# RISK AND CONTINGENCY MANAGEMENT PLAN

Draft Report



**May 2010**

Columbia River CROSSING

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# ACRONYMS

| | |
|---|---|
| ADA | Americans with Disabilities Act |
| BA | Biological Assessment |
| BO | Biological Opinion |
| CMP | Contingency Management Plan |
| CRC | Columbia River Crossing |
| CREM | Cost Risk and Estimate Management |
| DEA | David Evans & Associates |
| EIS | Environmental Impact Statement |
| FD | Final Design |
| FEIS | Final Environmental Impact Statement |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| IWWW | in-water work window |
| MOT | Maintenance of Traffic |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| OEO | Office of Equal Opportunity |
| RMO | Risk Management Office |
| PDT | Project Development Team |
| PE | Preliminary Engineering |
| PMOC | Project Management Oversight Consultant |
| PMP | Project Management Plan |
| RCMP | Risk and Contingency Management Plan |
| ROD | Revenue Operating Date |
| ROW | Right of Way |
| SCC | Standard Cost Category |

| | |
|---|---|
| TS&L | Type, Size, and Location |
| WSDOT | Washington State Department of Transportation |
| YOE | Year of Expenditure |

# 1. Overview

The Risk and Contingency Management Plan (RCMP) is a sub-plan of the Project Management Plan (PMP) for the Columbia River Crossing (CRC) project dated, September 2009; its successful implementation depends upon a fully updated and active Project Management Plan (PMP). The purpose of the RCMP is to highlight specific areas of management focus as identified through the risk review process, which should be implemented along with normal project operations as described elsewhere within the PMP. Further, the purpose of the RCMP is to provide a means for monitoring project progress as it moves forward to Entry into Final Design (FD).

This RCMP contains two distinct sections, a plan and work plan (or appendix). The plan details effort in defining and managing the steps, actions, and risks to guide the CRC Project within the cost and schedule requirements, while maintaining target (cost and schedule) contingency levels through each project phase. This portion of the document is expected to be updated only as needed, or as requested by the Federal Transit Administration (FTA) Project Management Oversight Consultant (PMOC), i.e., entrance into a new phase and/or a change in FTA guidance.

Each component of the plan provides guidance for the successful management of the CRC project including, but not limited to, the following topic areas:

- Primary Mitigation – an iterative process and the result of developing planned activities to mitigate CRC Project risks during the earliest possible project phase. The primary mitigation baseline consists of individual risk mitigation plans developed for risk elements that requires managerial, administrative, and/or technical action,
- Insurance – includes a summarized discussion of major insurances provided by the CRC Project owners in response to the multitude of risk vulnerabilities that may be endured,
- Contingency Management – discusses plans for managing the CRC cost and schedule contingencies to cover residual risk and uncertainties in the case of unsuccessful primary mitigations,
- Secondary Mitigation – comprises actions required if the primary mitigations, and the phase contingency values of time and money, are inadequate to avoid cost overruns and/or schedule delays, and
- Risk Management and Mitigation – references the formally adopted risk management process to continuously identify, assess, and mitigate CRC Project risk.

The work plan, or appendices, will be more dynamic as they contain the vast majority of the data to be updated periodically. The appendices serve as the tracking tool to assess the CRC Project

for its ability to mitigate risk, close PMOC SPOT Report action items, and dispense contingency, as forecasted:

- Appendix A – includes a robust primary mitigation plan for each Preliminary Engineering (PE) Phase risk with an impact; including risk owners, handling steps, step deliverables, and residual risk scores.
- Appendix B – consists of a list of recommended actions with required completion dates and assigned responsibilities.

The Project risk baseline was initially developed for the submittal to FTA New Starts during the risk workshop held April 14 and 15, 2009 lead by Gannett-Fleming Inc., serving as the FTA PMOC. As a result of the April 2009 workshop, the PMOC drafted the project SPOT Report detailing CRC's technical capacity and capability, risk assessment, and associated reviews.

# 2. Goals and Objectives

Adherence to the goals and objectives encompassed in this RCMP is paramount to successfully guiding the CRC Project through all of the FTA New Starts project phases.

RCMP goals include:

- Serve as a project work plan to aid in managing the CRC Project within the cost and schedule requirements including the managing of risk by developing and tracking primary and secondary mitigation measures and recommended actions,
- Establish the CRC insurance strategy,
- Establish and maintain target cost and schedule contingency levels for each project phase, and
- Outline PE Phase goals.

PE Phase goals include:

- Adoption of project delivery strategy and finalization of contract packaging,
- Development of plans and specification of project elements to a level that would support a PE level cost estimate and project schedule,
- Fulfillment of the National Environmental Policy Act (NEPA) requirements,
    - Identification of handling strategies for all identified project engineering risks, including detailed plans to substantially reduce the risk's impact by the earliest possible milestone using avoidance, acceptance, mitigation, and/or transference, and
- Development of cost and schedule risk mitigation capacity as needed, including targets achieved during the PE Phase and forecasted cost and schedule risk management capacity for subsequent phases.

## 2.1 Risk Review Process

Risk analysis is treated separately from the base cost estimates. This enables a more rigorous and objective approach to this important component of the project, and includes anticipated variances in the base cost (for example, in unit costs and quantities) and impact of risk events. FTA and Federal Highway Administration (FHWA) guidance both have similar components that risk management plans should provide.

The following components to a risk management plan provide a review of the planning steps:

- Identification
- Evaluation
- Analyses of treatment alternative, i.e., avoidance, prevention, mitigation/cost control, and insurance
- Assignment of Risk
- Selection of Risk Treatment
- Monitoring and Evaluation of treatment performance

Risk management identifies and evaluates options to reduce risks to acceptable levels within project constraints. The initial effort will address those uncertainties identified as having the greatest impact. Treatments may include, but are not limited to the following:

- Additional investigations/designs where such expenditures are cost-effective compared with potential impacts.
- Construction contract language that apportions risk to the parties most able to control that risk.
- Effective change management procedures.

Where project proponents have little or no control over the uncertainty, treatment may involve little additional action beyond gaining a greater understanding of causal factors.

The Risk Management Plan and mitigation strategies will be expanded as project details are developed. The overall risk analysis will be reviewed on a periodic basis for validity and effectiveness. Where needed, the project team will perform additional measures to mitigate risks.

These will include:

- Choosing an alternative response strategy.
- Implementing a contingency plan.
- Taking corrective actions.
- Re-planning portions of the project.

Active risk management plans will be maintained by each Task Manager and reported monthly to Senior Management Staff via Project Development Team (PDT) meetings. The task manager assigned to each risk will assess the effectiveness of the current strategy of the specific risk, any unanticipated effects, and any mid-course correction that the PDT must take to mitigate the risk.

