

Alaskan Way Viaduct Replacement Program Expert Review Panel Updated Report

February 27, 2014

THE ALASKAN WAY VIADUCT REPLACEMENT PROGRAM

Updated Report of the Expert Review Panel

February 2014

The enclosed Report conveys the findings of the Expert Review Panel (“ERP”) instituted under the provisions of Bill 1175 to assess the viability and feasibility of the Alaskan Way Viaduct (“AWV”) Replacement Program’s (“Project”) Finance Plan and to review key assumptions for the Project’s schedules, risk identification and management, and cost estimates to assure they are reasonable.

The ERP continues to be confident that the Project is on course to be successfully completed. As we discuss in detail in our Report, this confidence is tempered by the understanding that (a) the re-commencement of tunneling will present important challenges that may impact budget and schedule; (b) the Project’s success continues to depend on maintaining positive relationships with key stakeholders, the tunnel contractor, Seattle Tunnel Partners (“STP”), and government agencies; and (c) actions are still needed to secure important funding sources.

Current challenges notwithstanding, the ERP finds that, based on information available to us, the Project is likely to be completed, within the existing budget, and on a schedule that is somewhat delayed. As with any project of this size and complexity, challenges remain that could adversely affect the Project. This 2014 Report offers recommended actions that would keep the Project moving toward successful completion.

The ERP’s recommendations have been developed to enable the Governor and Legislature to take action as it deems necessary to allow the Project to continue to move forward efficiently, while at the same time enabling the Project to achieve the goals envisioned by all who will benefit from the AWV Project at the local, regional and state levels.

The ERP stresses that it is not uncommon for issues to arise in tunnel projects. The Project continues to benefit from decisions and actions taken in anticipation of such issues. It was appropriate that Washington State Department of Transportation (“WSDOT”) retained a world class tunnel contractor that would understand how risks are identified, managed, and dealt with as they arise. It is important that WSDOT has engaged STP’s services through a design-build contract which establishes expectations and accountability for both parties. It is very useful that a risk management plan was developed that identified potential risks along with actions that could be taken to mitigate such risks and the potential monetary and delay impact of those risks. WSDOT and the citizens of Washington will now be best served by WSDOT using the contract provisions to manage the work, asking appropriate questions but also taking advantage of the tunnel contractor’s expertise.

Because of the significant amount of work to be conducted over the next several months, and in consideration of the current status of the Tunnel Boring Machine (“TBM”), the ERP strongly recommends that the Governor and Legislature consider a semi-annual ERP review and use the ERP for advice regarding issues as needed in accordance with the ERP’s charge.

The ERP deeply appreciates WSDOT's responsiveness and support throughout our review. We were continually impressed with the skill and experience WSDOT staff brought to this process. We also commend the Governor and the Legislature for their continued commitment to this Project, since without their leadership, rebuilding this key public infrastructure would be impossible.

Dr. Patricia D. Galloway, P.E., Chair

John Rose

Robert Goodfellow, P.E.

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ACRONYM AND ABBREVIATION LIST

<i>Acronym/Abbreviation</i>	<i>Full Definition/Listing</i>
ACTT	Advisory Committee on Tolling and Traffic Management
AWV	Alaskan Way Viaduct
CEVP	Cost Estimate Validation Process
City	City of Seattle
Code	Code of Practice for Risk Management of Tunnel Projects
DBE	Disadvantaged Business Enterprise
DMR	Deformation Mitigation and Repair
DSC	Differing Site Condition
ELG	Executive Leadership Group
ERP	Expert Review Panel
FHWA	Federal Highway Administration
ITIG	International Tunnel Insurance Group
JTC	Joint Transportation Committee
MVFT	Motor Vehicle Fuel Tax
PDA	Preservation & Development Authority
POC	Program Oversight Committee
Port	Port of Seattle
Project	Alaskan Way Viaduct Replacement Program
RMP	Risk Management Plan
STAT	Strategic Technical Advisory Team
STP	Seattle Tunnel Partners
TBM	Tunnel Boring Machine
WSDOT	Washington State Department of Transportation

1. EXECUTIVE SUMMARY

This February 2014 Report is the second annual update of the Expert Review Panel's ("ERP") initial report published in February 2012, regarding the viability and feasibility of the Alaskan Way Viaduct ("AWV") Replacement Program's ("Project") Finance Plan and key assumptions for the Project's schedule, risk identification and management, and cost estimates. The ERP's first annual update was issued on February 27, 2013.

The ERP was originally appointed in September 2011 by the Governor and Legislature under the provisions of ESHB 1175. The ERP at that time was asked to update a previous expert review panel's 2006 report and to conduct an independent financial and technical review of the Project's key assumptions, Finance Plan and Risk Management Plan ("RMP").

The ERP was re-authorized by the 2013 Legislature. ESHB 5024.PL, Section 306, Proviso 10 provided that:

"The department shall reconvene an expert review panel of no more than three members as described under RC 47.01.400 for the purpose of updating the work that was previously completed by the panel on the Alaskan Way viaduct replacement project and to ensure that an appropriate and viable financial plan is created and regularly reviewed."

The \$3.1 billion AWV megaprogram is comprised of several individual project elements including:

- Previously completed projects essential to the viaduct's replacement including, but not limited to, the removal and replacement of the viaduct from Holgate to King streets;
- The central viaduct replacement project including a design-build deep-bored tunnel contract;
- Other smaller projects including projects that tie-in the south and north end of the deep-bored tunnel contract; and,
- Post-tunnel projects, including demolition of the existing viaduct, de-commissioning of the Battery Street Tunnel and relocation of the Alaskan Way surface street.

The ERP's reports have reviewed the Project's Finance Plan for its viability and feasibility, identified risks that might impact the attainment of Project goals and objectives, and recommended actions to mitigate risks and contribute to the Project's success. Topics reviewed in this update include:

1. The Project's updated Finance Plan, including adopted and requested budgets, to ensure that it (a) clearly identifies secured and anticipated funding sources; and (b) is feasible and sufficient;
2. The Project's implementation, including schedule status, risk identification and risk management practices, project management practices, and the current status of tunnel construction; and,
3. The Project's relations with stakeholders and other parties important to the Project's overall success.

This Report will identify the ERP's general findings and provide recommendations for keeping the Project moving toward successful completion.

1.1 General Findings

The ERP is confident the Project can be successfully completed based on its current course. However, this confidence is tempered by the understanding that (a) the re-commencement of tunneling will present important challenges that may impact budget and schedule; (b) the Project's success continues to depend on maintaining positive relationships with key stakeholders, the tunnel contractor Seattle Tunnel Partners ("STP"), and government agencies; and (c) actions are still needed to secure important funding sources.

Current challenges notwithstanding, the ERP finds that, based on information available to us, the Project is likely to be completed within the existing budget on a schedule that is somewhat delayed. As is true for any project of this size and complexity, challenges remain that could adversely affect the Project. This February 2014 Report provides recommendations that would keep the Project moving toward successful completion.

The primary findings of the ERP as of the date of this Report include:

Funding Sources

- The recent binding agreement with the Port of Seattle ("Port") has provided certainty to the Project for that source of funding.
- Toll Revenues are not yet secured. The Advisory Committee on Tolling and Traffic Management ("ACTT")'s draft 2014 report is a good start, but important decisions have yet to be made to allow toll funding to be secured for the Project.
- Transit funding has not been secured to mitigate impacts during the remainder of the construction of the Project.

Budget

- Based on information available to the ERP, the current budget is likely sufficient to complete the Project.
- Project contingency funds are likely to be sufficient to cover future changes, provided that expected savings on individual projects are achieved and contingency funds are not used to pay for items that are outside the current scope of the Project.

Project Management

- The Washington State Department of Transportation ("WSDOT") has implemented several of the ERP's February 2013 recommendations, and with its partners, has achieved significant successes since the ERP's February 2013 report.

- The Project’s management has successfully completed multiple contracts within the overall Project on time and within budget.
- Changes to the Project’s leadership have resulted in a loss of institutional knowledge and prior stakeholder relationships, which has led to potentially detrimental misunderstandings with Project stakeholders.
- Especially at this point in time, additional turnover in Project leadership could be harmful to the Project, as the tunnel project has entered into a critical phase.
- The ERP finds that the Project has not benefitted from an open exchange of technical ideas and information between WSDOT and STP. For example, WSDOT has retained a Strategic Technical Advisory Team (“STAT”) that provides quarterly reports containing technical observations, opinions and recommendations for action. These reports have not been formally discussed with STP.

Risk Management

- The Project’s risk management processes continue to be adequate to successfully manage this megaprogram. Cost and schedule are tracked with direct reference to the risks impacting each component of the Project.
- The risk management process continues to identify various risks that could emerge over the course of the Project along with their potential impact to cost and schedule. These risks, as noted by the ERP in its earlier reports, are typical for tunnel megaprojects.
- WSDOT and STP have accepted a previous ERP recommendation from 2012 and 2013 to jointly assess, mitigate, and track risks and identify their potential impact to the Project. This leads to a jointly reviewed and updated risk management process that should significantly enhance this process, creating an extremely useful dialog moving forward.

Tunnel Boring Machine

- The launch and early operation of the Tunnel Boring Machine (“TBM”) was a success. In spite of a late start to tunneling and other delays to the tunnel project in late 2013, the TBM position on December 6th when it stopped was within two feet of its originally scheduled location. This indicates significantly better than expected performance of the TBM while it was mining.
- The current stoppage of the TBM is a significant concern that will likely impact the opening of the tunnel by some months after STP’s proposed contract completion date of December 31, 2015, but still earlier than the contract performance date of November 13, 2016. The ERP expects that fixes for the TBM can and will be implemented after concluding the investigation into causes of the stoppage. As of the writing of this Report, the ERP finds that STP is taking appropriate steps to resolve this issue.

