

Earthquake simulation talking points – Oct. 25, 2009

There is a one in ten chance than an earthquake could permanently damage the Alaskan Way Viaduct and seawall.

- In 2007 new geotechnical data and a better understanding of local and regional seismic behavior allowed seismic and structural experts to determine that there is a higher chance of an earthquake occurring that could cause portions of the viaduct to collapse.
- This translates to a one in ten chance that an earthquake that could permanently damage the viaduct could occur in the next 10 years. This is approximately double the previously identified risk.
- This is a more intense earthquake than the 2001 Nisqually earthquake and would either be closer, be stronger, or last longer.
- In early 2007 we began to work on a visual simulation of how the viaduct and seawall would respond in the event of an earthquake in order to better understand the new information, share the new seismic information to the public, and emphasize the importance of moving forward.
- Experts from an international structural engineering firm and the University of Washington reviewed the video simulation and found it to be an accurate representation of the new seismic information and potential impact on the viaduct and seawall.
- Once the video was completed in November 2007, WSDOT decided not to release it due to concerns that it sensationalized a serious safety issue and could distract from the collaborative process that was underway. The [technical report](#) was released to the public in early 2008 and shared at a stakeholder advisory committee, posted on the Web site, and provided in briefings to elected officials.

We are releasing this video now because of a public disclosure request.

- This [video](#) does not contain new information. We released the seismic risk information portrayed in the video simulation to the public in early 2008 – at a stakeholder meeting, posted on the Web site, and through briefings to elected officials.
- We are releasing this video now because of a public disclosure request. The request was for a number of documents, including the earthquake simulation video.
- Our intent is to comply with the public disclosure request. However we remain concerned that this video sensationalizes a serious safety issue.

WSDOT continues work to ensure the viaduct is safe for drivers, but we cannot afford further delay.

- This video shows clearly why we cannot afford to delay taking down the viaduct.

- Progress is being made. We are starting construction in March to take down the [south half of the viaduct](#) near the sports stadiums. The project will be advertised to contractors on Monday, Oct. 26.
- The viaduct is safe for drivers today. WSDOT has kept close watch on the viaduct ever since the 2001 Nisqually earthquake.
 - Inspections have increased to four times a year to ensure it remains safe for drivers. When damage is found during the inspections, steps to repair the damage are taken.
 - We strengthened four column footings between Columbia and Yesler in 2008. This is a temporary repair that limits settlement in this area of the viaduct, prevents further damage to the structure, and allows the viaduct to remain open to traffic.
 - Vehicles with a gross weight of more than 105,500 pounds are prohibited, and trucks and buses must travel in the right-hand lane only.
- WSDOT is installing an [automated closure system](#) this spring. The current system is manual and requires the police force and others to close the viaduct in an emergency.
- The automated system will remove traffic from the viaduct in case of a catastrophic failure or a moderate seismic event that weakens the structure. The system will include:
 - New monitoring system, including GPS antennas and wireless equipment, to detect structure and ground movement.
 - Eight gates placed at ramps and entrances to the viaduct
 - Advance warning signs, to notify travelers of a closure, will be added or upgraded in west Seattle, south Seattle, SODO, downtown, and north of the Battery Street Tunnel.
 - Traffic cameras will be added along the viaduct and at gate locations.
- The automated closure system will cost approximately \$5 million and is being funded by federal funds.

The City of Seattle will replace the seawall in parallel with the bored tunnel.

- The [seawall](#) is at the same risk of collapse in the event of an earthquake as the viaduct.
- Replacement of the seawall is undergoing environmental review by the City of Seattle and U.S. Army Corps of Engineers.
- Design will begin next year and construction of the new seawall will begin in parallel with construction of the bored tunnel.

Earthquake simulation commonly asked questions – Oct. 25, 2009

Why is this [video](#) being released now?

It is being released because it has been requested through a public disclosure request that was submitted on Sept. 23.

Why was the video not released earlier?

We did release the [data](#) on which the video was based (Seismic Vulnerability Analysis Report, Nov. 2007) in early 2008. The video was not released earlier because we believe it sensationalizes a serious safety issue.

Is the viaduct still safe for drivers?

