Mumbai-Ahmedabad High Speed Railway Corridor

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Basis of this Presentation

“Preliminary Study on the Formation of High-Speed Railway Project in Western India”

Ministry of Land, Infrastructure, Transport and Tourism of Japan
Route Alignment Design and Stations (DRAFT)

(Source; Google)
Basic Information on Gujarat State & Maharashtra State

<table>
<thead>
<tr>
<th></th>
<th>Gujarat</th>
<th>Maharashtra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>196,024 Km²</td>
<td>307,713 km²</td>
</tr>
<tr>
<td>Population</td>
<td>60.4 million</td>
<td>112 million</td>
</tr>
<tr>
<td>Population Density (per km²)</td>
<td>308</td>
<td>365</td>
</tr>
<tr>
<td>Population Rank</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Population Density Rank</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Urban Population</td>
<td>37.4%</td>
<td>42.4%</td>
</tr>
<tr>
<td>GDP (in millions)</td>
<td>$90,650</td>
<td>$190,310</td>
</tr>
<tr>
<td>GDP (per Capita)</td>
<td>$1,510</td>
<td>$1,700</td>
</tr>
</tbody>
</table>
To build a standard-gauge HSR line completely separating from the existing network would be recommended.

- In Japan, conventional line: narrow gauge, HSR: standard gauge.
- We propose standard gauge for HSR in India (even though conventional line has broad gauge), as following reasons:
  - Main stream of world HSR is standard gauge
  - Capacity of the conventional line would be limited for HSR
  - Securing safety in different speeds of railway operations
## Design Specifications of HSR (DRAFT)

<table>
<thead>
<tr>
<th>Item</th>
<th>Design Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauge</td>
<td>1435mm</td>
</tr>
<tr>
<td>Number of line</td>
<td>Double track (One way)</td>
</tr>
<tr>
<td>Maximum design speed</td>
<td>350km/h</td>
</tr>
<tr>
<td>Maximum operation speed</td>
<td>320km/h</td>
</tr>
<tr>
<td>Distance between track centerline</td>
<td>4.3m</td>
</tr>
<tr>
<td>Width of formation level</td>
<td>11.3m</td>
</tr>
</tbody>
</table>

![Train tracks and infrastructure]

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## Design Specifications of HSR (DRAFT)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Cross-section of tunnel</td>
<td>63.4m² (double track)</td>
</tr>
<tr>
<td>Maximum axle load</td>
<td>16t</td>
</tr>
<tr>
<td>Feeder voltage</td>
<td>AC 2x25kV</td>
</tr>
<tr>
<td>Signaling system</td>
<td>Digital-ATC</td>
</tr>
<tr>
<td>Train radio</td>
<td>LCX (Leaky Coaxial Cable)</td>
</tr>
<tr>
<td>Rolling stock</td>
<td>Maximum 16 cars&lt;br&gt;(Number of passenger capacity: High-speed type 1300/&lt;br&gt;Double-decker type 1600)&lt;br&gt;Car body width : 3.4m</td>
</tr>
</tbody>
</table>
Cross section double track in embankment (Slab track)
The Basic Policy of Alignment for HSR No.1 in India

Station

Stations layout in consideration of the convenience for users and city planning, etc.

- The locations of Mumbai and Ahmedabad stations and big station were examined in the center of the city area.

- The intermediate stations were also examined for the convenience of passengers along the railroad line, and future development along the line.

- Small stations were examined in the location to the center of the town as close as possible.
The Basic Policy of Alignment for HSR No.1 in India

Between stations

Alignment to secure the high-speed operation in consideration of the natural and social environment

- A plane and profile were determined in consideration of high speed operation for HSR.

- A national park and a sanctuary were avoided for an effect of the natural environment.

- Existing buildings were also avoided for an effect of the human community and the social environment.

- Location of the large bridge were considered where is the best way pass through the big river.
Station Layout (tentative)

Stations layout to secure the high-speed operation and to expect maximizing demand

No. of station: 11  
Total length: 498.5km  
Average length between stations: 49.8km
Conceptual Drawing for HSR in Ahmedabad (draft)
Demand Forecasting

The future demand of current transport modes (railway, airplane, private car and bus) is estimated by using the four-step model.

Four-Step Method of Demand Forecast

1) Trip Generation / Attraction Model
2) Trip Distribution Model
3) Modal Split Model
4) Traffic Assignment
Demographic Conditions along the proposed Line of HSR

Population Density (2011)
(Source; Population Census 2001, 2011)

Annual Average Population Growth Ratio 2001 - 2011
Fare Level Setting and Fare Revenue

- HSR fare is set more than 1A class of existing railway and less than air fare.
- Fare revenue is the highest in case of ALT2.

ALT2: HSR fare is 1.5 times fare of 1A class of existing railway.
Sectional Passengers of Route No.1 HSR in 2020 (ALT2 Case)

Daily Boarding Passengers: 29,529 Persons/day
Maximum Sectional Passengers: 25,326 Persons/day

Passengers (2020) ALT2

Unit: Persons/day
Daily Boarding Passengers: 231,522 Persons/day
Maximum Sectional Passengers: 199,410 Persons/day

Sectional Passengers of Route No.1 HSR in 2050 (ALT2 Case)
### Traffic Volume and Number of Trains (tentative)

<table>
<thead>
<tr>
<th>year</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cars per train</td>
<td>10</td>
<td>10</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Capacity (seat)</td>
<td>750</td>
<td>750</td>
<td>1270</td>
<td>1270</td>
</tr>
<tr>
<td>Traffic Volume (day/direction)</td>
<td>13000</td>
<td>27000</td>
<td>55000</td>
<td>100000</td>
</tr>
<tr>
<td>Number of Trains (day/direction)</td>
<td>25 - 30</td>
<td>50 - 60</td>
<td>60 - 70</td>
<td>120 - 130</td>
</tr>
<tr>
<td>Number of Trains at peak hour (train/hour/direction)</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

Traffic volume is tentativeness.

Traffic volume may change in the future. With it, Number of trains change, too.
Mumbai – Ahmedabad
Rapid train: 1 h 57 min.
Each stop train: 2 h 40 min.

Number of Trains at peak hour (train/hour/direction)
2 trains
(2020)
10 trains
(2050)
Conclusion

• Mumbai-Ahmedabad corridor has huge potential as an industrial and economic growth zone in India.

• To build a standard-gauge line completely separating from the existing network would be recommended.

• High volume of railway demand would be expected in the HSR.

• Collaboration of railway development and town development would be quite important in station planning.