing the pedestrian commuters from crowded station area safely and quickly without crisscrossing any motorized modes of traffic.
- d) **Area below Low Level Deck in front of station:** The area below the low level deck has been exclusively provided for pick-up points of other IPT modes viz. Auto Rickshaw and Taxis. The pick-up points for Auto-Rickshaws towards different part of city have been separated.

As seen earlier from the modal split-up of commuters travelling from Thane Railway Station, 49% of the commuters prefer to walk on foot. Hence, to provide excellent pedestrian facility, two skywalks of length 225 m and 175 m have been constructed respectively on south and north side of Thane Railway station. This helps in dispersing the pedestrian commuters from crowded station area safely and quickly without crisscrossing any motorized modes of traffic. Next important IPT mode is Public Transport buses. About 34% of the commuters use public transport buses. Other IPT modes of traffic viz. Auto Rickshaw and Taxi and private vehicles ply below the Low Level Deck in front of Railway Station. Proper segregation has been made for different modes at ground level also. Exclusive Space has been provided for emergency vehicles in front of Railway Station.

Before implementation of the scheme, the circulation area in front of Railway Station had been limited to 8000.00 sq m only. All the modes of traffic collectively used the same area. After implementation of SATIS, the available circulation area at two different grades has increased to 12150.00 sq m. Thus an additional circulation area of about 4150.00 Sq m has been created through the scheme in addition to segregating the different modes of traffic. By construction of flyover, the area of approaching network has been augmented by about 3500 Sq m will help in streamlining traffic flow on approach road network.

#### ***V.4.1 Goals of the Project***

- 1) Elimination of crisscross movement of traffic in station area, grade separation of various modes of traffic and thereby improvement in travel speed.
- 2) Considerable savings through VoT and VoC [The calculated EIRR (Economic Internal Rate of Return) tunes to 29.60%]
- 3) Providing dedicated passage to pedestrian movement to encourage Non-Motorized mode of transport (in conformity to NUTP-2006)
- 4) Providing dedicated passage to public transport to improve functioning and thereby encouraging use of public transport system (in conformity to NUTP-2006)
- 5) Providing additional space for traffic in Station Area
- 6) Avoiding conflicting movements at junctions
- 7) Bringing down the pollution levels in Thane Railway Station Area.

#### *V.4.2 Strategy Used to Achieve the Desired Goals*

The desired goals have been tried to be achieved through provision of additional circulation area by constructing infrastructures in the form of flyover, Foot Over Bridges and concourse area.

#### *V.4.3 Activities Implemented to Achieve the Desired Goals*

##### **a) Identification of the reasons behind the problem**

In order to find the reasons behind the persistent traffic hassles in the Thane Railway Station area, the TMC carried out Traffic Studies in the central zone of Thane City in Year 2004

**b) Evolving suitable alternative measures to eliminate the problem and selecting the best suited alternative:** Based on the findings through the traffic studies, various alternative measures were evolved to eliminate the traffic problems in Station Area. The feasibility of the alternatives was verified and best suited option was decided on the following considerations:

- Technical feasibility;
- Financial feasibility;
- Commercial viability;
- Environmental compatibility;
- Social and political acceptability; and
- Legal and regulatory feasibility.

**c) Getting approval from competent authorities:** The proposed best suited option was put forth in the General Body (G.B.) of TMC, the authority competent to accord administrative approval Hon'ble G.B. approved the proposal vide Resolution no. 14 dated 16.06.2004

**d) Public Hearing:** The proposal was given large local publicity and suggestion and objections of the citizens of Thane were invited.

**e) Getting approvals from the other stakeholders:** Since, the project had to be implemented partly on the land belonging to Central Railways; the proposal was

submitted to them for approval. A memorandum of Understanding was signed between Central Railways and Thane Municipal Corporation on 08.02.2006 regarding implementation of the Project.

The proposal was then submitted to Central and State government for funding under the Jawaharlal Nehru National Urban Renewal Mission. The Central Sanctioning and Monitoring Committee sanctioned the project on 8<sup>th</sup> December 2006:

- a) **Getting statutory approvals from Heritage committee:** Part of the project was to be implemented near Kopineshwar Mandir, a heritage structure. Hence, necessary statutory approval from the Heritage Committee was taken.
- b) **Appointment of agency:** Lump sum Tenders on Design-Build basis had been called for the project. Work order to commence the work has been placed on contractor on 9<sup>th</sup> March 2007.
- c) **Public Interest Litigation (PIL):** After the issue of work order, some citizens had filed Public Interest Litigation No. 20 / 2007 in Hon'ble High Court of judicature at Mumbai. The petitioners had raised various objections regarding the General Arrangement Drawing and usefulness of the project. The Thane Municipal Corporation successfully vindicated the project and Hon'ble High Court dismissed the PIL on 20<sup>th</sup> September 2007.
- d) **Shifting of monuments:** A statue of Bharat Ratna Dr. Baba Saheb Ambedkar infringed the construction activities of foundation of Flyover Bridge. Hence, shifting of the same was necessary. Since, the issue had been socially sensitive and could have caused threat to the law and order situation, the shifting was arranged after proper coordination with concerned groups, political parties, individuals, local administration and Police. Number of common meetings, hearings etc. were arranged in the effort and finally the statue was shifted peacefully to the better location on 22<sup>nd</sup> March 2009.
- e) **Completion of the project:** The project was completed on 22<sup>nd</sup> August 2009.

## V.5 Challenges / Constraints Encountered and how it was overcome

- a) **Handing over land from Railways:** About 33% of the worksite under the project belongs to Central Railways. Hence, Memorandum of Understanding including plans of the project had been signed with Railways well in advance. However, at the time of execution of work, the Central Railway insisted upon getting the General Arrangement Drawings approved from them. The approval procedures took around ten months. Persistent follow-up had to be kept with Railway for the same and then after for removal of infringing structures.
- b) **Restrictions on working hours due to traffic:** Being in the busiest area of the city, there have been huge flow of traffic at the work site and it hadn't been possible to divert the same. Hence, the work had to be carried out within the moving traffic. Additional safety measures had to be taken for the same.
- c) **Problems of local residents:** Due to the heavy traffic during day hours, the work had to be planned during nights. However, the local residents used to stop the work after 10 pm due to sounds of working machinery. The problem was addressed through regular coordination with the local residents and with the help of pollution control department to convince the noise compliance of machinery as per CPCB / MPCB norms.
- d) **Shifting of monument:** A statue of Dr. Baba Saheb Ambedkar was infringing the construction of flyover. Being socially sensitive issue involving law and order situation, the issue of shifting the same was tackled through coordination with the concerned groups, political parties, individuals and the local administration and police department.

