



Oregon – Washington  
Memorandum of Intent  
on  
Replacing the I-5 Bridge over the Columbia River

“Whereas the current I-5 bridge is a **major seismic risk** and traffic bottleneck for the region and the entire nation;

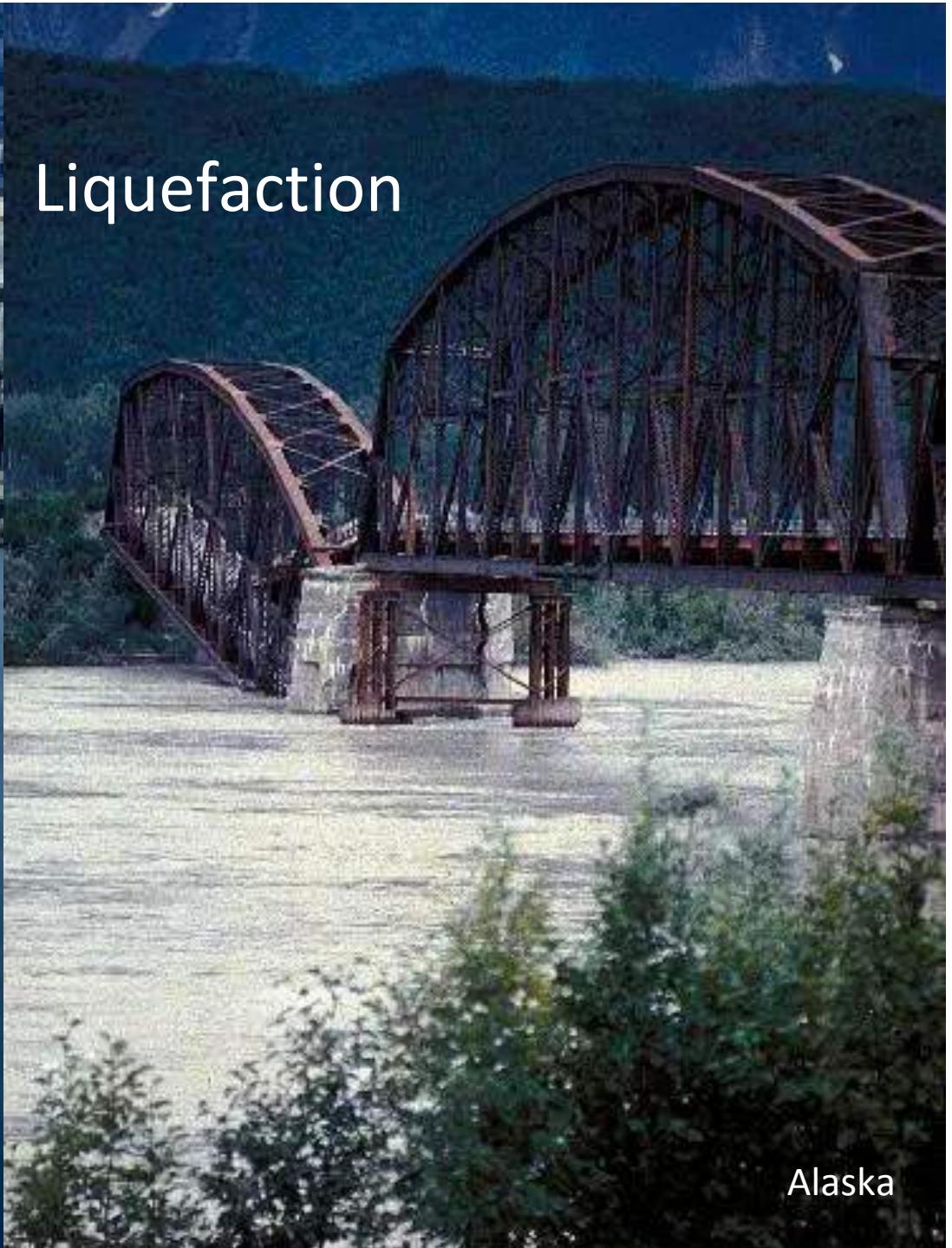
Additionally, in reevaluating the project scope, the project office shall assume any plan for a **new bridge\*** will include **high capacity transit.**”

\*

*A new tunnel would be more **seismic resistant**, provide a better **transit** design, and cost less than a **new bridge**.*



