RISK AND CONTINGENCY MANAGEMENT PLAN

Draft Report

January 2011

Columbia River CROSSING

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ACRONYMS

BY	Base Year
CEVP	Cost Estimate Validation Process
CRA	Cost Risk Assessment
CRC	Columbia River Crossing
CREM	Cost Risk and Estimate Management
C-TRAN	Clark County Public Transportation Benefit Area
DEA	David Evans & Associates
EIS	Environmental Impact Statement
FD	Final Design
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
IWWW	In-Water Work Window
LPA	Locally Preferred Alternative
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
OEO	Office of Equal Opportunity
PDT	Project Development Team
PE	Preliminary Engineering
PIP	Project Implementation Plan
PMOC	Project Management Oversight Committee
PM	Project Manager
PMOG	Project Management Online Guide
PMP	Project Management Plan
RCMP	Risk and Contingency Management Plan
RIT	Risk Identification Team

RMO	Risk Management Office
ROD	Record of Decision
TriMet	Tri-County Metropolitan Transportation District
WSDOT	Washington State Department of Transportation

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 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.

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 & 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 Committee (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 & 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 the risk template with a primary mitigation plan for each Preliminary Engineering (PE) Phase risk that was identified in the PMOC Risk

Assessment ; including risk owners, handling steps, step deliverables, and residual risk scores. The risk list will be monitored internally through monthly meetings and will be available to FTA by request. Additionally a Risk Assessment may be performed by the PMOC in preparation for the projects readiness to enter Final Design (FD).

- PE Letter action item list will be monitored separately.

The Project risk baseline was initially developed for the submittal to FTA New Starts during the risk workshop held April 14th and 15th 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 Final Design Phase Goals

FD Phase goals include:

- Completion of project delivery strategy and finalization of contract packaging in preparation for construction ready bid documents.
- Development of plans and specification of project elements to a level that would support a FD level adherence to cost estimates and project schedule,
- List of risks and opportunities facing the project that will be addressed during FD and continual monitoring of the risk list through internal (monthly/bi-weekly) meetings.
- Monitoring of handling strategies for all identified project engineering risks, during the Risk Assessment and CEVP, including mitigation strategies and actions to be taken to reduce the risk's impact by the earliest possible milestone using avoidance, acceptance, mitigation and/or transference,
- 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 Final Design and Construction phases,
- Strong adherence and connectivity to the following plans in FD to minimize risks; project operations plans, project implementation (contracting) plan, Document Control Plan, Configuration Management Plan and Change Control Plan.

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 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 WSDOT Cost Risk and Estimate Management (CREM) office and modified as necessary for transit elements based on project 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

3.1 Insurance Claims Management

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.

Washington State Department of Transportation (WSDOT) is the FTA Grantee for transit grants and lead agency for the overall multi-modal project. WSDOT's (RMO) has responsibility for directing and coordinating all risk functions. RMO will 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's Claims Manager – Streator Johnson - 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 Director of Project Delivery will be responsible for conducting operations in accordance with departmental standards and statutory requirements. He will determine the degree of indemnification and/or insurance protection necessary in consultation with the Office of Attorney General/WSDOT Division or the RMO's Claims Manager – Streator Johnson, and will report losses or claims in accordance with requirements in Chapters 5 and 8 of the WSDOT Risk Management Manual.

CRC 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.

3.2 CRC Insurance

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 it's required by a fiduciary arrangement. WSDOT's risk exposures are financed by various combinations of self-assumption, self-insurance, and commercial insurance.

Each construction contractor or supplier will obtain, at its expense, and keep in effect during the term of the contract, a Commercial General Liability Insurance and other insurance coverages, if indicated in the contract Special provisions, covering bodily injury and property damage in a form and with coverages that meet the requirements of the contract Special provisions.

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 Preliminary Engineering (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 Project Management Plan (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 Final Design (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 encompasses 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.

4.2.1. 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 requirement 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 BA and schedule
10.04.03	More restrictive constraints on IWWW than in estimate would lead to higher costs TS&L, and longer schedules
40.03.03	Potential change in environmental regulations could lead to new protected species and/or environmental requirements.