- WSDOT has taken the appropriate steps to remain informed with regard to the TBM stoppage, and is prepared to assist STP as needed. In addition, WSDOT has appropriately not directed STP to pursue a particular course of action, as doing so could shift risk to WSDOT in a potentially negative way.

Relations with the Tunnel Contractor

- Several factors have strained the relations between WSDOT and STP, primarily at the executive level. If this relationship is not quickly repaired this critical relationship could be irreparably damaged, potentially adversely affecting successful completion of the Project.

Schedule

- The Project's completion date will probably be delayed. Time lost by the current tunnel stoppage can be partly mitigated by opportunities that have been identified by STP to gain back some schedule time. Based on the ERP's review, it appears that the tunnel will open in the first or second quarter of 2016, which is later than STP's proposed contract date of December 31, 2015, but earlier than the contract performance date of November 13, 2016.
- Given the commencement of the City of Seattle's ("City") Seawall project in the vicinity of STP's current work, contractor coordination and traffic management could have potential schedule or cost impacts to the State, the City and/or STP if not closely monitored.

Stakeholder Communications

- The Governor acted on the ERP's 2012 and 2013 recommendation to reconstitute a Program Oversight team and has constituted an Executive Leadership Group ("ELG") comprised of the major stakeholder decision-makers to encourage and facilitate communication among this group. Given the amount of change in the Project's leadership across the State, WSDOT, the contractor and key stakeholders, this initiative can assist in eliminating potential obstacles to Project success, educating new participants, and recreating relationships that were lost when individuals who filled these key leadership positions moved on.
- There have been significant improvements in WSDOT's cooperation with the City on the post-tunnel projects, but there remains an urgent need for a formal agreement regarding their respective expectations, roles and responsibilities as well as an agreed methodology for how post-tunnel projects will be funded. The ERP finds this agreement to be of critical importance to the State because: (a) the public may not differentiate between the City versus the State in executing this work, potentially affecting the public's view of the State's performance at the completion of its Project; (b) the successful completion of both the State's and the City's projects depend on both projects' timely completion; and, (c) the Waterfront Redevelopment project and the Seawall Replacement project are viewed by many in the public as being part of the AWV Project regardless of the fact that they are separate projects with separate funding sources.

- Communications with the press have sometimes led to unnecessary confusion and damaged relationships with partners and stakeholders.
- Staff turnover has contributed to key stakeholders' perceptions that less attention is being paid to their concerns or that prior understandings have been replaced.

1.2 Recommendations

Based on its independent review, the ERP makes the following recommendations:

Funding Sources

- Tolls: The Legislature and others should use the ACTT report as the beginning of the process to secure the use of toll revenues for the Project's capital budget. Legislative direction should be given as to acceptable amounts of traffic diversion and the priority for use of toll funds. Such direction could have a major impact and could potentially increase the amount of toll funds available for the Project's capital budget.
- Transit funding: The Legislature should act to extend funding for transit services that mitigate the impacts during construction. This funding should not come from the existing Project budget.

Project Contingency Funds

- Project contingency funds should be vigorously protected. Project scope should not be expanded at this time, and Project savings or unanticipated revenue should be retained in the contingency fund. Contingency funds will be adequate only if scope discipline is maintained. In addition, to strengthen the contingency's adequacy, any unanticipated savings from projects that turn out to cost less than budgeted should be returned to the contingency pool. For example, it is likely that the costs of replacing Alaskan Way will be less than originally budgeted. Such savings should at this time be used solely to replenish Project contingency funds.

WSDOT Project Management

- To limit unhelpful disruption that could negatively affect Project delivery, WSDOT should seek to avoid additional changes in Project management personnel and minimize staff turnover.
- WSDOT in collaboration with STP should set up a regularly scheduled open forum for discussion of technical issues. The results of these meetings would not be instructions to STP, but merely a means by which the collective experience of all parties can be brought to bear to benefit the Project. It would remain STP's responsibility to decide whether to implement the ideas raised in these meetings or otherwise. The benefits of these technical workshops/meetings are only realized when STP participates fully with responses to ideas presented, including reasons for rejections or acceptance of ideas.

Design-Build Contract Actions

- In order to facilitate effective communication and rebuild the relationship between WSDOT and STP, the ERP recommends that WSDOT revise its actions with regard to how it communicates with STP, reflecting a more commonly used megaproject-management practice. The ERP believes that the WSDOT Project Team would better manage communication as well as the project-level relationship with STP if a single point of contact was established and maintained. The ERP recommends the WSDOT Deputy Program Administrator responsible for engineering and the tunnel construction be assigned this role and responsibility.
- STP should be given appropriate time to develop a plan for restoring the TBM to operation. The question of financial liability should not interfere with the need to get the TBM moving again, nor should either WSDOT or STP be focused on financial liability at this time. Returning the TBM to operation should be everyone's primary objective.
- The ERP strongly urges WSDOT and STP to act quickly to find ways to resolve the Disadvantaged Business Enterprise ("DBE") conflict.
- WSDOT and STP executive management should identify actions and procedures that will restore a relationship of trust and cooperation. "Partnering" workshops planned for the near term should take place with full participation by executive and project leadership of both WSDOT and STP.

Schedule

- WSDOT and STP should identify steps to mitigate factors that are delaying STP's proposed contractual tunnel project completion date of December 31, 2015. Opportunities for schedule savings should be entered on the WSDOT and STP jointly developed risk register and tracked and maximized to their realization.
- Projects to be completed post-tunnel construction must continue to proceed on schedule. The need for interactions with the management of these follow-on projects will increase as the tunnel project proceeds. Effective communication with the managers of these projects must continue and increase in frequency to ensure all points of intersection are accounted for, mutual milestones are realized, and disturbance to stakeholders is minimized.

Stakeholder Relations

- The ELG recently formed by the Governor should meet expeditiously and regularly so that agency partners can affirm their institutional commitments, new participants can be educated and/or updated regarding the Project's progress, and remaining decisions can be made, keeping the common goal of Project success at the forefront.
- The ERP recommends the Governor consider the addition of the Chairs of the Joint Transportation Committee ("JTC") in the ELG membership to minimize the likelihood of a mixed

political or Project Team message, which at this critical stage in the Project, could be counterproductive to the success of the Project.

- WSDOT and the City should move expeditiously to complete a binding agreement that clarifies management and financial responsibility for the post-tunnel projects. The agreement should specify that the State's financial responsibility for these projects is limited to costs WSDOT would have incurred if it had executed the work themselves.
- The WSDOT Program Administrator should reach out to the key stakeholders on a frequent and regular basis and should consider providing monthly reports that would include factual status regarding the entire Project. This would allow for consistency of the information shared among the stakeholders, and would be a benefit to the public.

2. INTRODUCTION

2.1 Project History/Description

The Alaskan Way Viaduct Replacement Program includes projects led by WSDOT, the City, and King County. A more detailed history of the Project is included in the ERP's February 2012 and February 2013 reports, which are available on the WSDOT website at:

<http://wsdot.wa.gov/Projects/Viaduct/Library/Reports>.

2.2 Independent Expert Review Panel Formation and Charge

The history of the ERP's formation, its charge, and detailed biographies are included in the ERP's February 2012 and February 2013 reports, which are available at the WSDOT website noted above.

The composition of the ERP remains the same. The ERP is chaired by **Dr. Patricia D. Galloway**, a civil engineer with expertise in megaprojects, transportation programs, and project delivery. Dr. Galloway has 36 years of megaproject experience, including major transportation projects around the world. Additional panel members include:

- **Robert Goodfellow** who has over 20 years of tunnel and underground design and construction experience on major projects all over the world, specializing in technical and contractual management of risk; and,
- **John Rose** who has more than 30 years of experience in public sector budgeting and financing, including prior experience as King County Budget Director and as President and CEO of Seattle-Northwest Securities Corporation.

2.3 Key Project Assumptions

One focus of the ERP was to assess the soundness of the key project assumptions. This included an assessment of key assumptions for successful delivery of the Project by identifying any potential risks to both cost and schedule that could affect the Project's Finance Plan and an assessment of ways to maximize the opportunities for successful delivery. Specific Project items that the ERP reviewed included the:

- Finance Plan;
- Risk Management Plan;
- Risk identification and assessment;
- Decision-making process and governance structure;
- Schedule;
- Cost Estimate;
- STP design-build contract and progress; and,
- Communications with Project stakeholders.

2.4 Process Followed by the Expert Review Panel

The ERP’s work began again with update briefings from Project management and staff, and a review of relevant Project information, focusing on the events that have occurred since the ERP’s February 2013 report. The ERP also toured the Project area, the tunnel construction site, and the ring segment manufacturing facility to provide context to the background material and to observe actual progress underway.

As is appropriate with an independent review panel, the format of the work of the ERP was left up to the chair and panel members. As the ERP strongly believes that its work should be independent, it made specific requests for Project materials, briefings, and meetings with stakeholders of the Project. The ERP received thousands of pages of information in response to the panel requests.¹ The meeting/teleconference dates and subjects covered are presented in **Table 2.4-1** below.

**Table 2.4-1
ERP Briefings and Subjects Covered**

Date	Subjects Covered
November 14, 2013	ERP Work Plan Update Schedule Program Update Budget and Financial Management Update Port Update Tolling Update City Agreements WSDOT Risk Management Update STP Risk Management Update
November 15, 2013	Site Visit Seattle Department of Transportation (“SDOT”) Project Update
December 16, 2013	Program Update Parking Mitigation Update WSDOT Risk Update Downtown Seattle Association STP Update Tunnel Progress Update
December 17, 2013	STP Risk Update Seattle City Council Update Freight Update Federal Highway Administration (“FHWA”) Update/DBE Seattle Waterfront Committee Update City of Seattle-Department of Transportation Update

¹ A listing of the documentation received and reviewed by the panel has been retained for comparison with future ERP reviews as contemplated in the ERP’s charge.

