State of progress on the high-speed maglev line project between Munich’s central railway station and its airport

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ABSTRACT: An overview of the state of progress on the high-speed maglev line project between Munich’s central railway station and its airport is provided.
- state of progress of planning process
- state of progress of approval process
- state of progress of preparations for implementation.
Commercial passenger volumes at Munich Airport

- **Source:** Munich Airport (January 2006)

Munich Airport catchment area

- **Source volumes 2005:**
  - > 250,000 boarders
  - > 100,000 boarders
  - > 25,000 boarders
  - < 25,000 boarders

- **Total:** 5.7 million boarders
  - (areas marked blue)

- **Total population:** 22.0 million

- **Source:** Munich Airport; Passenger survey, basis 6,100,000 boarders (February 2006)
**Maglev passengers 2020 (million)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift from rapid transit (S-Bahn)</td>
<td>3.45</td>
</tr>
<tr>
<td>Shift from airport buses, Lufthansa bus</td>
<td>0.38</td>
</tr>
<tr>
<td>Passenger-induced traffic</td>
<td>0.40</td>
</tr>
<tr>
<td>Passengers owing to increase in primary passenger volume</td>
<td>1.11</td>
</tr>
<tr>
<td>Shift from road traffic</td>
<td>2.65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7.98</strong></td>
</tr>
</tbody>
</table>

Source: Intraplan Consult GmbH, traffic survey for the maglev line between Munich central railway station - Munich Airport, 11 August 2004

**Principal changes in the course of planning phases 1 - 4**

1. Maglev station at central railway station is located at lower level below platforms 23 – 26 instead of upper level above platforms 11 – 13
   - No need for points and switches before the station, thus raising availability
   - The upper level position requires a separate fire lobby => completely encased => this would severely restrict visibility.
   - The upper level position would require a tunnel cross-section of approx. 196 m² at the station throat, which would have to be produced in shotcrete during service operations => high construction risk.
   - The lower level position would require investments of approx. the same amount but would guarantee
     - fewer risks during the construction phase
     - greater flexibility and availability during operations.
3. Shifting the mouth of Landshuter Allee tunnel to the north

- Landshuter Allee crossing as a cut tunnel instead of a cut-and-cover tunnel => no need for road traffic overpass
- The tunnel mouth is moved approx. 115 m to the north => reduction of noise immission at Borstei district

4. Tracks moved approx. 15 m further from the Olympia press village

- No need for a shunt crossover at the Olympia press village => track layout is rerouted
Ground modelling between the tracks and the residential buildings, as well as towards Landshuter Allee, can be executed using the material excavated for the tunnels
5. Feldmoching tunnel extended to north of the A 99 motorway

Extending Feldmoching tunnel and the resulting underground crossing of the A 99 motorway means that the over 18 m high structure is no longer needed.

There is no need for expensive and ecologically questionable soil remediation measures that would be required for the deposited soil. No expensive foundations are needed for the high supporting structures, which have very small tolerances.

As there are no forced points, the track layout can be routed parallel to the A92 motorway at an earlier point, thus avoiding the need to section the sensitive landscape at Würm canal again.

No visual impairment of the landscape caused by the 18 m high structure.

There is no need to interrupt motorway traffic during the construction phase.

Sonic boom

Inadmissible micropressure waves are avoided by appropriate construction of the tunnel mouth:

- Micropressure wave shafts are arranged along the first 100 m of the tunnel with progressively smaller cross-sections in the direction of travel
- Free tunnel cross-section is reduced along the first 100 m of the tunnel in the direction of travel
Vibrations

Grounds and calculation:

- Vibration forecast is for the Munich project is calculated in accordance with legal requirements pursuant to DIN 4150, Part 2.
- The requirements will be defined exactly on completion of the tunnel carcass or during trial operations.

Results of forecast:

- Active vibration protection: only in some parts of Stadttunnel
- Passive vibration protection: is not expected to be necessary at any part of the project

Conclusion:

**Very positive results could be achieved by:**
- Relatively low system-inherent vibration emissions
- Convenient track layout parallel to the motorway – away from built-up areas
- Designing the tunnel with a mass/spring system in the critical inner-city areas

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Noise

Grounds and calculation:

- Noise immission calculation for the Munich project has already been effected for the project approval procedure in accordance with legal requirements pursuant to the maglev noise protection regulation.

Results:

- Active noise protection: 2.75 km total length of noise barriers of 28 km overground track – less than 10%
- Passive noise protection: not required at any point of the project (!)

Conclusion:

**Very positive results could be achieved by:**
- Relatively low system-inherent noise emissions
- Convenient track layout parallel to the motorway – away from built-up areas
- Tunnelling under critical inner-city areas
Sectioning

Avoiding ecological and landscape sectioning by

- Designing as tunnels in densely populated urban areas of Munich
- Using the existing rail corridor in the outer districts of Munich
- Track layout outside Munich urban area incl. crossing the River Isar routed parallel and close to A92 motorway
- Entrance to airport between airport feeder and S-Bahn
- Avoiding interruption of visual axes by positioning track mainly at ground level
- Maintaining all intersecting routes and pathways by means of under/overpasses

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Project approval procedure for Munich maglev - milestones

Already in process / imminent:

<table>
<thead>
<tr>
<th>Step</th>
<th>Status</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Documents completed</td>
<td>June – Sep.</td>
</tr>
<tr>
<td>2</td>
<td>Documents submitted</td>
<td>Nov. - Jan. 07</td>
</tr>
<tr>
<td>3</td>
<td>Public inspection</td>
<td>27.04.06 – 26.05.06</td>
</tr>
<tr>
<td>4</td>
<td>Dealing with objections</td>
<td>Summer/ autumn 2007</td>
</tr>
<tr>
<td>5</td>
<td>Hearings (not public)</td>
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</table>

Subsequently:

<table>
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<th>Step</th>
<th>Status</th>
<th>Dates</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>Any necessary modification of plans</td>
<td>June – Jan. 07</td>
</tr>
<tr>
<td>7</td>
<td>Final statement</td>
<td>Feb. 2007</td>
</tr>
<tr>
<td>8</td>
<td>Project approval decision</td>
<td>Defending any lawsuits/ summary proceedings</td>
</tr>
<tr>
<td>9</td>
<td>Federal Railway Office (immediately enforceable)</td>
<td></td>
</tr>
</tbody>
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Maglev 2006, 25.08.2006 12 Mobility Networks Logistics

Maglev 2006, 25.08.2006 13 Mobility Networks Logistics
Traffic load in 2015

Source: General transport plan Bavaria 2002