4.2.2. 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
10.04.04	Selecting a signature bridge with additional aesthetic elements could lead to higher TS&L and longer schedules
20.01.03	Added aesthetic station features would create added costs
20.01.04	Interchange moves South and impacts existing Expo station
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 Contract Packaging

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. The information provided in this section is summarized in Appendix XX the Project Implementation Plan (PIP) of the PMP and will continue to be updated in accordance with decisions continuing to be made regarding, delivery methods, contracting and packaging. The Columbia River Crossing (CRC) project is nearing completion of the National Environmental Policy Act (NEPA) phase, with a modified preferred alternative expected to be supported by a Record of Decision (ROD) in the late first quarter of 2011. An efficient framework for project execution is now necessary to assist the CRC project team in advancing the project post-NEPA – *into final design and construction*. This requires the development and execution of a **Project Implementation Plan** addressing three critical needs:

Project Packaging Strategy – that would optimally divide the project into separate and distinct functional construction packages that meet broad technical, political, and financial needs;

Project Delivery Method Strategy – that would optimally assign roles and responsibilities for the performance of each project package activities – design and construction – and facilitate the optimal performance of these activities, with respect to the owner's project objectives; coupled with

Procurement Strategy – that is most suitable in combination with the delivery methods where evaluation and selection of contractors would optimally deliver each project package and would be based on price, technical qualifications, or on a combination of price, technical qualifications, time, and other factors.

A Project Packaging, Delivery Method and Procurement Strategy workshop was held on September 21–23, 2010 to develop recommendations on project packaging options, delivery methods and procurement strategies. The 3-day workshop was attended by inter-agency staff, industry experts, and Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) representatives (see PIP Appendix A for list of participants). Their knowledge base included practical experience in different project delivery and procurement methods, prior involvement in the process of selecting delivery methods, background in the methods of procurement selection, and practical experience on large mega projects.

CRC staff provided workshop participants with a general project overview that covered major work features including Highway, Bridge (Columbia River Crossing/Portland Harbor Crossings/ Land Bridges) and Transit elements. CRC staff introduced participants to the Project Purpose and Need describing the primary objectives for the CRC project and presented project constraints that were deemed influential in how to package the project and the selection of delivery methods.

4.3.1. Delivery Methods

For the purpose of this workshop ***Delivery Methods*** refer to the overall processes by which a project is designed, constructed, and/or maintained (*it does not refer to evaluating and selecting contractors*). Various types of delivery methods, listed below, were discussed.

- Design-Bid-Build (D-B-B)
- Design-Build (D-B)
- Construction Manager @Risk (CM @Risk)
- Agency-Construction Manager (CM @Fee)
- The Portland Method (Hybrid CM @Risk)
- Design Sequencing
- Early Contractor Involvement (ECI)/Target Pricing (Hybrid D-B)

A description of the three most prominent delivery methods [***Design-Bid-Build*** (D-B-B), ***Design-Build*** (D-B), and ***Construction Manager at Risk*** (CM @R)] were presented to workshop participants as follow.

Design–Bid–Build (D-B-B)

- Separate contract with a designer and contractor.
- Design and construction are sequential.
- Design changes are easily accommodated prior to start of construction.
- Owner is responsible to the contractor for E&O.
- Owner can control quality.

Design–Build (D-B-B)

- Owner holds a single contract with the D-B.
- Design and construction often overlap.
- Responsibility for delivery is shared between designer and contractor.
- Owner is not responsible to the contractor for E&O.
- Design and construction quality are primarily controlled by the D-B.

Construction Manager @ Risk

- Separate contract with a designer and contractor.
- Design and construction sometime may overlap.

- Contractor engaged during the design phase.
- Owner is responsible to the contractor for E&O.

General delivery method risk trends were presented to workshop participants on overall schedule durations, schedule and cost growth, number of interface points, control of design details, and ability to make late design changes without impacting cost or schedule. General delivery methods attributes trends were also discussed.