Date	Subjects Covered
December 18, 2013	STP Update Tunnel Progress Update Seattle Waterfront Business Update Labor King County Update/Transit Mitigation
January 6, 2014	Program Update STP Update Tunnel Progress Update WSDOT Risk Update JTC Update
January 7, 2014	Seattle City Council Update Pike Place Market Preservation & Development Authority ("PDA") Seattle Waterfront Business Update TBM Site Visit WSDOT Parking Mitigation Update Treasurer's Office/WSDOT Finance Update SDOT Update/ Agreement Between City and WSDOT
January 13, 2014	STP Update Tunnel Progress Update
January 28, 2014	Governor's Office Transportation Policy JTC Update Program Update WSDOT/STP Joint Risk Update
January 29, 2014	Program Update Program Risk Update Secretary of Transportation Update
February 2, 2014	ACTT Update
February 7, 2014	STP Update Tunnel Progress Update
February 11, 2014	Program Update STP Update Budget Update
February 12, 2014	Segment Facility Tour Seattle Mayor Update WSDOT/STP Joint Risk Update WSDOT Headquarters Update
February 13, 2014	WSDOT Construction Management Update Tunnel Progress Update STP Update

Date	Subjects Covered
February 17, 2014	FHWA/DBE Update
February 19, 2014	City Projects Update
	City /WSDOT Agreement Update
	WSDOT/STP Risk Update

As an independent panel, it was important for the ERP to meet with a wide variety of parties interested in the Project so that it might gain a full perspective and understanding of the Project’s status, and learn of any perceived threats to its successful completion. The ERP’s work was enhanced by interviewing parties with differing perspectives. The individuals interviewed and dates of the interviews are shown in **Table 2.4-2** below:

**Table 2.4-2
ERP Interviews**

Interview Date	Individuals Interviewed
November 14, 2013	Todd Trepanier, AWV Program Administrator
November 14, 2013	Matt Preedy, AWV Deputy Program Administrator
November 14, 2013	Craig Stone, WSDOT Assistant Secretary Toll Division
November 14, 2013	Mark Bandy, WSDOT Urban Corridors Traffic Engineer
November 14, 2013	Brent Baker, PB Tolling Consultant
November 14, 2013	Alec Williamson, AWV Engineering Manager
November 14, 2013	Harry Jarnagan, AWV Program Manager
November 14, 2013	Josh Posthuma, AWV Special Projects Manager
November 14, 2013	Dawn McIntosh, AWV Risk Manager Coordinator
November 14, 2013	Bill Bryant, Port Commissioner, Port of Seattle
November 14, 2013	Elizabeth Morrison, Port Director, Corporate Finance
November 14, 2013	Mike Merritt, Port Local Government Relations Manager
November 14, 2013	Miguel Alonso, STP Project Controls Manager
November 14, 2013	Bob Donegan, Ivar’s Inc., Seattle Waterfront Businesses
November 15, 2013	Bob Chandler, Seattle Department of Transportation, Assistant Director Strategic Projects
November 15, 2014	Angela Brady, Seattle Department of Transportation, Waterfront Program Manager
December 16, 2013	Matt Preedy, AWV Deputy Program Administrator
December 16, 2013	Becky Hixson, AWV Special Projects Manager
December 16, 2013	Brian Smith, AWV Program Controls Manager
December 16, 2013	Kate Joncas, President and CEO, Downtown Seattle Association
December 16, 2013	Michael Cash, Vice President of Operations, Tutor Perini
December 17, 2013	Chris Dixon, STP Project Manager
December 17, 2013	Councilmember Sally Clark, Seattle City Council

Interview Date	Individuals Interviewed
December 17, 2013	Warren Aakervik, President, Ballard Oil Co., Inc.
December 17, 2013	Dan Mathis, FHWA Division Administrator
December 17, 2013	Gerald Johnson and John Nesholm, Co-Chairs, Finance and Partnership Subcommittee, Seattle Waterfront Committee
December 17, 2013	Bernard Van De Kamp, Interagency Program Manager, City of Seattle, Department of Transportation
December 18, 2013	Jose Luis Mendez, Executive Vice President, Dragados USA
December 18, 2013	Alejandro Canga, President West Coast, Dragados
December 18, 2013	Bob Donegan, Ivar's Inc., Seattle Waterfront Business
December 18, 2013	Chris Dixon, STP Project Manager
December 18, 2013	Harold Taniguchi, Director, Department of Transportation, King County
December 18, 2013	Sung Yang, Chief of Staff, Office of King County Executive Dow Constantine
January 6, 2014	Todd Trepanier, AWV Program Administrator
January 6, 2014	Matt Preedy, AWV Deputy Program Administrator
January 6, 2014	Alec Williamson, AWV Engineering Manager
January 6, 2014	Jack Frost, Executive Vice President-CEO Civil Group, Tutor Perini
January 6, 2014	Representative Judy Clibborn, Chair-Joint Transportation Committee
January 6, 2014	Rick Conte, AWV Project Manager
January 6, 2014	Harry Jarnagan, AWV Program Manager
January 6, 2014	Brian Smith, AWV Program Controls Manager
January 7, 2014	Councilmember Tom Rasmussen, Seattle City Council
January 7, 2014	Ben Franz-Knight, Executive Director, Pike Place PDA
January 7, 2014	John Finke, PDA Councilmember
January 7, 2014	Ellen Evans, Deputy Treasurer, WA State Treasurer's Office
January 7, 2014	Amy Arnis, WSDOT Chief Financial Officer/Assistant Secretary, Financial Administration
January 7, 2014	Goran Sparrman, Interim Director, Seattle Department of Transportation
January 7, 2014	Matt Preedy, AWV Deputy Program Administrator
January 7, 2014	Becky Hixson, AWV Special Projects Manager
January 28, 2014	Todd Trepanier, AWV Program Administrator
January 28, 2014	Matt Preedy, AWV Deputy Program Administrator
January 28, 2014	Alec Williamson, AWV Engineering Manager
January 28, 2014	Rick Conte, AWV Project Manager
January 28, 2014	Chris Dixon, STP Project Manager
January 28, 2014	Charles Knutson, Transportation Policy Advisor, Governor's Office
January 28, 2014	Senator Curtis King, Co-Chair, Joint Transportation Committee
January 28, 2014	Senator Tracey Eide, Co-Chair, Joint Transportation Committee
January 29, 2014	Todd Trepanier, AWV Program Administrator
January 29, 2014	Alec Williamson, AWV Engineering Manager
January 29, 2014	Secretary Lynn Peterson, WSDOT
January 29, 2014	Matt Preedy, AWV Deputy Program Administrator
February 3, 2014	Charles Knutson, Transportation Policy Advisor, Governor's Office

Interview Date	Individuals Interviewed
February 5, 2014	Maud Daudon, Co-Chair, ACTT Committee
February 7, 2014	Jack Frost, Executive Vice President-CEO Civil Group, Tutor Perini
February 11, 2014	Todd Trepanier, AWV Program Administrator
February 11, 2014	Matt Preedy, AWV Deputy Program Administrator
February 11, 2014	Chris Dixon, STP Project Manager
February 11, 2014	David Sowers, AWV Deputy Program Administrator
February 11, 2014	Harry Jarnagan, AWV Program Manager
February 12, 2014	Mayor Ed Murray, City of Seattle
February 12, 2014	Linea Laird, WSDOT Chief Engineer, WSDOT
February 13, 2014	Pat McCormick, WSDOT Tunnel Construction Engineering Manager
February 13, 2014	Alejandro Canga, President West Coast, Dragados
February 17, 2014	Fred Wagner, Chief Counsel, Federal Highway Administration
February 17, 2014	Warren Whitlock, Associate Administrator Civil Rights Division, FHWA
February 17, 2014	Martha Kenley, DBE Program Administrator, FHWA
February 19, 2014	Goran Sparrman, Interim Director, Seattle Department of Transportation
February 19, 2014	Jared Smith, Program Director for the Office of the Waterfront, City of Seattle
February 19, 2014	Chris Dixon, STP Project Manager
February 19, 2014	Rick Conte, AWV Project Manager

The ERP reviewed and analyzed a vast array of material including responses to questions the ERP submitted to the WSDOT AWV Project Team. Based on the information received and reviewed, the presentations made to the ERP, the interviews conducted, and the ERP’s experience and expertise, the ERP has prepared this Independent Report of its observations, findings, and recommendations. The Report represents the ERP’s independent view of this very complex megaprogram.

2.5 ERP Recommendations

The ERP’s Report is divided into three main sections corresponding to the ERP’s charge:

- Project Decision-Making Process and Governance Structure;
- Project Finance Plan; and
- Risk Management during Project Implementation.

Within each section are subsections that detail the topic areas reviewed in the AWV meetings described earlier, along with Project accomplishments, issue identification, potential challenges, and the ERP’s recommendations.

3. PROJECT DECISION-MAKING PROCESS AND GOVERNANCE STRUCTURE

A functional and effective project management structure and efficient decision-making protocols are essential elements of successful public megaprograms. While currently the key component of the

Project is the deep-bored tunnel that is under a design-build contract, the related issues associated with this Project, which involves multiple stakeholders, are exceptionally complex. These issues require careful and deliberate coordination so that the diverse needs and objectives of all the associated stakeholders are met as appropriate.

