

## I-134-001

The average recurrence interval for large earthquakes on the Seattle Fault that are capable of generating large tsunamis is 3,000 to 5,000 years. This recurrence interval is longer than the ground motion return period required in the seismic codes applicable to this project. Final design of the proposed action will take into account earthquake-related issues based on applicable seismic design codes and reasonably expected events that could occur during the life of the project.

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**From:** Dan Ruuska [danruu@comcast.net]  
**Sent:** Wednesday, December 01, 2010 1:23 PM  
**To:** AWW SDEIS Comments  
**Subject:** Seattle-Fault Tsunami Would Flood Seattle-Waterfront Tunnel Through Its Below-Sea-Level South Portal

Dear WSDOT:

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This testimony 1) addresses impact of a Seattle-Fault tsunami on public safety of the proposed SR 99 Seattle waterfront tunnel, and 2) asks who is responsible -- State of Washington or City of Seattle -- for providing that public safety.

As currently planned by WSDOT, the base of the tunnel's south portal would be located BELOW sea level NEAR the shore of Elliot Bay WITHIN the northern zone of the active Seattle Fault. Should a Seattle-Fault earthquake and tsunami occur, seawater from Puget Sound would drain into the south portal, flood the below-sea-level tunnel, and drown travelers inside.

The plans fail to highlight key geologic changes that occurred during the last Seattle-Fault earthquake 1100 years ago. The north side of the fault -- where the tunnel's south portal would be -- dropped about 3-6 feet, the south side of the fault rose about 20 feet, and the mouth of the Duwamish River moved from Tukwila to Seattle (<http://www.washington.edu/burkemuseum/waterlines/>).

The plans do not fully describe the tsunami danger. [http://nctr.pmel.noaa.gov/animations/seattle\\_cap.qt](http://nctr.pmel.noaa.gov/animations/seattle_cap.qt), a NOAA Center for Tsunami Research animation of a simulated magnitude 7.3 earthquake along the Seattle Fault, shows how tsunami seawater from Elliot Bay would inundate the south portal. Suddenly the top of the south-portal structure would be under 6 or more feet of seawater, plus about 3-6 feet more if the land drops as before, and the portal's entry/exit roadways would be under tens of feet of seawater. That seawater would flow into the deep-bore tunnel through the south portal, and fill up ALL of the tunnel except for the hundred yards above sea level near the north portal (<http://www.wsdot.wa.gov/Projects/Viaduct/boredtunnelportals.htm>; <http://www.wsdot.wa.gov/NR/rdonlyres/B4053BEE-A1F1-4D32-A37E-4053EB7E29A7/0/2010SDEISAppendixP.pdf>, pp. 37-38; [http://www.wsdot.wa.gov/NR/rdonlyres/CDE7BF6D-94D8-468C-9A7F-E2504A609CB0/0/05\\_Chapter5SDEIS2010.pdf](http://www.wsdot.wa.gov/NR/rdonlyres/CDE7BF6D-94D8-468C-9A7F-E2504A609CB0/0/05_Chapter5SDEIS2010.pdf), p. 126).

WSDOT asserts, "The proposed SR 99 bored tunnel would be a safe place for travelers. Engineers are designing the tunnel to withstand an earthquake, flooding or other disaster" (<http://www.wsdot.wa.gov/Projects/Viaduct/boredtunnelsafety.htm>). That safety claim is not true in regard to tsunami safety. The tunnel's "basic design" invites tsunami seawater to rapidly flood the southern 97% of the 1.7-mile-long tunnel. The "state-of-the-art safety systems" (<http://www.wsdot.wa.gov/Projects/Viaduct/centralwaterfront.htm>) do not include anything to prevent tsunami seawater from quickly flooding the tunnel and

**I-134-001** | drowning travelers en masse. Victims would experience the south portal and tunnel as a drain for and extension of Elliot Bay.

**I-134-002** | Instead of designing "inherent tsunami safety" into the tunnel, WSDOT appears to have assigned responsibility for tsunami safety to the City of Seattle -- by forcing Seattle to build and fund a safety fix for a tsunami-unsafe WSDOT tunnel. According to <http://www.wsdot.wa.gov/Projects/Viaduct/boredtunnelsafety.htm>, "The City of Seattle is responsible for replacing the central waterfront seawall. As they design its replacement, they are taking into account rising sea levels [long-term rising due to global warming plus short-term rising due to local tsunamis] in order to provide effective protection for waterfront and public facilities, such as the proposed bored tunnel." Will the City of Seattle be required to provide -- and pay for -- a seawall/dike system to prevent tsunami seawater from ever draining into the below-sea-level south portal and tunnel?

The new SR 520 floating bridge will be engineered and built to withstand an 11-foot-high Lake-Washington tsunami wave generated by a Seattle-Fault earthquake ([http://www.seattlepi.com/local/335189\\_seismic12.html](http://www.seattlepi.com/local/335189_seismic12.html)). Shouldn't the SR 99 waterfront tunnel be engineered and built to withstand a Puget-Sound tsunami generated by the very same Seattle-Fault earthquake -- by elevating the south portal so that tsunami seawater cannot ever reach it?

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## **I-134-002**

The Elliott Bay Seawall needs to be rebuilt or replaced because it is deteriorating and vulnerable to earthquakes. However, the seismic stability of a viaduct replacement along Seattle's central waterfront does not necessarily require that the seawall be rebuilt or replaced. It is for this reason that replacement of the seawall was removed from the Alaskan Way Viaduct Replacement Project's purpose and need. If the Bored Tunnel Alternative is selected, seawall replacement will be undertaken by the City of Seattle because the alignment of the bored tunnel would be inland so the failing seawall would not have the potential to affect the seismic stability of its alignment.

The City of Seattle's Elliott Bay Seawall Project focuses on the replacement of the aging seawall and enhancement of the critical marine habitat along Seattle's waterfront. Providing a system to prevent seawater from entering the tunnel as a result of a tsunami is not proposed as part of that project.

The bored tunnel would be designed to current seismic standards that would allow it to withstand earthquakes. Should a tsunami occur, most of the southern portion of the bored alignment (south of Marion) could be inundated with several feet of water. Water that enters the tunnel would be removed by state-of-the-art drainage and pumping systems. The inundation of several feet of water should not structurally damage the facility nor would it cause catastrophic flooding in the tunnel.