Metro Line 3: Colaba-Bandra-SEEPZ

“Supply Chain - Stakeholder Alignment for Critical Project Management”

DISHA-2019
Evolution of Public Transport Mumbai

- April 1853; First train in India; Bori Bunder - Thane.
- May 1874, First tram driven by horses Parel - Colaba.
- 1905, BEST introduced electric Trams & Buses.
- Feb. 1925 First Electrified (sub. rly.) Mumbai Harbor line
- 1930 to 1970, Tram operations expanded to various Indian cities; Kolkata, Chennai, Pune & many others.
- 1957 First Indian made Local Churchgate- Mahalaxmi.
- 1970, Tram operations decommissioned from almost all cities except Kolkata.
- 1975 Train length increased from 8 to 9 coaches.
- 1980 First Suburban trains 12 Coach Rake.
- 2005 MUTP Modernization of Mumbai Suburban incl. convert DC to AC & modern trains.
- 2017 First A/C Suburban Train service
Hallmark of present transport

- Unsafe travel conditions on Suburban railway-3500/yr causalities (40 % commuters)
- Distressing experience on Public Transport (saveML1)
- Road Journey Speeds falling below 12 kmph
- Loss of productivity & Family time (commute time >120 min)
- Affecting Personal, Social and Cultural life
- Mumbai fast disappearing from (once) desired (International) business destination of India
- Urban Traffic & Travel conditions reflect on behavioral aspects and response by public (a study from Mexico)
### MMR Proposed & Operational Metro/Mono Network

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Versova Andheri Ghatkopar</td>
<td>11.4</td>
</tr>
<tr>
<td>2 (A&amp;B)</td>
<td>Dahisar - D.N. Nagar- Bandra - Mandale</td>
<td>42.2</td>
</tr>
<tr>
<td>3.</td>
<td>Colaba - Bandra – SEEPZ</td>
<td>33.5</td>
</tr>
<tr>
<td>4 &amp; 4A</td>
<td>Wadala - Ghatkopar - Mulund Thane- Kasarvadvali &amp; Kasarvadvali - Gaimukh</td>
<td>35.0</td>
</tr>
<tr>
<td>5</td>
<td>Thane (Kapurbawadi) - Bhiwandi – Kalyan</td>
<td>23.5</td>
</tr>
<tr>
<td>6</td>
<td>Swami Samarth Nagar- Jogeshwari - Kanjurmarg–Vikhroli</td>
<td>14.5</td>
</tr>
<tr>
<td>7</td>
<td>Dahisar (E) -Andheri (E) &amp; Andheri - CSIA</td>
<td>19.5</td>
</tr>
<tr>
<td>8</td>
<td>Andheri - CSIA - Mankhurd - NMIA</td>
<td>35.0</td>
</tr>
<tr>
<td>9</td>
<td>Dahisar E - Mira Bhyandar</td>
<td>10.5</td>
</tr>
<tr>
<td>10</td>
<td>Gaimukh- Shivaji Chowk, Mira Road</td>
<td>11.2</td>
</tr>
<tr>
<td>11</td>
<td>Wadala - Azad Maidan</td>
<td>14.0</td>
</tr>
<tr>
<td>12</td>
<td>Kalyan-Dombivali-Taloja</td>
<td>25.0</td>
</tr>
<tr>
<td>MO.</td>
<td>Chembur-Wadala- Gadge Maharaj Chowk</td>
<td>20.0</td>
</tr>
</tbody>
</table>

**Operational network:** 30 km (Metro 1 & Mono)  
**Under execution:** 163 km
**Mumbai Metro Line 3: Alignment**

- **Alignment**: 33.5 km (fully underground)
- **Stations**: 27 (26 U/G + 1 At Grade)
- **Completion cost**: Rs 23,136 cr
- **Debt/Loan (JICA)**: 57.2%
- **GoI/GoM/Others**: 42.8%
- **Project EIRR**: 17.93%
- **FIRR**: 2.71%
- **Implementation**: Phase I: June 2021 (Aarey-BKC)
  Phase II: Dec. 2021 (BKC-Colaba)

