TACKLING
CHALLENGES OF TRANSPORTATION
IN
INDIA

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3rd September. 2013
PROBLEM IDENTIFICATION
Population Highlights 2011

- Out of the total of 1210.2 million population in India, the size of Rural population is 833.1 million (or 68.84% of the Total Population)
- Urban population 377.1 million (or 31.16%)
- During 2001 – 2011 the population of the country increased by 181.4 million
- Increase in Rural areas: 90.4 million
- Increase in Urban areas: 91.0 million

- Growth rate of urban population in 2001-2011 decade has been 31.8 % as against 12.2 % in rural areas
Trend in Urban- Rural Distribution of Population

1901 CENSUS

India

89.2
10.8

1951 CENSUS

India

82.7
17.3

2011 CENSUS

India

68.8
31.2

Rural
Urban
NEED FOR THE PUBLIC TRANSPORT

• India’s urban population as per census 2011 is 31 % (377 million) of its total population.
• Rapid urbanization takes this proportion to over 60% before it begins to stabilize.
• It is projected that India’s urban population would grow to about 473 million in 2021 and 820 million by 2051.
• Hence, cities not only meet the demand today but also provide for the needs of those who will join the urban population in future.
CHALLENGES

- Rapid urbanization associated with high growth of vehicular traffic without upgradation/augmentation of the roads to result in congestion on the roads with more and more wastage of time and money in addition to increased number of accidents.
- Necessitates the requirement of an effective, efficient, environment friendly Urban Transport system.
- Selection of a suitable, efficient and sustainable transport system- a difficult task.
INDIAN GOVERNMENT’S INITIATIVE AND POLICY

• In 2006, a document in the name of National Urban Transport Policy with its objective to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, recreation and such other needs within our cities was brought.

• Policy laid down number of incentive to encourage the State and UT Governments to come with proposals to develop an effective urban transport system
GUIDELINES

- MRTS planning for a city to be started when the population reaches at the level of 2 million and the same to be in place when it reaches to the level of 3 Million.
### GUIDELINES (Contd.)

<table>
<thead>
<tr>
<th>Mode Choice</th>
<th>PHPDT in 2021</th>
<th>Population as per 2011 census(mill.)</th>
<th>Av. trip length (km.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro</td>
<td>More than 15000 in 5 Km. stretch</td>
<td>More than, equal to 2</td>
<td>More than 7-8</td>
</tr>
<tr>
<td>LRT at grade</td>
<td>Less than, equal to 10000</td>
<td>More than 1</td>
<td>More than 7-8</td>
</tr>
<tr>
<td>Mono Rail</td>
<td>Less than, equal to 10000</td>
<td>More than 2</td>
<td>About 5-6</td>
</tr>
<tr>
<td>BRT</td>
<td>4000-20000</td>
<td>More than 1</td>
<td>More than 5</td>
</tr>
<tr>
<td>Org. City Bus</td>
<td>&gt;1 Lac, 50000 in case of hilly towns</td>
<td></td>
<td>&gt;2 to 3</td>
</tr>
</tbody>
</table>

**WORKING GROUP ON URBAN TRANSPORT FOR 12TH FIVE YEAR PLAN**
EARLY DEVELOPMENTS
KOLKATA

• Construction of Metro Rail in India started first at Kolkata in 1972 for Dum-Dum Tolleyganj Corridor (16.5 Kms)
• The part length 3.4 Kms (Esplanade - Bhowanipur) of this corridor was commissioned in 1984.
• The entire Line of 16.9 Kms became operational in 1995.
• Kolkata Metro is further extended up to New Garhia by 8 Kms.
DELHI

- Central Road Research Institute suggested MRTS for National Capital Territory of Delhi as early as in 1969-70.
- In 1975, Metropolitan Transport Project Authority, Delhi recommended a MRTS Network comprising 36 Kms Underground and 97 Kms of Surface/Elevated Corridors.
- In 1984, DDA proposed a Master Plan 2001 comprising 200 Kms of LRT, 10 Kms of Tramways and extension to surface rail system and extensive road network.
However, major threshold came in 1990, when M/s RITES prepared the Feasibility Report for Multi Modal Mass Rapid Transport System recommending a combination of:

- Rail Corridors
- Metro Corridors
- Bus Corridors

with total Network of 184.5 Kms. Further 14 kms was added subsequently.
DELHI (CONTD.)