In light of these facts, the ERP has made the following key assumptions regarding the Project decision-making process and governance structures:

- a. Key decision makers will continue their positive and solution focused engagement so that initial commitments are fulfilled and appropriate actions can be taken as conditions change;
- b. Relations with partners will continue to be successful so that each party responsible for tasks related to the Project's success can coordinate their work and hold each other accountable for timely completion;
- c. Construction management procedures are properly designed, managed and implemented; and,
- d. Staff assigned to the Project has the necessary skills and experience.

The ERP's findings and recommendations relative to these key assumptions are discussed below.

3.1 Managing Relations with Project Partners

The Project partner stakeholders in the Project include the State Legislature, WSDOT, FHWA, the City, King County, and the Port. Each of these partners recognizes the need for extensive and effective partnering and coordination to deliver a successful project.

Recognizing the importance of key stakeholder involvement and communication, Governor Gregoire, in accordance with industry best practices, appointed a Program Oversight Committee ("POC") consisting of the following stakeholder members:

- The Governor;
- The Co-chairs of the Legislature's JTC;
- The Mayor, City of Seattle;
- A City Council member;
- The King County Executive;
- A King County Council member;
- The Port of Seattle Commissioner; and,
- The Port of Seattle CEO.

The ERP recommended in its February 2012 and February 2013 reports that the POC should reconvene its meetings as quickly as possible and meet regularly until the Project is completed, but action was not taken.

Key decision makers joined together at the Project's inception to collaborate and make decisions based on what was known to them at the time as to how the megaprogram would be funded, managed and coordinated. The POC was constituted to allow those stakeholders to meet quarterly, at a minimum, and discuss challenges that may be facing the Project, and in order to arrive at mutually agreed solutions. Since the original formation of the POC, there have been changes in the representatives of many of those agency positions. In many cases, new representatives of stakeholder agencies will be replaced by individuals who were not involved in the initial phases of this Project. As institutional knowledge is lost, there may be a lack of understanding of important background and context when new challenges arise, potentially making resolution more time consuming and costly.

The ERP understands that Governor Inslee has created the ELG to have a similar function the POC, and that this group had its initial planning meeting on February 2, 2014. The ELG currently includes:

- The Governor;
- The Secretary of Transportation (as part of the Governor's Staff);
- The King County Executive;
- The Port of Seattle CEO; and,
- The Mayor, City of Seattle.

The ERP understands that the ELG is currently in its "implementation" phase with its next meeting to be held the first week of March 2014. During the implementation phase, other key stakeholders may be brought into the ELG. The chances of the Project's ultimate success will be significantly increased by a strong working relationship with and between major decision makers, decision makers that include the Legislature, the State and other government agencies.

Recommendations

- The ERP recommends the Governor consider the addition of the Chairs of the JTC in the ELG membership. To minimize the likelihood of a mixed political or Project Team message, which at this critical stage of the Project, could be counterproductive to the success of the Project.
- The ERP recommends that the Governor also take steps to ensure that the ELG continues to meet regularly and at a minimum quarterly, and uses the ELG to discuss challenges and potential solutions to those challenges as they arise on the Project, ensuring the Project is a win-win for all stakeholders involved.

3.2 Managing Written Agreements with Project Partners

Successful project management includes management of the multiple agreements entered into with various stakeholders. The programmatic agreements entered into with the City, Port, King County, utilities, and others address policies, procedures, funding commitments, and other topics. The Project agreements entered into with the City, Port, King County, utilities, and others, also address Project specific activities, schedules, and funding responsibilities.

The ERP recommended in its February 2012 and February 2013 reports that WSDOT finalize its agreement with the Port to secure funding for the Project and to define the roles and responsibilities of WSDOT and the Port. This agreement was finalized on August 27, 2013, and as discussed in **Section 4** of this Report, defines expectations between the Parties and provides certainty to a major funding source for the Project.

The ERP finds that WSDOT continues to successfully monitor and carry out the remaining agreements with one important exception:

1. The Agreement between the City and WSDOT regarding the roles and responsibilities for projects that will follow tunnel completion has not been finalized as of the date of this Report. As is discussed further in **Section 4** of this Report, this Agreement has significant implications for Project funding as well as the potential for post-tunnel construction ownership/coordination of the remaining projects.

Recommendations

- Given the potential impacts to the Project, the ERP recommends that WSDOT quickly complete negotiations with the City and finalize its Agreement.

3.3 Construction Management

The ERP continues to find that the construction management policies and procedures developed for the Project are being implemented and followed by the WSDOT AWV Project Team and are in accordance with industry standards for a megaprogram of this size and complexity.

3.3.1 Management of the Tunnel Contract

WSDOT made the decision to execute the tunnel project using a design-build contract delivery approach. This was an appropriate decision given the features of the tunnel project.

The design-build contract is based on the idea that a partnership between contractor and owner can contribute to success on a large and complicated project. This relationship is explicitly described in the design-build contract's Section 23 "Collaborative Partnering Principles."

Several factors have strained the relationship between STP and WSDOT leadership, with irritants including a perceived slowness in responding to issues, a quickness to make issues public, and a tendency to assign blame rather than to work together to solve problems.

One important example of how this essential relationship has been strained is illustrated in the issues surrounding STP's actions in implementing its contractually required DBE program on the tunnel project. The issues have been intensified by WSDOT executive management's decision to declare STP to be in "breach" of the contract. The companies comprising the STP joint venture believe WSDOT's "breach" action has damaged their reputations and compromised their ability to seek business elsewhere in the United States.

The DBE matter began with the FHWA's investigation of complaints directed at STP's actions in recruiting DBE subcontractors.

It is not the ERP's role to independently review the facts and allegations related to the DBE matter. It is the ERP's concern that the DBE matter not be allowed to stand in the way of the Project's successful completion. To that end the ERP finds that:

- It is important that the Project provide opportunities for DBE firms.
- The public discussion of this issue has had the counter-productive result of causing important stakeholders to doubt WSDOT's management of the Project.
- WSDOT executive management and WSDOT Project staff acknowledge that STP is likely to meet the DBE goals as defined in the contract.
- STP has stated that it intends to meet its DBE goal as defined in the contract.
- The FHWA investigation found that WSDOT and STP share responsibility for non-compliance with the federal regulations:
 - *"...the procedures it [STP] followed [in STP's replacement of the DBE contractor Grady who later became decertified as a DBE] created barriers and hardships for DBEs which do not conform to good faith efforts requirements. WSDOT failed in its oversight responsibility to ensure STP uses good faith efforts to find other DBEs once the decision was made to replace Grady"*²
 - *"WSDOT failed to oversee and adequately monitor STP's efforts to achieve the DBE goal"*³
 - *"While STP would have been within its rights to retain Grady and continue to count Grady's participation, ambiguous clauses in their contract (with WSDOT) and public outcry led to discussions between STP and WSDOT and the ultimate decision to terminate Grady's contract and substitute the remainder of Grady's work to another DBE."*⁴
- FHWA staff reports that the "breach of contract" letter sent by WSDOT to STP was not done at its direction. FHWA staff explained that, while the letter discussing "breach" was in the realm of appropriate actions that the State may have taken, it was not the only response available to WSDOT. FHWA staff explained to the ERP that it will not dictate to a state what actions it is to take, but rather it determines if actions taken do in fact remedy the non-compliance identified.

² FHWA Office of Civil Rights, Investigative Report on DBE Complaint Relative to The Seattle Tunnel Project – WSDOT October 31, 2013, p. 12

³ FHWA Office of Civil Rights, Investigative Report on DBE Complaint Relative to The Seattle Tunnel Project – WSDOT October 31, 2013, p. 19

⁴ FHWA Office of Civil Rights, Investigative Report on DBE Complaint Relative to The Seattle Tunnel Project – WSDOT October 31, 2013, p. 7

- WSDOT has stated its decision to issue a letter discussing “breach” was based on FHWA’s investigation and a confidential Special Assistant Attorney General’s report, which is a privileged document, and therefore not available to the ERP.
- There is a profound difference of opinions between STP and WSDOT executive leadership as to whether STP has demonstrated “good faith” within the area of pursuing DBE participation.
- Project level management is willing and has been working to rebuild a positive relationship with STP, but they need support from executive leadership from both WSDOT and STP. The ERP notes that a positive step has been taken by STP and WSDOT’s agreement to commence a facilitated “partnering” workshop with senior executives.

Recommendations

- The ERP strongly urges WSDOT and STP to act quickly to find ways to resolve the DBE conflict to avoid potential, additional damage of the essential relationship between WSDOT and STP, and to work actively to repair damage. Not doing so could adversely affect the successful completion of the tunnel project.

3.3.2 Communications with the Tunnel Contractor

The ERP has observed some confusion from persons internal to the WSDOT organization and with its tunnel partner, STP, with respect to who has the authority and accountability for various aspects and components of the Project. The ERP observed some confusion regarding what tunnel information is needed by whom in WSDOT leadership, in what form and how often it is to be provided. While the ERP finds the overall policies and procedures of the Project to be consistent with industry standards, those standards provide more of a global direction of how internal communication is to take place and do not dictate the specifics. It is in the specifics of what, when, how and to whom that Project staff appear to be struggling.

The ERP has also observed confusion on the part of STP relative to how information and direction is formally communicated by WSDOT to it, including receipt of correspondence and direction that may come from individuals who have not been in meetings where important Project issues have been discussed. This leads to possible miscommunication and misperceptions of what is expected of STP and/or how a particular issue may be resolved. It may further increase tension in the partnership relationship if the formal communication is not reflective of what may have been discussed and/or if the tone of the communication is reflective of an adversarial relationship versus a positive team approach.

