MASS RAPID TRANSIT SYSTEM (MRTS)

VERSOVA- ANDHERI- GHATKOPAR CORRIDOR

MUMBAI –INDIA

EXECUTIVE SUMMARY

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

BANDRA KURLA COMPLEX, BANDRA(E), MUMBAI 400 051

Fax: 2659 1246

EPBX: 2659 001-08

Email:- mmrda@giasbom01.vsnl.net.in

Web : http://www.mmrdamumbai.org

1.0 Background

Greater Mumbai, the capital of Maharashtra, the financial capital of India is the heart of commercial and trade activities of the country. The Island City of Mumbai is experiencing rapid growth in economic activity and suburbs are growing faster than the Island City in terms of population distribution and activity location. The city with its present population of over 12 million generates about 14 million trips in a day, with about 88 percent of the total trips catered by the suburban railway and the public transport bus service provided by BEST. The ever growing vehicular and passenger demands coupled with constraints on capacity augmentation of the existing network have resulted in chaotic conditions during peak hours of the day.

Greater Mumbai has always had the distinction and advantage of a high modal share (88%) in favour of a public mass transport system. The role of existing Suburban Rail Services is extremely important in the life of people of Greater Mumbai. The system carries about 6 million passengers every day. The existing suburban rail network serves the South – North traffic very efficiently. For East-West traffic, however, there is an urgent need for efficient, fast and environment friendly public transit system.

To augment the capacity of the rail and road transport systems, several improvement works are now under implementation under the World Bank aided MUTP II. The emphasis is mainly on the railway corridor and improving east – west road connectivity. To supplement these efforts, GOM through MMRDA has embarked upon the ambitious MUIP with emphasis on road improvements & flyovers etc and works are under implementation.

In the above context, the Government of Maharashtra has also been exploring the viability and suitability of various efficient, economical and environmental friendly mass transit systems such as Light Rail Transit (LRT), Rapid Rail Transit (RRT), electric trolley buses, etc. for the city travel needs. MMRDA was a nodal agency for detailed

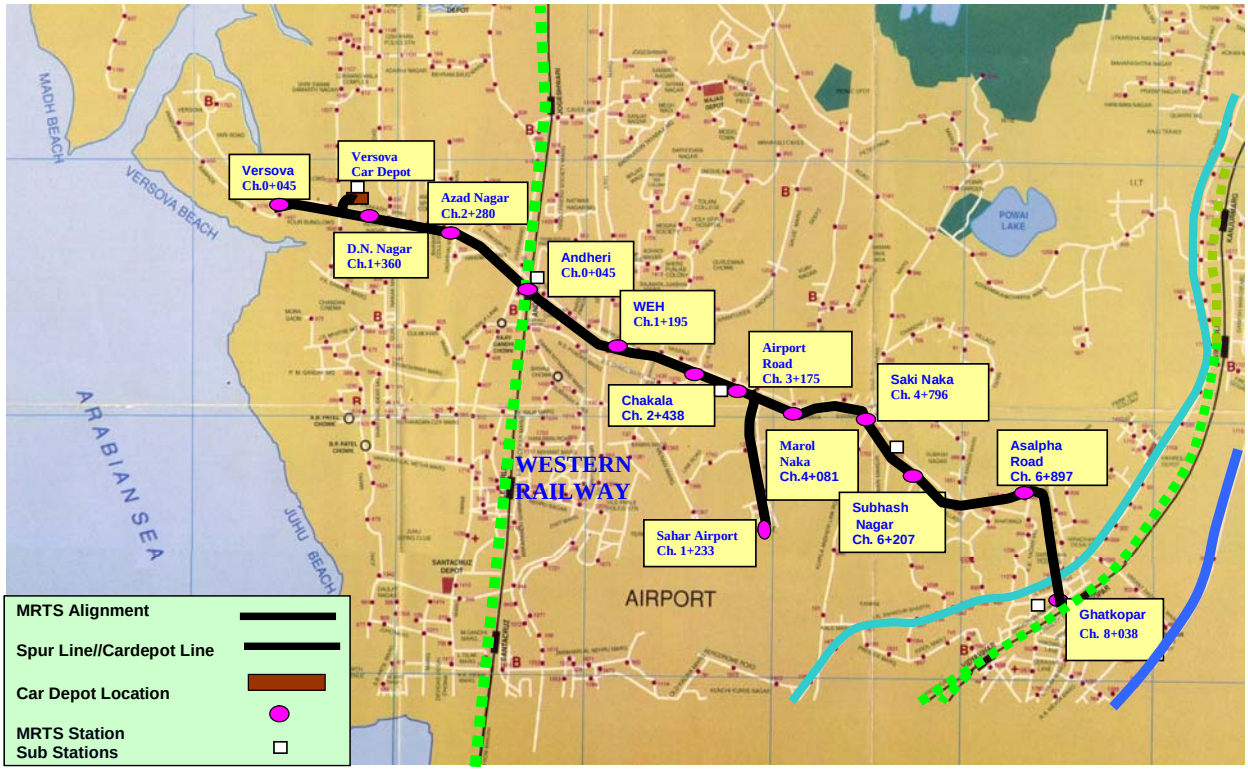
feasibility study under the SMART Project (**S**election of a **MA**ss **R**apid **T**ransit System) for Mumbai. The study was carried out under the Indo-German Technical Co-operation by entrusting the consultancy work to TEWET in association with DE-Consult & TCS, during 1997-2000. The study recommended a mass transit corridor from Andheri to Ghatkopar as potentially bankable and economically viable, after examining a number of alternative corridors and alignments

