Columbia River CROSSING

Road Map Item #: 5.0

Product Name: PROJECT MANAGEMENT PLAN (PMP) UPDATE

Submittal Date: May 1, 2013

ABSTRACT: This deliverable provides the framework, strategies, processes, and procedures necessary to successfully deliver the CRC Program from Preliminary Engineering through Engineering, Construction, and Testing and Start-Up. The PMP is a living document that will be modified throughout the duration of the CRC Program to reflect changes in the program requirements.

PROJECT MANAGEMENT PLAN

Rev. 5

Draft Report

May 2013

Columbia River CROSSING

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DOCUMENT REVISION RECORD

Columbia River Crossing – Project Management Plan

Revision Number	Date Issued	Approval	Comments
Rev. 01	June 2006		
Rev. 02	September 2008		
Rev. 03	May 2010		
Rev. 04	September 2011		
Rev. 05	May 2013		

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APPROVAL PAGE

Columbia River Crossing – Project Management Plan, May 2013, Rev. 05

CRC Washington Director Date

CRC Oregon Director Date

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APPENDICES

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ACRONYMS

A&E	Architectural and Engineering
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AGO	Office of the Attorney General
APTA	American Public Transportation Association
APWA	American Public Works Association
ATU	Amalgamated Transit Union
B&A	Basis and Assumption
BIA	Bridge Influence Area
BIN	Budget Item Number
BNSF	Burlington Northern Santa Fe (Railway)
BO	Biological Opinion
BRT	Bus Rapid Transit
BVS	Best Value Selection
CADD	Computer-Aided Design and Drafting
CAE	Computer-Aided Engineering
CATI	Context-sensitive Associated Transit Improvements
CBCP	Category B Change Proposal
CCIP	Contractor Controlled Insurance Program
CD	Collector-Distributor
CEJG	Community and Environmental Justice Group
CEVP	Cost Estimation Validation Process
CFR	Code of Federal Regulations
CIL	Certifiable Items List
CM	Construction Manager
CMAP	Construction Management and Construction Administration Plan

CN	Construction
CO	Change Order
CPCSP	TriMet Capital Projects Construction Safety Program
CPI	Cost Performance Index
CPMS	Capital Program Management System
CQAM	Construction Quality Assurance Manager
CPTED	Crime Prevention Through Environmental Design
CRA	Cost Risk Assessment
CRC	Columbia River Crossing
CREM	Cost Risk and Estimate Management
CSS	Context-Sensitive Solutions
CSSP	Construction Safety and Security Plan
C-TRAN	Clark County Public Transportation Benefit Area Authority
CVS	Certified Value Specialist
DAP	Design Approval/Acceptance Process
DB	Design-Build
DBB	Design-Bid-Build
DBE	Disadvantaged Business Enterprise
DBELO	DBE Liaison Officer
DDP	Design Documentation Package
DEIS	Draft Environmental Impact Statement
DEQ	Department of Environmental Quality
DFI	Design-Furnish-Install
DHS	Department of Homeland Security
DMV	Department of Motor Vehicles
DSDC	Design Services During Construction
EAC	Estimate at Completion

D/M/WBE	Disadvantaged/Minority/and Women-Owned Business Enterprise
ECHO	Electronic Clearing House, Inc.
ECRB	External Civil Rights Branch
EEO	Equal Employment Opportunity
EIS	Environmental Impact Statement
ETC	Estimate to Complete
EVA	Earned Value Analysis
FAA	Federal Aviation Administration
FAI	First Article Inspection
FEIS	Final Environmental Impact Statement
FFGA	Full Funding Grant Agreement
FWG	Freight Working Group
FHWA	Federal Highway Administration
FLS	Fire/Life Safety
FLSC	Fire/Life Safety and Security Committee
FTA	Federal Transit Administration
GC	General Contractor
GEC	General Engineering Consultant
GC/CM	General Contractor/ Construction Manager
GMP	Guaranteed Maximum Price
HAR	Highway Advisory Radio
HCT	High Capacity Transit
HOV	High Occupancy Vehicle
HR	Human Resources
I-5	Interstate 5
ICP	Initial Construction Program
InterCEP	Interstate Collaborative Environmental Process

IPS	Integrated Project Staff
IRP	Independent Review Panel
IT	Information Technology
ITS	Intelligent Transportation Systems
JHA	Job Hazard Analysis
LPA	Locally Preferred Alternative
LRFD	Load Resistance Factor Design
LRT	Light Rail Transit
LRV	Light Rail Vehicles
LUFO	Land Use Final Order
MA	Master Agreement
MAX	Metropolitan Area Express
MCDD	Multnomah County Drainage District
MDL	Master Deliverable List
MDSG	Marine Drive Stakeholders Group
MPO	Metropolitan Planning Organization
MOT	Maintenance of Traffic
MTIP	Metropolitan Transportation Improvement Program
MTP	RTC's Metropolitan Transportation Plan
MUTCD	Manual on Uniform Traffic Control Devices
NEPA	National Environmental Policy Act
NHS	National Highway System
NTP	Notice to Proceed
OCIP	Owner-Controlled Insurance Program
OCS	Overhead Catenary System
ODOT	Oregon Department of Transportation
OEO	Office of Equal Opportunity

OFM	Office of Financial Management
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Administration
OTC	Oregon Transportation Commission
OTD	Operations Technical Director
PBAC	Pedestrian and Bicycle Advisory Committee
PCM	Project Control Manager
PCO	Potential Change Order
PCRF	Project Change Request Form
PCRO	Project Control and Reporting Office
PDA	Project Development Approval
PDPP	Project Delivery and Procurement Plan
PDT	Project Development Team
PE	Preliminary Engineering
PF	Project File
PG	Project Management Oversight Operating Guidance
PHA	Preliminary Hazard Analysis
PI	Public Information
PIN	Project Item Number
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PNRS	Projects of National and Regional Significance
PRC	Project Review Committee
PS&E	Plan, Specification, and Estimate
PSC	Project Sponsors Council
PSU	Portland State University
PTBA	Public Transportation Benefit Area

PWG	Portland Working Group
QA	Quality Assurance
QAM	Quality Assurance Manual
QAP	Quality Assurance Program
QAPM	Quality Assurance Program Manual
QA/QC	Quality Assurance/Quality Control
QBS	Qualification-Based Selection
QC	Quality Control
QCP	Quality Control Plan
QMP	Quality Management Plan
RACC	Regional Arts and Cultural Council
RAMP	Real Estate Acquisition Management Plan
RAP	Rail Activation Plan
RCMP	Risk and Contingency Management Plan
RCW	Revised Code of Washington
RE	Resident Engineer
RFC	Released for Construction
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Qualification
RMO	Risk Management Office
ROD	Record of Decision
ROS	Record of Survey
ROW	Right-of-Way
RTC	Southwest Washington Regional Transportation Council
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

SAPD	Systems Analysis and Program Development
SASS	Sponsor Agency Senior Staff
SAVE	Society for American Value Engineering
SC&ME	State Construction and Materials Engineer
SCC	Standard Cost Categories
SEPP	Security and Emergency Preparedness Plan
SPI	Schedule Performance Index
SPUI	Single-Point Urban Interchange
SR	State Route
SSC	Safety and Security Committee
SSMP	Safety and Security Management Plan
SSO	State Safety Oversight
SSPP	System Safety Program Plan
STHB	Stacked Transit/Highway Bridge
STIP	Statewide Transportation Improvement Program
SWR	Southwest Region
TAC	Technical Advisory Committee
TAG	Technical Advisory Group
TCC	Total Committed Cost
TCCP	Technical Capacity and Capability Plan
TCP	Traffic Control Plan
TDD	Transportation Development Division
TEAM	Transportation Electronic Award Management
TES	Traction Electrification System
TIP	Transportation Improvement Program
TMC	Transportation Management Center
TMP	Traffic Management Plan

TO	Transportation Operations
TRAINS	Transportation Reporting and Accounting Information System
TriMet	Tri-County Metropolitan Transportation District of Oregon
TSA	Transportation Security Administration
TSEM	Transit Systems Engineering Manager
TTC	Temporary Traffic Control
TVA	Threat and Vulnerability Assessment
UDAG	Urban Design Advisory Group
USC	United States Code
USDOT	United States Department of Transportation
VAST	Vancouver Area Smart Trek
VE	Value Engineering
VECP	Value Engineering Change Proposal
VM	Value Methodology
VWG	Vancouver Working Group
WAC	Washington Administrative Code
WBS	Work Breakdown Structure
WIN	Work Item Number
WSDOT	Washington State Department of Transportation
WSTC	Washington State Transportation Commission

1. Introduction

1.1 Overview of the Project Management Plan

1.1.1 Purpose of the Project Management Plan

The purpose of the Columbia River Crossing (CRC) Project Management Plan (PMP) is to provide the framework, strategies, processes, and procedures necessary to successfully deliver the CRC Program from preliminary engineering through final design and construction. The PMP is a living document that will be modified throughout the duration of the CRC Program to reflect changes in the program requirements.

The PMP describes the organizational structure, array of roles and responsibilities, project management approach, and procedures to successfully deliver this multibillion dollar, multimodal, bi-state transportation program. This PMP:

- Addresses the requirements of the Federal Transit Administration (FTA) 5309 New Starts Program.
- Establishes the framework for administering this complex program in accordance with the requirements of Title 49 United States Code (USC) §5309(e)(1)(A), FTA's Final Rule on Major Capital Investment Projects of September 2001, and FTA Circular 5200.1A, "Full Funding Grant Agreements Guidance."
- Follows reporting instructions for the Section 5309 New Starts Criteria, prepared by the FTA pursuant to the Transportation Equity Act for the 21st Century (Public Law 105-178 as amended by Title IX of Public Law 105-206).
- Addresses 23 USC 106(h) and Federal Highway Administration (FHWA) guidance based on the September 24, 2012 memorandum "Interim Major Project Financial Plan Guidance."
- Provides a guideline for the orderly interaction of the multiple agencies, organizations, and staff involved in, and committed to, the CRC Program.
- Establishes standards by which program performance will be measured.

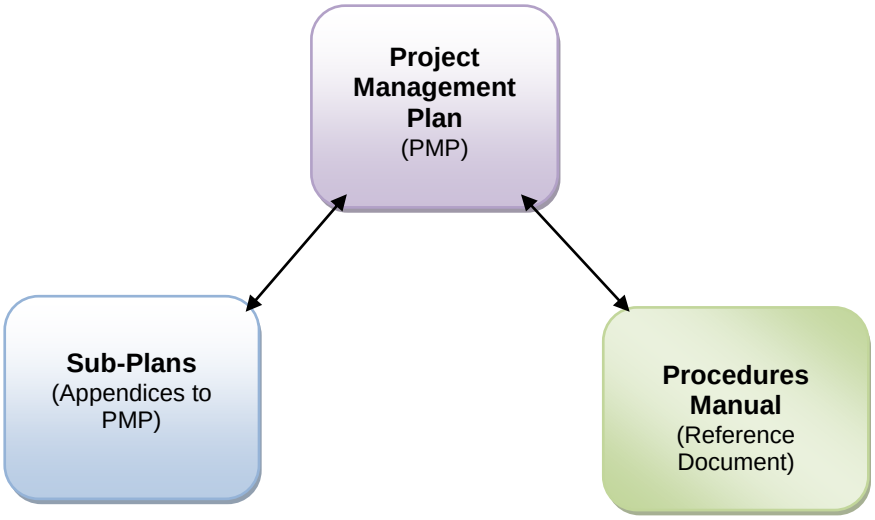
The PMP is composed of three main components, as follows:

Project Management Plan (PMP) – This is the overall document that describes the CRC Program's Purpose and Need, background, goals and objectives, roles and responsibilities of key personnel, communication, and reporting for the CRC Program Team. The PMP highlights to team members (Washington State Department of Transportation (WSDOT), Oregon Department of Transportation (ODOT), Tri-County Metropolitan Transportation District of Oregon (TriMet), and Clark County Public Transportation Benefit Authority (C-TRAN), assisted by consultant

staff) the design and construction processes and procedures guiding their work on the CRC Program. The PMP includes several sub-plans as appendices. These appendices exist as separately bound documents for ease of use and future updating. A list of the appendices is included in the Table of Contents of this document.

Sub-Plans – These are tactical plans that have been developed to execute services in key program areas. Each sub-plan describes the means by which these services will be accomplished in accordance with the strategies and tasks identified in the sub-plan and includes staffing organization, roles and responsibilities of team members, task descriptions, detailed work processes and procedures necessary to deliver the work, and associated task deliverables. A complete list of the current sub-plans can be found in the Table of Contents as Appendices to this PMP.

Procedures Manual – This document describes the procedures necessary to perform the work in accordance with the tasks identified in the main PMP document. These procedures are consistent with the PMP and are frequently referenced by this document. The Procedures Manual provides procedures that the CRC Program Team will use to deliver the CRC Program.



1.1.2 Maintenance and Updating of the PMP

The PMP will be reviewed semiannually for potential updating. The CRC Program's Business Services Team is responsible for updating and maintaining the PMP. Business Services will work closely with the CRC Senior Management Team (see Section 2.4 of this PMP) on each update of the PMP. Individual functional managers will be responsible for disseminating new PMP information to their staff, as necessary.

The PMP is a controlled document. The principal means by which it is accessed by individuals at CRC is by electronic means via a "web link" provided for employees by Business Services. This link provides access to the most recent version of the PMP. As a secondary source, hard copy PMP notebooks will be maintained and their distribution controlled by Business Services to ensure that PMP updates are properly maintained.

1.2 Program Purpose and Description

1.2.1 Purpose and Need

As the only continuous north-south interstate highway on the West Coast connecting the Canadian and Mexican borders, Interstate 5 (I-5) is vital to the local, regional, and national economies. At the Columbia River, I-5 provides a critical economic connection to two major ports, deepwater shipping, upriver barging, two transcontinental rail lines, and much of the region's industrial land. Truck-hauled freight movement onto, off of, and over the I-5 Columbia River crossing is critical for these industrial centers, for regional employment, and to the regional and national economies. The I-5 crossing provides the primary transportation link between Vancouver, Washington, and Portland, Oregon, and is the only direct connection between the downtown areas of these cities.

The purpose of the CRC Program is to improve I-5 corridor mobility by addressing present and future travel demand needs in the CRC Bridge Influence Area (BIA). The BIA extends from approximately Columbia Boulevard in the south to State Route (SR) 500 in the north. The CRC Program is intended to achieve the following goals: (a) improve travel safety and traffic operations on the I-5 crossing's bridges and associated interchanges; (b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the BIA; (c) improve highway freight mobility and address interstate travel and commerce needs in the BIA; and (d) improve the I-5 river crossing's structural integrity (seismic stability). These goals address the following needs:

- ***Growing Travel Demand and Congestion*** – Existing travel demand exceeds capacity in the I-5 Columbia River crossing and associated interchanges. This corridor experiences heavy congestion and delay lasting 4 to 6 hours during both the morning and afternoon peak travel periods and when traffic accidents, vehicle breakdowns, or bridge lifts occur. Due to excess travel demand and congestion in the I-5 bridge corridor, many trips take the longer, alternative I-205 route across the river. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Boulevard and Interstate Avenue increases local congestion. The two river crossings (I-5 and I-205) currently carry more than 260,000 trips across the Columbia River daily. Daily traffic demand over the I-5 crossing is projected to increase by more than 35% during the next 20 years, with stop-and-go conditions increasing to approximately 15 hours each day if no improvements are made.

- ***Impaired Freight Movement*** – I-5 is part of the National Truck Network and is the most important freight freeway on the West Coast, linking international, national, and regional markets in Canada, Mexico, and the Pacific Rim with destinations throughout the western United States. In the center of the program area, I-5 intersects with deepwater shipping and barging on the Columbia River as well as two river-level, transcontinental rail lines. The I-5 crossing provides a direct and important highway connection to the Port of Vancouver and Port of Portland facilities located on the Columbia River, as well as to the majority of the freight consolidation facilities and distribution terminals in the area. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle hours of

delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90% over the next 20 years. Growing demand and congestion will result in increasing delay, costs, and uncertainty for all businesses that rely on this corridor for freight movement.

- ***Limited Public Transportation Operation, Connectivity, and Reliability*** – Because of limited public transportation options, a number of transportation markets in the area are not well served. The key transit markets include trips between the Portland Central City and the City of Vancouver and Clark County, trips between north/northeast Portland and the City of Vancouver and Clark County, and trips connecting the City of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the I-5 river crossing are currently up to three times longer during parts of the a.m. peak period than during off-peak periods. Travel times for public transit using general purpose lanes on I-5 in the BIA are expected to increase substantially by 2030.

- ***Safety and Vulnerability to Incidents*** – The I-5 river crossing and its approach sections experience crash rates more than two times higher than statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents.

- ***Substandard Bicycle and Pedestrian Facilities*** – The bike/pedestrian lanes on the I-5 Columbia River bridges are about 3.5 to 4 feet wide—narrower than the 10-foot standard—and are located extremely close to traffic lanes, thus impacting safety for pedestrians and bicyclists. Direct pedestrian and bicycle connectivity is poor in the BIA.

- ***Seismic Vulnerability*** – The existing I-5 bridges are located in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

1.2.2 Program Description

The CRC Program is a multimodal transit and highway improvement on and near a 5-mile segment of I-5. The area of the CRC Program stretches from SR 500 in Vancouver, Washington, to approximately Columbia Boulevard in Portland, Oregon, including the Interstate Bridge across the Columbia River. A light rail transit alignment will also extend across the river from its current terminus at the Expo Center in Portland, Oregon, to Clark College in Vancouver, Washington.

The Record of Decision for the Columbia River Crossing Program identifies the transportation improvements of the selected alternative for the 5-mile program corridor, including:

- A new river crossing over the Columbia River and I-5 highway improvements.

- Improvements to seven I-5 interchanges, from south to north: Victory Boulevard, Marine Drive, Hayden Island, SR 14, Mill Plain, Fourth Plain, and SR 500. Related enhancements to the local street network.

- Three new structures over North Portland Harbor associated with I-5, and one new multimodal bridge carrying Light Rail Transit (LRT), local traffic, pedestrians, and bicyclists.

- A variety of bicycle and pedestrian improvements throughout the program corridor. A multiuse path connecting to the existing system. The path would allow users to travel from north Portland, over Hayden Island and the Columbia River, and into downtown Vancouver.

- Extension of LRT from the Expo Center in Portland to Clark College in Vancouver and associated transit improvements. Transit stations would be built on Hayden Island, in downtown Vancouver, and a terminus near Clark College. Three park and rides would be built: Columbia (near the SR 14 interchange), Mill (in uptown Vancouver), and Central (near Clark College). Improvements would be made to the tracks on the Steel Bridge in Portland, as well as bus route changes and an expansion of the Ruby Junction LRT maintenance facility.

- Transportation demand and system management measures to be implemented with the CRC Program, including the use of tolls, subject to the authority of the Washington and Oregon Transportation Commissions.

A detailed description of the selected alternative is included in Chapter 2 of the Final Environmental Impact Statement (FEIS).

1.3 Initial Construction Program

Construction of the entire program will require a number of years to complete and will be phased to provide efficient implementation while minimizing impacts on the community and corridor users. In response to legislative direction, the CRC program team has developed an Initial Construction Program (ICP) that adapts to available resources and fits into today's economic reality; thus, the construction of the selected alternative will be phased to match available funding while providing significant transportation benefits. The first construction phase, the ICP, includes the following multimodal elements:

- The new river crossing over the Columbia River and the I-5 highway improvements, including improvements to three interchanges, as well as associated enhancements to the local street network.

- Extension of light rail from the Expo Center in Portland to Clark College in Vancouver, and associated transit improvements, including transit stations, park and rides, bus route and station changes, and expansion of a light rail transit (LRT) maintenance facility.

- Upgrades and modifications to the Steel Bridge and transit command center.

- Purchase of 19 Light Rail Vehicles (LRVs) and other transit-related procurements.
- Bicycle and pedestrian improvements throughout the program corridor that connect to the transit system.
- Toll system for the river crossing.
- Transportation demand and system management measures to be implemented with the CRC Program.

The ICP will require multiple construction contract bundles or packages. Details of the individual construction packages associated with the ICP are found in the TCCP, which is an appendix to the PMP.

Figure 1-1 illustrates the overall program and its relationship to the region, including the existing LRT system. Figure 1-2 illustrates the main program area and the ICP.

FIGURE 1-1. CRC PROGRAM AND THE LRT SYSTEM

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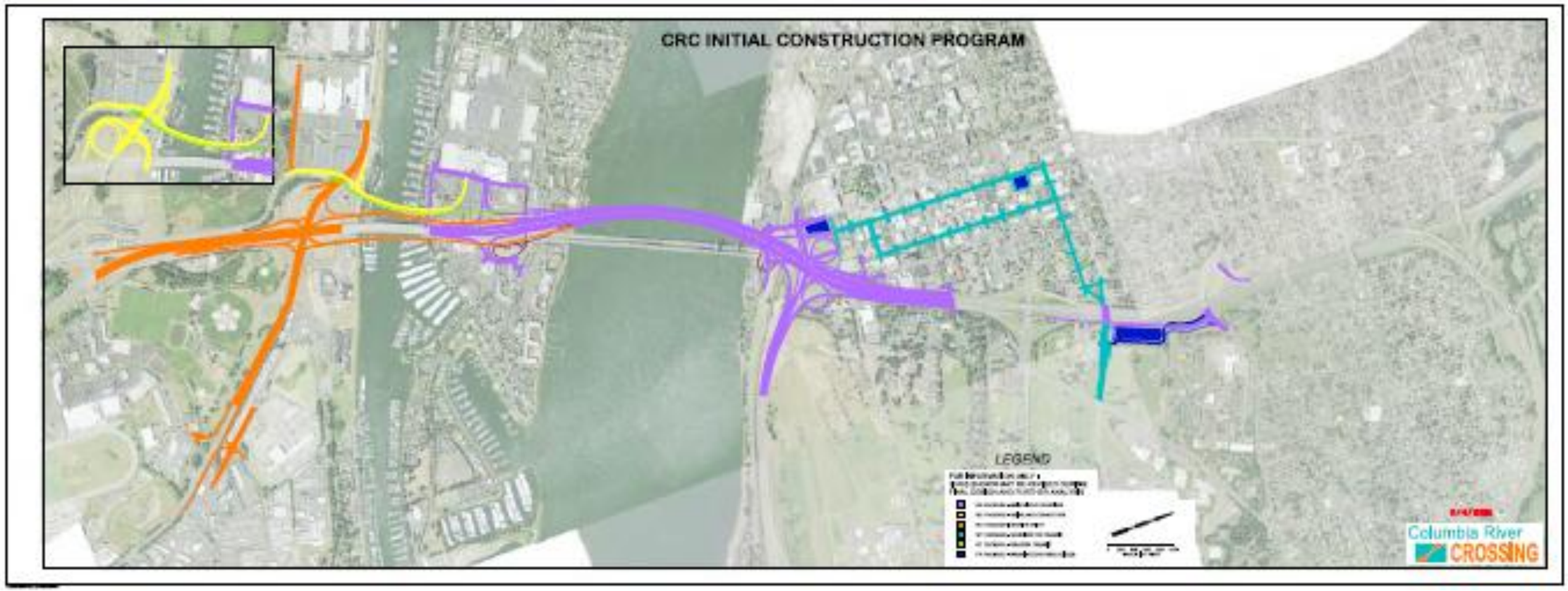
FIGURE 1-2. CRC INITIAL CONSTRUCTION PROGRAM



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1.4 Program History

The following is a summary of the CRC Program history:

- **1990–1998: Bi-State High Capacity Transit (HCT) Studies**

  Several HCT studies were performed in the 1990s related to the possibility of providing a form of HCT between Oregon and Washington. The following is a list of those studies:

  - Clark County HCT Analysis – 1990
  - South/North I-5/I-205 HCT Pre-Alternative Analysis – 1993
  - South/North I-5 LRT Draft Environmental Impact Statement (DEIS) – 1996
  - Commuter Rail and High Occupancy Vehicle (HOV) Studies – 1998

- **1999–2000: I-5 Trade Corridor Study**

  In 1999, a preliminary assessment for the I-5 corridor began to evaluate problems on the corridor and a range of solutions. The study ended with the following general conclusions:

  - Unacceptable economic impacts and congestion will result if no corrective action is taken.
  - Solution must be multimodal.
  - Improvements to the I-5 corridor will require new funds.
  - Region must promote transportation-efficient development.

- **2001–2002: I-5 Transportation and Trade Partnership**

  In 2001, the governors of Oregon and Washington formed a bi-state partnership to study transportation problems and possible solutions for the I-5 corridor. In its 2002 Strategic Plan, the I-5 Transportation and Trade Partnership recommended fixing three bottlenecks:

  - I-5 at Salmon Creek in Clark County (completed in 2006)
  - I-5 at Delta Park in Portland (completed in 2009)
  - I-5 at the Columbia River (this CRC Program)

- **Spring 2005: CRC Program begins**

  - In late 2004, WSDOT and ODOT initiated work to begin the CRC Program.
  - The CRC Program Team was formed around a nucleus of WSDOT and ODOT staff to include partners TriMet, C-TRAN, the Southwest Washington Regional Transportation Council (RTC), Metro, and the Cities of Vancouver and Portland.

  - The 39-member CRC Task Force was formed in early 2005 by the CRC Program Team to provide advice on key decisions. The CRC Task Force consists of leaders from a broad cross-section of Oregon and Washington communities, including public agencies, businesses, civic organizations, neighborhoods, and freight, commuter, and environmental groups.

- **Fall 2005: Defining the problems and potential solutions**

  - Using data developed by the I-5 Transportation and Trade Partnership, the CRC Program Team worked with the public to define the problems and needs in the program area. More than 70 different ideas were proposed as solutions, including 23 river crossing and 14 transit concepts. Evaluation criteria were also developed.

- **Spring 2006: Narrowing the ideas**

  - Continuing discussions with the CRC Task Force and community, the CRC Program Team studied the river crossing and transit ideas. As a result of this discussion and analysis, the ideas were further narrowed to a set of four river crossing options and five public transit options.

- **Spring–Summer 2006: Testing the preliminary alternatives**

  - The CRC Program Team packaged the most promising bridge and transit options into a dozen preliminary alternatives. Each alternative included several transportation components: bridge, highway, transit, freight, bicycle, and pedestrian improvements, and strategies to reduce travel demand. These preliminary alternatives were tested against the evaluation criteria. The results highlighted the strengths and weaknesses of the components.

- **Fall 2006–Spring 2007: Identifying Draft Environmental Impact Statement (DEIS) alternatives**

  - In collaboration with partner agencies, the CRC Program Team worked with the public to identify five project alternatives and recommended these for further analysis in the DEIS.

- **Spring–Fall 2007: Analyzing the five alternatives**

  - Working with the CRC Task Force, the CRC Program Team analyzed each alternative to determine how well it would relieve congestion and improve safety and mobility on I-5. The five alternatives were:

    - Replacement bridge with bus rapid transit (BRT)
    - Replacement bridge with LRT
    - Supplemental bridge with BRT
    - Supplemental bridge with LRT
    - No build (for comparison purposes)

- **Spring 2008: DEIS was released on May 2, 2008**
    - The DEIS was released on May 2, 2008, with a 60-day comment period. More than 1,600 comments were received during this period.
- **Summer 2008: Locally Preferred Alternative (LPA) selected**
    - The partner agencies (TriMet, C-TRAN, City of Vancouver, City of Portland, Metro, and RTC) selected an LPA in late July 2008 that consisted of a replacement bridge with LRT ending at Clark College.
    - Metro Council amended the 2035 Regional Transportation Plan, Appendix 1.1, Financially Constrained System to include the CRC Program, on July 17, 2008 (Metro Resolution 08-3960B).
    - RTC adopted the Metropolitan Transportation Plan to include the LPA on July 22, 2008 (RTC Resolution 07-08-10).
- **Fall 2008–2010: Refining Designs and Reviewing Work to Date**
    - The governors of Oregon and Washington formed the Project Sponsors Council (PSC) to advise the departments of transportation on completion of the Environmental Impact Statement (EIS), project design, project timeline, sustainable construction methods, compliance with greenhouse gas emission reduction goals, and the financial plan. The PSC began meeting in November 2008 and is composed of two citizen co-chairs and representatives from each sponsoring agency.
    - The PSC considered several items related to bridge design in 2009. Discussions by the Urban Design Advisory Group (UDAG), Pedestrian and Bicycle Advisory Group, and regulatory and partner agencies resulted in a PSC recommendation for a two-bridge facility.
    - Two independent review panels were convened and delivered assessments on greenhouse gases and travel demand estimates. Both panels found the analyses by the CRC Program Team to be valid.
    - The PSC supported a concept in spring 2009 for a regional Mobility Council that would establish a local body to advise the state departments of transportation and transit districts on the optimal long-term performance of the Columbia River crossings. The primary purpose of the Mobility Council is to help maximize the long-term benefits of the CRC Program for all users and affected stakeholders in an equitable manner by recommending the implementation of the agreed-upon goals.
    - In early 2010, the Vancouver City Council and C-TRAN Board of Directors adopted the light rail alignment for downtown Vancouver, with trains traveling north on Broadway Street, south on Washington Street, and east and west on 17th Street to the terminus station near the Marshall/Luepke Center and Clark College.

- The governors of Oregon and Washington convened an Independent Review Panel (IRP) to assess the implementation plan, review the financial plan, and review and evaluate post-construction performance measures for the CRC Program. The panel reported its findings and 30 recommendations to the governors on July 30, 2010. All recommendations were accepted by the departments of transportation.

- In August 2010, the PSC unanimously agreed on a set of recommendations to the governors of Washington and Oregon for moving ahead with development and construction of the CRC Program. The recommendations include a permanent ten-lane I-5 bridge and a change to the Hayden Island interchange design to address several community concerns. These recommendations were supported by Metro's updated land use model that found that the CRC Program would not induce sprawl in the region.

- In 2010, CRC Program Team convened a Bridge Review Panel to evaluate the bridge type under consideration. In February 2011, the panel released a report that offered three feasible bridge type options for the crossing over the Columbia River other than the bridge type under consideration at that time. The governors of Oregon and Washington responded to the panel's report by asking their respective Departments of Transportation to conduct an expedited review of the three bridge types and make a recommendation considering affordability, schedule, environmental impacts, commitments made to stakeholders, and risk. Based on these criteria, the states conducted further evaluations and made the draft recommendation of a deck truss bridge type for the crossing. After reviewing many different factors, including public comments, the governors found that the deck truss bridge type best met the multimodal transportation needs of the CRC Program while also being the most affordable and presenting the least risk to budget and schedule overruns. The governors identified in their recommendation the need to add an architect to the CRC Program Team, to establish architectural specifications for the Design-Build (DB) contractor to follow, and to engage the design community and public in the process.

- **2009: Entry into Preliminary Engineering**

  - The FTA issued approval to enter into Preliminary Engineering on December 11, 2009.

- **2011: Land Use Final Order Adopted**

  - Metro Council adopted the Land Use Final Order (LUFO) on August 11, 2011 (Metro Resolution 11-4280).

- **2011: Final Environmental Impact Statement (FEIS) Signed and Published**

  - RTC signed the FEIS on September 6, 2011.

  - TriMet signed the FEIS on September 6, 2011.

  - WSDOT signed the FEIS on September 6, 2011.

  - ODOT signed the FEIS on September 7, 2011.

- FTA Region 10 signed the FEIS on September 7, 2011.
- FHWA Oregon Division signed the FEIS on September 7, 2011.
- FHWA Washington Division signed the FEIS on September 7, 2011.
- C-TRAN signed the FEIS on September 8, 2011.
- Metro Council signed the FEIS on September 8, 2011.
- The FEIS was published on September 23, 2011.

- **2011: Record of Decision (ROD) Published**
  - The ROD was published on December 7, 2011.
- **2012: President's Dashboard and Major Permit Applications**
- **2013: CRC Program Enters Engineering Phase**
  - With the January 9, 2013 publication of a new final rule for Major Capital Investment Projects (amending 49 CFR 611), the CRC Program has been grandfathered into the Engineering phase.

1.5 Program Goals and Objectives

1.5.1 Goals

To address the transportation problems on I-5, a mix of public transit and highway solutions that optimize the transportation system are needed. The goals of the CRC Program are to:

- Improve travel safety and traffic operations at the I-5 river crossing and nearby interchanges.
- Improve connectivity, reliability, travel times, and operations of the public transportation systems in the program area.
- Improve freight mobility and address interstate travel and commerce needs in the program area.
- Increase the structural integrity of the I-5 river crossing.

1.5.2 Objectives

The objectives of the CRC Program are to:

- Develop a financially feasible design that enhances public safety and long-term operations of I-5 while being sensitive to aesthetic, cultural, and environmental resources, and reflecting community values.
- Identify realistic and achievable approaches to contracting of CRC Program construction and CRC Program financing.
- Complete the CRC Program:
  - On time;
  - Within budget;
  - Without litigated claims;
  - In a safe manner for both the individuals working on the CRC Program and for the traveling public; and
  - In a manner such that the public trust, support, and confidence in the CRC Program will be maintained.

1.6 Governance

1.6.1 Legal Authority

On July 17, 2008, Metro passed Resolution 08-3960b endorsing the LPA for the Columbia River Crossing Project and amending the Metro 2035 Regional Transportation Plan, Appendix 1.1, Financially Constrained System, to include the LPA.

On July 22, 2010, the RTC passed Resolution 07-08-10 endorsing the LPA for the Columbia River Crossing Project and amending the RTC Metropolitan Transportation Plan to include the LPA.