Japan



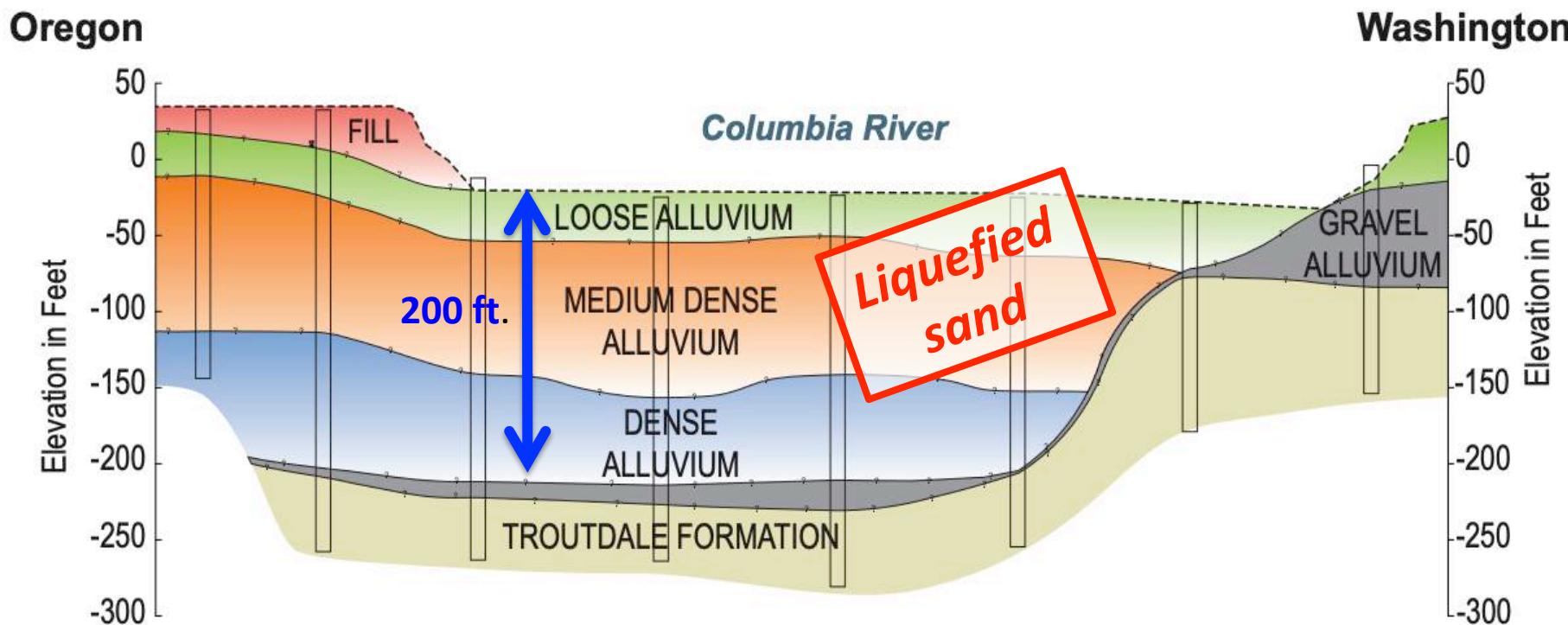
Alaska

## Liquefaction



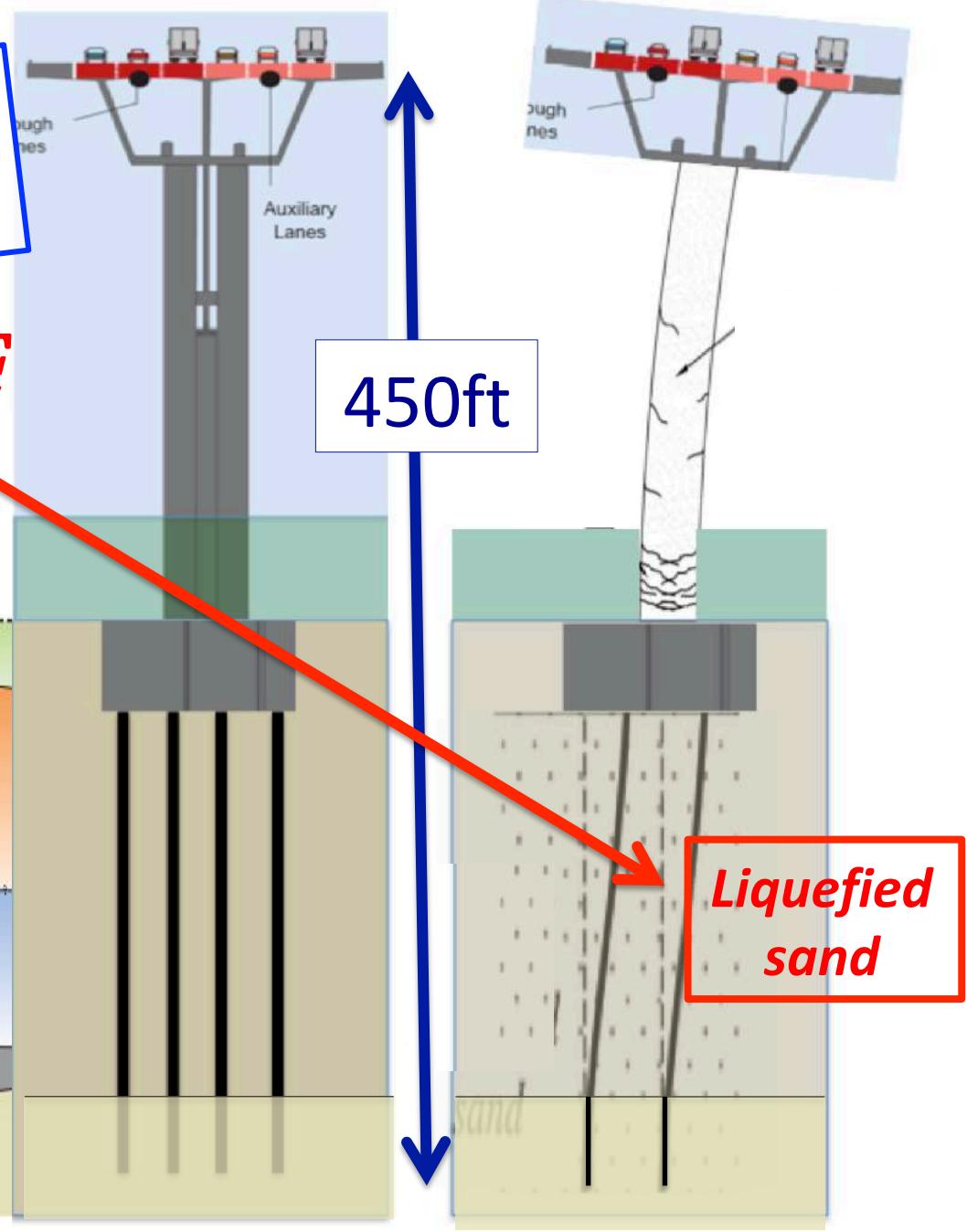
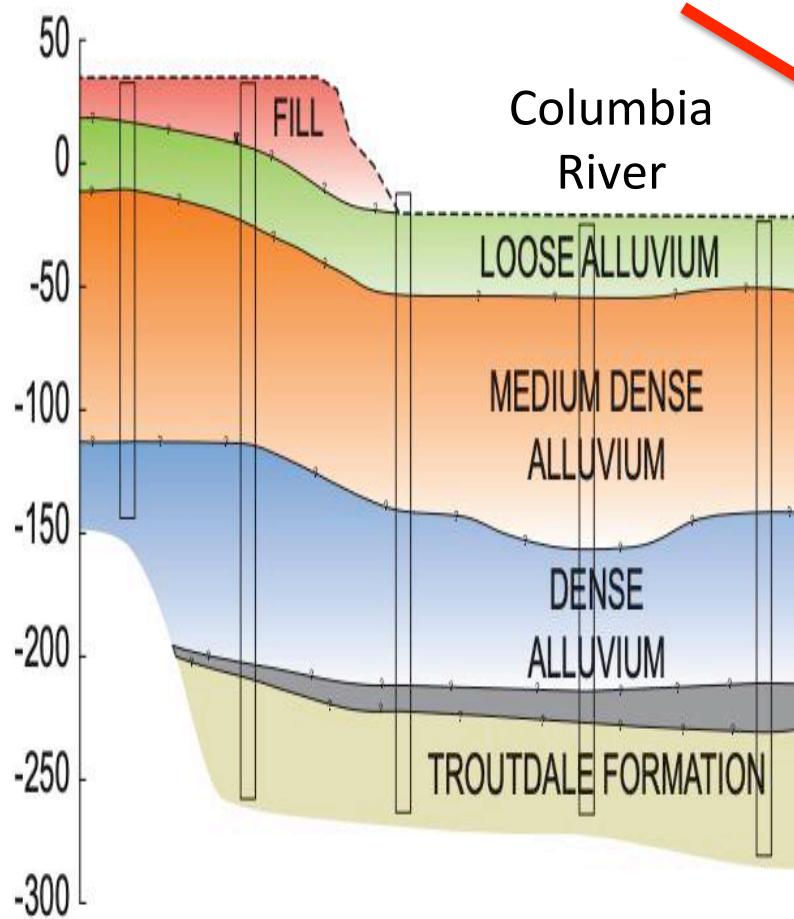
**200 Feet of Liquid Sand**

**EARTHQUAKE RISK:** The