

## **ELEVATED RAIL CORRIDOR IN MUMBAI**

### **PROJECT INFORMATION MEMORANDUM**

#### **I. Background –**

- Mumbai has one of the most crowded and overloaded suburban systems in the world. The System is operated by Western and Central Railway and is spread over 319 route km operating more than 2,300 train services daily.
- The existing Corridor is about 60 km long from Churchgate to Virar with 28 stations. Non air-conditioned EMU trains of 9/12/15 coaches run for about 20 hours a day. The trains are over-crowded much beyond their rated carrying capacity with headway of around four minutes and are intensively utilized. The City is expanding towards Virar and beyond resulting in high annual growth rate in passenger movement between Virar and Borivali as compared to southern sections.
- Ministry of Railways (MOR) is concerned about the capacity constraint on the Corridor and is keen to take suitable measures to augment the system capacity as well as to provide improved services to the commuters.
- Lateral expansion by way of laying additional tracks by the side of existing tracks is not feasible due to non availability of required land strip for most length of the Corridor. MOR has therefore, envisioned a two track elevated Corridor with a capacity of 90,000 PHPDT along Churchgate-Virar section. It is expected that introduction of air-conditioned EMU services will help in addressing the twin issues of capacity constraint as well as non-availability of high quality travelling comfort to the commuting public. MOR plans to implement the Project through private sector partnership on DBFOT basis.
- There are two existing corridors between Churchgate and Borivali, one for slow local and other for fast suburban trains, where mainline long distance services are also run between Mumbai central and Borivali, In addition 5th line (up and down) has been provided in Mumbai Central - Borivali section (except between Mahim and Santacruz) and is generally used for diversion of through trains during peak hours. 5th line between Mahim and Santacruz and 6th line between Mumbai Central – Borivali is under construction, to achieve segregation of suburban and non suburban traffic. From Central Railway two lines (Harbour Corridor) enter from east side at Mahim and run parallel to western Railway network upto Andheri, Further extension of Harbour lines upto Goregaon is in progress. Between Borivali-Virar, there were only two lines and two more have been added.
- Existing corridors are highly congested in terms of train operations, resulting in non

availability of traffic and Power blocks during day time necessitating construction of new corridor with short duration traffic and power blocks.

- Between Mumbai Central and Churchgate, the space is not available for construction of columns of elevated corridor. There are a number of private buildings between Charni Road and Grant Road right at the edge of railway boundary, necessitating alignment to be taken underground. Proposed corridor also needs to be extending beyond Churchgate, upto Nariman point/ Mantralaya.
- On Mumbai Central Borivali stretch, restricted clearance is available between outermost line and railway boundary. 6th line work has also been taken in hand by MRVC. All this require special design and construction methodology to be adopted for the Elevated Corridor.
- Between Borivali and Virar, there are 4 lines and adequate land is available in considerable length for two future lines. New corridor has to be proposed keeping provision for two future lines. Wherever land is available or can be acquired; at grade alignment is considered preferable. The Corridor passes across Vasai Creek necessitating bridge with special design, spans and headway clearance.
- Due to existence of 81 Nos. of FOBs, and 25 ROBs, height of corridor deck has been kept generally more than 15 meter, depending upon floor height/ road level.
- There are 4 high EHV power transmission lines at Ch. 25770m, 32400m, 38470m and 41590m having height of 20.66m, 18.40m, 18.70m and 18.2m above existing rail level respectively. Provision of elevated corridor will need raising / modification of these EHV lines. By keeping the proposed Corridor at grade between Dahisar and south of Bhayandar, raising of two Reliance EHV lines at Ch. 38470m and 41590m has been avoided.
- Due to height restrictions imposed by Airport authority of India in Air funnel stretch, the Elevated Corridor has to be brought at grade for a length of 2.2 km between Santacruz and Vileparle - involving acquisition of private land and properties.
- Crossing of Elevated Corridor over the existing corridors from east to west and vice versa due to space constraints has been necessitated, to avoid / minimize acquisition of land.

## **II. Proposed Corridor -**

Oval Maidan - Virar Elevated Corridor will have a length of 62.268 Km on Oval Maidan - Virar stretch of Mumbai passing through Churchgate, charni road, Mumbai central, Mahalaxmi, Lower Parel, Elphinston Road, Dadar, Matunga Road, Mahim Junction, Bandra, SantaCruz, Andheri, Jogeshwari, Goregaon, Malad, Kandivali, Borivali, Dahisar, Bhayandar, Naigaon, Vasai Road and Nalasopara.

26 stations are proposed on the corridor from Oval Maidan to Virar. Out of which 5 stations would be underground, 19 elevated and 2 at grade.