WSDOT and ODOT are lead agencies for this multimodal project. WSDOT and ODOT entered into a partnership to jointly develop and manage the CRC Program—WSDOT, acting by and through the Secretary of Transportation, and ODOT, acting by and through the Oregon Transportation Commission (OTC). WSDOT is the FTA grantee for transit grants on the CRC Program. TriMet and C-TRAN will operate and maintain the new LRT extension.

WSDOT is authorized by:

- The Revised Code of Washington (RCW) 47.52.020, Powers of Highway authorities— State facility, county road crossings.
- RCW 39.34.030, Joint powers— Agreements for joint or cooperative action, requisites, effect on responsibilities of component agencies – financing of joint projects.

ODOT is authorized by:

- Oregon Revised Statutes (ORS) 190.420, Authority of public agency to make agreements with public agencies in other states; contents of agreement; liability of public agency.
- ORS 381.005 to 381.820, Interstate bridges under state jurisdiction.

TriMet is authorized by:

- ORS 267.010 through and including 267.430.
- Code of Tri-County Metropolitan Transportation District of Oregon.

C-TRAN is authorized by:

- RCW 36.57A, Public Transportation Benefit Area (PTBA).

1.6.2 Policy and Governing Agency

WSDOT and ODOT operate as stewards for the National Highway System and their respective state routes. FHWA provides oversight to WSDOT and ODOT for projects associated with the National Highway System and/or projects that utilize funding provided by FHWA. The FTA provides oversight to WSDOT, which is the FTA grantee for transit grants on the CRC Program.

WSDOT is a cabinet agency under the Washington governor, and reports directly to the Washington governor, the Washington State Legislature, and the Washington State Office of Financial Management (OFM). The Washington State Transportation Commission (WSTC) makes policy recommendations to the Washington governor and the Washington State Legislature. The WSTC is composed of seven commissioners appointed by the governor. Policy is implemented by the Secretary of Transportation.

ODOT reports to the Oregon governor, the OTC, and the Oregon State Legislature. The OTC is composed of five commissioners appointed by the governor and is responsible for establishing state transportation policy. Policy is implemented by the ODOT Director.

Overall policy direction for the CRC Program will be provided by an Executive Management Group composed of senior and executive-level principals from WSDOT and ODOT. Overall management of the CRC Program will be provided by a Program Director from WSDOT and a Program Director from ODOT. The organization and reporting lines of the CRC Program Team are described in Chapter 2 below.

1.7 Inclusion in State Transportation Improvement Programs and Regional Transportation Plans

1.7.1 Oregon Statewide Transportation Improvement Program

The 2010-2013 Oregon Statewide Transportation Improvement Plan (STIP) was approved by the OTC on September 22, 2010.

The CRC Program can be found on page 51 and is identified by "Key 13136." The 2010-2013 Oregon STIP can be found at:

http://www.oregon.gov/ODOT/HWY/STIP/1013DraftSTIP.shtml

1.7.2 Washington Statewide Transportation Improvement Program

The 2012-2015 Washington Statewide Transportation Improvement Program (STIP) was approved in January 2012.

The CRC Program can be found on page 818 of the following website:

http://www.wsdot.wa.gov/NR/rdonlyres/A60AA54E-7A61-42CB-B2A3-FC0E763C94D1/0/2012_2015_STIP.pdf

1.7.3 Metro's Regional Transportation Plan

The latest adopted version of Metro's Regional Transportation Plan (RTP) is the 2035 RTP (adopted by the Metro Council on June 10, 2010). The RTP includes two entries in the RTP project list that include elements of the CRC Program. Basic information on these two projects is summarized below:

Project #	Jurisdiction	Description	Funding Estimate (2007$)
10893	ODOT	Replace I-5/Columbia River bridges and improve interchanges on I-5.	$2,982 million
10902	TriMet	MAX light rail: Yellow Line: CRC / I-5 North extension	$755.6 million

Further details on the RTP and its references to these projects may be found at:
http://www.oregonmetro.gov/index.cfm/go/by.web/id=25038

1.7.4 RTC's Metropolitan Transportation Plan

The latest version of the RTC's Metropolitan Transportation Plan (MTP) 2007 Update, Amended 2008, also specifically identifies the CRC Program.

Key elements of the CRC Program description in the MTP are:

Facility	Cross Streets	Description	Jurisdiction
I-5	Columbia River Crossing SR-500 in Vancouver to Columbia Blvd. in Portland	Replacement I-5 river crossing and reconstructed interchanges. Light Rail Transit with terminus in Clark College vicinity.	WSDOT

Further details on the MTP and its references to this project may be found at:
http://www.rtc.wa.gov/programs/mtp/outline.htm

2. Organization and Key Staffing

2.1 Overview

The CRC Program is a bi-state multimodal program. WSDOT is the grantee for the transit grants and the lead agency for the overall CRC Program. ODOT is co-lead for the overall CRC Program. TriMet and C-TRAN will operate and maintain the new LRT extension between the Expo Center in Portland and Clark College in Vancouver.

This section discusses agency organization, agency responsibilities, management approach, and interface with lead federal agencies and local jurisdictional partners. It also discusses the CRC Program organization, responsibilities of key personnel, and staffing during engineering and construction.

This section also discusses how the CRC Program meshes with its agency partners' organizations, the responsibilities of partner agencies with respect to the CRC Program, and the interface with lead federal agencies and local jurisdictional partners.

2.2 Key Management Principles for the CRC Program

The CRC Senior Management Team is committed to implementing the CRC Program on time and within budget in conformance with the policies and direction of the States of Washington and Oregon and their respective Departments of Transportation and in conformance with the requirements of the U.S. Department of Transportation (USDOT) and applicable federal laws and regulations.

- All material decisions regarding the funding, design, construction, and operation of the CRC Program require mutual agreement of the two Departments of Transportation.
- Overall policy direction is provided by an Executive Management Group composed of senior/executive level principals from WSDOT and ODOT. As subrecipients, the CRC Program's transit agency partners, TriMet and C-TRAN, continue to provide leadership regarding our federal partner policies.
- Overall management of the CRC Program is provided by a Program Director from WSDOT and a Program Director from ODOT who will be jointly responsible for developing and implementing a multimodal program that achieves the CRC Program's goals and objectives.
- WSDOT, ODOT, TriMet, and C-TRAN staff have total management involvement and retain control over and/or input into all aspects and phases of the work. This includes self-performing the management functions of the CRC Program, including, but not limited to, project controls, safety and security, procurement, financial

management, real property acquisition management, design management, construction management, and operations of the LRT system.

- Day-to-day management responsibilities of CRC Program management and administration, design oversight, preparation of procurement documents, administration of procurement contracts for equipment and materials, and construction administration including mitigation monitoring reside with functional managers from WSDOT, ODOT, TriMet, and C-TRAN under the direction of the Operations Technical Director (OTD), who in turn reports to the Washington Program Director and the Oregon Program Director.

- The General Engineering Consultant (GEC) will act in a support function and perform work under contract with WSDOT. The GEC is jointly located with agency staff in the CRC Program office in downtown Vancouver.

- WSDOT and ODOT staff will manage the design and construction of the highway improvements. TriMet and C-TRAN will manage the transit design. TriMet, WSDOT, and ODOT will manage the construction of the transit component under the direction of the Oregon and Washington Program Directors. Contract bid and award will be the responsibility of WSDOT, ODOT, and TriMet under the oversight of the Oregon and Washington Program Directors. Contract document preparation and construction administration of all executed contracts will be carried out under the oversight of the CRC Project Delivery Director.

- The Communications Team receives direction from the Washington and Oregon leads, with staffing provided by the GEC.

- The CRC Program's Project Controls team is responsible for developing and maintaining all scheduling, budgeting, cost estimating reviews, cost tracking, reporting, document control management, and change management. CRC's Business Services team is responsible for overall quality management, policy, development and maintenance of procedures and project management plan, office information technology management, public disclosure management, and office administrative support management.

- Document control procedures have been established and strictly observed by all WSDOT, ODOT, TriMet, and C-TRAN and consultant staff working on the CRC Program.

2.3 Program Leadership and Management

The following describes the composition and interrelationship of the several management and advisory groups that the CRC Program Team relies upon for approval, support, and input:

- **Executive Management Group:** The Executive Management Group is an internal group composed of WSDOT and ODOT top management, including the ODOT Director and the WSDOT Secretary of Transportation. Its focus is providing overall

policy and management guidance to the CRC Program Team on policy and strategy to accomplish the CRC Program's goals and objectives. The Executive Management Group defines the CRC Program position on matters of importance that are destined for other groups.

- **Transit Program Management Group:** This group consists of the CRC Program's Washington Program Director and Oregon Program Director and the TriMet and C-TRAN Executive Directors. The Transit Program Management Group focuses on multimodal aspects of the CRC Program to ensure integration and coordination of public transit, highway and all other components, including funding, design, procurement, operations, and construction issues.

- **Technical Advisory Group:** The Technical Advisory Group (TAG) consists of senior staff from WSDOT, ODOT, TriMet, C-TRAN, and the Cities of Portland and Vancouver. The TAG's function is to coordinate the interests of these representative agencies in the CRC Program related to design, permitting, and construction activities. Members of the TAG are generally senior department leaders who manage portions of the agency staff involved in providing input or oversight of design and construction activities of the CRC Program as related to their agency's jurisdiction. They generally meet with key CRC Program staff in sub-groups focused on specific technical issues.

- **Government Relations and Strategic Communications:** The Oregon and Washington leads for Government Relations and Strategic Communications provide guidance and oversight related to government/media relations, policy, and communications. They coordinate as needed with ODOT and WSDOT federal liaisons, ODOT and WSDOT communications directors, and Oregon and Washington governors' offices with regard to the CRC Program and issues critical to key stakeholders. They also work with the CRC Program's Executive Management Group and the CRC Program's two Program Directors, and direct the CRC Program's Communications Team.

Additional details on the above groups can be found in the TCCP, which is Appendix A to this PMP.

2.4 CRC Program Organization

During engineering and construction, the CRC Program will utilize a team that integrates WSDOT, ODOT, TriMet, C-TRAN, and GEC staff to deliver multimodal highway and transit designs that meet FHWA and FTA requirements and the CRC Program's goals and objectives.

WSDOT and ODOT will deliver the CRC Program with a combination of agency and GEC staff under the direction of the Washington Program Director and the Oregon Program Director. The number of agency and consultant staff engaged in the CRC Program will vary with the phase in progress, the specialties required for that phase, and the selected delivery method. An organizational chart depicting the basic structure of the CRC Program is shown in Figure 2-1.

Additional details and expanded CRC Program organizational charts can be found in the TCCP, which is Appendix A to this PMP.

The TCCP also explains the roles and responsibilities of key team members who comprise the CRC Senior Management Team including:

- Washington Program Director
- Oregon Program Director
- Operations Technical Director
- Program Manager
- Transit Manager
- Environmental Manager
- Project Delivery Director
- Specialty Services Director
- Finance Manager
- Communications Outreach Manager

2.5 Relationship between the CRC Program and WSDOT, ODOT, TriMet, and C-TRAN

The TCCP explains the relationship of the CRC Program to WSDOT, ODOT, TriMet, and C-TRAN. It provides information on the responsibilities of these agencies with respect to the CRC Program as well as the reporting relationships of key members of the CRC Program Team to the partner agencies.

2.6 Interface with Partnering Federal Agencies

The success of the CRC Program requires close partnering between the two states' Departments of Transportation and the two co-lead federal oversight agencies, FHWA and the FTA. The individual responsibilities of the co-lead federal agencies are listed below.

2.6.1 Federal Transit Administration (FTA)

Responsibilities

- Oversight for transit planning, preliminary design, engineering, construction and testing and start-up.
- Together with FHWA, oversight and approval for CRC Program environmental compliance.

- Provides funding for the CRC Program through the FTA's New Starts program.
- Authorizes entry into Preliminary Engineering, Engineering and executes Full Funding Grant Agreement (FFGA).

Project Management Oversight Contractor (PMOC)

The FTA utilizes transit industry consultants to assist in monitoring grantee compliance with all applicable FTA requirements. The Project Management Oversight Contractor (PMOC) reports directly to the FTA on project progress and issues and serves as an extension of FTA staff. Typically, the PMOC conducts monthly on-site reviews, with other subject-specific reviews (Spot Reports) taking place as needed. The PMOC is expected to focus its assessment on scope, schedule, cost, and grantee technical capacity and capability, with an emphasis on risk identification and mitigation. The PMOC consultant also participates in quarterly review meetings jointly held with the FTA and FHWA. The PMOC conducts its work in accordance with the FTA's Project Management Oversight Operating Procedures.

Quarterly Reviews

Each quarter, the FHWA and FTA, assisted by the PMOC, jointly conduct a program review. Appropriate senior members of the CRC Program Team are responsible for organizing the meetings. The PMOC prepares the agenda with input from the FTA and the PMOC. At the meetings, CRC Program staff present a review of the progress of the preceding quarter and the activities planned for the upcoming quarter. Discussions from the quarterly review are recorded in meeting notes prepared by the PMOC and distributed by the FTA to all parties. Consistent with FTA requirements, the CRC Program staff, with help from other WSDOT staff as appropriate, prepares and submits quarterly electronic reports on program activities, budget, and schedule in the Transportation Electronic Award Management (TEAM) system.

2.6.2 Federal Highway Administration (FHWA)

Responsibilities

- Oversight for the highway planning, preliminary design, engineering, and construction
- Together with the FTA, oversight and approval for CRC Program's environmental compliance

FHWA Mega-Project

FHWA and the two Departments of Transportation have longstanding relationships that span the entire spectrum of project development and implementation from planning, to construction, to maintenance of roadway facilities. FHWA maintains an oversight role but has delegated the stewardship for development and maintenance of the interstate system to the respective Departments of Transportation. Typically, a regional FHWA Area Engineer provides oversight and approval for projects either scoped on the interstate system and/or state and local projects with an allocation of federal funding. Because of the large size of the CRC Program, FHWA has

assigned a Major Projects Manager who is dedicated full-time to the CRC Program and who is co-located in the CRC Program office to facilitate daily coordination, including attending regular staff meetings. Additional details regarding roles and responsibilities between FHWA and the state Departments of Transportation are found in the FHWA Stewardship and Oversight Agreement (Feb. 19, 2008).

FHWA Reviews

As discussed above, each quarter, the FHWA and the FTA jointly conduct a program review. As the CRC Program advances into engineering, FHWA will establish a formal schedule of reviews. FHWA will review and provide comments on all environmental documentation, Memorandums of Agreement or Memorandums of Understanding, agreements, and design criteria. A structured three-tiered design review, with FHWA approval at each tier, is anticipated to occur. This design review process is as follows:

- Design Approval/Design Acceptance (approximately 30% design): for scope, schedule, budget, geometric design, known deviations/exceptions, and intersection and interchange plans.
- Project Development Approval (approximately 60% design): for scope, schedule, budget design documentation, advanced roadway design, and review of current design decisions.
- Final Plan, Specification, and Estimate (PS&E) Approval: for concurrence on final plans, provisions, and estimate.

Additionally, FHWA has requirements for best project management practices that the CRC Program will need to meet, including:

- Preparing and implementing a Project Management Plan:
  - Required by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).
  - Guidance is found at http://www.fhwa.dot.gov/programadmin/mega/.
- Preparing and implementing a Financial Management Plan:
  - Required by SAFETEA-LU.
  - Guidance is found at http://www.fhwa.dot.gov/programadmin/mega/.
- Conducting Value Engineering (VE) studies.

2.7 Interface with Local Partners

The CRC Program is a partnership between the two Departments of Transportation and the Portland-Vancouver local jurisdictions made up of the cities of Portland and Vancouver, the

transit agencies (TriMet and C-TRAN), and the two metropolitan planning organizations (Metro and RTC). Key responsibilities of the two Departments of Transportation, TriMet and C-TRAN are described in the TCCP (see Appendix A to this PMP). Key responsibilities of the cities of Portland and Vancouver, Metro, and RTC are as follows:

2.7.1 City of Portland

Responsibilities

- Provide input and guidance related to local facility design in Portland.
- Provide concurrence and approval of design elements affecting its jurisdiction.
- Provide input and guidance for local coordination and community involvement in Portland.
- Provide input for transit planning in Portland.

2.7.2 City of Vancouver

Responsibilities

- Provide input and guidance related to local facility design in Vancouver.
- Provide concurrence and approval of design elements affecting its jurisdiction.
- Provide input and guidance for local coordination and community involvement in Vancouver.
- Provide input for transit planning in Vancouver.

2.7.3 RTC

Responsibilities

- Together with Metro, provide oversight and concurrence for traffic modeling and travel demand forecasts.
- Adopts Metropolitan Transportation Plan (see Section 1.7.4).

2.7.4 Metro

Responsibilities

- Together with RTC, provide oversight and concurrence for traffic modeling and travel demand forecasts.
- Adopts Regional Transportation Plan (see Section 1.7.3).

2.8 Program Organization during Engineering and Construction

During engineering and construction, the CRC Program will utilize a team integrating WSDOT, ODOT, TriMet, C-TRAN, and consultant staff to deliver multimodal highway and transit designs that meet FHWA and FTA requirements and the CRC Program's goals and objectives. WSDOT and ODOT will deliver the CRC Program with a combination of agency and consultant staff under the direction of the CRC Washington and Oregon Program Directors. The number of agency and consultant staff engaged in the CRC Program will vary according which phase is in progress, the specialties required for that phase, and the selected delivery method.

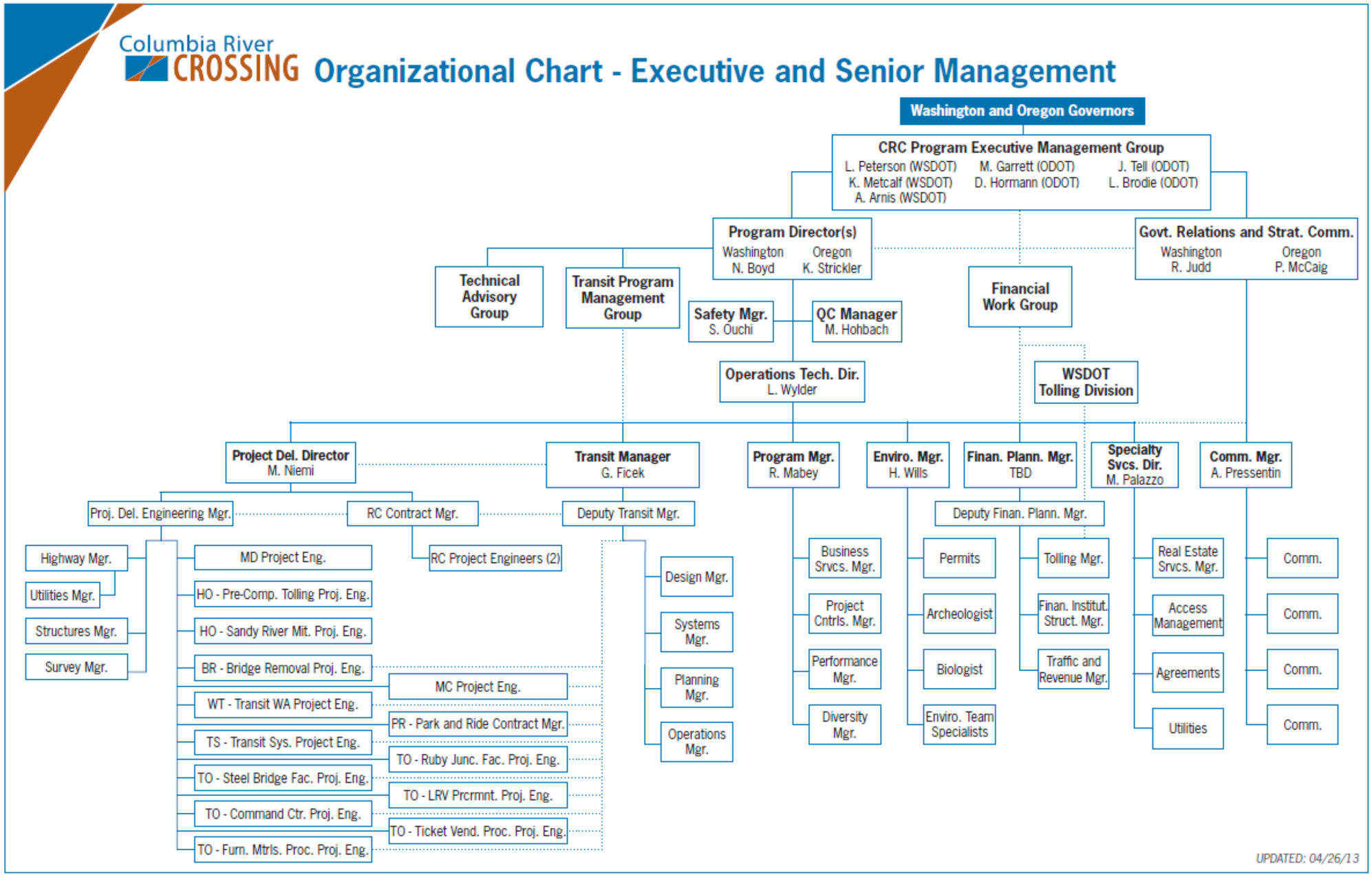
WSDOT and ODOT will utilize an integrated team composed of agency staff and consultants. Under contract, consultants will undertake specific tasks, providing support and performing functions:

- For specialized expertise.
- For short-term staff augmentation to assist staff during peak work periods.
- For events and under conditions for which the CRC Program may benefit from outside perspective and objectivity.
- On smaller consulting contracts for specialized services during various stages.
- For legal and claims support, environmental, consulting, materials testing, operations planning, real estate acquisition support, computer support, partnering, safety and security, and public relations, among others.
- For long-term design services in support of major CRC Program elements (e.g., transit elements), which can be more efficiently performed by outside services. This could include the following areas:
    - Civil Engineering – provide design services in the areas of civil and structural facilities, trackwork, utilities, architecture, and landscaping. These contracts also include design services during construction.
    - Right-of-Way (ROW) – provide ROW services in the areas of title, acquisition, appraisal, appraisal review, relocation, and property management.
    - Systems Engineering – provide design services in the areas of operations facility revisions, electrification system, train signal system, train-to-central control communications system, LRVs, and fare collection system. These contracts also include systems design services during construction.
    - Program Management – provide assistance in risk assessment, scheduling, database development, and cost estimating during engineering and construction phases.
    - Construction Management Consulting – provide staff augmentation, including resident engineering, office engineering, and inspection staff.

Preparation, negotiations, and execution of agreements with consultants will follow applicable procedures outlined in the WSDOT Agreements Manual, M 22-99.01, November 2009 or the ODOT Procurement Manual.

Additional details on procurement relating to activities performed by consultants can be found in the TCCP, which is an appendix to the PMP, and the Project Delivery and Procurement Plan.

FIGURE 2-1. CRC PROGRAM ORGANIZATION CHART



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3. Management Control

3.1 Overview

The CRC Senior Management Team will execute the CRC Program during the Engineering and Construction phases within clearly defined program parameters as well as manage individual project packages, discussed in Chapter 8 – Program Delivery and Procurement, to approved scope, schedule, and budget baselines that will be established when local (state) funds have been secured for the program at or before the commencement of 2013 – 2015 biennium.

CRC Program Management team members as listed in Section 4 of Appendix A, the Technical Capacity and Capability Plan (TCCP) will monitor work progress against established scope, budget, and schedule baselines, and all CRC Program managers will implement procedures that accurately document changes following the establishment of the program schedule and budget baselines. The CRC Program Management team will prepare and disseminate status reports frequently to the CRC Senior Management Team to allow timely and proactive response to issues that could potentially have impacts on the approved scope, budget, and schedule.

Management and administration of the CRC Program will comply with all federal, state, and local regulations. Management and administration procedures are based on those already in use at WSDOT, ODOT, TriMet, and C-TRAN, and new or revised procedures are developed, as needed, specifically for the CRC Program. Procedures in place will ensure compatibility with the framework of the PMP and effective management control.

Throughout all phases of the CRC Program, there is a need to have consistency in the manner in which various physical and technical aspects of the CRC Program are defined and recorded. During the Engineering and Construction phases, this definition ensures that the CRC Program's baseline (scope, budget, and schedule), which is approved when local (state) funds have been secured for the CRC Program at or before the commencement of 2013–2015 biennium, is followed and that completed program components will function as designed. The CRC Program has developed procedures for identifying, evaluating, accommodating, and capturing changes that may occur during the Engineering and Construction phases and that have an impact on the approved baseline. Change management procedures for design and construction control, discussed in Section 3.6 below, specify responsibilities for initiating and approving changes, permitting results to be achieved rapidly, providing for full evaluation of the impact of the changes, and specifying the documentation of the changes.

The CRC Program's cost, schedule, and scope objectives will be accomplished by instituting a framework for tracking the CRC Program's status as provided for with the Work Breakdown Structure (WBS). The CRC Program will use: (a) the WBS to define and monitor costs; (b) procedures for ensuring traceability of scope, schedule, and budget supported by the change management process described in this PMP; (c) a drawing management system for design control; (d) a document management system for control of records; and (e) a quality assurance/quality control (QA/QC) program for audit of management control procedures.

3.2 Project Controls

Project controls refer to established processes employed to manage cost and schedule goals for the CRC Program. The development, implementation, and enforcement of project control activities are the responsibility of the Project Controls Manager under the direction of the Program Manager.

Project controls provide accurate and timely project cost and schedule information for the CRC Senior Management Team, as well as regular analyses and review of projections and variances. The Project Controls team also develops and employs procedures to uniformly document changes made during the Engineering and Construction phases of the CRC Program. This information facilitates ongoing review of individual contract performance as well as analyses of overall trends of the CRC Program. The goal is to ensure that all scope, schedule, and cost goals are met.

3.2.1 Work Breakdown Structure

The CRC Work Breakdown Structure (WBS) provides consistent treatment of similar costs and schedule tasks of the CRC Program. The WBS decomposes project package elements and tracks all program costs and each project package described in Chapter 8 – Program Delivery and Procurement using a codification convention. The WBS also accommodates agreements, tasks, and subtasks, providing powerful reporting capabilities. The WBS is deliverable-oriented and can be reported in any combination of the following levels, each of which is hierarchical and dependent on the other levels:

Level 1 – Program (Budget Item Number)

The WBS "Program" level is the entire CRC Program and is the summary of all lower-level WBS components. This level is equivalent to the WSDOT Budget Item Number (BIN).

The BIN will be linked back to the program-level numbers used by the various funding partners to ensure a direct connection of the CRC Program with the WBS formats that each partner uses.

Level 2 – Major Element (Project Item Number)

The WBS "Major Element" level includes work elements that are naturally grouped together and will likely be managed by similar or complementary teams. These work elements include CRC Highway & Bridge, CRC High Capacity Transit, CRC Program Management and the EIS. All of the elements combine to form the entire CRC Program. This level is the equivalent of the WSDOT Project Item Number (PIN).

Level 3 – Project (Work Item Number)

The WBS "Project" level breaks the Major Elements into specific scopes of work that would be sequenced (for procurement purposes) to meet projected cash flow and will likely have a designated project manager, budget, and contract. This level is the equivalent of the WSDOT Work Item Number (WIN).

The WBS "Project" level represents a cost control element describing how and when the planned work is to be executed on a project. This level serves as a central collection point (or cost center) for recording all expenditures associated with a particular project or activity, which will typically include any or all of three phases—Program Engineering, Right of Way, and Construction.

Level 4 – Phase

The WBS "Phase" level addresses the different project phases, and each phase is abbreviated using two-letter identifier that is specific for use in the WBS. The phases are:

- Program Engineering (PE) – includes all engineering and support services through Notice to Proceed (NTP) of the construction contract.
- Right-of-Way (RW) – includes all right-of-way procurement and associated expenses and activities. (NOTE: The RW phase is included in the CRC Program Management Major Level (PIN) for ease of procurement of RW parcels across contract limits.)
- Construction (CN) – includes all the costs for construction and management activities through construction closeout.

Level 5 – Cost Accounts (Agreement/Task Order/Contract)

The WBS "Cost Account" level provides for a breakdown of the Work Order into the type of work to be performed. A scope of work, schedule, and budget are developed for each Work Package. The WSDOT Master Deliverable List (MDL) will be used as a basis for this level.

All expenditures, budgets, and commitments will be entered based on the above-described WBS system – see Figure 3-1.

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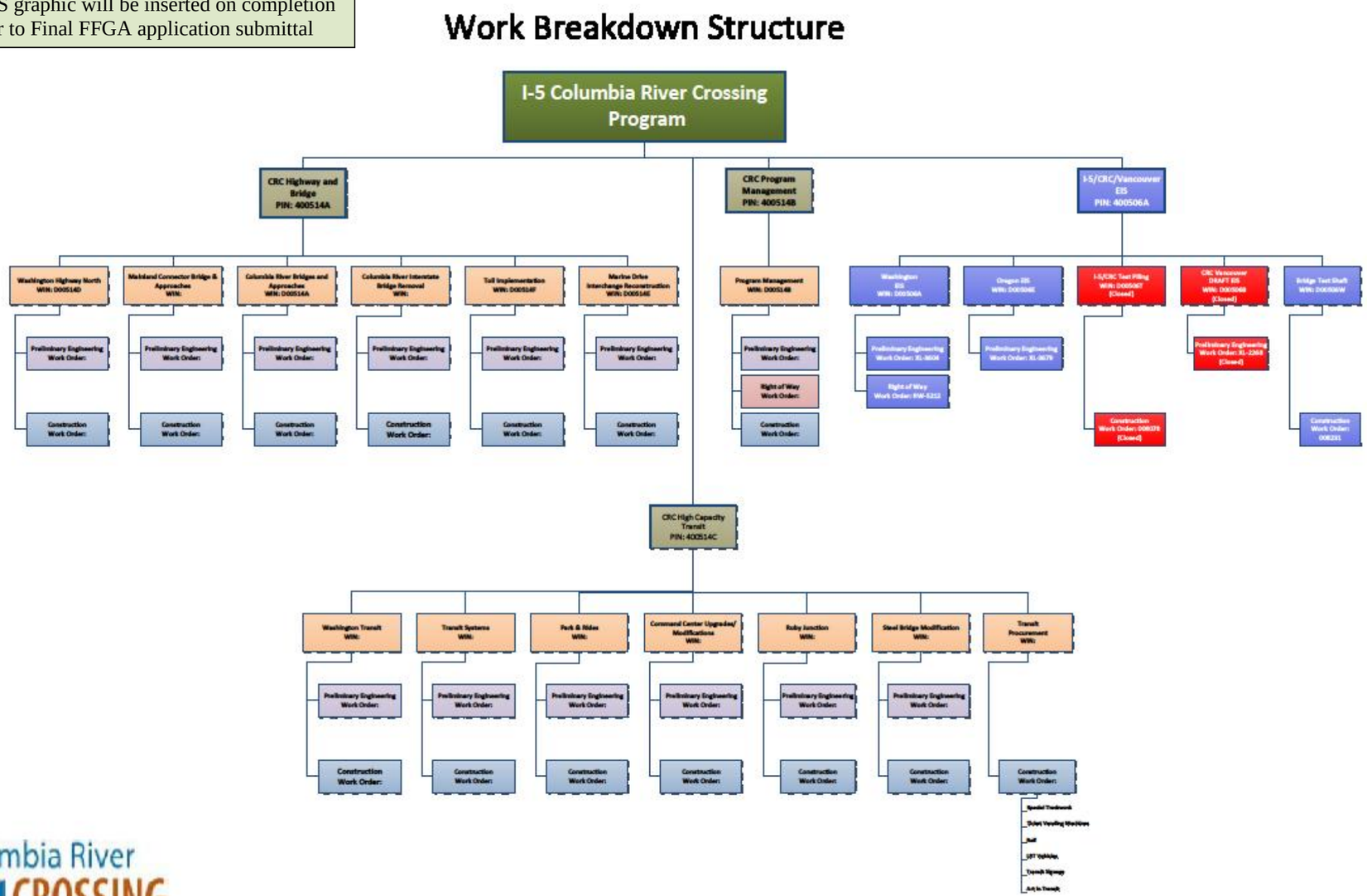
FIGURE 3-1. WORK BREAKDOWN STRUCTURE

This graphic serves as a placeholder. Final WBS graphic will be inserted on completion prior to Final FFGA application submittal



Columbia River CROSSING

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3.2.2 Maintenance of WBS

The WBS represents the organization of the CRC Program, and any changes to the WBS that require system and process changes will be reviewed through the change management process and will require the approval of the CRC Program Manager. Therefore, the implementation of any change should ultimately be used to best reflect the direction and structure of the CRC Program as it evolves. Implementation of any approved changes to the WBS will be performed by Project Controls team staff under the direction of the Project Controls Manager.

3.3 Cost Control

The Program Delivery and Procurement Plan (PDPP) describes the program delivery strategy that will divide the CRC Program, following completion of the 30% design, into separate and distinct project packages. Baseline budgets will then be established for each project package based on the engineers' cost estimate and the schedulers' forecasted durations to account for the effects of inflation and potential interim finance cost. Subsequently, changes in scope and schedule with potential impact to budget baselines will follow the change management procedures discussed below in this PMP.

The Project Controls Manager ensures that baseline documentation is available for the approved project package scope and matches it to baseline budgets that coordinate with the program and project WBS, including any budget transfers between project packages. The Project Controls Manager also tracks and reports on the status of the budget and costs.

3.3.1 Cost Control Procedure

Cost control is a broad set of cost accounting methods and management techniques with the common goal of improving cost-efficiency by managing the rate of cost changes and/or growth in costs. Project managers use cost control methods to monitor, evaluate, and enhance the efficiency of specific areas within the CRC Program. (See the Cost Control Plan, which is Appendix B to this PMP.)