Risk tracking will occur utilizing a basic spreadsheet developed by the Washington State Department of Transportation (WSDOT) Cost Risk and Estimate Management (CREM) office and modified as necessary for transit elements based on TriMet procedures. This spreadsheet offers a straightforward method for tracking risks and a preliminary understanding of how to avoid or mitigate for risks if they occur. An example of this risk tracking spreadsheet can be found in Appendix A, Risk Tracking Matrix. Proper tracking and maintenance of risks enables internal and external communication of risks among partners, stakeholders, PDT managers, and staff. PDT identification and maintenance of risks will also enable effective communication of identified risks to independent teams during the required risk assessment workshops described below.

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# 3. Insurance

Risk Management is the sum of conscious actions taken by CRC project staff, Agency employees, and/or legal counsel to avoid or mitigate losses, which might impair the operational capability or financial status of the CRC project. All CRC project staff shall be responsible for utilizing safe work practices, employing adopted standards and procedures regarding public safety, and for providing a cooperative working environment for all fellow employees and staff. Prompt reporting of unsafe conditions, discriminating or harassing behavior, and/or accidents is required to their immediate supervisor and/or the applicable safety office or Office of Equal Opportunity (OEO) representative, dependent upon who they are employed by.

Risk Management Rules for WSDOT who is currently the primary agency at risk for the project, because they hold the contracts and also intend on being the grantee for transit, the Risk Management Office (RMO) has responsibility for directing and coordinating all risk functions, it shall be directly responsible for:

- Tort Claims Adjusting
- Property Damage Recoveries
- Risk Analysis
- Tort Self-Insurance Management
- Attorney General Tort Defense Cost Management
- Tort Claim Reporting

The RMO will coordinate information and act in an advisory capacity with regard to litigating torts, purchasing insurance, obtaining certificates of insurance for requesters, reporting tort claim information, and analyzing risk aspects of contracts, leases, agreements, or other legal documents. Within the CRC Project, the Regional Administrator or Project Director shall be responsible for conducting operations in accordance with departmental standards and statutory requirements. They will determine the degree of indemnification and/or insurance protection necessary in consultation with the Office of Attorney General/WSDOT Division or the WSDOT Risk Manager, and will report losses or claims in accordance with requirements in Chapters 5 and 8 of the WSDOT Risk Management Manual. When appropriate, these functions will be coordinated through C-TRAN and/or TriMet's Program Management. CRC management will coordinate with the C-TRAN and/or TriMet Insurance Administrator who is responsible for identifying those areas of exposure that place project agencies at risk and for taking the necessary actions to protect against that risk in a fiscally responsible manner. For TriMet, the Insurance Administrator reports to the Director of Program Management and TriMet's Executive Director of Finance and Administration, ensuring the seamless integration of the program.

Washington State policy, as expressed in Chapter 43.19, RCW, is to assume risks to the maximum extent possible, but to purchase commercial insurance when, among other reasons: the size and nature of potential loss make it in the State's best interest; coverage is cost effective; or is required by a fiduciary arrangement. WSDOT's risk exposures are financed by various combinations of self-assumption, self-insurance, and commercial insurance. CRC Executive Management, along with WSDOT Headquarters, will determine the form of the Project's insurance program during the preliminary engineering phase.

# 4. Primary Mitigation

Primary Mitigation is a continuous process occurring throughout each project phase resulting in planned actions or strategies to lessen the probability and/or severity of each risk's impact. These strategies are to be identified and completed during the earliest possible project phase. A specific mitigation plan has been developed for each project risk identified.

## 4.1 Technical Capacity

The PMOC found that CRC possesses adequate technical capacity and capability for entry into PE with the implementation of improved Quality Management and Project Control processes. In the PMOC's opinion, the CRC Project has adequate resources to deploy in order to accomplish the project objectives.

The PMOC's Technical Capacity and Capability review found that CRC's organizational approach was necessarily complex. The PMP showed a formal organization structure that is a counterpart "siloed" owner/consultant structure with separate reporting lines of authority for the agency staff and the David Evans & Associates (DEA) consulting managers. However, the PMOC observed that in practice the project office is functioning largely as an integrated project management office.

The PMOC found that the PMP and subsidiary documents are adequate for entry into PE. As expected, these documents will need to be revised as the project proceeds through the PE phase in order to be ready for FD.

At this time, there are no PE Phase related risks that require primary mitigation activities under the Technical Capacity Primary Mitigation category for the CRC project.

## 4.2 Project Scoping and Design

Project scoping and design risks relate to all activities associated with the earliest design concepts through the final design activities. This group is subdivided into requirements risks, which generally encompass all activities from earliest concept through the Alternatives Analysis and design risks, which encompass all activities after the Alternatives Analysis through the beginning of construction.

### Requirements Risks

Risks related to requirements commonly arise from unstable specifications as the project moves towards final design. Specifically, the majority of the project's requirements risk centers around one project group's requirements impacting another group within the project. Mitigation strategies for these risks focus on defining exact needs and conditions of each affected project team, signed agreements between all relevant stakeholders communicating and documenting these agreements, and improving regular dialogues between these groups.

A list of PE phase related requirements risks requiring primary mitigation activities are listed below:

| SCC | Risk Title |
|---|---|
| 10.02.01 | Rail Crossing approvals could lead to a requirement for special signaling. |
| 10.04.01 | Selecting the three bridge option has the potential to lead to higher costs and rework on Biological Assessment (BA) and schedule. |
| 10.04.03 | More restrictive constraints on in-water work window (IWWW) than in estimate would lead o higher costs Type, Size, and Location (TS&L), and longer schedules. |
| 40.03.03 | Potential change in environmental regulations could lead to new protected species and/or environmental requirements. |

### Design Risks

Design risks for the project are largely tied to the stakeholder's requirements and the time consuming approvals process pushing key decisions toward the end of the design phase. If the cities and/or other federal, state, and local regulatory and permitting agencies and property owners require design changes late in the CRC design schedule this will result in changes to a mature design. Mitigation activities related to these risks involve early coordination and agreements with key stakeholders to identify and adjudicate concerns driving multiple design options and previously undefined requirements and prevent drawn out coordination/approval from stakeholders.

