DATE: December 29, 2008

TO: Dave Dye
Ron Paananen

FROM: John White

CC: Craig Stone
Matt Preedy
Theresa Greco

SUBJECT: SR 99 Deep Bored Tunnel

BACKGROUND

In response to your request for additional information on a single deep bored tunnel under downtown Seattle as a replacement for the Alaskan Way Viaduct, the program team has prepared this briefing paper. Based on this preliminary analysis, the team believes that a single bored tunnel is the most likely cost effective tunnel option (compared to a twin bored tunnel) and was the main focus of this review. More investigation is required to confirm this preliminary finding. The briefing paper covers the following topics:

1) Transportation function provided by a four-lane deep bored tunnel
2) Cost estimate for a deep single-bored tunnel
3) Schedule for opening a deep bored tunnel to traffic
4) Potential options for funding a deep bored tunnel

CONCLUSIONS

- Constructing a deep bored tunnel will maintain capacity for trips through downtown Seattle and provide room for growth in those vehicle trips expected to occur by 2030.
- A deep bored tunnel would be open to traffic by early 2017 if a decision is made to proceed in early January 2009. The existing viaduct can be taken down by 2012 as currently planned or remain in place to provide capacity during construction.
- Preliminary cost estimates for a single bored tunnel shows the possibility of achieving cost savings compared to a twin bored tunnel. More work is needed in early 2009 to confirm this finding.

DISCUSSION

Proposed deep bored tunnel. A deep single bored tunnel would connect to the new south mile of SR 99 (from Holgate St. to King St.). It would connect to Aurora Avenue at the north end of the Battery Street Tunnel. The alignment of the tunnel would be under First Avenue to avoid other tunnels (bus, rail, sewer, water) under downtown Seattle.

The tunnel would be approximately 9,000 feet in length and would be a single bore that is approximately 54 feet in diameter. The tunnel would accommodate four lanes of traffic (two lanes in each direction) plus shoulders and tunnel systems (ventilation, emergency access).

In the current location of the viaduct, a four-lane surface street would be constructed with a surface street connection to Elliott and Western Avenues, replacing an essential link to the Ballard, Interbay and Magnolia areas of northwest Seattle. It is assumed that the seawall replacement, utilities relocation, and investments in I-5, transit, city streets, and demand management strategies will be implemented independently by other programs or agencies.

Deleted: the

Deleted: existing Battery Street Tunnel.

Through traffic on SR 99 would be on a limited access road from Denny Way to Spokane Street. Traffic from Ballard, Interbay, and Magnolia that use the existing viaduct via the Elliott/Western ramps would move through downtown Seattle in a different way. Those drivers would either take Alaskan Way to travel through downtown, or access the deep bored tunnel via Mercer Street (east to southbound direction only). Access from the south into downtown Seattle would be served by new ramps near the sports stadium (removal of the mid-town ramps at Columbia and Seneca have been assumed in all scenarios evaluated to date).

Deleted: no longer have that option

Transportation performance of a bored tunnel. Public safety would be improved compared to the existing viaduct.

- The Battery Street Tunnel, which has limited sight distance, short ramps, narrow lanes, and no shoulders, would no longer serve high volumes of traffic.
- The existing viaduct also has narrow lanes and shoulders. The deep bored tunnel would have lane and shoulder widths that more closely match today's safety standards.
- Generally grades in and out of the tunnel would be six percent or less, which would meet state and federal design guidelines.
- The tunnel would be designed with modern safety features that comply with national fire protection safety standards.

Capacity for trips through downtown Seattle would be maintained and their travel times would increase by up to two minutes due to population growth expected by 2030.

- Approximately 65 percent of traffic using the viaduct today is through trips (trips that do not begin or end inside the downtown area). The bored tunnel would carry a higher percentage of through trips (75 percent) by 2015.
- Trips that use the viaduct today to travel through downtown Seattle take between five and a half and seven minutes during peak travel times. In a deep bored tunnel, these trips would take between five and six minutes in 2015.
- Predicted population growth is expected to increase traffic by up to 11 percent by 2030. This could add up to two minutes to travel times for through trips during the peak periods.
- Today there are approximately 91,000 vehicles each day on the viaduct (measured north of Seneca Street); a deep bored tunnel will carry approximately 80,000 to 85,000 vehicles at the same location. The lower volumes are due to the removal of the Elliott/Western ramps.

Trips from Ballard, Magnolia, and Interbay would no longer have direct access to SR 99 with a deep bored tunnel; this would lengthen the time it takes to make trips from those neighborhoods through downtown Seattle.

- Trips from northwest Seattle neighborhoods (Ballard, Interbay, Magnolia) that would no longer have direct access to SR 99 would experience longer trip times.
- Those trips take between two and three minutes today; they would take between seven and eight minutes in 2015 if they took a four-lane surface street on the waterfront. Trips times could increase by up to another three minutes by 2030 due to population growth.

Trips from West Seattle would experience longer travel times to downtown Seattle, due to the removal of the mid-town ramps at Columbia and Seneca (assumed in all scenarios evaluated). Travel times for West Seattle trips through downtown to the north would be slightly shorter than today.