The objective is to conduct program delivery activities throughout the Engineering and Construction phases to the approved scope, budget, and schedule established when local (state) funds have been secured for the CRC Program at or before the commencement of the 2013–2015 biennium.

3.4 Scope Control

Scope control for the CRC Program is addressed in the attached Configuration Management Plan, Appendix R, and encompasses the following elements:

- A clear listing of measurable, comprehensive, and definitive deliverables will be created for each phase of the CRC Program.
- The required tasks will be developed from the written project scope into an understandable format through the use of the WBS.

- Key deliverables that are products of the tasks will be identified as benchmarks in the schedule and monitored very closely for slippage.
- Modifications to the baseline scope will be identified as changes, as outlined in the Configuration Management Plan, which is Appendix R to this PMP.

Any change that could affect or potentially change the scope and WBS is managed through the change management process described in the Configuration Management Plan.

3.5 Schedule Control

The Project Controls team is responsible for schedule management with input from all participants of the CRC Program. Schedule management is accomplished through the use of schedules, a change management process, and a monitoring and reporting system.

The Lead Program Scheduler has primary responsibility for schedule management and the development of the overall Master Program Schedule and updates. All schedule updates, including updates to the schedule's basis and assumptions (B&As), will be reviewed by the discipline managers and recommended for approval by the Project Controls Manager and the Deputy Director before the updated schedule is published. The Lead Program Scheduler, Construction Schedulers, and assigned Cost/Schedule Analysts will generally cover several contracts, providing scheduling support to the CRC Program functional managers and to the Project Engineers (Resident Engineers) overseeing construction contracts. Detailed information relating to Earned Value, Cost Performance Index (CPI), and Schedule Performance Index (SPI) as well as reporting related to risks will be provided and discussed at monthly meetings.

3.5.1 Scheduling Procedures

Scheduling procedures, described in the Schedule Control Plan (see Appendix N to this PMP), have been established to provide efficient, timely, and accurate methods of schedule and cost control, monitoring, and reporting.

3.6 Configuration and Change Management

The CRC Program Team will execute the CRC Program within clearly defined program parameters and will manage individual project packages to approved scope, schedule, and budget baselines. WSDOT and ODOT executives recognize that changes are inevitable on a mega-program such as the CRC Program. However, it is their expectation that, without their prior approval, changes cannot exceed limits specified in budgets, schedules or documents that have been approved and authorized by the executives.

The configuration management and change management processes as outlined in the Configuration Management Plan (Appendix R to this PMP), is designed to ensure that the program scope, schedule, budget, and quality objectives that are committed to are achieved. The configuration and change management process provides a consistent and well-documented means of managing individual change and cumulative change in a manner that provides for

evaluating, approving, and documenting changes while minimizing the risk to program scope, schedule, and budget baselines.

3.7 Document Control and Records Management

The document control and records management functions for the CRC Program will be carried out as outlined in the Document Control Plan (Appendix L to this PMP).

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4. Program Funding

4.1 Overview

WSDOT is the FTA grantee for transit grants and lead agency for the overall multimodal CRC Program. ODOT is co-lead of the overall multimodal CRC Program. The CRC Finance team is responsible for development of the finance plan, preparation of financial plan reports for New Starts submittals, implementation of tolling, and resolving issues affecting implementation of the finance plan. The CRC Finance Manager oversees efforts of professional staff on the CRC Finance team and tolling coordination with WSDOT's Toll Division. The finance plan, the "CRC Capital and Operating Finance Plan," which was submitted to the FTA for the Full Funding Grant Agreement (FFGA) will address funding for the Initial Construction Program, or ICP, of the integrated multimodal CRC Program. The CRC Capital and Operating Finance Plan is a stand-alone document and not an appendix to this PMP. This Chapter 4 is intended to provide an overview of the funding mechanisms and procedures pertaining to the CRC ICP. For detailed funding information, see the CRC Capital and Operating Finance Plan.

4.2 Capital Funding Sources

The CRC Program seeks federal funding for the ICP through the Section 5309 New Starts Program (transit). The capital portion of the CRC Capital and Operating Finance Plan for the ICP also depends on toll revenues (i.e., toll bond proceeds and net toll revenues) and state transportation funds from ODOT and WSDOT, to cover a portion of program costs. The CRC Program's expected resources and requirements will be described in detail in the CRC Capital and Operating Finance Plan. In summary, the funding plan:

- Draws on a combination of local, state, and federal funding sources, as shown below.
- Includes an interim borrowing program to ensure that cash flow supports the most cost-effective development schedule.
- Benefits from placing cost responsibilities with those most able to manage them.

CRC Potential Funding Sources – Initial Construction Program

- ODOT/WSDOT: Existing Funding
- ODOT/WSDOT: Additional Funding
- Post-Completion Toll Bond Proceeds
- Residual Toll Revenues

- Pre-Completion Toll Revenues
- Section 5309 New Start Funds

4.3 Investor Relations

As described above, the funding plan relies on numerous investors. The CRC Program Team will lead efforts to communicate, collaborate, and coordinate with investors including, but not limited to:

- FTA
- FHWA
- Executive and elected officials (local, state, and federal)
- Private financial institutions associated with interim financing

These efforts will be supplemented, as needed, by experts from the CRC Program as well as partnering agencies and consultants to best respond to particular questions as they arise.

The FTA's role includes its performance of Financial Capacity Assessments conducted by a Financial Management Oversight Consultant as part of the process to execute the FFGA. FHWA's role includes its approval of an initial finance plan and subsequent annual updates. The initial finance plan should be approved by FHWA before its concurrence on the award of a Design-Build contract or before authorization of federal aid funding for Interstate construction.

4.3.1 Grant Administration – FTA

Overview

WSDOT, as the FTA grantee for transit grants, in collaboration with TriMet and C-TRAN, as needed, will administer grants in accordance with FTA Circular 5200.1A, Full Funding Grant Agreements Guidance, and FTA Circular 5010.1D, Grant Management Requirements.

Grant Analysis and Administration

The CRC Program Team and the WSDOT Public Transportation Division are responsible to the FTA for grant-related project issues. This work will be conducted with assistance from and coordination with TriMet and C-TRAN, as needed. Areas of responsibility include the following:

- Coordination of the development of grant applications and amendments.
- Coordination of grant application-related required activities.
- Coordination of response to FTA application review comments.
- Facilitation and execution of grant agreements, and notification of approval to CRC Program staff.

- Maintenance of grant files, including all grant applications, grant agreements, grant-related correspondence, quarterly reports, grant budgets, and revisions.
- Coordination of FTA quarterly report submittals and budget revisions.
- Distribution of grant status, labor, and financial reports to CRC Program staff and stakeholders.
- Distribution of information to appropriate CRC Program staff about new or changing federal grant-related requirements or regulations.
- Guidance to CRC Program staff on grant eligibility issues, budget management, and most appropriate use of grant resources.
- Preparation and distribution of monthly reports with details on activities, schedule, forecast cost, and overall completion.

Grant Accounting

The CRC Project Controls team, the WSDOT Public Transportation Division, and the WSDOT Accounting and Financial Services Division perform the following grant management accounting functions:

- Establishing all grant accounting information within the general ledger system.
- Processing grant-funded project invoices and charges.
- Producing monthly grant status, labor, and financial reports.
- Preparing financial status reports for quarterly TEAM reporting.
- Reviewing and validating expenditures before submitting grant drawdown transactions.
- Processing grant drawdown transactions.
- Ensuring the grant is appropriately accounted for the in the WA Schedule of Expenditure of Federal Awards and the WA Combined Annual Financial Report.

Cash Management

WSDOT, as the FTA grantee for transit grants, is responsible for receiving and dispersing all transit funds. Qualified CRC Program, Public Transportation Division, and Accounting and Financial Services Division staff are, or will be, trained users of the WSDOT Transportation Reporting and Accounting Information System (TRAINS) system.

The CRC Program intends to follow the most expeditious and cost-effective development schedule; that is, progress on the CRC Program will not be delayed awaiting federal funds.

WSDOT's Accounting and Financial Services Division will draw federal funds in accordance with 31 CFR 205.33 and Electronic Clearing House, Inc. (ECHO) procedures to minimize the time between the drawdown of federal funds from the federal government and WSDOT's immediate disbursement needs. When federal funds are not available due to appropriation cycles, local funds and/or interim financing will be used to pay expenditures.

Grants Closeout

Upon completion of the CRC Program, CRC Program staff will prepare a report stating the actual expenditures on the CRC Program broken down by contract and FTA line item code. Other reports will be prepared in accordance with all appropriate rules and regulations.

Full Funding Grant Agreement Reporting

WSDOT, as the FTA grantee for the FFGA, is responsible for ensuring that the CRC Program Team prepares quarterly reports in FTA's electronic grant management system (TEAM), including tracking physical progress against each element of the budget. The Project Controls Manager will provide a report of actual cash drawdown against approved grants. Explanation of any existing or potential problems will be noted. Reporting will be conducted in accordance with guidance in FTA Circular 5200.1A, Full Funding Grant Agreements Guidance.

Force Account

See the Force Account Plan, included as Appendix M to this PMP, for details.

4.4 Financial Audits

The WSDOT Audit Office and the ODOT Audit Services Office are engaged with the CRC Program Team to conduct audits and prepare audit plans as needed to support program development and delivery. Both states ensure compliance with state and federal requirements through internal and independent external audits.

The CRC Program's transit-related activities will be subject to FTA's Triennial Review. Additional oversight is provided through FTA's Financial Capacity Assessments conducted by a Financial Management Oversight Consultant prior to execution of the FFGA.

5. Insurance (Risk Management)

5.1 Overview

Insurance will be used as one of the risk transfer and finance mechanisms for the CRC Program's loss exposures. The goals of the insurance program are to protect the assets of the CRC Program and the agencies from the adverse impacts of loss associated with claims arising out of the course of design and construction. The CRC Program will coordinate with the WSDOT, ODOT, and TriMet risk management groups to develop and enforce contract indemnification and insurance requirements sufficient to cover those risks that the CRC Program and agencies deem necessary to transfer through an insurance portfolio. Because of the interstate nature of the CRC Program, consideration for both states' laws and regulations will be included.

During Engineering and prior to issuing the Request For Proposals (RFP), the CRC Program will work with the parties mentioned above to study the best method of protecting the CRC Program and the contracting agencies (WSDOT, ODOT, and TriMet). Using this study process, the CRC Program will gain a thorough understanding of the loss exposures and identified risks associated with each contract.

The CRC Program will evaluate risk transfer and finance through all appropriate insurance coverage types and amounts. During development of the RFP, legal and insurance professionals will review the language regarding insurance coverage.

Minimum insurance coverage types may include, but are not limited to:

Table 5-1 Minimum Insurance Coverage Types

Workers' Compensation	Commercial General Liability
Automobile Liability	Environmental Liability
Excess Liability	Railroad Protective Liability
Builder's Risk	Marine Liability
Aircraft Liability	Verification of Coverage
Contractor's Protective Liability	Endorsements and Waivers
Subcontractor Insurance Requirements	Changes in Requirements
Waivers of Subrogation	Support of Indemnifications
No recourse	Grantee's Right to Remedy Breach
Commercial Unavailability Alternatives	Claims Relating to Differing Site Conditions
Insurance Proceeds and Prosecution of Claims	Disclaimer
Commencing of Work	
Revenue disruption for tolling due to catastrophic loss	
Professional Liability (including consideration of design errors and multistate inspection)	

Chapter 5 of the Risk and Contingency Management Plan (RCMP) (see Appendix C to this PMP) describes typical response actions that can be used to mitigate identified project risk events, including both threats and opportunities. Insurance is one tool for transferring risk in procurement, design, construction, and operation and may be tailored to address specific project risk events. If this response type is deemed appropriate for an identified risk event, it will be documented and implemented by the project risk manager.

Program risk management is broken down into two areas of responsibility: enterprise risk management and project risk management. Project risk management is discussed in detail in the RCMP (see Appendix C to this PMP).

Enterprise risk management deals with the categories of risk that arise out of the CRC Program that may have consequences to either ODOT or WSDOT at the corporate level. For instance, cost overruns may impact the non-CRC budgets and projects of either agency; a means for mitigating these issues is critical. In consultation with WSDOT, ODOT, and TriMet Risk Management, the Enterprise Risk Management team is responsible for evaluating, administering, and coordinating the insurance and claims for the CRC Program, including:

- Identifying the loss exposures of the CRC Program and evaluating the best methods to limit these exposures and protect the interests of the CRC Program and agencies.
- Determining the appropriate coverage types and limits.
- Developing and administering a claims management program to coordinate property, liability, and worker's compensation claims, including property damage recoveries.
- Conducting risk analysis for insurance purposes.
- Managing the insurance program, including monitoring the contractor insurance program.
- Assisting in litigation management.
- Reviewing contracts, lease agreements, and other legal documents for assumption and transfer of risk.

The CRC Program will take the necessary actions to protect against risk in a fiscally responsible manner and to coordinate the insurance needs of the agencies.

Insurance will be consistent with:

- TriMet standard practices for insurance requirements on contracts.
- WSDOT Standard Specifications M41-10, Chapter 1-07, 2012.
- ODOT/APWA Oregon Chapter, Volume 1, 00170.70.
- Interagency Agreements.

6. Real Estate Acquisition Management Plan

This chapter provides an overview of the CRC Real Estate Acquisition Management Plan (RAMP) with respect to:

- Scope of real estate activities;
- Implementation framework; and
- Implementation strategies.

For additional information, please refer to the entire RAMP document in Appendix F to this PMP.

6.1 Scope of the CRC RAMP – Initial Construction Program

Conceptually, the acquisition and management of real property required for the ICP can be broken into four distinct phases:

- **Corridor Planning and Project Development**: The phase in which the real property impacts of all program alternatives are documented and compared to a no-build alternative. Potential acquisitions and displacements are quantified, initial property descriptions (including easily accessible ownership and title information) are compiled, and environmental contamination surveys are completed that do not require a Permit of Entry. The requirements of the National Environmental Policy Act (NEPA) are addressed during this phase, including the execution of a ROD.

- **Baseline Engineering and Design**: During the baseline formulation phase, NEPA data pertaining to the LPA is refined and verified, and proposed acquisitions for the entire LPA are more precisely classified. A baseline cost estimate is completed, a preliminary acquisition schedule is developed, staffing and administration needs are determined, and a property need certification process is completed. During this phase, the CRC Program works with the PMOC to ensure that all requirements requisite for approval of the RAMP by the FTA are met. This phase generally corresponds to the Engineering phase of project development as defined by the New Starts Program.

- **RAMP Implementation**: During this phase, all real property activities required for funded delivery packages are completed, including acquisition, relocation, demolition, and environmental remediation. The actual commencement of acquisition activities may start after execution of a ROD under pre-award authority, may start concurrent with the Engineering phase, or may start subsequent to both of these milestones. By the time the Construction phase is substantially complete, all property interests are vested to long-term owners.

- **Post-Construction Property Management**: In addition to maintenance and security activities, this final phase includes the formation and updating of excess property utilization plans, updating of triennial review and audit files, and the pursuit of excess property disposal and/or joint development.

While the CRC RAMP addresses all four phases, emphasis is placed on baselining and implementation activities.

6.2 Implementation Framework

The CRC operates as a partnership between program sponsors. Table 6-1 summarizes the role of each with respect to real property activities.

Table 6-1 Primary Sponsors of the CRC Program and Roles Related to Real Estate

Entity	Jurisdiction	Role with respect to CRC real property activities
Federal Transit Administration (FTA)	Co-lead NEPA compliance	Provide Federal Assistance administered by the FTA
Federal Highway Administration (FHWA)	Co-lead NEPA compliance; Uniform Act lead agency	Provide federal discretionary and/or formula highway funds
Washington State Department of Transportation (WSDOT)	Washington state highways and other duties designated by state legislature	Co-lead for CRC management; FTA grantee, acquisition of property required for highway purposes in Washington, acquisition of property required for transit purposes in Washington under a Local Agency Agreement with C-TRAN
Oregon Department of Transportation (ODOT)	Oregon state highways and other duties designated by state legislature	Co-lead for CRC management; acquisition of property required for highway purposes in Oregon
Southwest Washington Regional Transportation Council (RTC)	State-mandated regional planning, and designated federal metropolitan planning organization in Washington for Portland Vancouver-Hillsboro Metropolitan Statistical area	ROW phase programming in SW Washington Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP)
Metro	Elected regional planning and designated federal metropolitan planning organization in Oregon for the Portland Vancouver-Hillsboro Metropolitan Statistical area	ROW phase programming in the Metropolitan Transportation Improvement Program (MTIP), and STIP
Tri-County Metropolitan Transportation District (TriMet)	Public transit provider in Oregon within the Portland Vancouver-Hillsboro Metropolitan Statistical area	Acquisition of property required for LRT maintenance facility at Ruby Junction; title holder of property with FTA interest in Oregon
Clark County Public Transit Benefit Area Authority (C-TRAN)	Public transit provider in Washington within the Portland Vancouver-Hillsboro Metropolitan Statistical area	Title holder of property with FTA interest in Washington, including park and ride garages,
The City of Vancouver	Land use and development permitting in Washington within the city limits	Title holder of real property related to the CRC Program
The City of Portland	Land use and development permitting in Oregon within the city limits	Title holder of real property related to the CRC Program

6.2.1 Legal Requirements Influenced by Federal Funding Sources – "Color of Money"

The FTA and FHWA are anticipated to provide Federal Assistance constituting approximately 40% of the capital funds required to implement the ICP. In general, real property activities

funded in whole or in part by discretionary FTA "New Starts" capital grants are subject to the legal requirements of 49 U.S.C. 5309, and real property activities that include FHWA discretionary highway funds must be conducted in compliance with 23 CFR Part 710.

6.2.2 Authority to Acquire and Dispose of Real Property

Although no enabling legislation is necessary to pursue CRC Program ROW activities, the legal basis for ROW activities stems from the statutory authority of the individual sponsors to acquire property for certain transportation uses, to evoke eminent domain, to share powers, and to act cooperatively. Table 6-2 documents the statutory authority available to the CRC Program for ROW implementation.

Table 6-2 Statutory Authority of CRC Sponsors with Respect to Real Property Powers

CRC Sponsor	Eminent Domain Authority	Other Powers
WSDOT	RCW 47.12.010; RCW 47.12.270	RCW 47.52.210 (relinquishment)
ODOT	ORS 366.320; 366.340	ORS 190.110; ORS 366.576 (intergovernmental agreements)
TriMet	ORS 267.200	ORS 267.200; ORS 267.255 (intergovernmental agreements)
C-TRAN	RCW 36.57A.090	RCW 36.57A.080 (intergovernmental agreements)

6.3 RAMP Implementation Strategies

Real estate activities required for the CRC Program will be managed by the Right-of-Way (ROW) work group.

Given the complex scope and structure of the CRC Program, ROW work group management and staff have developed a number of implementation strategies, which are described in more detail in the RAMP.

6.3.1 Utilize Third-Party Agreements

The CRC Program has a list of approximately 70 third-party agreements required to provide the statutory authority, the technical capability, and the long-term protection of federal interests required for program implementation. The scope of six agreements related to real estate activities are summarized in Table 6-3. December 1, 2013 is the target date for all agreements to be executed.

Table 6-3 Summary of Third-Party Agreements Related to CRC Real Property Activities

FFGA Road Map Tracking Number	Agreement Name	Scope
8.1.6	ROW BNSF Construction and Maintenance	To address rights necessary for the project and include the land swap on SR 14
8.2.(4,5,6,7)	Continuing Control Agreements	Grants necessary permanent rights for the operation and maintenance of LRT on property where a transit agency is not the underlying owner
8.2.18	Turnback Agreement WSDOT-City of Vancouver	Upon completion of the CRC Program, certain right-of-way will be transferred from WSDOT to City of Vancouver ownership
8.1.11	C-Tran & WSDOT Acquisition and Task Assignment for Park and Ride parcels and other non-railbed alignment parcels	Task assignment for right-of-way funding and acquisition procedures
8.2.12	TriMet & WSDOT Right-of-Way Agreement	To include funding and acquisition procedures
8.2.13	City of Vancouver & WSDOT Right-of-Way Agreement	Acknowledges WSDOT's role in acquisition activities on behalf of C-TRAN. Upon completion of the CRC Program, certain right-of-way will be transferred from WSDOT/C-TRAN to City of Vancouver ownership

6.3.2 Define a Procedural Framework Compatible with FTA and FHWA Real Property Requirements and Policy

While all CRC Program acquisitions must conform to The Uniform Act, as implemented by 49 CFR Part 24, the RAMP describes how the CRC Program addresses differences between federal and state acquisition policies and/or procedures.

6.3.3 Classify Acquisitions Prior to Starting Acquisition Activities

To help navigate the complex policy, administrative, and funding terrain over which real estate activities take place, property interests will be classified by attributes that describe how the property interest will be managed both during and after the CRC Program. Attributes will be assigned to each property interest before starting acquisition activities and will be documented as part of the Property Interest Certification process and the CRC design control process for real estate.

The 11 attributes by which all CRC acquisitions will be classified are as follows:

- Sequence
- Rights
- Extent
- Duration
- Normality
- Use Designation
- Federal Funding
- Acquiring Agency

- Authority
- Ultimate Vesting
- Agent

6.3.4 "Just in Time" Acquisition Sequencing

More than 300 property interests must be acquired, and construction activities are anticipated to span more than 8 years. The strategy of "Just in Time" scheduling of ROW resources reflects both the complexity of the acquisition and the phasing of construction.

6.3.5 Disassociate Staff Responsibilities from Agency Affiliations to Promote Agility, Flexibility, and Long-term Efficiency

ROW staff roles and responsibilities are influenced and informed, but not confined, by the agency from which a particular staff person originates. In other words, ROW work group staff and consultants work on both sides of the Columbia River to the extent allowed by state law.

6.3.6 Facilitate Interdisciplinary Coordination

In complex projects, effective and efficient coordination is nearly as important as a clearly defined scope, schedule, and budget. Three specific methods that the ROW work group uses to facilitate coordination are monthly coordination meetings, interdisciplinary reviews of design documents, and the Property Interest Certification process.

6.3.7 Exercise Right to Use Judicial Procedure to Expedite Establishing the Right of Entry in Oregon

ORS 35.220 (Precondemnation Entry on Real Property) provides a method to expedite securing a Right of Entry and to lower the schedule risk associated with gaining possession for certain activities such as environmental assessments, surveys, and appraisals. The FTA has determined that using this procedure does not adversely influence acquisition negotiations with respect to The Uniform Act. The equivalent procedure in Washington is authorized under RCW 47.01.170.

6.3.8 Offer Mediation

When chances of completing an acquisition, based on determination of value, appear unlikely, mediation can provide an attractive alternative to the evocation of eminent domain. ODOT has established a formal mediation program called Alternative Dispute Resolution.

WSDOT has used mediation in numerous transportation projects. Mediation neither deviates from the WSDOT ROW Manual, nor precludes the CRC Program from using condemnation in the event mediation is not successful. In other words, mediation can be used as an effort to avoid, not to replace, condemnation as the acquisition process of last resort.

6.3.9 Focus First on Acquisitions with High Schedule Risk

Washington and Oregon differ in their judicial abilities to gain possession of properties needed for public use. Should a property owner in Oregon refuse possession, ORS 35.235 and ORS 35.625 offer ODOT a way to gain possession without a hearing. After initiation of condemnation proceedings, ODOT does not have to wait for a jury verdict to obtain possession of the property.

WSDOT approaches all acquisitions as a potential schedule risk until possession is obtained. Therefore, WSDOT has a great interest in beginning the acquisition process in Washington as soon as possible for initial project needs, while maintaining a high interest in the potential for any acquisitions throughout an entire project's limits in order to reduce this risk.

Coordination with the Office of the Attorney General (AGO) will help in estimating the time necessary to get to a condemnation trial. That schedule will guide decision making for the dates of any planned final action required (RCW 8.25.290 – Condemnation Final Actions) before filing for condemnation (RCW 8.04.010 - Petition for Appropriation), to ensure possession is obtained.

7. Community Relations

7.1 Overview

The CRC Program is employing an extensive community relations strategy to provide consistent, timely, and accurate information to interested parties, facilitate dependable lines of communication with the public, and build broad support for the CRC Program. With the expectation that construction activities will cause disruption to nearby communities, it is the goal of the CRC Program to execute an effective communications program that will serve the local community's needs and minimize harmful effects. Community relations and engagement activities support pre-construction planning and construction of the CRC Program. A description of the communications and community involvement team and organization can be found in Section 1 of the Communications Plan, which is included as Appendix O to this PMP.

7.2 Community Outreach Tools

The community involvement efforts that have been and will continue to be undertaken on behalf of the CRC Program are outlined in the Communications Plan in Sections 2 through 4. In coordination with the CRC Program's partner agencies, the CRC Communications Manager will write an annual communications plan that includes detailed messages and strategies for approval by the CRC Strategic Managers. Additional communication plans will be designed specifically for contractor specifications, for each project delivery package. Records related to outreach activities, contacts made with the public, and comments received are kept in a communications database and/or in the CRC Program electronic filing system.

The outreach activities will include regular briefings to a variety of stakeholders and community groups. These groups will include, but are not limited to, decision makers, interest groups, businesses, property owners, employer organizations, neighborhoods, and environmental justice communities.

As in the planning and pre-construction phase, the CRC Program's public outreach efforts will continue to employ a variety of tools, depending on the needs of the audience and whether comment is being sought or information is being delivered. The CRC Program will continue to use the following avenues for distributing information and gathering public input:

- Fairs, festivals, and community events
- Open houses and workshops
- Social service, civic, and business group updates and briefings
- Drop-in events
- Printed materials
- Constituent contacts
- Surveys

- Social media
- Newspaper and media organizations
- Door-to-door outreach

Specific details about each of these tools can be found in Section 3 of the Communications Plan.

7.2.1 Advisory Groups

The CRC Program has used advisory groups throughout the program development process. In late 2011, most of the existing topic-based advisory groups were concluded.

New advisory committees will be formed as the CRC Program receives funding and moves toward construction. The formation of new advisory groups could also be tied to major program milestones. The CRC Program could enlist community groups to cover topics such as additional station design, conduct of construction, business mitigation, and other topics as needed. Refer to Section 5 of the Communications Plan for a full list of advisory groups.

7.2.2 Media Relations

Communication with the media is led by the CRC Strategic Communications Managers, who may appoint media spokespeople for the CRC Program. Coordination with WSDOT, ODOT, TriMet, and C-TRAN communications managers and other program sponsors occurs on a regular and ongoing basis. Communications with media include reporter briefings, press releases, editorial board briefings, minority and small press contact, and op-eds or letters to the editor.

8. Project Delivery and Procurement

Similar to other sections of the PMP, this chapter focuses on the delivery of the Initial Construction Program (ICP) that is described in Chapter 1. This chapter of the PMP provides an overview or summary of the project delivery and procurement that is described in greater detail in the Project Delivery and Procurement Plan (PDPP).

8.1 Overview

The delivery of the CRC Program will follow the framework developed during the Preliminary Engineering (PE) and Engineering phases. The framework divides the CRC Program into separate and distinct functional packages that meet broad technical and financial needs. The PDPP describes the major procurements for final design and construction of the CRC Program. Detailed information on construction management and administration has been removed from the previous version of the PDPP and is addressed in the Construction Management and Administration Plan, which is included as Appendix D to this PMP. The PDPP summarizes:

- The recommended design and construction project packages;
- The recommended delivery methods to perform the design and construction activities of each project package;
- The procurement options to be utilized in combination with the delivery methods;
- The procuring or contracting agencies; and
- The procurement schedule.

8.2 CRC Procurement – Laws and Policies

The CRC Program anticipates procuring Architectural and Engineering (A&E) services through WSDOT, ODOT, and possibly TriMet. These A&E services would support preparing final construction documents for project packages delivered using the traditional Design-Bid-Build (DBB) or General Contractor/ Construction Manager (GC/CM) delivery models, prepare program requirements and specifications that support Design-Build (DB) or Design-Furnish-Install (DFI) procurements, and provide design oversight reviews on construction documents prepared under the DB and DFI delivery models. The procurement of construction services, equipment, and materials for the program packages will be divided between WSDOT, ODOT, and TriMet in a manner that best meets the requirements and objectives of the CRC Program. Such procurements will be governed by applicable WSDOT, ODOT, or TriMet contracting rules, and conducted in a manner that provides maximum open and free competition consistent with FTA Circular 4220.1F, Third-Party Contracting Guidelines, and the USDOT 49 CFR Part 18, Uniform Administrative Requirements for Grants and Cooperative Agreements to State and

Local Governments. The CRC Program team will provide administrative oversight on all executed procurement contracts.

The CRC Program will contain a number of contracts related to transit and highway construction; delivery methods are being identified and may be DBB, DB, DFI, or GC/CM. The CRC Program is authorized under both Oregon and Washington laws.

Procurement of A&E design, construction services, and materials and equipment will be undertaken by the applicable contracting agency (WSDOT, ODOT, or TriMet) and will comply with applicable state and federal procurement rules.

Bi-state contracts historically have been delivered with coordination during the planning phase through construction. An agreement is written to describe roles, responsibilities, and funding contributions. Normally, one agency is the lead through each specific phase. In addition, a maintenance and operations agreement is executed. WSDOT and ODOT have past examples of successful coordination with existing structures that cross state lines. Additionally, the Bi-State DOT Project Development Agreement will address ownership, project organization, management, administration of funds, tolling, construction, administration, design, and change order decision making.

8.3 Preferred Program Sequencing

Construction of the entire program will require a number of years to complete and will be phased to provide efficient implementation while minimizing impacts on the community and corridor users. In response to legislative direction, the CRC program team has developed an Initial Construction Program (ICP) that adapts to available resources and fits into today's economic reality.

The CRC Program improvements that were described in the NEPA documents are known as the Locally Preferred Alternative (LPA). A Record of Decision was issued in December 2012. The construction of the LPA will be phased, and the initial phase is referred to as the Initial Construction Program, or ICP. The ICP includes highway, transit, and bicycle and pedestrian improvements, as summarized below.

- The new river crossing over the Columbia River and the I-5 highway improvements, including improvements to interchanges north and south of the river, as well as related enhancements to the local street network.
- Extension of light rail from the Expo Center in Portland to Clark College in Vancouver, and associated transit improvements, including transit stations, park and rides, bus route and station changes, and expansion of an LRT maintenance facility.
- Bicycle and pedestrian improvements throughout the project corridor.
- A toll on motorists using the river crossing.
- Transportation demand and system management measures to be implemented with the CRC Program.

- Transit Steel Bridge and Command Center upgrades and modifications.
- Purchase of 19 Light Rail Vehicles (LRVs), Ruby Junction LRT maintenance facility Phase II expansion, and other transit-related procurements.

The ICP will be split into construction packages. A graphic presentation of the construction packages can be found in the PDPP.

The general strategy of the program sequencing is to complete the revenue-generating aspects of the CRC Program as quickly as possible and to complete remaining elements of the CRC Program as funding becomes available.

8.4 Contracting Agency, Delivery Methods, and Procurement Methods

The project packaging strategy divides the CRC Program into separate and distinct functional construction packages.

Key factors informing the CRC Program's framework for project packaging include:

- The preferred program sequencing strategy described in Section 8.3, above;
- Interdependencies of program components;
- Jurisdictional changes and urban features along the alignment;
- Schedule criticality;
- Financial cash flow projection;
- Inherent risks;
- Oversight required for multiple interfaces among packages;
- Lead times;
- Specialty work;
- Optimizing opportunities for competition and for participation by Disadvantaged Business Enterprises (DBEs).

The project packaging strategy and the assignment of project packages accounts for:

- The contracting or procuring agency;
- The preferred delivery method; and
- The procurement strategy.

The PDPP provides background information about the contracting/procuring agency, delivery methods, and procurement methods. In addition, it provides a summary of transit-related interfaces.

8.4.1 Contracting/Procuring Agency

WSDOT was the main agency to procure contracts with consultants during the environmental phase of the CRC Program. WSDOT is also the grantee for FTA federal funding and principal contracting/procuring agency as the CRC Program proceeds through construction.

Two other agencies—ODOT and TriMet—are expected to play a role in the contracting and procurement process. Both ODOT and TriMet will become operators of components of the completed CRC Program and both have special skills to contribute to the contracting and procurement process. The basic division of responsibilities for contracting and procurement of general categories is summarized in Table 8-1. Any possible issues related to the ability of an agency to contract in the adjoining state will be investigated and resolved before or during the Engineering phase.

Table 8-1 Contracting/Procuring Agency

General Package Category	Contracting Agency
I-5 Columbia River bridges and approaches	WSDOT
Transit civil components in Washington	WSDOT
Transit civil components in Oregon	ODOT/TriMet
Transit system components in Washington and Oregon	TriMet
Highway components located in Oregon	ODOT
Highway components located in Washington	WSDOT

8.4.2 Delivery Methods

The delivery methods refer to the overall process by which a project is designed, constructed, and/or operated and maintained.

As described in the PDPP, the range of delivery methods includes:

- Design-Bid-Build (DBB);
- General Contractor/Construction Manager (GC/CM);
- Design-Build (DB); and
- Design-Furnish-Install (DFI).

Additional details, including a description of the advantages and disadvantages of various delivery methods, are provided in the PDPP.