## V.6 Outcome of the Initiatives

### a) Improvement in travel speed

Traffic flow in Thane Railway Station Area has been streamlined. The crisscross movements of different IPT modes of traffic have been eliminated by grade separation. The travel time of buses from Thane Station to Talaopali (about 1 Km from Thane Station) has reduced to about two minutes as compared to earlier 15-20 minutes.



**b) Reduction in accidents**

**Pedestrian Traffic:** With the provision of two skywalks, the pedestrian traffic has been provided guarded and exclusive path. Hence, the vulnerability of pedestrians to accidents with moving vehicular traffic has been minimized.

**Vehicular traffic:** The vehicular traffic flow has been streamlined by defining corridors and eliminating crisscross movements. Hence, the possibility of accidents has also been minimized.

**c) Reduction in green house gas emission**

With the tremendous traffic flow and frequent traffic jams and idling of vehicles in Railway Station area, the pollution levels have been rising alarmingly. With the implementation of project, the traffic jams and idling of vehicles in the area shall be avoided. This will help in bringing down the green house emission and air and noise pollution levels in the area.

**d) Reduction in energy consumption**

There will be high savings in energy consumption due to elimination of frequent traffic jams and idling of vehicles in Railway Station area due to implementation of Scheme.

**e) Other benefits:**

- Encouragement of non-motorized modes of transport by provision of dedicated corridors to pedestrian (FOBs).
- Dedicated bus corridor will help in encouraging mass transport of passengers from Station to rest of city. Thereby encouraging economic mode of public transport by bus. This is the need of the city and the country.
- Large savings on account of VoT and VoC. The estimated EIRR of the project is 29.60%, which is far more than the acceptance norms of funding agencies like World Bank, ADB etc.
- Before the implementation of scheme, there had been no earmarked space for emergency vehicles and private vehicles in the station Area. Now, proper space for

emergency vehicles has been earmarked. The private vehicles have been provided exclusive lane for drop down and pick-ups.

- The project is pro-economical, pro-environmental and pro-poor and conforms to National Urban Transport Policy-2006.

#### **V.7 Role and Activities of the Partner**

- Funding the project as per the limits specified under Jawaharlal Nehru National Urban Renewal Mission (JNNURM).
- Taking regular review of the progress of work.

#### **V.8 Important Stakeholders Involved and Communication / Networking Procedure for the Project**

The project was implemented under Jawaharlal Nehru National Urban Renewal Mission. The Central Government and Government of Maharashtra were the stakeholders other than Thane Municipal Corporation. Both the Governments took regular periodic review of the progress of work through the nodal agency M/s Mumbai Metropolitan Region Development Authority.

#### **V.9 Factors of Success**

The yield from the project shall be through:

- Saving in the travel time for vehicular traffic and pedestrian traffic, i.e., Value of Time (VoT).
- Saving in the vehicle operating costs due to improvements, i.e., Vehicle Operating Costs (VOC).

Economic Analysis has been carried out for an analysis period of 25 years. The benefit stream in the analysis is through the savings on account of VoT and VOC as seen above.

Table V.1: Economic Analysis

S. No.	Parameter	Nature of variation	EIRR (In %)
1)	Base case		29.60%
2)	Cost of Construction	Increase by 20%	24.90%
3)	Benefits	Decrease by 20%	23.84%
4)	Combined effect of Sr. No. 2 and 3	Cost of construction increase by 20% and benefits decrease by 20%	19.99%

Source: Thane Municipal Corporation, Thane

It may be seen from the Economic Analysis that the EIRR for critical case is 19.99% which is far above the acceptable limits (12%) for infrastructure projects as per the policies of funding agencies like World Bank/ Multilateral Development Banks etc.

## V.10 Budgetary Implications and Sustainability

The Total Cost of the Project is ₹ 2936.00 Lakhs.

### V.10.1 Financial Partners Involved

The project has been approved under Jawaharlal Nehru National Urban Renewal Mission. Approved DPR cost under JNNURM is ₹ 2325.00 Lakhs. Equity Share contribution:

- Central Govt.: - 35%
- State Govt.: - 15%
- ULB: - 50%

## V.11 Impact of the Initiatives

This is first of its kind project implemented outside major metropolitan Railway Station area in country. This will prove to be a pilot project for many other busy stations. All the transport departments in the country will have role model for observing its benefits and efficiency before the model will be taken-up elsewhere. It has been one of the most challenging projects undertaken by the Thane Municipal Corporation.



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## Annex-VI

### **Indore City Bus Service Profile\***

#### **VI. 1 Context**

Indore, the largest metropolitan city of the state of Madhya Pradesh, is fast emerging as a centre of trade and commerce. Indore has a population of 2.72 million in 2001. There was an increase of almost 50 percent during the period 1991-2001. It has estimated 3.30 lakh workers in 1991 with 63.4% of the workforce in the tertiary sector. The workforce has increased at a growth rate of 3.64% per annum during the period 1961-91. The workforce participation rate was 28.9% in 1991. A population size of 42 lakh is estimated for the city by the year 2025. For employment, it was estimated that 13.44 lakh workers would comprise the workforce in the study area by 2025 giving a work force participation rate of 32%. Further, it is assumed that by the year 2025, nearly 63% of the total workforce would be in the tertiary sector while the secondary sector will account for 33%.

#### **VI. 2 Situation before Implementation of the Project**

##### ***VI. 2.1 Existing Transportation System***

It had a registered vehicle population of 0.48 million in 2000 increasing at an average annual rate of 8.8 percent. Currently total vehicle population is 732893. The intra-city public transport system is essentially road based with an estimated 550 private minibuses and 500 tempos and 10000 auto rickshaws.

An estimated 62, 85,950, passenger trips have been forecasted, for the year 2025, comprising 55, 03,000 intra-city trips while the rest comprise of inter-city passengers. An estimated 27, 51,825 trips by public transport have been forecasted for the horizon year.

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\*Based on information gathered from Internet and PowerPoint presentation on 'Bus Service Operation in Indore' by Mr. Amit Bhatt, Centre for Sustainable Transport.

By year 2025, at modal split of 50% and with an estimated average trip length of 6.02 km, it is estimated that 16.5 million passenger km would be performed daily by public transport. According to traffic estimates, a total of 5.5 million person trips would be generated every day by 2025, of which the share of public transport trips would be 2.75 million trips.

**Travel Demand:** The passenger demand per day, on the Bus System, in 2025, has been estimated as under:

**Direct Service:** 5, 97,330

**Feeder Service:** 6, 25,580

**Total:** 12, 22,910

The average trip length by bus is 5 kms. In order to overcome the traffic problem of future, it was decided to introduce a better public transport system in the city.

### ***VI. 2.2 Problems and Needs Addressed by the Project***

In the context of rapid growth of the city, increasing mobility, high travel demand, increasing intensity of traffic, congestion, delays, accidents and other such problems, public mass transport system of the city stands out as the most critical issue.