The viaduct is safe for drivers. WSDOT conducts inspections four times a year and makes repairs as necessary. Weight restrictions keep the heaviest trucks off the viaduct, and trucks and buses that are allowed are required to stay in the right-hand lane. In the event of an earthquake, we will be installing an [automated closure system](#) (seismic monitoring equipment, ramp closure gates, information signs, and traffic cameras). The city also regularly monitors the condition of the seawall and has made approximately \$500,000 in repairs.

What strength earthquake does the video depict?

One possibility is a 7.0 earthquake that lasts the same amount of time and is the same distance from downtown Seattle as the 2001 Nisqually earthquake. Scientists estimate this magnitude earthquake occurs once every 108 years. The Nisqually earthquake was a 6.8 magnitude earthquake. An earthquake that is closer, with less magnitude, or lasting longer, could also precipitate failure. The proposed SR 99 bored tunnel would be designed and built to current seismic standards, which means it will not collapse in the event of a 1,000 year earthquake.

How accurate is the video?

The video is based on seismic information from the State Department of Natural Resources and structural analysis by licensed engineers. It has been reviewed and found to be technically accurate by two independent experts – David Goodyear, TY Lin International and Steven Kramer, University of Washington Civil and Environmental Engineering. Jugesh Kapur, the state bridge engineer, has also reviewed the video and found it to be accurate.

How much did the video cost?

The video cost approximately \$80,000 to produce.

Is WSDOT trying to scare the public?

No, WSDOT is not trying to scare the public. We have not released this video before because it sensationalizes a serious safety issue. We have communicated the risks of not replacing the viaduct over the last eight years and the public and elected officials have listened. Progress is being made – construction on the south mile of the viaduct will begin in January.

Why doesn't WSDOT close the viaduct now?

Through quarterly inspections of the viaduct, weight restrictions, and repairs, we are keeping the viaduct safe for drivers. We would close the viaduct if we felt it was unsafe, just as we have

taken ferry boats off routes and closed the Murray Morgan bridge in Tacoma. Further weight restrictions may be required if conditions warrant such action.

Isn't it too risky to allow traffic on the viaduct until 2015?

The viaduct is safe for drivers. We will continue to inspect it four times each year to make sure it is safe for drivers. If there is any evidence that it is no longer safe, we will close it. Ensuring the public safety is one of the reasons we are installing the automated closure system. Closing the viaduct must also be balanced with the impacts to the regional economy from a major transportation route shutting down with no alternate routes in place. Also, closing the viaduct would not address the seawall. Failure of the seawall could still cause significant damage to the waterfront and utilities.

Can't the viaduct just be fixed or retrofitted until 2015?

Almost a decade of studies and numerous reviews by outside experts have led us to the conclusion that retrofitting the viaduct is not a cost effective solution. It costs almost as much as a full replacement and the narrow lanes and no shoulders would not be addressed. Retrofitting the viaduct also does not fix the seawall.

Will the tunnel be safe during an earthquake?

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 BART tunnels in San Francisco were re-opened hours after the earthquake when no damage was found. The proposed SR 99 bored tunnel would be designed and built to current seismic standards, which means it will not collapse in the event of a 1,000 year earthquake.

When will the [seawall](#) be replaced?

The City of Seattle has invested almost \$500,000 in temporary repairs to the seawall and regularly monitors its condition. The seawall will be replaced in parallel with construction of the bored tunnel. Construction will be phased to minimize impacts to waterfront businesses during busy seasons.

Is there a plan if the viaduct or seawall were to fail during an earthquake?

WSDOT will be installing an automatic closure system next year that will close the viaduct after an earthquake, fire, or other event that damages the structure. WSDOT and the City of Seattle also have an [emergency closure plan](#) for the viaduct.

In the event of a sizable earthquake and its aftershocks, priority will be given to moving emergency response personnel through the city. Traffic will be re-directed away from downtown Seattle. Key bridges and structures will be inspected. Temporary detours will be put in place, and emergency public information systems will be activated. If there is a long term closure of the viaduct, traffic will be re-routed to downtown city streets (Second and Fourth avenues) and parking on north-south streets will be limited. In the days and weeks after an earthquake, the real difference will be made by Seattle travelers' decisions to change routes, limit travel and alter travel modes. This will determine how well people and goods move during a long-term closure of the viaduct.