

## Schedule and budget

According to STP's schedule, repairs and enhancements to the machine will be completed in fall 2015. Following that, STP and Hitachi will begin a robust testing plan that will help ensure the machine is ready to complete the project. STP has a target date to resume tunneling on Nov. 23, 2015. The contractor submits an updated schedule each month that is published on our website.

The state cannot verify the contractor's schedule, but both STP and WSDOT have an important stake in the successful completion of the tunnel, and in expediting work where possible while also ensuring the job is done right. The cause and responsibility for damage to the machine will be resolved through the process outlined in the tunnel contract.

While crews repair the tunneling machine, significant work continues elsewhere along the SR 99 corridor. Crews are building ramps and highway connections at the tunnel's future north and south portals, and have built approximately 450 feet of double-deck roadway within the tunnel.



Looking south toward the tunnel's future north portal.



Construction of the roadway within the tunnel.

## Alaskan Way Viaduct REPLACEMENT PROGRAM

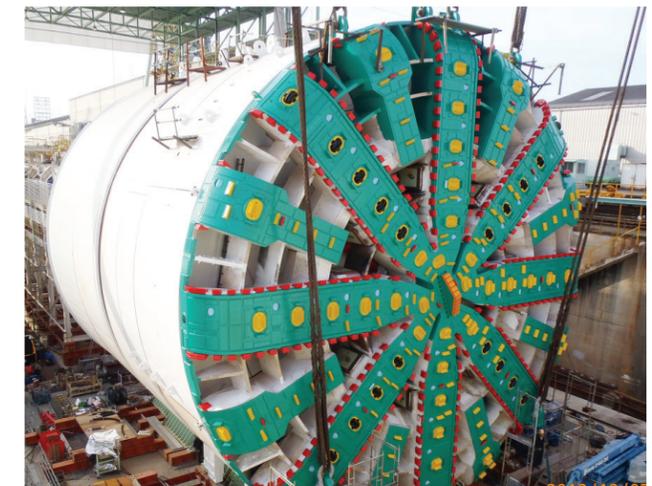


July 2015

## Repairing and enhancing the SR 99 tunneling machine

In summer 2013, Bertha, the world's largest tunneling machine, began digging the SR 99 tunnel beneath downtown Seattle. In December 2013, Seattle Tunnel Partners, the contracting team hired to design and build the tunnel, stopped excavation approximately 1,000 feet into the dig after measuring increased temperatures in the machine.

While investigating the cause of the high temperatures, STP discovered damage to the machine's seal system and contamination within the main bearing. STP has since built a 120-foot-deep pit to access the machine and lift a portion of it to the surface. They are now making repairs and enhancements to prepare the machine for the remainder of the tunnel drive.



The SR 99 tunneling machine was manufactured in Japan by Hitachi Zosen Corp. STP is responsible for ensuring it functions properly at all times.

### For more information

Visit the website at [www.AlaskanWayViaduct.org](http://www.AlaskanWayViaduct.org)  
Call the hotline at 1-888-AWV-LINE  
Send an email to [viaduct@wsdot.wa.gov](mailto:viaduct@wsdot.wa.gov)  
Follow @BerthaDigsSR99

Send a letter to:  
Alaskan Way Viaduct Replacement Program  
Washington State Department of Transportation  
999 Third Ave., Suite 2200  
Seattle, WA 98104

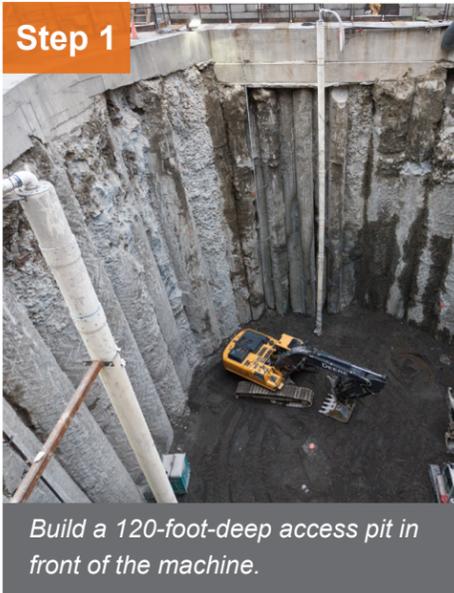
### Americans with Disabilities Act & Title VI information