### **VI. 3 Description of the Project**




A special purpose vehicle in the form of public limited company 'Indore City Transport Services Limited' (ICTSL) was set up to operate and manage the public transport system in Indore on 1<sup>st</sup> December 2005 with private sector participation to overcome financial constraints. The new SPV is ideally constituted as a Public Limited Company incorporated under the Companies Act, 1956. This is the first Public-Private Partnership (PPP) model in India. ICTSL is carrying 1 lakh passengers' trip per day after its incorporation.

ICTSL is responsible for planning, infrastructure, management control and monitoring. There are four operators, namely, Dayajeet Nimay Logistics Pvt. Ltd, M/s Rama Jyoti Travels, M/s Anam Travels and M/s Priyadarshani Transport Service. These are responsible for operation and fare collection. Giriraj Adverting & Marketing Services is the agency authorized by ICTSL for the

purpose of booking Advertisement Space on the City Buses. The company has already started operation of its 37 ultra-modern low floor buses. These city buses with 2 broad doors are allowing passengers to board and alight quickly and easily, save time and fuel, and give better run-times and improved economy to the bus operators. Real time vehicle tracking and fully computerized ticket vending system are some other highlights. Operations and Management (O&M) and other regulatory measures are being exercised by the company.

The city bus route network system has been planned and designed in a scientific manner. Direction oriented Hub and Spoke pattern of routing has been adopted. Routes have been planned to ensure that besides the regular city transport users, office goers, students and employees should also avail the services. It has been ensured that proposed routes caters to the requirement of places of residence as well as places of job. Eighteen high travel demand routes have been identified.

Company has taken permit for these routes from R.T.A. After due testing of routes and time scheduling ICTSL has initially started operation of 37 buses on these identified routes and later on add to its fleet of coaches to improve the frequency of buses at particular bus stop or intersection. Colour coding of routes and buses and their numbering has been carried out in such a manner that a commuter may easily identify the bus stop and intersection for convenient commuting. All routes follow these general principles:

		
<p>All Blue buses move towards Rajwada and will definitely touch MG Road at any moment of time.</p>	<p>All Magenta buses move along the AB Road and will definitely touch AB Road at any moment of time.</p>	<p>All Orange buses move towards Airport along the Bond Road and will definitely reach Bada Ganpati Square.</p>

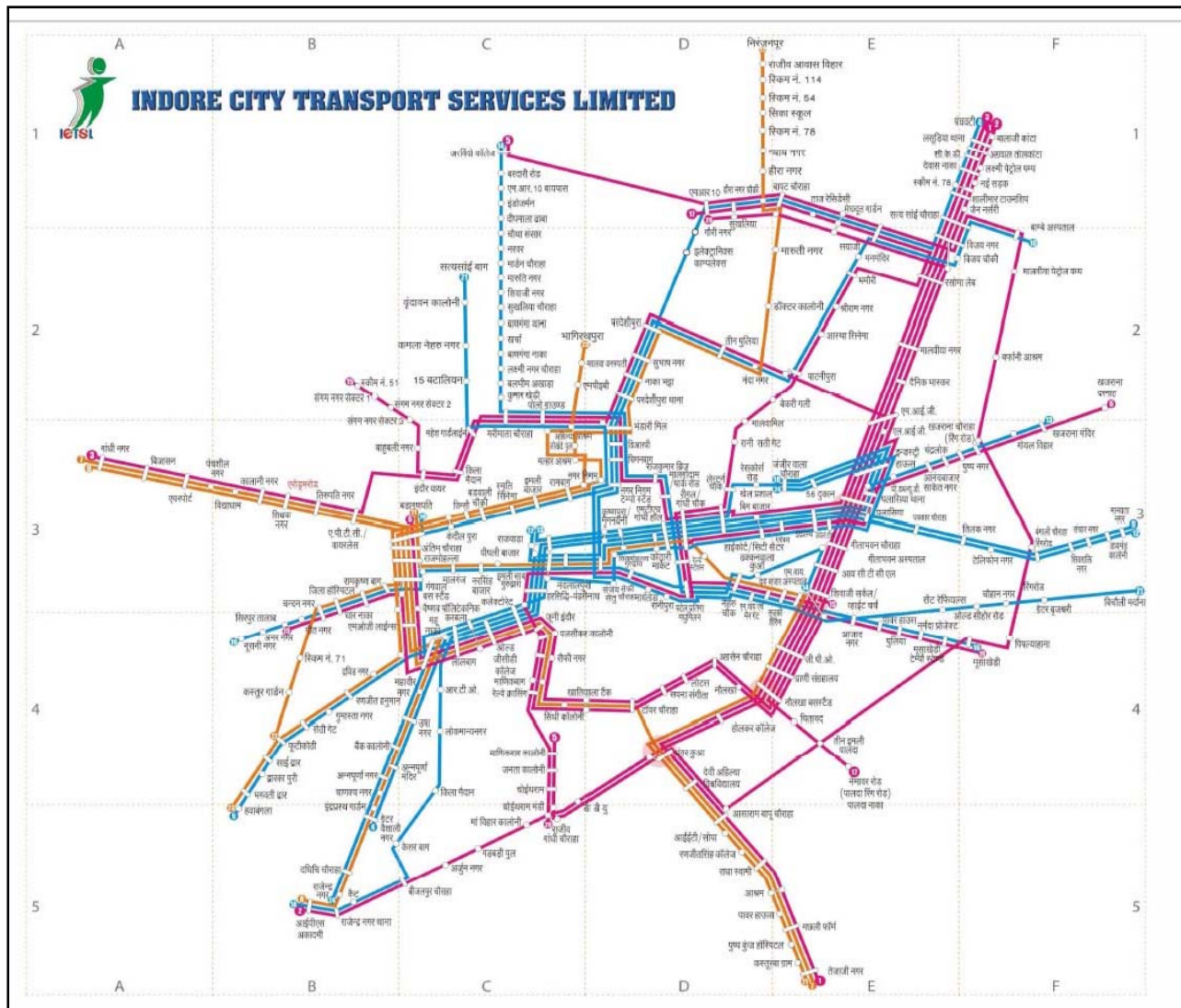


Figure VI.1: Route Map of ICTSL

The main sources of revenue for the system are the fare box collection, advertising, passes revenue, monthly premium by operators, revenue from bus stops, revenue from PIS display screens and bidding amount by private participants. Around 60% of the advertisement revenue and 80% pass revenue goes to operators. Fare collection fully remains with the operators.

The optimum fare structure is decided to meet twin objective of Equity access to poor and incentive for upper middle class to prefer these buses over their own vehicles. The fares are kept reasonable to give healthy competition to existing minibuses and tempos, low enough to secure fullest utilization and high enough to ensure viability of the system within the government



norms. System of monthly, weekly, employee and student passes ensure the fullest utilisation of the new system.