A list of PE phase related design risks requiring primary mitigation activities are listed below:

| SCC | Risk Title |
|---|---|
| 10.01.01 | East/West Alignment shift to 16th or 17th Avenue could lead to heavier utility relocation costs. |
| 10.01.02 | Shift to 16th and tunnel could increase costs. |
| 10.04.04 | Selecting a signature bridge with additional aesthetic elements could lead to higher TS&L and longer schedules. |
| 20.01.01 | Provision to add a fifth station to the East/West alignment would lead to track change and additional right-of-way (ROW) acquisition. |
| 20.01.03 | Added aesthetic station features would create added costs. |
| 20.01.04 | Interchange moves South and impacts existing Expo station. |
| 20.06.03 | Parking reconfiguration of SR14 and Mill Station would require additional right of way acquisition. |
| 40.02.01 | Undergrounding of overhead utilities on McLoughlin would increase costs. |
| 40.03.05 | Community objections could have impacts on transit schedule. |

## 4.3 Delivery Methods and Contracting

Delivery methods and contracting risks are largely tied to issues surrounding contracting strategy and the CRC leadership having the necessary experience to carry out the required oversight of contractors.

At this early stage in the project development, the procurement methodology has not been determined. Influential factors guiding the final strategy will include 1) funding availability and cash flow considerations, 2) environmental compliance and mitigation requirements during construction, and 3) risk allocation.

CRC intends to assemble a joint committee including WSDOT, ODOT, TriMet, and C-TRAN staff to study delivery strategies and provide recommendations regarding procurement methodology. The process will be complicated by virtue of two states having different governing laws and perspectives regarding use of alternative contracting, e.g., “non-low bid.” The committee is expected to begin work during the Preliminary Engineering phase with the goal of completing a Project Procurement Plan.

Not unlike other multi-year mega-projects, the timeline of funding allocations will play a major role in procurement method selection. If the cash flow stream cannot be kept commensurate with methods that inherently operate under accelerated schedules (design/build for example), then traditional design-bid-build contracting becomes preferable. For any alternative contracting method, it will be crucial to ensure that the contract documents and special provisions require strict adherence to environmental controls in order to maintain commitments made during the Environmental Impact Statement (EIS) approval process.

Contract packaging has likewise not been developed at this point. Preliminary ideas have been explored to combine work at Hayden Island, SR14, and the river crossing into one package, with each of the remaining interchanges being independent stand-alone packages. By schedule, transit construction will occur later in the project and will also contain several stand-alone contracts. Many issues will influence how the contract limits and scopes-of-work are established including:

- Size of the packages.
- Coordination of critical path schedule elements.
- Anticipated contractor means and methods.
- Construction operations.

Establishing the contract limits and associated work scopes is a critical component, and a precursor to setting overall construction sequencing and Maintenance of Traffic (MOT) design. Plans for the procurement process and construction management will be developed by the CRC team as a part of the Preliminary Engineering process.

## 4.4 Construction Process

The project has a high level of construction complexity. Depending on the contracting option selecting many of these risks may be transferred to the contractor. A majority of these risks originates from the tight working conditions within downtown and the necessary sequencing of activities to complete the CRC project within the tight project and budget constraints.

A list of PE phase related risks requiring primary mitigation activities are listed below.

| SCC | Risk Title |
|---|---|
| 10.03.02 | Conflicts and interfaces with other major construction projects could lead to contractor conflicts (e.g., unrelated utility/street work). |
| 10.04.06 | Concerns about contractor compliance with permitting requirements for in water work. |
| 10.04.07 | Construction work window in downtown Vancouver could increase schedule and cost. |
| 10.04.08 | River traffic accidents could lead to schedule delay and associated costs. |
| 10.08.01 | Unforeseen site conditions in the guideway. |
| 20.06.02 | Unfavorable geotechnical conditions for the piles. |
| 40.02.02 | Lack of utility responsiveness to relocate. |
| 40.03.01 | Unforeseen site conditions could impact cost and schedule. |
| 40.03.02 | Utility relocation will be difficult in congested downtown area and rely heavily on as- built drawings. |
| 40.03.07 | Archeological discoveries could lead to stop work during construction. |

# 5. Project Tracking

Project tracking risks relate to the tracking and forecasting of cost and schedule outcomes for the project. This group is subdivided into Cost estimating and forecasting, financing and financial management risks, and project schedule management risks.

## 5.1 Cost Estimating and Forecasting, Financing and Financial Management

These risks relate to the ability of the project team to adequately forecast necessary budgets and costs associated with contractors, materials, insurances, etc. Mitigation activities include early documentation of requirements, analyses of projected financial impacts, specific contract language, and regular contractor oversight.

A list of PE phase related cost estimating and forecasting financial and financial management risks requiring primary mitigation activities are listed below.

| SCC | Risk Title |
|---|---|
| 10.03.01 | Cost of complete street rebuild along transit corridor could lead to more time per block and higher cost. |
| 10.04.02 | Cost allocation agreement for SHTB is necessary to avoid shifts in cost allocation. |
| 10.09.01 | Market price track: Direct fixation exceeds escalation. |
| 10.10.01 | Market price track: Embedded – exceeds escalation. |
| 10.12.01 | Market price track: Special (switches, turnout) exceeds escalation. |
| 10.12.02 | Track: Special (switches, turnout) – exceeds escalation. |
| 20.01.02 | Replacement of eliminated parking could lead to added ROW cost. |
| 20.06.01 | City requires ground floor retail/architectural features could lead to added cost. |
| 30.02.01 | Milwaukie project does not go forward would lead to no cost sharing. |
| 30.02.02 | Cost sharing agreement differs from estimate, would lead to added cost. |

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# 6. Project Schedule Management

These risks relate to the ability of the project team to adequately forecast proper schedules to sequence events to coincide with the tight deadlines associated with real estate acquisition, city, and environmental permitting processes.

Common mitigation activities for these risks include development of project team plans, aligning activities to the critical path and regular monitoring of the critical path items.

A list of PE phase related project schedule management risks requiring primary mitigation activities are listed below.

| SCC | Risk Title |
|---|---|
| 10.04.05 | Packaging a historical impact, SR14 in with bridge crossing. Risk that this package will impact transit schedule. |
| 40.03.04 | Limited in water barge time. |
| 40.03.06 | Extended consultation with National Marine Fisheries Service (NMFS) could lead to delayed receipt of Biological Opinion (BO) and delay of Final Environmental Impact Statement (FEIS). |
| 40.03.08 | Lack of Tribal agreement could lead to delay in 106 process and BO. |

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# 7. Contingency Management

CRC is in the process of developing a Risk Management Plan that identifies risks, assigns management oversight responsibility, and assigns order-of-magnitude cost and schedule impacts. This plan will be utilized to develop the Contingency Management Plan (CMP), whereby changes to the project cost and schedule can be measured against contingency levels. In this manner, contingency levels can be monitored for viability throughout the project life cycle. CRC plans to have the Contingency Management Plan fully developed during the Preliminary Engineering phase.

It should be noted that the current project estimate provides for allocated and unallocated contingency that equates to approximately 30% of the base year project cost. This contingency level is "typical" for this stage in project development, but Requirements Risk and other risks are higher than typical for the CRC Project.