<table>
<thead>
<tr>
<th></th>
<th>2021</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ridership</strong></td>
<td>13.9 L</td>
<td>17.0 L</td>
</tr>
<tr>
<td><strong>Headway (CP-BKC)</strong></td>
<td>4 min, 16sec</td>
<td>2 min, 55 sec</td>
</tr>
<tr>
<td></td>
<td>256 sec</td>
<td>175 sec</td>
</tr>
<tr>
<td><strong>Coaches</strong></td>
<td>248 (31x8 cars)</td>
<td>336 (42x8 cars)</td>
</tr>
</tbody>
</table>
Project Financing

Completion Cost: Rs 23,136 cr

- **Govt. Equity**
  - GOI (10.4%) Rs 2,403 cr
  - GoM (10.4%) Rs 2,403 cr

- **Sub Debt**
  - GOI (4.4%) Rs 1,025 cr
  - GoM (7.0%) Rs 1,615 cr

- **Market Market**
  - PD/RE (4.3%) Rs 1,000 cr

- **Stake holder contribution**
  - AAI+MIAL (3.4%) Rs 777 cr

- **MMRDA**
  - Rs 679 cr (2.9%)

- **Principal Debt**
  - JICA (57.2%) Rs 13,235 cr

- **Addl. State Taxes**: Rs 806 Cr

AAI: Rs 518 Cr GVK: Rs 259 Cr
## Mumbai Metro Line 3: Contract Packages

<table>
<thead>
<tr>
<th>Package</th>
<th>Contractor/JV Address &amp; Contact Details</th>
<th>Length (km)</th>
<th>Station Names</th>
<th>Cut &amp; Cover</th>
<th>NATM</th>
</tr>
</thead>
<tbody>
<tr>
<td>UGC-01</td>
<td>L&amp;T – STEC JV MUMBAI</td>
<td>4.2</td>
<td>Cuffe Parade, Vidhan Bhavan, Churchgate</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Hutatma Chowk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGC-02</td>
<td>HCC - MMS JV</td>
<td>4.05</td>
<td>CST</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kalbadevi Girgaon Grant Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGC-03</td>
<td>Dogus - Soma JV</td>
<td>5.06</td>
<td>Mumbai Central, Mahalakshmi, Science Museum,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acharya Atre Chowk, Worli</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGC-04</td>
<td>CEC - ITDCEM-TPL JV</td>
<td>6.81</td>
<td>Siddhi Vinayak, Dadar</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shitaladevi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGC-05</td>
<td>J.Kumar – CRTG (JV)</td>
<td>4.95</td>
<td>Dharavi, B.K.C., Vidyanagari</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Santacruz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGC-06</td>
<td></td>
<td>4.45</td>
<td>CSIA Domestic, Sahar Road, CSIA International</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGC-07</td>
<td>L&amp;T – STEC JV MUMBAI</td>
<td>4.15</td>
<td>MIDC, SEEPZ</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marol Naka</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depot</td>
<td>Civil Workd</td>
<td>--</td>
<td>Aarey Depot Stn &amp; other Buildings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## System Contracts

<table>
<thead>
<tr>
<th>System Package</th>
<th>Name of Works (Design, Engineering, Supply, Installation, Testing and commissioning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCS–11 (A) (Traction)</td>
<td>Overhead Contact System ASS, 33 kV Cable Distribution Network &amp; Integration with other system.</td>
</tr>
<tr>
<td>PSS–11 (B) (Power Supply)</td>
<td>Power supply work including RSS, TSS, 110 kV Cable work, Switching Stn., Auxiliary Main Substation, SCADA and integration with other systems.</td>
</tr>
<tr>
<td>STPT–12 (S &amp;T)</td>
<td>Signalling, Train Controlling, PSD Communications</td>
</tr>
<tr>
<td>SSS–13</td>
<td>Station Security System</td>
</tr>
<tr>
<td>AFC–14</td>
<td>Automatic Fare Collection (AFC) System</td>
</tr>
<tr>
<td>TVS&amp;ECS –15 A&amp;B</td>
<td>Tunnel Ventilation &amp; Environmental Control System</td>
</tr>
<tr>
<td>L&amp;E–16A &amp; 16B</td>
<td>Escalators (16A) &amp; Lifts (16B)</td>
</tr>
<tr>
<td>RS–17</td>
<td>Rolling Stocks (RS) (31 Trains; 248 Cars)</td>
</tr>
</tbody>
</table>
Multiple Stakeholders