In the year 2003, MMRDA appointed M/s CES to review the recommended MRTS alignment by SMART Report and update the same. DMRC were appointed in 2003 to prepare the master plan for Mumbai metro , Andheri –Ghatkopar section has been extended to Versova as a part of the master plan

2.0 Alignment

The salient features of the recommended alignment for Versova - Andheri- Ghatkopar MRTS CES Report are as follows:

- Alignment Length – 11.443 km
- Branch line to Sahar Airport -1.265 km
- Car Depot - DN Nagar / Versova and / or Ghatkopar
- MRT Station Locations – Versova, D.N. Nagar, Azad Nagar, Andheri, WEH, Chakala, Airport Road, Marol Naka, Sakinaka, Subhash Nagar, Asalpha Road, Ghatkopar and Sahar Airport.



1. The alignment is fully elevated . It also cross the (Western Express Highway) WEH on elevated structures
2. All the station will have mid level concourse with adequate provisions of escalators. Lifts and other amenities for physically challenged persons.
3. Ghatkopar MRT Station will be located over central railway track for better integration with the existing sub-urban station.
4. All stations will have good interchange facilities with other modes of transport
5. The trains will have 4 coach composition fully vestibuled and air-conditioned
6. The system will have electric traction at 750 V DC (OHE) and modern 3 phase AC Technology which may be eventually replaced by 25 KV AC traction supply.
7. Three aspect of automatic colour light Signalling will be provided to regulate tram movement on the corridor. Section will be centrally controlled
8. Modern communication facilities are planned to be provided both at stations and on train.
9. Stations will be provided with automatic fare collection system and will be access controlled.
10. Adequate measures will be taken to protect the environment all along the corridor and provisions of sound barrier
11. safety and security of the commuters will be given the outmost consideration in system implementation
12. Each train will have two drivers with 4 coach composition.

Salient features of the proposed Versova Andheri Ghatkopar MRTS is presented in the **Table 1.0** below.

Table 1.0 Salient feature for Versova Andheri Ghatkopar corridor

Sl. No.	Item	Figure for A-V-G
1.	Route Length	Main Line – 11.443 km Airport line – 1.265 km Car-depot line – 0.45 km Total length 13.158 km
2.	Elevated alignment	100 %
3.	Maximum gradient	4.0%
4.	Maximum curvature	100 m
5.	Minimum Ground Clearance	5.5 m
6.	No. of stations	13
7.	Platform Length	90
8.	Car Depot	D.N Nagar
9.	Length	22 m.
10.	Width of coach	3.2 m.

3.0 Ridership Forecast

To appreciate the study area travel and traffic characteristics, extensive data related to Greater Mumbai has been collected from a number of sources viz. MMRDA, MCGM, Regional Transport Office, Census of India, Indian Railways, etc. and compiled. The data and information generated have been used in developing transport demand model to forecast future travel demand by using **TRIPS** software.

In the present study, the MRT ridership has been assessed considering the impact of road improvements proposed under Mumbai Urban Infrastructure Project (MUIP) and proposed changes in the alignment & MRT Station locations and envisaged headway. The ridership figures are given in the table 2.0 below

Table 2.0 Total Passenger Boardings on
Versova -Andheri – Ghatkopar MRT Corridor

Year	Hourly Ridership	Daily Ridership	PHPD
2008	38004	475046	17356
2011	41067	513338	18580
2021	53176	664703	23321
2031	70603	882533	30491

- *PHPD – Maximum oneway peak hour flows*

The 3 slab distance based fare structure is proposed to adopted as under

- <3 km – Rs. 6 /-
- 4-8 km – Rs. 8/-
- >8 km – Rs. 10/-

The above fare structure compares favorably with other modes of transport on the corridor.

4.0 System Technology

MRTS System

Traffic study has estimated the maximum peak hour peak direction section load on the Versova -Andheri – Ghatkopar Corridor to be 17356 in 2008 and 30491 in the year 2031 respectively. A number of systems in operation all over the World including India have been studied and finally for this corridor, bottom supported flanged steel wheels on steel rail with standard gauge (1435 mm) MRT System is proposed due to its proven engineering superiority in suspension features, guidance, propulsion, switching and suitability compared to other systems.