Financial evaluation of the project is carried out with the objective of determining its financial viability and assessing its potential for implementation on a commercial format. At this stage, projected financial analysis estimates the likely returns to the operators, company and people at large.

### ***VI. 3.1 Online GPS Based Bus Monitoring & PIS Solution***

A fully automated vehicle tracking system will ensure that the city buses reach the stop at fixed time. Any deviation from timing would be corrected and controlled using GPS and real time tracking solutions. The very purpose for this city bus service is to offer better civic facilities and ICTSL is determined to ascertain that the service level is duly monitored.

GPS based On Line Bus Tracking System (OLBTS) is identified as a tool to ascertain the service levels. For this ICTSL plans to establish a control room for OLBTS and every bus will be fitted with GPS based tracking device with online data transfer facility. ICTSL provides Passenger Information System (PIS) for the convenience of the commuters at all bus stops which shows on a LED monitor the exact time of arrival of the next bus.

- ICTSL desires to avail following advantages by implementing OLBTS:
- Estimated time of arrival that could be flashed on display screens at bus stops;
- Schedule & itinerary adherence;
- Log of exact kilometre travelled by bus ;
- Punctuality and improvement in driving pattern;
- Control over unauthorized and unscheduled stoppages;
- Better KMPL & EPKM;
- Better analysis; and
- Migration to Passenger Information system including IVRS.

In the first phase the OLBTS will have 37 buses, which will expand to 100 buses in 6 to 8 months. Development of vehicle tracking system solutions will help us monitor our own

performance against people expectations. This would help our team to give better services to people and enable the buses in reaching the stops at scheduled times. ICTSL has already tendered for GPS system on BOT Basis.

In order to ensure tracking of city buses a detailed GPS-enabled digital mapping of the city is being done which will enable the staff at central control room to direct the driver to maintain the schedule and timings.

### ***VI.3.2 Ticket Vending System***

Fully computerized Electronic Ticketing Machines are used for issuing daily passenger tickets. Ticketing system has been finalized by company to ensure the common ticketing system for all operators. The software used in these machines is owned by ICTSL. This eliminates the risk of passengers being ever charged more than the specified fares by the operators. The computerized ticketing system also helps in effective monitoring and control of conductors and management of ticketing data. With the hi-tech Electronic Ticket Issuing Machines, it is easy for the conductor to issue tickets generated through the machine and to collect the money from passengers.

The stages on the route and respective fares are fed to the machine. For example, if a passenger boards the bus at stop number four and intends to get down at 10, the driver will press the buttons 4 and 10. A ticket will come out and the corresponding fare will be displayed on the machine and the ticket, for which the money will be collected by the conductor.

### ***VI.3.3 Management of Passes***

One of the important sources of revenue to the company and the operators is system of various kinds of passes. Project envisages sharing of pass revenue in the ratio of 80:20. Operators will get 80% i.e. 200 Rs against the denomination of 250 Rs monthly pass. ICTSL will save an amount Rs.30.50 on new pass and Rs.42.50 on renewed passes. Remaining amount will go to the vender for processing, marketing and delivery of passes.

System of issuing passes is being done through 15 instant pass centers and a network of distributors and retailers. Company has taken a minimum guarantee of issuing at least 15000

passes every month from the agency. This minimum guarantee of passes ensures an assured income of Rs.40 lakhs per month to be shared between the ICTSL and operators.

Our Pass system is complete modular, web based solution specially designed for Public Transport Systems. It aims at reducing the strenuous workload involved in managing passes by seamlessly integrating the various aspects of running a large system.

System is based on Client-Server architecture. It provides central database which can be updated from several clients simultaneously. This system reduces the error / faults of manual system by providing bar code (which reduces duplicity), pass centre number, shift number, date and pass number are encoded in the barcode. It also has a specially designed hologram to root out any scope of duplicity. The centralized server located at the ICTSL Head Quarters and is attached with several clients at different locations.

#### ***VI.3.4 Management***

The management of the company will be entrusted with the Board of Directors. There are sVI members on Board of Directors with Collector District Indore as its Executive Director who has been entitled to exercise all powers for effective management of the new transport system under Public Private Partnership model.

#### ***VI.3.5 Goals of the Project***

The main objects of the company are:

- a) To create specialized and effective regulatory agency to monitor cost effective and good public transport services within the city of Indore with private partnership;
- b) To establish and maintain line of passenger coaches to transport passengers and;
- c) To develop support system for improving transport infrastructure.

#### ***VI.3.6 Strategy Used to Achieve the Desired Goals***

- A SPV incorporated to provide quality service.

- Public Private Partnership (PPP) concept introduced.

### ***VI.3.7 Total Cost of the Project***

The authorized capital of the company is Rs 25 lacs divided into 2.50 lacs equity shares of Rs. 10/- each. The initial paid up capital of Rs. 25 lacs is being held by the Indore Municipal Corporation and Indore Development Authority in equal proportion.

### **VI.3.8 Procurement of Buses under JNNURM**

JNNURM approved procurement of 175 buses (standard buses – 125 and low floor buses- 50) for city operations. The central Government funds cover 50% of the bus cost, the State Government share is 20% and ICTSL has to pay remaining 30%.

### **VI.3.9 Impact of the Initiatives**

ICTSL is carrying 1 lakh passenger trips per day. ICTSL having limited infrastructure and fleet size has increased the public transport share from 16.4% to 21% within a short span of one year since its incorporation in January 2006. Indore city has been benefitted by the operation of ICTSL in following terms:

- (a) Considerable change in travel pattern within the city;
- (b) Savings in travel time for ICTSL users;
- (c) Reduced congestion on roads;
- (d) Reduction in road accidents; and
- (e) Reduction in environmental pollution.

## Annex - VII

### **Technological Innovations / Applications in Ahmedabad Janmarg BRTS**

Janmarg is the first full BRTS system in India operated as a closed system. With technology applications, Janmarg emulates Metro experience without compromising on the advantages of bus in terms of flexibility, cost and convenience. Comprehensive planning of the usage and type of technology has ensured the system to be successful in providing rapid mobility for the people of Ahmedabad. Technology applications are in three broad areas:

- A) Wireless station and bus door operations by driver, RFID (Radio-Frequency Identification) based docking system;
- B) Integrated Transit Management System; and
- C) Area Traffic Control System.

The three technology applications in detail are:

#### **A) Wireless Station and Bus Door Operations by Driver, RFID Based Docking System**

There are 62 bus stations located on the median with an average spacing is of 600 meters apart. The stations have been provided for external ticketing, display, audio systems and other support infrastructure. The stations are accessed at-grade through signalised zebra crossing. They are accessible to the physically challenged. Off-board ticketing system is in place.

