



Washington State
Department of Transportation

SR 99 Tunnel Project

September 2011

Breaking ground on the SR 99 tunnel

After a decade of debate, analysis and public involvement, the future of the SR 99 corridor is clear: WSDOT is building a tunnel beneath downtown Seattle to replace the waterfront section of the Alaskan Way Viaduct. When it opens in late 2015, the tunnel will connect the new section of highway under construction near Seattle’s port and stadiums to Aurora Avenue north of downtown, maintaining a vital route for people and goods. The tunnel will combine with a host of improvements led by the City of Seattle, King County and the Port of Seattle – a new waterfront street, overhauls of the Mercer and Spokane street corridors, and expanded transit service – to improve mobility in Seattle and the region.

Using a tunnel boring machine allows us to build the new SR 99 corridor while the viaduct stays open to traffic. The viaduct will be demolished at the end of the project, opening up more than nine acres of new public space on Seattle’s waterfront.

Building on previous success

Major projects demand thoughtful planning. The tunnel’s cost estimate was developed using the same method that has helped WSDOT deliver 90 percent of gas tax projects early or on time and 94 percent on or under budget. We use outside experts to help establish a more comprehensive budget at the early stages of a project and identify risks that need to be actively managed. We also take into account project changes, mitigation, inflation and risk - something projects that experience cost overruns generally fail to do.

But sound estimates alone aren’t enough. Building a project of this size takes a world-class construction team. WSDOT selected Seattle Tunnel Partners – a joint venture of Dragados USA and Tutor Perini Corp. – to design and build the tunnel. Both firms have extensive backgrounds in delivering successful megaprojects, including similar tunnels, around the world.



Dragados successfully completed the 49.5-foot diameter Madrid M-30 South Bypass Tunnel in 2008 (top photo), and a nearly 40-foot diameter tunnel beneath the famed La Sagrada Familia in Barcelona (bottom photo).

Fast facts about the SR 99 tunnel

Construction timeline:
fall 2011 to late 2015

Contracting team: Seattle Tunnel Partners (Dragados USA and Tutor Perini Corp. joint venture, with Frank Coluccio Construction, Mowat Construction, HNTB Corp and Intecsa-Inarsa.)

Boring machine manufacturer:
Hitachi Zosen Corporation

Boring machine size:
326 feet long, 5,500 tons

Time to build the boring machine: 14 months

Contract type: Design-build for tunnel, design-bid-build for road construction at each end of the tunnel.

Cost: \$1.96 billion
(for all tunnel-related work)

Diameter: 57.5 feet

Length: 1.7 miles

Capacity: The tunnel will have an upper- and lower-deck. The northbound and southbound directions will each have two 11-foot lanes, with an eight-foot safety shoulder on one side of the roadway and a two-foot shoulder on the other side.

Tunnel construction in four not-so-easy steps

Because there are many ways to build a tunnel, choosing the right construction approach is important. The SR 99 tunnel will be bored using a specialized, five-story tall machine that digs its way through the soil, building the tunnel behind it as it goes.

Here's how we're building the tunnel:

1 Build the machine: The first thing you need is the right tool. In this case, we need a one-of-a-kind 57.5-foot diameter tunnel boring machine. Our machine is being designed and built by Japanese company Hitachi Zosen. The machine will first be assembled and tested in Japan. It will then be taken apart, shipped to Seattle and assembled near the stadiums, where it will start its historic journey beneath downtown.



Assembly of the M-30 tunnel boring machine in Madrid.

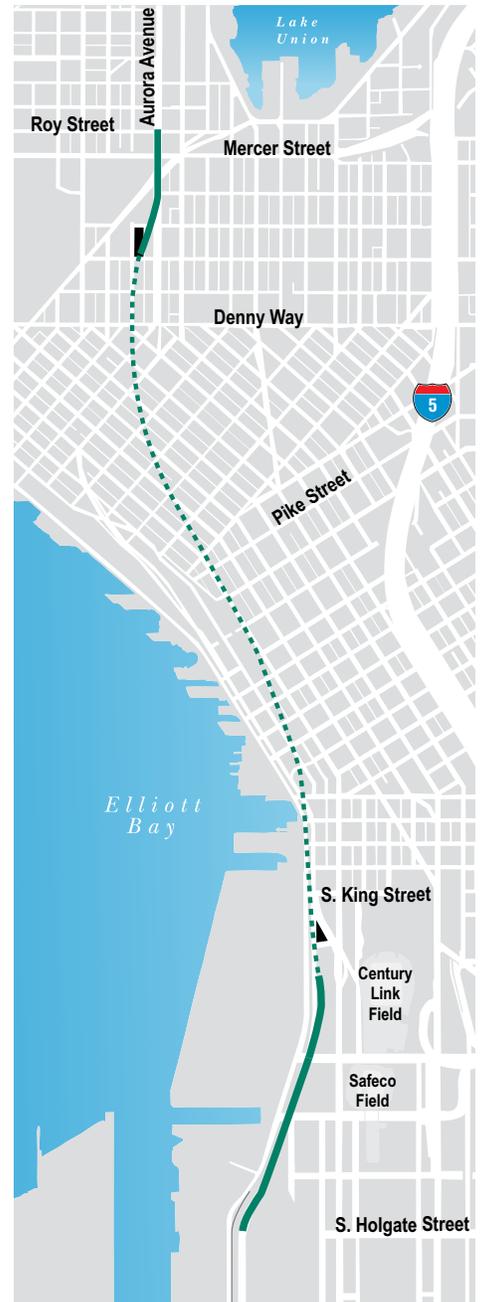
2 Dig the pit: While the boring machine is being manufactured, Seattle Tunnel Partners' crews will relocate utilities and dig what we call a