8.4.3 Procurement Methods

The primary procurement methods used to evaluate and select designers and construction contractors fall into two broad categories:

- **Competitive Low Bid Procurements** – This is the most common procurement method for selecting the construction contractor under the DBB delivery method, but it is rarely used for procuring designers for projects. Award is based on lowest bid price from a responsive contractor. To avoid bids from unqualified construction contractors, contractors may be required to go through a prequalification process prior to competitive bidding.

- **Negotiated Procurements** – This procurement method is used primarily for selecting the designers and/or contractors for the DBB and GC/CM delivery methods and the designer-construction contractor team for DB delivery methods. Selection could be based solely on qualifications (Qualification-Based Selection or QBS) or a combination of qualifications and price, such as a Best Value Selection (BVS), or selection criteria based on the proposed schedule and approach to the project. The final price for the work is arrived at through a negotiation process between the owner and contractor.

The CRC Program Team will finalize the procurement strategy for project packages when funding has been committed and when the program sequencing, procuring agency assignments, project packaging, and delivery method strategies are finalized. The procurement strategy for each project package will be the most suitable in combination with the delivery method assigned to that package, meets the project schedule and budget, satisfies applicable federal and state procurement requirements, and results in the best value to the CRC Program.

The CRC Program's procurement strategy recognizes three contract categories:

1. A&E and Personal Services contracts
2. Construction contracts
3. Equipment, Material, and Supplies contracts

Additional details about the CRC Program's procurement methods can be found in the PDPP.

8.4.4 Proposed Packaging

Table 8-2 summarizes the proposed packages and provides agency and package delivery information.

Table 8-2 Proposed Packaging – Summary

Package Title	Procuring Agency	Delivery Method
Columbia River Bridges and Approaches	WSDOT	DB
Columbia River Interstate Bridge Removal	WSDOT	DBB
Mainland Connector Bridge and Approaches	ODOT	DBB
Marine Drive Interchange Reconstruction	ODOT	DBB
Washington Transit	WSDOT	GC/CM/DBB
Park and Ride Garages	WSDOT	DB
Transit Systems	TriMet	DFI
Transit Other:		
Ruby Junction - Phase II Expansion	TriMet	DBB
Steel Bridge Modifications	TriMet	DBB
Command Center Upgrades/Modifications	TriMet	DFI
Light Rail Vehicle Procurement	TriMet	DFI
Ticket Vending Machine Procurement	TriMet	DFI
Transit Owner Furnished Materials	TriMet	DFI
Highway Other:		
Pre-Completion Tolling	WSDOT	DBB
Sandy River Habitat Mitigation	ODOT	DBB

Additional details on the CRC Program's proposed packaging, including the rationale for the selection of the delivery method, can be found in the PDPP.

9. Labor Relations and Policy

9.1 Statutory and Regulatory Requirements

For contracts administered by WSDOT, ODOT, or TriMet, the contractor will always comply with all federal, state, tribal, or local laws, ordinances, and regulations that affect work under each contract. The contractor will indemnify, defend, and save harmless the states (including the governor, transportation commission, secretary, and any agents, officers, and employees) and/or TriMet against any claims that may arise because the contractor (or any employee of the contractor or subcontractor or material-person) violated a legal requirement.

The contractor will be responsible for the safety of all workers and will comply with all appropriate state safety and health standards, codes, rules, and regulations. The contractor will be obligated to comply with all federal safety and health standards, codes, rules, and regulations that may be applicable to the contract work.

9.2 State and Local Regulations

The CRC Program's participants, including all contractors, must identify and comply with all relevant federal, state, and local laws and regulations. In instances where conflicts exist between the federal and state laws covering the same or similar areas, the CRC Program will consult the AGO or the Department of Justice, or both.

9.3 Federal Requirements

By use of federal funds, each contract must conform to certain federal requirements regarding personnel and/or labor and must contain other federal regulations that apply regardless of funding sources. The following sections provide more detail regarding significant labor-related requirements. All contracts will carry the federally mandated clauses pertaining to employment and human relations.

All contracts with FHWA funding will include form FHWA-1273 as part of the contract. All contracts with FTA funding will include the latest federal requirements, similar to "Appendix A" of TriMet contracts. If there are conflicts between requirements, they will be worked through with the FTA and FHWA before placing the requirements in the contract.

9.4 Wage and Hour Requirements

Each contract must comply with all federally decreed wage and hour requirements, including but not limited to the Davis-Bacon Act, 40 USC 3141, et. seq., and the Copeland Act, 18 USC Section 874, et. seq., as supplemented by U.S. Department of Labor regulations set forth in 29 CFR Parts 1, 3, 5, 6, and 7.

On contracts specifying Davis-Bacon prevailing wage rates, the contractor and subcontractors must submit certified payrolls on a weekly basis. Each certified payroll must include the certification shown in Section V.2.d in form FHWA-1273, which will be included in the contract. It is the responsibility of the Project Engineer to both monitor and enforce these provisions to the degree necessary to ensure full compliance.

9.5 Local Labor Conditions and No Strike Agreements

Operations and other functions performed by members of Division 757 of the Amalgamated Transit Union (ATU) are subject to the current labor agreement with TriMet. Article I, Section 5 of the agreement for December 1, 2009, through November 30, 2012, states:

> "It is agreed the Association or any employee shall not engage in any strike, walkout, or slowdown during the period of this Agreement. It is further agreed the District shall not lock out its employees during the term of this Agreement."

In addition, it should be noted that mass transit district workers are forbidden from striking under Oregon law (ORS 234.728).

Because of the size and uniqueness of this CRC Program, project labor agreements may be negotiated for individual contracts between labor unions and the contractor.

9.6 Affirmative Action Plan

Differences between state and federal laws require a variety of guiding requirements. As a result, individual contracts may have different guiding requirements depending upon what laws were in place at the time the contract was executed and how the contract is funded. The special provisions, Standard Specifications, and amendments determine the specific requirements for each contract.

9.6.1 Compliance with Regulations

The contractor must comply with all civil rights program requirements that apply to transit-related projects. The applicable civil rights program areas follow Title VI of the Civil Rights Act of 1964 (Service Delivery/Benefits); Equal Employment Opportunity (EEO); the Disadvantaged Business Enterprise (DBE) Program (Section 106(c)); and the Americans with Disabilities Act (ADA) of 1990.

9.6.2 Solicitations for Subcontractors

The contractor will use its best efforts to solicit bids from, and to utilize, disadvantaged, minority, and women subcontractors, or subcontractors with meaningful minority and women representation among their employees. The contractor will notify all potential subcontractors and suppliers of the EEO obligations required by the contract. The contractor will use its best efforts to ensure subcontractors' compliance with the EEO obligations.

9.6.3 Sanctions for Noncompliance

If the contractor is found to be in noncompliance with the provisions, the contracting agency may impose such sanctions as it or FHWA or the FTA may determine necessary to achieve compliance including, but not limited to:

- Progress payment requests may not be honored until the noncompliance is remedied to the satisfaction of the contracting agency.
- The contract may be suspended, in whole or in part, until such time as the contractor is determined to be in compliance by the contracting agency.
- The contractor's pre-qualification may be suspended or revoked. The contracting agency may refer the matter to the applicable federal agency for possible federal sanctions.
- The contract may be terminated.

9.6.4 Disadvantaged Business Enterprise (DBE) Program

The contractor will be required to submit to the Project Engineer a report of the "Amounts Credited as DBE Participation" quarterly on WSDOT-administered contracts and monthly on ODOT- and TriMet-administered contracts, and upon completion of the CRC Program. The measurement is not simply the payments made to the DBEs; rather it is in accordance with the "DBE Participation" section of the contract special provisions and, for TriMet contracts, the TriMet DBE Program. This report should contain all DBEs utilized on the contract. The information is used to track attainment of WSDOT's and ODOT's overall DBE goals, and it is important to ensure that the report is received and processed in a timely manner. For TriMet-administered contracts, the information will be used to track the percentage of DBE participation on the contract.

On-site reviews will be conducted on all federal-aid contracts where there is DBE participation. On-site reviews will be conducted at periodic intervals: when the DBE begins work, during the peak period of the DBE's work, and any time there is a change in the nature or methods of the DBE's work.

DBE Liaison

The contractor will officially designate and make known to the Project Engineer during the preconstruction conference and discussions the contractor's EEO Officer and DBE Coordinator. The EEO Officer and DBE Coordinator each will also be responsible for making himself or herself known to each of the contractor's employees. The EEO Officer and DBE Coordinator must possess the responsibility, authority, and capability for administering and promoting an active and effective contractor program of equal employment opportunity and DBE participation.

Other DBE Support Personnel

All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees or subcontractors, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement the contractor's

EEO policy and DBE policy, and contractual responsibilities, in order to provide equal employment opportunity in each grade and classification of employment and promote DBE participation in accordance with the CRC DBE Program.

10. Agreements, Permits, and Environmental Mitigation

10.1 Overview

The CRC Program encompasses two states, two cities, two counties, and two Metropolitan Planning Organizations (MPOs). It is subject to both Oregon and Washington regulations, as well as many federal requirements. Completion of the CRC Program requires agreements between finance partners; agreements for services from some of these authorities; and permits from federal, state, and local agencies, some of which may include:

- Agreements between finance partners for delivery of project funds (State of Oregon, State of Washington, FTA, etc.).
- Agreements for design and construction services between partner agencies (ODOT, WSDOT, C-TRAN, and TriMet).
- Agreements for design support services from jurisdictions (Cities of Portland and Vancouver).
- Permits related to rail and utility rights-of-way (BNSF, etc.).
- Federal and state permits such as the Clean Water Act Section 404, the General Bridge Act of 1946, Section 10 of the Rivers and Harbors Act, and the Clean Water Act National Pollutant Discharge Elimination System (U.S. Army Corps of Engineers, U.S. Coast Guard, Washington and Oregon state agencies, etc.).
- Local permits and approvals such as land use approvals, building permits, and historic demolition permits.

The Specialty Services Manager is responsible for ensuring that all agreements are obtained within the timelines identified in the CRC Program schedule. The Environmental Manager is responsible for ensuring that all permits (federal, state, local jurisdictions, rail, and private utilities) and approvals are obtained within the timelines identified in the CRC Program schedule. Various CRC staff will be tasked with the day-to-day coordination of establishing agreements and negotiating permits. CRC staff from all disciplines will provide support within their areas of expertise.

The CRC Program Team has identified all agreements, and has established the CRC Agreement Tracking Matrix to monitor progress that includes assigned responsibilities and expected dates to execute necessary agreements.

The CRC Environmental team has produced a Master Permit and Approval Plan that describes all federal, state, and local environmental permits that the CRC Program will require, and that plan is included as an appendix to this document (see Appendix Q to this PMP).

CRC Procedure 10.3B – Agreement Development and Approval (*Public Entities*) describes in detail the process for drafting, reviewing, and approving agreements between the Departments of Transportation and with partner agencies (TriMet, C-TRAN) and local jurisdictions (Cities of Portland and Vancouver, Metro, and RTC).

10.2 Agreements

10.2.1 Funding Agreements

The funding plan will be finalized towards the end of the Engineering phase and will be followed with execution of a bi-state agreement between the leading partners, WSDOT and ODOT. Detailed information on the current funding plan can be found in the capital finance plan for the CRC Program.

The bi-state agreement between the leading partners, WSDOT and ODOT, will be prepared in accordance with the WSDOT Agreements Manual (M 22-99.01, November 2009, Chapter 4: GCA Agreements – Agreements with Government Agencies) and as described in CRC Procedure 10.3B – Agreement Development and Approval (*Public Entities).*

10.2.2 Design Services Agreements

Negotiations between WSDOT, ODOT, TriMet, C-TRAN, and local jurisdictions (Cities of Portland and Vancouver) are ongoing to define the process and fee structure for obtaining permits and services related to utility relocations and reconstruction, land use, construction management, inspections, street lighting, traffic engineering, parks, street trees, planning and plan reviews, fire permits, and all other permits/procedures required by the applicable local jurisdiction.

WSDOT will negotiate separate agreements with partner agencies and local jurisdictions including, but not limited to:

- C-TRAN
- TriMet
- City of Portland
- City of Vancouver
- Metro
- RTC

The terms and conditions of such cost reimbursement agreements will be in writing, incorporate required FTA contract requirements if using FTA grant funds, and identify the correct federal cost standards applicable to the work.

CRC Procedure 10.3B – Agreement Development and Approval (*Public Entities*) describes in detail the process for drafting, reviewing, and approving agreements with partner agencies (TriMet, C-TRAN) and local jurisdictions (Cities of Portland and Vancouver, Metro, and RTC).

In general, the design services agreements establish a project manager from each agency who will act as the "point of contact" for the duration of the agreements. The agreements also establish the mechanisms by which partner agencies and local jurisdictions will accept improvements in their rights-of-way for local maintenance.

Partner agencies performing work for the CRC Program under executed design services agreements will submit invoices to the Agreements/IGA/Invoices Lead under the terms of the agreements. These invoices are subject to the same review and approval process as other contracts.

10.2.3 Other Agreements

Agreements with BNSF Railway (BNSF) and with utilities to relocate individual utilities are also required, as well as an agreement with Multnomah County Drainage District (MCDD) to modify portions of the MCDD levee system. The Specialty Services Manager is responsible for monitoring status and ensuring timely issuance of agreements according to the CRC Program schedule. These approvals and agreements that will be obtained include:

- Agreement/Memorandum of Understanding with BNSF to locate the new grade-separated crossing of BNSF railroad tracks at the south end of downtown Vancouver, where the freeway bridge and light rail will pass over the freight tracks. The Specialty Services Director is responsible for the day-to-day coordination of securing the agreement/Memorandum of Understanding with BNSF according to the CRC Program schedule. The agreement will reflect indemnification and operations and maintenance of the crossings. The WSDOT Utilities Manual, Chapter 3: Railroads, describes in detail the procedure for drafting, reviewing, and approving the agreement with BNSF.

- Agreement/Memorandum of Understanding with MCDD to modify the levee system. The specifics of the agreement/Memorandum of Understanding will be determined when design details have been developed.

- Continuing control agreements will be established between each of the two states and their respective local jurisdictions whose right-of-way is necessary for the construction, operation, and maintenance of the new transit facilities. These agreements will establish the respective responsibilities of the jurisdictions and each state with regard to continuing control. CRC Procedure 10.3B – Agreement Development and Approval (*Public Entities*) describes in detail the procedure for drafting, reviewing, and approving continuing control agreements. Agreements will be required between:
    - ODOT
    - WSDOT
    - City of Vancouver
    - City of Portland
    - C-TRAN
    - TriMet
- Utility agreements to relocate individual utilities in advance of CRC work in their areas. The Utilities Lead, with support from the Washington AGO and the Oregon State Department of Justice, is responsible for day-to-day coordination with utilities for preparation of permit documents and for securing approval from each utility. CRC Procedure 10.3C – Agreement Development and Approval (*Utilities*) describes in detail the procedure for drafting, reviewing, and approving agreements with utilities.

10.2.4 Private Utility Interface

Numerous private utility companies maintain facilities that will be affected by construction activities or permanent facilities of the CRC Program. During the Engineering phase, composite utility base maps were created based on information gathered in meetings with the individual utilities and through other means. Preliminary relocation plans and schedules are being developed in consultation with the specific utilities.

During the Engineering phase, the CRC Program Team will continue working with the individual utilities to come to agreement on specific details establishing the impacts to the utilities' facilities. Each utility will be responsible for preparing relocation plans and relocating its infrastructure before CRC Program work in its area begins.

The Utilities Lead is responsible for the day-to-day coordination with private utilities in preparing relocation plans and ensuring utility relocation is completed according to the CRC Program's budget and schedule. The Specialty Services Manager is responsible for monitoring status and for execution of agreements according to the CRC Program's budget and schedule.

10.3 Permits

Any project that has impacts to lands, waters, or resources will require environmental permitting before construction. As discussed in detail below, the Environmental Manager is ultimately responsible for obtaining and tracking regulatory permits. Some regulatory permits will be designated the responsibility of the construction contractor, and will be obtained and tracked by the contractor. The responsible party will be clearly stated in the initial DB and subsequent RFP. The Environmental Procedures Manuals from WSDOT and ODOT were used as guidance in producing this section of the PMP. For more information on permits, please see the Master Permit and Approval Plan, which is an appendix to this document.

10.3.1 Regulatory Agency Coordination

As a bi-state project, the CRC Program is subject to both Oregon and Washington regulations, as well as many federal requirements and City of Portland and City of Vancouver requirements. The CRC Program Team worked with state and federal agencies to develop an effective approach for coordinating their involvement, and for streamlining regulatory reviews and permits during the NEPA phase. The result is explained in the Interstate Collaborative Environmental Process (InterCEP) Agreement.

InterCEP will allow the CRC Program to efficiently plan, design, and build a solution that successfully addresses the CRC Program's goals and meets state and federal environmental regulations. The following regulatory agencies signed the InterCEP Agreement:

- National Marine Fisheries Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- Washington State Department of Ecology
- Washington State Department of Fish and Wildlife
- Washington State Department of Archaeology and Historic Preservation
- Oregon Department of Fish and Wildlife
- Oregon Department of Land Conservation and Development
- Oregon Department of State Lands
- Oregon State Historic Preservation Office
- Oregon Department of Environmental Quality

The main goal of this process was to ensure that the CRC Program development team is aware of any potential concerns that could complicate the permitting process. In addition, the CRC Program Team engaged in an ongoing dialogue with the necessary state and federal agencies before making major decisions. By getting concurrence and comments at key milestones, the CRC Program worked toward reducing environmental impacts and avoiding delays often associated with large-scale projects.

The signatory agencies of InterCEP Agreement served as a key advisory group to the CRC Program, providing formal feedback to the CRC Program development team at milestones including, but not limited to:

- Project Purpose and Need
- Screening criteria for alternatives
- Methods for analyzing impacts
- Range of alternatives to carry into the DEIS
- Preliminary Draft EIS
- Draft EIS
- Biological Assessment
- Final EIS

According to the InterCEP Agreement, the contract terminated when the Final EIS and ROD were issued for the CRC Program. However, the CRC Program is continuing to use the collaborative framework with the InterCEP signatory agencies as a model throughout environmental permitting and construction.

The CRC Program has been included in a Presidential Executive Order as a surface transportation project of national or regional significance to be expedited. The Program has been placed on the Federal Infrastructure Projects Permitting Dashboard (Dashboard), which indicates target submittal and completion dates of federal permits. The CRC Program schedule corresponds with the Dashboard.

The CRC Program Team also worked directly with staff from the Cities of Portland and Vancouver during the CRC Program's planning phase, and has continued to work with these jurisdictions as design continues. Discussion issues have included, but are not limited to, design and potential impacts related to traffic, historic resources, and water quality. This early and ongoing collaboration is intended to avoid schedule and design issues that could otherwise arise during the local permit and approval processes.

10.3.2 Obtaining Permits

For permits that the CRC Program will be obtaining, the Environmental Manager is responsible for the day-to-day coordination of negotiating the permits with agencies according to the CRC

Program schedule. During the Engineering phase, the Environmental Manager created a work plan outlining all the necessary information to be submitted to obtain the permit and a schedule for its submittal (the Master Permit and Approval Plan). The Master Permit and Approval Plan has been updated for the submittal of the FFGA application and can be found as an appendix to this document. For permits that the construction contractor will be obtaining, the Environmental Manager will be responsible for managing the construction contractor to ensure that the permits are progressing and that deadlines are being met.

The process for obtaining permits generally consists of a pre-application meeting, production and submittal of the necessary information for the permit, an application completeness review, submittal of additional information to complete the application, public notice/comment, agency review, a public appeal period, an applicant appeal period, and a post-appeal decision. The Environmental Manager is responsible for monitoring status to ensure the timely execution of permits and approvals as indicated in the CRC Program schedule.

10.3.3 Federal Permits and Approvals

Some approvals were granted from federal agencies before publication of the FEIS or granted through the ROD on the FEIS. Some of these approvals are:

- Air quality conformity determination in the Regional Transportation Plan (RTP) and Metropolitan Transportation Improvement Program (MTIP)
- National Historic Preservation Act Section 106 Memorandum of Agreement
- Department of the Interior Section 4(f) Report (formal approval for mitigation measures addressing impacts on historic resources and parklands are outlined in the ROD)
- Biological Opinion – Federal Endangered Species Act, Magnuson-Stevens Act

Various post-ROD environmental permits and approvals from federal agencies will be required, including:

- U.S. Army Corps of Engineers Section 408 review, including net rise analysis
- Clean Water Act Section 404 Permit
- U.S. Coast Guard General Bridge Permit
- Federal Aviation Administration 7460-1 Notice of Construction or Alteration
- Marine Mammal Protection Act Letter of Authorization

10.3.4 State Agency Permits

Permits from both Washington and Oregon state agencies will be required with regard to issues under their respective jurisdictions, and include:

- Clean Water Act Section 401 Certification (Oregon and Washington)
- Construction Stormwater 1200-C Permit – Oregon Department of Environmental Quality (Oregon)
- Construction Stormwater General Permit – Washington Department of Ecology (Washington)
- Stationary Source Permit (Oregon and Washington)
- Hydraulic Project Approval (Washington)
- Shoreline Management Act Permit (Washington)
- Removal-Fill Permit – Oregon Department of State Lands (Oregon)
- Lease-Easement Application (Oregon and Washington)
- Oregon Fish Passage Act – Oregon Department of Fish and Wildlife (Oregon)
- Archaeological Excavation Permit – Oregon State Historic Preservation Office (Oregon)
- Archaeological Treatment Plan – Washington Department of Historic Preservation (Washington)
- Application for Authorization – Washington Department of Natural Resources (Washington)

10.3.5 Local Agency Permits

Permits from both the City of Portland and the City of Vancouver will be required with regard to issues under their respective jurisdictions, and include:

- Numerous land use approvals from the Cities of Portland and Vancouver to locate facilities. For the City of Portland, this includes an Environmental Review, Design Review, and potential Adjustment Review. For the City of Vancouver, this includes Critical Area Ordinance and Shoreline Master Program compliance as well as transportation development review of designs and traffic, all of which will be bundled as part of a Public Facilities Master Plan review. The Environmental Manager is responsible for coordinating preparation of land use and master plan permit application documents and securing approval from local agencies according to the CRC Program schedule.
- Building permits and street opening permits from the cities of Portland and Vancouver to build the CRC facilities. The Environmental Manager is responsible for the coordination of securing building and street opening permits from the cities according to the CRC Program schedule.

- Demolition permits from the City of Portland and the City of Vancouver, including for removal of the existing bridges and the Lucky Lager Building. The Environmental Manager is responsible for the coordination of securing the permits according to the CRC Program schedule.

A Land Use Final Order, or LUFO, was approved in 2011 by the Metro Council (Oregon) for the CRC Program inclusive of all the elements of the LPA. In order to ensure consistency with plans from multiple jurisdictions, Metro is authorized to approve LUFOs on projects in its region, and has specifically done so for the South-North Light Rail Transit Project, of which the CRC Program is a part. The LUFO consolidates the determination of consistency with Oregon Statewide Planning Goals into one process rather than requiring findings from every jurisdiction.

10.4 Environmental Mitigation

10.4.1 Program Impact Analysis

The CRC Program published the FEIS on September 23, 2011, in order to meet the requirements of NEPA. The FEIS identified environmental impacts of the CRC Program, including:

- Neighborhood impacts
- Residential and commercial displacements
- Property acquisitions
- Public service impacts
- Visual and aesthetic impacts
- Noise and vibration impacts
- Impacts to fish and aquatic habitat
- Water quality impacts
- Wetlands impacts
- Geologic impacts
- Hazardous materials
- Construction impacts
- Transportation impacts
- Historic and archaeological resources impacts
- Impacts to public parks and recreation areas

The CRC Program received a Biological Opinion (BO) on January 19, 2011, from the National Oceanic and Atmospheric Administration—Fisheries. The BO describes the impacts of the CRC Program on Endangered Species Act-listed species and essential fish habitat.

10.4.2 Environmental Mitigation Principles

The CRC Program received the ROD on December 7, 2011. The ROD includes mitigation measures to address the adverse impacts that the CRC Program would cause. In addition to mitigation, measures to minimize impacts have been incorporated into the design and construction approach for the CRC Program. The purpose of the mitigation measures is to mitigate for unavoidable environmental effects. These mitigation measures are described in the ROD Appendix A, Mitigation Commitments. The Environmental Manager is responsible for monitoring the CRC Program's compliance with those measures. The Environmental Manager will coordinate with regulatory agencies and local jurisdictions to further develop appropriate mitigation measures, and to catalog and track those mitigation measures that are mandated as terms and conditions of authorized permits, approvals or clearances.

Implementation of the mitigation measures in the ROD are material conditions of the ROD and will be incorporated in any funding agreement or approval that the FTA or FHWA may provide for the construction of the CRC Program. Additional mitigation elements are encompassed in the terms and condition of authorized permits, approvals, or clearances. With the accomplishment of the mitigation commitments, the CRC Program will have taken all reasonable, prudent, and feasible means to avoid or minimize impacts from the CRC Program.

10.4.3 Tracking Environmental Commitments

The CRC Program has made commitments in environmental documents, including the ROD, BA, and Section 106 Memorandum of Agreement. Additional commitments will be prescribed by the terms and conditions of the environmental permits that the CRC Program obtains. This section outlines the processes used to track environmental commitments. Related procedures will be adopted by the Environmental Manager during the Engineering and Construction phases.

The environmental commitments are entered into a commitment tracking database along with the following information: environmental document reference, a description of the measure, and the responsible party. Commitments that are the responsibility of the contractor will be written in the contract provisions in language that is biddable by the contractor, buildable in practice, and enforceable. Once responsibilities are assigned, the progress against each measure is tracked in the commitment tracking system. This tracking ensures that the contractor and the CRC Program staff clearly know their respective responsibilities and assures the permitting agency that the CRC Program is fulfilling its commitments. The tracking database matrix will be updated and submitted quarterly to the FTA.

Implementation of Environmental Commitments during Engineering Phase

The Environmental Manager is responsible for ensuring, during the Engineering phase, that the environmental commitments are included in the design plans and contract provisions. The following steps will be or are being taken to verify the fulfillment of environmental commitments in the ROD, environmental permits, and other environmental approvals:

- The Environmental Permitting Specialist has entered the environmental commitments into the commitment tracking database matrix, and regularly monitors compliance. The database functions as the CRC Program's single point of environmental compliance tracking. The status of each environmental commitment is updated regularly by the Environmental Permitting Specialist, and the database matrix is submitted quarterly to the FTA.

- The Environmental Manager has determined at the beginning of the Engineering phase the risk level for each environmental commitment. This risk level (low/moderate/high) is based on how likely it is for project design to violate environmental regulations or permit conditions. Risk is based on a number of factors, including proximity to the resource, sensitivity of the resource, nature of work, etc. Risk management is described in Chapter 5 of this PMP.

- The Environmental Manager has formed an Environmental Task Force to meet on a regular basis with design and engineering staff to ensure the coordination of design development with environmental commitments.

- The Environmental Manager or designee regularly reviews project designs (through the Environmental Task Force meetings) to ensure that the environmental commitments continue to be incorporated into design documents.

- If surveying of property occurs during the Engineering phase, the environmental resources that are at risk of impact should be fully delineated and surveyed.

- The Environmental Manager proactively coordinates with the resource agencies to ensure early and constant communication of issues and requirements.

- As permits are acquired, the Environmental Manager will ensure that any new environmental commitments described in permit terms and conditions are incorporated into design plans and contract provisions.

- Design plan sets will include Environmental Compliance Plan and Environmental Compliance Notes plan sheets (to be cross-referenced in civil and other relevant plan sets) to identify sensitive areas, which will be cross-referenced to environmental commitment type.

- The Environmental Manager will maintain consistent contact with resource agencies and a working knowledge of environmental issues to ensure that the FEIS and permit commitments are addressed.

- The Environmental Manager or designee will attend the preconstruction conferences and will present the environmental issues using the Environmental Compliance Plan, Environmental Compliance Notes, and commitment tracking database as the basis.

Implementation of Environmental Commitments during Construction Phase

During the Construction phase, the CRC Program will use a proactive approach for monitoring and inspecting field work to help guard against environmental violations that could potentially introduce cost and schedule impacts. Requirements and procedures will be developed during the Engineering phase and described in contract provisions. Key requirements and procedures during the Construction phase are:

- Require each prime contractor to prepare and submit an Environmental Compliance Plan.
- Include a listing of environmental commitments in the construction contract.
- Designate the party responsible for acquiring permits to be described in detail in the contract provisions.
- Include a listing of permit conditions in the contract provisions.
- Develop record keeping and reporting procedures that CRC staff will use during the Engineering and Construction phases.
- Include requirements for environmental protection training for the contractor's staff and subcontractors before field work begins.
- Include a requirement that the contractor will submit, before field work begins, required environmental plans for review by the Environmental Manager.
- Develop procedures for permit modification during construction, if deemed necessary, including strategies for guarding against cost and schedule impacts while still acting as a good steward to the environment.
- Continue updating the commitment tracking database matrix, with quarterly reporting to the FTA.
- Monitor the contractor activities that may affect the environment.
- Coordinate the daily activities of the CRC Program's environmental monitoring staff with the construction contractor.
- Identify fluctuating work schedules among the environmental monitoring staff members to ensure constant coverage of field activities that may affect the environment.
- Develop and implement an archaeological monitoring and treatment plan with clear procedures for assessing inadvertent discoveries that balances significance of a discovery and ways to minimize construction delays.

11. Safety and Security

11.1 Overview

WSDOT, ODOT, and the partnering transit agencies, TriMet and C-TRAN, will strive to design and build a safe and secure multimodal project that delivers the needed highway and LRT improvements to the growing Vancouver and Portland metropolitan areas. Providing a safe and secure environment is a core value for the CRC Program that affects all levels of the highway and transit activities, including planning, design, construction, testing, and operations.

Safety and security are not optional. All CRC Program staff and contractors are charged with the responsibility of following applicable safety and health standards as set forth by the Occupational Safety and Health Administration (OSHA) and other regulatory agencies. It is the responsibility of every CRC Program staff member to provide for workplace safety by using safe work practices and employing applicable agency standards and procedures regarding public safety in work zones, and to provide a cooperative working environment for CRC Program staff. CRC Program staff are required to promptly report to their immediate supervisor and/or the applicable safety office any unsafe conditions, incidents, and accidents, and to report to their immediate supervisor and/or the Office of Equal Opportunity (OEO) representative any discriminating or harassing behavior.

The CRC Program established the Safety and Security Committee (SSC) during the PE phase to develop, implement, and administer a comprehensive and integrated safety and security program in compliance with the requirements of FTA Circular C5800.1. The SSC is made up of representatives from WSDOT, ODOT, C-TRAN, and TriMet, many of whom are also members of the program's Fire/Life Safety and Security Committee (FLSC). Appendix G, Safety and Security Management Plan, details the specific strategies to identify, prevent, and control hazardous conditions and security issues affecting the LRT elements of the CRC Program, its customers, and those who come in contact with it.

11.2 Risk Control (Safety)

WSDOT, ODOT, C-TRAN, and TriMet are committed to the safety of their employees. Providing CRC Program staff (both agency and co-located consultant staff) a safe and secure environment in which to work is a top priority. CRC Program staff operating at CRC offices in Vancouver, Washington, are covered by the policies and procedures in the WSDOT *Safety Procedures and Guidelines Manual* (http://www.wsdot.wa.gov/publications/manuals/fulltext/M75-01/Safety.pdf) and other related policy documents. CRC Program staff operating in the field are covered by the applicable WSDOT *Safety Procedures and Guidelines Manual* or the ODOT *Safety and Health Manual*, depending on the location of field work.

For staff located in offices, building-specific safety and evacuation plans are available on-site.

11.2.1 LRT Safety and Security Verification

The CRC Program developed the Safety and Security Management Plan (SSMP) that lays out strategies to identify, prevent, and control hazardous conditions and security issues affecting the LRT elements of the CRC Program. The SSMP describes the integration of safety and security activities to reduce the potential for incidents and accidents and increase the efficiency of LRT operations. It establishes accountability and responsibility for safety and security during each CRC Program phase—PE through start-up; integrates the safety and security functions and activities throughout the CRC Program's, C-TRAN's, and TriMet's organizational structure; and identifies parties responsible for operating and maintaining the CRC Program's LRT facilities and equipment. The Transit Manager, assisted by TriMet's Manager, Safety Risk Assessment/Construction Safety, is responsible for implementing the SSMP in collaboration with TriMet's Safety and Security Executive and C-TRAN's Director of Operations.

Preliminary Hazard Analysis and Threat and Vulnerability Assessment

The Transit Design Manager is responsible for ensuring that a Preliminary Hazard Analysis (PHA) and a Threat and Vulnerability Assessment (TVA) are conducted during the Engineering phase. The PHA and TVA workshops for the CRC Program were conducted in late 2012, and additional workshops will be held as the design progresses. The analyses will help determine security enhancement needs for the new main river crossing, new station locations, and park and ride facilities. Once the PHA and TVA risk level (criticality) matrices have been developed, the Transit Design Manager will track their respective items through design, construction, and start-up for resolution. Details of the PHA and TVA processes can be found in Appendix G to this PMP, the SSMP.

Safety and Security Certification

TriMet's Manager, Safety Risk Assessment/Construction Safety will coordinate with TriMet's Safety and Security Executive, C-TRAN's Director of Operations, and program technical leads on the development of Certifiable Elements, Certifiable Items Lists (CILs), and conformance checklists, followed by verification of design conformance, construction conformance, and operational conformance, including Certificates of Conformance for each Certifiable Element as completed. Details of the design safety and security certification procedure, including Design Criteria Verification, Testing/Inspection Verification, Hazard and Vulnerability Resolution Verification, and Operational Readiness Verification, are included in Appendix G to this PMP, the SSMP.