The Year of Expenditure (YOE) project budget is $945.7 million (SCC 10-100). Allocated contingency as a percentage of YOE dollars is approximately 21.3%, or $155.3 million. Unallocated contingency as a percentage of YOE dollars is approximately 8.3%, or $60.3 million. Combined, contingency reflects approximately 29.5% of the YOE dollars, or $215.6 million.

## 7.1 Cost Contingency Management Plan

Cost contingency is a portion of the project budget identified to cover project risk uncertainty, including the effect of schedule risk and uncertainty on cost risks. Cost risks can include variations in project elements such as scope/quantity, labor productivity levels, labor availability and costs, material availability and pricing, equipment costs and availability, bidder competition, as well as impacts of schedule risks.

Contingency is expressed in the CRC estimate as allocated, equating to $155.3 million (YOE), and unallocated, equating to $60.3 million (YOE). The YOE project budget is $945.7 million, with combined contingency at $215.6 million representing approximately 29.5% of the YOE dollars.

As a part of the contingency review, each Standard Cost Category (SCC) was assessed in terms of risk and CRC's perception of these risks as represented through assignment of allocated contingency to each SCC.

**Figure 7-1. Contingency Distribution to Each SCC**

| Estimate Item | YOE $ | Percentage of Total |
|---|---|---|
| SCC 10 Guideway and Track Elements | $72.7M | 33.7% |
| SCC 20 Stations, Stops, Terminals | $14.6M | 6.8% |
| SCC 30 Support Facilities | $ 2.5M | 1.2% |
| SCC 40 Sitework and Special Conditions | $17.1M | 7.9% |
| SCC 50 Systems | $ 9.8M | 4.5% |
| SCC 60 Right-of-Way | $ 5.1M | 2.4% |
| SCC 70 Vehicles | $12.4M | 5.7% |
| SCC 80 Professional Services | $21.1M | 9.8% |
| SCC 90 Unallocated Contingency | $60.3M | 28.0% |
| SCC 100 Financing | $ 0.0M | 0.0% |
| *Total* | *$215.6M* | *100.0%* |

The Transportation Research Board's Managing Capital Costs of Major Federally Funded Public Transportation is a document that is used industry-wide to provide guidelines on the amount of contingency typically required for each stage of project development, and is also referenced in appropriate FTA Guidance. These amounts, expressed as a percentage of the total project cost (excluding contingency) are shown in Figure 7-2.

The CRC Project's stated level of contingency has been evaluated from two separate and distinct perspectives: 1) based on risk elements that are unique to this project and relative to information contained above, and 2) based on minimum requirements necessary to advance the project into the Preliminary Engineering Phase per FTA Guidelines and relative to information contained below.

**Figure 7-2. Typical Contingency Levels**

| Project Phase | Minimum Contingency Recommended |
|---|---|
| Entry to Preliminary Engineering (PE) | 30% |
| Mid Preliminary Engineering | 25% |
| Entry to Final Design (FD) | 20% |
| FFGA | 15% |
| 100% Bid | 10% |
| 50% Construction | 8% |
| 75% Construction | 6% |
| 90% Construction | 4% |
| Revenue Operating Date (ROD) | 3% |

Essentially FTA guidelines identify a 30% contingency level as reasonable for most projects entering the Preliminary Engineering Phase. At 29.5%, CRC's stated contingency is within this guideline.

To the extent that this project represents higher-than-typical project risks due to the complexity of the bridge construction, scope uncertainty that remains to be defined relative to the LPA, IWWW that might not be achievable, contingency for this project should be greater than "typical." This opinion is corroborated by the Risk Assessment output, which shows that the estimate will fall out of acceptable probabilistic parameters prior to entry into Final Design unless the predominant share of the Requirements Risks have been mitigated.

It should be noted, however, that many of the risks on the project are due to the fact that the transit elements are being advanced into the PE Phase somewhat earlier than typical in terms of alignment, scope, and schedule definition. Some of these Requirements Risks will no doubt be mitigated during the PE Phase. The contingency is minimally adequate for this stage based on stated guidelines, but will remain adequate for continued progression of the project only if some or all of the major Requirements Risks are mitigated during the PE Phase. Without mitigating the Requirements Risks during the PE Phase, contingency levels and the corresponding overall project cost would need to increase significantly.

## 7.2 Schedule Contingency Management Plan

The schedule for the CRC Project has been constructed to address the entire bridge, highway, and transit scope elements. Due to the fact that the bridge and highway components represent the predominant number of activities and are in fact driving the project end date, it is not possible to ascertain the details related to only the transit components, including true float and contingency amounts.

Essentially, completion of the Columbia River Bridge will drive the remaining transit construction schedule activities, but these cannot be assessed until detail and logic ties for transit have been developed allowing the identification of transit critical path, float and contingency. CRC intends to add logic ties for activities related to transit in order to gain these perspectives.

It is important to note that, at this point in time, the overall transit schedule appears achievable because of considerable contingency built into the pre-construction durations (as detailed through the combined bridge/transit components), but this is contingent on receipt of approval from regulatory agencies to work in the Columbia River year-round.

In the interim, and for purposes of this analysis, the schedule does not provide for sufficient contingency to address significant potential issues. This is based on the fact that the schedule assumes the most optimistic in-water work window of 12 months. If contingency were to be added to address the potential for changed in-water work window assumptions, the project cost could be significantly impacted.

By way of example, a four month IWWW would probably drive the transit schedule out to 2023 and a corresponding increase to the project cost from $945.7 million (YOE) to $1,005.3 billion (YOE) to address escalation impacts. 6-month and 12-month IWWW would result in cost impacts of $975.0 million and $931.5 million, respectively.

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# 8. Secondary Mitigation

Secondary mitigation as defined by the FTA are actions triggered if the primary mitigation, and the phase assigned contingency values of time and money, are inadequate to avoid cost overruns and/or schedule delays. These secondary mitigation/recovery plans are to provide a value equal to a percentage of the total project budget and, if applicable, an appropriate amount of schedule duration reduction, depending on the stage of the project.

In Section 9 of the risk assessment, it was noted that the current project cost estimate is higher than the risk assessment target for Entry into Preliminary Engineering. Therefore there is not the need at this time for secondary mitigation measures to be developed. However, below is a list of common examples found in large transportation projects:

- Defer non-critical project elements (i.e., delayed procurement of vehicles).
- Defer/re-phase parking and/or structure construction.
- Change project scope and/or lengthen project schedule.
- Request contractor to develop recovery schedule(s).
- Direct contractor to accelerate work.
- Add additional resources (i.e., multiple contractors, overtime, workdays).

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# 9. Risk Management and Risk Mitigation

The status of the Risk Management Framework is at a preliminary level. The current risk mitigation deliverable actions formulated for the material transit component project risks and their respective due dates for their accomplishment are set. The risk mitigation deliverable actions and dates are set out in Appendix A.