Govt. Control/Sanction
- Govt. of India
  - MoHU
  - DEA/MoF
- Railway
- Plng. Comm./NITI
- MOEFCC
- CMRS
- State Govt
  - UDD
  - Planning
  - Finance
  - GoJ/JICA
  - Courts & NGT

On Field Public Entities
- MCGM Various Dept.
- MMRDA
- W. Rly
- PWD/MSRDC
- AAI/MIAL
- MMOPL/Line 1
- MIDC/SEEPZ
- AHD/Aarey
- MHCC
- MCZMA/MPCB
- MHDA/SRA
- Utility Agencies
- Police/Traffic

Citizen/Non Gov
- Neighborhood & Citizens
- Slum PAP
- Protected Tenants /PAP
- Land owners- individual
- Owners- Pvt. Entitles
- Owners- Public Entitles
- NGO
- Petitioners/Litigents
Stage of Project; Planning/Financing/Approvals

- GoI; MoF, DEA, Railways, Plng. Commission /NITI, MoEFCC & SEEPZ (MoC)
- GoM; UDD, Planning, Finance, Environment, MCZMA, MMRDA, MIDC, AHD & Collectors
- MCGM, MHCC, Utilities
- GoJ/JICA
- Land Owners, PAPs
- Citizens
Institutional Framework

- Central Sector Project
- Metro Railway Act 2009; Project notification
- Formation of JV SPV (50:50) of GoM & GoI
- Funding; JICA, Equity, Sub Debt & Stakeholders
- Declare as Vital Public Infrastructure
- Constitute High Power Committee
- Environmental, Social framework & clearances
- Consultative Process
- Land Acquisition; REFLTOR 2013
- Rehabilitation; MUTP
- Cost recovery; Fare box & Non Fare Revenue
Stage of Project: Procurement

• Procurement Process/Rules
• Bid Documents
• Bidders
• Bankers
• JICA
• TAC/Board
Robust Procurement Process

- Resilient Procurement Rules JICA/FIDIC
- EPC; Design & Build Tenders-Bench Mark Works/Bids
- Packaging and Slicing; Optimum
- Project technical Details, Field Data; Geo-Tech, BCS, Charted & Uncharted Utilities
- Construction Methodology
- Qualification Criteria, Specific Conditions
  - Financial and Technical
  - Liquidity & Payment conditions
  - Key Dates, Interface & Integration
- Land for Project and Construction Depots
- Specifications
- Bonus, Penalities, Dispute resolution & Arbitration
Stage of Project: Implementation

- GC, Contractors, DDC, LDC
- MCGM, Utilities (Public & Pvt.)
- Railways/Metro; WR & MMOPL
- PWD, MSRDC, MHDA, SRA, MMRDA, MIDC
- AAI, MIAL, GVK
- Collectors, Forest, Traffic Police, MPCB
- Land Owners, Protected PAPs & Slum PAPs
- Neighborhood, Citizens
- NGO, Activist, Petitioners,
Project Facilitation & Issue Resolution

- Chief Ministers War Room
- Committed & Dedicated Team
- Land acquisition; launching shafts, structures
- Muck Disposal & access to sites
- R & R Framework for Slums & legal tenants
- Public Engagement & Consultative process
- Out of Box & Tailor made Solutions
- Legal remediation (to counter petitioners)
- Environmental & Social Conscious approach
- Traffic Diversion and Co-ordination
Stages of Project: Operations & Maintenance

- CMRS, ISA
- O&M Contractors/suppliers
- Other PT/IPT operators
- Security Agencies
- Banks & Fare collection systems
- Commuters
- Citizens
- Fare Fixing/Regulator
Sustainable Framework of Operations

- Define Maintenance Philosophy
- MRA & Metro Rail Operating rules
- CBTC Signals, UTO operations
- Testing & Commissioning
- Operating framework; Own/Private
- AFC & Common Mobility Cards
- PSD, CCTV Surveillance & Security systems
- Common Asset Management Etc.
- Multi-model Integration, last mile connectivity
- Customer service/Public relations
Land Acquisition

- Govt. Land Required = 73.14 ha; Pvt. Land Required = 2.56ha
- GoM processed & gave advance possession of required lands
- Private land acquisition Nearing completion.

