

# 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

## 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



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

\*Test track speed, which was limited by length of test track.

- 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



## 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

## Conducted four rounds of analysis to determine most viable options

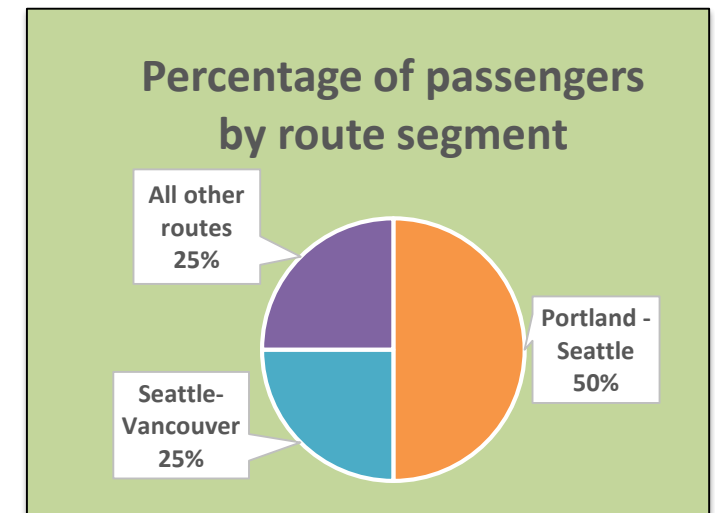
- Started with 5 conceptual corridors
- Narrowed to three primary corridor options (1A, 2 and 4)
- Determined 12 daily round trips appear to be optimal number before diminishing return
- Evaluated the effect of connecting to new east-west route to Spokane and viability of connecting to California High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

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



# 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



## 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.

## 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



## 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 **UHS GT** program



# Questions?



For more information, please  
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