It is not uncommon for complex tunnel projects to develop technical meetings where technical matters can be discussed by all parties in an open forum. It is mutually understood that these meetings do not constitute contractual instruction, but are merely a means to bring the full weight of project expertise and experience from all parties to bear on the technical challenges that exist on the project. Frequently, experts are retained by project parties that can help to solve existing issues, anticipate and mitigate

upcoming risks and issues, and generate response plans to reduce the consequences if anticipated issues arise.

Both WSDOT and STP have retained experts for advice on technical issues, which would benefit the Project if both WSDOT and STP experts could meet jointly, or at a minimum, share the written recommendations with each other during meetings where observations, ideas and recommendations could be discussed. These technical meetings can be labeled simply as “technical meetings” or “risk reduction” meetings with the discussion centering on identified risks and how to mitigate those risks. The meetings can be held in conjunction with regular risk meetings or progress meetings for convenience, but their benefit is maximized when full and active participation from all parties is realized. STP would be responsible for responding to ideas and ultimately providing a reasoned basis for implementation or otherwise of ideas presented.

It is evident that no technical forum for open discussion of technical issues currently exists on the Project. For example, WSDOT has retained a STAT team that provides quarterly reports containing technical observations, opinions and recommendations for action. These reports have not been formally discussed with STP and the benefit to the Project of the STAT team experience and expertise is not being utilized to the fullest extent possible.

Recommendations

To avoid miscommunication or understanding and/or direction, the ERP recommends that:

- The WSDOT Program Administrator and the WSDOT Deputy Program Administrator meet with all the key leads for the Project, both at the site and in the office, to discuss communication needs and to develop a process that will allow the Project to enhance its current processes in delivering the Project in an effective and efficient manner;
- There be only one individual formally communicating with STP and that the most appropriate individual for this role is the WSDOT Deputy Program Administrator responsible for engineering and tunnel construction; and
- WSDOT in collaboration with STP should set up regularly scheduled open forums for discussion of technical issues. The results of these meetings would not be instructions to STP but merely a means by which the collective experience of all parties can be brought to bear to benefit the Project. It would remain STP’s responsibility to decide whether to implement the ideas raised in these meetings or otherwise, including a response to the technical group and WSDOT that provides reasons for acceptance or rejection of an idea.

3.3.3 WSDOT AWV Project Team

Day-to-day activities on the Project are managed at many levels, as is appropriate for a megaprogram. Project leadership is provided by the WSDOT Program Administrator, with Deputies in specific areas of the Project. They are charged with oversight of the contractors, including the design-build tunnel contractor, and oversight of the Project staff, including consultants who bring specific expertise to the

Project and the myriad day-to-day activities associated with the Project work. The ERP notes that there have been significant changes in WSDOT leadership personnel assigned to the Project. As is true with any megaprogram, changes in leadership result in loss of institutional knowledge and come with changes in management style. Due to loss of institutional knowledge and differences in management style, which happens when management/leadership changes, internal staff, partners and key stakeholders may perceive of a lack of attention and or coordination with the new management/leader based on the expectations set by prior leadership actions and/or management style. The ERP has observed this happening with regard to WSDOT's leadership.

Given the confusion that has resulted from changes in WSDOT leadership, and the perception of a lack of attention, while not uncommon of megaprojects spanning over several years, the ERP notes that staff continuity is of increasing importance as the Project enters this critical phase and thus, any further changes to WSDOT Project staff should be avoided to the maximum extent possible.

Recommendations

- The ERP recommends that the WSDOT Program Administrator continue to reach out to all Project stakeholders. The WSDOT Program Administrator has taken positive steps to increase the Project Team's communication with stakeholders, including sending email messages regarding tunnel progress. The WSDOT Program Administrator should do this outreach on a more frequent and regular basis, providing timely and accurate facts as to the status of the Project and to address stakeholder questions and/or concerns before potentially unhappy stakeholders have an impact on the Project.
- The ERP recommends WSDOT look at potential ways and opportunities to maintain and keep Project staff.
- The ERP recommends this outreach occur in both face-to-face meetings and in written monthly reports to the Project stakeholders. This will allow a timely and consistent message as to the status of the Project.

4. FINANCE PLAN

The ERP's 2014 update includes a review of current cost estimates, identified funding sources, and the State's relationship to projects where the City or King County have responsibilities that may affect the State's Finance Plan.

4.1 FHWA Approval

The Project's Finance Plan as reviewed by the ERP includes but is not limited to a review of the Financial Plan provided to the FHWA as part of the initial approval process for the Project.

The FHWA's State Division approved the State's 2013 Finance Plan Annual Update via letter dated July 23, 2013, noting continuing small changes in the Project's estimated expenses and schedule.

However, the FHWA’s positive conclusion is not based on a complete review of the Project’s finances, and is of limited value to the Legislature because:

- The FHWA certification only covers about 70% of Project costs. The certification does not cover the following projects not included in the Final Environmental Impact Statement for the Project:
 - The replacement and realignment of the Alaskan Way surface street;
 - The Moving Forward projects; and,
 - Transit enhancements.
- The ensuring seven months since FHWA’s letter has brought about new information; and
- The certification does not recognize the remaining challenges of obtaining construction funds from tolling.

4.2 Project Costs

Projected Project costs are shown below in **Table 4.2-1**:

Table 4.2-1
Estimated Alaskan Way Viaduct Replacement Program Costs
 (Year of Expenditure, Rounded to Millions of Dollars)

<i>Project</i>	<i>2014 Revised Amount (1)</i>	<i>2013 Estimate (2)</i>	<i>2011 Estimate (3)</i>
<i>Moving Forward</i>	691.3	698.0	745.7
<i>Central Waterfront</i>	2,059.1	2,052.0	2,010.7
<i>Bored Tunnel</i>	1,630.3	1,650.6	1,656.3
<i>North and South Access</i>	111.6	103.8	121.7
<i>ROW Acquisition</i>	182.2	161.9	126.9
<i>Preliminary Engineering</i>	134.9	135.7	105.7
<i>Other Components</i>	319.7	320.0	320.0
<i>Surface Street Restoration</i>	290.0	290.0	290.0
<i>Construction Mitigation</i>	29.7	30.0	30.0
<i>Program Management</i>	75.0	75.0	75.0
Total	\$3,145.0	\$3,145.0	\$3,151.4

(1) Source: AWV Program 2014 Supplemental Budget Submittal to Washington State Legislature

(2) Source: WSDOT 2013-15 Budget submittal as described in 2/1/13 email from WSDOT to ERP panel member John Rose

(3) Source: Initial 2011 Financial Plan, Figure 4

The ERP concludes the revised cost estimate of \$3,145,000,000 remains valid based on the information known as of the date of this Report. While amounts have been and will likely continue to be moved

between Project components, the ERP’s confidence in the overall numbers is the result of the following findings:

1. As noted in the ERP’s previous February 2012 and February 2013 reports, the budgeted costs for the tunnel project are based on WSDOT’s Cost Estimate Validation Process (“CEVP”) and the design-build contract, which the ERP finds remain valid bases for the cost estimates.
2. Results to date have been favorable.
 - a. Completed and current contracts outside of the tunnel project have consistently been within budget as shown below in **Table 4.2-2**.

**Table 4.2-2
Major Non-Tunnel Contracts
Original vs. Current Budget (1)**

<i>Contract Title</i>	<i>Original Contract Budget</i>	<i>% Complete</i>	<i>Current Budget</i>	<i>Current as % of Original</i>
Electrical Line Relocation	21,763,723	100%	20,685,932	95%
Holgate Stage 1	19,733,756	100%	13,146,417	67%
Other H2K	359,279,924	98%	151,726,812	42%
H2K Stage 3	41,945,129	69%	37,814,412	90%

(1) Source: WSDOT 2.14.2014 AWV Construction Closeout

- b. Future contracts pose less risk to the budget. Their size is smaller than the earlier contracts, and engineers’ estimates are supported by past success in achieving contracts within estimates. Potential variances from engineers’ estimates are within an expected range at this stage of the Project as shown below in **Table 4.2-3**.

**Table 4.2-3
Remaining AWV Contracts (1)**

<i>Contract Title</i>	<i>Design Status</i>	<i>Projected Ad Date</i>	<i>Engineers’ Estimate of Construction Costs</i>
South Access	90%	April 2014	\$46,000,000
North Surface	0%	mid 2016	\$12,000,000
Alaskan Way/Elliott Way	30%	2016	See Section 4.4 below
Battery Street Tunnel Decommission/Viaduct Demolition	0%	2015	See Section 4.4 below

(1) Source: WSDOT dated 1.23.2014

3. As discussed in more detail in **Section 5** of this Report, no additional major new risks have been identified that would cause changes in the overall cost estimate. It is likely, but not certain, that costs of repairing the TBM will have limited impact on the Project’s budget. However, delays in the schedule remain a significant potential risk to the Project’s overall costs.
4. The Project’s budget continues to provide for an appropriate amount of unallocated contingency funds if actions are taken to achieve anticipated savings and re-allocate those dollars to the Project’s unallocated contingency (See **Section 4.5** below).

4.3 Tunnel Boring Machine

The final resolution of the cost impacts of the TBM stoppage will depend on many things and may well be resolved through formal dispute resolution procedures. The ERP's findings on the stoppage are described in **Section 5** of this Report.

It is likely that the State's responsibilities for these costs will be limited. **The ERP's finding is based on current information known to the ERP. The root cause analysis being conducted by STP is to be issued in the near future, which could include additional information that may supersede the information contained herein and could change the ERP's finding.** As of the date of this Report, the ERP's review of the known facts and the design-build contract suggests that:

- The State's responsibilities may be limited to the extent that the obstructing well casing contributed to damage to the TBM;
- The well casing is only one of several possible causes of the damage; and,
- It is advisable for the State continue to be vigilant in protecting the Project's budgeted contingency funds until the resolution of these costs is complete.