The current project cost estimate is higher than the risk assessment target for Entry into Preliminary Engineering. Therefore there is not the need at this time for secondary mitigation measures to be developed. However, the risk model for the immediately following milestones, such as Entry into Final Design, indicates a forecast that the grantee's current project estimate is below the projected FTA target for that milestone, thereby predicting that secondary mitigation measures may be required during Final Design phase. The Project will continue to development a full Risk Mitigation Framework.

Risk management, as an integral part of project management, occurs on a daily basis. With pro-active risk management we look at projects in a comprehensive manner and assess and document risks and uncertainty. The steps for risk management are provided below.

## 9.1 Risk Management Steps

WSDOT Project Management Online Guide (PMOG) risk management steps:

1. Risk Management Planning – Risk Management Planning is the systematic process of deciding how to approach, plan, and execute risk management activities throughout the life of a project. It is intended to maximize the beneficial outcome of the opportunities and minimize or eliminate the consequences of adverse risk events. (WSDOT PMOG).

2. Identify Risk Events – Risk identification involves determining which risks might affect the project and documenting their characteristics. It may be a simple risk assessment organized by the project team, or an outcome of the CEVP®/CRA workshop process.

3. Qualitative Risk Analysis – Qualitative risk analysis assesses the impact and likelihood of the identified risks and develops prioritized lists of these risks for further analysis or direct mitigation. The team assesses each identified risk for its probability of occurrence and its impact on project objectives. Project teams may elicit assistance from subject matter experts or functional units to assess the risks in their respective fields.

4. Quantitative Risk Analysis – Quantitative risk analysis is a way of numerically estimating the probability that a project will meet its cost and time objectives. Quantitative analysis is based on a simultaneous evaluation of the impacts of all identified and quantified risks.

5. Risk Response Planning – Risk response strategy is the process of developing options and determining actions to enhance opportunities and reduce threats to the project's objectives. It identifies and assigns parties to take responsibility for each risk response. This process ensures that each risk requiring a response has an "owner." The Project Manager and the project team identify which strategy is best for each risk, and then selects specific actions to implement that strategy.

6. Risk Monitoring & Control – Risk Monitoring and Control tracks identified risks, monitors residual risks, and identifies new risks—ensuring the execution of risk plans, and evaluating their effectiveness in reducing risk. Risk Monitoring and Control is an ongoing process for the life of the project.

# Appendix A. Project Risk by FTA SCC

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# RCMP CONSOLIDATED RISK LISTING

| SCC | FTA Risk Title | Risk Category | Mitigation Category | Handling Approach | Handling strategy description | Mitigation Plan Deliverables | RA Beta | Expected Risk Retirement Date | Assigned |
|---|---|---|---|---|---|---|---|---|---|
| 10.01.01 | East/West Alignment shift to 16th or 17th Avenue could lead to heavier utility relocation costs | Design | Project Scoping & Design | mitigate | Received document of city staff reccomendation for 17th St alignment unanimously accepted by Council, also approved by C-TRAN board. | Survey report for 17th Avenue | 3.28 | 6/30/2010 | King |
| 10.01.02 | Shift to 16th and tunnel could increase costs | Design | Project Scoping & Design | avoid | 16th is no longer being discussed - Resolved | 17th Avneue has ben selected as east/west alignment per City and C-TRAN board vote | 3.28 | CLOSED | |
| 10.02.01 | Rail Crossing approvals could lead to a requirement for special signaling | Requirements | Project Scoping & Design | mitigate | Early and frequent contact with City for MOU. Incorporate MOU sub schedule into Master Schedule | Develop Rail Crossing work plan | 2.78 | 3/1/2011 | Oldfield |
| 10.03.01 | Cost of complete street rebuild along transit corridor could lead to more time per block and higher cost. | Requirements | Cost Estimating & Financial Management | mitigate | Project limits include reconstruction of entire ROW from Property line to property line. Limits are included in project cost estimate for PE application and FEIS finance chapter description. | FEIS: project description for Transit | 2.78 | 12/1/2010 | Oldfield |
| 10.03.02 | Conflicts and interfaces with other major construction projects could lead to contractor conflicts (e.g. unrelated utility/street work) | Construction | Construction Process | mitigate | Obtain Major Projects schedule from Cities, Transit Agencies and DOTs, incorporate any Major project by others into master schedule, Gen conditions | Show Major Projects in master schedule. Commuication with City Planning office | 2.78 | 1/1/2012 | Oldfield |
| 10.04.01 | Selecting the three bridge option has the potential to lead to higher costs and rework on BA and schedule | Requirements | Project Scoping & Design | mitigate | Securing FHWA agreement to two bridge option. Decidion will be validated at completion of the ROD. | Record of Decision | 3.38 | 12/31/2010 | Green |
| 10.04.02 | Cost allocation agreement for SHTB is necessary to avoid shifts in cost allocation | Requirements | Cost estimating & Financial Management | mitigate | Develop term sheets. Recognize FTA guidelines on financial match and associated milestones. | Memorandum of Understanding between Transit and Highways addressing approach. | 3.38 | 9/30/2010 | Witter |
| 10.04.03 | More restrictive constraints on IWWW than in estimate would lead o higher costs TS&L, and longer schedules | Requirements | Project Scoping & Design | mitigate | Pursue regulatory relief for advance construction. | Biological Opinion | 3.38 | 9/30/2010 | Wills |
| 10.04.04 | Selecting a signature bridge with additional aesthetic elements could lead to higher TS&L and longer schedules | Design | Project Scoping & Design | mitigate | Decouple structure type from aesthetic schemes | TS&L Final Report | 3.38 | 9/30/2010 | Green |
| 10.04.05 | Packaging a historical impact and SR 14 in with bridge crossing. Risk that this package will impact transit schedule. | Requirements | Project Schedule Management | mitigate | Identify SR 14/historical impact risks. Incorporate transit schedule interfaces. Prepare a sequencing plan for SR 14 and river crossing and put milestones in construction contract. | Include a list of cordination risks in Contract Implementation Plan. Plan to include cordination Milestone in Construction contracts. | 3.38 | 12/31/2011 | Green |
| 10.04.06 | Concerns about contractor compliance with permitting requirements for in water work | Requirements | Construction Process | mitigate | Specifically establish what regulatory agencies define as in water work and put in construction contract. CRC negotiates and obtains permits. Include a list of regulatory reqiuirements in Contract Implementation Plan. Include Regulatory requirements in Permitting Plan | Contract Implimentation Plan, Permitting Plan, attachments include Biological Opinion | 3.38 | 3/15/2011 | Wills |
| 10.04.07 | Construction work window in downtown Vancouver could increase schedule and cost | Construction | Construction Process | mitigate | Conduct of construction plan, and negotiation of limited work in holiday periods. Include requirements in Contract implimentation Plan for inclusion in Contract General Conditions | Conduct of Construction plan for Downtown Vancouver. | 3.38 | 6/1/2011 | Oldfield |
| 10.04.08 | River traffic accidents could lead to schedule delay and associated costs | Construction | Construction Process | mitigate | Supplement tug and river pilots, provide Construction schedule and staging plan to Barge companies | Conduct of Construction for River crossing | 3.38 | 6/30/2013 | Green |
| 10.08.01 | Unforeseen site conditions in the guideway | Construction | Construction Process | mitigate | Complete geotechnical baseline report . Incorporate in contract provisions | Geotech report | 2.88 | 6/30/2013 | Oldfield |