Interstate Bridge pilings sit in sandy river soils which could behave like liquid during an earthquake, causing the bridge to fail.



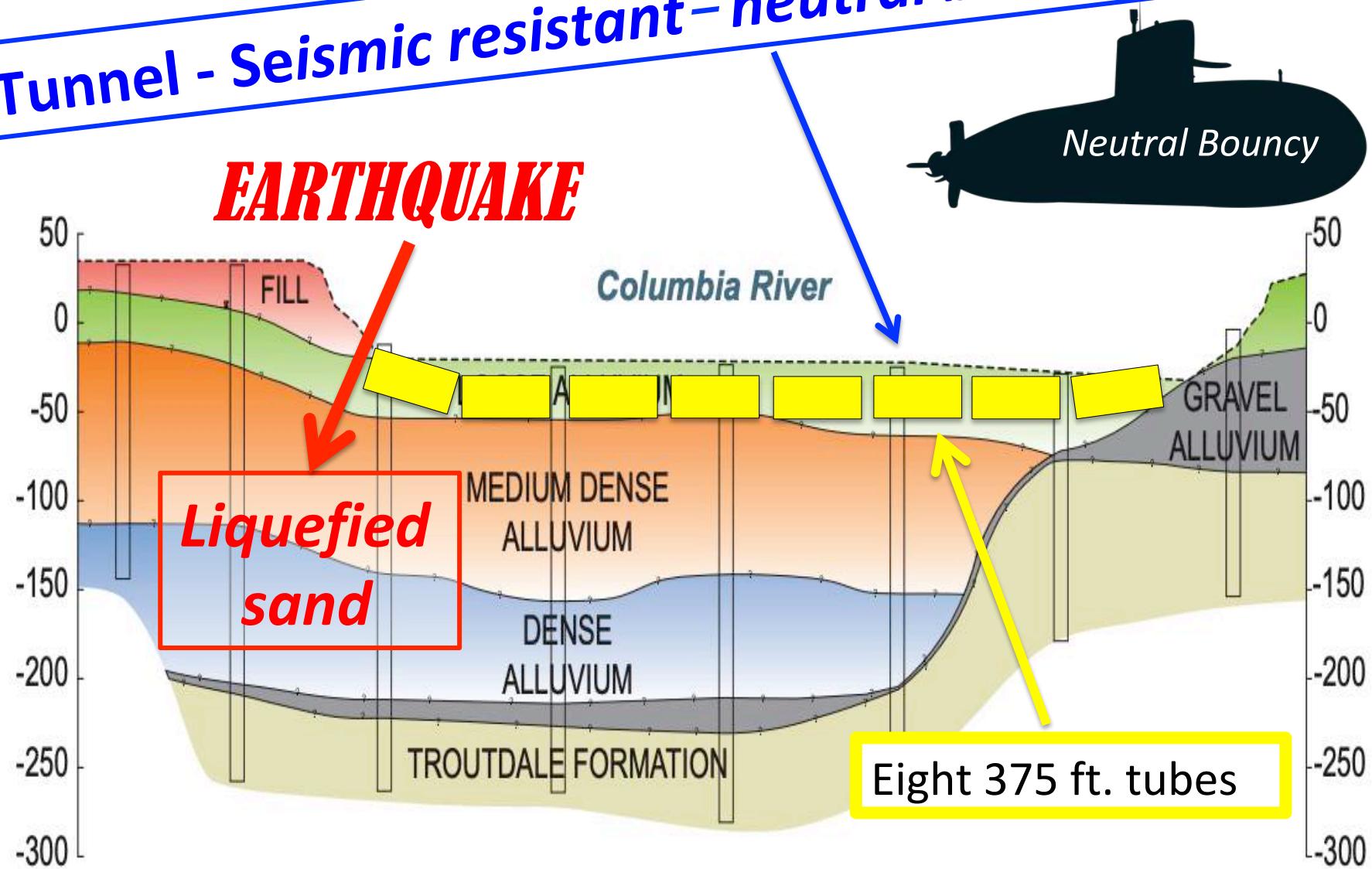
Bridge - Seismic risk  
450ft. to solid ground