- i) The stations have facility for docking 4 numbers of buses (2 up and 2 down). The bus stations are designed such that docking is perfect with the gap between bus and station is minimal (less than 4 inches). This has been achieved through design of a projection near the station doors.
- ii) Identification of the stop line for bus is achieved through aligning the bus front side with the RFID Sensing System on the station. The RFID system ensures safe distance alignment with station doors and once the bus is aligned with the tag placed on the driver

door, audio-visual indicators through beeps and red light enables driver with the decision to operate door.

- iii) A switch connected with RFID based controller to the bus door and station door is placed on the dash board of the bus. The station doors are synchronised with bus doors and are operated through a switch under the control of bus operator (driver). RFID based signal enables driver to locate the stop line and through RFID based controller the bus and bus stations are opened by the driver by pressing the button inside the bus.

Buses stop at all the stations. Bus deceleration, docking, opening of the bus door, then the station door and the steps repeated in reverse order takes about 12-15 seconds depending on the number of passengers.

RFID and RF based 'Remote Door Docking And Operations Mechanism', implemented for the first time in any system in India is an innovative solution which allows bus docking / alignment, operated by a driver only in event of safe to open door for operations brings in safest mechanism for station service operations. The system has built in service redundancy and in case of one system failing the other allows the service continuity.

Additionally RFID as a technology allows multiple end use by way of assigning priority to buses at junctions in future, bus maintenance data check in future etc. The system is highly scalable and shall lead to a highly sustainable operating environment. While it took some time to develop the technology application, the impact both as a safety and security feature and also as an identity of a modern transit has gone a long way in building Janmarg image.

## **B) Intelligent Transit Management System**

ITMS allows transit managers to operate transit system in a highly productive manner by providing real-time analytics and decision support system by way of alerts and in-line analytics. The system intelligently prompts the managers to take quick and accurate decision based on the pre-set operational parameters and threshold limits. The system offers analysis services based on the legacy data and allows transit managers to perform service requirement analysis which leads to better understanding of operational parameters and allows insight into improvement opportunities within the system. This approach brings in a factor of long term sustainability

factor based on scientific methods and allows to bridge service gaps and requirements in an ever changing urban environment.

Ahmedabad Janmarg Limited (AJL) with its aim to provide world class transit experience embarked on the project to implement Integrated Transit Management System which would provide stakeholders and operations with a system to bring in world class operational efficiency and automation for its transit operations. ITMS is expected to meet the corporate objectives of enhancing service standards, bring in commuter market approaches, better organization of planning and operations; integration of Para-transit, capital improvements, marketing, and automate collection and payment of transit fares.

ITMS is aimed at enabling AJL to automate its Financial Characteristics, Operational Characteristics, and better insight into Passenger profiles, Route Analysis to optimize on operational efficiency, Service Consumption, functional area productivity analysis and thereby creating AJL Bus service a user choice. The ITMS solution landscape consists of the following components:

**i) Automated Fare Collection System (AFCS):**

AFCS is an automated revenue collection system which facilitates purchase of pre-paid tickets and their subsequent use through electronic systems to permit access to/ from the transit stations and buses. Integration with parking is also planned.

Ticket counters are located at both the ends of the 62 bus stations operational today, facilitating easy access to transit services. Station area is a closed area and only passengers with valid travel credentials are allowed to access the secure area and the travel amenities. Currently paper tickets are issued by Station Operators at the stations, however the implementation of electronic travel card system is in progress and the same shall allow travellers to access transit system using smart card.

The infrastructure includes POS machines, station server and network connectivity to control room. Additional equipments include turnstiles which control entry and exit at the stations. Smart card based system shall be made operational in December 2010. In addition to bus

stations, the provisions are being made to dispense smart cards and related services like top-up etc through city civic centres. The system will have payment options that suit passenger needs and to further facilitate travel for all types of travellers, single journey tickets through RFID tokens and 2-D bar codes as options are being considered by Janmarg.

The system provides rich information dissemination capabilities like, information on passenger flows by each station, time wise ticket type wise is available instantly as this information is collected in real-time by the central server located at the control centre. Passenger origin-destination data is being used for assessing and modifying schedules from time to time. Fare stage wise information is a useful input in altering fares. As ticketing is automated, revenue leakages is totally avoided. This is also an easy way of revenue collection.

The Operations Plan developed not only provides route structure for BRT operations but also the rationalised routing plan for AMTS operations. This is necessary so that the two systems complement each other rather than compete with each other. In terms of routes following three types of routes are structured to operate transit services. Three types of services are planned.

- BRTS Trunk Routes;
- AMTS Complimentary Routes; and
- BRT Feeder Routes.

Fare Integration with AMTS and also with parking have been planned and to be undertaken in the next phase (March 2011).

- ii) **Passenger Information System:** Advance information on arrivals, departures, next vehicle, next station display announcements are integral part of Janmarg operations. All the bus stations are equipped with two LED (Light-Emitting Diode) panels providing route and next bus information. Similarly buses are equipped with LED and audio systems and announcements on current station, next station and other operations' information including warning messages are announced. Next bus information is obtained from AVL system.
- iii) **Automated Vehicle Location System:** Specially designed buses equipped with GPS device and GPRS technology allows the vehicles to be tracked while in operations. This



enables operations of PIS, vehicle kilometer count and speed monitoring. Control centre monitors all the buses on time and instructions are given to slow down/go fast depending on the status of bus schedule.

**iv) Other ITS information sub-systems include:**

- Vehicle Scheduling and Dispatch System
- Bus Depot and Terminal Management System
- Financial Management and Central Clearing House System: Partially operational
- Incident Management System: Operational at basic level

Infrastructure Landscape of ITS includes Data Centre, Disaster Recovery Site, Control Centre, Training Centre, Bus Station Infrastructure, Bus Infrastructure, Communication Infrastructure, Operations, Management & Maintenance Services, Ticket Operators, Control Centre operators, Depot Management System. Depot management system is being implemented.

The integrated systems allow transit managers to plan and manage transit services in a highly efficient manner. This is primarily achieved by the analysis of data carried out at central control centre through specialized reporting structures which analyses data in multiple dimensions leading to feedback and decision support capabilities extended to transit management.

### **C) Area Traffic Control System**

Encumbrance free operation of BRTS buses in exclusive lanes is a predominant feature of this system. Physical barriers of BRTS lanes by means of median, railing and landscaping is providing necessary segregation but faster mobility is possible through advance engineering technology.