Salient Features of System Technology	
Item	**Description**
Traction	750 V DC OHE
Signaling	Way side signals/ 3 aspect automatic colour lights signal
Train control	With Driver
Ticketing system	Auto Fare Collection
Train Composition	Four Coaches
No. of Classes	Single Class
Environment	Air Conditioned
Max. Speed	80 kmph
Average Speed	33 kmph
Acceleration	1.1 m/sec^2
Deceleration	1.2 m/sec^2
Max. Rake requirement (2021)	14 nos.
Frequency (2008) (2031)	5 min. 3 min
Carrying Capacity/rake	1500 Pax.
Total Journey Time	17 min Approx

5.0 Station Area Planning

The stations are an essential component of the entire MRT System since stations are the place where the users directly interact with the system.

Salient Features

The salient features provided for in the design of stations can be summed up as follows:

- All stations are elevated.
- All stations are of side platform configuration except airport road which has an island platform configuration.
- Since all the stations have platforms at an average height of 12 to 13 m, concourse has been provided at an intermediate level which has ticketing and other facilities.
- All stations have been provided with escalators for accessing concourse and platform levels.
- Lifts have been provided for the physically challenged

6.0 Integration and Extendibility

Integration with the other modes of transport has been given due consideration as this will generate the traffic. Location of the stations plays very important role in this respect. Andheri and Ghatkopar stations have been integrated with suburban railway system to facilitate smooth Intermodal transfer of commuters. Integration with bus stops, taxi and rickshaw stands is taken into consideration.

7.0 Capital Cost and O&M Cost

The estimated cost of project as shown below in **Table 3.0** is based on the proposed alignment and the economical system design as now proposed.

Table 3.0 Estimated Capital Cost

(Rs. in Millions)

Item	Cost (at prices 2003)
Civil Works	4080
OHE	148
Traction Power Supply	438
Signalling	171
Telecom	191
Ticketing	532
E&M Equipment	100
Depot Equipment	515
Rolling Stock	2060
Environment Measure	29
Sub-Total	**8264**
Preparation of DPR @ 2%	165
Detailed Engineering & Project Management @ 5%	413
Financial charges @ 3%	248
Sub-Total	**9090**
Land for the project	530
Pre-construction planning expenses @ 1%	83
Grand Total	**9703**

8.0 Economic Analysis

The estimated cost of the Project is Rs 9703 million including other charges. The capacity augmentation cost and reinvestment cost is estimated at Rs 190 million and Rs 1988 million respectively. Similarly annual O&M cost is estimated at Rs 422.8 million and Rs 470.4 million in the year 2011 and 2021 respectively. These costs have been converted into economic costs by applying conversion factor of 0.90 so as to represent exclusion of taxes and duties which are considered transfer payments and costs relating to depreciation. The economic analysis of the base case is 18.27% with an NPV of Rs. 3035 M. at 12% rate of discount.

9.0 Environmental Screening

Preliminary screening of environment and social impacts of the proposed MRTS between Andheri and Ghatkopar was carried out including Environmental Legislations, ambient air quality, noise level, water bodies, ecology, heritage and aesthetic issues, sensitive receptors along the alignment etc. The detailed EIA Study will be carried out in due course. All necessary measures will be adopted to protect the environment along the corridor Rail based MRT system with electric traction is eco friendly by design.

10.0 Way Forward

Project Preparation and Risk Minimisation

The project is proposed to be implemented on BOOT basis through Public Private Partnership. MMRDA have already reached following very important decisions in preparation for a BOOT/PPP implementation programme and have adopted a tender strategy which will minimize the risks, for the investors and make it attractive for potential BOOT operators.

- The GoM's necessary approvals have been obtained.
- MMRDA has setup Project Implementation Unit (PIU) for carrying out pre-requisite tasks prior to implementation of MRTS.
- Strategic legal planning by adopting Tramway Act to keep Government of Maharashtra's Control over the project.
- Proper integration with existing and future rail, road and other modes of transport
- Inviting global tenders on BOOT/PPP basis to get access to modern technology, management skills and competitive finance
- Providing land free of cost for the Car Depot, ROW, stations and traction substations free of cost
- Relaxing normal Concession Period of 25 and extended to 35 years (including a maximum of 5 year Construction Period)
- Accepting responsibility for necessary Clearances and liaison with local agencies
- Adopting an open door policy to accept international modern technology and management philosophy.
- MMRDA would participate in SPV by providing equity.
- Government of India has also been approached for financial participation in the project and extend all concession for this important infrastructure project. The global bid are expected to be invited shortly. The construction period for the project is maximum of 5 years. Completion of this project will be an important landmark for Mumbai 's transport system.

11.0 Likely time schedule for Implementation

Invitation of Bids (Issued)	Aug 2004

Sale of Documents	(6^{th} – 30^{th}) Sept 2004
Selection of Owners Consultant	Sept 2004
Pre-Bid conference	25^{th} Oct 2004
Selection of preferred bidder	April / May 2005
Financial Closure	Dec 2005
Construction Period	2005-2008
Commencement of Operations	2008