A detailed attributes listing (i.e., advantages/disadvantages) of the three most prominent delivery methods (D-B-B, CM @R, and D-B) were discussed (see Appendix B of PIP). Workshop participants used them, to rate the effectiveness of delivery methods to successfully accomplish/maximize owner-driven performance goals.

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.

4.3.2. Contract Packaging

The owner-driven project packaging guiding criteria (Figure 4-1) was developed by Washington State Department of Transportation (WSDOT), Oregon Department of Transportation (ODOT), Tri-County Metropolitan Transportation District (TriMet), and Clark County Public Transportation Benefit Area (C-TRAN) project representatives, prior to the workshop, to capture broad technical, political, financial, and risk (cost and schedule) management needs. The criteria were provided to workshop participants to guide their deliberations.

Figure 4-1. Project Packaging Guiding Criteria

- Functional construction packages that satisfy the project's Purpose and Need
- ✓ *Consider level of design, interdependencies, inherent risks, and schedule criticality for each work package;*
- ✓ *Consider level of owner management and oversight required for multiple interfaces among work packages; and*
- ✓ *Consider urban features and jurisdictional change along the alignment.*
- Meet projected financial cash flow.
- Size to promote participation by local contractors.
- ✓ *Balance need for local participation with need for appropriate expertise and experience.*
- Consider early packages to reduce schedule risks.
- Consider separate packages for long lead items.
- Consider separate packages for specialty work.
- Consider potential contracting opportunities for DBEs.

In addition to the owner-driven guiding criteria, workshop participants were provided with the meeting summary (Appendix E of PIP) of the Construction Contractor Open House held on September 9, 2010 to generate input from construction trades to help inform the workshop. This meeting summary transcribed contractors' responses to a questionnaire that included the following sample questions:

- Do you have concerns with a construction contract that includes work in both states?
- Please identify any issues or concerns you have with bonding, including bond limits.
- The project will need staging areas for construction. Please comment on whether these should be provided by the agency or the contractor.
- How should a construction contract be developed to make execution of work in two states easier?
- Please provide any additional information to inform the procurement, contracting, and bid process for CRC.

4.3.3. Project Packaging Options Analysis

The process used to reach consensus on project packaging recommendations consisted of dividing the participants into two groups, whereby each group developed and presented an initial project packaging strategy. The two groups then discussed similarities and differences between the two strategies, including how packages meet the guiding criteria and reaching consensus on project packaging recommendations.

Workshop participants considered many factors to reach consensus on packaging recommendations. This included the owner-driven guiding criteria (described above), input from the construction trade (Appendix E of PIP), type of work involved (e.g., marine structure versus land structure), location characteristics (e.g., urban commercial business district versus industrial local), geographic and engineering constraints, work elements inter-dependability, unique requirements including technical complexity, estimated construction cost breakdown of project work elements (the most up to date Cost Estimate Validation Process (CEVP) results for the Locally Preferred Alternative Phase 1 Scenario), anticipated schedule of funding decisions, size of contract, contractor bonding capacity, and the opportunity for "early start" projects that could facilitate advancing major work elements with minimal cash flow impacts. Workshop participants did not have the benefit of a project cash flow curve.

The recommendations on Large Project Packages, Small/Early/Specialty and Long Lead Project Packages were developed by workshop participants and are available in detail in the PIP.

Specifically related to transit objectives were identified to prioritize concerns related to downtown Vancouver, costs, and risks.

Objectives (Vancouver Light Rail)

- Maintain traffic operations in downtown Vancouver.
- Maintain Access to retail, business transportation hubs, and entertainment centers.
- Minimize impacts to existing infrastructure systems.
- Reduce cost and schedule risks.
- Reduce public safety risks.
- Complete project within established budgets.

Performance Goals (Vancouver Light Rail)

1. Provide owner control of final design.
2. Minimizing disruption to business/residence.
3. Maintaining property access.
4. Ensuring lowest reasonable price.

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

originate 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 & forecasting, financing and financial management risks and project schedule management risks.

