

Alaskan Way Viaduct and Seawall Replacement - Bored tunnel safety

The new SR 99 bored tunnel will provide many safety benefits for drivers. In a natural disaster or other emergency situation, tunnels can be designed as one of the safest places for travelers. The bored tunnel replacement will also be equipped with many safety features, including state-of-the-art ventilation, fire detection and suppression, and lighting systems.

Tunnels are built to be safe during natural disasters.

Geotechnical and structural engineers agree that tunnels can be designed as one of the safest places to be during an earthquake. This is because ground movements below the surface are much smaller than the amplified movements above the surface. The SR 99 bored tunnel will be designed and built to current seismic standards, which require structures to withstand a severe earthquake with a probability of occurring only every thousand years.

Comment [HS1]: Please let me know if this is the correct standard, or if a different earthquake standard (ie 2500 year) should be used.

In the event of a tsunami, it is highly unlikely that a wave would overtop the seawall and reach the tunnel. WSDOT and the City of Seattle investigated the risk of a tsunami wave overtopping the current seawall and found that the only time this could happen would be during the short period of high tide, when water could potentially reach one foot higher than the seawall. A tsunami meeting those conditions is estimated to occur only once every 23,000 to 60,000 years. The replacement seawall, to be built by the city during construction of the bored tunnel, will have approximately the same height as the current seawall.

The bored tunnel will also be designed to prevent possible flooding. For example, the concrete lining of the tunnel will have special gaskets that will prevent groundwater seepage. The tunnel will be equipped with a state-of-the-art drainage system with pumps to remove water from fire sprinklers, runoff from vehicles or surface water that enters the tunnel.

Safety features are built into the tunnel's design.

Both levels of the bored tunnel will include an outside shoulder to allow disabled vehicles to safely stop and to improve access for emergency vehicles. Inside shoulders will provide increased sight distance. Two 12-foot travel lanes will ensure adequate space for even the largest highway trucks of legal size.

Secure waiting areas between the tunnel's levels, also known as safe refuge areas, and emergency exits will be provided by an enclosed walkway. Access to the refuge area and walkways will be provided at least every 650 feet. In the event of a fire or other emergency, travelers will walk along the shoulders to reach the doorways into the refuge area. Staircases inside the refuge area will provide access between the roadway levels. Signs will point travelers to the nearest exit where they will wait for assistance in a refuge area or walk out of the tunnel. Surveillance cameras will also monitor the tunnel and the

exit areas at all times. Refuge areas will contain emergency telephones and will be continuously monitored by tunnel staff in the tunnel control center.

A tunnel control center will provide continuous monitoring.

The tunnel roadways, walkways, and refuge areas will be continuously monitored by closed circuit television cameras. State-of-the-art smoke detectors, air quality monitoring equipment and video cameras will provide real-time information to the operators at WSDOT's 24-hour control center and allow them to respond quickly to changing conditions and emergencies. The control center has direct lines to the Seattle Fire Department, Police Department, and other emergency responders.

The tunnel will use the latest in ventilation and sprinkler technology.

The SR 99 bored tunnel replacement will include the latest technology in ventilation and fire protection systems. Smoke, fire, heat and exhaust gas monitoring systems coupled with video cameras will allow continuous detection of hazardous conditions in the tunnel and allow for rapid response of both sprinkler systems and emergency fan systems.

Two independent power sources will ensure a reliable source of electricity. Backup power systems will also be provided for essential tunnel systems at all times.

In addition to these features, WSDOT is developing emergency response plans that will be incorporated into the tunnel's design and operation as required. By preparing for emergencies and by being designed to withstand natural disasters, the bored tunnel will be safe for the traveling public.