Americans with Disabilities Act (ADA) Information: This material can be made available in an alternate format by emailing the WSDOT Diversity/ADA Affairs Team at [wsdotada@wsdot.wa.gov](mailto:wsdotada@wsdot.wa.gov) or by calling toll free, 855-362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

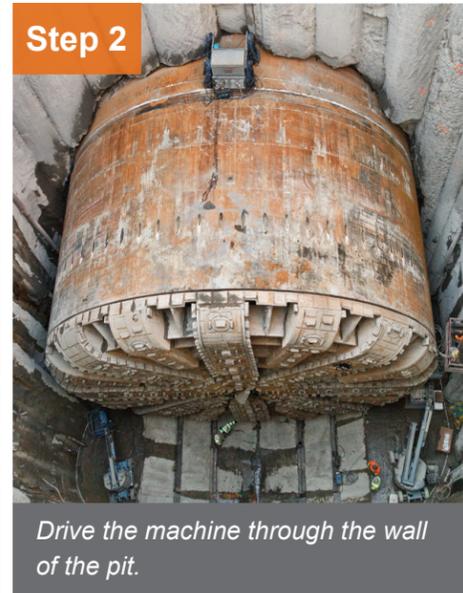
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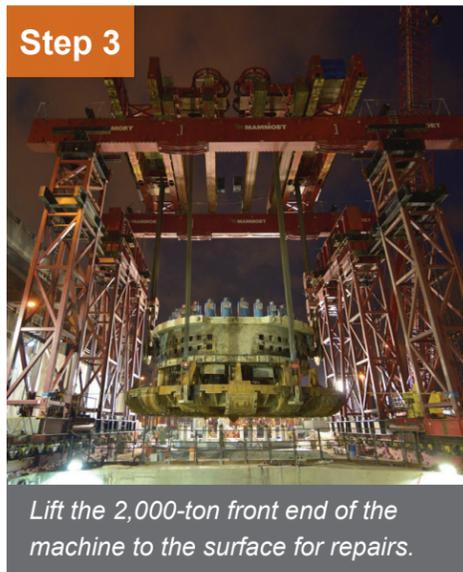
The following images show the steps of STP's repair effort:



Build a 120-foot-deep access pit in front of the machine.



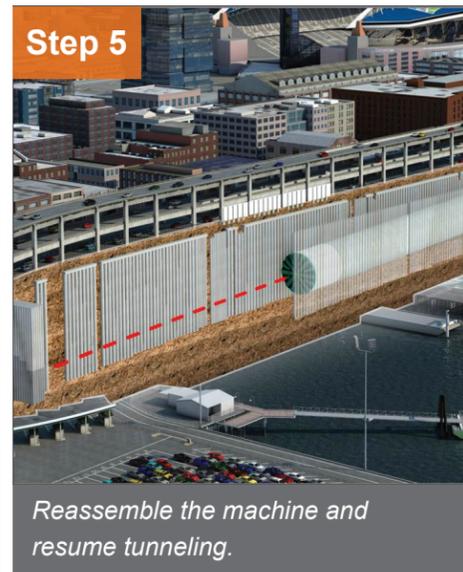
Drive the machine through the wall of the pit.



Lift the 2,000-ton front end of the machine to the surface for repairs.



Repair the seal system, replace the main bearing and make enhancements to the machine.