11.2.2 Highway Operational Safety

Close coordination of the safety and security for both the light rail and highway/bridge projects is needed for the CRC Program to be successful. Representatives of both disciplines sit on the SSC and the FLSC. Identified safety and security hazards, threats, and vulnerabilities are addressed and tracked through these standing committees. The CRC Program encompasses the states of Washington and Oregon and is subject to the applicable Department of Transportation's safety requirements, depending on the work zone location. CRC Program staff (both agency and consultant staff) in the field may be routinely exposed to a variety of hazards. They must take adequate safety precautions at all times. Refer to Appendix P to this PMP, the Project

Construction Safety and Security Plan for items that represent common activities that CRC Program staff may encounter, and that should be addressed in pre-activity safety plans and tailgate talks, as needed.

11.2.3 Incident Reporting during Field Work

Each CRC Program field crew has a plan that includes safety and security notification information related to situations that could emerge during their field work. CRC Program field crews are responsible for notifying any necessary permitting, regulatory or other responsible agency as dictated in their scope of work. CRC Program field crews are also responsible for notifying the Project Engineer about accidents and incidents in the workplace. This information will be circulated to the Regional Safety Officer, Communications Outreach Manager, and the CRC Program Directors.

11.2.4 Construction Safety and Security

General

Contractors doing work for the CRC Program must provide safety and security controls for the protection of life and health of the contractor's employees and other persons, for the prevention of property damage, and for the avoidance of interruptions in the performance of the work under each executed construction contract. WSDOT, ODOT or TriMet, as contracting agencies represented by CRC Program staff performing day-to-day contract administration, have the responsibility for enforcement of the provisions of each construction contract; however, provisions and regulations that are by law the fundamental responsibility of other agencies, both from the standpoint of interpretation and enforcement, should be monitored by CRC Program staff, but with full recognition as to the responsibilities and authorities of those agencies. The Project Delivery Director, Project Delivery Engineering Manager, and Project Engineers, with support from the Regional Safety Officer, will cooperate fully with the responsible agency.

Any safety violations observed by the Project Engineer or representatives will be brought to the attention of the contractor for correction. The Project Engineer or representatives will also notify the responsible agency (if that action is deemed necessary) and utilize such sanctions as are consistent with contract terms in assisting the responsible agency in enforcing laws, rules, and regulations.

Pre-Contract Preparation

- The CRC Program field staff will review contract plans and contract provisions to identify those aspects of the work meriting special attention from the standpoint of potentially dangerous types of work, security issues, and hazard elimination.
- The CRC Program field staff will review the site to identify those aspects of the location that present hazards such as limited sight distance, confined spaces, difficult terrain, extreme temperatures, illegal encampments, or exposure to biological and physical hazards associated with animals or humans.

- The CRC Program field staff will review and become familiar with the requirements of the TriMet Capital Projects Construction Safety Program (CPCSP), included in the contract provisions on transit contracts.

Preconstruction Duties

As part of the Preconstruction Meeting, the contractor's safety and security program should be discussed. Some key items that the Project Engineer (or representative) should highlight include:

- The contractual obligation of the contractor to comply with state and federal construction safety standards and best security practices.
- The availability of the safety standards that apply to the contract, including the LRT CPCSP, if applicable.
- The contractor's site-specific Construction Safety and Security Plan (CSSP), if applicable, must be submitted for review before any physical work on LRT contracts will be allowed.
- The accident prevention program of the contractor—organization, staff, names of responsible individuals, meetings, training, reports, etc. A review of specific areas for which plans are required (especially those also affecting CRC Program field staff). These might include Fall Protection, Confined Spaces, Respirators, Hearing, and Hazardous Materials plans. Implementation of a mechanism for employees to report "near misses" and/or work zone accidents.
- The contractor's responsibility for seeing that subcontractors comply with safety and security rules and regulations.
- The contractor's plans for meeting specific safety and security requirements and for eliminating potentially critical hazards on the project sites for all contractor employees, CRC Program field staff, and the public.

Project Engineer's Role in Safety on the Program

As professionals and representatives of the respective contracting agency and the Project Delivery Director, the Project Engineers and their supporting field staff have an obligation to take action if they become aware of a situation that presents an immediate threat. CRC Procedure 11.2.4 – Field Incident Notification – Internal Staff describes to CRC Program field staff the internal lines of communication and the process for alerting the responsible agencies, the Project Engineer, and the Project Delivery Director to serious safety hazards.

CRC Program field staff will be made aware that the contractor is obligated to make the work site safe and secure, to its satisfaction, for inspection activities. CRC Program field staff who are uncomfortable with access for inspection will inform the contractor and the Project Engineer of the situation and should expect resolution. CRC Program field staff will also be made aware of project-specific hazards and will be trained in specific areas as the work zone warrants (for example, fall protection and confined space requirements). CRC Program field staff will be

required to review and become aware of pre-activity safety plans associated with the construction. The Project Engineer is responsible for ensuring that his or her employees have the proper safety training.

CRC Program field staff will be made aware that the construction contract requires the contractor to perform any measures or actions that the Project Engineer may deem necessary to protect the public, and that the Project Engineer may suspend work if the contractor fails to correct unsafe conditions. Additionally, field staff will be made aware that transit contracts require the contractor to perform specific job hazard analyses (JHAs) for transit construction activities and to submit these JHAs to the Project Engineer for review and comment. CRC Program field staff will continuously monitor the contractors' work activities for potential violations of legal safety requirements, security risks, and for any condition that poses an immediate threat to the health of any person. CRC Program field staff will immediately notify the contractor to stop work upon becoming aware of any such condition.

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12. LRT Design

12.1 Overview

This chapter summarizes the design requirements, design management, and design activities for the transit portion of the CRC Program as supported by the TriMet Design Criteria, as adopted by the CRC Program, and the CRC Safety and Security Management Plan. The definition of the "design" function will normally vary by delivery method used to execute the project packaging strategy, as discussed in Chapter 8 of this PMP. The "design" function discussed in this chapter is defined as follows:

- Preliminary engineering (PE) and Engineering phase activities (including system integration) in support of developing procurement documents (100% plans, specifications, and cost estimates) to select a contractor or contractors to build specific portions of the transit elements of the CRC Program under the DBB delivery model.

- PE and Engineering phase activities (including system integration) to support negotiating a Guaranteed Maximum Price (GMP) lump-sum price agreement with a contractor to potentially build specific portions of the transit elements of the CRC Program under the GC/CM delivery model.

- Conceptual engineering activities (varies from 10% to 30% level design) during the PE and Engineering phases to support preparation of the project package configuration and related procurement documents, and the selection of a Design-Builder using Best Value Selection, or BVS, procurement to design and build specific portions of the transit elements of the CRC Program. This definition applies to the Request for Qualifications (RFQ) and RFP phases of the DB delivery model.

Chapter 14 – Design Oversight for Design-Build Delivery discusses in detail the design oversight after the selection of a Design-Builder to ensure satisfactory development and management of work plans, conformance of products to the "Design Work" portion of executed DB contracts, satisfactory compliance with the design deviation process, and verification of Design-Builder compliance with design QC and QA requirements. The CRC Transit team will take an active role in the development of the RFQ/RFP for the DB project including analysis, and DB selection and approval for alternative technical proposals.

The CRC Transit team (agency and consultant staff) will manage transit design activities to minimize costs for design, construction costs of capital facilities, and operating expense; minimize energy consumption; and minimize the disruption of local facilities and communities. The design will be consistent with maximum passenger safety, system reliability, service comfort, mode of operation, type of LRT vehicle to be used, sustainability, and ease of maintenance.

12.2 LRT Design Requirements and Standards

The CRC Transit team has adopted the TriMet Design Criteria referred to as the "CRC Transit Design Criteria," which define applicable design standards, technical requirements, and design references for the LRT portion of the CRC Program. The CRC Design Criteria is monitored as a controlled document. These design criteria leverage TriMet's extensive design experience on several LRT extensions completed and opened to service in the Portland metropolitan area and reflect lessons learned on previous work as well as industry advances. The CRC Transit Design Criteria establish the basic criteria to be used in the design of the LRT system and facilities and will take precedence over other existing design standards that may have been used on other area LRT projects before the CRC Program. The CRC Transit Design Criteria are updated in conjunction with TriMet. Design exceptions will be vetted through the standard process according to the governing or impacted agencies.

The CRC Transit team updated the CRC Transit Design Criteria during the PE phase and will update individual design criterion on an as-needed basis during the Engineering phase or as changes are identified at TriMet. The Transit Design Manager maintains the CRC Transit Design Criteria throughout the life of the CRC Program. The Transit Design Manager will coordinate with the Transit Systems Engineering Manager (TSEM) for any necessary updates with input from the Civil, Park-and-Ride, Vehicles, Signals, Communications, and Traction Electrification System (TES)/Overhead Catenary System (OCS) Engineering Managers. Updates to the criteria will be documented as described in CRC Procedure 12.2 – Design Criteria Approval and Modifications. The Transit Manager, with concurrence from the Deputy Transit Manager, will approve any updates to the design criteria in writing before they can be used in the design. In addition, drafting standards have been prepared to standardize and guide design activities and preparation of contract documents.

The CRC Transit Design Criteria cover the following LRT work elements:

- Civil Engineering
- Small Buildings
- Track Geometry and Trackwork
- Parking Facilities
- Utilities
- Sustainability
- Landscaping
- Associated Transit Improvements
- Stations
- Electrical System
- Noise and Vibration
- Structures
- Fare Collection
- Light Rail Vehicles
- Clearances
- Operations Facilities
- Bus Facilities
- Traction Electrification
- System Security
- Signal System
- Elevators
- Communications
- Lighting
- Stray Current/Corrosion Control
- Amenities (Station)
- Light Rail Crossing Safety
- Signage and Graphics

The CRC Transit team will prepare drawings and technical specifications for each LRT project package designated for delivery under the traditional DBB method or the GC/CM method in accordance with the design requirements in the Transit Design Criteria Technical Memorandum as follows:

- Within the State of Oregon, LRT design will be governed by the TriMet Design Criteria (Revised January 2010) with the exceptions documented in the most current CRC Transit Design Criteria Technical Memorandum (May 2009).
- Within the State of Washington, LRT design will be governed by the TriMet Design Criteria (Revised January 2010) with the exceptions documented in the most current CRC Transit Design Criteria Technical Memorandum (May 2009).

Deviations from the approved transit design criteria may be made in particular situations. The Transit Design Manager and TSEM will each identify, explain, and justify any deviation from established design criteria in their respective areas.

CRC Procedure 12.2 – Design Criteria Approval and Modifications describes in detail the process to modify and receive approval for design deviations from established CRC design criteria. This includes approval in writing by the Transit Manager, with concurrence from the Deputy Transit Manager, of any design deviation before it can be included in the design.

12.3 LRT Design Management

The CRC Program has developed a project implementation strategy summarized in Chapter 8 of this PMP and discussed in detail in the PDPP. The PDPP divides the LRT portion of the CRC Program into separate and distinct project packages. It also identifies the delivery method that would optimally assign roles and responsibilities for the performance of each project package activity (design and construction). During the PE and Engineering phases, the Transit Manager and Deputy Transit Manager will oversee all activities of the CRC Transit team for their respective agencies and program projects including track and systems engineering, parking garages, station design, LRT vehicles procurement, signals and communications, and equipment installation and testing, among other things. The Transit Manager and Deputy Transit Manager will be assisted and supported by the Transit Design Manager and TSEM, who oversee:

- The day-to-day engineering activities to support preparation of the project configuration and procurement documents for any DB procurement package or packages.
- The production of the LRT Engineering plans, including production of construction documents for all other transit improvements
- Additional organization details and functions are outlined in Appendix A, Technical Capacity and Capability Plan (TCCP).

12.4 LRT Design Execution

Transit design execution encompasses the PE and Engineering phases. The PE and early Engineering phase was part of the project development phase, and through this process several design alternatives were developed and analyzed, the project definition was determined, and the environmental documents (DEIS and FEIS) were prepared.

The PE phase also includes developing the project configuration and procurement documents to support issuance of the RFQ and RFP to select a Design-Builder for any project package designated for DB delivery.

The Engineering phase is the process to develop 100% design plans and specifications for transit packages designated for DBB delivery, or potentially GC/CM delivery.

Chapter 14 – Design Oversight for Design-Build Delivery of this PMP discusses in detail the design oversight after the selection of a Design-Builder.

12.4.1 LRT Preliminary Engineering

The goal of the PE phase is to define all transit work elements sufficient to "freeze" the design and establish the project definition before entering the Engineering phase. The PE design of transit work elements was developed to the generally accepted industry standard level of PE phase design of approximately 30%. Because the ultimate program cost was also determined by the completion of the PE phase, emphasis was placed on development of the elements that may be of the highest inherent risk, in order to minimize cost uncertainties. The scope of the PE design effort and the corresponding milestones and deliverables are described in the contract documents with the design consultants.

During the PE phase, the preparation of the FEIS was also in progress, requiring close coordination between PE design and environmental efforts. Upon successful completion of the FEIS, the FTA awarded a ROD, which allowed the CRC Program to move into the Engineering phase. At the conclusion of the PE phase, the following had been determined:

- Program definition that establishes the baseline scope, baseline schedule, and baseline budget, including a WBS structure;
- Existing conditions of the proposed site for the CRC Program, including geotechnical conditions, utilities, hazardous materials, and archaeological conditions;
- Type, size, and location of all major structures;
- Limits of cuts and fills, and right-of-way impacts, including a complete breakdown of partial and full takes;
- Conceptual design report to support the CRC Program's application to FTA to enter into the (Final Design) Engineering phase;
- PE drawing set;

- Prepared project configuration and procurement documents to support issuance of the RFQ and RFP to select a Design-Builder for any project package designated for DB delivery;
- Identification of and mitigation strategies for environmentally sensitive areas;
- Updated and fully integrated master program schedule;
- Updated cost estimate for each transit project package to carry forward for the remainder of the CRC Program;
- Updated design criteria and standard drawing and specification templates;
- Risk and Contingency Management Plan (RCMP) that includes primary and secondary mitigation activities to address transit-related program risks; and
- Updated PMP that meets the approval of the FTA and provides clear direction on agency policies and procedures to enable capable management of the Engineering and Construction phases.

12.4.2 LRT Engineering

The goal of the Engineering phase is to elevate the preliminary plans to 100% level of design, refine project quantities, identify bid items for all work activities reflected in the 100% plans, prepare special contract provisions, and assemble biddable documents to:

- Advertise specific project packages for the purpose of selecting contractors to implement transit project construction under the DBB delivery method; and/or
- Support negotiating a GMP agreement with a contractor to implement transit project construction under the GC/CM delivery, if any.

The Transit Design Manager and TSEM will oversee preparation of contract bid documents, including plans and specifications for transit project packages identified for DB, DBB, and GC/CM delivery (if any). During the Engineering phase, the CRC Transit team will:

- Control the scope, schedule, cost, and quality of the transit work.
- Coordinate regular design reviews and incorporate constructability input from the GC/CM contractor as Engineering progresses on any project package identified for GC/CM delivery; develop an independent cost estimate at the end of Engineering and negotiate a GMP agreement with the GC/CM contractor (to realize benefits of the GC/CM, it is the goal of the Design team's goal to have a designer/contractor on board by 60% design).
- Schedule GC/CM trainings for CRC Program staff so that a thorough evaluation of this delivery process is achieved. If CRC Program staff move forward on this delivery method, begin the application process for project approval to utilize GC/CM

from the Washington State Project Review Committee (PRC). Note that members of the CRC Transit and Delivery teams attended GC/CM training in early February 2013.

- Manage formal transit design reviews at prescribed milestones and conduct such reviews according to the design review procedures discussed in Appendix H, Quality Control Plan (QCP), including reviews by TriMet Capital Projects and Operations, C-TRAN, and each respective State Safety Oversight (SSO). Note that much of this review is conducted through the established Safety and Security Committee (SSC) and Fire/Life Safety and Security Committee (FLSC).

- Manage the deviation (if any) from approved design criteria and standards and ensure the traceability of scope, schedule, and budget against the project definition.

- Implement procedures related to QA and QC, design reviews, constructability reviews, VE studies, and changes to in-progress designs.

- Manage, review, and approve the packaging of transit construction and procurement contracts, and their scopes, sequencing, schedules, and interfaces.

- Manage, review, and approve each set of transit contract bid documents including plans and specifications.

- Assist the Agreements/IGA Lead in developing third-party agreements and related relocation designs for impacted facilities and systems.

12.4.3 LRT Drawing Management

The Computer-Aided Design and Drafting (CADD) Manager will oversee the drawing management system for the CRC Program's transit drawings. Detailed procedures for accessing and managing the development of A&E drawings that are controlled documents are described in CRC Procedure 12.4.3 –Architectural and Engineering Drawing Management. The CRC Program designers and technicians will comply with established procedures for preparing and delivering electronic engineering data for transit project packages. The Transit Design Manager and the TSEM are expected to manage the CRC Program's transit designers and technicians to established protocols and procedures.

The CRC QA/QC Manager will perform periodic audits of the drawing management process and the as-built drawing process, and on performed design work.

12.5 LRT Design Control

A critical element to successful delivery of the PE and Engineering phases is ensuring that the design criteria and other specified requirements, including requirements of the relevant regulatory agencies, are met. The CRC Program Team will give important management consideration to the following design control activities: design coordination, design reviews, VE, constructability reviews, operations and maintenance reviews, system integration, and reliability and safety.

12.5.1 Design Coordination

The CRC Transit team will institute regular internal design coordination meetings and coordinate closely with partnering local jurisdictions, advisory groups established during the PE phase, and third-party stakeholders to communicate program information and work through engineering issues.

Internal Coordination

The CRC Transit team will hold regular internal design coordination meetings during the PE and engineering phases to discuss project issues, and to review design production progress, program schedule, and upcoming delivery milestones. These meetings are the responsibility of the Transit Design Manager and will include discussions with the SSC. The SSC will be responsible for all safety and security aspects for CRC LRT through design, construction, and revenue operations. The SSC includes C-TRAN representation and is the primary coordination venue for operations personnel. For further information, see Appendix G, Safety and Security Management Plan (SSMP).

The Transit Manager and Deputy Transit Manager attend weekly project controls meetings to coordinate with the Project Controls Manager on schedule, budget, and scope interface issues, and to coordinate with the Communications Outreach Manager on upcoming public meetings. Design engineering meetings are held weekly with the design consultant during the Engineering phase.

Coordination with Local Jurisdictions

Local jurisdictions (Cities of Portland and Vancouver) involved in the CRC Program will be invited to participate in regularly scheduled external coordination meetings attended by the CRC Program's transit staff to discuss various project issues, seek consensus, and provide informal guidance to staff. The meetings will be the primary forum for coordination with local jurisdictions and for exchange of views with local jurisdictions on design issues. Local jurisdictions design coordination meetings are the responsibility of the Transit Manager, Deputy Transit Manager, and Transit Design Manager.

State and Federal Coordination

The CRC Transit team will interface with state and federal agencies, including SSOs, as required by law and administration procedures. Such agencies include the FTA for all transit funding and grant matters, the Department of the Interior for Section 4(f) and 106 considerations, the U.S. Army Corps of Engineers for water permit concerns (such as 404 permits), the State Department of Environmental Quality (DEQ) for various environmental matters, and various other regulatory agencies.

Advisory Groups Coordination

The Transit Manager and Deputy Transit Manager, assisted by the Communications Outreach Manager, is responsible for coordination with the appropriate external interface groups during the Engineering phase to communicate program information and seek informal guidance for CRC Program staff on design issues.

Third-Party Coordination

The CRC Program will interface with BNSF to address and reach agreement on operations and maintenance of a new transit crossing in Vancouver, Washington. The CRC Program will hold regular coordination meetings with BNSF to ensure timely design input and reviews, resolution of any issues, and execution of the operations and maintenance agreement according to the CRC Program schedule.

The Utilities Project Manager is responsible for ensuring that utilities within the program area (Transit and Highway areas) are properly located, impacts are identified, and relocation (or protection) designs are developed and implemented to ensure timely relocation according to the CRC Program schedule. This work effort requires close coordination between the Utilities Manager, the CRC Transit team, and all known utility companies and agencies within the program area. The CRC Transit team will build on the extensive mapping of utility networks in program area that was prepared during the PE phase and will continue coordination with jurisdictional utility districts and utility companies through the Utilities Manager during the Engineering phase to produce the necessary relocation plans. The CRC Transit team will also coordinate directly with the respective service utilities in terms of supplying power for substations, park and rides, etc.

12.5.2 Design Review Process

The CRC Transit team has conducted and will conduct and document QC design reviews at major milestones during the PE and Engineering phases, in accordance with written procedures in the QCP. The CRC Transit team will coordinate formal design reviews by internal and external stakeholders following the completion of a QC review.

Quality Control Design Review Process

Milestones for QC design reviews of transit work elements will be included in the CRC Program schedule. QC design reviews will begin no later than five business days before the submittal date. The major milestone submittals for the PE phase were: 25% design and 30% design. Major milestone submittals for the Engineering phase are: 60% design, 90% design, and 100% design.

The CRC Transit team will perform QC design reviews to the approved engineering criteria, applicable codes and standards, and regulatory requirements. Quality-related activities will be documented and records will be maintained as discussed in Section 15.4, Design Quality Control, and in accordance with the CRC Program's QC procedures described in the QCP.

Stakeholders Design Review Process

The CRC Transit team has and will distribute the 15%, 25%, 60%, and 90% design documents (following completion of QC design reviews) to internal and external stakeholders, along with comment sheets on which reviewers may record their comments on the documents. Reviewers will include representatives from the Cities of Portland and Vancouver, FTA and its PMOC representative, internal TriMet and C-TRAN division representatives (Facilities Management, Project Planning, Real Property, Safety and Security, etc.), WSDOT, and ODOT.

The design review process allows internal reviewers and the FTA and its PMOC representative to evaluate the design products (i.e., plans, specifications, and estimates) as they progress. The Transit Design Manager and TSEM will compile and maintain a list of all comments received and will distribute written responses to those comments in a timely manner. All comments will be tracked through resolution. The Cities of Portland and Vancouver will review the design from the perspective of local code and ordinance compliance and compatibility with existing facilities or planned development. The CRC Transit team will pay special attention to design comments that may impact the CRC Program schedule or budget. The Transit Design Manager will meet with the cities' representatives to resolve any issues identified. All design service agreements will specify the participation of the Cities of Portland and Vancouver in the design review process and the required timeframes for submitting comments to CRC.

The Transit Design Manager and TSEM review any external comments that would be a change to the scope of work. They may determine that the change is minor and necessary, and direct that the design documents be revised. Comments that the Transit Design Manager and TSEM believe could pose a threat to the CRC Program's budget or schedule are discussed with the Transit Manager, Deputy Transit Manager, and CRC Directors. The CRC Directors determine the next appropriate course of action.

12.5.3 Value Engineering

The CRC Program places a high degree of importance on VE studies. VE is a systematic process of review and analysis by a multi-disciplined team of persons not involved in the project. VE studies ensure that essential functions are procured at the lowest capital and life cycle cost, and that costs are consistent with needed performance, quality, reliability, aesthetics, safety, and operation. The CRC Program Team will coordinate VE studies through WSDOT's Value Engineering Program and will comply with federal requirements. The CRC Program's process will be compatible with FTA guidance and practice.

WSDOT's program emphasizes participation from interdisciplinary industry experts and construction contractors independent of the CRC Program Team as a VE team to ensure an unbiased interest in the project design. VE team make-up may vary depending on the scope of the study. VE of transit design work elements may be done by independent teams of qualified professionals.

The VE Facilitator (a Certified Value Specialist through the Society for American Value Engineering (SAVE) International) submits a plan outlining the VE study phases and time allotment following WSDOT's VE policy and SAVE International best practices, for approval by the CRC Program's Highway, Structures, and Transit Managers. Each VE study will include investigation, speculation (brainstorming), evaluation, development, and presentation phases. The presentation phase results in a report and presentation from the VE study team.

The CRC Program Team has completed several VE studies to date, and several more are planned. See Section 13.4.3 of this PMP for the complete list.

The Transit Manager, Deputy Transit Manager, and Transit Design Manager are responsible for reviewing and preparing a formal response to VE recommendations specific to the transit portion

of the CRC Program, and indicating adoption or an explanation of why the CRC Program Team disagrees with any particular recommendations. Adoption of recommendations will only occur with appropriate notification to the Transit Program Managers Group (City of Vancouver, City of Portland, TriMet, C-TRAN, ODOT, and WSDOT) with consent from the CRC Directors on scope and budget revisions.

During the Engineering phase, the Transit Design Manager is responsible for ensuring that all agreed-upon VE proposals specific to the transit portion of the CRC Program are tracked and incorporated into the design documents. VE recommendations may be carried as a risk or opportunity that is included in a Cost Estimation Validation Process (CEVP) or FTA Risk Assessment until resolution. For more information related to risk, see Appendix C to this PMP, the Risk and Contingency Management Plan.

12.5.4 Constructability Reviews

Constructability is a matter of continual evaluation of the technical details of the engineering solutions to the overall CRC Program components during the design process for the purpose of ensuring that each project package is readily biddable, buildable, and maintainable. It concerns both the engineering attributes and the possible means and methods by which the program components can be constructed. Given the complexity of the multimodal CRC Program, constructability reviews will occur at key process steps during the PE and Engineering phases. Additionally, the reviews will focus on schedule (long-lead items), force account support, design implications of connections to the existing TriMet system (i.e., at the Expo station), and maintainability to ensure that quality CRC facilities are provided continuously throughout the operational phase. Specifically, maintainability will assess ease of maintenance, workability, and accessibility, and will involve minimizing, wherever possible, operational conflicts and the exposure of maintenance staff and equipment to moving traffic. There will be discussions pertaining to alternatives or substitutions recommended for consistency with designs and details developed around a specific manufacturer. Included will be confirmation that the design is compliant with all relevant codes, standards, and regulations and that it corresponds with design details drawings and specifications.

Constructability reviews will occur during the phases of work described below and will focus on raising issues, resolving problems, recommending modifications, suggesting actions, and providing guidance that is endorsed by the CRC Program Team before advancing the development of the PS&E.

- **Conceptual/Schematic** – A conceptual constructability review was held from June 16, 2008, to June 20, 2008. The constructability review panel provided feedback on several areas including staging, schedule durations, cost, risk identification, and ideas for improvement. A final report was prepared detailing the findings of the study.

- **25% Design Review** – Completed January 9 through 13, 2012, in coordination with the transit 25% design VE Review.

- **60% Design Review** – The 60% design constructability review will focus on several features and details and would address all items that will be critical to the completion

of a constructable, maintainable project. Reviews include plans, costs, and structural requirements including special foundation considerations or materials involved, construction staging and traffic control requirements, details of hydraulics requirements, and special drainage structures. The 60% design review, and those reviews subsequent to 60%, will occur on a contract-by-contract basis.

- **90% Design Review** – The 90% design constructability review will be the review of the contract plans and the special provisions as the CRC Program design is being completed and advertisement for construction being readied. The review also will include any design modifications or variations from the agreements reached at the 60% design constructability review.

- **PS&E Review** – Near the completion of the Engineering phase (for project packages procured through WSDOT), a "plan in hand" review will be conducted for every contract. This review of the PS&E will focus on the following elements:

    - Design compliance with all relevant codes, standards and regulations.
    - Completeness of scope, cost, and schedule.
    - Correctness of cross-references from drawing to drawing and clarity of details.
    - Agreement of intent between general conditions, special provisions, and technical sections of the specifications.
    - Compatibility between drawings and schedule of bid items.
    - Compatibility of civil, structures, and systems construction in conjunction with highway plans and packages.
    - Expectations for the construction schedule.
    - Availability of laydown areas, field offices, parking, etc.
    - Verification that long-lead items have been identified correctly in the schedule.

The Project Engineer coordinates the scheduling of constructability reviews for the CRC Program, including those for transit elements. The reviews for transit and highway elements may be held concurrently, since both are constructed within the same area, thus aiding in identifying potential issues and overlapping construction problems. The Project Engineer, with input from the Transit Manager and Deputy Transit Manager, is responsible for developing the agenda, times for each segment of the review meeting, and background information to provide to reviewers before any meeting. The Project Engineer will also ensure that all disciplines involved have checked the applicable documents and plans, and completed the applicable checklists.

At each constructability review meeting, the CRC Program staff will distribute the design documents along with constructability review checklists for various project features. Reviewers may include outside professional consultants, construction trade experts, or any other agency discipline as necessary, depending on the expertise required. The review should be recorded by a

designated note keeper. At a minimum, all decisions and agreements and all directions should be documented. A brief report should be developed that outlines the results of the review (issues raised, decisions or solutions) and that documents the direction discussed and agreed upon for the next phase of project development. The Project Engineer is responsible for coordinating with the Transit Manager and Deputy Transit Manager to address any unresolved transit-related issues that remain at the conclusion of the review meeting and to ensure expedited resolution of any outstanding problems that affect PS&E progress. The noted action or response will be audited by the CRC QA/QC Manager to ensure compliance with the final set of contract documents.

12.5.5 Operations Reviews

The CRC Transit team will coordinate with TriMet's and C-TRAN's operations, safety, security, and maintenance staff to review and provide input to the preliminary and Engineering documents, as described below, to ensure that new CRC transit facilities and equipment mesh seamlessly with those already in place and to support coordinated LRT operation linking the Portland and Vancouver communities. They will:

- Participate in constructability reviews to ensure operability, maintainability, safety, and convenience.
- Participate in the CRC Program's Safety and Security Committee (TriMet, C-TRAN, ODOT, WSDOT, SSOs) to develop, implement, and administer a comprehensive, integrated, and coordinated System Safety and Security Certification Program that identifies, prevents, and controls hazardous conditions, threats, and vulnerabilities affecting LRT resources and customers.
- Review all designs for compatibility of bus-rail passenger transfer facilities.
- Participate in establishing test requirements and provide requirements on test summary sheets for on-site tests (acceptance, systems, and pre-revenue).
- Provide support to on-site acceptance testing as required.
- Allocate operations and maintenance personnel and equipment resources as identified on test summary sheets.
- Actively participate in the planning, test procedure writing, management, and implementation of LRT systems and pre-revenue tests.
- Establish test procedures, which will include project safety rules for test operations, general operating rules for conducting test operations, equipment operating procedures, and test scheduling procedures.

12.6 System Integration

The purpose of this management function is to ensure compatibility and seamless integration of new and existing light rail systems. The Transit Manager and Deputy Transit Manager are responsible for ensuring system integration within the CRC Program's transit contract elements,

as they relate to other concurrent or follow-on CRC Program contracts and with TriMet's existing operating systems. The TSEM oversees the day-to-day management of the overall integration effort.

12.6.1 Preliminary Design and Engineering

The TSEM will work closely with TriMet and C-TRAN operations and maintenance representatives to verify that:

- Documents under review fulfill the functional requirements of the design criteria and are consistent with operating plans, procedures, and rules; and
- Train signaling, traffic signal, vehicle traction power, fare machine, and communication system documents are mutually compatible and coordinated; and at the same time, verify that the right-of-way, trackwork, stations and storage, maintenance, and other permanent facilities defined in the documents under review will accommodate the system elements.

12.6.2 Pre-Revenue Testing

The TSEM will coordinate with TriMet and C-TRAN operations and maintenance personnel to perform pre-revenue testing. The purpose of the testing is to ensure compatibility between various elements of systems and to make sure they work together. The testing also provides assurance that there are no conflicts between the civil and systems installations that would interfere with transit operations. The pre-revenue testing program will be developed by TriMet's Test Program Coordinator in conjunction with TriMet's Manager, Safety Risk Assessment/Construction Safety, operations and maintenance representatives, and contractors, as described in detail in Chapter 17 – LRT System Testing and Start-Up.

12.6.3 Compatibility with Existing Systems

The TSEM oversees systems integration activities to ensure that the new facilities and systems are compatible with the existing system characteristics and CRC Transit Design Criteria. Among these characteristics are:

- Track and special trackwork compatibility with the existing system.
- Traction power voltage compatibility with the existing system.
- Communication and signal system features, including automatic train stop and train-to-wayside.
- Car body crush strength, collision post and anti-climber strength/location, and clearance envelope.
- Vehicle performance, such as motoring and braking rates, train line commands, and mechanical and electrical coupling.

- Consistent station platforms to enable all riders to board and depart.
- An integrated approach to the provision of service to elderly and disabled patrons.

12.7 Reliability, Dependability, and Safety

Quality, safety, and other review processes are described below.

12.7.1 Quality Assurance Reviews

The CRC QA/QC Manager will conduct formal QA audits after major design submittals. These audits will also assess compliance with the CRC Program's QA Program requirements, which are described in detail in Appendix E, Quality Assurance Manual, and Appendix H, Quality Control Plan, respectively.

12.7.2 Safety and Security Reviews

The Transit Design Manager is responsible for implementing the components of the Safety and Security Management Plan (SSMP) (see Appendix G to this PMP), in close collaboration with TriMet's Director of Safety and Security and C-TRAN's Director of Operations.

The Transit Design Manager is responsible for coordinating design reviews of proposed LRT facilities and equipment designs by TriMet's operations and safety staff in coordination with C-TRAN, ODOT, WSDOT, and the SSOs. These reviews will be conducted in accordance with the SSMP and will focus on operational safety and security of the completed system for passengers, automobile drivers, bicyclists, and pedestrians, and will ensure that designs comply with TriMet's safety and security requirements and give full consideration to concerns unique to C-TRAN's operating environment. Contracted safety specialists may also be included in the reviews, depending on the special features of the design under study.