5.1 Cost estimating & 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 & 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

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, SR 14 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 NMFS could lead to delayed receipt of BO and delay of FEIS
40.03.08	Lack of Tribal agreement could lead to delay in 106 process and BO

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7. Contingency Management Program

CRC has developed a risk management process that identifies risks, assigns management oversight responsibility, and assigns order-of-magnitude cost and schedule impacts. This process will be utilized to help develop this Risk and Contingency Management Plan (RCMP), whereby changes to the project cost and schedule can be measured against contingency levels. In this manner, risks and contingency levels can be monitored for viability throughout the project life cycle. CRC plans to have the Contingency Management Program fully developed before a FFGA is completed.

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. All dollar figures within the Contingency Management Program are specific to the transit portion of the CRC.

The 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 Risk Analysis Approach

Risk analysis consists of assessment of the uncertainties in the base factors of cost, schedule, scope, and escalation. Risks and opportunities are identified as potential events that could result in changes to the Project costs and schedule. The risk factors include the likelihood of each event occurring during each phase of the Project and the cost and schedule impacts if the event occurs. A probabilistic cost and schedule model is determined to establish appropriate contingencies to provide a target level of uncertainty of the total project cost and the Revenue Service date. From this analysis follows risk mitigation strategies and contingency management plans. The contingency management is described in the following sections.

As a part of the contingency review, each 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 Elements	Guideway and Track	$72.7M	33.7%
SCC 20	Stations, Stops, Terminals	$14.6M	6.8%
SCC 30	Support Facilities	$ 2.5M	1.2%
SCC 40 Conditions	Sitework and Special	$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 on the following page.

The CRC Project's stated level of contingency has been evaluated from multiple and distinct perspectives:

(7.1.1) Risk Assessment

FTA has risk assessment protocols integrated into their funding mechanisms. A Risk Assessment is required during the New Starts Application evaluation process and prior to the Full Funding Grant Agreement approval. FTA utilizes a "Top-Down" process to provide evaluation for aspects of the project scope, project schedule, project estimate, grantee's capacity, program management, and management plan. This evaluation results in a judgment of risk by SCC category and type (market, bid, construction, or requirements) and a range of projected costs at

various stages of project development. The results are used as a management tool to guide development of risk management strategies.

Based on risk elements that are unique to this project and relative to information contained above, an initial risk assessment was completed by Gannett Fleming, Inc. in April of 2009. This report addressed the full CRC project including LRT's, five stations, three park & ride sites, and LRT extension into Vancouver. The size of the CRC project and the coordination of the number of agencies involved make the identification of schedule delay costs difficult.

(7.1.2) Cost Estimation Validation Process (CEVP) and Cost Risk Assessment (CRA)

WSDOTs own process which deals with identifiable and quantifiable project-type risks – i.e. those events that can occur in planning, design, bidding, construction, and changed conditions. The CEVP process will be conducted internally roughly once per year or in accordance with any major project changes.

The CEVP and Cost Risk Assessment (CRA) are proven techniques for risk management and risk-based estimating. CEVP/CRA is a proprietary approach developed by WSDOT which utilizes a team of subject matter experts to identify and quantify uncertainty and risk in a workshop setting. WSDOT is required by Executive Order numbers E 1053.00, E 1038.00, and E 1032.01 to utilize this process. The CEVP/CRA process is endorsed by FHWA and ODOT as a proven and effective technique for risk management and risk-based estimating. While transit elements will be evaluated as part of this process, FTA has differing requirements needed to meet their goals for risk assessment. It is understood that this process will be implemented in addition to and not in place of the FTA risk assessment process, which is described in the next section of this document.

The Cost Estimate Validation Process is a risk analysis that combines the first three components of the risk management plan. The outcomes of the analysis are risk registers, risk-laden design and construction schedules, and projected ranges of total costs and expected completion dates. The risk register includes an estimate of the positive or negative potential impact in terms of cost and schedule, the probability, and the design/construction activity likely to be affected. The range of probable costs and completion dates varies from those with a 10 percent to a 90 percent probability of being exceeded. The ranges, which are estimated using a Monte Carlo simulation, include the effect of escalation. The range will decrease through design and construction until commissioning, when the cost and completion date become final.