## EARTHQUAKE



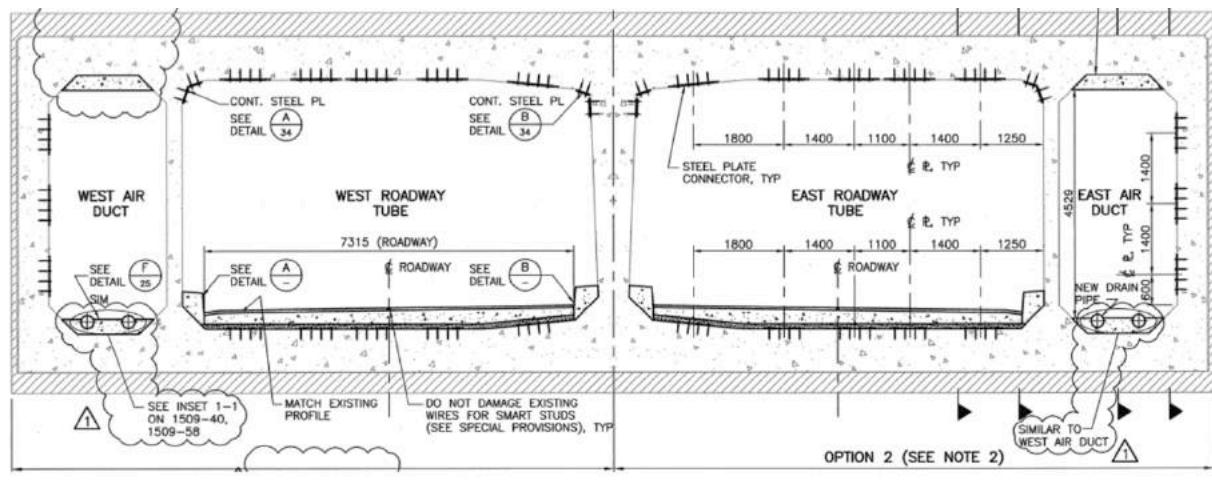


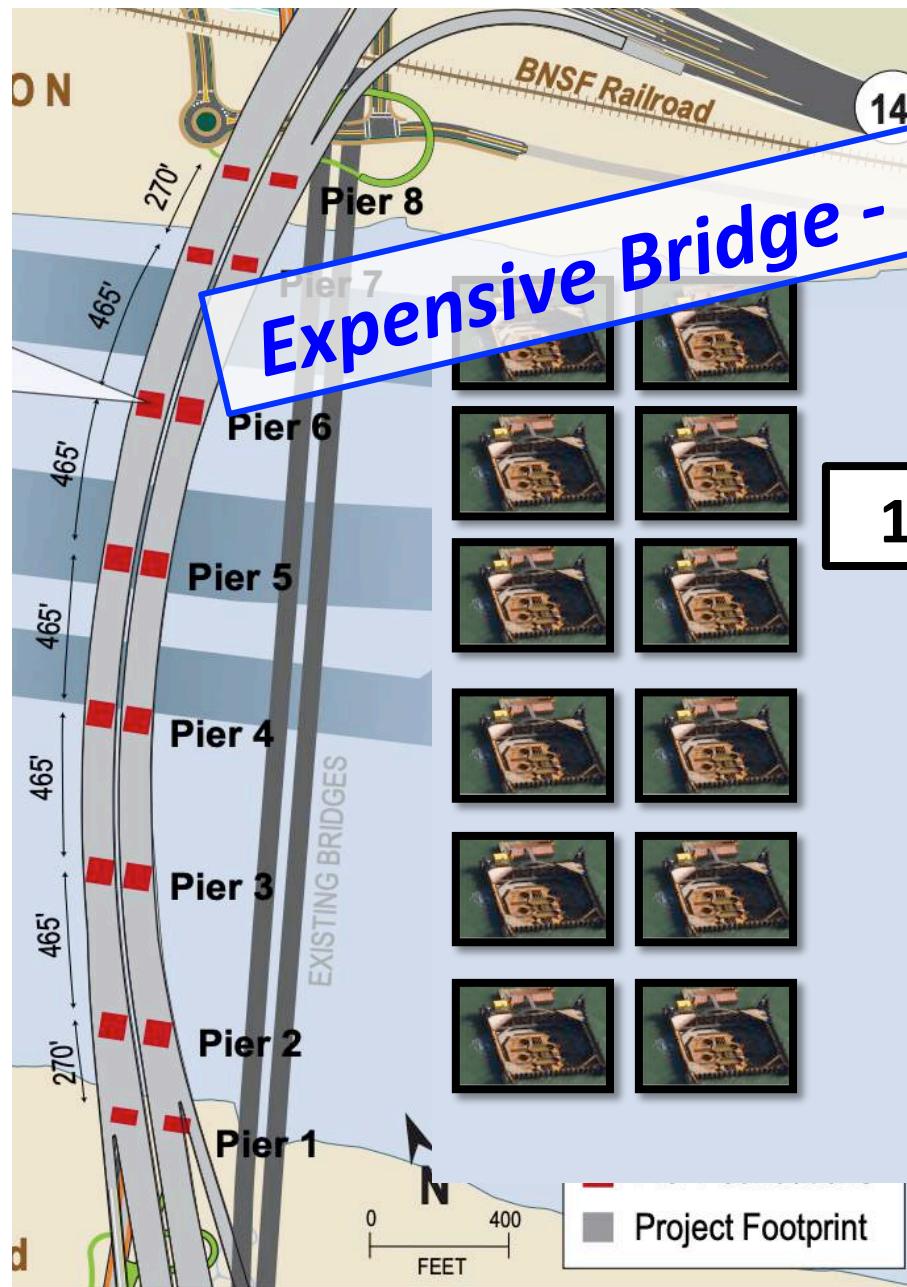
**Tunnel - Seismic resistant - neutral bouncy**