• Detailed Project Report for 1st Phase of Delhi Metro Rail consisting of 55.3 Kms was submitted in 1995 with target for commissioning as March, 2005.

• Delhi Metro Rail Corporation Limited came into existence on 03.05.1995 with participation of 50% each by Govt. of India and Govt. of National Capital Territory of Delhi (GNCTD), the model of its kind first time in India.
Delhi Metro – Phase-I

- Length: 65.3 kms. (13.17 kms. U/G)
- No. of Stations: 59
- No. of Depots: 3
- Completion Cost: Rs.10,5710 millions (US $ 2114 million)
- Works started: 1st October, 1998
- Fully Commissioned: December, 2005 (within sanctioned cost)
➢ Three lines
➢ Total length – 65.1 km (U/G:13.2, Ele/At-Grade:51.9)
➢ Total No. of Stations – 59 (U/G:12, Ele:47)
PHASE II DELHI METRO

• Delhi Metro Phase-II covering 123 kms. was started in January, 2006 and completed in December 2010/February 2011 with total cost of Rs 248810 millions (US $ 4976 millions). There were total 79 Stations.
PHASE -I: 65.1Km (U/G:13.2 Km, ELE/Grade:51.9 Km) Stns: 59 (U/G:12, Ele: 47)

PLOT –II: 124.9Km(U/G:31.2 Km.,ELE:93.5 Km, Stns: 85(U/G:17,Ele:68)
DELHI METRO NETWORK ON COMPLETION OF PHASE II

- Phase -I: 65.10 Km

- Phase-II
  - Delhi Portion: 108.28 Km
  - NCR: 16.62 Km

(Sub-Total): 124.90 Km

- Total phase I, II & extensions to National Capital Region: 190 Km
PHASE III (UNDER IMPLEMENTATION)
Phase III totaling to about 140 Kms.
**PHASE – IV CORRIDORS (Under Planning)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Corridors</th>
<th>Total (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii)</td>
<td>Shastri Park to Loni Border</td>
<td>9.12</td>
</tr>
<tr>
<td>iii)</td>
<td>Tughlakabad to Delhi Aero City</td>
<td>22.089</td>
</tr>
<tr>
<td>iv)</td>
<td>Lajpat Nagar to Saket G-Block</td>
<td>8.533</td>
</tr>
<tr>
<td>v)</td>
<td>Inderlok to Indraprastha</td>
<td>12.575</td>
</tr>
<tr>
<td>vi)</td>
<td>Rithala –Bawana</td>
<td>12.50</td>
</tr>
<tr>
<td>vii)</td>
<td>Bawana to Narela</td>
<td>10.00</td>
</tr>
<tr>
<td>viii)</td>
<td>Yamuna Vihar (i.e. Maujpur) to Mukundpur</td>
<td>12.54</td>
</tr>
<tr>
<td></td>
<td><strong>Total:</strong></td>
<td><strong>115.937</strong></td>
</tr>
</tbody>
</table>
DELHI METRO PHASE-IV CORRIDORS & MONORAIL CORRIDOR
MONO RAIL PROJECTS
MONORAIL – SUITABILITY AND CONSTRAINTS

Suitability

• PHPDT : ?
• Sharp Curvature : Curves upto 50 m radius
• Steep Gradient : Upto 6%
• Occupies little space on Right of Way

Constraints

• Cost is almost same as for elevated Metro.
• Higher Operation and Maintenance Cost.
• Passenger Evacuation issues
• Detailed Project Report for Shastri Park to Trilokpuri Monorail Corridor is submitted to Delhi Government on 18.06.2013.

• DPR envisages a 11 kms Monorail from Shastri Park to Trilokpuri with 12 stations.