The M-30 launch site in Madrid.

launch pit – a 75 to 100 foot deep trench that will serve as the starting point for the boring machine. North of the launch pit, crews will build a protected area – basically, a 450-foot-long box – through which the machine will begin tunneling. The box will allow crews to ensure the machine is working properly in a controlled environment before tunneling begins under any buildings or structures.

New SR 99 corridor



The dashed line represents the tunnel route.

3 Dig, dig, dig: Once the tunnel reaches a depth of about 120 feet – just north of South King Street – the machine will be deep enough that the protective box is no longer needed. Crews will continually monitor conditions to protect above-ground structures as the machine bores beneath downtown. This includes initially driving the machine at a conservative pace, digging about six feet of tunnel per day before increasing to as much as 38 feet per day. Real-time monitoring of the amount of soil removed, along with soil improvements and other techniques, will help ensure unstable voids aren't created underground.

4 Tie up loose ends: Once the machine is tunneling beneath the city, crews will begin building new road connections at either end of the tunnel route. They'll also build the tunnel's interior roadway, and operations buildings at each portal to house ventilation and other maintenance equipment. When the boring machine emerges from the soil at the north end of the route, the hardest work will be over.



The SR 99 tunnel will have two lanes with an eight-foot safety shoulder in each direction.

Construction timeline

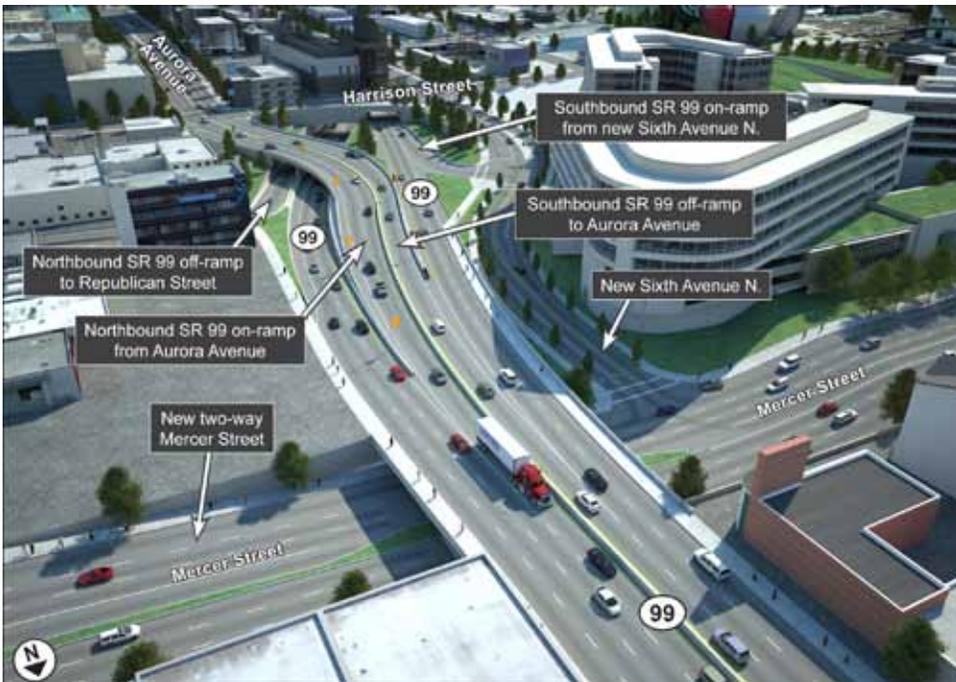
2011	2012	2013	2014	2015
	Utility relocation			
	Portal construction			
	Bore tunnel and build interior roadway			
			Open SR 99 tunnel to traffic	

Future SR 99 access in Seattle

SR 99 drivers approaching the tunnel will face a choice depending on their destination: use the tunnel to bypass downtown or exit to city streets and head into downtown. At the tunnel's north end, access to downtown will be similar to today, with on- and off-ramps near Seattle Center. From the south, ramps from SR 99 will connect to a new waterfront street, which will serve as the primary route into downtown.



South portal



North portal

Top: The SR 99 tunnel's south portal will include entrances and exits to SR 99 in both directions, improved connectivity between SR 99 and I-5/I-90, transit routes and improved bike and pedestrian access.

Bottom: The SR 99 tunnel's north portal will include on- and off-ramps between Harrison and Mercer streets and a new Aurora Avenue surface street between Denny Way and Harrison Street with signalized intersections at John, Thomas and Harrison streets and two transit stops in each direction.

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