Ultra-High-Speed Ground Transportation Feasibility Study

Joint Transportation Committee

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Scott Richman
CH2M HILL, INC

Roger Millar, Secretary of Transportation
Keith Metcalf, Deputy Secretary of Transportation
UHSGT study framework

Legislature funded $300,000 feasibility study to:
  • Identify conceptual corridors to study
  • Describe UHSGT technology options and pre-planning-level analysis inputs
  • Evaluation (CONNECT):
    • Ridership and revenue analysis
    • Cost recovery
  • Institutional/cross-border framework
  • Potential funding and financing model/mechanisms
  • Recommendations

Microsoft contributed $50,000 and the Trades contributed $10,000 for additional economic analysis still in progress to be completed by December 31
Advisory Group

23-member non-voting advisory group assisted with study

Members represent economic, transportation and community interests

- Washington Governor’s Office
- British Columbia Ministry of Transportation
- Oregon Department of Transportation
- Puget Sound Regional Council
- Utilities and Transportation Commission
- Washington Department of Commerce
- City of Seattle
- City of Portland
- Sound Transit

- Seattle Chamber of Commerce
- Snohomish County Executive
- Office of King County Executive
- Microsoft
- Alaska Airlines
- Fred Hutchinson Cancer Research Center
- Association of Washington Business
- Futurewise
- Prosper Portland

- Transportation Choices
- Washington CleanTech Alliance
- Portland Business Alliance
- Business Council of British Columbia
- FastTrackWa.org
- Washington Building Trades
- University of Washington
- Tourism Vancouver

Others interested in the topic signed up to receive email updates on the progress of the study
Where high-speed rail works best

General criteria to evaluate:

• **In a mega-region** (*Cascadia*)
• **Cities/metro areas** - larger populations  
  *(Vancouver – Seattle – Portland)*
• **100-500 mi travel distance**  
  *(Vancouver to Portland ~350 miles)*
• Interconnected with **regional/local transit**
• Metropolitan **economic productivity**
• **Congested areas** *(autos and air)*
Technology options

Three technologies reviewed
• High-speed rail
• Maglev
• Hyperloop

<table>
<thead>
<tr>
<th>Technology Option</th>
<th>Current Maximum Speed</th>
<th>Maximum Design Speed</th>
<th>Maximum Seating Capacity</th>
<th>Minimum Horizontal Curve</th>
<th>Maximum Gradient</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-speed Rail</td>
<td>220 mph</td>
<td>250 mph</td>
<td>1,500</td>
<td>4.7 miles</td>
<td>4%</td>
</tr>
<tr>
<td>Maglev</td>
<td>270 mph</td>
<td>375 mph</td>
<td>824</td>
<td>5.7 miles</td>
<td>10%</td>
</tr>
<tr>
<td>Hyperloop</td>
<td>200 mph*</td>
<td>760 mph</td>
<td>28 per capsule</td>
<td>3.0 miles</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Test track speed, which was limited by length of test track.
FRA’s CONNECT modeling tool

• FRA modeling tool for high level intercity passenger rail pre-planning
• All CONNECT results presented in ranges
• Area representation of a rail corridor or network (Core-based statistical areas – not cities)
• Seattle and Tacoma in same CBSA - no trips under 50 miles captured
• Provides the ability to:
  • Describe a potential high-performance rail network – coarse level
  • Estimate the financial and operational performance of the network
  • Develop high-level service plans
  • Generate operational data
Focus of analysis

Primary corridor
• Between Vancouver, British Columbia and Portland, Oregon

Connecting corridors
• East-West via the Stampede Pass (possibly Ellensburg, Moses Lake, Spokane)
• South connection to California High Speed Rail

Passengers
• Number of seats filled
• Passenger miles
• Shift to rail from other modes

Cost recovery
• Fare box recovery
• Capital and maintenance costs

Potential funding and financing model/mechanisms
• Base year – 2015
• Forecast year – 2035
• Horizon year – 2055
Iterative analysis of corridors

Conducted four rounds of analysis to determine most viable options

• Started with 5 conceptual corridors
• Narrowed to three primary corridor options (1A, 2 and 4)
• Determined 12 daily round trips appear to be optimal number before diminishing return
• Evaluated the effect of connecting to new east-west route to Spokane and viability of connecting to California High Speed rail in Sacramento