4.4 State Responsibility for Post-Tunnel Projects

The ERP's February 2013 report recommended that,

"The City and WSDOT should continue to work together and enter into a written binding agreement memorializing their mutual understanding with respect to their respective roles, responsibilities, and scope for the design and construction of the tunnel follow-on projects..." and reported that, *"The City and State are in agreement with respect to the defined State funding for these projects and with the City's lead in the conceptual design for the Alaskan Way surface street."*

Many stakeholders report that relations between the Project and the City have become more productive in recent months. However, WSDOT and the City have yet to complete a binding agreement regarding their roles, responsibilities, and scope for the projects that follow the completion of the deep-bored tunnel, including the:

1. Alaskan Way surface street relocation;
2. Western/Elliott connection;
3. Viaduct removal;
4. Battery Street Tunnel decommissioning; and,
5. Marion Street pedestrian overpass.

Furthermore, it is not the case that all stakeholders are in agreement with respect to the State's role in funding these projects.

We are advised that contract negotiations with the City have now commenced in earnest. The outcome of these negotiations has taken on new importance because of their potential impact on the Project's budget.

- The Project's initial and current budget includes \$290,000,000 for these post-tunnel projects.
- WSDOT Project leadership now believes that the post-tunnel projects can be completed for substantially less than this amount. While a new cost estimating process is currently underway, the savings have been estimated to be as high as \$70,000,000.
- Some stakeholders hold the view that the State should transfer the responsibility for project management and the full \$290,000,000 to the City. These funds have been cited as a source for funding needed transit improvements, or as a source to fund the City's Waterfront projects.
- The potentially large savings would be a very important source of reserves for WSDOT to use in dealing with unexpected costs that may well arise as the tunnel project moves toward completion.

The cost-estimating process that is being used to estimate the Alaskan Way surface roadway is a methodology commonly used by WSDOT, though the process is being run by the City with participation from WSDOT staff. While the cost estimating will be based on the City's design, WSDOT has required that a related analysis provide the estimate of costs that would be required where the design would be limited to State standards, which has the effect of limiting the amount of "betterments" that would be paid for using state funds. An important part of this cost estimating methodology is the decision to base the estimate at the 60% probability level. WSDOT should make sure that the City is using the same probability level in evaluating costs that might be paid by the State.

4.5 Project Contingency Funds

Funds available to the Project's contingencies have changed appropriately as some risks have been retired but others have occurred or have been better quantified. This is an important time for WSDOT to take actions to protect and increase amount of contingency funds:

- The Project is a long way from completion. For example, the tunnel mining is only 10% completed. It is the nature of tunnel projects that the unexpected will be encountered.
- The ERP notes that WSDOT's estimates of future changes (other than the post-tunnel projects) will use up substantially the Project's entire primary contingency fund (the "unallocated" contingency).
- Furthermore, WSDOT's estimates of future changes could understate costs, and they do not include all potential increased costs. Potential risks that could increase costs are discussed in **Section 5** of this Report.

Potential savings from the post-tunnel projects are an important source of funds to address issues that may create cost increases elsewhere.

Several decisions will be made in the next period that will significantly affect the amounts available for contingencies. These decisions include:

- Tolling decisions that could increase amounts available for capital (See **Section 4.6.2** below);
- The allocation of costs for system-wide tolling systems. WSDOT has estimated that \$3.3 million of contingency funds might be needed to pay for the Project’s share of the costs of creating a system-wide tolling capability. There are ongoing discussions as to the method of allocating these costs; certain WSDOT decisions could substantially increase the amount of Project funds used for this purpose;
- Negotiations with the City over the State’s responsibility for the costs of post-tunnel projects (See **Section 4.4** above); and,
- Final resolution of liabilities for costs related to solving the problems of the TBM. For example, changes in schedule could reduce payments due to STP under the schedule incentive clause of the design-build contract, and increase amounts due the State under the design-build contract’s liquidated damages provisions. Liquidated damages are \$50,000 per day for each day beyond the contract substantial completion date (currently January 2, 2016) and increase to \$100,000 per day for each day beyond the contract performance period (currently November 13, 2016). The schedule incentive pays a maximum of \$25 million and is calculated based on \$100,000 per day for each day the contract is completed prior to November 13, 2016.

There are four Contingency Funds established in the tunnel contract as shown below in **Table 4.5-1**. None of these are expected to be a significant source for uses beyond their original intent. The “expected use” noted in **Table 4.5-1** is simply assumed to be half of the value with the remainder split 75% to STP and the 25% remaining with WSDOT as defined by the design-build contract.

**Table 4.5-1
Tunnel Contract Contingency Funds (1)**

<i>Name</i>	<i>Contract Section</i>	<i>Contract Amount (\$million)</i>	<i>Uses to Date</i>	<i>Expected Uses</i>	<i>Forecasted Balance</i>
Schedule Incentive	13.3	25.0	0.0	(25.0)	0.0
Port of Seattle Lease	7.4	20.0	(16.0)	(4.0)	0.0
Differing Site Condition (“DSC”) and Unanticipated Intervention Risk	13.1	40.0	0.0	(35.0)	5.0
Deformation Mitigation and Repair (“DMR”) Risk	13.2	20.0	0.0	(17.5)	2.5

(1) Source: WSDOT, dated September 30, 2013

The most important contingency fund is outside of the tunnel contract and is labeled the “Program Wide Unallocated Contingency” as shown below in **Table 4.5-2**. The most recent accounting of that fund reflects the result of several uses of the fund, and several additions to the fund as risks are retired and contracts completed. This accounting also estimates potential future uses of the fund. The net result is a forecasted deficit in this fund, unless future cost savings and unanticipated revenues are used to replenish those funds.

Table 4.5-2
Program Wide Unallocated Contingency Fund
(\$million) (1)

Beginning Balance	\$100.3
Transfers through January 2014	
Transfers In	30.4
Transfers Out	(71.9)
Identified Risks	
Program wide risks	(36.4)
Tunnel risks	(15.4)
Other Project risks	(17.7)
Forecasted Balance	\$(10.7)

(1) Source: WSDOT “Risk Management Update-Slide 12-Updated Risks and Opportunities through January 2014”

4.6 Funding Sources

Projected sources of funds for the Project are summarized below in **Table 4.6-1**:

Table 4.6-1
Funding for the Alaskan Way Viaduct Replacement Program
(Year of Expenditure, Millions of Dollars)

<i>Source</i>	<i>2014 Revised Amount (1)</i>	<i>2013 Estimate (2)</i>	<i>2011 Estimate (3)</i>
<i>Federal</i>	787.1	752.4	483.0
<i>State (non-toll)</i>	1854.2	1,854.1	1,911.2
<i>Tolling</i>	200.0	200.0	400.0
<i>Port of Seattle</i>	281.0	281.0	300.0
<i>Other Local Funds</i>	22.7	57.5	57.2
Total	\$3,145.0	\$3,145.0	\$3,151.4

(1) Source: AWW Program 2014 Supplemental Budget Submittal to Washington State Legislature

(2) Source: WSDOT 2013-15 Budget submittal as described in 2/1/13 email from WSDOT to ERP panel member John Rose

(3) Source: Initial 2011 Financial Plan, Figure 5

4.6.1 Port of Seattle

The ERP's February 2013 report recommended that, *"The Port and WSDOT should act quickly to enter into a written, binding agreement for the Port's financial contribution."* This occurred with the August 2013 execution of the AWW Replacement Program Funding Agreement securing the Port's contribution to the Project.

The Agreement includes the following important provisions:

- The total anticipated funding is reduced. The original budget anticipated \$300,000,000 from the Port. The Agreement acknowledges the Port's prior contributions to related projects in the amount of \$19,000,000, leaving the new amount of \$281,000,000 as shown in **Table 4.6-1**. This sum amount is further adjusted with a deduction for certain Port costs and the recognition that acceleration of the Port's funds increases Port costs while having advantages for the State.
- The timing of the Port's funds is accelerated. The original Memorandum of Agreement anticipated the receipt of funds in the period 2016-18. The new Agreement provides for the Port's contribution to be received in two large payments, with the second no later than May 1, 2016.
- The Agreement contains some minor contingent items, including the possibility of an additional payment of \$6,000,000 above the \$267,700,000 at the Port's discretion for *"transportation projects identified by the STATE as serving the SR 99 system"*.

The Agreement has several positive benefits for the Project, including:

- The Project benefits from certainty over the amount and timing of the Port's funds;
- The earlier receipt of Port funds delays the need for funds from tolling. This gives the State more time to develop and implement a tolling plan, but it also adds some uncertainty, as changing bond markets will affect the conversion of toll revenues to capital dollars; and,
- The tunnel portion of the overall Project can actually be completed without toll funds, thereby reducing concern over fully funding the tunnel completion.

4.6.2 Tolling

The ERP's February 2013 report stated that,

"The ERP finds that toll funds for the Project are not secured. Important tolling decisions have not been made. Important information related to those decisions will not be available to assist the current Legislature in reviewing the Project's financing."
[Emphasis Added]

Toll funds are still not secured; however, the ACTT has completed and made available to the ERP its draft report. The draft report reflects the goal of obtaining \$200,000,000 in capital funds from tolling. The ERP's February 2013 report noted that WSDOT's revised Finance Plan had reduced the tolling contribution to the Project to \$165,000,000, a number which had caused some stakeholders to doubt that tolling had to be used at all. The JTC's instruction, to utilize \$200,000,000 in toll derived revenues for the Project, is now being used by WSDOT and by the ACTT in its analysis.