For this purpose BRTS corridors and specially intersections are managed by Traffic Signals. All the bus shelters and pedestrian crossings are also having similar signal system to increase safety of bus commuters and pedestrian. All installed signals differ with customary traffic signals as it has intelligent system for operation and it is known as AREA TRAFFIC CONTROL SYSTEM –

ATCS. Ahmedabad Municipal Corporation has introduced such system for 93 (65 BRTS and 28 non BRTS) intersections.

### **i) Intersection Management**

Geometrics of all intersections of BRTS corridor are designed based on traffic pattern, available RoW, location of intersections in overall road network and phase-wise execution of BRTS corridors. As mentioned above all have traffic signals to control and manage BRTS Buses and mix traffic too.

Principal aspects of designing these traffic signals system are to increase mobility and reduce delay at intersection. This is possible only if number of phases in each signal cycle are minimised. For the same purpose segregated phase of BRTS buses in signal cycle has been eliminated for the intersections having BRTS for two arms only (i.e. Intersections where two BRTS corridors are meeting each other, separate signal phase for BRTS buses will be there). This will also provide lesser delay for mix traffic. For each intersection signal cycle length, nos. of phases is designed by using state of the art technology SYNCHRO 6.0.

### **ii) Components of ATCS**

Model use in operation of ATCS is simpler. Each individual intersection is provided with loop detectors, which are installed beneath pavement layers on each arm. These detect the traffic plying on them with a gap time of 3 seconds only. All detectors are connected with traffic controller located on one corner of the intersection. Each individual traffic controllers are connected with master control centre (Located at Victoria Garden) through Managed Lease Line (MLL) of BSNL. These MLL lines of BSNL play vital role for collection of data, signal coordination, connectivity with server.

There are 93 BRTS (65) and NON- BRTS (28) junctions covered with intelligent traffic signal system. All major junctions under the ATCS enable better control and vigilance and monitoring through the control room (operational). The complete installation of a comprehensive Area Traffic Control System (ATCS) has led to an improved traffic movement and decreased junction delay.

The components of ATCS are:

- Traffic Signal Controller
- Vehicle Detectors (Through Embedded sensors)
- Communication Network
- ATCS Application Software
- Central Control System (operational)

### **iii) Signal Synchronization**

Signal Synchronization is defined as a coordination of signals at junctions to reduce the junction delay and to improve the level of service for a system as a whole. Generally, synchronization is done for the main corridor of the city where the maximum traffic can run with minimum delay. The affecting parameter for the co-ordination is average speed of a vehicle on that stretch and proportion of various vehicle mixes. However the green time is the important parameter at the junction to prefix the efficient co ordination.

In co ordination of signals for BRTS corridor it has been considered that traffic platoon is running at an average speed and that platoon of vehicle when released from one junction must have minimum red on the next junction. Special features have been introduced in BRTS Signal Co-Ordination in Bus Shelters and pedestrian crossings. As all bus shelters located near to the intersections, pedestrian movement at nearby shelter and intersections will be very high. Safety of pedestrian and reduce delay for vehicles approaching intersections is possible through such co-ordination only. All pedestrian crossing of Bus shelters have separate signals for pedestrian and some are co-ordinate with nearby signals of intersections in such a way both have same signal phase (i.e. red or green) which provides continuous movement of traffic platoon and safety of pedestrian too.



## Annex-VIII

### **Innovative Funding Model of Pimpri-Chinchwad Municipal Corporation**

Pimpri Chinchwad Municipal Corporation (PCMC) is developing 130 km of bus-based mass transit road corridors across Pimpri-Chinchwad city, based on its comprehensive mobility plan. These ten roads will have dedicated corridors for a bus rapid transit system (BRT), for pedestrians and cyclists along with infrastructure amenities to support high population densities. PCMC will catalyse spatial development of the city through this project and planned investments in improving mobility, rather than catch up with rapid-city development.

#### **Urban Transport Fund to Capture New and Incremental Revenues**

PCMC has set up an Urban Transport Fund (UTF) to fund this ₹ 1,500 crore project. The fund will be managed by a wholly-owned Special Purpose Vehicle (SPV) of PCMC, named PCMC Infrastructure Company. The UTF has been structured to capture the incremental benefits arising from the development of the BRTS corridors, as a long-term means of financing.

The UTF has identified 100 m on either side of the BRT corridors as BRT influence zone. The zone will be densified as per the Ministry of Urban Development's policy of corridor densification. PCMC provides 80% higher Floor Space Index (FSI) of 1.80 in the BRT influence zone. The UTF has been assigned revenues viz., premium for loading Transfer of Development Rights (TDR), development charges for building permission, incremental property tax, advertisement rights, lease on utilities ducts, etc. This funding model for the UTF is dedicated and secure through an escrow-like arrangement that ensures that the BRTS project is sustainable on a stand-alone basis with limited recourse to the PCMC budget.

PCMC has leveraged this UTF to raise debt funds from The World Bank, ADB and other lending agencies. Four project corridors have been supported by JNNURM. PCMC has also requested lesser grants from JNNURM as against permissible norms for the latter two corridors due to UTF's mode of project structuring.

## **Premium on Loading of TDR is a Robust Source of Revenue**

The model for densification of PCMC is unique and very different from the FSI bank or sale of incremental FSI schemes of other cities in the country. PCMC's model allows loading of Transfer of Development Right (TDR) into the BRT influence zone. TDR is a development right given to a land / property owner in lieu of land that is acquired from him for municipal purposes. Previously, whenever TDR was generated, the TDR could only be used in outer city areas. This resulted in lower income to the TDR holder and many issues related to acquiring land for developmental purposes were faced by PCMC. This also increased the urban sprawl and had its impact on provision of infrastructure services.

The TDR loading concept followed by PCMC allows the TDR to be loaded onto the BRT corridor, thereby increasing density along the high capacity zones. PCMC charges a TDR loading premium to the property developer in the BRT corridor as a source of income for the UTF. This model ensures that additional FSI is not released in the market (which is the case in incremental FSI or the FSI bank model) but only realigns the FSI in the city into high-density corridors.

Attractive rates for TDR are also assured as there is no excess supply of FSI in the market. PCMC benefits by planning high-end services infrastructure in the BRT influence zone with excellent connectivity to these zones and at the same time ensures that land acquisition is not a bottleneck for its development activities elsewhere in the city.

## **Diversifying Incomes to the UTF**

The other incomes accorded to the UTF include building permission development charges, incremental property taxes, advertisement revenues, lease rentals on utilities ducts, etc. PCMC also regulates advertisement rights on its BRT corridors and leverages the same on PPP basis. Through this regulation it has been able to substantially increase its advertisement incomes to fund the UTF.

PCMC is developing a Central Business District in one of the land parcels owned by TDR holders. This land parcel is on the intersection of two BRT corridors. The development is structured on PPP basis. PCMC has received offers from leading real estate developers of the

country for the development of the Central Business District on PPP basis and will generate cash income for the UTF.

