

## **Introduction**

Since the Nisqually Earthquake in 2001 when the Alaskan Way Viaduct (AWV) was damaged, the Washington State Department of Transportation (WSDOT) has been working with the City of Seattle and others to select an acceptable replacement.

In December 2008, an agreement was reached by the project partners to replace the existing elevated structure with a 54-foot outside diameter bored tunnel with dual levels of a two-lane roadway. Located to the east of the existing viaduct structure, the tunnel would enter a portal north of S. Royal Brougham Way in a deep cut-and-cover section and follow under First Avenue past the Pioneer Square neighborhood. The tunnel would continue under First Avenue in a northwest heading and turn north in a gentle curve beginning at approximately Stewart Street, passing diagonally to the street grid under the Belltown neighborhood. The tunnel would line up with Aurora Avenue and a portal would be constructed north of Denny Way that would allow the tunnel roadway to match the existing grade at Aurora Avenue at approximately Thomas Street.

To keep the public and drivers safe while the State of Washington, King County and the City of Seattle came to a meeting of the minds for the replacement of the main section of the viaduct along the waterfront, work has begun on critical safety projects including strengthening of selected columns, which has been completed, relocation of electrical and transmission lines off of the viaduct on the south end, and replacement of the southern most part of the original structure. This latter project will be constructed in stages, the first of which will be the relocation of subsurface utilities which will advertise in the spring of 2009. The second will involve replacement of the existing structure from S. Holgate Street to S. Royal Brougham Way, and is scheduled to be advertised in the fall of 2009. Only the second of the two projects will be discussed in detail during the workshop, and only to the extent that it connects to the future tunnel, and also connects to a temporary detour around the tunnel staging area in the vicinity of King Street.

## **Purpose and Scope**

The purpose of this three-day workshop is to review the planned construction program for replacing the existing Alaskan Way Viaduct and to suggest alternative construction sequences and contraction packages for the various construction components that make up the AWV Program.

While the overall AWV Program includes the ultimate removal of the elevated roadway along the Seattle waterfront and the restoration and rehabilitation of the roads and landscaping along the waterfront, this workshop is focused solely on constructing the single bore, and related structures.

The major elements of construction that this workshop will include in its deliberations can be summarized as follows. Note that the work descriptions that follow are not intended to imply preferred contract packaging or work sequencing.

1. **S. Holgate St. to S. King, St. – Stage 2:** Replacement of the existing AWV structure from S. Holgate Street to S. Royal Brougham Way. This work is in final design with a

scheduled advertisement date of August 2009. It is assumed at this time that the Holgate-to-King Contractor will also construct the detour structure to the west of the existing viaduct and demolish the Railroad Avenue ramps after SR-99 traffic is detoured to the temporary bypass.

2. **The South Tunnel Portal consisting of a cut-and-cover structure between S. King Street and the WOSCA\* site just south of Railroad Avenue.** For purposes of discussion, it is assumed that this work includes a shored excavation on the WOSCA site of sufficient length to accommodate the tunnel boring machine (TBM) and all required trailing gear. Utilities along the alignment of the cut-and-cover structure will either be supported in place or temporarily relocated and replaced.
  3. **Tunnel boring from S. King Street to the North Portal.** This work description assumes:
    - A lubricated face (slurry) TBM with associated slurry recovery plant
    - Pre-cast concrete segmental one-pass liner
    - Erection of the TBM on the WOSCA property but actual launching it from a bulkhead at King Street
  4. **North Portal:** A relief shaft to accommodate the removal of the TBM at the conclusion of the tunnel drive.
  5. **An interior concrete structure from one end of the pre-cast liner** to the other, that will accommodate two lanes of traffic on the upper deck and two lanes on the lower deck with emergency evacuation stairway between levels every 600 feet along the alignment. The structure may be cast-in-place (CIP), pre-cast, or a combination of the two.
  6. **A cut-and-cover structure from the North Portal (relief shaft) to a point north of N. Mercer Way** where it will merge with the existing SR 99 roadway. The cut-and-cover structure will consist of a “weave” that will bring the upper roadway (southbound) and the lower roadway (northbound) to the same grade at the merge point.
  7. **Construction of a similar weave at the South Portal (King Street) to a connecting point to the new at-grade structure on S. Royal Brougham Way**, built as part of the S. Holgate-to-S. King St. Stage 2 Project (See 1. above). This work includes on and off ramps to and from SR 99 and First Avenue South.
  8. **Construction of two ventilation buildings—one in the vicinity of the South Portal and one in the vicinity of the North Portal.** It is assumed that each of the ventilation buildings will house a new power substation.
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WOSCA – Washington Oregon Shippers Cooperative Association: The name of the future site of the South Portal, bounded by 1st. Ave South, Railroad Avenue, S. Royal Brougham Way, and the existing Viaduct

9. **Tunnel systems work** including power, lighting, ventilation, fire alarm and interconnected fan controls, deluge system, signals and communications. Tunnel systems includes ventilation fans and drainage pumps and piping.
10. **Temporary detour roads at the north portal** that will take traffic off of SR 99 north of N. Mercer Way and direct it into the existing Battery Street Tunnel during construction of the cut-and-cover structure.
11. **Reconstruction of First Avenue South** from King Street to the WOSCA property including replacement/reconnection of utilities.