# RCMP CONSOLIDATED RISK LISTING

| SCC | FTA Risk Title | Risk Category | Mitigation Category | Handling Approach | Handling strategy description | Mitigation Plan Deliverables | RA Beta | Expected Risk Retirement Date | Assigned |
|---|---|---|---|---|---|---|---|---|---|
| 10.09.01 | Market price Track: Direct fixation exceeds escalation | Market | Cost estimating & Financial Management | mitigate | Assess/buy long lead items early and just in time delivery. Incorporate approval processes. Strategy matrix. Incorporate procurement of long lead items in CIP | Contract Implimentation Plan, | 2.93 | 3/15/2011 | Oldfield |
| 10.10.01 | Market price Track: Embedded - exceeds escalation | Market | Cost estimating & Financial Management | mitigate | Assess/buy long lead items early and just in time delivery. Incorporate approval processes. Strategy matrix Incorporate procurement of long lead items in CIP | Contract Implimentation Plan, | 2.93 | 9/30/2011 | Oldfield |
| 10.12.01 | Market price Track: Special (switches,turnout) - exceeds escalation | Market | Cost estimating & Financial Management | mitigate | Assess/buy long lead items early and just in time delivery. Incorporate approval processes. Strategy matrix | Contract Implimentation Plan, | 3.03 | 9/30/2011 | Oldfield |
| 10.12.02 | Track: Special (switches,turnout) - exceeds escalation | Market | Cost estimating & Financial Management | mitigate | Additional operations requirements. Plans review by operations in conjunction with Fleet Management Plan | 30% plans & TAC meeting minutes | 3.03 | 3/31/2011 | Oldfield |
| 20.01.01 | Provision to add a fifth station to the East/West alignment would lead to track change and additional right of way acquisition | Design | Project Scoping & Design | avoid | Monitor to ensure it does not require a supplemental | Additional station is not planned for in this project however, conduits will be included to ensure that future station development will not be hindered. | 3.03 | CLOSED | |
| 20.01.02 | Replacement of eliminated parking could lead to added ROW cost | Requirements | Cost Estimating and Financial Management | mitigate | Parking mitigation Plan /Management plan. Monitor to ensure it does not require a supplemental | Parking Mitigation Plan, Parking Mangemnet Plan with City | 3.03 | 6/30/2010 | King |
| 20.01.03 | Added aesthetic station features would create added costs | Requirements | Design | mitigate | Early communication with City, with input from VWG. Establish standards to support identification of betterment. Working with the Vancouver Advisory Committee, station design reccomendations will be established | Conceptual Design Report containing Station Design Reccomendations | 3.03 | 9/30/2011 | King |
| 20.01.04 | Interchange moves South and impacts existing Expo station | Design | Project Scoping & Design | mitigate | Add screening to highway rather than canopy to station | Marine Drive Stakholders reccomendation | 3.03 | CLOSED | |
| 20.06.01 | City requires ground floor retail/architectural features could lead to added cost | Requirements | Cost estimating & Financial Management | mitigate | A high level of Architectural finishes as well as retail storefronts are already included in the cost estimate used as the basis of the FEIS Financial Plan for Transit. | Detailed list of Cost Estimate Assumptions | 2.98 | 9/30/2011 | King |
| 20.06.02 | Unfavorable geotechnical conditions for the piles | Construction | Construction Process | mitigate | Geotechnical report information will be include in design for walls, bridges and misc structures as part of PE. Geotechnical Report will be include or referanced in Contract documents. | Geotecnical report | 2.98 | 9/30/2011 | Oldfield Green |
| 20.06.03 | Parking reconfiguration of SR 14 and Mill Station would require additional right of way acquisition | Design | Project Scoping & Design | mitigate | Additional design studies and communication with City on mass and traffic. SR-14 and Mill park and rides are included in FEIS. CRC to issues memo to City of Vancouver detaing justification of SR-14 site selection and notifying city that alternative site will only be considered in the context of City funding or public private partnership and cost differential in the two sites. CRC has been able to reduce number of spaces at Mill P&R in accordance with VWG Reccomendations | Memo to City regarding SR-14 site selection. Parking mitigation plan. | 2.98 | 3/15/2011 | King |

