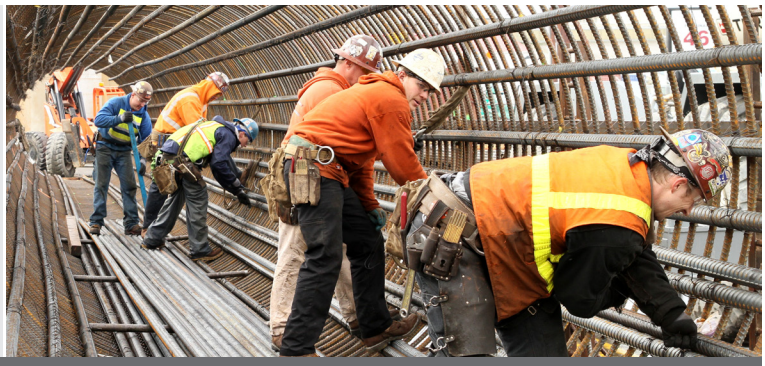
Alaskan Way Viaduct
REPLACEMENT
PROGRAM



May 2014

Protecting structures along the SR 99 tunnel route

The SR 99 Tunnel Project is one of the largest excavation projects in the history of our state.

The project's five-story-tall tunneling machine will remove approximately one million cubic yards of soil by the time it finishes digging the tunnel. While the ground naturally experiences movement over time, digging underground may cause additional movement.

We researched the soil's characteristics before establishing the two-mile-long tunnel route. Most of the tunneling will take place deep beneath downtown Seattle in terrain that is very dense and stable. In fact, multiple tunnels in the region have been successfully excavated in similar conditions.

Soils along the tunnel route that are prone to settlement will be strengthened before the machine digs through them.

Settlement monitoring program

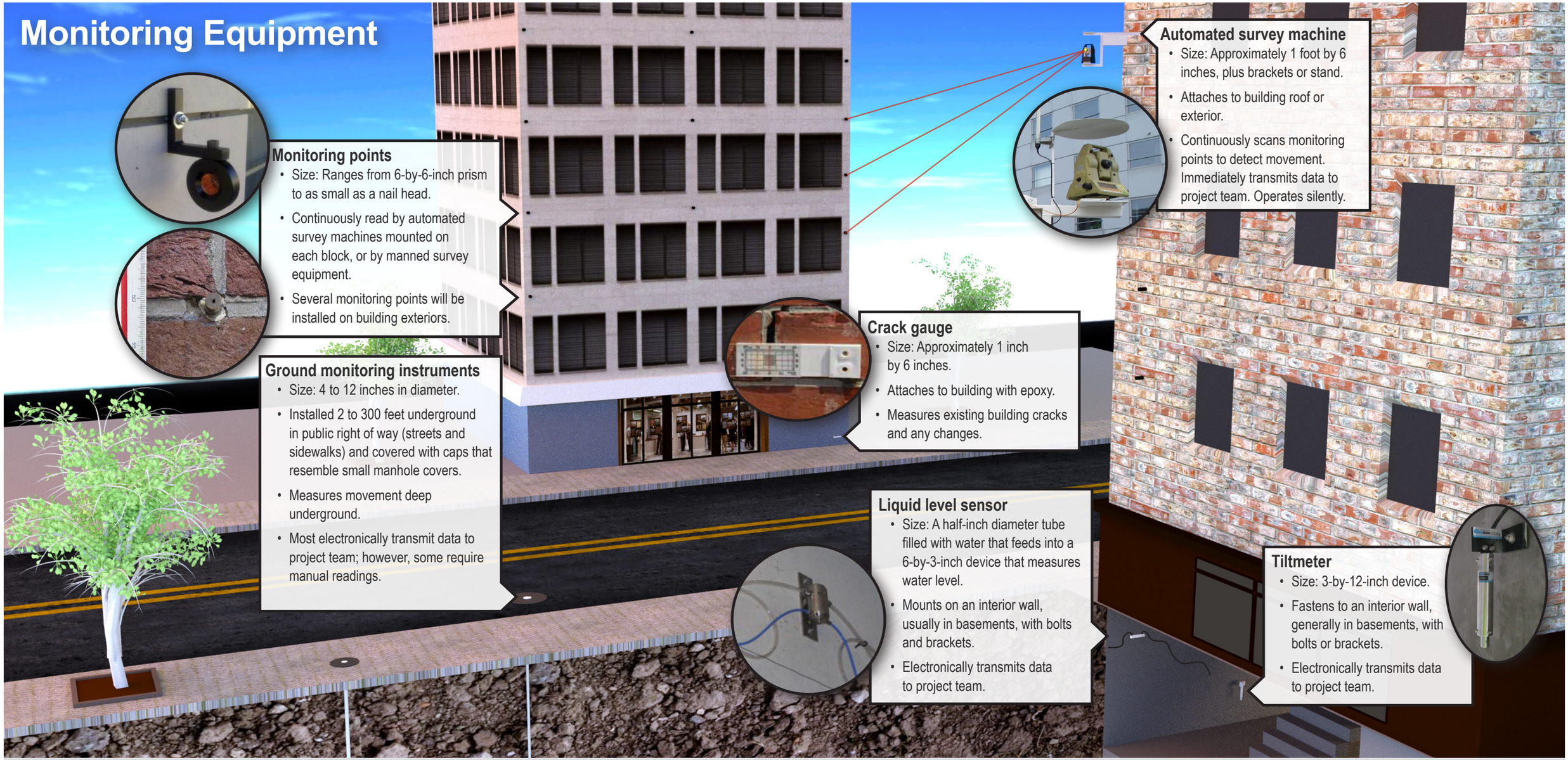
While we do not anticipate significant levels of settlement, as a precaution, we are implementing a comprehensive program to monitor and mitigate any effects of tunneling. As the tunneling machine pushes forward through the earth, crews are measuring the soil it removes while also tracking any ground movement or changes above its path.

