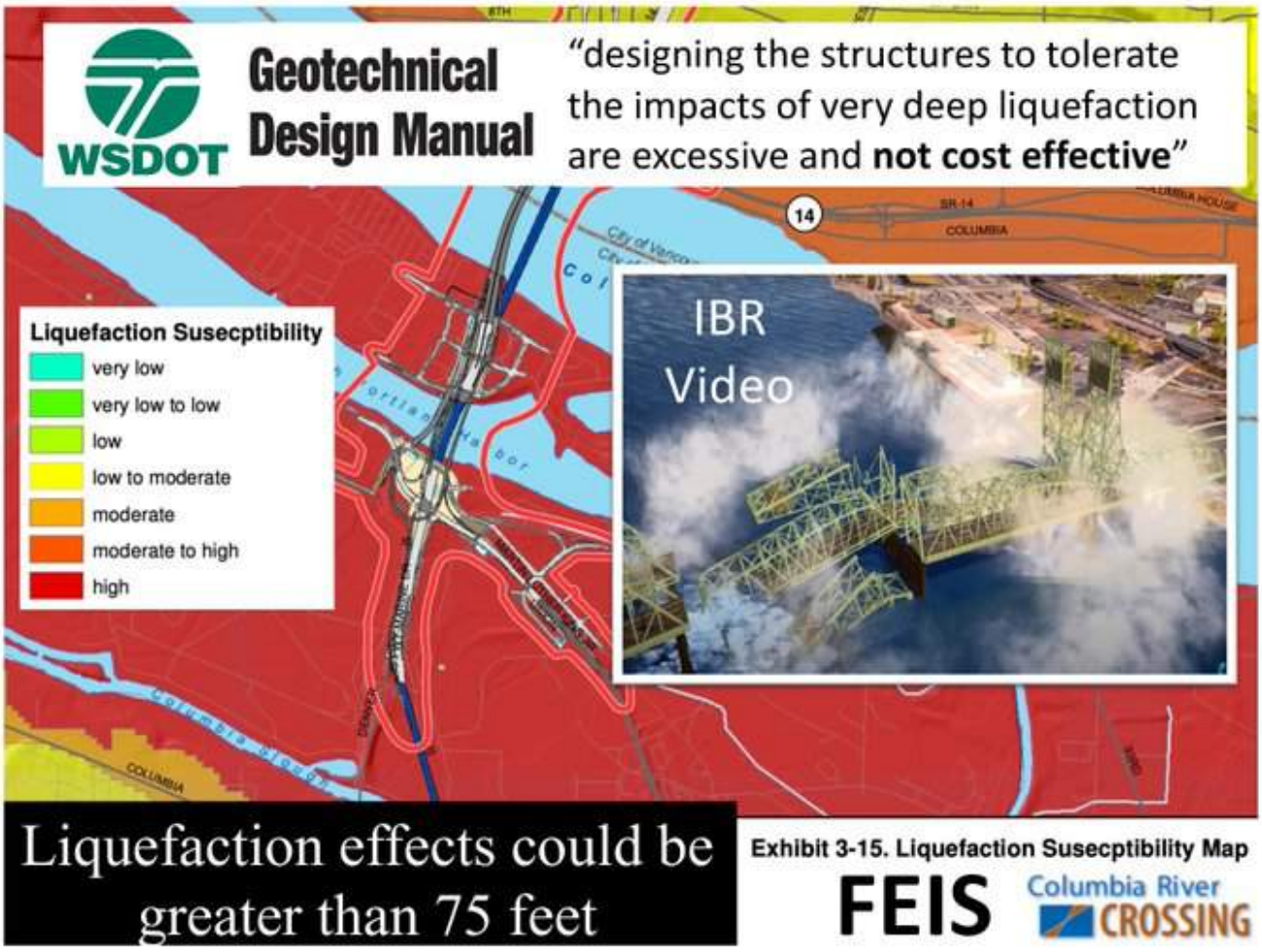
WSDOT warns it's "not cost effective" to build a bridge on deep liquefaction. However, 75ft. of liquefaction per CRC's Final EIS.

Immersed Tunnel less costly, more earthquake resistance.

Examples: SF's BART & Japan's 20 Immersed Tunnels.