Changes or exceptions to critical safety and security components of the design criteria during the course of the design and construction of the CRC Program's LRT elements will be brought to the attention of the CRC Program's SSC for review and approval. The committee will review the information and either approve or not approve the exception. If the exception is not approved, the SSC may require CRC Program staff to return with additional alternatives to review until an acceptable solution is found. This process will be in place throughout the design and construction of the LRT elements. For further details, see Appendix G to this PMP, the SSMP.

12.7.3 ADA Reviews

A design review will be conducted at 60% design to ensure compliance with the requirements of the Americans with Disabilities Act (ADA). ADA compliance specialists may also be brought in for this design review.

12.7.4 Peer Reviews

A peer review involves the focused review of selected program elements by a group of specialists (professionals and/or construction experts) experienced in the affected type of work. Such reviews generally entail a comprehensive study of a particularly challenging matter, subject or problem (for example, the complexities of construction of a major new river crossing, as recently done by the Bridge Expert Review Panel convened by ODOT and WSDOT executives to evaluate Columbia River bridge types and configurations).

The CRC Program will use peer reviews to provide technical and constructability guidance to staff where appropriate. Some LRT elements that are potential candidates for peer review are:

- Track sections
- Stations, park and rides, and Associated Transit Improvements
- Major LRT structures
- Safety, security, signal, and communication systems
- New technologies being considered for use

Peer review panels will be composed of experienced design team personnel, experienced managers or operators from similar transit systems, and independent professionals and/or construction experts. Peer reviewers will be selected based upon several general guidelines:

- Experience in the specific areas under review
- Experience in the design and construction of other light rail systems
- Experience with the start-up period and actual operation of a similar system

The Transit Design Manager coordinates with the Highway and Structures Engineering Managers to determine the staffing and scheduling of peer reviews. The Transit Design Manager, assisted by the Systems Managers, is responsible for developing the transit portion of the daily agendas and the background information for the meetings to provide to peer review members before the meetings so they can develop a familiarity with the purpose of the meetings, the subject matter, and the project(s). A brief report should be developed outlining the results of the review (issues raised, solutions, and recommendations). The Transit Design Manager coordinates with the Highway and Structures Engineering Managers to address recommendations in the report and ensures that there is an expedited response to the recommendations in order to avoid affecting PS&E progress.

13. Highway Design

This section summarizes the design requirements, design management, and design activities for the highway (roadway and structures) portion of the CRC Program. Chapter 8 discusses the project packaging and delivery model strategy for the CRC Program. The project packages will be delivered using DB, GC/CM, or traditional DBB delivery.

The definition of the "design" function will normally vary by delivery method used to execute a project package. The "design" function discussed in this chapter is defined as follows:

- Engineering phase activities in support of developing procurement documents (100% plans, specifications, and bid values) to select a contractor or contractors to build specific portions (roadway, structures, and transit light rail) and elements of the CRC Program (this definition applies to the traditional DBB delivery model); and to support preparation of the project package configuration and related procurement documents, and the selection of a Design-Builder or Design-Builders using BVS procurement to build specific portions and elements of the CRC Program (this definition applies to the RFQ and RFP phases of the DB delivery model).

Chapter 14 – Design Oversight for Design-Build Delivery discusses in detail the Design Oversight after the selection of a Design-Builder to ensure satisfactory development and management of work plans, conformance of products to the "Design Work" portion of executed DB contracts, satisfactory compliance with the design documentation process, and verification of Design-Builder compliance with design QC and QA requirements.

The CRC Delivery team (agency and consultant staff) will manage and direct design activities toward acceptable feasible costs for design and construction, minimum disruption to interstate commerce and the traveling public, and minimum impacts to local facilities and communities. The design will be consistent with the needs of the CRC Program.

13.1 Design Requirements and Standards

The CRC Delivery team has developed design standards and technical requirements ("design criteria") documentation for the roadway and structures portion of the CRC Program. The design criteria recognize that the CRC Program spans two states and two separate local jurisdictions (the City of Portland and the City of Vancouver). The design criteria define applicable design standards and design references based on published engineering design standards from the Oregon and Washington Departments of Transportation for the area influenced by the crossing structure, defined as the main structure and approach spans. The design criteria also summarize critical design standards for areas outside of the immediate crossing area for both the Oregon and Washington Departments of Transportation and the Cities of Portland and Vancouver. The Delivery team will review Department of Transportation and local jurisdiction standards during the Engineering phase and update individual design criterion on an as-needed basis following CRC Procedure 12.2 – Design Criteria Approval and Modifications.

The CRC Program's roadway and structures design criteria will be maintained throughout the life of the CRC Program. Updates to the design criteria by the respective Project Engineers will document design criteria, update recommendations, and confirm that they are consistent with the appropriate state Department of Transportation manuals and current engineering practices and procedures. Updates to the criteria will be documented as described in CRC Procedure 12.2 – Design Criteria Approval and Modifications. Any updates will be approved in writing, before they can be used in the design. In addition, drafting standards have been prepared to standardize and guide design activities and preparation of contract documents.

The CRC Program's roadway and structures design criteria cover the following major design features:

- Major Route and Functional Classification
- Design Speed
- Structures Design Standards Including Seismic Considerations (bridge, retaining wall, sound wall, and large culvert)
- Horizontal and Vertical Clearances
- Highway and Local Street Geometrics (lane width, shoulder width, cross slope, maximum super-elevation, spiral curve, vertical curves, stopping site distance, etc.)
- Pedestrian/Bicycle Path Design Requirements
- Stormwater Runoff and Discharge
- Geotechnical Design Standards Including Seismic Considerations for Foundations (footings, piles, and shafts) and Earth Structures (retaining walls, slopes, and embankments)
- Special Design Standards (aviation clearance and marine navigation clearances)

Drawings and technical specifications for each project package will be prepared in accordance with the design requirements in the most current roadway and structures design criteria as follows:

State of Oregon

- Roadway design will be governed by the ODOT Highway Design Manual, and will be supplemented by the CRC Program's Final Design Criteria Technical Memorandum and amendments including Design Criteria Worksheets and Design Decision Memos.
- Within the State of Oregon, structures design will be governed by the ODOT Bridge Design and Drafting Manual and Geotechnical Design Manual, and the American Association of State Highway and Transportation Officials (AASHTO) Guide Specifications for Load Resistance Factor Design (LRFD) seismic bridge design,

supplemented and/or updated by the CRC Program's Structural Design Criteria for the River Crossing Report (May 2008) or its current version.

- Structural and seismic LRT bridge design of the Hayden Island and North Portland Harbor structures (from the southern interface with the main river crossing south) will be governed by the TriMet Design Criteria (Revised June 2010) or its current version.

State of Washington

- Roadway design will be governed by the WSDOT Design Manual, and will be supplemented by the CRC Program's Final Design Criteria Technical Memorandum and amendments including Design Criteria Worksheets and Design Decision Memos.

- Within the State of Washington, structures design will be governed by the WSDOT Bridge Design Manual and Geotechnical Design Manual, and the AASHTO Guide Specifications for Load Resistance Factor Design (LRFD) seismic bridge design, supplemented and/or updated by CRC's Structural Design Criteria for the River Crossing Report (May 2008) or its current version.

- Structural and seismic LRT bridge design of the main river crossing will be governed by the WSDOT Bridge Design Manual and Geotechnical Design Manual, the ODOT Bridge Design and Drafting Manual and Geotechnical Design Manual, and the AASHTO Guide Specifications for Load Resistance Factor Design (LRFD), supplemented and/or updated by the CRC Program's Structural Design Criteria for the River Crossing Report (May 2008) or its current version.

- Structural and seismic LRT bridge design of the Vancouver touchdown bridge (from the northern interface with the main river crossing to the north) will be governed by the WSDOT Bridge Design Manual and Geotechnical Design Manual, and the AASHTO Guide Specifications for Load Resistance Factor Design (LRFD), supplemented and/or updated by CRC's Structural Design Criteria for the River Crossing Report (May 2008) or its current version.

Deviations or exceptions from the approved CRC roadway and structures design criteria will need to be identified, explained, and justified.

CRC Procedure 12.2 – Design Criteria Approval and Modifications describes in detail the process to modify and receive approval for design deviations or exceptions from established CRC Design Criteria. This includes approval by WSDOT, ODOT, or FHWA, as applicable.

13.2 Design Management

The CRC Delivery team has developed a project implementation strategy that is summarized in Chapter 8 of this PMP and discussed in detail in the PDPP. The plan divides the CRC Program into separate and distinct project packages. The PDPP also identifies the delivery method that would optimally assign roles and responsibilities for the performance of each project package activity (design and construction).

During the Engineering phase, the Delivery Director, supported by the CRC Delivery team/Project Engineers/Assistant Project Engineers, will oversee all activities of the CRC Program. The team will include expertise by discipline-specific task leaders in various areas including roadway, structures, stormwater, geotechnical, traffic, landscaping, erosion and sediment control, right-of-way, survey, and utilities. The discipline-specific task leaders oversee:

- The day-to-day project development and engineering activities to support preparation of the project configuration and procurement documents for the Columbia River bridge and approaches, and other project packages designated for implementation under the DB delivery method.
- The production of engineering plans, including production of construction documents to approved scope, schedule, and budget for all other packages designated for implementation under the DBB or GC/CM delivery methods.

Appendix A, Technical Capacity and Capability Plan, discusses in detail the design management organization of the CRC Delivery team.

13.3 Design Execution

The Engineering phase is part of the project development phase, which will develop procurement documents for DBB, GC/CM, and DB delivery models.

DBB Delivery

The Engineering phase involves the process to develop 100% design plans and specifications to procure construction services to implement specific portions of the CRC Program using the traditional DBB delivery method.

DB Delivery

The Engineering phase also includes developing the project configuration and procurement documents to support issuance of RFQs and RFPs to select Design-Builders for specific project packages designated for DB delivery.

Chapter 14 – Design Oversight for Design-Build Delivery discusses in detail the design oversight activities that occur after the selection of a Design-Builder.

13.3.1 Engineering

At the conclusion of the Engineering phase, the CRC Program's Project Engineers, assisted by their respective Assistant Project Engineers, will have:

- Completed the project definition that establishes the baseline scope, baseline schedule, and baseline budget, including a WBS structure for the CRC Program and approved project packages.

- Established existing conditions of the proposed site for the CRC Program and project areas including geotechnical conditions, utilities, hazardous materials, and environmental/ archaeological conditions.

- Completed the Type, Size, and Location of all major structures, including stormwater treatment facilities.

- Established limits of cuts and fills, and ROW impacts, including a complete breakdown of partial and full ROW takes.

- Completed the engineering drawing set for project packages designated for DBB or GC/CM delivery.

- Completed the project configuration that assists in developing the scope of the project packages and supports developing the content of the RFQs and RFPs used to select a Design-Builder or Design-Builders for project packages designated for DB delivery.

  (The project configuration will include the necessary base data (survey, geotechnical borings, etc.) to appropriately allocate risk between the contracting agency and the Design-Builder, define the critical elements or limitations of the project package so that they can be incorporated into the RFP, and identify and resolve early in the process any major project risks that may require design exceptions, additional ROW, subsurface utilities and aboveground utilities or other considerations.)

- Identified mitigation strategies for environmentally sensitive areas.

- Finalized the independent engineer's cost estimate for each project package to carry forward for the remainder of the CRC Program.

- Completed the CRC Design Criteria and standard drawing and specification templates.

- Identified design deviations from the WSDOT or ODOT Highway (or Bridge) Design Manuals and/or AASHTO's A Policy on Geometric Design of Highways and Streets, and will have:

  - For Washington-based project packages, prepared deviation requests and obtained approvals following the procedures in Exhibits 300-7 and 300-2, respectively, of Chapter 300 – Design Documentation, Approval, and Process Review – of the WSDOT Design Manual (http://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm).

  - For Oregon-based project packages, prepared design exception requests to the requirements in ODOT Design Exception Request Form and obtained approvals following the procedures in Chapter 14 – Design Exception Process – of the ODOT Highway Design Manual (ftp://ftp.odot.state.or.us/techserv/roadway/web_drawings/HDM/2011%20HDM%20Rewrite/2012%20Chapter%2014%20Design%20Exception%20Process.pdf).

- Obtained design approval to secure approved documentation that locks in design policy for Washington-based project packages designated for DBB delivery in Washington. Design approval will have:
    - Completed the documentation of the Design Approval Package to the requirements in Exhibit 300-5, Chapter 300 of the WSDOT Design Manual (http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-01/300.pdf).
    - Coordinated with WSDOT SW Region and WSDOT Headquarters Design Office the review of the Design Approval Package and obtained the necessary approvals (including FHWA's), for the levels described in Exhibits 300-2, 3. and 4, Chapter 300 of the WSDOT Design Manual (http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-01/300.pdf).
    - Incorporated the Design Approval Package documentation into the Design Documentation Package.
- Completed the Design Acceptance Package (DAP) for each Oregon-based project package designated for DBB delivery to the requirements in the ODOT Design Acceptance Checklist (http://www.oregon.gov/ODOT/HWY/TECHSERV/BPDS%20docs/designacceptancechecklist.doc), and completion of respective Design Acceptance Checklists (http://www.oregon.gov/ODOT/HWY/TECHSERV/BPDS%20docs/dapchecklist_final_5-28-09.doc).
- Coordinated with ODOT Technical Services for DAP reviews and obtaining of Certification of Design Acceptance from the ODOT Technical Center Manager for project packages designated for DBB delivery in Oregon.
- Reviewed the risks discussed in the Risk and Contingency Management Plan (RCMP).
- Prepared 60%, 90%, and 100% design submittals.
- Managed formal roadway and structures design reviews at 60%, 90%, and 100% design submittal milestones.
- Controlled the project scope, schedule, cost, and quality of the roadway and structures work.
- Managed the deviation from approved roadway and structures design criteria and standards and ensured the traceability of scope, schedule, and budget against the project definition.
- Developed a Traffic Management Plan (TMP), as discussed in the traffic management section, to minimize traffic impacts on freight and commuter traffic during the construction of the CRC Program.

- Implemented procedures related to quality assurance (QAM) and quality control (QCP), design reviews, constructability reviews, VE studies, and changes to in-progress designs.;

- Managed, reviewed, and approved the packaging of roadway and structures procurement contracts, and their scopes, sequencing, schedules, and interfaces (such as ROW, railroad, marine traffic).

- For ODOT-let project packages, completed PS&E bid documents for each set of roadway and structures contract bid documents, including plans and specifications, to the following requirements:

    - PS&E Delivery Manual (http://www.oregon.gov/ODOT/HWY/OPL/docs/pse_delivery_manual.pdf).

    - Final PS&E Checklist (http://www.oregon.gov/ODOT/HWY/SEOPL/docs/form/final_pse_submittal_checklist.doc).

- For WSDOT-let project packages, completed PS&E bid documents for each set of roadway and structures contract bid documents, including plans and specifications, to the following requirements:

    - WSDOT Plans Preparation Manual, M 22-31.04, September 2012 (http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-31/PlansPreparation.pdf);.

    - Design Documentation Checklist (http://www.wsdot.wa.gov/publications/fulltext/design/ASDE/DDP_Checklist.docx).

- For WSDOT-let project packages,

    - Prepared and submitted the Project DAP to the requirements in the WSDOT Design Manual, Division 3, Chapter 300, Exhibits 300-4 and 300-5 (http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-01/300.pdf);

    - Obtained Project Development Approval when PS&E bid documents are completed for the approval levels described in Division 3, Chapter 300, Exhibits 300-2, 3, and 4 of the WSDOT Design Manual (http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-01/300.pdf); and

    - Entered the Project Development Approval documentation into the Design Documentation Package, as discussed in Section 13.3.3 – Design Documentation Management, below.

- For ODOT-let project packages, coordinated the review and acceptance of completed PS&E bid documents by ODOT's Technical Services – Office of Project Letting and, in addition, coordinated through ODOT's Program and Funding Services Unit for

final processing and submittal of PS&E bid documents to FHWA for authorization to advertise for bids.

- Assisted the Specialty Services Director in developing third-party agreements and related relocation designs for impacted facilities and systems.

Traffic Management

During the Engineering phase, a detailed Traffic Management Plan, or TMP, will be developed to minimize traffic impacts on freight and commuter traffic during the construction of the CRC Program. The three major components of a TMP are described below.

(1) Temporary Traffic Control (TTC)

- Control Strategies: Could include staged construction, full road closures, lane shifts or closures, night work, or one-lane two-way operations (flagging and or pilot car).
- Traffic Control Devices: Temporary signing, channelizing devices (cones, drums), changeable message signs, arrow panels, temporary signals, and temporary pavement markings.
- Project Coordination, Contracting Strategies, and Innovative Construction Strategies: A+B bidding, incentives/disincentives, and precast members or rapid cure materials.

(2) Transportation Operations (TO)

- Demand Management Strategies: Transit service improvements, transit incentives, and promotion of park and rides.
- Corridor/Network Management (traffic operations) Strategies: Signal timing coordination improvements, temporary signals, bus pullouts, reversible lanes, and truck/heavy-vehicle restrictions.
- Work Zone Safety Management Strategies: Speed limit reductions, barriers and attenuators, and automated flagger assistance devices.
- Traffic/Incident Management and Enforcement Strategies: Work Zone Intelligent Transportation Systems (ITS), Washington State Patrol, tow service, WSDOT Incident Management vehicle(s), and traffic screens.

(3) Public Information (PI)

- Public Awareness Strategies: Brochures or mailers, press releases, paid advertisements, and project website (consider providing information in other languages if appropriate).
- Motorist Information Strategies: Highway advisory radio (HAR), changeable message signs, and Transportation Management Center (TMC).

In addition, there may be capacity issues when the work zone is in place. Work zones can create many types of roadway restrictions, such as lane closures, shoulder closures, narrowed lanes, closures and detours, and diversions, all of which reduce capacity. Even when the construction work does not affect adjacent traffic lanes, slowdowns in the traffic flow are common because these activities can distract motorists.

Work zone restrictions may need to be analyzed to determine the level of impacts. Short-term impacts may require work hour restrictions only; long-term impacts require a detailed capacity analysis of the proposed mitigation strategies to select the best method of maintaining mobility.

The following strategies will be considered for implementation to assist in monitoring, responding, and/or adjusting, as needed, the traffic management strategies in effect during construction:

- Coordination of traffic maintenance among multiple contractors, in order to integrate temporary signing and traffic control devices among various contracts.
- Conducting of periodic maintenance of traffic (MOT) reviews during construction (including nighttime inspections), for conformance with plans, specifications, and approved standards, and to ensure that all traffic control devices are functioning properly.
- Incident management within the CRC Program limits, including accident prevention strategies, emergency procedures, reporting requirements, and mitigation strategies.
- Coordination with the CRC Program's Communications Outreach team concerning traffic switch, lane closures, traffic delays, alternate routes available, work zone accidents, etc.
- Traffic management monthly reporting.

13.3.2 Drawing Management

The Computer-Aided Engineering (CAE) Manager will oversee the drawing management system for the CRC Program's roadway and structures drawings. Detailed procedures for accessing and managing the development of A&E drawings that are controlled documents are described in CRC Procedure 12.4.3 – ProjectWise Architectural and Engineering Drawing Management. The CRC Program designers and technicians will comply with established ProjectWise procedures for preparing and delivering electronic engineering data for project packages. The discipline-specific engineering managers are expected to manage the CRC Program's structures, geotechnical, roadway, stormwater, traffic, landscaping, erosion and sediment control, right-of way, illumination, ITS, survey, and utilities designers and technicians so that they conform to the established protocols and procedures.

The CRC QA/QC Manager will perform periodic audits of the drawing management process and the as-built drawing process.

13.3.3 Design Documentation Management

The Delivery Director is responsible for ensuring the Project Engineers follow the general retention schedule or special records retention schedule and records laws that govern the retention and disposition of records in Washington and Oregon, and is responsible for providing Department of Transportation staff with guidance and tools to assist with project closeout records management requirements. General records retention procedures are described in detail in the following controlled documents:

- For WSDOT-let project packages, use the WSDOT Project Design Documentation Checklist (http://www.wsdot.wa.gov/publications/fulltext/design/ASDE/DDP_Checklist.docx), which identifies all the documents necessary for records retention requirements. The Project Design Documentation Checklist categorizes documentation into two categories: Project File (PF) and Design Documentation Package (DDP). PF documents are retained by the CRC Program for at least three years after construction is completed. DDP documents are retained at the WSDOT Headquarters Office for at least 75 years after construction is completed. The discipline-specific managers are responsible for properly categorizing documents as PF or DDP before transmitting them to Document Control.

- For ODOT-let project packages, use the ODOT Highway Division Records Retention Matrix and the ODOT Records Manual. The records retention schedule in these documents identifies the minimum and maximum lengths of time the department records must be kept, in accordance with legal regulations.

13.4 Design Control

The CRC Delivery team will give important management consideration to the following design control activities: design coordination, design reviews, Value Engineering, constructability reviews, operations and maintenance reviews, peer reviews, and reliability and safety.

13.4.1 Design Coordination

The CRC Delivery team will institute regular, internal design coordination meetings and will coordinate with partnering local jurisdictions, advisory groups (as needed), and third-party stakeholders to communicate program information and work through engineering issues.

Internal Coordination

The CRC Delivery team staff currently hold regular internal design coordination meetings to discuss project issues and to review design production progress, project schedule, and upcoming delivery milestones.

Weekly Task Manager meetings are held to discuss interface design issues between transit, highway, and structures design functions; to coordinate with the Project Controls Manager on

schedule, budget, and scope interface issues; and to coordinate with the Communications Outreach Manager on upcoming public meetings.

Coordination with Local Jurisdictions

Local jurisdictions (Cities of Portland and Vancouver) will be invited to participate in external coordination meetings attended by the CRC Delivery team to discuss and seek consensus on important design issues. The meetings will be the primary forum for coordinating with local jurisdictions, communicating program information, exchanging views and working through engineering issues, and providing informal guidance to CRC Program staff.

State and Federal Coordination

The CRC Program will interface with state and federal agencies as required by law and administration procedures. Project Engineers are responsible for regular coordination with FHWA's designated CRC representative, who is co-located with CRC Program staff, on highway- and structures-related design and environmental issues. The Environmental Manager is responsible for regular coordination with the Department of the Interior for Section 4(f) and Section 106 considerations, with the U.S. Army Corps of Engineers for water permit concerns (such as 404 permits), with the state DEQ for various environmental matters, and with various other regulatory agencies.

Coordination with Advisory Groups

The CRC Delivery team staff, assisted by the Communications Outreach Manager, are responsible for coordination with the appropriate external interface groups during the Engineering phase to communicate program information and seek informal feedback to assist CRC Program staff on design issues.

Third-Party Coordination

The Specialty Services Director is responsible for ensuring that utilities within the program area are properly located, impacts are identified, and relocation (or protection) designs are developed and implemented to ensure timely relocation in accordance with the CRC Program schedule. This work effort requires close coordination between the Specialty Services Director and the Utilities Lead, other discipline-specific managers, and all known utility companies and agencies within the program area. Policies and procedures specific to utility relocation in Washington and Oregon are described in detail in the following controlled documents:

- For project packages in Washington, the CRC Program will follow the procedures in WSDOT's Utilities Manual (July 2012) (http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-87/Utilities.pdf).
- For project packages in Oregon, the CRC Program will follow ODOT's accommodation policy OAR 734-055 (http://arcweb.sos.state.or.us/pages/rules/oars_700/oar_734/734_055.html) and:
    - ODOT's Utility Relocation Guide (December 2011) (http://www.oregon.gov/ODOT/HWY/ROW/utility_resource.shtml); and

- ODOT's Utility Manual (Chapter 10, Right of Way Manual), August 2012 (http://www.oregon.gov/ODOT/HWY/ROW/docs/row_manual_chapter_10.pdf).

The CRC Program will build on the extensive mapping of utility networks in the program area prepared during the PE phase and continue to coordinate with jurisdictional utility districts and utility companies during the Engineering phase to produce the necessary relocation plans. The Utilities Lead will coordinate closely with:

- AT&T
- Century Link
- City of Vancouver Water, Sewer and Stormwater
- City of Portland Water, Sewer and Stormwater
- Clark Public Utilities
- Comcast
- Integra
- NW Natural
- Pacific Power & Light
- Portland General Electric
- Time Warner Telecom
- Verizon
- Vancouver Area Smart Trek (VAST)

The CRC Program will also interface with BNSF to address and reach agreement on operations and maintenance of a new I-5 crossing in Vancouver, Washington. CRC Delivery team staff will hold regular coordination meetings with BNSF to ensure timely design input and reviews, resolution of any issues, and execution of the operations and maintenance agreement in accordance with the CRC Program schedule.

13.4.2 Design Review Process

The CRC Delivery team will conduct and document QC design reviews at major milestones during the Engineering phase in accordance with written procedures in the QCP. The CRC Program will coordinate formal design reviews with internal and external stakeholders following the completion of a QC review.

Quality Control Design Review Process

A critical element to successful delivery of the Engineering phase is checking that design criteria and other specified requirements, including requirements of the relevant regulatory agencies, are met by instituting thorough QC design reviews. Milestones for QC design reviews of roadway and structures work elements will be included in the CRC Program schedule. QC design reviews will begin no later than five business days before the submittal date. The major milestone submittals for the Engineering phase are 30%, 60%, 90%, and 100% design.

The CRC Delivery team will perform QC design reviews control and will review approved engineering criteria, applicable codes and standards, and regulatory requirements. Quality control and review-related activities will be documented and records maintained as discussed in Chapter 15 – Quality Assurance and Quality Control and in accordance with the CRC Program's QC procedures described in the QCP.

Stakeholders Design Review Process

Following completion of QC design reviews, the 30%, 60%, and 90% roadway and structures design documents will be distributed to internal and external stakeholders, along with comment sheets on which reviewers may record their comments on the documents. Reviewers will consist of internal WSDOT and ODOT representatives, FHWA and FTA representatives, and representatives from the Cities of Portland and Vancouver.

The design review process allows internal WSDOT, ODOT, and FHWA reviewers to evaluate design products (i.e., plans, specifications, and estimates) as the construction documents and plans progress for project packages designated for DBB delivery. Plans-in-hand review sessions will be conducted with internal reviewers following each milestone distribution of the design documents. CRC Delivery team staff will compile and maintain a list of all comments received and will distribute written responses to those comments. All comments will be tracked through resolution. The discipline-specific task managers will be responsible for the resolution of those comments in their respective areas.

The Cities of Portland and Vancouver will review the design from the perspective of local code and ordinance compliance and compatibility with existing facilities or planned development. The Project Engineers will pay special attention to design comments that may impact the CRC Program schedule or budget. They or designated representatives will meet with the cities' representatives to resolve any issues identified during a milestone review. All design service agreements will specify the participation of the Cities of Portland and Vancouver in the design review process and the required time frames for submitting comments.

All internal or external comments that the related discipline-specific task manager believes would be a change to the scope of work will be reviewed. Project Engineers may determine that the change is minor and necessary, and direct that the design documents be revised. Comments that could pose an impact to the CRC Program's budget or schedule will be discussed with the Delivery Director, and potentially the CRC Directors. The CRC Directors will determine whether an external comment needs to be brought before the Integrated Project Staff (IPS) for discussion, as described in the TCCP, and whether the review comment could generate a potential change to the CRC Program.

13.4.3 Value Engineering

The CRC Program places a high degree of importance on VE studies. VE is a systematic process of review and analysis by a multi-disciplined team of persons not involved in the project. VE studies ensure that essential functions are procured at the lowest capital and life cycle cost, and that costs are consistent with needed performance, quality, reliability, aesthetics, safety, and operation. The CRC Program will coordinate VE studies through WSDOT's Value Engineering Program and comply with federal requirements for VE studies and recommended VE project modifications to the base project.

WSDOT's Value Engineering Program emphasizes participation from interdisciplinary industry experts and construction contractors independent of the CRC Program Team with the goal of creating an unbiased interest in the project design. The make-up of the VE team may vary depending on the scope of the study. VE of roadway and structures design work elements may be done by independent teams of qualified professionals.

The VE Facilitator (a Certified Value Specialist through SAVE International) submits a job plan using the Value Methodology (VM) process outlining the VE study phases and time allotment following WSDOT's VE policy and SAVE International best practices, for approval by the Project Engineers and Transit Managers. Each VE study will include investigation, speculation (brainstorming), evaluation, development, and presentation phases. The presentation phase results in a report and presentation from the VE team.

The CRC Program has completed several VE studies to date, and several more are planned. Below is a list of studies conducted and planned:

- Study No. 1 – Transit Options – May 21-25, 2007
- Study No. 2 – River Crossing Options – May 21-25, 2007
- Study No. 3 – Washington Approach – June 4-8, 2007
- Study No. 4 – Oregon Approach – June 4-8, 2007
- Study No. 5 – Transit Focused VE – January 9-13, 2012
- Study No. 6 – 30% Design Evaluation – Date and Content To Be Determined
- Study No. 7 – 60% Design Evaluation – Date and Content To Be Determined
- Studies No. 8 and No. 9 – Design/Construction Specific – Date and Content To Be Determined

The Project Engineers are responsible for reviewing and preparing a formal response to VE recommendations for their respective disciplines either indicating adoption or including an explanation of why the CRC Program staff disagree with any particular recommendations. Adoption of recommendations will only occur with appropriate notification to WSDOT and ODOT executives and the CRC Director(s) on scope and budget revisions.

During the Engineering phase, the Project Engineers are responsible for ensuring that all agreed-upon VE proposals, in their respective areas, are tracked and incorporated into the design documents.

13.4.4 Constructability Reviews

Given the complexity of the multimodal CRC Program, constructability reviews will occur at key process steps during the Engineering phase. In addition, the reviews will focus on maintainability so that quality CRC facilities are provided continuously throughout the operational phase. Specifically, maintainability will assess ease of maintenance, maintenance work space, and accessibility, and will reduce, where possible, operational conflicts and the exposure of maintenance staff and equipment to moving traffic.

Constructability reviews will occur during the phases of work described below and will focus on sequencing and scheduling, inconsistencies between plans and specifications, limitations of access for work to be performed, compatibly of materials, coordination of trades, suggested actions, and guidance that is endorsed by the CRC Program before advancing the development of the PS&E.

- **Conceptual/Schematic** – A conceptual constructability review was held from June 16, 2008, to June 20, 2008. The constructability review panel provided feedback on several areas including staging, schedule durations, cost, risk identification, and ideas for improvement. A final report was prepared that detailed findings of the study.

- **30% Design Review** – A 30% design constructability review would mainly focus on a constructability assessment of the CRC Program's primary geometric features. Geometric details would be reviewed, and guidelines and directions would be given to structures, highway, and other disciplines so that they could develop the required, ultimate design details for the PS&E during the Engineering phase.

- **60% Design Review** – A 60% design constructability review would focus on several features and details and would address all items that would be critical to the completion of a constructable, maintainable project. Reviews include structures and roadway plans, costs and structural requirements including special foundation considerations or materials involved, construction staging and traffic control requirements, and details of hydraulics requirements and special drainage structures.

- **90% Design Review** – A 90% design constructability review would be a review of the contract plans and the special provisions as the program design is being completed and advertisement for construction is being readied. Complete plans for review would include traffic plans, structures, and roadway plans, including stormwater, signals, illumination, signage, and other miscellaneous plans. The review also would include any design modifications or variations from the agreements reached at the 60% design constructability review.

- **PS&E Review** – Near the completion of the Engineering phase, a biddability review will be conducted for major civil, structures, and systems contracts. This review of

the plans, specifications, and estimates, or PS&E, will focus on the following elements:

- Completeness of scope.
- Correctness of cross-references from drawing to drawing and clarity of details.
- Agreement of intent between general conditions, special provisions, and technical sections of the specifications, and bid units and bid unit descriptions.
- Compatibility between drawings and the schedule of bid items.
- Compatibility of civil, structures, and systems construction.
- Expectations for the construction schedule.

The CRC Delivery team will coordinate the scheduling of constructability reviews for the CRC Program. The reviews for transit and highway elements will be held concurrently, since both are constructed within the same project or area. Concurrent reviews of highway and transit elements will aid in identifying potential issues and overlapping construction problems. The CRC Delivery team will also direct that all disciplines involved have checked the applicable documents and plans, and completed the applicable checklists.

At each constructability review meeting, the CRC Delivery Team will distribute the design documents along with constructability review checklists for various project features. Reviewers may include outside professional consultants, construction trade experts, or any other agency discipline as necessary, depending on the expertise required. The review should be recorded by a designated note keeper. At a minimum, all decisions and agreements and all directions regarding constructability comments should be documented. A brief report should be developed that outlines the results of the review (issues raised, decisions or solutions) and that documents the direction discussed and agreed to for the next phase of program development. The CRC Delivery team is responsible for coordinating and addressing any unresolved issues in their respective areas that remain at the conclusion of the review meeting that could affect PS&E progress. The noted action or response will be audited by the CRC QA/QC Manager to ensure compliance with the final set of contract documents.

13.4.5 Operations Reviews

The CRC Program will coordinate with WSDOT's and ODOT's operations and maintenance staff to:

- Review and provide input to the engineering design documents, as described below, to ensure that new CRC roadway and structures facilities mesh seamlessly with those already in place.
- Participate in constructability reviews in order to advise on operations, maintenance, and safety items.

13.5 Reliability and Dependability

Quality and other review processes for highway design are described below.

13.5.1 Quality Assurance Reviews

The CRC QA/QC Manager will conduct formal QA audits after major design submittals. These audits will assess compliance with the CRC Program's QA Program requirements, which are described in detail in Appendix E, Quality Assurance Manual, and Appendix H, Quality Control Plan.