The ACTT's draft report is now available and provides useful information for the next steps of planning and implementing tolling. The report supports a tolling strategy which:

- Meets the \$200,000,000 funding target for the Project while "minimizing diversion";
- Uses \$1 tolls 24-hours per day with a \$1.25 toll during the 6 to 9 a.m. and 3 to 6 p.m. peak periods;
- Projects that this level of tolling will generate \$1.085 billion in gross revenue over 30 years;
- In addition to paying for the required capital contribution, provides funds to support toll collection costs, operations and maintenance of the tunnel and transportation system improvements needed to address diversion; and,
- Projects that such tolls will cause traffic diversion rates to City streets of approximately 20 percent during peak periods and 38 percent during daytime off-peak periods in 2017.

The ACTT's draft report validates the ability of tolling to generate capital funds for the Project. However, this is only the first step in securing tolls as a funding source. It is worth noting that the ACTT report does:

- Make an important distinction about assumed future increases in toll rates, noting that while no increases might be a good best assumption for structuring bonds, it seems unreasonable to assume that it would never be appropriate to raise tolls; and,
- "Sees value in a systems approach to tolling and recommends regional tolling being studied further."

Toll funds are not secured until actions are taken by the Legislature, Treasurer, Finance Committee, and Transportation Commission.

The ERP finds that it may be possible to generate more than \$200,000,000 from tolling for the Project's capital budget. This might be made possible if certain decisions are made about:

- The standard for acceptable diversion. The ERP's February 2013 report recommended that "*The Legislature should consider means to give the ACTT direction as to the amount of traffic diversion that is acceptable.*" To date no policy body has given such direction, and therefore the ACTT was left to come up with its own standard. ACTT representatives have advised that the standard chosen (20% during peak periods) is not the result of analysis but represented a consensus of

committee members. A different diversion goal might support different tolling strategies, producing different sums for the capital budget.

- Priorities for use of toll revenues. The ACTT report contemplates the use of toll revenues for items that could be, and might best be paid from other sources. The ERP finds that the most pressing current need is to complete the tunnel, and thus producing funds for capital should be the highest priority. Tunnel operations and maintenance will be a WSDOT responsibility under any plan, and transit services might best be addressed using other fund sources.
- Structure of bonds supported by tolls. The ACTT's report finds that an acceptable toll strategy will produce \$200,000,000 for the tunnel's construction budget. However, that finding is not based on a specific analysis of how toll revenues translate to bond proceeds. There was no assumption made about interest rates or about the structure of the bonds that would produce the \$200,000,000. The State has optional bond structures available to it that will significantly affect how much capital money can be produced from a given revenue stream. For example, if the State chose to use toll proceeds in support of Motor Vehicle Fuel Tax ("MVFT") bonds (and without the structures common to toll revenue bonds), larger capital sums might be produced.

4.6.3 Federal Sources

The amount of Federal funds allocated to the Project has not materially changed since the last ERP report. The ERP's February 2013 report noted that the FHWA has confirmed that the Federal funding identified for the Project are indeed committed and need no further Congressional or administrative approval.

Concern has been expressed that failure to satisfy the FHWA's concerns over DBE actions could result in a loss of Federal funds. Based on the information made available to the ERP at the date of this Report, plus discussions with WSDOT, STP, and FHWA, the ERP expects that those concerns will be put to rest.

4.6.4 Transit Funding

The ERP's February 2012 report noted that the State has successfully met its commitment to King County to provide funds for the short-term transit enhancements. However, this construction mitigation funding ends in 2014. The ERP recommends that the Legislature, working with the City, King County, and WSDOT quickly devise solutions that are additional to and not taken from the current Project budget for resolving the transit mitigation issue during construction.

The ERP's February 2013 report recommended that,

"The Governor and Legislature should consider legislative authority for local taxes to provide transit enhancements that will allow the Project to meet its passenger and freight mobility goals."

Transit improvements have been identified as a major mitigation for the fact that the tunnel’s capacity is substantially less than that of the viaduct that it will replace. Absent transit improvements, the Project will not achieve its transportation goals.

4.6.5 Funding for City Projects

The ERP reiterates what it found in its February 2013 report regarding funding for City Projects:

“Projects related to the replacement of the viaduct include certain projects that are the responsibility of the City of Seattle. These related City projects include:

- *Elliott Bay Seawall Project;*
- *Mercer East;*
- *Mercer West and Parking Program;*
- *South Spokane Street Viaduct Widening Project;*
- *Waterfront Redevelopment Project; and*
- *Public Utility Relocation.*

The State has committed \$290 million of funding for projects not related to the deep-bored tunnel portion of the Project, including the demolition of the viaduct, the decommissioning of the Battery Street tunnel, and the relocation of the Alaskan Way surface street. The implementation of these projects merits special oversight. WSDOT should clarify what happens to this allocation if necessary costs are a lesser amount.

5. RISK MANAGEMENT DURING PROJECT IMPLEMENTATION

Risk is defined as the result of an uncertain event or condition that, if it occurs, has a consequence (the consequence can be negative or positive; positive outcomes are usually called “opportunities”). Risk is quantified as the combination of the probability of an event and the resulting consequence.

The ERP finds that the WSDOT AWV Project Team is abiding by the established RMP for the Project and that this RMP is in conformance with or exceeds industry standards for risk management.

In reviewing and updating the ERP’s opinion on the sufficiency of the risk management processes for the Project, the bored tunnel contract was used as a primary example of how risk will be managed because the potential exposure to risk is highest within this specific component. Three aspects of management of risk were examined for this update:

1. Review of the risk management tools used;
2. The risk management plan content for both WSDOT and STP; and,
3. The execution of those plans to this point of the Project.

These discussions will present observations and findings, followed by conclusions and, where appropriate, recommendations for consideration.

5.1 Review of Contractual Cost and Risk Management Tools

As previously discussed in the ERP's February 2012 report, WSDOT has one of the best risk management programs of any state for major infrastructure projects. The planning, design, bidding, and risk allocation processes are proven and successful in delivering major projects within the planned budget and schedule. The ERP finds that the AWW Project risk management processes are adequate to manage this megaprogram successfully.

Additional detail on the risk management tools employed by the AWW Project Team is included in the ERP's February 2012 report.

5.2 Execution of the Risk Management Plan

The International Tunnel Insurance Group ("ITIG") published a Code of Practice for Risk Management of Tunnel Projects (the "Code") in 2006. The Code has become the industry standard for risk management and is referenced in the design-build tunnel contract. WSDOT is adhering to this Code; and given the magnitude and urban location of the tunnel project, the ERP finds this to be prudent. In accordance with the Code, both WSDOT and STP have established a RMP that has been issued and revised periodically since the beginning of construction.

WSDOT as the owner agency retains the political risk and risk to reputation for completion of the tunnel project even if commercial risk for specific items is allocated to STP. For this reason it is important that responsibility for overall management of Project risk lies with WSDOT. STP manages its risk as a subset of the overall Project.

The ITIG Code emphasizes that the presence of experienced practitioners on the team is an important factor in mitigation and management of project risk. After a review of resumes of the AWW Project risk management team, the ERP concludes that the AWW Project Team is experienced in major transportation projects and has been supplemented by personnel with technical experience in major urban tunnel projects.

There is concern that staff turnover on the WSDOT AWW Project Team could introduce risk into Project execution, particularly in areas of communication and building team relationships and trust that are discussed in **Section 3** of this Report. Thus, turnover of staff must be managed to ensure negative consequences of such turnover are not manifested. Any additional staff turnover in the coming months would be disadvantageous to the Project as it continues through this critical phase of execution.

The ERP has found that WSDOT and STP have accepted a previous ERP recommendation from 2012 and 2013 to jointly assess and mitigate risks and their impact to the Project. As recommended, the teams are jointly reviewing and updating risk management process. There are advantages of WSDOT and STP combining in a joint risk management process and using a single risk register to track tunnel project risks. These advantages include:

1. A natural check and balance of both parties on each other that provides more consistent and superior quality of input into the risk register.
2. Reduced risk of disputes as the parties will jointly recognize and agree regarding the connection of each risk to a specific risk contingency fund.
3. Improved communication and collaboration on both:
 - a. Identification and assessment of new risks; and,
 - b. Suggestions for risk mitigation and problem solving for the overall benefit of the tunnel project.
4. Discussion of cost and schedule impacts in a forum where minimization of impact is the emphasis rather than responsibility and blame.

WSDOT and STP have developed a new format for its risk register that will allow the teams to better classify, assess and rank non-cost risks that are nevertheless significant to the tunnel project, such as lack of team alignment, or the realization of projected cost and schedule risks. Using this new format, each party is able to rank their own risks as they have always done, while there would be a new list of risks for the entire tunnel project that would be ranked by inspection and agreement rather than by pure magnitude of impact. This new ranking would potentially include a combination of the top risks from each party as well as non-cost risks that were considered significant to the tunnel project.

The ERP finds that this change in process allows the team to more effectively manage risk on the tunnel project moving forward.

The overall exposure during execution of the Project is divided into three areas, which are discussed below:

1. Risk;
2. Cost; and,
3. Schedule.

5.2.1 Project Risk

Industry acceptable risk registers have been prepared for the Project and, as stated above, are managed well using a thorough and collaborative process between the STP and WSDOT teams for the tunnel project. This effort is becoming more collaborative and positive as has been described above. The expected post-mitigation cost and schedule exposure identified by STP in its tunnel project risk register (January 2014) is \$16 million and four-and-a-half months to the current contractual date of January 2, 2016.