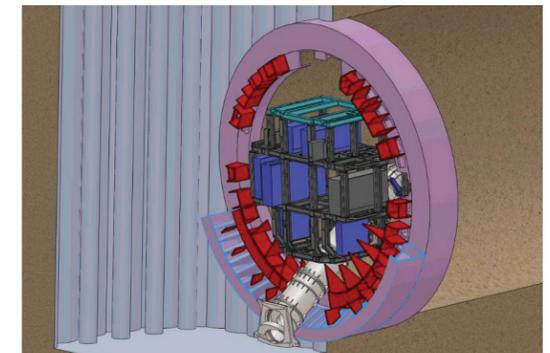
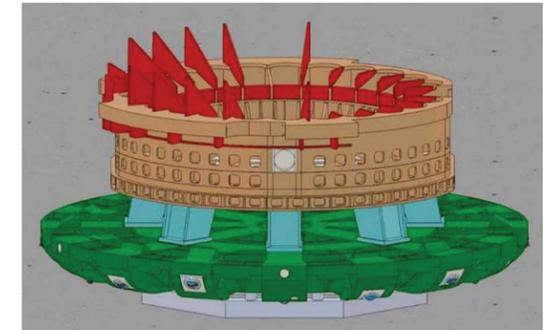
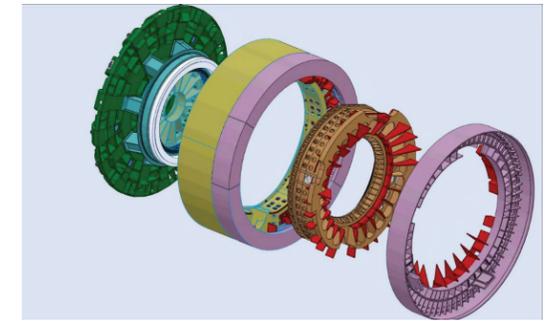


Reassemble the machine and resume tunneling.

## Building a better Bertha

In addition to making planned repairs to the seal system and replacing the main bearing, STP is making enhancements to Bertha based on information gathered during the first 1,000 feet of tunneling. Changes include:

- **New main bearing:** The main bearing allows the machine's cutterhead to rotate. The original main bearing is being replaced with a spare bearing that, per the tunnel contract, STP manufactured prior to the start of tunneling.
- **New seal system:** The seal system protects the main bearing from potentially damaging material like dirt and grit. STP is installing a new seal system that is more robust and easier to access from within the machine.
- **Enhanced monitoring systems:** Enhanced monitoring systems will alert crews of potential issues during mining.
- **Reinforcing steel:** New steel will strengthen the machine to protect its interior systems.
- **Soil-processing improvements:** A number of modifications will reduce the likelihood of clogging during the remainder of the tunnel drive. Changes include:
  - Modifications to openings on the cutterhead.
  - New wear-resistant steel on the cutterhead.
  - An improved soil conditioning injection system.
  - Lengthened agitator arms for mixing excavated soil in the chamber behind the cutterhead.



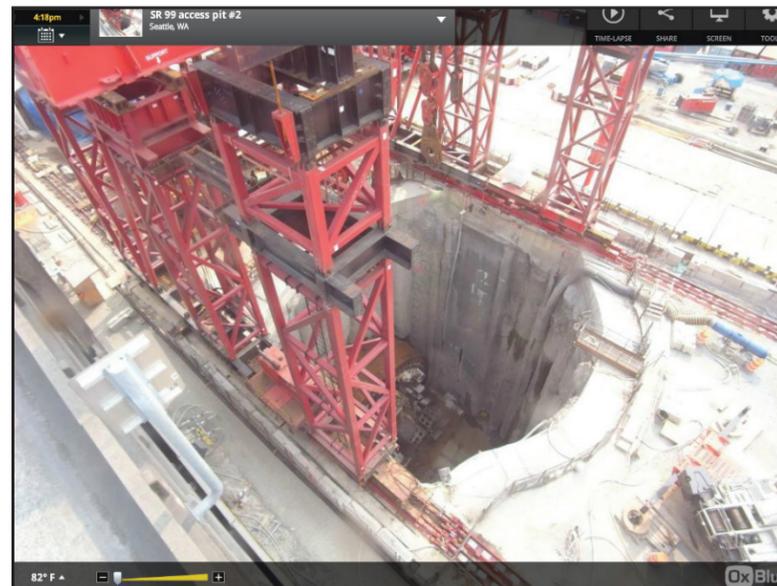
Red indicates steel that is being added to strengthen the machine. An animation and additional details of STP's repair plan is available at [www.alaskanwayviaduct.org](http://www.alaskanwayviaduct.org).

## Watch STP's progress

STP's work to resume tunneling is difficult to see in person because crews often work beneath a large white tent. The best view is from our online time-lapse camera.

Visit [www.AlaskanWayViaduct.org](http://www.AlaskanWayViaduct.org) and click on the icon below:

Construction  
CAMERAS



Crews in Osaka, Japan fabricate a new bearing block for the machine in June 2014.



Some of the openings in Bertha's five-story-tall cutterhead are being modified as part of STP's plan to resume tunneling.