### **Aligning Other Infrastructure Making BRTS Corridors Attractive**

Along with efforts to densify the BRT corridors, PCMC has already increased capacities for water, sewerage and other municipal services to cater to the high demand. PCMC is marketing these corridors, offering 24 hours of water supply, availability of high capacity mass transit and amenities for conducting business as well as for residential usage. These efforts will build demand for real estate, thereby increasing the demand for TDR and improving the financial viability of the UTF.

### **Implementing BRTS Corridor Projects**

PCMCs BRTS project comprises 10 trunk BRT corridors recommended by the comprehensive mobility plan. Of the ten corridors, five corridors are under development in the first phase. Four corridors, viz., Old NH4, Aundh-Ravet, Kalewadi to Dehu Alandi Road and Nashik Phatak to Moshi are being supported by JNNURM and the fifth corridor, Telco road, is being funded through PCMC's sources. The World Bank and the proposed ADB funding will ensure that the mobility needs of PCMC for the next 10 years are catered to.

The first phase BRTS corridors will provide mobility to the citizens of PCMC and also provide important linkages to fast-developing areas and will substantially optimize the traffic flow in the city.

### **Ensuring Success through Holistic Approach to Development**

The success of the development model hinges on the timely construction of the corridors. The PCIC will be responsible for construction and syndication of funds for the projects. The SPV will be managed by a Board of Directors comprising elected representatives and key officials of PCMC. Professional staff, either nominated from PCMC or appointed from external sources, will manage the day-to-day operations of the company relating to the construction, operations and maintenance of the BRT corridors, financial management and management of UTF. PCMC will provide a good level of autonomy to the PCIC to help it discharge its obligations.

### **Potential to Scale up the Model**

In the future, PCMC will also explore the option of developing one or more corridor on PPP basis after the UTF model matures. This PPP may be designed in a manner that a PPP developer will be assigned/ given the right to collect and retain the revenues from a particular corridor in lieu of development of the BRT corridor. Alternatively, roads in the outskirts or new city areas can also be developed through a PPP by offering TDR earned from the road corridors to fund the construction. The models envisage transfer of market / real estate risk to a PPP developer, these models are possible only after PCMC stabilizes and operates the UTF structure successfully.

The key challenge for PCMC is to manage cash flows and timing mismatches as the incomes to the UTF are linked to vibrancy in the real estate markets. Grant support from JNNURM, debt funding from multilaterals and banks, and recourse to PCMC's budget in the event of shortfall of funds will ensure success of the model.



**Annex-IX**

**Media Report on the Visit of NIUA Study Team to Jalgaon Municipal Corporation**



■ जळगाव मनपाच्या परिवहन उपक्रमासंदर्भात माहिती जाणून घेताना राजेश चंद्रा व सर्वेश व्यास. उपस्थित लक्ष्मीकांत चौधरी, चंद्रशेखर ठुसे, रामनाथ सोनवणे, आर.आर.काळे, मगर, ठाकूर आदी.

# महानगरपालिकेच्या परिवहन उपक्रमाचे राष्ट्रीय नगर कार्य संस्थानकडून कौतुक

विनागुंतवणूक उत्पन्न मिळवून देणारा उपक्रम देशात अन्यत्र कुठेही नाही : चंद्रा

जळगाव, दि. २१ - मनपाच्या परिवहन उपक्रमांतर्गत सुरू असलेल्या शहर बसवाहतुकीची राष्ट्रीय नगर कार्य संस्थानच्या अधिकाऱ्यांनी आज पाहणी केली व त्याची माहिती घेतली. गुंतवणूक न करता मनपाला उत्पन्न मिळवून देणाऱ्या या उपक्रमाचे त्यांनी कौतुक केले.

देशातील १० निवडक शहरांमधील परिवहन उपक्रमांची माहिती संकलित करण्याचे काम संस्थानच्या माध्यमातून सध्या चालू आहे. अहमदाबाद, सुरत, जालंदर येथील माहिती घेतल्यानंतर संस्थानचे प्रकल्प समन्वयक राजेश चंद्रा व सर्वेश व्यास हे आज येथे आले होते. या दोहोनी जळगाव मनपा परिवहन

समितीचे सभापती लक्ष्मीकांत चौधरी, आयुक्त रामनाथ सोनवणे यांची भेट घेतली आणि त्यांच्याकडून परिवहन उपक्रमाची सविस्तर माहिती जाणून घेतली. खर्च न करता उत्पन्न मिळवून देणारा असा उपक्रम देशात अन्यत्र कुठेही नाही. सेवेतील बसचा दर्जा चांगला आहे. या उपक्रमात मनपाला कुठेच तोटा नसल्याचा अभिप्राय चंद्रा यांनी याप्रसंगी नोंदविला आहे.

महापालिका व बससेवा अभिकर्ता यांच्यातील करारात प्रत्येक बसमागे घेतलेली बँक गॅरंटी, राज्य शासनाच्या धोरणांन्वये विद्यार्थी, ज्येष्ठ नागरिक, अपंग, अधिस्वीकृतीधारक पत्रकार यांना

भाड्यात सवलत, करार जर खंडित करायेचा असेल तर सहा महिन्यांची पूर्वसूचना बंधनकारक असणे आदी अटीचीदेखील चंद्रा यांनी प्रशंसा केली. जळगाव मनपा जो उपक्रम राबवित आहे त्याचा अन्य ठिकाणी स्वीकार व्हावा, असा अभिप्रायदेखील त्यांनी नोंदविला आहे.

मनपाकडून उपक्रमाची जी माहिती मिळाली आहे ती केंद्र सरकारकडे सुपूर्द केली जाणार आहे. यावेळी परिवहन समितीचे सदस्य चंद्रशेखर ठुसे, उपायुक्त आर.आर.काळे, परिवहन अभिकर्ता प्रसन्न बसलिंग्स प्रा.लि.चे प्रतिनिधी मगर व ठाकूर आदी उपस्थित होते.