13.5.2 ADA Reviews

The CRC Program adheres to the requirements of the ADA. Design reviews and reviewers will check for ADA compliance needs, and ADA compliance specialists may also be brought in for design reviews.

13.5.3 Peer Reviews

A peer review involves the focused review of selected project elements by a group of specialists (professionals and/or construction experts) experienced in the affected type of work. For example, the Bridge Expert Review Panel convened by WSDOT and ODOT executives to evaluate Columbia River bridge types and configurations.

The CRC Program will use peer reviews to provide technical and constructability guidance to staff where appropriate. Some elements that are potential candidates for peer review are:

- Main river crossing type
- Major land structures
- New technologies being considered for use

Peer review panels will be composed of experienced design team personnel, experienced managers from other Departments of Transportation, and independent professionals and/or construction experts. Peer reviewers will be selected based upon several general guidelines:

- Experience in the specific areas under review
- Experience in the design and construction of major river crossing and land structures, and urban highway interchanges

Project Engineers will coordinate with the Transit Manager for the staffing and scheduling of peer reviews. Each manager is responsible for developing his or her portion of daily agendas for the meetings and the background information to provide to peer review members before any meetings, so peer review members can develop a familiarity with the purpose of the meetings, the subject matter, and the CRC Program. A brief report should be developed that outlines the

results of the review (issues raised, solutions, and recommendations). Recommendations will be addressed in the report and ensure an expedited response to avoid affecting the progress of PS&E.

14. Design Oversight for Design-Build Delivery

14.1 Overview

This section summarizes the design oversight requirements after the selection of design-build entities (the Design-Builder) to ensure satisfactory development and management of work plans, conformance of products to the "Design Work" portion of executed DB contracts, satisfactory compliance with the design deviation process, and verification of Design-Builder compliance with its design Quality Management Plan requirements.

Chapter 8 discusses the project packaging and delivery strategy that includes using the DB delivery model to construct the river crossing and approaches as well as the park and rides. The DB delivery model allows the CRC Program to execute a single contract with one Design-Builder for the design, construction, and quality management necessary to deliver a completed project package.

The definition of the "design" function will normally vary by delivery method used to execute a project package. The "design" oversight function discussed in this chapter is defined as follows:

- Design quality verification that consists of a combination of audits, reviews, and checks performed by the CRC Program staff, on a random basis, of the Design-Builder's production plans, including applicable CRC mandatory design standards and technical requirements, for conformity with the terms of the executed contract and compliance with the requirements of the approved Design-Builder's Quality Management Plan (QMP).

- Regular visits by the CRC Program staff to the Design-Builder's offices to discuss with the designers and verify design progress and the designers' Quality Plans, and to assist the Design-Builder and its designers in resolving design questions and issues. The Design-Builder will be responsible for scheduling all meetings and developing meeting agendas. The Design-Builder will also be required to record minutes of each meeting and distribute copies within a certain time that is agreed upon or stated in the contract.

Chapter 12 – LRT Design and Chapter 13 – Highway Design discuss in detail the requirements, design management, and design activities for project packages (transit and highway) implemented using the traditional DBB delivery methods to ensure minimum feasible costs for design, construction, capital facilities, and operating expense, and minimum energy consumption, and minimum disruption of local facilities and communities.

The design oversight responsibilities discussed in this chapter are managed by the Project Delivery Director, assisted by the Project Delivery Engineering Manager. The contract administration lies with the Project Engineer. They will be supported by CRC Program staff

(agency and consultant) that will perform formal reviews to ensure that the Design-Builder's design work products conform to the executed contract.

14.2 Design Requirements and Standards

The CRC Program Team has developed design standards and technical requirements ("design criteria") documentation for the transit and highway elements of the CRC Program. The Design-Builder must prepare all engineering documents, including technical specifications, necessary to complete the design of any project package in accordance with the design criteria described in the executed contract.

Deviations and exceptions from the design criteria that are not included in pre-approved design deviations described in the executed contract may be requested by the Design-Builder in particular situations. The Design-Builder must document and justify any deviation from the established criteria. Project development detail, including deviation requests, must describe what can be met, rather than what cannot be met. The Design-Builder will be responsible for conducting all work necessary to complete any new design deviations or modifications to approved deviations for the project. The Design-Builder will also prepare and obtain WSDOT, ODOT, and FHWA approval, as required, for all design deviations incorporated in the project that are not included in the pre-approved design deviations. WSDOT will coordinate with agency partners if any design deviation affects another agency's design criteria. A complete, detailed design is not required for this determination. Deviation requests are supported conceptually rather than with the completed design typically used in the DBB process. If required for the project, deviations should be approved before the solicitation of proposers. Since the final design is not set by the CRC Program, only the requirements of the design, the proposer's Best and Final Proposal may include other deviations. These deviations would be evaluated and approved or rejected as part of the proposal evaluation. Final design during contract execution might discover other necessary geometric design deviations for which the Design-Builder must prepare appropriate documentation and application materials. During contract execution, geometric deviation requests will be processed and approved if warranted. The Design-Builder must also identify scope, schedule, and budget impacts of deviations or exception from the design criteria. The impacts of deviation review and acceptance must be absorbed by the Design-Builder without contract adjustment.

CRC Procedure 12.2 – Design Criteria Approval and Modifications describes in detail the process to modify and receive approval for design deviations or exceptions from established CRC Program design criteria. This includes approval by the Project Engineer, and approval by WSDOT or ODOT Headquarters, and FHWA, as applicable. The Project Engineer will communicate in writing the approval of any deviation before it can be included by the Design-Builder in the design.

14.3 Design Oversight Execution

The CRC Program staff will review all engineering documents prepared by the Design-Builder, including design criteria, for conformity with the mandatory design standards and technical requirements in the executed contract and according to the approved Design-Builder's Quality Management Plan requirements. The CRC Program staff will also make regular visits to the

offices (the assumption presently is that the DB and agency office will be co-located) of the Design-Builder's designers to discuss and verify design progress. The Design-Builder will be responsible for scheduling all meetings and developing meeting agendas. The Design-Builder will also be required to record minutes of each meeting and distribute copies within a certain time that is agreed upon or stated in the contract.

The CRC QA/QC Manager will perform a design audit on the Design-Builder's implementation of the design aspects of the Design-Builder's approved QMP during the design phase.

In developing its own QMP, including but not limited to design reviews, the Design-Builder will be encouraged to follow the organization and format of the Quality Management Plan Outline located at: http://www.wsdot.wa.gov/NR/rdonlyres/27A54B86-9825-4E81-9DEE-138823B4ED86/56842/QMPOutline0504091.pdf.

The frequency and timing of the quality audits will depend on the duration of the design activities, the number of design units under design, and the level of problems being encountered during the design reviews. Audits by the CRC QA/QC Manager will be accomplished in accordance with Chapter 15 – Quality Assurance and Quality Control.

14.3.1 Design Oversight Philosophy

It is important for the CRC Program staff (agency and consultants) performing design oversight activities to understand that design review for a DB contract is different than design review for a traditional DBB contract. It is not the purpose of the design oversight review to provide a technical design review of the Design-Builder's engineering documents. For example, design review by the CRC Program Team does not include detailed review or checking of the design of major components and related details, except in unusual cases, or the accuracy with which such designs are depicted on the plans. Plan accuracy, conformance with the design guidelines described in the executed contract, and constructability of the project rests with the Design-Builder.

The CRC Program developed the following key guiding principles for design oversight activities on DB contracts. These guiding principles state the intent and purpose of the design review and provide parameters for the expected scope of review of the Design-Builder's engineering documents:

- Use standards and design criteria identified in the executed contract.
- Reference standards when providing technical comments.
- Identify requirements in the executed contract rather than preferences.
- Skip non-value-added and minor comments.
- Refrain from providing constructability-related comments.

The QCP describes in detail the scope of design oversight reviews of products (e.g., Released for Construction (RFC) plans and technical reports) prepared by the Design-Builder.

14.3.2 Design Management Oversight

The Project Engineers, under the direction of the Project Delivery Director, are responsible for maintaining the guiding principles described above throughout the life of each contract package implemented under the DB delivery model. They will work throughout program execution to continually reinforce these principles with staff assigned to perform design oversight activities. They will perform the following key responsibilities:

- Overseeing the Design-Builder's satisfactory development and management of work plans.
- Managing CRC Program staff (agency and consultant) by conducting over-the-shoulder design reviews of the Design-Builder's engineering documents and participating in the interpretive engineering decision process.
- Developing timely responses to formal submittal reviews from the Design-Builder.
- Responding to the Design-Builder's requests, such as Cost Reduction Proposals and Requests for Information (RFIs), in accordance with executed contract requirements.
- Verifying the Design-Builder's compliance with approved design QMP requirements, including performance of independent design checks and verification that the design complies with the requirements of the executed contract before formal submittal reviews by CRC Program staff.
- Verifying that all design services furnished by the Design-Builder are performed under the direction of a Professional Engineer licensed in the State of Washington (or in the State of Oregon on packages procured by ODOT).
- Overseeing the Design-Builder's satisfactory compliance with the design deviation process.
- Verifying design progress for payment purposes.
- Providing correspondence indicating whether the design deliverables meet the contract requirements at successful completion of design reviews at various stages.

14.3.3 Pre-Contract Meeting

The Project Engineer will coordinate with the Design-Builder to schedule a "Pre-Contract Meeting" as soon as practicable after the award of a contract. The purpose of the meeting is to acquaint key personnel with the details and features of the project in order to facilitate the design process, exchange information, and address any questions pertaining to the scope or level of effort of the project. WSDOT and ODOT expect a collaborative partnering work relationship among the Departments of Transportation, the Design-Builder, the transit agencies, and city representatives. A partnering session to establish a collaborative working relationship will be discussed at the "Pre-Contract Meeting."

14.3.4 Design Meetings and Over-the-Shoulder Reviews

The CRC Program Team intends to conduct weekly design coordination meetings with the Design-Builder and to perform over-the-shoulder design reviews to support project quality goals. These meetings and over-the-shoulder reviews will be an integral part of the design oversight process for discussing and resolving design issues outside of the formal review process. Preparation of weekly design coordination meeting agenda and minutes is the responsibility of the Design-Builder. Attendance at coordination meetings by CRC Program staff will be determined by the Project Engineer. The Design-Builder will be responsible for scheduling all meetings and developing meeting agendas. The Design-Builder will also be required to record minutes of each meeting and distribute copies within a certain time that is agreed upon or stated in the contract.

The over-the-shoulder reviews should not be considered "hold points" that restrict the progress of design. They are reviews of the design as it progresses and opportunities for CRC Program staff to provide comments and feedback to the Design-Builder on the design.

14.3.5 Released for Construction (RFC) Document Review

The CRC Program Team will perform at least one preliminary design review (near the midpoint of design) before completion of 100% design.

The CRC Program Team will perform design reviews on formal preliminary and final design submittals, prepared by the Design-Builder of all plans and technical specifications, and will resolve all review comments before the Design-Builder issues RFC documents. Any deviation by the Design-Builder from the mandatory design criteria requirements must be reviewed by the appropriate approving authorities in their respective areas, and recommended for approval to the Project Engineer before a submittal can be "Released for Construction."

The Design-Builder will follow the agreed- upon review times in the contract. The Design-Builder will also maintain close communication with the CRC Program Team throughout design and construction. This close communication will help expedite reviews. Over-the-shoulder reviews will likely be employed as part of the process to discuss and resolve issues outside of the formal review process.

Preliminary Design Submittal Review

The intent of the Preliminary Design Submittal Review is to provide a formal opportunity for the CRC Program Team and participating jurisdictions to review the construction documents in order to ensure that the design is progressing appropriately and proceeding in the right direction; that the plans reflect the executed contract requirements for construction; that design features are coordinated; and that there are no fatal flaws within a given discipline or between disciplines. At the conclusion of the Preliminary Design Submittal Review, the Project Engineer will ensure that the following has been completed:

- Certification has been obtained from the Design-Builder's Design QA Manager (prior to distributing the design submittal for review) that the item or segment of work:

(1) has been designed in accordance with executed contract requirements, and (2) has been checked in accordance with the Design-Builder's approved QMP.

- The design documents have been distributed with comment sheets on which reviewers may record their comments on the documents. Reviewers may include representatives from the Cities of Portland and Vancouver, the FTA and its PMOC representative(s), FHWA, TriMet, C-TRAN, WSDOT, and ODOT representatives.

- The review comments have been collected and consolidated and provided to the Design-Builder. It will be the responsibility of the Design-Builder to resolve conflicting comments.

- Work with the appropriate authorities in each specific area of expertise has been completed to ensure that the contents of the Preliminary Design Submittal in their respective areas are as specified in the executed contract technical requirements.

- It has been confirmed that requests for deviations from the design criteria not included in pre-approved design deviations described in the executed contract have been documented by the Design-Builder, and approvals have been obtained as described in CRC Procedure 12.2 – Design Criteria Approval and Modifications, and communicated in writing to the Design-Builder.

Final Design Submittal Review

The Final Design Submittal will be prepared when the design for a given element or area is 100% complete. The Final Design Submittal will include plan sheets, technical memos, reports, calculations, and other pertinent data, as applicable. It will also include all specifications, all approved amendments to the standard specifications, special provisions, technical requirements, and technical specifications in the executed contract, necessary to construct the work elements represented in the submittal. At the conclusion of the Final Design Submittal Review, the Project Engineer will ensure that the following has been completed:

- Certification from the Design-Builder's Design QA Manager (prior to distributing the design submittal for review) has been obtained that the work: (1) has been designed in accordance with executed contract requirements, (2) has been checked in accordance with the Design-Builder's approved QMP, (3) has been designed to fully provide for constructability, compatibility of materials, and conformity to acceptance criteria for inspections and tests as provided in the executed contract, and (4) is ready for construction to 100% completion.

- Resolution and disposition documentation for review comments have been obtained that showing that all comments made by the CRC Program Team on the Preliminary Design Submittal have been addressed and incorporated by the Design-Builder into the Final Design Submittal.

- Work with the discipline-specific engineering managers has been completed to confirm that the contents of the Final Design Submittal in their respective areas are as specified in the executed contract and include all amendments to the standard

specifications, special provisions, technical requirements, and technical specifications necessary to construct the work elements represented in the submittal.

- Written approval for deviations from the mandatory design criteria and technical standards has been obtained.
- All review comments on the Final Design Submittal have been resolved, so it may proceed through the written certification process described below in preparation for being "Released for Construction."

Released for Construction (RFC) Documents

RFC documents are prepared after the Design-Builder has incorporated the 100% design review comments. At the conclusion of the Released for Construction (RFC) Document Review, the Project Engineer will ensure the following has been completed:

- Written certification from the Design-Builder's Design QA Manager has been obtained that all plans, reports, specifications, and quantity estimates submittals and design reviews were completed in accordance with the QMP requirements and the executed contract, and that the documents are ready to be "Released for Construction."
- All plans, reports, and specifications have been sealed and signed by the Professional Engineer in responsible charge licensed in the State of Washington and/or in the State of Oregon, depending on the document, and are stamped "Released For Construction" by the Design-Builder's Design QA Manager.
- Review comments resolution and disposition documentation has been obtained showing that all comments made on the Final Design Submittal have been addressed and incorporated by the Design-Builder into the RFC documents. If necessary, the Design-Builder will resubmit revised RFC documents.
- Six hard copies and electronic files (in both MicroStation and PDF formats) on CD-ROM of all RFC documents have been received from the Design-Builder. The electronic drawing files will include copies of all sheet and reference files used in the RFC documents.

Design Revisions Following Issuance of Released for Construction (RFC) Documents

Either the Design-Builder or the CRC Program Team may initiate design changes. Design changes may occur on items or segments undergoing early construction, before final designs are complete, or after completion of final design and issuance of RFC documents. The Project Engineer will ensure that:

- The Design-Builder prepares Preliminary and Final (100%) Design Submittals for design review by the CRC Program Team for all design changes.

- All design changes including revisions to the RFC documents are prepared by, or under the direct supervision of, the Professional Engineer in responsible charge licensed in the State of Washington (or in the State of Oregon) for the documents.

- Written certification from the Design-Builder's Design QA Manager has been obtained ensuring that all revised plans, reports, specifications, and quantity estimates submittals and design reviews were completed as the original documents, in accordance with the QMP requirements and the executed contract, and revised documents are ready to be again "Released for Construction."

- Calculations for design revisions made during construction have been made available for CRC Program Team review and comments are incorporated into the revised documents before implementation of the revisions during construction.

14.3.6 Drawing Management

The Design-Builder will follow the contract requirements with regard to drawing management and will coordinate with the CRC Delivery team.

The CAE Manager oversees the drawing management system for the CRC Program's engineering drawings. The CAE Manager will ensure that:

- The Design-Builder prepares CADD files in conformance with executed contract requirements using applicable ODOT or WSDOT methodologies and standards as defined in:

  - ODOT's PS&E Delivery Manual (http://www.oregon.gov/ODOT/HWY/OPL/docs/PSE_Delivery_Manual.pdf?ga=tor)

  - WSDOT's Plans Preparation Manual, M22-31.04, September 2012 http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-31/PlansPreparation.pdf

- The Design-Builder submits the CADD files, including end area cross-sections, to the CRC Program office in Inroads format. All CADD data will be provided in a format that can be used directly by MicroStation with no translation and such that, when accessed within MicroStation, the data is organized according to the applicable ODOT or WSDOT standard levels, symbologies, colors, line weights, and basemap/sheet file organization.

The CRC QA/QC Manager will perform audits of the Design-Builder's drawing management systems and procedures as contained in the Design-Builder's approved QMP during the design phase. Audits will be accomplished in accordance with Chapter 15 – Quality Assurance and Quality Control of this PMP. Results of the audit will be issued to the CRC Director(s) for distribution to the Design-Builder.

14.3.7 Design Documentation Management

The Design-Builder will follow the contract requirements with regard to drawing management. Document control is an integral part of any project. Typically a Design-Builder will be required to use an electronic Document Control System to track and manage all project documentation. This electronic Document Control System will also have a collaborative website that is accessible to the Design-Builder and the CRC Program.

The Project Engineer is responsible for ensuring that the Design-Builder completes and submits the following documentation before final acceptance:

- An updated Design Approval Package for WSDOT-let project packages for any revisions and additional information prepared following execution of the contract, including Channelization Plan and Supplemental Conceptual and Geometric Design, if applicable.
- A completed DAP for ODOT-let project packages and/or for work elements in Oregon.
- A completed Project Development Approval Package, when PS&E bid documents are completed for WSDOT-let project packages and/or for work elements in Washington.
- Completed Design Documentation Package (DDP) and completed Project File (PF) documents for WSDOT-let project packages to include all of the elements identified in the WSDOT Design-Build Project Design Documentation Checklist (http://www.wsdot.wa.gov/NR/rdonlyres/263326B1-C0F2-42AA-90DC-AB46772C6712/0/DesignBuildDesignDocChecklistAugust2006.xls) to have components of work started by the CRC Program Team, and that the Design-Builder is required to complete or update. The Design-Builder will provide the CRC Program Team with updates and access to the DDP and PF items as changes are made.
- Completed PS&E documents for ODOT-let project packages, including plans and specifications, that meet the following requirements: Final PS&E Checklist (http://www.oregon.gov/ODOT/HWY/SEOPL/docs/form/final_pse_submittal_checklist.doc).
- Reports and technical memoranda that document decisions made during completion of the design regarding components not included in the design criteria.
- Approved deviations.
- Design calculations and documentation.
- Electronic MicroStation and InRoads files, including all RFC sheets, reference files, and base mapping (topography).

- Two hard copies of the As-Built Plans that meet the requirements of the executed contract and accurately represent the as-constructed conditions in the field. The As-Built Plans will include the following:
    - A written certification by the Professional Engineer in responsible charge that the As-Built Plans accurately and completely reflect all changes and corrections made during construction.
    - The stamp of the Professional Engineer in responsible charge on each reissued sheet of the revised RFC documents, and on the cover of each of the reissued, revised RFC technical specifications.
    - Each sheet of the As-Built Plans stamped or clearly marked "AS-BUILT."
    - An accompanying index and instructions.
- Updated electronic MicroStation and InRoads files that show the as-constructed conditions, incorporating all revisions made during construction, and that are consistent with the software and drawing conformance requirements in the technical requirements of the executed contract.
- Reproducible originals of the shop drawings for prestressed structural elements and all structural steel components.
- Calculations for design revisions made during construction that were incorporated into the design calculation file when construction is completed in accordance with the executed contract.

14.3.8 Change Proposal

The CRC Program places a high degree of importance on VE to optimize the value of each dollar spent. DB contracting allows for innovation and a VE approach to design optimization by the Design-Builder through a Category A Value Engineering Change Proposal (VECP) or a Category B Change Proposal (CBCP).

A Category A change is defined as the following:

- Any requirement in the General Provisions.
- Any of the standards identified as "Mandatory Standards" in any section of the technical requirements (but not including the WSDOT Standard Specifications).
- Any change to a commitment made in the Design-Builder's proposal documents.
- A change to the Basic Configuration, regardless of whether initiated by a Necessary Basic Configuration Change or a VECP

In general, Category A requirements may be changed only through VECPs or WSDOT-directed changes.

A Category B change is defined as the following:

- A change to any requirement found in Chapter 2, Technical Requirements, but not including changes to standards identified as "Mandatory Standards."
- Any change to a requirement of the WSDOT Standard Specifications or to the Amendments to the Standard Specifications that are included in the contract. If the Design-Builder proposes to do something differently from the way it is addressed in the Standard Specifications or Amendments the Amendments to the Standard Specifications, it will be considered a change to the Standard Specifications.
- Any change to a requirement identified in the contract as a special provision.

Changes to the Category B contract requirements can result from a change proposed by the Design-Builder, known as a Category B Change Proposal, or CBCP, or from a WSDOT-directed change. Each party will bear its own costs in the preparation and review of the change.

The Design-Builder may submit a VECP to change Category A contract requirements that include changes to: (a) any requirement in the General Provisions, (b) any of the standards identified as "Mandatory Standards" in any section of the technical requirements (but not including the WSDOT Standard Specifications), (c) any change to a commitment made in the Design-Builder's proposal documents, and (d) a change to the Basic Configuration. The Project Engineer will evaluate any cost savings according to the contents of the General Provisions.

The Design-Builder may also submit changes to Category B contract requirements that include changes to: (a) any requirement found in the contract technical requirements, but not including changes to standards identified as "Mandatory Standards," (b) any change to a requirement of the WSDOT Standard Specifications, or to the Amendments to the Standard Specifications, that are included in the contract, and (c) any change to a requirement identified in the contract as a Special Provision. It is up to the Design-Builder to propose a change to a Category B requirement as either a VECP or a CBCP. The Project Engineer will evaluate a CBCP according to the General Provisions to determine whether or not a Design-Builder's proposed change is "equal or better" than the underlying contract requirements.

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15. Quality Assurance and Quality Control

15.1 Overview

The goal of the CRC Quality Assurance Program (QAP) is to ensure conformance to specified quality requirements by the CRC Program Team (agency and consultant staff) and construction contractors. The CRC QAP accomplishes this objective by providing documented evidence that all facilities (transit, bridge, highway, and related components) are designed, procured, and constructed in accordance with established engineering criteria and applicable state and federal requirements.

The objectives of the CRC QAP are to:

- Continually strive to prevent deficiencies and nonconforming work and services,
- Instill a culture of quality throughout the CRC Program,
- Develop effective audit plans,
- Identify negative quality trends,
- Keep the Program Directors informed of the condition of the QAP throughout the life of the CRC Program.

The CRC Program Team accomplishes these quality objectives by contractually requiring that CRC Program designers, fabricators, and contractors implement quality control plans that demonstrate control over design, manufacturing, and construction processes. Compliance to contract documents and to the effectiveness of Quality Control Plans is ensured through scheduled Quality Assurance audits by the CRC QA/QC Manager.

Quality Assurance and Quality Control are related activities and are defined as:

- **Quality Assurance (QA)** – All those planned and systematic actions necessary to provide adequate confidence that an item is in conformance with established requirements and will satisfy given needs. The activity of providing the evidence needed to establish confidence that the quality control program and other quality functions are being performed adequately. QA is a management tool.

- **Quality Control (QC)** – Those functions that provide a means to control and measure characteristics as related to established requirements. The techniques and activities that sustain quality of an item to satisfy given needs; also the use of such techniques and activities. QC is a production tool.

The Quality Assurance Manual (QAM) in Appendix E and the Quality Control Plan (QCP) in Appendix H to this PMP comprise the QAP for the CRC Program. The QAM and QCP describe the QA and QC activities necessary to ensure conformance to contract documents. The QAM and QCP are "living documents" that may be modified throughout the duration of the CRC Program to reflect changes in and improvements to the quality requirements.

A summary of the overall requirements of the QAM and QCP follows.

15.1.1 Management Commitment to Quality

The CRC Senior Management Team is committed to planning and constructing the CRC Program with the highest regard for quality in all areas. The CRC Program Team is responsible for ensuring that design and construction is in conformance to specified quality requirements, has identified quality objectives for the CRC Program, and has designated a CRC QA/QC Manager to verify that quality-related activities are being implemented during program delivery to achieve those objectives. Every CRC Program Team member is expected to follow the QAP and the QC procedures detailed in the QAM and QCP documents, respectively.

The Design-Builder will provide a CRC Quality Management Plan, also known as a QMP, which will be approved by WSDOT, ODOT, TriMet, and the CRC QA/QC Manager, and must be in conformance with the QAM. The CRC Project Quality Management team will monitor the Design-Builder's work to ensure that the required quality elements are being performed.

15.1.2 Quality Assurance Program

The objective of the CRC QAP is to provide a planned, systematic, and documented approach to ensure that products and services are produced and delivered as specified and that the expected level of quality is achieved. The CRC QAP provides for the implementation of activities during design and construction that facilitate early identification of conditions that adversely affect satisfactory completion of the CRC Program. Administrative and control measures will be implemented by the CRC Program Team to verify and document the successful completion of a safe, reliable, economical, and convenient transit and highway infrastructure that meets the established quality standards.

15.1.3 Program Implementation

The QAM and QCP provide the necessary policies and processes for implementation of the CRC QAP through written procedures and audits, including the documentation of such activities.

The objective is to ensure that required quality is attained beginning with the development of design, according to required engineering criteria, through construction and the implementation of effective procurement and contracting procedures. Quality will also be attained through proper manufacturing, construction, installation, and testing and start-up activities.

15.2 FTA Requirements (15 Elements)

The CRC QAP complies with the FTA's *Quality Management System Guidelines, 2012* (FTA Guidelines) and includes the 15 elements of a quality program suggested by the FTA Guidelines. The CRC QAM and QCP include detailed requirements and guidelines for implementation of the quality policies.

15.2.1 Management Responsibility (Element 1)

The commitment to and responsibility for quality for the QAP belong ultimately to the highest level of management. Each CRC Program Team member is expected to be committed and accountable regarding the quality of his/her work.

Management will formally declare and communicate its quality policy and be responsible for assuring that the QAP is implemented and maintained throughout the organization, including continual improvement.

A QA/QC Manager is designated as representative of, and reports directly to, the Program Directors. The CRC QA/QC Manager and all personnel who have responsibility for quality activities are included on an organizational chart included in the QAM, which shows each individual's interrelationships with other project personnel. The CRC QA/QC Manager will report the ongoing effectiveness of the QAP as determined by the regular monitoring of QC activities as well as by scheduled quality audits.

Maintenance of the CRC QAP will be accomplished through regular documented reviews performed to ensure that the QAP remains suitable and effective.

15.2.2 Documented Quality Management System (Element 2)

The QAM and the QCP for the CRC Program will be implemented and maintained through a documented quality management system to ensure that the CRC Program's QA goals and objectives are met. This quality management system extends to all aspects of design, procurement, manufacturing, and construction. The written procedures and instructions address processes including inspection, testing, nonconforming product and work, corrective action, maintenance of quality records, quality audits, and training.

15.2.3 Design Control (Element 3)

Procedures that control and verify the design will be established and maintained by the QAP. These procedures must identify the roles responsible for QA for design and specify what design information should be documented, transmitted, and reviewed. Design inputs and design outputs will be documented, and design reviews will address constructability, operability, and maintainability. The procedures must also clearly indicate how design changes and modifications will be identified, documented, reviewed, and approved. QA activities will be conducted to verify that QC procedures related to design are being carried out and documented according to their requirements:

- The DBB construction contractor will follow the QAM for design control.
- The Design-Builder will have, in its QMP, processes for design control that are compliant with the QAM.

Both the QAM and the QCP include references and/or procedures to control and verify that the design criteria, other specific requirements, and requirements of regulatory agencies and industry standards are met.

15.2.4 Document Control (Element 4)

Procedures for control of project documents and data are established and maintained. Document control measures ensure that all relevant documents are current and available to all users who require them.

Document control procedures are discussed in the QAM and are presented in more detail in the QCP. Document control procedures of activities for DB delivery will be established and are to be located in the Design-Builder's QMP.

The following are examples of the types of documents requiring control:

- Drawings
- Specifications
- Inspection procedures
- Test procedures
- Special work instructions
- Operational procedures
- Project Management Plans
- Risk and Contingency Management Plans
- Real Estate Acquisition Management Plans
- Quality Assurance Plans
- Rail and Bus Fleet Management Plans
- Safety and Security Management Plans

15.2.5 Purchasing (Element 5) (Construction Only)

All suppliers, installers, manufacturers, and contractors will be selected based on their ability to meet the contract requirements, including quality requirements. Contract documents or purchasing specifications will contain relevant criteria, standards, drawings, process requirements, and inspection and testing procedures.

The procedures for purchasing during construction are provided in further detail in the QAM and the Design-Builder's QMP.

15.2.6 Product Identification and Traceability (Element 6)

Measures have been established (in the QAM) and maintained for identifying and controlling items of production (batch, materials, parts, and components) to prevent the use of incorrect or defective items. Incorrect or defective items will be identified and either marked accordingly and/or segregated from material storage to prevent incorporation into the work.

The QAM outlines procedures for identifying and tracking items of design production. Additional procedures for product identification and traceability specific to the Construction phase of the CRC Program will be established by the construction contractor within its QMP, and must include policy, procedure, and process that is in conformance with WSDOT, ODOT, and TriMet requirements and must include the contracting agency's procedure for verification of production identification and traceability for materials used during construction.

15.2.7 Process Control (Element 7) (Construction Only)

Suppliers and contractors will identify and plan the production and installation processes that directly affect quality in order to ensure that these processes are performed under controlled conditions.

Special processes, the results of which cannot be verified by subsequent inspection and testing of the product, will be continuously monitored. Activities related to official contract documents, including expectations of the FTA and other oversight agencies, will be controlled by identification of relevant specifications and determination of the most effective method of verification.

To achieve accuracy and consistency in production and installation processes, the QAP provides for:

- Documented work instructions to ensure quality, use of suitable production and installation equipment, a suitable working environment, personnel qualifications/certifications, and conformance with referenced standards/codes and their associated QMP.
- The monitoring and controlling of processes and product characteristics during production and installation.

15.2.8 Inspection and Testing (Element 8)

Performance of inspection and testing will be by qualified personnel in accordance with the established QMP or documented agency, TriMet, or federal requirement procedures, and will verify the quality of work and products throughout the duration of the work (in-process work).

Equipment, materials, and products delivered to the project site will be inspected, marked, and tracked in accordance with the QAM and the construction contractor's QMP to ensure that only acceptable materials are used and that any rejected materials are removed from the project site.

Inspection and testing is addressed in the QAM. Further detailed inspection and testing procedures and requirements for construction activities will be addressed in the construction contractor's QMP.

Final inspection and testing will be conducted to ensure that the finished product conforms to the specifications. Records will be maintained to document final inspection and testing.

15.2.9 Inspection, Measuring, and Test Equipment (Element 9)

Inspection, measuring, and test equipment used in the work will be identified, controlled, calibrated, and maintained in proper working order to ensure conformance to requirements, and will meet the standards of accuracy for the measurements required.

Equipment will be calibrated according to national standards when applicable or to documented standards when national standards do not exist.

Equipment will be regularly recalibrated. If inspection, measuring, and test equipment is found to be out of calibration, the validity of previous inspection and testing results will be re-evaluated for acceptability. A record of the equipment calibration status will be maintained.

The QAM details the policies and procedures for inspection, measuring, and test equipment. Additional requirements and procedures related to inspection, measuring, and test equipment specific to the Construction phase of the CRC Program will be addressed in the construction contractor's QMP.

15.2.10 Inspection and Test Status (Element 10)

Procedures for identifying the inspection and test status of work during production and installation will ensure that only work that has passed inspections and tests is incorporated into the CRC Program. The status will indicate conformance or nonconformance with regard to reviews, inspections, and tests. Test and inspection status will be identified by means of markings (stamp), tags, labels, routing cards, inspection and test records, physical location, or other suitable means.

Inspection and test status expectations for construction are located in the QAM, and a detailed policy and procedures for DB delivery are included in the Design-Builder's QMP.

15.2.11 Nonconformance (Element 11)

Procedures for identifying and controlling nonconforming materials or work will ensure that nonconforming materials or work is not incorporated into the final product.

Nonconforming work will be identified, controlled, documented, and evaluated for determining the proper disposition of the nonconforming work. Documented procedures will define the responsibility and authority for the review and disposition of nonconforming work. The final disposition of nonconforming work will require the approval of the Project Engineer (Resident Engineer), dependent upon the nature of the work, and may include rework, acceptance for an alternative application, or rejection. Reworked or repaired work will be re-inspected and/or retested in accordance with contract requirements. All incidents of nonconformance will be resolved with the involvement of quality personnel.