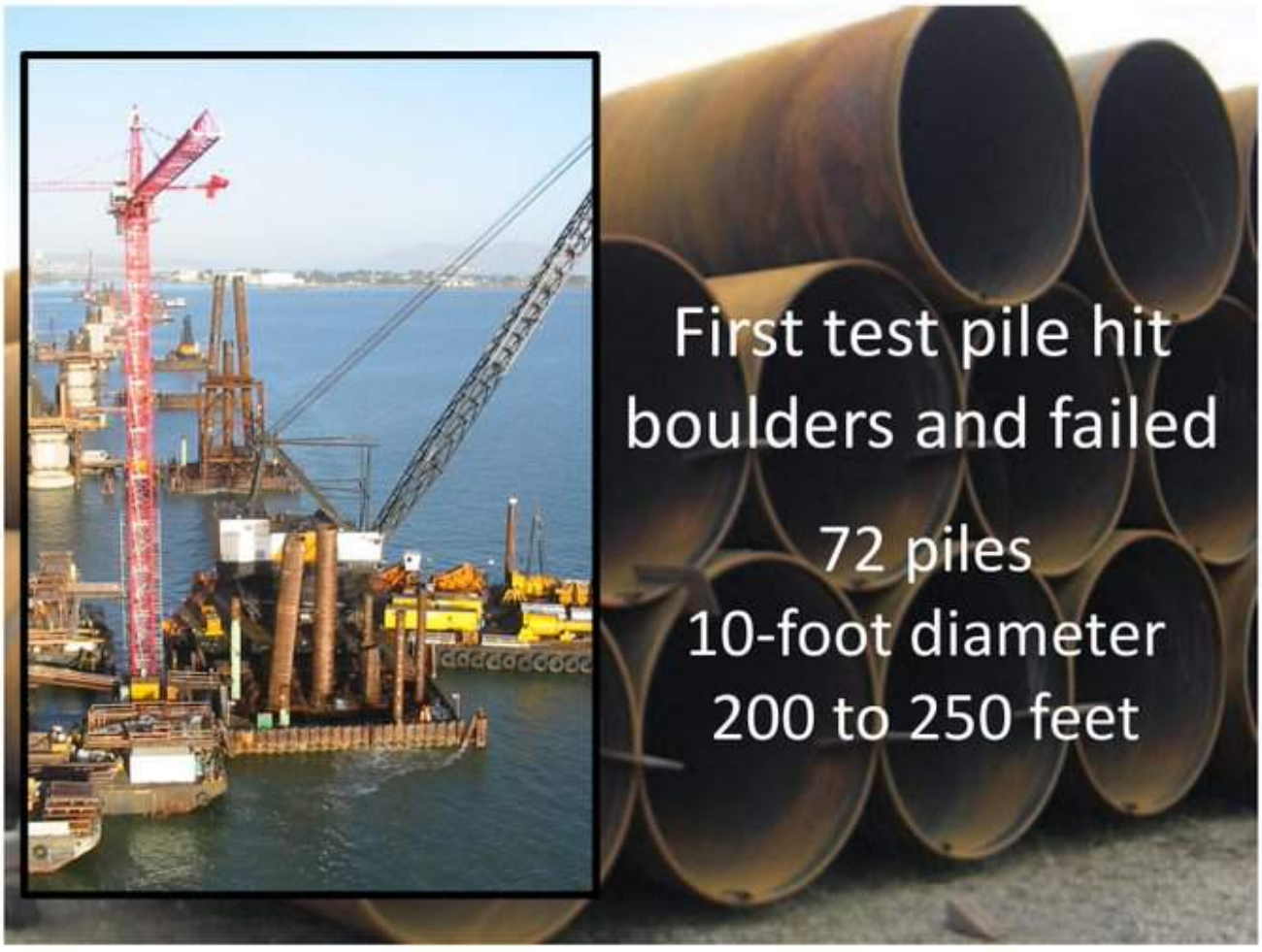
IBR Video:
https://www.youtube.com/watch?v=bVo8uUMeMLg&t=4s



The Columbia River Crossings' first 10-foot dia. 250-foot test pile on Hayden Island failed, part of a $4 million contact.

https://www.malcolmdrilling.com/wp-content/uploads/2013-Foundation-Drilling_CRC.pdf