### **Miscellaneous Administrative Constraints, Assumption and Allowances**

As stated earlier, the focus of this workshop is on construction packaging and work sequencing. While the AWV Program management welcomes input and can consider pros and cons of the selected alternative, the Program is working under some very real constraints that should be understood by workshop participants:

**A.** Traffic on SR 99 must be fully restored by December 2015. Work on other elements of the AWV Program may continue on after December 2015 but will not be considered as part of this workshop. Those future components include:

- Demolition of the viaduct from King Street to the Battery Street Tunnel
- Restoration of the Central Waterfront roads and landscaping
- Reconnection of city streets affected by the removal of the viaduct
- The replacement of the seawall
- Decommissioning of the Battery Street Tunnel
- Restoration of the detours at the north and south portals

**B.** The tunnel will be 54 feet in diameter (outside face), have two lanes of traffic in each direction, and follow First Avenue from the WOSCA site to a connecting point to SR 99 past the Battery Street Tunnel.

**C.** A critical measurement of success of this program is minimizing the shutdown of traffic on SR 99 during construction. The working constraints to meet these objectives are:

- Maximum closure of SR 99 at both the south and north portals to accommodate construction is one month.

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- Traffic speeds on SR 99 shall be maintained at 40 mph except at the transition structure connection at King Street which can be 25 mph for the duration of the project.
- On-off ramps to and from SR 99 at the south end must be maintained during construction
- On the north end, the Denny Way on-off ramps may be closed but southbound off access to city streets must be maintained.

D. An environmental impact statement (EIS) on the tunnel alternative is just getting underway. A Record of Decision (ROD) is not expected until October 2011. Until that time, work on the project is limited to the following:

- Design sufficient to support the environmental process.
- Soil borings (in support of the environmental process). Only limited boring information is currently available along the preferred alignment.
- Building foundation inventory (in support of the environmental process)
- Right of way acquisition. (Note: property can be acquired during this period if the sellers are willing. If sellers are unwilling to sell, property cannot be condemned until after issuance of the ROD. )

- The Federal Register, Vol. 72 No. 156 Dated August 14, 2007 states that projects agreements may be executed for design-build projects for preliminary design prior to the issuance of a ROD. Final design and construction must wait until the conclusion of the NEPA process.
- That same Federal Register section states that final design activities under the design-bid-build method of contracting can proceed so long as those activities include no Federal funding and the State understands that its preferred alternative could ultimately be rejected.

E. Bringing documents from preliminary engineering to construction advertisement, can take from 9 to 18 months depending on the scope of the work. A project that is at 100% complete design will take approximately 6 months to go through the review/bid/award process.

F. First Avenue S. may be closed to vehicular traffic from King Street to Railroad Avenue for up to 18 months in order to expedite construction of the cut-and-cover structure, launch the TBM, and restore the street.

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## Attachments

Following are attachments for review prior to the workshop.

Attachment 1

Workshop Agenda

Day 1  
Day 2  
Day 3

Attachment 2

Overall Alignment. This attachment shows the alignment in completed form. See other attachments for staged layouts. Included is a cross-section of the 54-foot funnel, and a geologic profile of the alignment based on information known to date.

Attachment 3

Component Layouts

Attachment 3A – Holgate-to-King – Stage 2. This project is in final design. Proceeding with this work will be unaffected by the ROD because it was authorized separately, as it was deemed necessary regardless of the final AWV replacement program selected. Construction is expected to begin in February 2010.

Attachment 3B – Side-Connection Alternative. This layout was selected as the detour of SR 99 traffic around the South Portal during construction of the cut-and-cover/TBM site development stage of the work. This work will be included in Holgate-to-King Stage 2 contract prior to bidding.

Attachment 3C – South Portal Cut-and-Cover Layout. This sketch illustrates the installation of secant piles, struts and decking between King Street and the WOSCA site in preparation of the launch of the TBM. It includes a shored excavation for the TBM and trailing gear, and assumes that the TBM will be constructed in the open at the WOSCA site and moved into place at King Street on a specially designed cradle.

Attachment 3D – South Staging Area showing the layout of the slurry recovery plant for the tunneling operator and concrete segment storage, and the area for staging the Holgate-to-King St. Stage 2 work during that time they are both working at the same time.

Attachment 3E – South End “Weave” Layout. This plan shows the plan and profile of the connection from the bored tunnel to the completed Holgate to King St. Stage 2 structure. Only the “weave” structure and the on-off ramps need to be constructed prior to December 2015. The local streets shown on the plan can be constructed after 2015. Note that a site for the ventilation structure has not yet been selected.

Attachment 3F – North Portal/Detour/Weave Layout (Alternative E). This drawing shows the detour of the SR 99 traffic through the Battery Street Tunnel during construction of the new cut-and-cover roadway. It also shows the termination point of the TBM and the final alignment of the

new “weave” roadways. Note that a site for the ventilation structure has not yet been selected.

Attachment 4      Program Schedules

Attachment 4A – Bar Chart of Construction Components 1 through 10 previously described.

Attachment 4B – North Portal Flowchart

Attachment 4C – South End Flowchart, including:

- Early Construction Activities (Electrical ductbank relocation is under construction; Holgate-to-King Stage 1 utility relocation is scheduled for summer 2009)
- Holgate-to-King Stage 2
- TMB Procurement/Setup/Tunnel Drive
- South End Cut-and-Cover Structure

Attachment 4D – Gantt Chart

Attachment 5      Preliminary Geotech Report

Attachment 6      4-D Model of Program Component

**Deleted: Attachment 7 Contract Packaging¶**  
Since the purpose of this workshop is to solicit input on work sequencing and contract packaging, internal discussions relative to these issues will not be included here, with the exception of the tunnel bore itself. Because of the constraints imposed by the timing of the ROD, it has been determined that the only feasible contracting strategy for tunneling that will assure a useable roadway by the end of 2015 is to employ the design-build process. This means a Design-builder must be on the job by January 2011 when the ROD is expected to be issued. The Design-builder will, as a minimum, complete the design, procure the TBM, prepare the site (including the cut-and-cover portion), and bore the tunnel (including disposal of soil and installation of the liner). Beyond that, packaging of all other work is open for discussion.¶