Comment [A1]: Chris- can you confirm this?

The travel demand modeling results for the deep bored tunnel assumed minimal investments in I-5 and city streets, a baseline level of demand management strategies and transit service enhancements. These investments have little effect on through trips that would choose to stay on SR 99 if it is maintained as a deep bored tunnel. Therefore if those investments are not made there is expected to be little effect on the transportation performance of the bored tunnel.

Building a deep bored tunnel. Completion of an environmental impact statement is required before construction of a deep bored tunnel can begin. Work on the environmental review process began in July 2008 with the issuance of a notice of intent and purpose and need statement. Scoping comments have already been solicited from the public and agencies.

We believe this earlier work can be used as the initiation of the environmental review of a deep bored tunnel. As required by the National Environmental Policy Act, more than one alternative needs to be evaluated in the environmental impact statement. We propose that a new elevated structure on the waterfront be the second alternative. Other options evaluated, such as a surface and transit option and cut and cover tunnel, could be dropped from further consideration based on future transportation performance and construction impacts.

If work begins in early January on the environmental review of a bored tunnel, then the draft environmental impact statement could be published in December 2009 for public review; a final impact statement released in September 2010; and a Record of Decision signed in December 2010. There is an opportunity to shorten this schedule if a decision is made to not accept federal funding for the central waterfront replacement of the viaduct. This would create a situation where the State Environmental Policy Act would guide the environmental review process.

A single bored tunnel could be open to traffic by early 2017 assuming an aggressive schedule and funding is available as needed. No assumption has been made about the existing viaduct. It could be removed by 2012 as currently planned or remain standing until the bored tunnel is open to maintain traffic in the SR 99 corridor. Maintaining traffic on SR 99 during construction would create higher construction risks at the portal locations and may increase the preliminary cost estimates below.

The cost estimates provided below are preliminary and have not been through a Cost Estimate Validation Process, which is a standard procedure for all large projects managed by WSDOT. The methodology for preparing these estimates has closely followed the methodology of CEVP

by establishing a base estimate for construction costs and adding factors for risks, contingency, and inflation that are likely to occur. These numbers are also based on conceptual designs; preliminary design and a complete CEVP are needed to confirm these costs.

Essential Elements – SR 99 Single Bored Tunnel	**Planning Level Estimate**
Construction Costs	$850 to $961 million
Contract and Construction Management; Final Design	$162 to $300 million
Contingency and Risk	$325 to $547 million
Inflation	$208 to $281 million
Right-of-way Costs	$40 million
Total Tunnel Costs	**$1,585 to 2,130 million**
Viaduct Demolition and Traffic Mitigation	
Alaskan Way Restoration (Four-Lane Surface Street)	
Total Program Costs	

Comment [MR2]: I haven't seen these costs anywhere, but seems like we should say what they are or if they are embedded somewhere else, where they are accounted for. Gordon's estimate only had the couplet costs -- $133 to $180 million

These costs do not include the costs of the following items:

Other Elements	**Planning Level Estimate**
Seawall replacement	$189 to $256 million
Waterfront utility relocation	$41 to $56 million
Waterfront streetcar	
Transit	$9 to $12 million
Other city street work	$49 to $66 million
Other	$83 to $112 million
Other Costs	**$503 to $682 million**

Comment [MR3]: Gordon's spreadsheet had an estimate for transit, but nothing for the waterfront streetcar – are they the same thing?

Paying for a Deep Bored Tunnel. The state has committed $2.8 billion to pay for a viaduct replacement. Currently $1.1 billion has been committed or spent for the Moving Forward Projects, which replace or repair over half of the viaduct. This leaves approximately $1.7 billion in state investment.

Charging tolls to drivers in a four-lane bored tunnel through downtown Seattle would support an additional $410 million in project funding between 2014 and 2018. Tolling the existing viaduct during construction would raise another $140 million in pay-as-you go project funding. This would bring the total funding contribution of tolling SR 99 to $550 million.

Tolling SR 99 during and after construction would increase the total possible state funding available for a deep bored tunnel to $2.25 billion. Tolling is expected to divert some trips to other routes such as the downtown street grid or I-5. Preliminary studies have indicated the diversion rate could be from 35 to 40 percent depending on the toll rate.

What should we say about federal funding? Stimulus package?

Other potential funding sources have been identified, including a local improvement district for property owners who would benefit from new open space on the central waterfront; local public utilities paying for utility relocation; open space funds; and Port of Seattle funding. The amount and likelihood of these funding sources have not been explored recently, although the Port of Seattle has expressed interest in discussing the funding plan for a capacity replacement.

NEXT STEPS

If a decision is made to pursue a deep bored tunnel as a replacement for the Alaskan Way Viaduct, we recommend the following steps be taken by the program team:

- Complete a three-month tunnel feasibility study to confirm preliminary findings about the cost and alignment of a single bored tunnel.
- Continue environmental review process
- What else?

ATTACHMENTS

1. Single bored tunnel alignment and profile