Risks (post-mitigation) subject to WSDOT's direct control total \$11.7 million and two months for the tunnel project. Thus, the total expected impact on the tunnel project of all identified risks after mitigation activity is: \$27.7 million and nine-and-a-half months to the current contractual date of

January 2, 2016. This compares with the early 2013 expected post-mitigation cost of \$27.5 million and a seven-and-a-half month schedule exposure.

The ERP notes that seven of the top 10 tunnel project risks are related to tunneling, either in operation and maintenance of the TBM, supply of equipment or ancillary items, risk contingency funds being overspent (from differing site conditions or damage to adjacent structures). The other three of the top 10 risks refer to labor instability; an inability to meet the DBE goals; and the timely installation of systems and tunnel commissioning (data obtained in January 2014).

The top risk in January 2014, according to STP, is not a tunneling risk but remains the same as in 2013, i.e. the schedule risk associated with installation and commissioning of systems inside the tunnel after tunneling boring is completed. This risk reflects the very tight tunnel project schedule, which is discussed below. The top risk according to WSDOT is that the risk contingency fund for differing site condition payments may be insufficient for the ground conditions encountered.

The essence of risk management is to use an established process to closely monitor each identified risk. The intent of this process is to minimize the likelihood of occurrence of each risk and to mitigate as much as possible the impact of those risks that do occur. Prudent management of risk requires the WSDOT AWV Project Team to continue monitoring so that:

- All members of the Project Team understand what the Project risks are;
- All members of the Project Team are empowered to identify new risks and suggest mitigation actions;
- All front line supervision are aware of the mitigation plans and actively implement them within their teams;
- The risk management team update risk registers at appropriate intervals and oversee implementation of mitigation plans; and,
- All WSDOT executive and senior project management are aware of the current status of major Project risks and mitigation measures.

Current response plans are not sufficiently clear to assist in the event that a significant risk manifests itself. It is common for each risk of very high consequence (and perhaps selected risks of high consequence) to have detailed written response plans of what should be done immediately after the occurrence of these risks. Details such as who to call and what immediate steps are required to reduce and mitigate impacts should be contained in these plans. As we have seen already on the tunnel project, when a major event occurs, time can be lost if there is no immediate plan to mobilize resources to investigate and remedy these events.

5.2.2 Cost

This section is primarily concerned with the contingency funds applied to the Project, their sufficiency and exposure with current risks. The tables in **Section 4** of this Report are referenced.

In its examination, the ERP found that each specific risk contingency fund currently contains sufficient funds for the expected “post-mitigation” level of risk allocated (**Table 4.5-1**). The Project Team must continue to work through each issue on a day-by-day basis and mitigate each risk thoroughly so that the total value of risk realized does not exceed these values. In a project of this size and complexity, it is prudent for the team to expect that the constant application of the established WSDOT and project risk management protocols by experienced practitioners will identify new and previously unforeseen risks for analysis and mitigation by the team.

From **Table 4.5-1** the following should be noted:

1. The schedule incentive fund is not likely to be entirely expended due to the current delay, which will likely translate to the later than anticipated opening of the tunnel.
2. The risk contingency funds needed to address deformation and repair of structures, differing site conditions, and unanticipated interventions will not be accessed until completion of the tunnel bore. It is acknowledged that when these issues occur, they can be high cost. For this reason, not only the exposure, but sensitivity of the remaining funds to risk occurrence is a prudent exercise for the WSDOT Project Team to carry out as part of its risk management protocols.

The elements of the unallocated risk contingency is organized and described in **Table 4.5-2**. The fund is to be used to pay for unanticipated costs and additional scope items allocated to the Project budget. The anticipated balance of this fund is currently somewhat negative, pending a decision regarding WSDOT responsibilities for the post-tunnel projects as discussed in **Section 4.4** of this Report. Given the remaining risk exposure associated with this complex Project, and the anticipated spending required from this contingency fund, it is important to the Project that:

1. No additional out of scope demands are placed on the Project budget.
2. All unrealized contingency spending is retained by the Project budget and placed into the unallocated contingency fund for potential needs elsewhere on the Project.

All contingency funds are tracked carefully by the WSDOT Project Team. WSDOT continues to demonstrate that close attention is being paid to the management of risk on the Project. These two factors and ongoing efforts to improve processes and collaboration with STP lead the ERP to a finding of confidence regarding cost control on the Project, providing outside influences do not prevail in expanding the scope burden on the Project budget.

5.2.3 Schedule

The ERP considers the current contractual tunnel completion date of January 2, 2016⁵ to be very aggressive and given current events, not likely to be achieved. STP's "Best Value" proposal is the basis for the scheduled tunnel opening date of December 31, 2015. That date is a completion date nine months earlier than originally proposed to the bidders by WSDOT. There exist several major intermediate milestones on the tunnel project schedule's critical path. Because of the linear nature of tunnel construction schedules, these milestones are important indicators of progress and can provide early notice of issues with the overall Project schedule. The most significant upcoming milestone is the TBM reaching "safe haven number three." "Safe haven number three" is the previously designed location where the TBM will have completed its performance testing, and the machine will undergo any final maintenance activity prior to mining under the viaduct and heading deeper under the City. This milestone was scheduled for December 28, 2013, but has not yet been reached due to the TBM stoppage, which is under investigation as of the date of this Report. However, some of the activity planned for "safe haven number three" is being conducted now while the TBM is stopped, thereby potentially reducing the planned time for the "safe haven number three" milestone.

The TBM is no longer moving forward, and tunnel progress stopped on December 6, 2013. Even with several well-publicized delays prior to this (later than anticipated start of tunneling and labor disputes) the progress of the TBM was significantly better than anticipated. At the time of the stoppage, and despite these delays, the TBM was only two feet away from its originally scheduled location on this date.

The ERP finds that the most important schedule-related risk item for the Project is with regard to effective partnership between WSDOT and STP: the entire WSDOT AWV Project Team must work in collaboration with STP and other stakeholders to get the TBM moving and progress tunnel excavation. To this end several parallel efforts have been initiated. An investigation is ongoing and multiple reports and task forces from WSDOT, STP and Hitachi-Zosen (the TBM manufacturer) that will clarify the cause or causes for the TBM stoppage as well as the proposed means and methods for fixing the TBM so it can proceed with tunneling. The ERP has confidence that the issue will be resolved and that the tunnel operation will proceed promptly upon this resolution.

Given the process being undertaken to fix the TBM and problems identified to date, it should be anticipated that a feasible window to re-start tunneling is between June and October 2014. This could result in an overall delay of seven to ten months to STP's proposed contractual date of December 31, 2015. It should be noted that additional issues or problems found during the ongoing investigation could increase the time of repair.

The Project Team has identified several opportunities that could help benefit the tunnel project schedule including:

⁵ At the time of the ERP's February 2013 Report, the contractual completion date was December 31, 2015.

1. The reconfiguration of the launch pit was to be carried out during a scheduled stoppage at “safe haven number three”. This activity can now be carried out as an early activity and be moved off the critical path. This opportunity could save up to six weeks of schedule.
2. An increase in work hours from 20 hours, 5 days per week to 24 hours, 7 days per week would provide over 60% more work time and result in an estimated 25-30% increase in productivity. This opportunity could save up to eight weeks of schedule.
3. The internal concrete structure was scheduled to begin after the tunnel had progressed 2,000 feet. Beginning the internal concrete structure immediately on restart would mean that the structures would be only approximately 1,000 feet behind the tunnel face. This opportunity could save up to six weeks of schedule.

The total of these opportunities could recoup up to 20 weeks (almost five months) of schedule, providing significant mitigation. The ERP recommends that these opportunities and any others that could save schedule are entered into the Project risk register and tracked and maximized to their realization. It is the combination of delays and mitigations that lead the ERP to conclude that the tunnel will open in the first or second quarter of 2016, which is later than STP’s proposed contractual date of December 31, 2015, but earlier than the contract performance date of November 13, 2016.

It should be noted that significant identified risks still exist in the remainder of the tunnel contract that if manifested could cause additional delay.

Based on the ERP’s discussions with STP and the WSDOT AWW Project Team, the ERP notes the following with regard to the bored tunnel project schedule:

1. The original schedule as reviewed by the ERP in its February 2013 report was considered aggressive.
2. The current stoppage puts STP’s original proposed contract completion date in serious jeopardy and it is anticipated that this schedule will not now be met.
3. There are opportunities to recover some of the schedule lost during the TBM repair.
4. The TBM performance while it was mining was above the Project Team’s expectations and made gains on the anticipated schedule.
5. Any additional schedule obtained from realizing schedule opportunities, better than expected TBM performance, and refining plans for later activities should be preserved for as long as possible to assist in managing other potential schedule risks that have not yet manifested.

Due to the linear nature of tunneling schedules and the need to continuously adapt to geotechnical and equipment-related issues on the tunnel project schedule’s critical path, it is traditionally found to be difficult to recover lost time on tunnel projects. The type of detailed planning that STP and WSDOT are currently undertaking coupled with a focus on the bigger picture which has been maintained by the risk

management program and risk registers is critically important to mitigate the potential for additional schedule delay.

5.3 Summary of Project Risks

The ERP stresses that it is not uncommon for issues to arise in tunnel projects. The Project continues to benefit from decisions and actions taken in anticipation of such issues. It was appropriate that WSDOT retained a world class tunnel contractor that would understand how risks are identified, managed, and dealt with as they arise. It is important that WSDOT has engaged STP's services through a design-build contract which establishes expectations and accountability for both parties. It is very useful that a RMP was developed that identified potential risks along with actions that could be taken to mitigate such risks and the potential monetary and delay impact of those risks. WSDOT and the citizens of Washington will now be best served by WSDOT using the contract provisions to manage the work, asking appropriate questions but also taking advantage of the tunnel contractor's expertise.