The QAM and QMP documents detail the policies and procedures for nonconforming work related to design and construction.

15.2.12 Corrective Action (Element 12)

Corrective action required as a result of repetitive nonconforming work or product will be identified and controlled to ensure timely and adequate resolution. Procedures for corrective action will be established, documented, and maintained. Corrective action procedures will be used that will:

- Investigate the cause of nonconforming work or product.

- Analyze processes to detect and eliminate potential causes of nonconforming work or product.
- Initiate preventative measures to correct problems appropriate to the level of risk.
- Ensure that corrective actions are implemented and effective.
- Implement and record changes in procedures resulting from corrective actions.

The corrective action process will be documented and controlled to final acceptance and closeout of the issue.

The QAM (for DBB) or the Design-Builder's QMP provide procedures for corrective action related to design. The QAM provides reference information on the requirements and policy for procedures regarding corrective action of construction activities for DBB delivery. For DB delivery, this policy and procedure can be found in the Design-Builder's QMP.

15.2.13 Quality Records (Element 13)

Procedures for maintaining quality records will be established and maintained that will show the proper functioning of the quality management system. These records will be prepared, compiled, and stored so that they can be easily retrieved. Attention will be given to accuracy, completeness, legibility, retention time, final disposition, and security of the quality records. Records will be kept in an environment that will help prevent their deterioration or damage. Typical quality records may include:

- Design reviews
- Inspection reports
- Test data
- Qualification records
- Calibration records
- Nonconformance reports
- Corrective actions
- Audit reports

The QAM and QCP documents address quality records in more detail.

15.2.14 Quality Audits (Element 14)

Verification for compliance to the QAM and QCP related to the Engineering phase is performed by completing audits. The CRC QA/QC Manager and other CRC QA staff, as assigned, will perform scheduled audits, as detailed in the QAM, to verify that each aspect of the QCP is being followed and that the elements of the quality management system are functioning as intended. Auditors will be qualified to perform the audit by meeting the requirements for quality auditors, as defined in the policies and procedures. Quality audits will be fully documented, and findings

will be tracked to their final disposition. The CRC QA/QC Manager will review audit findings with the personnel who have responsibility in the area being audited.

The QAM and the QCP address in detail the procedures and requirements related to quality audits. For construction elements, ODOT, WSDOT, and FHWA are responsible for performing audits of the construction contractor's inspection and materials process. The QAM addresses audits during construction for the DBB delivery method. The Design-Builder's QMP addresses in detail the procedures and requirements related to quality audits.

15.2.15 Training (Element 15)

Procedures for identifying training needs and for providing training to CRC Program staff performing activities that affect quality will be established and maintained. All CRC Program staff members will be technically qualified for their tasks and trained in the QAP and QC procedures pertaining to their work responsibilities. For design and owner representative construction personnel, the CRC QA/QC Manager has established a training program and maintains records of the participation of key CRC Program staff in training related to the QAP and QC procedures. Construction contractors will be required to establish a training program and maintain records of the participation of key project staff in training related to a construction QA program and QC procedures.

Training is addressed in more detail in the QAM and the QCP.

15.3 Quality Assurance and Quality Control Responsibilities

The responsibilities of the CRC QA/QC Manager related to the 15 elements of a quality program are described in the QAM. In-depth details of the Design-Builder's responsibilities will be included in its approved QMP.

15.4 Design Quality Control

Quality control of design activities applies to the activities of defining, performing, and controlling designs including, but not limited to, design of facilities, structures, systems, and equipment. CRC Program Team members (agency and consultant staff) will perform their design activities to the approved engineering criteria, applicable codes and standards, and regulatory requirements. QC reviews, including Interdisciplinary Reviews, will be performed by qualified individuals (other than those who originated the design) within the reviewer's area of professional expertise. Design changes or revisions will be subjected to the same level of checking, review, and approval as the original design. Design documents will be uniquely identified and controlled to ensure the use of approved documents. Quality-related design activities will be documented, and records will be maintained as detailed in the QCP.

Design activities performed through the DBB delivery method must follow the requirements in the QAM and QCP. The design activities performed through the DB delivery method should be provided in the Design-Builder's QMP and must be in compliance with the CRC QAM and QCP.

15.5 Construction Quality Control

The CRC Program will establish requirements for quality control of construction activities that the construction contractor must follow. The Design-Builder will submit to the Project Delivery Director a QMP for approval that describes control of quality of its work according to contract requirements. The CRC Project Delivery Director will assign a Project Engineer (Resident Engineer) and inspection staff to each construction contract to provide on-site quality inspections and oversight of the construction contractor's QMP. The CRC Project Delivery Director, with input from the CRC QA/QC Manager, will provide the Project Engineer (Resident Engineer) with review comments regarding the construction contractor's proposed QMP and personnel. The Project Engineer (Resident Engineer) is responsible for final disposition of the construction contractor's QMP.

15.6 Inspection and Test Plans

The construction contractor will be responsible for the quality of all work performed by its own employees, as well as by any manufacturers, subcontractors, or suppliers, to meet contract requirements and as detailed in its approved QMP. The Design-Builder will develop and submit to the CRC Project Delivery Director ,for approval, a QMP that addresses all testing requirements including inspection and tests required and performed by WSDOT, in addition to the types of tests, frequency of tests, minimum qualifications of those performing the tests, and required quality documentation. The QAM provides references in Section 3.10 for inspection and test requirements.

15.7 In-Process Inspections

The Construction Quality Assurance Manager (CQAM) and inspectors will be deployed to ensure that construction QC procedures are in place and effective, ensuring that quality standards are acceptable. The Project Engineer (Resident Engineer) and inspector activities will include:

- Verifying the construction contractor's material certifications and samples.
- Inspecting materials and equipment delivered to the job site(s).
- Performing inspections of specialty equipment and fabricated construction materials.
- Participating in First Article Inspections (FAIs), or witness and hold point activities, as outlined in the contract specifications and established in the construction contractor's approved QMP.
- Inspecting construction and installation work in progress.
- Documenting the results of inspections and tests, and specifically noting any failed tests, retesting, or recertification required.
- Monitoring construction operations and field-testing of construction material.
- Reviewing the construction contractor's QC documentation.

The ODOT, WSDOT, and the TriMet QA Managers will also perform audits and surveillances of the manufacturer's facilities, as needed.

15.8 Materials Testing Program

Contract specifications will include standards for materials and corresponding tests to ensure compliance with contract requirements. Qualified personnel will accomplish materials testing during construction in accordance with approved testing practices and procedures, as outlined in Chapter 9 of the WSDOT Construction Manual (Publication M 41-01.14, January 2013) on contracts procured by WSDOT; in the TriMet Design Criteria (Revision 10.2, January 2010) on contracts procured by TriMet; and in the ODOT Construction Manual (June 2012) and Manual of Field Test Procedures (2010 Update) on contracts procured by ODOT. Requirements for materials are described in Section 1-06 and Division 9 of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction (M 41-10).

The construction contractor will have primary responsibility for testing of materials, where required by the governing agency. The construction contractor is to prepare and submit a QMP that includes a testing plan that contains a list of tests that reference each specification section, where required by the contract or governing agency. It is anticipated that the construction contractor will obtain the services of an independent materials testing laboratory to actually perform the materials QC tests. Laboratory qualifications will also be submitted as part of the QMP. The construction contractor will submit the results of QC tests to the Project Engineer (Resident Engineer). The Project Engineer's (Resident Engineer's) office will review and maintain test reports and direct any actions to be taken for nonconforming items.

The CRC Program's agency staff (WSDOT, ODOT, and TriMet) are responsible for verification testing and inspection of prefabricated materials on construction contracts procured by their respective agencies. They will perform QA confidence tests to verify that the construction contractor's QC testing is satisfactory. The Project Engineer (Resident Engineer), the Inspector, or the CRC QA/QC Manager will coordinate QA confidence testing by the CRC Program's agency staff.

16. Construction Administration

16.1 Overview

As described previously under Chapter 8, construction of the CRC Program will be implemented through individual construction contracts administered by WSDOT, ODOT, and TriMet. The agency administering a contract package will follow its procedures and policies for construction administration. The CRC Program will contain a number of contracts related to transit and highway construction; delivery methods are being identified and may be Design-Bid-Build (DBB), Design-Build (DB), Design-Furnish-Install (DFI), or General Contractor/Construction Manager (GC/CM). WSDOT and ODOT have experience in the delivery of highway construction with DBB and DB delivery methods. WSDOT and ODOT have delivered numerous bi-state contracts with past examples of successful coordination with existing structures across state lines. TriMet has extensive experience on the design and delivery of light rail transit contracts by DB, DBB, DFI, and GC/CM delivery methods.

Each section below provides a general overview of contract administration, management, inspection, material testing, third-party coordination, site logistics, changes, claims, claims avoidance, and contract closeout. The Construction Management and Construction Administration Plan (CMAP) provides additional detail (see Appendix D to this PMP). Additional information on the CRC Program staffing and responsibilities can be found in Chapters 2 and 3 of this PMP and in the TCCP (see Appendix A to this PMP).

16.2 Construction Management Services

The construction management function for the CRC Program is designed to maximize safety, quality, and cost-efficiency of all construction activities. Construction management practices will conform to all federal and state regulations, including QA, QC, materials testing, structural and architectural inspection, and compliance with county, state, and federal requirements covering contract procedures and fair employment.

Construction of the CRC Program will be implemented through individual construction contracts administered by WSDOT, ODOT, or TriMet, as appropriate.

As described previously, WSDOT, ODOT, and TriMet are each expected to administer contracts. In cooperation with WSDOT, ODOT, and TriMet, the CRC Program Team will develop special contract provisions necessary to address any conditions, specifications, timing, and coordination issues not normally included in an agency's typical contract documents.

See the CMAP (Appendix D to this PMP) for further details.

16.3 Construction Materials Testing Program

Contract specifications will include standards for materials and corresponding tests to ensure compliance with contract requirements. Qualified personnel will accomplish materials testing

during construction in accordance with approved testing practices and procedures. The construction contractor will have primary responsibility for testing of materials according to WSDOT, ODOT or TriMet specifications.

See the CMAP (Appendix D to this PMP) for further details.

16.4 Construction Inspection

The construction contractor will be responsible for the quality of all work performed by its own employees, as well as by any manufacturers, subcontractors, or suppliers, to meet contract requirements and as detailed in its approved QMP. The construction contractor will develop and submit to the Project Engineer for approval a Quality Plan that addresses all testing requirements, including the type of tests, frequency of tests, minimum qualifications of those performing the tests, and required quality documentation.

The Project Engineer and inspectors will be deployed to ensure that construction QC procedures are in place and effective, ensuring that quality standards are acceptable.

See the CMAP (Appendix D to this PMP) for further details.

16.5 Inspection of Manufactured Items

The CRC Program will likely include procurement of certain manufactured items under the DFI delivery method. Examples include possible procurement of light rail vehicles (LRVs), ticket vending machines, and track. The inspection and QC process will rely heavily on the process established and documented in the manufacturer's Quality Control Plan, which will be a requirement of the contract. Specifications and requirements will be prescribed in the contract documents prepared by the contracting agency in cooperation with the CRC Program Team. Additional information can be found in Section 3 of the PDPP.

If procurement of LRVs is done under the option for the Portland Milwaukie Light Rail Project light rail vehicle contract, existing procedures contained within that contract will be used. All fabrication inspection of construction materials will be performed by the procuring agency, unless otherwise delegated. Items that are inspected and found to meet contract requirements are identified by a tag or stamp. This type of inspection is generally performed at the manufacturing or fabrication plants; however, there are also items that are inspected at the job site.

See the CMAP (Appendix D to this PMP) for further details.

16.6 Construction Management

Management procedures are based on those already in use at WSDOT, ODOT, and TriMet, and new or revised procedures will be developed, as needed. Procedures in place will ensure compatibility and effective management control. For information regarding management control of schedule, budget, change management, and record management, see Chapter 3 of this PMP. For the CRC Program, the contracting agency administering a contract package will follow its construction management procedures and policies.

Before the start of each construction contract within the CRC Program, a Construction Management Plan will be developed to identify the contract team's mission, roles and responsibilities, goals/strategies for success, and project schedule and budget. Each Construction Management Plan will be reviewed and endorsed by Project Team Members, specialty groups, and the CRC Senior Management Team.

See the CMAP (Appendix D to this PMP) for further details regarding:

- Organization
- Federal, state, and local agencies
- Relating to the public
- Safety
- Archaeological and historic objects

16.7 Construction Contract Administration

As described previously, the CRC Program is composed of multiple construction contract packages to be administered by WSDOT, ODOT, or TriMet. A description of the construction contracts for the CRC ICP can be found in Section 3 of the PDPP. For the CRC Program, the agency administering a contract package will follow its procedures and policies. The intent of each agency's procedures and policies is to identify desired results, establish standardized requirements, and provide uniformity in the administration and construction of contracts. The CRC Program staff responsible for work on construction contracts will be familiar with the guidance and instructions included in these manuals. Special contract provisions necessary to address any conditions, and any specification, timing, and coordination issues not normally included in an agency's typical contract documents will be developed by the CRC Program.

See the CMAP (Appendix D to this PMP) for further details regarding:

- Proposal and award of contract
- Project Engineer's relationship and responsibilities
- Construction traffic control
- Application of contract provisions, plans, and specifications
- Contract time
- Enforcement of wage rate requirements
- EEO, Disadvantaged/Minority/Women-Owned Business Enterprise (D/M/WBE), and training requirements
- Control of work

16.8 Coordination with Third Parties

The CRC Program affects or is affected by multiple third-party organizations including, but not limited to, utilities, railroads, airports, river users, parks, a historic reserve, media, private businesses, public facilities, cities, counties, and other public agencies.

Each construction contractor for construction contracts of the CRC Program will be advised about the relationships with third parties and the expectation they hold regarding the actions of both the CRC Program and the construction contractor.

See the CMAP (Appendix D to this PMP) for further details.

16.9 Site Logistics

During the environmental process, it was determined that off-site staging or casting/fabrication areas would likely be needed. The Sundial site and Port of Vancouver Aloca/Evergreen West site have been identified in the FEIS as potential large fabrication yards. One or more of these sites could be temporarily acquired or leased for the ICP. A site may be obtained by the state department of transportation or a contractor.

The contractor may identify staging sites other than those identified by WSDOT or ODOT. If this option were chosen, the contractor would likely be responsible for all necessary improvements to the site. The contractor will seek and obtain permission from the state department of transportation or project owner before the acquisition of that site and its active use. Before permission is given, an environmental evaluation would be necessary.

The five sites identified in the FEIS are:

- Port of Vancouver Parcel 1A
- Red Lion at the Quay Hotel site in Vancouver
- Vacant Thunderbird Hotel site on Hayden Island
- Port of Vancouver Alcoa/Evergreen West site
- Sundial site located between Fairview and Troutdale

Additional information on these sites can be found in Section 3.3.4 of the FEIS.

16.10 Processing Shop Drawings, Working Drawings, and Requests for Information

All shop drawings, working drawings, and supplemental details submitted by the contractor should be checked, in detail, for conformance to all contract requirements before forwarding to the appropriate approving authorities of the contract's administrating agency. Any conflicts with the contract plans that have been detected or revisions that may be desired by the administrating agency should be noted on one copy of the drawings being forwarded for approval. If change

orders to cover any deviation from the contract plans have been issued, or are being processed, those changes should also be noted.

The Request for Information (RFI) is a means by which an individual or contractor can obtain clarification of contract documents from the contracting agency. Depending on the response, a change order may be initiated. Otherwise, the RFI will be considered to be a clarification, with no basis for increased time or cost. The contracting agency will maintain a report of RFIs showing control number, originating organization, a brief description of the issue, received date, and response date.

See the CMAP (Appendix D to this PMP) for further details.

16.11 Claims Avoidance

During the course of a contract, differences of opinion may arise over decisions and plan interpretations that benefit one party at the expense of the other. It is good policy to pursue resolution of these differences at the earliest possible time and to fully recognize all of the contractual rights of the contractor during the resolution process.

See the CMAP (Appendix D to this PMP) for further details regarding:

- Owner/contractor (consultant) relationship
- Claims avoidance guidelines
- Claims management guidelines
- Dispute resolution process
- Disputes
- Claims

16.12 Changes and Claims

Contract change orders are changes to a legal document (the contract) and are themselves legal documents. Once a change order is executed, it becomes part of the contract and cannot be un-executed. The only way to make further modification to a contract is to process another change order.

Section 3.6 of this document outlines the Change Management process. Sections 3.6.3-B through 3.6.3-I of the CRC Project Procedures Manual provide the CRC Program's change order objective, definition, reference documents, work process, and checklists.

During the course of a contract, differences of opinion may arise over decisions and plan interpretations that benefit one party at the expense of the other. Disagreements, disputes, and protests are the responsibility of the Project Engineer until a formal claim is filed. Claims can be filed by the contractor when all other means provided in the contracting agency's standard

specifications have been exhausted to resolve a dispute. Should a claim situation arise, the contractor will submit the required documents and supporting data to the Project Engineer.

See the CMAP (Appendix D to this PMP) for further details.

16.13 Construction Completion/Closeout

Contract completion and closeout is a critical element in the life of a construction project. As the end of each contract approaches, there is the potential for diminished control and attention to detail. The contractor may often transfer key people to other projects and leave insufficient forces to supervise the contract closeout. As the workload diminishes, it must be expected that the number of people on a project will be reduced. What is essential is that there be a clearly defined closeout plan and procedures in place that allow the remaining staff to close out the project efficiently and effectively.

See the CMAP (Appendix D to this PMP) for further details regarding:

- WSDOT-administered contracts
- ODOT-administered contracts
- TriMet-administered contracts

17. LRT System Testing and Start-up

17.1 Overview

The primary goal of the CRC Program system testing and start-up program is a revenue service opening that incorporates the lessons learned and builds upon the successes achieved on previous LRT extension start-ups in the Portland metropolitan area. The CRC Program will leverage TriMet's successful integration of new and existing service on the Metropolitan Area Express (MAX) light rail system on prior extension start-ups including:

- Westside/Hillsboro Light Rail (Blue Line) Extension, September 1998
- Airport Light Rail Extension (Red Line), September 2001
- Interstate Light Rail Extension (Yellow Line), May 2004
- South Corridor Extension (Green Line), September 2009

In each case, start-up culminated over a year or more of ever-intensifying pre-revenue testing, training, and other preparatory activities.

In addition, the 7.3-mile Milwaukie extension is currently under construction from the south terminus of the Green and Yellow Lines on the Portland Mall near Portland State University (PSU) to a Park Avenue terminus south of Milwaukie. That extension is designated as the Orange Line and is scheduled to open in the fall of 2015. Preparations for the start-up of the Orange Line are under way, and start-up activities will commence on or before January 2014.

17.2 System Testing Procedures, Analysis, and Results

This section describes the objectives, methodology, management controls, and major milestones in the conduct of a test program intended to verify the readiness of LRT for revenue operations.

17.2.1 Objectives

Listed below are the objectives of the system testing and start-up program:

- Development and execution of an integrated comprehensive system testing program.
- Verification of contract compliance.
- Validation and demonstration of system performance.
- Verification that the extension performs as an integrated member of an entire system.
- Demonstration of safety, security, and service characteristics.

- Training of TriMet and/or C-TRAN personnel, and integration of personnel, equipment, and procedures into TriMet's overall operations.
- Full collaboration with TriMet and C-TRAN operations.

17.2.2 Types of Tests

Five types of tests will be required under the CRC Program system testing and start-up program. The following definitions include examples to distinguish the general uses of each of these tests.

Qualification or Proof of Design Testing

Proof of design tests are designed to verify that a proposed design can meet the specification requirements. They are usually performed on pre-production units or the first unit of a production run (for example, a substation load test or LRV crash worthiness test). The CRC Program may choose to limit design qualification tests to types and manufacturers of equipment not currently in service in the existing TriMet system.

Manufacturing Tests

Manufacturing tests are a general category of tests that are performed by the contractor and suppliers on a sampling basis or routine basis to verify the quality control and manufacturing process. They usually represent milestones for further assembly or construction activity, or as a prerequisite to the shipping of materials or equipment.

Acceptance Tests

Acceptance tests are performed by the contractors on each individual item, thereby verifying performance at the equipment/subsystem/system level, after installation or assembly. These tests are normally used as advanced milestones for contract progress payment on equipment type contracts. At the system level, these tests require interface with other system elements (for example, vehicle acceptance or ticket vending machine acceptance).

System Tests or Integrated Tests

Systems, or integrated, tests are any test or series of tests that requires the interface of more than one system or civil element and are designed to verify the integration and compatibility among individual elements. These tests are usually beyond the contractual responsibility of any single contractor. They are planned, performed, witnessed, reported, and documented by TriMet and C-TRAN. These tests are generally required as a validation of total system performance. A detailed test plan for each test and the required sequence will be included in the Integrated Test Plan.

Pre-Revenue Testing

Pre-revenue tests utilize the complete functional capabilities of all system elements. Such tests are beyond the contractually required tests of individual contractors; are required to be performed before the introduction of revenue service; and utilize and evaluate representative system schedules, personnel, procedures, and equipment. These tests will begin after system

elements relating to systems operations are complete and accepted. A detailed test plan for each test and the required sequence will be included in the Integrated Test Plan.

17.2.3 Test Management Approach

The management of the test program has been adapted to the organization of the CRC Program and is divided into two categories.

The first category includes proof of design, manufacturing, and acceptance tests. These tests are managed by the contractor, with oversight by the Project Engineer responsible for the contract to which they relate.

The second category of tests—systems integration and pre-revenue tests—is the responsibility of the CRC Test Program Coordinator. Typically, before testing activities begin, the Test Program Coordinator is selected from within the CRC Program's systems engineering team.

The Test Program Coordinator reports to the Systems Manager, who has the duty to implement the overall test plan. During the latter phases of the CRC Program, the tasks of schedule coordination and organization of other facilities or support elements will be the responsibility of the Test Program Coordinator.

There are three major activities in performing both categories of tests:

1. Establish requirements;
2. Perform tests (including remedial measures necessary to achieve successful results); and
3. Report test status, and document and analyze results, noting any discrepancies.

The general approach to the use of TriMet personnel will be to encourage maximum test witnessing as a means of training opportunities, while at the same time avoiding the imposition of contractual obligations and costs. These objectives must be consistent with the assumption of responsibilities relating to various stages of contract acceptance and within the limits of TriMet personnel resources.

Further details on the CRC systems testing program may be found in the Appendix T to this PMP, the LRT System Testing and Start-Up Plan.

17.3 Modifications or Retrofits

During system or pre-revenue testing, necessary changes to various program elements may be identified. Any such change will take the form of a modification or retrofit. Determination of the need for any modifications or retrofits will be based on the results of the system testing and start-up program, will incorporate engineering input and judgment, and must be carefully coordinated with the management of change orders and warranties.

The Project Engineer will negotiate and administer agreement on the scope of and assignment of financial responsibility for modifications and/or retrofits.

17.4 Start-Up Planning

Start-up of the light rail line is an inherently complex process requiring exceptional intra-agency coordination and planning. Anticipated challenges are:

- The construction and integrated testing phases will be nearing completion, a point in the overall process that is often exceptionally time-sensitive and for which few "workarounds" are available to deal with unresolved issues. These will be coordinated through the track access program, with weekly (or more frequently, if necessary) meetings to prioritize access to the alignment for completion of critical activities.

- Additional operations personnel are needed to operate the new line as an extension of the existing light rail line.

- General growth in other transit service areas is needed in order to support growth in rail, fixed-route bus, and paratransit operations well in advance of the commencement of new light rail operations.

Approximately two years before revenue operations, TriMet and C-TRAN will each designate a Start-up Coordinator, who will report to the CRC Systems Manager. The Start-up Coordinators will be responsible for managing the identification, critical path scheduling, coordination, and progress reporting of all activities directly supporting the commencement of revenue operations. Key coordination is required with the Transit Design Manager and Project Delivery Director to manage interfaces. An initial task will involve ensuring that a coordinated training program is implemented.

TriMet and C-TRAN divisions will be involved with CRC Program transit staff during start-up. This includes staff from Rail Transportation, Bus Transportation, Transportation Planning, Safety and Security, Rail Maintenance, Facilities Maintenance, and Marketing and Customer Service.

17.4.1 Start-Up Plan

The Start-up Coordinators will convene a Start-up Steering team to oversee the start-up effort. The first priority of the Start-up Steering team will be to guide the development of a comprehensive Start-up Plan. The plan will outline the procedures and policies necessary to activate and operate the light rail line and the key steps (testing, staffing, training, etc.) and timetable required.

Preparation of the Start-up Plan will be the responsibility of the Start-up Coordinators. It will be based on the successful plan and implementation process used on TriMet's previous start-ups. The plan will be used as a guide during the activation of the rail line and as a reference manual in future operation of the entire route.

The start-up activities program will continue past the date of commencement of revenue operations until all identified open items in the program have been closed.

17.4.2 Start-Up Schedule

The schedule for implementation of the Start-up Plan will be prepared as a separate document, referred to as the "Start-up Schedule." Functional groupings of start-up activities will be represented. Activity groups will include:

- Completion of construction
- Bus/rail service planning
- Operating budgets programming
- Personnel hiring and training
- Maintenance of facilities/equipment
- System safety and security certification
- Systems activation
- Marketing/customer services/community relations activities

CRC Program transit staff will coordinate closely with TriMet and C-TRAN divisions to prepare the sequence and timing of activities in this Start-up Schedule. The stated sequence and timing of events will be followed closely to meet the established date for the start of revenue service.

17.4.3 Start-Up Target Date

An initial target date for start-up of light rail service will be established early in the overall program scheduling. Progress toward this date will be continually evaluated during the testing and start-up phases. The ultimate decision on the start-up date for revenue service will be made by the TriMet General Manager, in consultation with the CRC Directors and C-TRAN, only after assurance of the system's safety and reliability. A fundamental requirement for determining the opening date will be the availability of the entire length of the line, including all line segments, operations facility, vehicles, and system elements for a period of approximately four months for purposes of testing, training, and simulated operation. Depending on the actual segment completion dates, the TriMet General Manager, in consultation with the CRC Directors and C-TRAN, will determine whether certain segments can be operated for either special or demonstration services. Full-revenue rail start-up will be integrated with the existing light rail system and bus service.

17.5 Operations Planning

Rail operations and maintenance plans are described below.

17.5.1 Basic Operating Plan

The basic operating plan for through-line operations, the location of stations, headways required to carry the expected passengers, and other similar information is determined during PE and is set forth in the FEIS.

17.5.2 Rail Activation Plan

The Rail Activation Plan (RAP), consisting of the Start-up Cost Estimate, the Rail Activities Timeline, and the Responsibility Matrix, will define the personnel and training needs required to accomplish the start-up of the CRC light rail line, meeting objectives while maintaining existing service. Changes in the basic operating plan are expected to be made as additional information becomes available regarding ridership levels, vehicle characteristics, legal and regulatory directions, and other factors that may affect the operation.

Rail Transportation team hiring and training needs, organized by time periods, will be set forth in the RAP, including consideration of the continuation of existing service, as well as demands for supporting CRC systems testing and training.

Rail Maintenance and Facilities Maintenance team hiring and training needs, organized by time periods, will be set forth in the RAP. Because of the long lead time for filling skilled-craft positions that require apprenticeship training, hiring efforts for such positions begin from two to four years ahead of start-up. A complete timeline for support to CRC systems testing and for CRC systems training for all involved Rail Maintenance and Facilities Maintenance personnel will also be set forth in the RAP, considering sustainment of all ongoing maintenance activities in continuation of the present service.

17.6 Operations Staffing

Since the CRC light rail line will be physically and operationally an extension of the existing light rail system in Portland, staffing of functions for train operators, maintenance of LRV, and facilities maintenance-of-way will be organized as additions to organizational units within existing TriMet and C-TRAN Operations. Personnel requirements for the start-up and operational phases will be developed as part of the RAP.

17.7 Operations Training

During the start-up phase, an outline of the education and training program for the TriMet and C-TRAN Operations staff will be developed through a combined effort of suppliers, vendors, consultants, and the TriMet/C-TRAN training staff. The training program will ensure that all operations personnel are cross-trained for both existing service and new system components. The training will also reinforce for trainees the importance of the safety of the system to TriMet and C-TRAN staff as well as the public.

TriMet has training programs in place for all rail operations, rail transportation, and maintenance personnel. These training programs will be updated based on recent experience and modified to include any new or unique CRC line features. Specific course requirements, lesson plans, and detailed training materials for the CRC line will be created by TriMet and C-TRAN training staff

with support from the CRC Program engineering staff, equipment suppliers and contractors, and engineering consultants. The training program will be finalized and ready to support the testing and start-up efforts.

Most systems contracts will contain a "train the trainer" program to educate TriMet and C-TRAN supervisory personnel in all details related to the safe operations and maintenance of their respective equipment. Supervisory personnel, initially trained by the contractor, will train other TriMet and C-TRAN personnel who are operating and maintaining equipment related to their disciplines.

Any training provided by contractors or suppliers as requirements of each contract will be the responsibility of that contractor, and coordinated and monitored by the Project Engineer. The training program will include, at a minimum, training manuals and instructor workbooks, and will focus on equipment and components that are new to the TriMet system. TriMet and C-TRAN will be responsible for maintaining and updating the training programs following the completion of initial contractor training.

Further details on the operations and maintenance training program can be found in the LRT System Testing and Start-Up Plan, which is Appendix T to this PMP.

17.8 Spare Parts and Inventory Control

TriMet has established strict procedures for the receipt and storage of all spare parts and material procured, and these procedures will be followed on the CRC Program. The CRC Program's Vehicle Contract Manager and Project Engineer will coordinate timing and location for receiving inspections on all incoming material and supplies. Once spare parts are delivered and accepted, the material will be securely stored and issued in accordance with TriMet inventory procedures.

All capital assets procured by TriMet are controlled and managed in accordance with the Office of Management and Budget requirements. The TriMet parts database provides automated materials management that is capable of tracking receipt of goods, inventory accounting, and procurement forecasting.

17.9 Pre-Revenue Operations

The operational testing program—including simulation of regular operations, emergency drills, and other special situations—will be scheduled well before the start of revenue service.

All TriMet rail transportation and maintenance personnel will participate in the operational testing program. For some tests, TriMet and C-TRAN bus employees will be required. Some of the tests will call upon fire, police, and other emergency responders, as well as state highway and utility personnel. Various operating situations will be simulated, and the adequacy of response relative to system security, safety of people, protection of property, and maintenance of service will be measured.

Pre-revenue testing and simulated revenue operations will be performed in accordance with the requirements specified under Section 17.2, System Testing Procedures, Analysis, and Results, of

this PMP. The CRC Program's Test Program Coordinator and TriMet and C-TRAN operations staff share responsibility for pre-revenue testing.

In analyzing pre-revenue performance and results, several items will be given consideration:

- Notification procedures
- Security coordination
- Central Control response
- Transportation supervisory response
- Maintenance response
- Police/fire/rescue performance
- Power sectionalization
- Performance of re-railing equipment
- Accident investigation procedures
- Simulated bus substitutions ("bus bridging")
- Assumption of authority
- Rescue train or Hi-Rail towing dispatch
- Continuation of service
- Simulated public notification
- Single-tracking performance
- State Safety Oversight (SSO) assessment
- Emergency drills
- Safety and security certification

A baseline start-up schedule will be established based on previous start-up experience and current operations.

17.10 Crossing Order Approvals

The Transit Design Manager will coordinate with state and city agencies, including ODOT's Rail Division and the City of Vancouver, that are responsible for approving and certifying certain safety elements of the LRT system, namely, railroad-type (gates and flashers) grade crossing protection equipment.

17.11 System Opening and Revenue Service

The primary goal of the system testing and start-up program is a revenue service opening that incorporates the lessons learned and builds upon the successes achieved on previous extension start-ups.

The final decision to open the extension for revenue service will be made by the TriMet General Manager in consultation with the CRC Directors and C-TRAN, only after assurance of the system's safety and reliability and all necessary testing and training has been completed. That assurance is made possible by the development, implementation, and management of the system testing and start-up program and cooperation from the many departments within TriMet and C-TRAN, including but not limited to:

- Rail Transportation
- Rail Maintenance
- Capital Projects
- Safety and Security
- Treasury (fare collection)
- Human Resources (hiring and staffing)
- Information Technology
- Grants Administration
- Transportation Planning
- Marketing/Customer Services
- Elderly and Disabled Access
- Bus Operations
- Facilities
- Programs and Communications

In addition, other agencies and groups contribute as partners in completing related improvements and providing oversight throughout the new rail line's progression to start-up. This ongoing collaboration ensures the safe and timely integration of new transit services.

17.12 Operations Description

The proposed 2.9-mile CRC light rail extension will be constructed from the north terminus of the Yellow Line (Interstate MAX) at the Expo Center in North Portland to a new terminus at the Central Park and Ride near Clark College in Vancouver, Washington. This Yellow Line extension is currently anticipated to open in 2019.

A detailed description of the MAX service design, including this CRC Yellow Line extension, can be found in the Operating Plan, which is Appendix U to this PMP.

17.12.1 Routing and Frequencies

A detailed description of the MAX routing and frequencies, including this CRC Yellow Line extension, can be found in the Operating Plan, which is Appendix U to this PMP.

17.12.2 Travel Time and Ridership

A detailed description of the MAX travel time and ridership, including this CRC Yellow Line extension, can be found in the Operating Plan, which is Appendix U to this PMP.

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