• Delhi Monorail project is under consideration of Government.
Shastri Partk – Trilokpuri Monorail Corridor

- Monorail Corridor starts from Shastri Park Metro Station and ends at Trilokpuri
- After crossing the Railway line the alignment runs on Yamuna Pushta Road
- Route takes left hand turn and align itself on Raja Ram Kholi Marg.
- From Geeta Colony, the alignment takes right turn and runs along the Patparganj Road
- Crosses Delhi Metro at Nirman Vihar Metro Station (on Vikas Marg)
- Crosses Railway line (under existing underpass) near Ganesh Nagar
- Further, after crossing railway line, the alignment turns left and aligns itself along New Patparganj Road and crosses NH-24
- Further, the alignment turns left and aligns itself parallel to Sanjay Lake and terminates parallel to proposed Trilokpuri Metro Station of Delhi Metro.
- **Length = 11.0 Km**
- **12 Stations**
### Projected Traffic

<table>
<thead>
<tr>
<th>Horizon Year</th>
<th>PHPDT</th>
<th>Daily Ridership</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>7615</td>
<td>1.37 lakh</td>
</tr>
<tr>
<td>2021</td>
<td>9339</td>
<td>1.61 lakh</td>
</tr>
<tr>
<td>2031</td>
<td>12551</td>
<td>2.20 lakh</td>
</tr>
<tr>
<td>2041</td>
<td>15299</td>
<td>2.70 lakh</td>
</tr>
<tr>
<td>Year</td>
<td>TOP FOR DELHI MONORAIL</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>3-car (48 m Length) trains with headway of 4.5 minutes are planned to cater for PHPDT of 7000</td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>3-car (48 m Length) trains with headway of 3.5 minutes are planned to cater for PHPDT of 9000</td>
<td></td>
</tr>
<tr>
<td>2031</td>
<td>3-car trains (48 m Length) with headway of 2.75 minutes are planned to cater for PHPDT of 11500</td>
<td></td>
</tr>
<tr>
<td>2041</td>
<td>3-car trains (48 m Length) with headway of 2.25 minutes are planned to cater for PHPDT of 14000</td>
<td></td>
</tr>
</tbody>
</table>
# Project Cost

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Estimated Cost (without Taxes)</th>
<th>Completion Cost (by March 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shastri Park-Trilokpuri</td>
<td>Rs 1662 crores</td>
<td>Rs 2289 Crores</td>
</tr>
<tr>
<td>Financial Internal Rate of Return:</td>
<td>7.81 % (without PD)</td>
<td>8.41 % (With PD)</td>
</tr>
<tr>
<td>Economic Internal Rate of Return:</td>
<td>17.53 %</td>
<td></td>
</tr>
</tbody>
</table>
KERALA MONORAIL
KOZHIKODE-SALIENT FEATURES

• The Population of Kozhikode UA is 20,30519 (As per 2011 Census)

• Detailed planning has been done and DPR submitted to Government in June 2012.

• A Corridor of 14.2 kms Length from Medical College Hostel to Meenchanda for a distance of 14.20 km with 15 stations has been suggested in Phase-I.
# Projected Traffic Per Day

<table>
<thead>
<tr>
<th>Horizon Year</th>
<th>PHPDT</th>
<th>Daily Ridership</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>5167</td>
<td>1.48 lakh</td>
</tr>
<tr>
<td>2021</td>
<td>6170</td>
<td>1.77 lakh</td>
</tr>
<tr>
<td>2031</td>
<td>8292</td>
<td>2.37 lakh</td>
</tr>
<tr>
<td>2041</td>
<td>11144</td>
<td>3.19 lakh</td>
</tr>
<tr>
<td>Year</td>
<td>TRAIN OPERATION PLAN FOR KOZHIKODE MONORAIL</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>3- car trains with headway of 5.5 minutes are planned to cater for PHPDT of 5700</td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>3- car trains with headway of 5 minutes are planned to cater for PHPDT of 6300</td>
<td></td>
</tr>
<tr>
<td>2031</td>
<td>3- car trains with headway of 3.75 minutes are planned to cater for PHPDT of 8400</td>
<td></td>
</tr>
<tr>
<td>2041</td>
<td>3- car trains with headway of 2.75 minutes are planned to cater for PHPDT of 11500</td>
<td></td>
</tr>
</tbody>
</table>
PROJECT COST (Crores)