# RCMP CONSOLIDATED RISK LISTING

| SCC | FTA Risk Title | Risk Category | Mitigation Category | Handling Approach | Handling strategy description | Mitigation Plan Deliverables | RA Beta | Expected Risk Retirement Date | Assigned |
|---|---|---|---|---|---|---|---|---|---|
| 30.02.01 | Milwaukie project does not go forward would lead to no cost sharing | Requirements | Cost Estimating & Financial Managment | mitigate | Scale back design requirements for Maintenance Facility Expansion | Milwaukie FFGA | 3.03 | 9/30/2011 | WItter |
| 30.02.02 | Cost sharing agreement differs from estimate, would lead to added cost | Requirements | Cost Estimating & Financial Managment | mitigate | Early agreement, MOA for share of Main River Crossing and CRC shared facilities, in addition to MOA with TriMet for facilities shared with Portland to Milwaukie LRT. | MOA with CRC and between CRC and TriMet | 3.03 | 9/30/2010 | Witter |
| 40.02.01 | Undergrounding of overhead utilities on McLoughlin would increase costs | Design | Project Scoping & Design | avoid | Code research and development plan for sharing cost with city | McLoughlin is no longer being considered per City Council/C-TRAN Board votes | 2.88 | CLOSED | |
| 40.02.02 | Lack of utility responsiveness to relocate | Construction | Construction Process | mitigate | Early utility coordination, development of agreement, build influencing relationships | Utility relocation plan | 2.88 | 6/15/2011 | Oldfield |
| 40.03.01 | Unforeseen site conditions could impact cost and schedule | Construction | Construction Process | mitigate | Early characterization and sampling. Advanced clean-up contracts | Geotech report | 3.08 | 9/30/2011 | Oldfield |
| 40.03.02 | Utility relocation will be difficult in congested downtown area and rely heavily on as- built drawings | Construction | Construction Process | mitigate | Potholing and site investigation. Traffic control planning with City | Conduct of construction agreement with city | 3.08 | 9/30/2011 | Oldfield |
| 40.03.03 | Potential change in environmental regulations could lead to new protected species and/or environmental requirements. | Requirements | Project Scoping & Design | mitigate | Monitor pending regulations | Biological Opinion | 3.08 | 9/30/2011 | Wills |
| 40.03.04 | Limited In-Water Barge Time | Requirements | Project Schedule Management | mitigate | | Biological Opinion | 3.08 | ongoing | Green |
| 40.03.05 | Community objections could have impacts on transit schedule | Design | Project Scoping & Design | mitigate | Community outreach, regular meetings (VWG), VTAC, TOD Committee and communication. Follow-up with City planning department | Conduct of construction agreement with city | 3.08 | ongoing | Novotny Belokonny |
| 40.03.06 | Extended consultation with NMFS could lead to delayed receipt of BO and delay of FEIS | Requirements | Project Schedule Management | mitigate | Early consultation and drafts. Close monitoring of intercept agreements | Biological Opinion | 3.08 | ongoing | Wills |
| 40.03.07 | Archeological discoveries could lead to stop work during construction | Construction | Construction Process | mitigate | Inadvertent discovery plan published and agreed | Inadvertent discovery plan | 3.08 | 9/30/2011 | Wills |
| 40.03.08 | Lack of Tribal agreement could lead to delay in 106 process and BO | Requirements | Project Schedule Management | mitigate | Identify and liaise with tribes | Tribal Agreements | 3.08 | ongoing | Wills |
| | | | | | | | <3 | | |
| | | | | | | | >3 | | |

## Appendix B. Status of PMOC SPOT Recommended Action Items

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# CRC Task List from FTA NS PE Letter Spot Report

| Number | Source | Task | Action | Responsible Contact ID | Date Complete | Initial Submittal to FTA | Roadmap Reference |
|---|---|---|---|---|---|---|---|
| 1-1 | | Technical Capacity & Capability (TC&C) | Submit draft detailed project control procedures for ongoing PMOC review | Williams | 8/15/2010 | | |
| 1-2 | PE | Technical Capacity & Capability (TC&C) | Develop and submit detailed project control procedures to further describe the scheduling, budget management, trending forcasting, and reporting functions as part of the PE process and to support the CRC project's contiuing evolution. | Williams | 12/31/2010 | | B.2.1 |
| 2-1 | | Org chart update | Update transt team org chart for FTA Quarterly | Williams | COMPLETE | | |
| 2-2 | | Org chart update | Insert updated Org chart in PMP update for spring 201( | Williams | COMPLETE | | |
| 2-3 | PE | Revise organization chart / define project controls | Address and reconcile inconsistencies between the organizational structure as documented in the PMP and the functions of the organization in practice. | Williams | 6/30/2010 | | B.2.1 |
| 3-1 | | Corrections to PE Letter Narrative | submit list of needed changes to Steve Saxton | Betteridge | 3/9/2010 | | |
| 3-2 | PE | Corrections to PE Letter Narrative | Need to change number of park and rides, terminus and number of stations. | Betteridge | 4/30/2010 | 3/9/2010 | N/A |
| 4-1 | | Provide MOU between transit and highway regarding approach | Develop Memorandum of Understanding between Transit and Highways addressing approach. | Witter | 6/30/2010 | | B.6.2 |
| 4-2 | Entry | Bridge Share | Negotiate a maximum cap for transit participation in the cost of the bridge | Witter | 6/30/2010 | | B.6.2 |
| 5-1 | | FMPs | Draft to PMOC for FMP | Williams | 8/31/2010 | | |
| 5-2 | Entry | FMPs | Refine the FMPs | Williams | 12/31/2010 | | A.2.4? |
| 6-1 | Entry | Project Budget Data into PMP | Incorporate project budget data into the Project Management Plan. The current plan does not include any cost/budget breakdown for the transit project. | Williams | 11/30/2010 | | B.1 |
| 7-1 | Entry | Modify WBS | Modification of the WBS is required to present information consistent with FTA expectations; data needs to be organized and retrievable at the following levels:<br>Total project<br>Mode (transit, highway, bridge)<br>Element (design, construction, Right Of Way (ROW), professional services, etc.)<br>Contract / agreement | Williams | 10/31/2010 | | B.1 |
| 8-1 | Entry | Include Basis & Assumption Document in Estimate | Include an estimate Basis & Assumptions (B&A) document that identifies major work scope, quantity, and unit rate assumptions utilized in the estimate development. This document would also include perspectives on unit rate source information as well as schedule and escalation assumptions. | Williams | 12/31/2010 | | A.2.1 |
| 9-1 | Entry | Build More Detailed Professional Services Estimate | Build a more detailed Professional Services estimate based on current CRC staffing and planning assumptions, in order to validate the professional services estimate, currently reflected as a percentage of the total project cost. | Williams | 12/31/2010 | | B.5.1 |
| 10-1 | | Identify scope | Plan to include in the VE Sessions | Oldfield | 10/1/2010 | | |
| 10-2 | RA | Constructability Review | Perform a thorough constructability review of all aspects of the project at the completion of PE and prior to request for entry into FD. Constructability review(s) should be included and monitored in with other risk mitigation items. | Oldfield | 10/1/2010 | | B.4.1 |
| 11-1 | RA | Aggregate Professional Services | Aggregate professional services - The PMOC recommends that CRC build a more detailed estimate based on specific Agency staffing plans. | Williams | 12/31/2010 | | B.1.1 |
| 12-1 | | Interdiscipline coordination | Identify activities from other disciplines that will impact transit construction. Verify they are accommodated in the schedule. | Oldfield | 12/1/2010 | | |
| 12-2 | RA | MOT Coordination | Coordination between contract packaging and key design activities, especially Maintenance of Traffic. | Oldfield | 3/9/2011 | | B.5.2 |