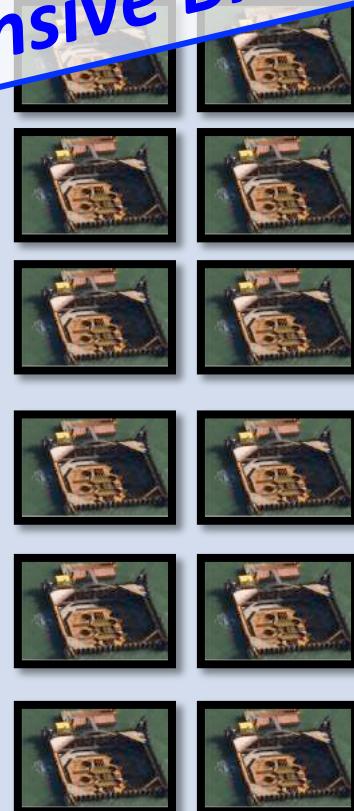
# George Massey Fraser River Crossing

2006 Seismic retrofit of **1959 immersed tube tunnel**  
Designed for 275-year earthquake





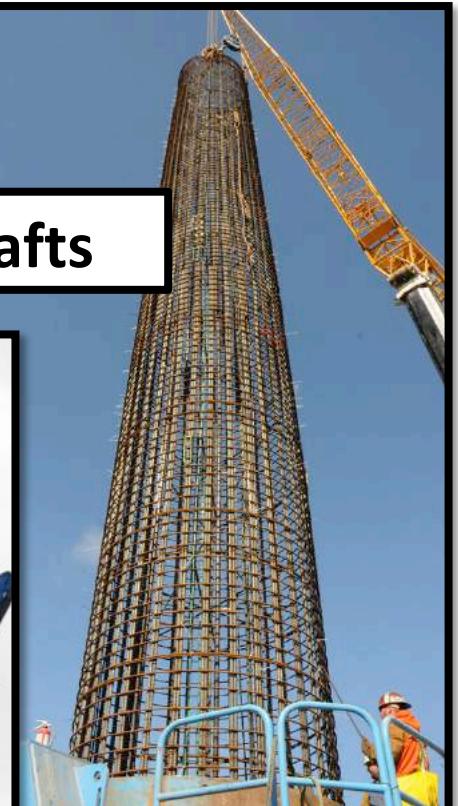
**Expensive Bridge - 12 River Piers**



**12 Cofferdams**



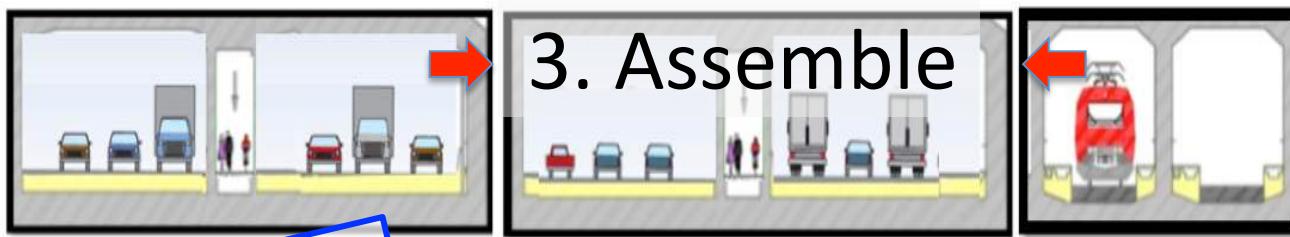
**192 drilled shafts**



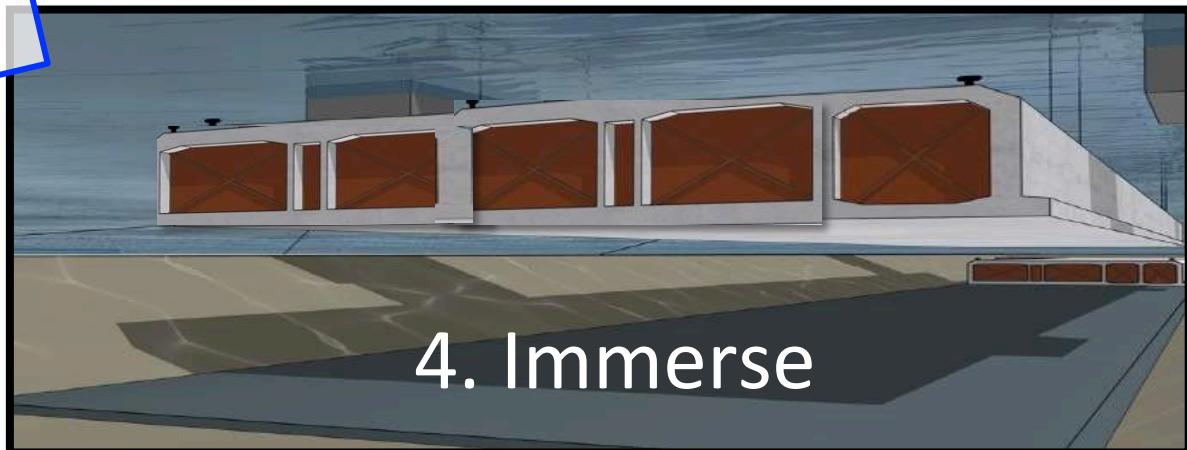


WA workers compensation  
rate \$4.93/hr.





Immersed Tube



Casting Yard - Aberdeen, WA



***SR 520 Pontoon***

***400,000 tons***

***2009 bid - \$367.3 million***

Kiewit-General's bid was \$180 million  
less than WSDOT's estimate.

***Yard work is less expensive***

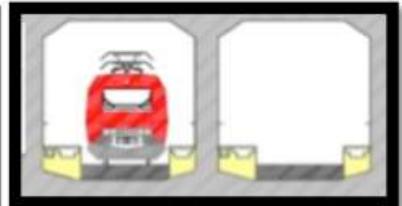
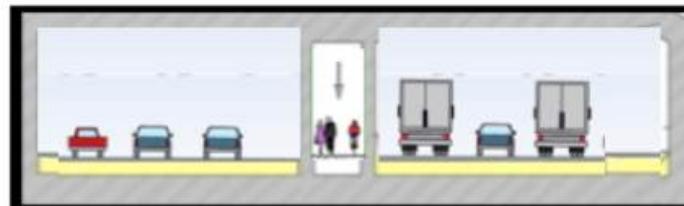
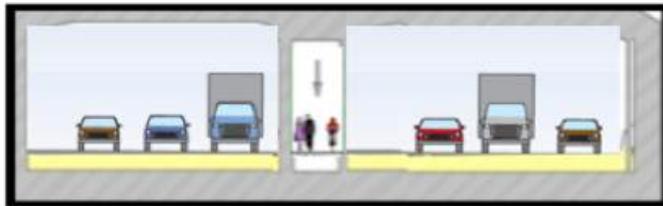
***Columbia River Tubes***