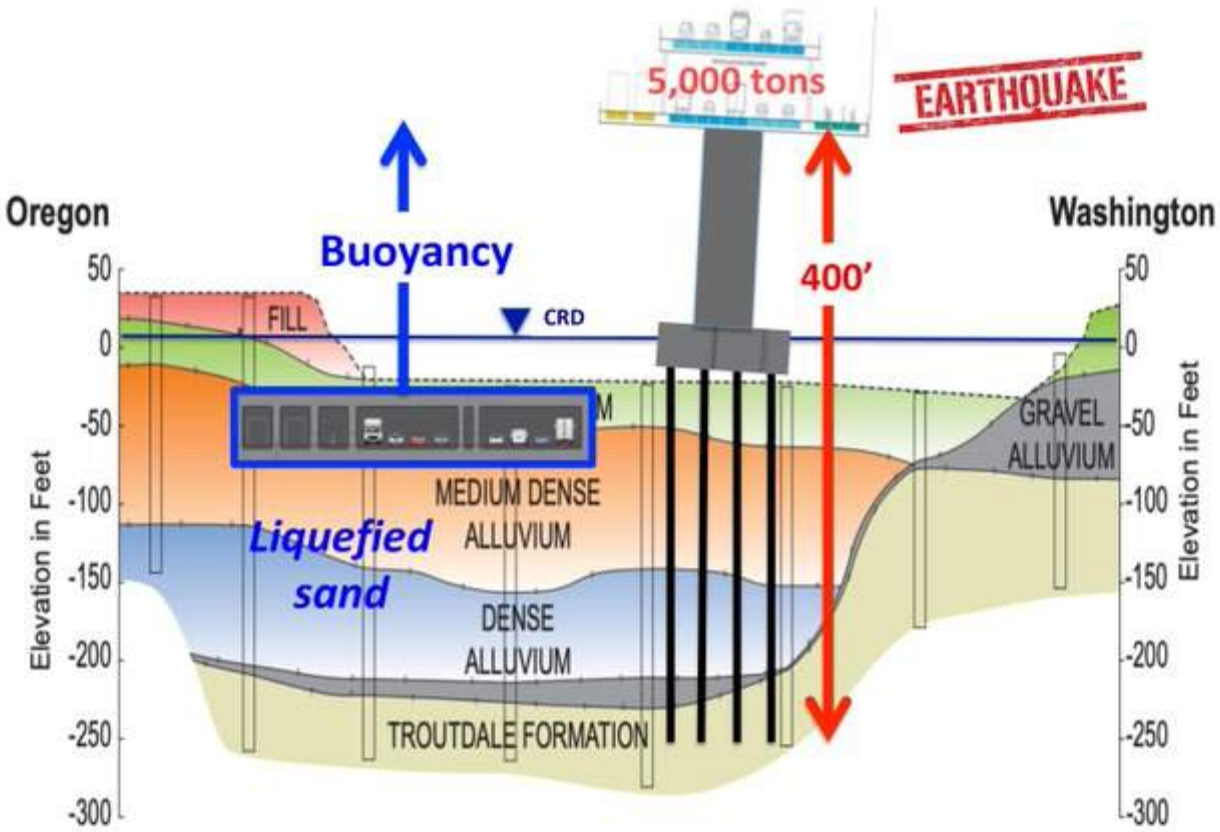
IBR's bridge design requires 72 individual 10-foot dia. 200 to 250-foot piles in the river, how many will fail?



Buoyancy makes an immersed tunnel almost immune to earthquake liquefaction.

Costly to earthquake proof a bridge supporting 5,000-ton trusses 400’ from solid ground.

Buoyancy is free.



WSDOT's "Bridge Design Manual" states designing a bridge for deep liquefaction is not cost effective.
An immersed tunnel's neutral buoyancy makes it almost immune to liquefaction and makes it cost effective in soft soils.

Designing a bridge for deep liquefaction is not cost effective

Washington State Department of Transportation

Bridge Design Manual September 2020

6-1.2.3 Maximum Considered Depth for Liquefaction

Difficulties Mitigating for Deep Liquefaction – The geotechnical engineering profession has limited experience with mitigation of liquefaction hazards at large depths, and virtually no field case histories on which to reliably verify the effectiveness of mitigation techniques for very deep liquefaction mitigation. In practicality, the costs to reliably mitigate liquefaction by either ground improvement or designing the structure to tolerate the impacts of very deep liquefaction are excessive and not cost effective for most structures.

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

Bob Ortblad MSCE, MBA