The CEVP process is an intensive workshop that will generally be applied to the project as a whole. In some instances the Executive and Senior Management groups may choose to employ a CRA process to evaluate risks for specific areas of the project design/construction. The CRA process is an effective and proven method as a risk assessment strategy. Risks are identified in the same way as the CEVP process and also utilize the Monte Carlo simulation. The primary difference between the two processes are the requirements for team make-up, as described below.

In the CEVP/CRA process, the team makeup centers around interdisciplinary subject matter experts to provide an accurate assessment of risks based on firsthand knowledge and experience. CEVP process requires an independent team of outside subject matter experts, and CRA may

utilize project or resource staff to aid in the risk assessment. These processes are organized through WSDOT's CREM Office and facilitated by either a CREM staff member or outside consultant employed by the CREM office and trained in CEVP/CRA methods and implementation.

For more information on the CEVP/CRA risk assessment approach, see the following website:

http://www.WSDOT.wa.gov/Projects/ProjectMgmt/RiskAssessment/

The CEVP/CRA process will be implemented at various phases in the project life. CRC has implemented both a CEVP and a CRA on the project to date. CRC is committed to continually performing risk assessment workshops to evaluate the monetary and schedule impacts of project risks at different phases in the project. The following summarizes risk assessment workshops and their schedule for implementation to date:

- Conceptual

The CEVP was used to assess risk for the ten conceptual build alternatives evaluated in 2006. The CEVP identified the bridge across the Columbia River as one of the main sources of uncertainty and risk, and a program was implemented during the next phase of work to improve confidence in costs and schedule. The program included advancing design development and undertaking a preliminary geotechnical investigation, which included drilling holes in the Columbia River channel.

The CEVP provided a comprehensive list of risks that formed a solid basis for the subsequent risk assessment update for the four preliminary build alternatives being evaluated for the DEIS. An update to evaluate the effectiveness of implemented recommendations followed with the less intensive WSDOT Cost Risk Assessment approach.

- 0-10% Design – CEVP
- 30% Design/Post-ROD – TBD
- 90% Design – TBD

(7.1.3) Internal Risk Monitoring

Internally the CRC Project is monitoring risk through the Risk Identification Team which will convene monthly through the Task Managers meetings which occurs bi-weekly. Additionally the Task Lead meetings held weekly will be analyzing risks identified and assigned for mitigation by task managers following mitigation plans. This process is discussed in further detail under the Risk Assessment. The RIT will begin meeting in September of 2010 and continue to coordinate through project delivery.

Additionally contingency is based on minimum requirements necessary to advance the project into the Final Design Phase as 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 Locally Preferred Alternative (LPA), In-Water Work Window (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 Contingency Management

Contingencies, both cost and schedule, are established to cover residual risks and uncertainties after the application of appropriate risk management. The contingencies are the difference between the ultimate cost or schedule at the target cumulative probability percentile and the baseline cost or schedule of the project.

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.

7.3 Project Milestones

The risks and associated contingencies will be re-evaluated at a minimum at each risk milestone, as defined in Figure 7-3. Additional evaluations may occur as required based on new information, trigger events, or changing Project conditions identified by changes in the total project cost estimate or schedule variance.

Figure 7-3. Project Risk Milestones

Figure 7-3 Project Risk Milestones		
Stage	**Phase**	**Milestone Date**
Entry into PE	**1**	**2010 1st Quarter**
Entry into Final Design	**2**	**2011 2nd Quarter**
FFGA Awarded	**3**	**2012 4th Quarter**
40% Bid Complete	**4**	**?**
20% Construction	**5**	**?**
50% Construction	**6**	**?**
75% Construction	**7**	**?**
90% Construction	**8**	**?**