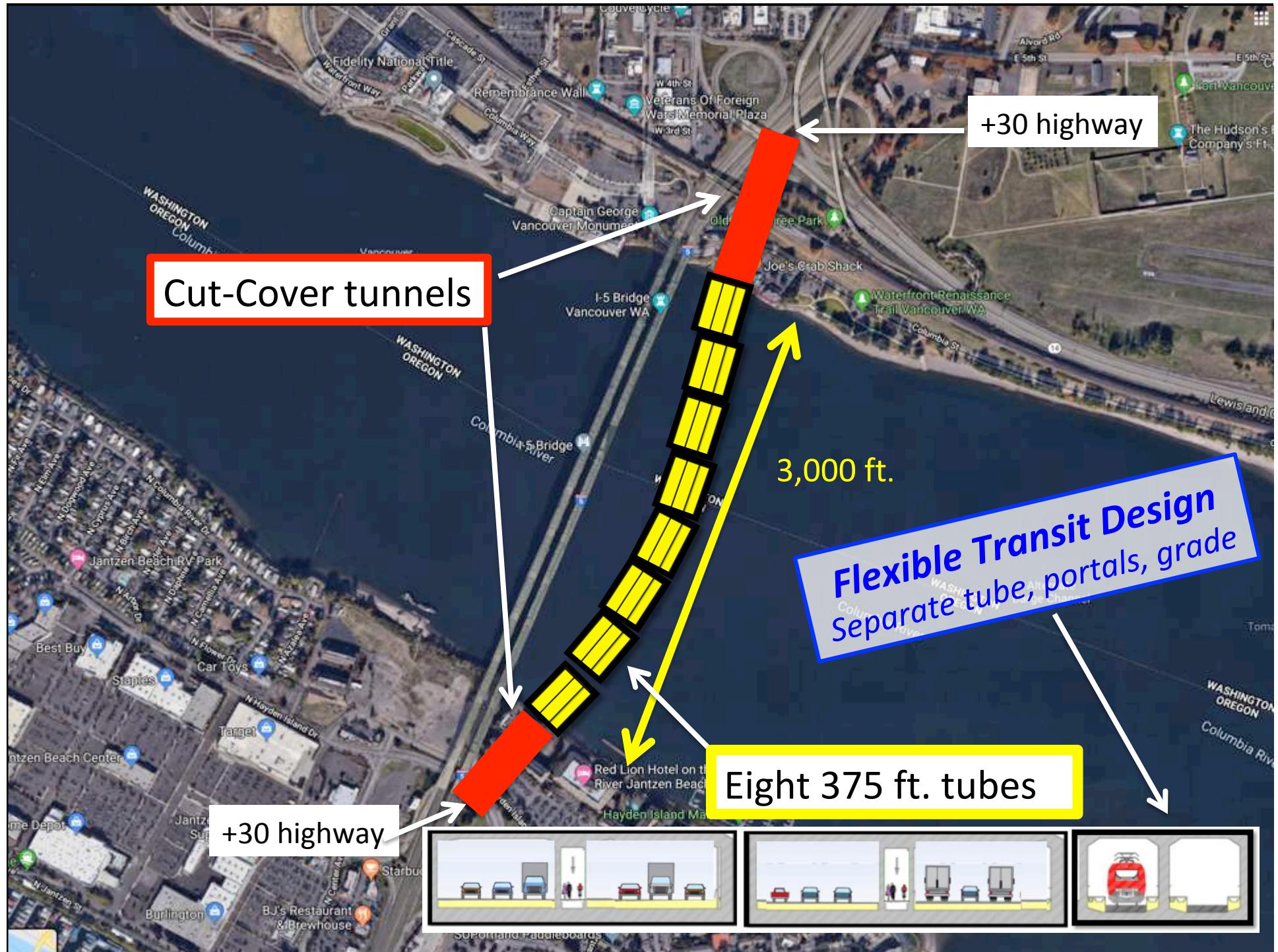
***500,000 tons***

***2021 estimate - \$650 million***



**Columbia River Tunnel – 3 Tubes – 8 sections**





## Advantages of an Immersed Tube Tunnel

Immersed tubes can be placed immediately beneath the river allowing approach to be shorter and flatter, connecting current on & off ramps