# CRC Task List from FTA NS PE Letter Spot Report

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13-1 | | Conservative Design Prov regarding Seismic Analyses | Following design criteria as established by DOTs. Will reevaluate in May 2010. | | 5/28/2010 | | |
| 13-2 | RA | Conservative Design Prov regarding Seismic Analyses | Application of overly conservative design provisions regarding seismic analyses on the river structures could unnecessarily increase foundation costs dramatically | Green | 5/28/2010 | | B.4.1/B.4.2 |
| 14-1 | | TS&L Development | Final TS&L going to WSDOT, ODOT, TriMet, C-Tran for review. Then to FTA FHWA end of May. | Green | 5/28/2010 | | |
| 14-2 | | TS&L Development | Presentation can be scheduled if deemed necessary | Green | 6/15/2010 | | |
| 14-3 | RA | TS&L Development | Continue dialogue with key decision makers regarding bridge final TS&L development to build/maintain consensus. An overview presentation to the technical audience (WSDOT; ODOT; FTA; FHWA) prior to kick-off of detailed reviews should be considered. | Green | 6/30/2010 | | A.1.5 |
| 15-1 | | Defensible Scrutiny by Competing Materials Industries | Type study is in it's final review, pending final comments. Letter will be sent regarding formal FHWA/FTA comments | | 5/14/2010 | | |
| 15-2 | RA | Defensible Scrutiny by Competing Materials Industries | Exercise particular care in documentation of all bridge design option evaluations (especially the water crossings) in the TS&L evaluation process such that the final recommendations are defensible against scrutiny by competing material industries (specifically structural steel and concrete). | Green | 5/28/2010 | | B.4.1/B4.2? |
| 16-1 | | Coordination with other TriMet projects | Identify requirements included in TriMet Portland to Milwaukie project and determine if those would be applicable to CRC project. | Oldfield | 9/1/2010 | | |
| 16-2 | RA | Planned Project Systems | The grantee's project systems design has not advanced to the point to determine whether the Grantee has matched the appropriate technology with the planned transit applications for the best performance at the lowest cost. | Oldfield | 3/9/2011 | | B.5.1 |
| 17-1 | | Coordination with other TriMet projects and C-TRAN | Identify requirements included in TriMet Portland to Milwaukie project and determine if those would be applicable to CRC project. Also discuss C-TRAN requirements | Oldfield | 9/1/2010 | | |
| 17-2 | RA | Project Cost Estimate and Existing Systems | Ensure that the project cost estimate accounts for additional expenses associated with upgrading existing transit systems and/or retrofit new technology to ensure compatibility between the two. | Oldfield | 6/9/2011 | | A.2.1 |
| 18-1 | | Light maintenance lay over facility at Clark College | Develop memo outlining why facility is not necessary | Griffiths | 6/15/2010 | | |
| 18-2 | RA | Light maintenance lay over facility at Clark College | Consider a light maintenance or lay-over facility on the north side of the river at Clark College. | Witter | 6/15/2010 | | A.1.1 |
| 19-1 | | Preliminary Engineering plans, drawings, design criteria, etc | Progress design drawings, design criteria, etc to define project scope to a 30% design effort. Include discussion of staging locations and opportunities in the design effort. | Oldfield | 3/9/2011 | | |
| 19-2 | RA | Overall Corridor Construction Staging | Develop and finalize the overall corridor construction staging as early as possible during PE | Oldfield | 3/9/2011 | | B.5.2 |
| 20-1 | | Contracting Packaging Methodology | Held workshop with contractor and WSDOT construction office. Report developed | Witter | 2/1/2010 | | |
| 20-2 | | Contracting Packaging Methodology | FTA/FHWA to receive copy of final report | Wylder | 6/1/2010 | | |
| 20-3 | | Contracting Packaging Methodology | Determine wether report is sufficient or additioonal workshop is necessatry. | Witter | 6/15/2010 | | |
| 20-4 | RA | Contracting Packaging Methodology | Seek input from outside industry experts regarding contract packaging and procurement methodology. A multi-day workshop consisting of CRC; FHWA; FTA; and independent experts in construction and procurement is recommended. | Witter | 6/15/2010 | | B.5.2 |

# CRC Task List from FTA NS PE Letter Spot Report

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|---|---|---|---|---|---|---|---|
| 21-1 | | Estimate Basis and Assumptions Doc | The "Basis of Estimate" will only be an update to the document submitted with the New Starts Application. | Kitchin | 6/15/2010 | | |
| 21-2 | RA | Estimate Basis and Assumptions Doc | Include an estimate Basis and Assumptions document that identifies major work scope, quantity, and unit rate assumptions used in the estimate development. | Kitchin | 6/15/2010 | | A.2.1 |
| 22-1 | | Identification of items | Identify items that could be long lead and possible contracting methods/timing | Oldfield | 12/1/2010 | | |
| 22-2 | RA | Procurement of long lead items | Consider procuring long lead items such as running rail and special trackwork early on to reduce exposure to escalation impacts. | Oldfield | 3/9/2011 | | B.5.2 |
| 23-1 | | Monthly schedule updates | Update schedule on monthly basis to reflect actual activity progress, provide additional detail on project final design and construction, etc. and coordinates with all disciplines | Oldfield | 6/9/2011 | | |
| 23-1 | RA | Transit Sub Schedule | Develop a focused transit sub-schedule that includes appropriate systematic interface ties to the overall highway program for reporting/management. | Oldfield | 6/9/2011 | | A.2.2 |
| 24-1 | | Monthly schedule updates | Update schedule on monthly basis to reflect actual activity progress, provide additional detail on project final design and construction, etc. and coordinates with all disciplines | Oldfield | 3/9/2011 | | |
| 24-2 | RA | Re-plan transit guideway construction | Re-plan the transit guideway construction counting back from the southbound bridge completion milestone. | Oldfield | 3/9/2011 | | A.2.2/B.5.2 |
| 25-1 | | Proprietary Systems Idenfications and Construction Methods | Determine propietary system needs and construction methods at VE workshop | Oldfield | 1/20/2011 | | |
| 25-2 | RA | Proprietary Systems Idenfications and Construction Methods | A determination of needed proprietary systems or construction methods has not been specified. This is needed to determine if a reasonable number of contractors are available with the expertise to compete for construction packages. | Oldfield | 3/9/2011 | | B.5.2 |
| 26-1 | | Preliminary Engineering plans, drawings, design criteria, etc | Progress design drawings, design criteria, etc to define project scope to a 30% design effort. | Oldfield | 3/9/2011 | | |
| 26-1 | RA | Major Work Detail Completed | Major work details, structural element dimensions, design interfaces and physical interfaces are not complete or well defined, as would be expected for a project entering PE. | Oldfield | 3/9/2011 | | A.1.1 |
| 27-1 | RA | Roles and Responsiblities | Roles and responsibilities of contractors versus those of the CRC Team (staff and any consultant support) are undefined at this phase. | Williams | 12/31/2010 | | B.1.1 |
| 28-1 | | Preliminary Engineering plans, drawings, design criteria, etc | Progress design drawings, design criteria, etc to define project scope to a 30% design effort. Discuss in VE effort. | Oldfield | 3/9/2011 | | |
| 28-2 | RA | Constructability Assessment | Project constructability can only be assessed in relative terms due to lack of detailed design. | Oldfield | 3/9/2011 | | B.4.1 |