<table>
<thead>
<tr>
<th>Land Requirement (ha)</th>
<th>Permanent (ha)</th>
<th>Temporary (ha) (Yellow + Green)</th>
<th>Total (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>BMC</td>
<td>Pvt.</td>
</tr>
<tr>
<td>Land Required</td>
<td>34.79</td>
<td>0.56</td>
<td>1.38</td>
</tr>
<tr>
<td>Land in Possession</td>
<td>34.79</td>
<td>0.56</td>
<td>1.34</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>97.10%</td>
</tr>
</tbody>
</table>
Rehabilitation & Resettlement of PAPs

- MUTP – R&R Policy, March 1997 (amended in Dec. 2000); Eligibility – BSES

- Total **2750** PAP’s **Rehabilitated/Shifted**: 1761 by MMRC, 699 shifted to Transit (Kalbadevi - Girgaon) and 290 by other means

- Govt. offices affected are shifted (temp.) to alternate premises.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Details of PAP</th>
<th>Affected</th>
<th>Rehabilitated</th>
<th>% Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Slum/encroachment on Govt. land</td>
<td>1937</td>
<td>1852</td>
<td>100.00</td>
</tr>
<tr>
<td>2</td>
<td>Slum/encroachment on Private Land</td>
<td>31</td>
<td>14</td>
<td>100.00</td>
</tr>
<tr>
<td>3</td>
<td>Offices on Govt. Land (Temporary Shift)</td>
<td>61</td>
<td>61</td>
<td>100.00</td>
</tr>
<tr>
<td>4</td>
<td>Legal title holder on private land/plots</td>
<td>859</td>
<td>823</td>
<td>95.92</td>
</tr>
<tr>
<td></td>
<td>(Kalbadevi &amp; Girgaon, Marol Naka)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>2888</td>
<td>2750</td>
<td>95.22</td>
</tr>
</tbody>
</table>
Rehabilitation by Redevelopment:

- Rehabilitation of PAPs within the same area by treating affected plots as integrated cluster development scheme under DCR 33(7) of Sanctioned DP 1991
- **Total No. of Affected Buildings:** 21 (14 in Kalbadevi + 7 in Girgaon)
- **Total No. of PAPs:** Approx. 734
- Out of 734 affected PAPs of Girgaon & Kalbadevi metro stations - 699 PAPs have been shifted, out of which 89 have shifted to Pimpalwadi tenements and 634 agreements are executed as on date.
In-situ Rehabilitation by Redev. at Kalbadevi & Girgaon

EXISTING BUILDINGS LOCATION

PERMANENT ACCOMMODATION LOCATION
In-situ Rehabilitation by Redevelopment at Kalbadevi & Girgaon

Proposed In-situ Redevelopment Glimpses

PROPOSED REDEVELOPMENT AT G3 BLOCK (HOST COMMUNITY- G3), GIRGAON

PROPOSED REDEVELOPMENT AT K3 BLOCK KALBADEVI

PROPOSED REDEVELOPMENT AT K2 BLOCK, KALBADEVI
### Environmental Aspects

- MoEFCC Confirmed; Metro Project doesn’t attract provision of EIA notification, 2006.

- EIA & SIA studies carried out conforming to State/Govt Infrastructure development policy.
- EIA & SIA Disclosed on JICA/MMRCL websites

- Environmental Management Plan (EMP) by respective Civil contractor and Monitored.

- Trees required to be removed for: TBM Shafts, Metro Stations, Ramp, traffic diversion & Depot
  - 3061 (C-1209; T-1852) Trees affected at Stations, LS and traffic diversion
  - 535 (C-345; T-190) Trees at Ramp, Pylon, Casting Yard affected
  - About 2702 (C-2238; T-464) Trees at Depot site would be affected

- Project fully in compliance with National Environmental Laws & Regulations
Plantation on Degraded Forest & Aarey Colony
Citizen stakeholders

Drawing Competition 2016

Signature Campaign 2018  Project Neighbourhood  National Technology Day event
Thank you for your attention

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