Air & Water clearances plus no in River Piers

Suitable for poor soil condition & High earthquake resistance

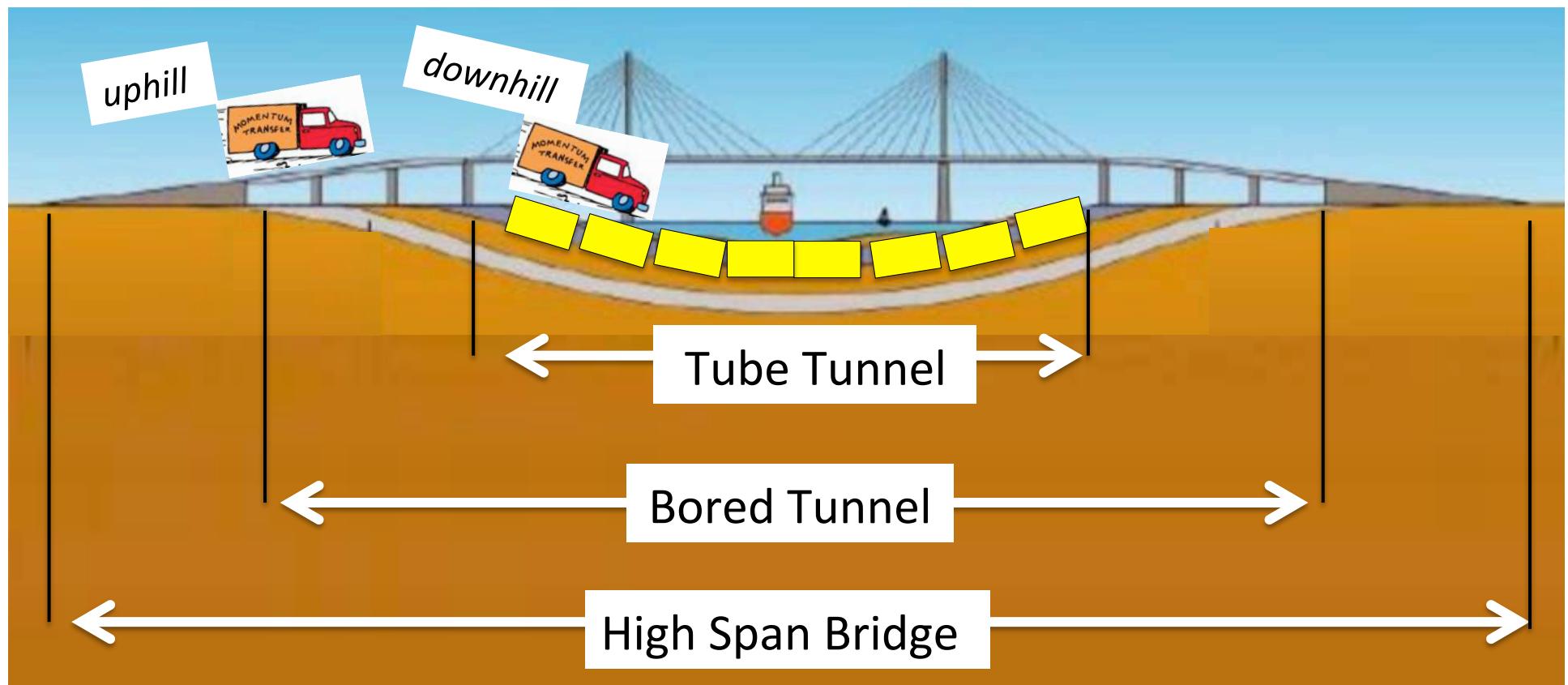
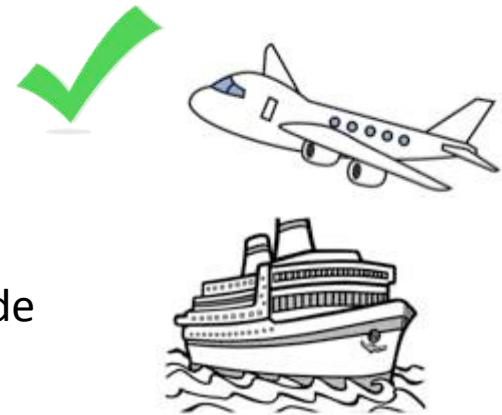
Parallel tube construction, Fraser River tubes installed in 5 months