7.4 Cost Contingency Management

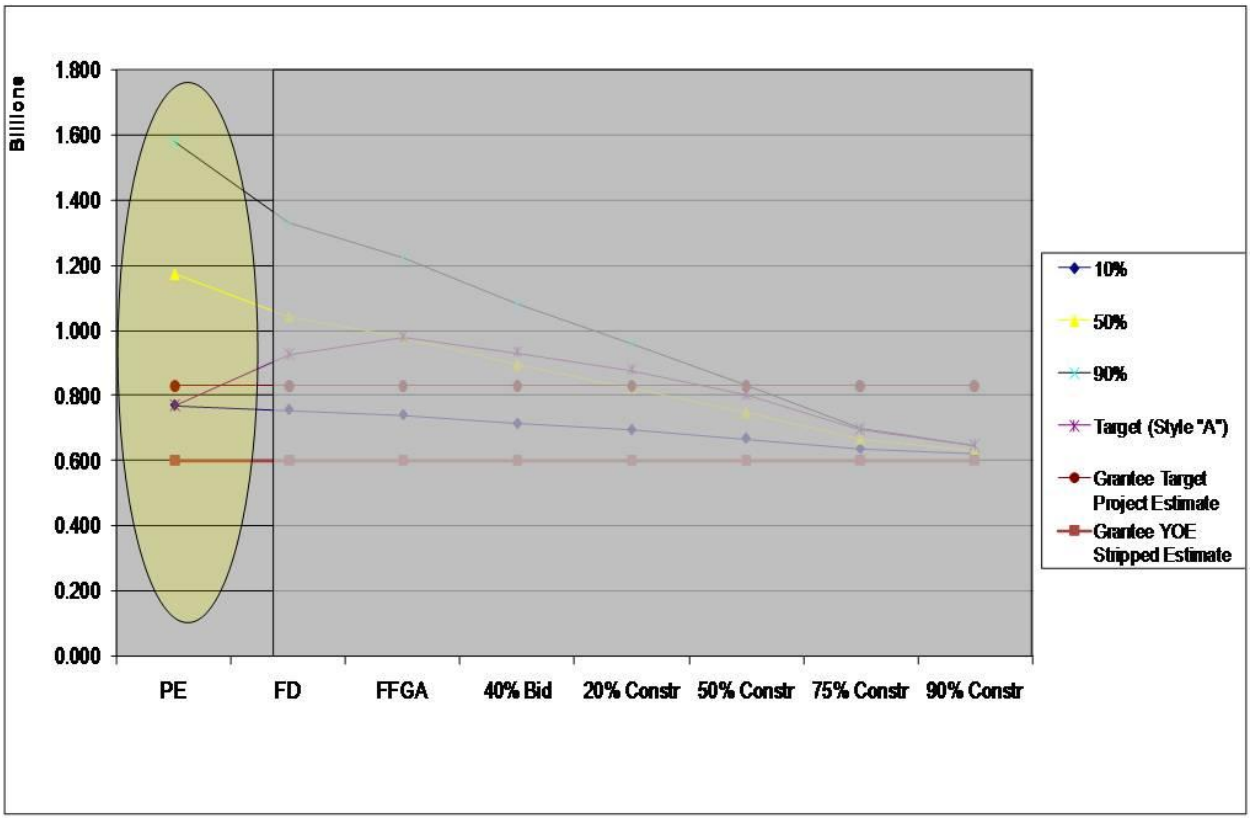
Experience consistently demonstrates that the defined or assumed conditions seldom occur precisely as predicted for complex projects like the CRC. Deviations from the defined set of conditions, which cannot be specifically identified or predicted, are uncertainties whose effects can be mitigated through the use of appropriate cost contingency. The amount of contingency is directly related to the probability of these uncertainties occurring and the consequences of those events. During the development of the Risk Assessment the project team used a multi-agency approach including WSDOT/ODOT, C-TRAN and TriMet. Staff developed the estimate in concert with highway and transit estimators having access to extensive databases for both bridge/highway and transit projects. Additionally to develop the percentage contingency to address estimating uncertainties finance charges and inflation were added to the CRC estimate to arrive at the total CRC transit cost. A cost contingency of $ 215.6 million was included in the estimate and includes the finance charges from base year (BY) to YOE calculated at 4% annually for inflation.