Buildings, utilities and streets located above and near the tunnel route will be monitored before, during and after construction. Each building was surveyed prior to construction to document its interior and exterior condition. Monitors installed on buildings by our crews are being checked against data from before construction, as well as data from monitors installed outside the monitoring area.

If damage does occur to buildings, utilities or streets as a result of tunnel construction, WSDOT will be responsible for repairs. We will rely heavily on pre-construction surveys and monitoring data to evaluate construction-related damages.

Assembly of the SR 99 tunneling machine in the launch pit west of Seattle's stadiums.

Monitoring Equipment



Monitoring plan features

Building monitoring: We have outfitted nearly 200 buildings along the tunnel route with equipment to measure movement. All buildings have monitoring points installed on the exterior, and a limited number require equipment on the inside, typically in the basement. Data is being collected around-the-clock. If any movement is detected, project staff will be alerted immediately.

Ground monitoring: More than 700 underground monitoring instruments are installed in the streets and sidewalks along the tunnel route. These instruments will track any movement below the surface during tunneling.

Equipment installation, maintenance and removal: We are coordinating with property owners for installation and removal of monitoring equipment. During tunneling, some maintenance and readings may require that we have periodic access to the monitoring equipment. After tunneling, all buildings, streets and sidewalks will have equipment removed and be restored to their original condition. Installation of equipment and restoration of historic buildings will be consistent with federal and local preservation standards.

Schedule: Installation of monitoring equipment began in spring 2012 and continued through summer 2013. We collected six months of baseline data of naturally-occurring earth movement before tunneling started. We will continue collecting readings for about six months after tunneling is complete to ensure there is no delayed movement, after which the equipment will be removed.

Other tools used to monitor settlement

Information from the tunneling machine

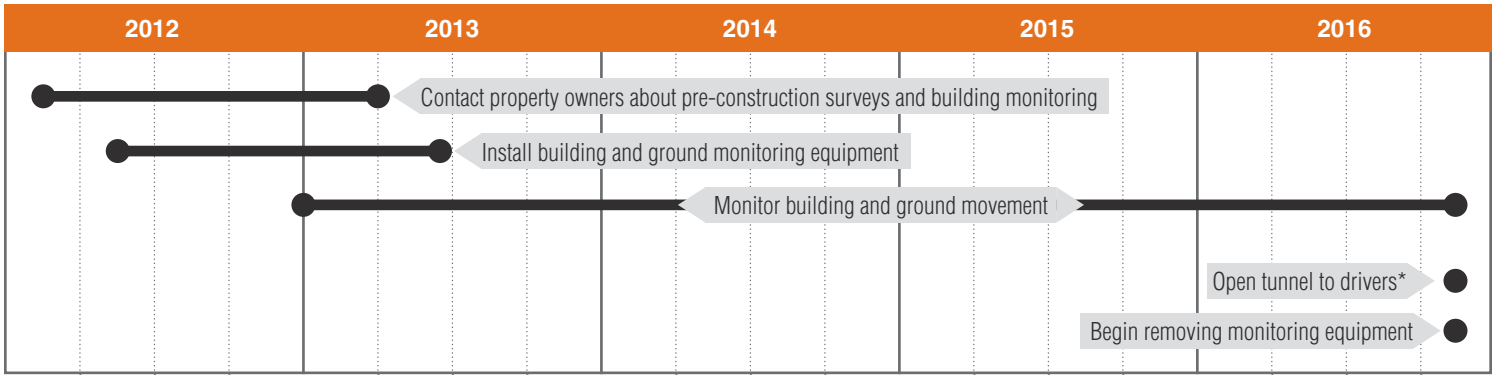
By the time it's beneath downtown, the tunneling machine will dig an average of 35 feet per day. It will take approximately 10 days to pass underneath one city block. To ensure unstable voids aren't created underground, the machine is monitored in real-time. Inch-by-inch progress data is collected and analyzed by dozens of monitors on the tunneling machine, and the team is closely measuring the amount of material excavated from the tunnel.

Satellite imaging

To provide a comprehensive view of buildings and structures along the tunnel route, we are using satellite imaging to collect data. Satellite images taken prior to tunnel construction create reference points for our engineers. Throughout construction, we'll use satellite imaging to assess the condition of the ground. This technology allows for precise, real-time topographic measurements and analysis of any movement, and enhances information gathered by monitoring equipment on buildings and in the ground.

Inside the control room of the SR 99 tunneling machine.

Timeline



* Contingent on Seattle Tunnel Partners meeting its proposed schedule.

For more information

Visit the website at www.AlaskanWayViaduct.org
Call the hotline at 1-888-AWV-LINE
Send an email to viaduct@wsdot.wa.gov
Follow on twitter @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

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