**Annex - X****General Information of the Organization dealing with Urban Transport Project**

<b>Ahmedabad</b>	
General information about your Organisation (Fill the following queries and provide one page write up about your organisation and project as well)	
<b>Project Contact Person:</b>	Municipal Commissioner, Ahmedabad Municipal Corporation; Pr. H. M. Shivanand Swamy, Director Centre of Excellence in Urban Transport
<b>Information Contributed by:</b>	Ms. Swapna Ann Wilson
<b>Detailed Address of the Organization/Agency</b>	Centre of Excellence in Urban Transport, CEPT University, Ahmedabad
<b>Telephone No.</b>	Mob:
	Fax:
<b>Type of the Organization</b>	CEPT University (BRTS Consultancy), Supported By Ahmedabad Municipal Corporation
<b>Partnering Agencies/Individuals</b>	-----

<b>Jaipur</b>	
General information about your Organisation (Fill the following queries and provide one page write up about your organisation and project as well)	
<b>Project Contact Person:</b>	Ms. Preeti Mathur (Dy. Commissioner, BRTS, J.D.A)
<b>Information Contributed by:</b>	Mr. Ashok Chaudhary (Zonal Engineer, J.D.A)
<b>Detailed Address of the Organization/Agency</b>	Jaipur Development Authority (JDA), Near Lal Kothi, Jaipur, Rajasthan.
<b>Telephone No.</b>	Mob: 9460186538 and 9829017473
	Fax: 0181 – 5053070
<b>Type of the Organization</b>	Company Registered with shares under Company Act, 1956 with the name of ‘Jaipur City Transport Service Limited (JCTSL).’
<b>Partnering Agencies/Individuals</b>	<ol style="list-style-type: none"> <li>1) Jaipur Development authority (JDA);</li> <li>2) Jaipur City Transport Services Limited (JCTSL);</li> <li>3) STUP Consultant Limited, Jaipur;</li> <li>4) Unified Metropolitan Transport Authority (UMTA);</li> <li>5) Rajasthan State Road Transport Corporation (RSRTC);and</li> <li>6) PDCOR LTD.</li> </ol>

<b>Jalandhar</b>	
General information about your Organisation	
<b>Project Contact Person:</b>	Sh. Vinay Bublani, PCS, Executive Director cum Commissioner, Jalandhar City Transport Services Limited
<b>Information Contributed by:</b>	Manish Agrawal, Project Manager, Jalandhar City Transport Services Limited.
<b>Detailed Address of the Organization/Agency</b>	R.O.: Municipal Corporation, Nehru Garden, Jalandhar.
<b>Telephone No.</b>	Office: 0181 – 2227015
	Fax: 0181 – 5053070
	E-mail: citybusjalandhar@gmail.com
<b>Type of the Organization</b>	Company Registered with shares under Company Act, 1956 with the name of “Jalandhar City Transport Services Limited.”
<b>Partnering Agencies/Individuals</b>	Two Partners of Jalandhar City Transport Services Limited: 1) Municipal Corporation, Jalandhar. 2) Punjab Infrastructure Development Board, Punjab.

<b>Thane</b>	
General information about your Organisation	
<b>Project Contact Person:</b>	Project Contact Person: Sh. K. D. Lalla, City Engineer, Thane Municipal Corporation, Thane
<b>Information Contributed by:</b>	
<b>Detailed Address of the Organization / Agency</b>	Mahapalika Bhawan, Dr. Almeida Road, Chandanwadi, Panchpakhadi, Thane (W) – 400 602
<b>Telephone No.</b>	Office: +91 22 2534 77 14
	Fax: +91 22 2534 77 14
	E-mail: kd-chief@yahoo.co.uk
<b>Type of the Organization</b>	Urban Local Body
<b>Partnering Agencies/Individuals</b>	Govt. of Maharashtra, Govt. of India

<b>Jabalpur</b>	
General information about your Organisation (Fill the following queries and provide one page write up about your organisation and project as well)	
<b>Project Contact Person:</b>	Mr. Hari Ranjan Rao, Executive Director
<b>Information Contributed by:</b>	
<b>Detailed Address of the Organization/Agency</b>	Jabalpur City Transport Services Ltd (JCTSL) 1 <sup>st</sup> Floor, Red cross Building, Collectorate campus Jabalpur- 482 001
<b>Telephone No.</b>	Office: 0761-4014501,4082786
	E-mail: jcs1_2006@yahoo.co.in
<b>Type of the Organization</b>	A Company, supported by Jabalpur Municipal Corporation and Jabalpur Development Authority
<b>Partnering Agencies/Individuals</b>	Jabalpur Municipal Corporation and Jabalpur Development Authority

Surat	
General information about your Organisation	
Project Contact Person:	Ms. S. Aparna, IAS, Municipal Commissioner, Surat Municipal Corporation
Information Contributed by:	
Detailed Address of the Organization/Agency	Surat Municipal Corporation Mahanagar Seva Sadan, Mughalsarai, Surat-395003
Telephone No.	Office: 0261-2423750-56
	Fax: 0261-2422110
	e-commissioner@suratmunicipal.gov.in / commissionersmc@hotmail.com
Type of the Organization	ULB
Partnering Agencies/Individuals	



<b>Jalgaon</b>	
General information about your Organisation	
<b>Project Contact Person:</b>	Mr. R. K. Sonawane, Municipal Commissioner
<b>Information Contributed by:</b>	Mr. Prasanna Patwardhan, MD, PBLPL
<b>Detailed Address of the Organization / Agency</b>	Jalgaon Municipal Corporation, Jalgaon
<b>Telephone No.</b>	Mobile: +91 9967 440 222
	Fax: +91 257 2222260
	Email: rksonawane2007@yahoo.co.in
<b>Type of the Organization</b>	ULB
<b>Partnering Agencies / Individuals</b>	Prasanna Bus Link Pvt. Ltd.

<b>Kolkata</b>	
General information about your Organisation	
<b>Project Contact Person:</b>	Mr. Arnab Roy, Municipal Commissioner
<b>Information Contributed by:</b>	Mr. Md. Salidul Islam, Joint Commissioner
<b>Detailed Address of the Organization/Agency</b>	Kolkata Municipal Corporation, Kolkata
<b>Telephone No.</b>	Website: <a href="http://www.kolkatamycity.com">www.kolkatamycity.com</a>
	Phone: +91 33 2286 1234, 2286 1034, 2286 1000
	Fax: +91 33 2286 1334/1434
	Email: <a href="mailto:kmc@vsnl.net">kmc@vsnl.net</a> / <a href="mailto:mc@kmcgov.in">mc@kmcgov.in</a>
<b>Type of the Organization</b>	Urban Local Body
<b>Partnering agencies/individuals</b>	Simplex Pvt. Ltd.

<b>Pimpri-Chinchwad</b>	
General information about your Organisation	
<b>Project Contact Person:</b>	Mr. Ashish Sharma, Municipal commissioner
<b>Information Contributed by:</b>	Mr. Dilip Kudale, JNNURM Coordinator, PCMC Mr. B. Gaikewad, Ex. Engineer
<b>Detailed Address of the Organization/Agency</b>	Pimpri-Chinchwad Municipal Corporation
<b>Telephone No.</b>	Mobile: +91 9922 501 502
	Phone: +91 20 2742 6331
	Fax: +91 20 2742 5600
	Email: pcmc@vsnl.com, b.gaikwad@pcmcindia.gov.in, d.kudale@pcmcindia.gov.in
<b>Type of the Organization</b>	ULB
<b>Partnering agencies/individuals</b>	-----