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Nearest Station Locations</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pacific Central Station – Vancouver, B.C. &lt;br&gt; Fairhaven Station – Bellingham, WA &lt;br&gt; Everett Station (new station near Delta Yard) – Everett, WA &lt;br&gt; Stadium Station – Seattle, WA &lt;br&gt; Tacoma Dome Station – Tacoma, WA &lt;br&gt; Centennial Station – Lacey, WA &lt;br&gt; Rose Quarter Station (TriMet Max station) – Portland, OR</td>
<td>All seven cities identified in legislation</td>
</tr>
<tr>
<td>1A</td>
<td>Vancouver International Airport – Vancouver, B.C. &lt;br&gt; Fairhaven Station – Bellingham, WA &lt;br&gt; Everett Station – Everett, WA &lt;br&gt; Stadium Station – Seattle, WA &lt;br&gt; Tacoma Dome Station – Tacoma, WA &lt;br&gt; Centennial Station – Lacey, WA &lt;br&gt; Rose Quarter Station – Portland, OR</td>
<td>All seven cities identified in legislation</td>
</tr>
<tr>
<td>2</td>
<td>Pacific Central Station – Vancouver, B.C. &lt;br&gt; Stadium Station - Seattle, WA &lt;br&gt; Tacoma Dome Station – Tacoma, WA &lt;br&gt; Portland International Airport – Portland, OR</td>
<td>Four largest cities</td>
</tr>
<tr>
<td>3</td>
<td>Pacific Central Station – Vancouver, B.C. &lt;br&gt; Stadium Station - Seattle, WA &lt;br&gt; Rose Quarter Station – Portland, OR</td>
<td>Outside city core of three largest cities</td>
</tr>
<tr>
<td>4</td>
<td>King George Station – Surrey, B.C. &lt;br&gt; Tukwila Station – Seattle, WA &lt;br&gt; Expo Center Station – Portland, OR</td>
<td></td>
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</table>
Key findings - ridership

• Corridor 1A with 7 stations has highest ridership (2 million with high-speed rail and 2.1 million with MagLev)

• Corridor 4 with three stations outside city cores has lowest capital costs, but also lowest ridership

• Between 13% and 17% of travelers might use high speed trains in 2035 (highest mode share under Corridor 2)

• In 2035, projected annual ridership ranges from 1.7 to 2.1 million for primary corridor options

• In 2055, projected annual ridership ranges from 2.8 to 3.2 million for primary corridor options

Percentage of passengers by route segment

- Portland - Seattle 50%
- Seattle - Vancouver 25%
- All other routes 25%
- All other routes 25%
Key findings – cost recovery

Capital costs
• Range from $24 to $42 billion* (assumptions include all three technologies and tunneling)
• Maglev has higher capital costs (need straighter route and more costly technology)
• High speed rail has wider range of capital costs (depending on alignment, tunnels, bridges, ROW)

Operating costs
• Maglev has potential to cover operating costs by 2035
• High-speed rail has potential to cover operating costs by 2055
• Hyperloop’s operational model is still under development (data not readily available)

* Range of $24-$42 billion encompasses the needs of all three technologies, including some that require very straight routes with minimal curvature and/or subgrade development with tunneling. When these capital parameters are narrowed down following a more detailed analysis, cost range could be reduced by 25 percent or more.
Overview of results

Geography

• Seattle to Portland connection is critical to any future UHSGT options
• Additional service increases on existing Amtrak Cascades corridor as interim steps could build greater demand and market share
• New east-west corridor could add 15 to 25% to network ridership, but would require subsidies through at least 2035
• Connecting corridor from Portland to Sacramento should be planned beyond the 2055 time horizon
Overview of results

Technology differentiation

- In 2035, Mag-Lev has potential to cover O&M costs in most alternatives
- In 2035, costs may not be completely covered for HSR
- By 2055, all technologies cover O&M and to varying degrees cover further development costs

Demand shares

- For these technologies at 12 daily round trips, 12-17% of the travel market is diverted to UHSGT mode by 2035
- Preliminary data indicate maximum passenger loads might double between 2035 and 2055
Next steps – recommendations

- Perform a next phase **corridor planning/business case study**
- Enhance **ridership evaluation** to inform and support the corridor planning study
- Evaluate **governance and economic framework**
- Further evaluate **funding and financing mechanisms**
- Strengthen focused involvement of **key stakeholders in BC, WA and OR**
- Conduct further **rail planning** consistent with needs of a **UHSGT program**
Questions?

For more information, please contact:

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