1. Estimated Cost (April 2012 Prices) : Rs.1566 crores
2. Estimated Cost (With Taxes) : Rs.1833 crores
3. Completion cost (by Sept 2015) : Rs.1991 crores
4. FIRR : 1.42%
5. EIRR : 15.92%
THIRUVANANTHAPURAM MONORAIL PROJECT

- R1: Technocity CH:00
- R2: Sreekariyam CH:10029
- R3: Killipalam CH:20541

Stops:
- Technocity
- Pallipuram CH:775
- Kaniyapuram CH:1690
- Kazhakkootam CH:3079
- Kazhakkootam Junction CH:4026
- Karyavattom CH:5889
- Gurumandiram CH:6927
- Pangapara CH:8314
- Sreekariyam CH:10029
- Nalanchira
- NH 47
- Pongumoodu CH:11514
- Ulloor CH:12736
- Kesavadasapuram CH:14203
- Pattom CH:15122
- Plamood CH:15865
- Palayam CH:17023
- Secretariat CH:18319
- Thampanoor CH:19829
- Killipalam CH:20541
- Karamana CH:21910

Directions:
- To Kollam
- N
# Projected Traffic

<table>
<thead>
<tr>
<th>Horizon Year</th>
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<th>Daily Ridership</th>
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<tr>
<td>2015</td>
<td>6886</td>
<td>2.46 lakh</td>
</tr>
<tr>
<td>2021</td>
<td>7874</td>
<td>2.67 lakh</td>
</tr>
<tr>
<td>2031</td>
<td>8524</td>
<td>2.88 lakh</td>
</tr>
<tr>
<td>2041</td>
<td>10918</td>
<td>3.27 lakh</td>
</tr>
</tbody>
</table>
## TRAIN OPERATION PLAN

<table>
<thead>
<tr>
<th>Year</th>
<th>TOP FOR THIRUVANANTAPURAM MONORAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>3- car (48 m Length) trains with headway of 5.5 minutes are planned to cater for PHPDT of 7000</td>
</tr>
<tr>
<td>2021</td>
<td>3- car (48 m Length) trains with headway of 5 minutes are planned to cater for PHPDT of 7900</td>
</tr>
<tr>
<td>2031</td>
<td>3- car trains (48 m Length) with headway of 3.75 minutes are planned to cater for PHPDT of 8400</td>
</tr>
<tr>
<td>2041</td>
<td>3- car trains (48 m Length) with headway of 2.75 minutes are planned to cater for PHPDT of 11500</td>
</tr>
</tbody>
</table>
PROJECT COST (Crores)

1. Estimated Cost (April 2012 Prices) : Rs.2703 crores
2. Estimated Cost (With Taxes) : Rs.3178 crores
3. Completion cost (by April 2019) : Rs.3590 crores
4. FIRR (With PD) : 1.61%
5. EIRR : 14.77%
FUNDING OPTION

• Since the IRR for Kozhikode and Thiruvananthapuram Monorail projects are very low, no private party will come forward to invest in this project. Hence PPP or BOT model have not been recommended.

• The projects have therefore been recommended as completely Government funded.
PRESENT STATUS

- Government of Kerala has sanctioned both the Monorail Projects.
- DMRC has been assigned the role of General consultants.
- Expression of Interest has been invited to get these two projects implemented through one Consolidated Contract.
- RFQ has been targeted for submission on 1st October 2013.
METROS/MONORAILS
PLANNED/UNDER PLANNING IN INDIA
By DMRC

TOTAL 21 CITIES

TOTAL 25 CITIES
including adjoining NCR cities
Special thanks to Government of Japan for extending ODA Loan to DMRC