

**PORT OF SEATTLE**  
**MEMORANDUM**

**COMMISSION AGENDA**  
**STAFF BRIEFING**

<b>Item No.</b>	<u>7a</u>
<b>Date of Meeting</b>	<u>April 1, 2014</u>

**DATE:** March 14, 2014  
**TO:** Tay Yoshitani, Chief Executive Officer  
**FROM:** Michael Ehl, Director, Airport Operations  
Wayne Grotheer, Director, Aviation Project Management  
**SUBJECT:** Airport Service Tunnel Renewal/Replacement

**SYNOPSIS**

The Airport Service Tunnel is located below the Airport arrivals drive, and runs the full length of the main terminal. The tunnel supports the entire arrivals drive, critical portions of the departure drive, houses a range of utilities essential to main terminal operation, and provides access to the Central Loading Dock and Central Heating Plant. The loading dock and heating plant reside in the middle of the tunnel, in the Central Area Structure, which has already been seismically upgraded in 1997. The 2,500-foot-long tunnel was designed, constructed, and commissioned in phases between 1968 and 1974. The Airport Service Tunnel Renewal/Replacement project will bring the service tunnel structures up to current seismic code and improve their earthquake safety. The work is part of an ongoing program of seismic upgrades at the Airport that was accelerated to include the Airport's roads and bridges following the Nisqually earthquake in 2001. Work would include improvements to shear walls, improved column footings, beam reinforcement, and additional seismic bracing. Ongoing seismic upgrades at the Airport have included upgrades to the main parking garage (1990), the central loading dock area (1997), main terminal baggage and ticketing (1998 and 1999), Airport roads and bridges (2001), and additional main terminal seismic retrofitting (2004).

Staff will return to request Commission authorization to use design-build contract delivery methodology and to develop preliminary design documents for this project on April 22. This approach would allow staff to solicit and select a consultant team with design-build contracting, structural design and geotechnical engineering experience to do the preliminary design. The consultant would identify and perform initial design on the seismic upgrades needed, and prepare the preliminary design specifications and planning documents that will be used as the bridging documents to solicit, bid, and award a major works design-build contract.

**BACKGROUND**

The service tunnel structure is complex, consisting of four different structural support systems in seven different locations shown in Attachment A. One area, the Central Area Structure, was upgraded in 1997 as part of the Ground Access and Seismic Improvements

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project. The Service Tunnel Renewal/Replacement project will address the six remaining portions of the service tunnel that have not been upgraded.

In 2009, Kennedy/Jenks Consultants completed a condition assessment of the parking garage and service tunnel to determine long-term major maintenance and seismic reinforcement needs. The condition assessment identified a number of seismic vulnerabilities in every portion of the service tunnel, with the exception of the loading dock area.

### **CRITICAL NEED**

The service tunnel is an essential Airport facility and is structurally linked to other critical Airport infrastructure. For instance, the roof of the service tunnel forms the Airport's arrivals drive, and supports portions of the departures drive. The tunnel provides critical secured access to the Central Heating Plant and its supporting infrastructure, the central loading dock for the terminal used by commercial delivery vehicles, and the employee busing operation. The tunnel is the structural support for multiple critical utilities, offices, locker rooms, storage rooms, and emergency generators. The central loading dock was previously upgraded seismically in 1997. A catastrophic failure during a seismic event could significantly cripple Airport operations and those above and within the tunnel.

The service tunnel is one of the remaining major pieces of essential Airport infrastructure that has not been strengthened or upgraded to current seismic building codes. The tunnel was built by two contractors: the Main Terminal contractor and the North Airport Expressway contractor. The Main Terminal contractor was responsible for construction immediately in front of the terminal structure. The airport expressway contractor was responsible for those portions of the tunnel extending beyond the terminal and interfacing with the regional highway network.

The portions of the tunnel built by the terminal contractor were constructed to the seismic building code standards of the time, but not to the more robust roadway seismic standard. Seismic standards have changed greatly since the construction of the service tunnel, and an update is needed. Retrofitting the service tunnel will improve its survivability and strength, while also extending the service life of the facility.

Without seismic upgrades, there are unreinforced portions of the service tunnel that will be at risk of severe damage and/or localized failure during a seismic event. This in turn could lead to localized failure of the departures drive. The 2009 Kennedy/Jenks study indicated that each section of the service tunnel had unique seismic deficiencies, with the transition structures between the cast-in-place concrete sections and the sections supported by structural framing being the areas of greatest risk. There are also failing expansion and construction joints that are causing water-related deterioration and damage to the tunnel. Unique design solutions will be required for different sections of the service tunnel since the structural designs vary.

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Proposed improvements will include the strengthening of columns and their footings, structural beam reinforcement, tying structural beams together, and adding shear walls and panels. Other critical repairs within the tunnel include improving the drainage and repairing failed structural and expansion joints that are allowing backfill material to move through joints in the tunnel walls.

### **DESIGN-BUILD PROJECT DELIVERY**

The service tunnel is a critical facility for Airport operations and must remain open with limited disruptions 24 hours a day, 7 days a week. As a result, staff is recommending the use of design-build contract delivery methodology. The project would benefit from designer-contractor collaboration to create opportunities for greater innovation, efficiencies, unique design solutions, and highly specialized construction approaches to improve constructability and phasing that are critical to minimizing operational impacts during construction. Additionally, using a design-build approach allows the project to design a segment, evaluate the efficacy of that design, and develop specific construction techniques and staging strategies to construct that segment. This approach can then be used to refine the design and construction methods of subsequent similar tunnel sections.

### **ATTACHMENTS TO THIS BRIEFING**

- Attachment A – PowerPoint slides.

### **PREVIOUS COMMISSION ACTIONS OR BRIEFINGS**

- March 27, 2007 – Parking Garage/Service Tunnel Pre-Design authorized.