As mentioned above, with the passage of time and achievement of risk milestones, the level of remaining contingency required to cover the remaining portion of the project may vary, but will generally decrease over time with the declining number of expected risk events.

Unused contingency from each phase is planned to be released and allocated to the Project's contingency reserve for uses such as supplementing remaining phase contingency or secondary risk mitigation actions. Figure 7-4 below depicts an expected utilization profile over the project life. Currently the CRC team is reviewing processes internally to identify areas of coordination for the project deliverables within the PMP. This document will coordinate processes within each respective agency as to not waste resources. There will be a process developed for mitigating cost contingency with consistency regardless of the agency affected. It will be important for all agencies to agree on this process for PMP solidification.

The appointment of a Project Manager (PM) to oversee the identified risk will be done on a case by case basis the PM will coordinate with his Task Leads to mitigate risks. Since PMs are the main Risk Managers for each agency they will be useful in the development of this process. As the Risk Manager each individual PM will be responsible for monitoring the cost contingency.

Figure 7-4. Expected Utilization Profile Over The Project Life



7.5 Schedule Contingency Management Plan

The Schedule Contingency, like the cost contingency, will be allocated to the various project phases, continuously managed in accordance with this plan, and re-evaluated at each contingency milestone. As each risk milestone is completed an evaluation will be performed of schedule contingency utilized to-date and remaining schedule contingency.

The CRC Project schedule includes perspectives on the entire CRC Project including bridge, highway and transit components. Essentially, the bridge structure and all items precedent to its implementation are driving the critical path for transit.

A transit sub-schedule will be taken from the overall project schedule and will continually be used to update the FTA throughout the Road Map and Final Design process. The transit portions of the main CRC project schedule will be coded in a way that will allow for the CRC team to request only transit aspects of the schedule be highlighted and printed for review or email to FTA, PMOC or other interested stakeholders. The interface between transit system changes and the effects on the highway and bridge portions of the CRC Project will be a focal point of the schedule. This will allow grouping deliverables for transit, for example; the Road Map.

Currently the project will maintain a joint highway/transit timeline and schedule, within the schedule transit deliverables are easily identifiable for they have their own FTA/Transit category. Additionally transit activities can be monitored through the FTA Road Map to Final Design. This is being completed and updated in conjunction with the project schedule. The Road Map

highlights all deliverables the CRC project will need to complete for entry into FD in April of 2011. The interfaces being implemented for transit identification with the main project schedule will be vital in monitoring the transit schedule and keeping track of delays, which will be reported to the FTA on a quarterly basis.

It is important to note that 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.

7.6 Documenting and Reporting

The transit team will continue to conduct the Risk Assessments and participate in the CEVP process as well as identifying and monitoring risks through the Risk Identification Team (RIT). Progress and updates will be provided in the FTA Monthly Report and/or as needed including updates on the RIT. As the PMP develops and newer Risk Assessments and CEVPs are completed, the RIT will identify whether or not the risks identified will be alleviated through completion of the project schedule. If a risk requires additional analysis the RIT will appoint the appropriate project manager and identify agencies that may need to be involved in the analysis. The PM will discuss with the RIT and Task Lead the most appropriate way to mitigate the identified risk. The general process to be followed by PMs with the support of the RIT is discussed in further detail under the Risk Management and Risk Mitigation section.

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)

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 when entering 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 develop a full Risk Mitigation Framework.

Risk management, as an integral part of project management, occurs on a daily basis as an aspect of each Project Managers position on the CRC. 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.

Below is the Risk Management steps from the WSDOT Project Management Online Guide (PMOG), slight modifications have been made because of the multi-modal nature of the CRC:

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, an outcome of the CEVP®/CRA workshop process, or FTA required Risk Assessment.

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 a PM. The Project Manager and the RIT identify which strategy is best for each risk, and then selects specific actions to implement that strategy. This will include working with the Task Team Leaders to include the New or Identified Risks on the projects critical issues list to be monitored and mitigated.

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 that is a responsibility of each Project Manager within their respective Divisions. The RIT will be required for PMs to discuss risk monitoring and controls while continuing to develop the formal process for mitigation.