The breakup of stretch is as given below:

| <b>Particular</b>            | <b>Oval Maidan - Mahalaxmi</b> | <b>Mahalaxmi – Borivali</b>   | <b>Borivali - Virar</b>                           | <b>Total</b>          |
|------------------------------|--------------------------------|-------------------------------|---|-----------------------|
| Length<br>(In Km)            | 8.04                           | 27.41                         | 27.818  | <b>63.268</b>         |
| Underground<br>(In Km)       | 8.04 (12.70%)                  | -                             | -   | <b>8.04(12.70%)</b>   |
| Elevated<br>(In Km)          | -                              | 25.213 (39.85%)               | 17.507 (27.67%)                                   | <b>42.72 (67.52%)</b> |
| At Grade<br>(In Km)          | -                              | 2.20 (3.48%)                  | 10.311(16.30%)                                    | <b>12.511(19.78%)</b> |
| <b>Stations<br/>(in Nos)</b> | <b>5 Nos. (All U/G)</b>        | <b>14 Nos. (All Elevated)</b> | <b>7 Nos.<br/>(5 Elevated and<br/>2 At Grade)</b> | <b>26 Nos.</b>        |

Maintenance Depot : North of Virar station

Construction Depot : Mahalaxmi (North), Jogeshwari (North/East), Mira Road, and Naigaon.

Broad features of the alignment are-

**1. Oval Maidan-Mahalaxmi** -The underground alignment for this section is considered feasible as

- Acquisition is private land/properties is minimum
- Road traffic diversions will be limited

- Will serve Nariman point/Mantralaya
  - Oval Maidan station will get integrated with Hutatma Chowk station on Colaba- Bandra Metro
  - Operational facilities will be provided , at Oval Maidan
  - Aesthetics of Heritiage Building will not be affected.
2. **Mahalaxmi – Borivali-** the alignment is mainly elevated except for a length of 2.2 km north of Santacruz to north of Ville Parle Station, where due to the height restrictions imposed by Airport Authority of India, the alignment is brought to surface.
3. **Borivali – Virar -** While proposing the alignment for this section, provision for two future lines has been kept. Feasibility of keeping alignment at grade has been seen, wherever land is available within railway right of way, or feasible for acquisition.

- **Stations on the Line**

A total of 26 stations have been planned, at an average spacing of around 2.25 km. The inter-station distance varies from 1 km to 4.5 km due to traffic and topographic reasons.

- **Rail Levels and Alignment**

Proposed rail level in underground section is approximately 15 m below the ground level. The rail level on the elevated section is generally about 15 m and upto 20 m above road level.

- **Platforms**

Underground stations have been planned around island platforms, while all elevated and at-grade stations are planned to have side platforms.

### III. Indicative Project Parameters

#### A. Technical

- Rolling Stock of Broad Gauge, air-conditioned coaches of 3660 mm width,
- Train comprising motor car (MC) and trailer car (TC) in basic unit of 3 cars (DTC-MC-MC or TC-MC-MC),
- Cab signaling with CBTC having ATP and ATO features similar to other metros
- Automatic fare Collection with Automatic ticket vending machines and POMs
- Modern communication facilities
- Design speed – 100 km/h

#### B. Operational

- Running of services for 19 hours of the day (5 AM to Midnight) with a station dwell time of 30 seconds,

- Transport capacity of 90,000 PHPDT
- One emergency siding at Jogeshwari and other stabling lines for morning start of train services at Oval Maidan (3) and in Dahisar – Mira Road section(4), Naigaon (8), Bandra (2). These places can be used to reverse direction in emergency.
- For restoration of breakdown, following facilities are proposed at Virar Coach Maintenance Depot One accident relief train (ARTs) with Diesel locomotive, Catenary Maintenance Vehicle
- Road cum Rail Vehicle with re-railing equipments
- Crossovers have been planned at Bandra, Jogeshwari, Dahisar, mira Road and Naigaon stations with a view to maintaining train services during dislocations caused by technical failures / accidents.

#### IV. Revenues

The revenues are expected from the mix of fare box and no-fare box

1. **Fare box revenue-** From the demand analysis, it has been estimated that about 1.7 million passengers would use the corridor in year 2019-20. The concessionaire will enjoy the freedom of setting tariff.
2. **Other sources of revenue-** Other sources of revenue could be commercial development and advertisement on the station building. Also it is possible to raise revenue through leasing of parking rights at stations, advertisement on trains and tickets, advertisement within stations and parking lots, advertisement on viaducts, coloums and other metro structures, co-branding rights to corporate, film shootings and special events in premises.
  - Available land parcels with Railways are limited (details provided below).
  - Limited scope of air space exploitation on running system.
  - air space exploitation over elevated stations not recommended.
  - Project viability to be improved by
    - Use of appropriate FSI on available plots.
    - Flexible land use.

| S.No | Location       | Area(in Sq.mtr) |
|------|----------------|-----------------|
| 1    | Mumbai Central | 22464           |
| 2    | Mahalaxmi      | 14027           |

|   |              |               |
|---|--------------|---------------|
| 3 | Lower Parel  | 8242          |
| 4 | Bandra       | 17627         |
| 5 | Santacruz    | 15311         |
| 6 | Andheri      | 4663          |
| 7 | Jogeshwari   | 28039         |
| 8 | Borivali     | 20990         |
|   | <b>Total</b> | <b>131363</b> |