Safer in yard construction vs. dangerous in river construction

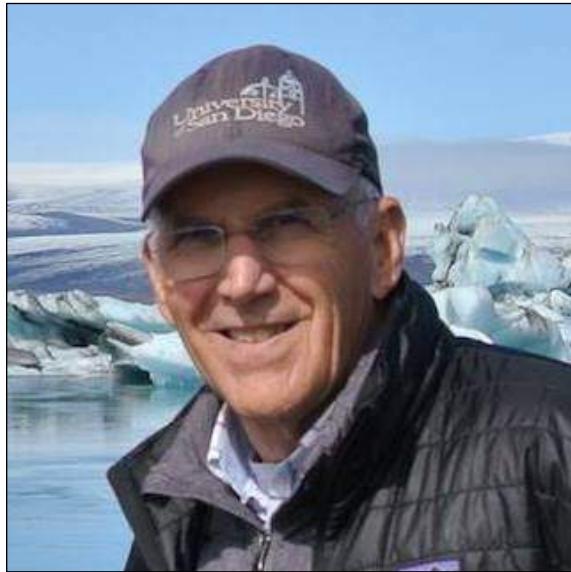
Flexible transit design – possible separate transit tube, portals, grade

Initial downhill grade giving uphill momentum for trucks

Aberdeen SR 520 pontoon casting yard



# Thank You



Bob Ortblad is a Civil Engineer & MBA.  
He teaches the history of infrastructure at the University of Washington  
[r.ortblad@comcast.net](mailto:r.ortblad@comcast.net)

References:

Buckling of Piles During Earthquake Liquefaction, Battacharya 2004

[https://www.iitk.ac.in/nicee/wcee/article/13\\_95.pdf](https://www.iitk.ac.in/nicee/wcee/article/13_95.pdf)

Columbia River Crossing crews dig shafts, drive piles on Hayden Island in search of cost savings -Oregonian May 22,2012

[https://www.oregonlive.com/portland/2012/05/columbia\\_river\\_crossing\\_crews.html](https://www.oregonlive.com/portland/2012/05/columbia_river_crossing_crews.html)

Columbia River Crossing -Project Overview Sept30, 2011 WSDOT

[http://wsdot.wa.gov/accountability/ssb5806/docs/6\\_Project\\_Development/PublicInvolvement/CRCprojectFactSheet.pdf](http://wsdot.wa.gov/accountability/ssb5806/docs/6_Project_Development/PublicInvolvement/CRCprojectFactSheet.pdf)

CRC FEIS Description of Alternatives 2.3.2 Construction Activates Over-water

[https://www.wsdot.wa.gov/accountability/ssb5806/docs/6\\_Project\\_Development/Environmental\\_Process\\_And\\_Permitting/FEIS\\_PDFs/CRC\\_FEIS\\_Chapter\\_2.pdf](https://www.wsdot.wa.gov/accountability/ssb5806/docs/6_Project_Development/Environmental_Process_And_Permitting/FEIS_PDFs/CRC_FEIS_Chapter_2.pdf)

Independent Technical Review of the George Massy Crossing, page 14

[https://www.richmond.ca/\\_shared/assets/westmaradvisorsindependenttechnicalreviewgeorgemasseycrossing52656.pdf](https://www.richmond.ca/_shared/assets/westmaradvisorsindependenttechnicalreviewgeorgemasseycrossing52656.pdf)